DIVISION 14 - CONVEYING SYSTEMS

Section 14000 - General Discussion

Introduction

The size, number, and location of elevators must be addressed at the earliest stages of the design, to ensure that neither the overall function of the facility nor the optimum configuration of elevators is compromised. The size and location of the machine room is similarly critical.

Provide a minimum elevator machine room size of 100 square feet, exclusive of the area above the hoistway (for traction elevators), and without any odd corners, narrow passages or structural interferences.

Consultant shall design elevators to comply with current ASME A117.1, ASME A117.2, UBC and NEC codes.

When new elevators are being installed into existing buildings where elevators do not currently exist (as opposed to elevator modernization) comply with the criteria for new elevators to the most practical degree (extent) possible.

The Consultant is expressly responsible for incorporating these overall requirements into the project, and for ensuring that all sub-consultants are aware of the requirements and incorporate them into their designs as well.

Reliance on "after-the-fact" equipment selections to compensate for a problematic design decision is unacceptable.

Consultant is encouraged to develop the basic building design so that stairs are the naturally preferred mode of vertical travel.

Service elevators shall be located near the loading dock.

Basic Elevator Selection

Hydraulic elevators are generally used in low-rise buildings with two to three floors. Electric traction elevators are generally used in buildings over three stories. Consultant shall coordinate the electrical requirements as well as the code requirements for the pit, overhead clearance, shaft ventilation, pit ladder, light (with switch adjacent to ladder) and electrical duplex 120 VAC outlet in pit, equipment room and phone in cab.

In addition to this general discussion section refer to the following applicable sections:

- Section 14210 – Electric Traction Elevators
- Section 14240 – Hydraulic Elevators
- Section 14440 – Stair Lifts
- Section 16175- Elevator Power and Controls

Fire Alarms and Protection

Provide fire sprinkler heads in elevator shafts and machine rooms, when required by NFPA.

Provide smoke/heat detectors in elevator shafts and machine rooms when required by NFPA.

In addition, provide heat detectors with in 24 inches of each sprinkler head in the elevator shafts and in the machine rooms, which are connected to a shunt trip circuit, which in turn will shut off elevator equipment power prior to the discharge of water from the sprinkler system.

University Checklist

The following checklist is used by the University when reviewing elevator drawings and specifications. The Consultant is encouraged to review this against his specifications to insure completeness at the time of submittal.

Motion Control Engineering Controls	Motion control performance
Modem and connections	ADA phone and make connections
Shunt trip breaker w/ heat detector	GFI breakers on 120 V. circuits, M/R and hoistway
Sump pump in elevator pit	Run phone wires for emergency phone and modem
Fire Service	Vent and cool M/R
Mount controller on M/R wall to prevent vibration	Lockable car light switch in M/R
	Submersible pump on hydraulic pump units
Oil return pump	Duplex receptacle in pit
Pit depth	Pit ladder
Pit stop switch next to ladder	Pit light switch next to ladder
Sump pump in pit	Hoist way overhead clearance
Vent hoistway (unobstructed)	PVC casing around jack assembly
Paint fascia	Emergency light located in car control station
Car control station shall be hinged and swing for easy access	Car position indicator
	Hall position indicator at main lobby only
Hall lanterns (directional arrows)	Tamper resistant fixtures by EPCO
All fixtures illuminated by LED's	Meet ADA requirements (Braille & audible signals)
Stop switch keyed to EPCO-1	Light & fan switches keyed to EPCO-1
Independent service keyed to EPCO-1	Fire service switch keyed to MFD-1
Smoke detectors to be compatible with and tie into building system	Provide emergency access in all hall hoist way doors
	Provide protective cab blankets & hooks
S.S. Handrails	Engrave bldg name and elevator # in car control panel
Squirrel cage fan single speed	GAL door equipment
Photo curtain (Gatekeeper 2000 by Adams)	Nudging
Instruct University	Test equipment
As-built drawing, parts list, instructions (in triplicate)	12 mo. warranty and maintenance w/24 hour coverage at no added cost
Key lock out to be mortised and accept Sargent & Medico cylinders	Verify M/R access, slope ships ladder to be less than 60°
	Fire extinguisher in all machine rooms
Self-closing self-latch machine room Doors	Elevator shutdown (shunt trip)
	Shunt trip control circuits monitored

- Ancillary electrical elevator equipment shall be fed from a separate, solely dedicated, elevator electrical LOAD CENTER. This elevator load center shall only be used for elevator related equipment and devices. It will provide the required means to lockout the equipment for service. Required characteristics of elevator electrical Load center are: surface mounted, copper bus, no door, dead front, 14 inches wide, lockable (lockout) breakers and a maximum size of 12 full size breaker spaces. Additional spaces are authorized only where the number of elevator related loads increases above 12 spaces. Unused breaker spaces shall not have any spare breakers installed. Ancillary elevator equipment to be fed from this panel may be, but is not limited to, the following:

    - Shunt trip control feed
    - Machine room lights/receptacles
    - Elevator car lights
    - Elevator pit lights/GFI receptacle
    - Elevator pit sump pump
    - Machine room A/C
    - Elevator Fan (A/C)
    - Hydraulic oil cooler

- Main electrical elevator feed should employ a molded case shunt trip breaker and a suitably sized enclosure. Larger enclosures for electronic type breakers are to be avoided as they take up too much room in an already cramped service space. Requirements for electrical coordination to be accomplished upstream of the main elevator feed.

Refer to attached pages 14000-3 through 14000-7 for “Construction Guidelines For Elevators” and “Firefighters Service/Shutdown Requirements” presented by The Industrial Commission of Arizona.

ICA/ADOSH-ELEVATOR SECTION – PHOENIX (602) 542-3313 TUCSON (520) 320-4236/4237)

CONSTRUCTION GUIDELINES FOR ELEVATORS

(Per ASME A17.1-2000' Safety Code)

HOISTWAY

1) Rule 2.1.1.1: Provide fully enclosed hoistway as required. (seal all penetrations)
2) Rule 2.1.1.2.2(d): Glass shall be laminated and each piece visibly marked as per ANSI Z.97.1 or 16 CFR Part 1201. (windows are prohibited in hoistways)
3) Rule 2.1.4: Provide hoistway ventilation if more than three floors. The area of the vent shall not be less than 3 ½ % of the area of the hoistway or a minimum of 3 square feet per elevator.
4) Rule 2.1.6.2(b): Projections, ledges, or recesses more than 4 in. wide shall be beveled to 75 degrees.
5) Rule 2.8.1.2: Electrical or mechanical equipment not pertaining to the elevator is prohibited.
6) Rule 2.8.2.4: Pipes conveying gases, vapors, or liquid not pertaining to the elevator is prohibited.
7) Rule 2.8.2.3.1: Sprinkler protection branch lines shall supply sprinklers at not more than one floor. (heat detectors used for shunt-trip operation* must be within 2 ft. radius of each sprinkler head)
8) Rule 2.27.3.2.1(c): Provide smoke detector at the top of the shaft when the hoistway is sprinkled.
9) R4-13-512: The clearance between the car and the hoistway enclosure shall not exceed 18 in.

PIT

1) Rule 2.8.2.4: Pipes conveying gases, vapors, or liquid not pertaining to elevators is prohibited.
2) Rule 2.8.2.3.1: Sprinkler protection branch lines shall supply sprinklers at not more than one floor. (heat detectors used for shunt-trip operation* must be within a 2 ft. radius of each sprinkler head and are not required if the sprinkler head is within 24 inches of the pit floor)
3) Rule 2.2.2: Provide a drain or a sump w/sump pump and cover that is level to the floor. Either means shall have positive means to prevent water, gases, and odors from entering the hoistway
4) Rule 2.2.5: Provide a light (10 fc. min.) with guard, easily accessible light switch, and GFI receptacle.
5) Rule 2.8.2.3.4: If sprinkled; all electrical equipment in the pit, within 48 in. above the pit floor shall be (a) weatherproof (NEMA4); and (b) wiring identified for use in wet locations as req'd in NFPA 70.
6) Rule 2.2.4.2: Provide a ladder or separate pit door for access when required.
7) Rule 2.2.8: Provide a permanent means to access the underside of car if the distance from the pit floor to the underside of the plank channels or slings exceeds 83 inches.
8) N.E.C. 620.24: Provide separate branch circuit for hoistway pit lighting and GFI receptacle.

MACHINE ROOM

1) Rule 2.7.1: Machine rooms and machinery spaces shall have a fire-resistance rating not less than what is required for the hoistway enclosure.
2) Rule 2.7.3: Provide safe, permanent, and convenient access to machine room and machine spaces.
3) Rule 2.7.3.4.1(b): Access doors to machine rooms shall be self-closing and self-locking. (c): be provided with a spring-type lock to permit opening from the inside without a key.
4) Rule 2.7.4.1: Machine rooms shall have a clear headroom of not less than 7 ft.
5) Rule 2.27.3.2.1.(b): Smoke detector required.
6) Rule 2.7.5.1: Provide lighting (19 fc. min.) with bulb protection, light switch, and GFI receptacle.
7) N.E.C. 620.23: Provide separate branch circuit for machine room/ machinery space lighting and GFI receptacle.
8) Rule 2.7.5.2: Provide adequate ventilation to meet the manufacturers' specifications.

1-04

CONSTRUCTION GUIDELINES-PAGE 2

(continued)

9) Rule 2.8.4: Air conditioning equipment shall not be located directly above elevator equipment or electrical equipment. Required condensation drains shall not be located directly above elevator equipment or electrical equipment and not connected directly to a sewer.
10) Rule 2.8.2.3: Only branch sprinkler lines permitted in the machine room. (heat detectors when used for shunt-trip operation* must be within 2 ft. radius of each head)
11) Rule 2.8.2.5: Pipes containing liquid shall not be located above the elevator equipment.
12) N.E.C. 620.51(a): Provide single mainline disconnect lockable in the open position (when the elevator equipment areas are sprinkled- the disconnect shall have shunt-trip operation*). Per N.E.C. 620-91(c): A hydraulic elevator provided with battery lowering requires an auxiliary contact in the mainline disconnect.
13) N.E.C. 620.22: Provide separate branch circuit for the car lights, and car-top GFI receptacle. The overcurrent protection device shall be located in the machine room.
14) N.E.C. 620.53: Provide single means of disconnect for car light source and must be lockable in the open position.
15) Rule 8.6.1.6.5: Provide Class A-B-C fire extinguisher (easily accessible).
16) Rule 2.8.1.1: All wiring must be enclosed in metal conduit (telephone, detectors, etc..).
17) Rule 2.8.1.2: Electrical or mechanical equipment not pertaining to the elevator is prohibited.
18) Rule 2.8.2.4: Pipes conveying gases, vapors, or liquid not pertaining to the elevator is prohibited.
19) Rule 8.9.1&2: Provide code data plate on the controller or mainline disconnect.
20) Rule2.26.1.5.10(c): When provided, machine room inspection operation with open door circuits shall have a means of two-way communication between the interior of car and the machine room.

SECONDARY & OVERHEAD SPACES- (IF APPLICABLE)

1) Rule 2.7.3.4.1(a): Requires access door (29.5" x 29.5"minimum).
2) Rule 2.7.5.1: Provide lighting (19 fc. min.) with bulb protection, light switch, and GFI receptacle.
3) N.E.C. 620.23: Provide separate branch circuit for machine room/ machinery space lighting and receptacle.

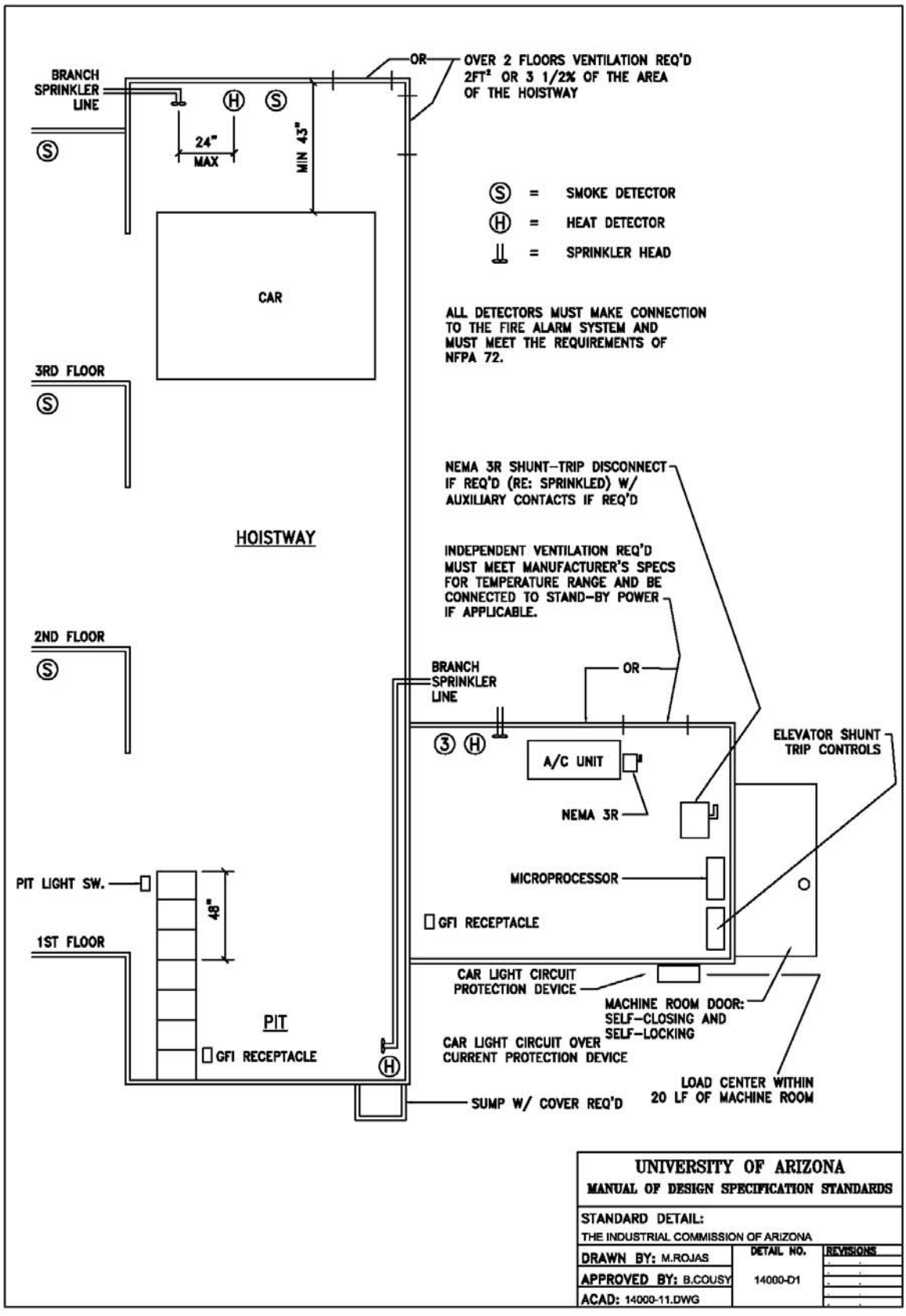
CAR

1) Rule 2.27.1.2: Provide means of two-way conversation to authorized personnel responsible for taking appropriate action (telephone).
2) Rule 2.14.1.8: Glass in cars must be laminated, permanently marked (each piece of glass), and meet ANSI Z97.1 or 16 CFR Part 1201.
3) Rule 2.14.1.5: An emergency exit electrical device shall be provided on the car-top exit cover.
4) Rule 2.14.1.7.1: Provide a handrail on all sides of the car-top when the distance from the car-top to the hoistway enclosure exceeds 12 inches.

GENERAL

1) *Rule 2.8.2.3.2: If sprinkled: Provide means to automatically disconnect the mainline power supply prior to the application of water from sprinklers located in the machine room or shaft. (re: Shunt-trip)
2) Rule 2.27.3: Provide Firefighters' Emergency Operation for all automatic elevators.
3) ALL ELEVATORS SHALL COMPLY WITH NFPA 72. (smoke and heat detectors shall be connected to a fire alarm panel**, give location, be monitored, have secondary power, etc…)
**THE FIRE ALARM PANEL SHALL NOT BE LOCATED IN THE ELEVATOR MACHINE ROOM.

THE ELEVATOR SECTION WILL MANDATE COMPLIANCE WITH THE ABOVE. PRIOR TO AN ELEVATOR INSPECTION ALL DEVICES MUST BE PRE-TESTED FOR CONFORMANCE TO THESE RULES. THIS WILL MINIMIZE DELAYS FOR A CERTIFICATE OF COMPLIANCE.
1-04


BRANCH SPRINKLER LINE
OR
OVER 2 FLOORS VENTILATION REQ'D 2FT² OR 3 1/2% OF THE AREA OF THE HOISTWAY
24" MAX
MIN 43"
Ⓢ = SMOKE DETECTOR
Ⓗ = HEAT DETECTOR
= SPRINKLER HEAD
CAR
ALL DETECTORS MUST MAKE CONNECTION TO THE FIRE ALARM SYSTEM AND MUST MEET THE REQUIREMENTS OF NFPA 72.
3RD FLOOR
NEMA 3R SHUNT-TRIP DISCONNECT IF REQ'D (RE: SPRINKLED) W/ AUXILIARY CONTACTS IF REQ'D
HOISTWAY
INDEPENDENT VENTILATION REQ'D MUST MEET MANUFACTURER'S SPECS FOR TEMPERATURE RANGE AND BE CONNECTED TO STAND-BY POWER IF APPLICABLE.
2ND FLOOR
BRANCH SPRINKLER LINE
OR
A/C UNIT
NEMA 3R
ELEVATOR SHUNT TRIP CONTROLS
MICROPROCESSOR
PIT LIGHT SW.
48"
GFI RECEPTACLE
1ST FLOOR
CAR LIGHT CIRCUIT PROTECTION DEVICE
MACHINE ROOM DOOR: SELF-CLOSING AND SELF-LOCKING
PIT
GFI RECEPTACLE
CAR LIGHT CIRCUIT OVER CURRENT PROTECTION DEVICE
LOAD CENTER WITHIN 20 LF OF MACHINE ROOM
SUMP W/ COVER REQ'D
UNIVERSITY OF ARIZONA
MANUAL OF DESIGN SPECIFICATION STANDARDS
STANDARD DETAIL:
THE INDUSTRIAL COMMISSION OF ARIZONA
DRAWN BY: M.ROJAS
APPROVED BY: B.COUSY
ACAD: 14000-11.DWG
DETAIL NO.
14000-D1
REVISIONS

ICA/ADOSH-ELEVATOR SECTION – PHOENIX (602) 542-3313, TUCSON (520) 320-4236,4237

ELEVATOR SECTION
FIREFIGHTERS' SERVICE / ELEVATOR SHUTDOWN
GENERAL REQUIREMENTS

(Per **ASME A17.1-2000'** and **NFPA 72**-current edition)

General Note:
The following requirements are only a guideline for Firefighters' Service ("elevator recall") and Elevator Shutdown. See the above listed code books for complete requirements. These two operations are separate and work independently of each other. Smoke detectors are used to "recall" an elevator for Firefighters' Service (takes it out of normal service) and heat detectors are used for Elevator Shutdown (main power removal) via the "Shunt-Trip" disconnect.

(A) Fire Alarm Panel requirements:

1) The Fire Alarm Panel shall not be located in the elevator machine room.
2) The Fire Alarm Panel, or where required - "remote annunciator-fire alarm panel", must be located in an area where an alarm will be readily noticed. If that is not possible, the Fire Alarm Panel, wherever its building location, must be remotely monitored.
3) The Fire Alarm Panel and when required - "remote annunciator-fire alarm panel" must identify the type of device activated and its location. Example: "smoke detector - top of elevator shaft (hoistway)"

(B) Detector requirements with no sprinklers in the hoistway or machine room:

1) A smoke detector is required in the elevator machine room. Activation of this device shall recall the elevator to the alternate floor, unless the machine room is remotely located, and must cause the "Fire Hat" light in the elevator car station to flash.
2) Smoke detectors are required in all enclosed (not open to the outside) elevator lobbies. The detector at the designated (egress) floor level must recall the elevator to the alternate floor and all other lobby detectors must recall the elevator to the designated level.
3) No detectors are allowed in the hoistway.

(C) Detector and other requirements with sprinkler in the machine room:

Same requirements as **(B) plus:**

1) Heat detector(s) required and shall be located within 24 inches of each sprinkler head. Heat detector(s), when activated, must "Shunt-Trip" the mainline disconnect before the activation of the any sprinkler head.
2) If at any time, the power source to operate "Shunt-Trip" is not present, the Fire Alarm Panel and required annunciator panels must indicate a supervisory signal for "loss of elevator shunt-trip power".
3) If the mainline disconnect in the machine room is manually turned "off" or its been Shunt-Tripped "off" from a heat detector activation, the Fire Alarm Panel must **NOT** indicate a supervisory signal for "loss of elevator shunt-trip power".

cont'd

(D) Detector and other requirements with sprinkler at the top of the hoistway:
Same requirements as **(B)** number **1)** and **2) plus:**

1) A smoke detector is required at the top of the hoistway. Activation of this device shall recall the elevator to the designated level and must cause the "Fire Hat" light in the elevator car station to flash.
2) A heat detector is required at the top of the hoistway within 24 inches of the sprinkler head. Activation of this device must "Shunt-Trip" the mainline disconnect prior to the activation of the sprinkler head.
3) All electrical equipment within 48 inches of the pit floor must be weatherproof and NEMA 4 rated (must provide protection from the water spray of a sprinkler head).

(E) Detector and other requirements with sprinkler at the bottom of the hoistway:
Same requirements as **(B)** number **1)** and **2) plus:**

1) A smoke detector is required at the top of the hoistway. Activation of this device shall recall the elevator to the designated level and must cause the "Fire Hat" light in the elevator car station to flash.
2) A heat detector is not required in the pit within 24 inches of the sprinkler head **if** the sprinkler head can be located within 24 inches of the pit floor. If the sprinkler head is over 24 inches above the pit floor, a heat detector will be required, and must meet the weatherproof NEMA 4 rating.
3) All electrical equipment within 48 inches of the pit floor must be weatherproof and NEMA 4 rated (must provide protection from the water spray of a sprinkler head).
4) A smoke detector is not advisable in the elevator pit (possibility for false alarms).

(F) Firefighters' Service Indication requirements:

1) Upon activation of any smoke detectors in any affected elevator spaces, or when the affected elevator Phase I Fire Service recall key switch is turned to the "on" position, an indicator light, on or at, the Phase I Fire Service recall key switch located at the designated level shall illuminate to indicate that the affected elevator(s) is on Firefighters' Service. Activation of any affected elevator lobby smoke detector shall illuminate the "Fire Hat" symbol located inside the elevator. Activation from a hoistway or machine room smoke detector shall illuminate a "flashing Fire Hat" symbol inside the elevator.

(G) Hydraulic Elevator Auxiliary (battery) Lowering with a Shunt-Trip disconnect req's:

1) An auxiliary contact on the mainline disconnect must be provided to disable the battery lowering function (elevator cannot move) if the mainline disconnect is manually turned "off" or if it has shunt-tripped "off". Battery lowering can only occur if the normal building power that feeds the mainline disconnect is not present.

(H) Sprinkler Line general requirements:

1) Only branch sprinkler lines are allowed in elevator spaces. Branch lines must terminate once they enter a space. Branch sprinkler lines entering the hoistway must enter only from the floor they are to serve. A branch sprinkler line that enters the hoistway at the first landing to sprinkle the pit, can only sprinkle the pit. The branch sprinkler line for the pit cannot extend up to sprinkle the top of the hoistway. That branch line must enter at the top landing. Branch sprinkler lines entering the hoistway at the top floor to sprinkle the top of the hoistway may not extend to other parts of the building. A branch sprinkler line entering the machine room shall only sprinkle the machine room, or it can be allowed to extend to the hoistway only if it will branch sprinkle at that level.

End of Section 14000