

SECTION 14240

HYDRAULIC ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes hydraulic passenger elevators.
- B. Related Sections include the following:
  - 1. Division 2 Section "Earthwork" for excavation to accommodate plunger-cylinder assembly.
  - 2. Division 3 Section "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
  - 3. Division 4 Section "Unit Masonry" for setting sleeves, inserts, and anchoring devices in masonry.
  - 4. Division 5 Section "Metal Fabrications" for the following:
    - a. Structural-steel shapes for subsills.
    - b. Pit ladders.
  - 5. Division 13 Sections for smoke detectors in elevator lobbies to initiate emergency recall operation and heat detectors in shafts and machine rooms to disconnect power from elevator equipment before sprinkler activation and for connection to elevator controllers.
  - 6. Division 16 Sections for telephone service to elevators.
  - 7. Division 16 Sections for electrical service for elevators to and including fused disconnect switches at machine room door.

1.2 DEFINITIONS

- A. Defective Elevator Work: Operation or control system failures; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; the need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

1.3 SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information.
- B. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals. Indicate variations from specified requirements, maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.

- C. Samples: For exposed finishes of cars, hoistway doors and frames, and signal equipment; 3-inch- (75-mm-) square samples of sheet materials; and 4-inch (100-mm) lengths of running trim members.
- D. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.
- E. Maintenance Manuals: Include operation and maintenance instructions, parts listing with sources indicated, recommended parts inventory listing, emergency instructions, and similar information. Include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel. Submit for Owner's information at Project closeout as specified in Division 1.
- F. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Elevator manufacturer or an experienced installer approved by elevator manufacturer who has completed elevator installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Regulatory Requirements: In addition to local governing regulations, comply with applicable provisions in ASME A17.1, "Safety Code for Elevators and Escalators."
  - 1. Seismic Risk Zone: Project is located in Zone 2.
- C. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10B.
- D. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.
  - 1. Elevators: Provide elevators as required by accessibility regulations and requirements of authorities having jurisdiction. These include, but are not limited to, the following:
    - a. Automatic Operation: Provide self-leveling feature.
    - b. Hall Call Buttons:
      - 1) Center height at 42 inches (1065 mm) above the floor.
      - 2) Provide not less than 3/4 (19 mm) inch diameter button. Place button designating the up direction on top.
    - c. Hall Lanterns: Provide a visible and audible signa at each hoistway entrance to indicate which car is answering a call.
      - 1) Sound audible signal once for the up direction and twice for the down direction.
      - 2) Visible Signals:
        - a) Mount fixture with centerline not less than 72 inches (1830 mm) above the floor.
        - b) Provide smallest dimension of the visual element not less than 2-1/2 inches (64 mm).

- c) Locate signals so they are visible from the vicinity of the hall call buttons.
  - d. Raised and Braille Characters on Hoistway Entrances:
    - 1) Provide raised and braille floor designations on both door jambs.
    - 2) Mount centerline of designations at 60 inches (1525 mm) above the floor.
    - 3) Provide designations that meet the requirements of signage.
  - e. Door Protective and Reopening Device:
    - 1) Provide automatic opening and closing of doors.
    - 2) Provide reopening device that will stop and reopen a car door and hoistway door automatically if the door becomes obstructed by an object or person.
      - a) Provide a device capable of completing these operations without requiring contact for a obstruction passing through the opening at heights of 5 and 29 inches (125 and 735 mm) above finish floor.
      - b) Door reopening devices shall remain effective for at least 20 seconds.
  - f. Door and Signal Timing for Hall Calls: Not less than 5 seconds.
  - g. Door Delay for Car Calls: The minimum time for elevator doors to remain fully open in response to a car call shall be 3 seconds.
  - h. Illumination Levels: Not less than 5 footcandles.
  - i. Car Controls:
    - 1) Buttons: Provide not less than 3/4 (19 mm) inch diameter button.
    - 2) Tactile, Braille and visual Control Indicators: Provide raised and braille characters and numerals.
      - a) Provide a raised star at the left of the floor designation for the main entry floor.
      - b) Locate raised designations to the left of the button to which they apply.
      - c) Provide floor buttons with visual indicators to show when each call is registered. Extinguish the visual indicator when each call is answered.
    - 3) Height: Not higher than 54 inches (1370 mm) above the finish floor. For side approach and 48 inches (1220 mm) for front approach.
      - a) Group emergency controls, including the emergency alarm and emergency stop at the bottom of the panel and locate centerlines not less than 35 inches (890 mm) above the finish floor.
  - j. Car Position Indicators: Provide a visual car indicator above the car control panel or over the door to show the position of the elevator in the hoistway. Illuminate the corresponding numerals and sound an audible signal as the car passes or stops at a floor.
    - 1) Provide numerals not less than 1/2 inch (13 mm) high.
    - 2) Provide an audible signal of not less than 20 decibels with a frequency no higher than 1500 Hz.
  - k. Emergency Communications: Provide emergency two-way communication between the elevator and a point outside the hoistway.
    - 1) Locate the operable part of communication device not less than 48 inches (1220 mm) above the finish floor of the car.
    - 2) Identify device with raised symbol and lettering.
    - 3) If the system uses a handset, then provide a cord from the panel to the handset not less than 29 inches (735 mm) long.
2. Notify Architect of details or specifications not conforming to code.

- E. The elevator installation shall be a design that can be maintainable by any licensed elevator maintenance company employing journeymen mechanics, without the need to purchase or lease additional diagnostic devices, special tools, or instructions from the original equipment manufacturer.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Management and Coordination."

#### 1.5 COORDINATION

- A. Coordinate installation of sleeves, block outs, and items that are embedded in concrete or masonry for elevator equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.
- B. Furnish well casing and coordinate delivery with related excavation work.
- C. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders, sumps, and floor drains in pits; entrance subsills; and electrical service, electrical outlets, lights, and switches in pits and machine rooms.
- D. Coordinate size of elevator pit with manufacturer selected. Provide any necessary revisions to pit or shaft size at no additional cost to the Owner.

#### 1.6 WARRANTY

- A. Special Manufacturer's Warranty: Written warranty, signed by manufacturer agreeing to repair, restore, or replace defective elevator work within specified warranty period.
  - 1. Warranty Period: 12 months from date of Substantial Completion.

#### 1.7 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance service by skilled employees of the elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies as used in the manufacture and installation of original equipment.
  - 1. Perform maintenance, including emergency callback service, during normal working hours.
  - 2. Include 24-hour-per-day, 7-day-per-week emergency callback service.
    - a. Response Time: Two hours or less.
- B. Continuing Maintenance Proposal: Provide a continuing maintenance proposal from Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering hydraulic elevators that may be incorporated into the Work include, but are not limited to, the following:
1. Canton Elevator Co.
  2. Otis Elevator Co.
  3. ThyssenKrupp Elevator.

### 2.2 MATERIALS AND COMPONENTS

- A. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components, published by manufacturer as included in standard preengineered elevator systems and as required for a complete system.
- B. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations. Provide either of the following:
1. Submersible pump, with submersible squirrel-cage induction motor, suspended inside tank from vibration isolation mounts.
  2. Provide motor with solid-state starting.
  3. Provide motor with circuit requirements to match indicated power circuits provided or include cost for revisions to electrical design.
  4. Provide variable-voltage variable-frequency motor control.
- C. Hydraulic Silencers: Provide hydraulic silencer containing pulsation-absorbing material in a blowout-proof housing at pump unit.
- D. Piping: Provide size, type, and weight piping recommended by manufacturer, and provide flexible connectors to minimize sound and vibration transmissions from power unit.
1. Provide dielectric couplings at plunger/cylinder units.
  2. Casing for Underground Piping: PVC pipe complying with ASTM D 1785 joined with PVC fittings complying with ASTM D 2466 and solvent cement complying with ASTM D 2564.
- E. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Specification Section.
- F. Protective Cylinder Casings: Schedule 40 PVC pipe casings complying with ASME A17.1, of sufficient size to provide not less than 1-inch (25-mm) clearance from cylinder, and extending above pit floor.
- G. Guide Rails: Manufacturer's standard, selected for loads and for full height span between support locations indicated by building structural design.
- H. Car Frame and Platform: Welded steel units.

- I. Finish Materials: Provide the following materials and finishes for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated:
  - 1. Satin Stainless Steel: ASTM A 666, Type 304, with No. 4, directional satin finish.
  - 2. Enameled-Steel Sheet: Cold-rolled steel sheet complying with ASTM A 366/A 366M, matte finish, stretcher-leveled standard of flatness; hot-rolled steel sheet complying with ASTM A 569/A 569M may be used for door frames. Provide with factory-applied enamel finish; colors as selected by Architect.
  - 3. Plastic Laminate: High-pressure type complying with NEMA LD 3, Type HGS for flat applications; color, texture, and pattern as selected by Architect from plastic-laminate manufacturer's full range of products.

## 2.3 OPERATION SYSTEMS

- A. Passenger Elevators: Provide manufacturer's standard microprocessor operation system for each elevator or group of elevators as required to provide type of operation system indicated.
  - 1. Single Elevator: Provide "automatic operation" as defined in ASME A17.1.
- B. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated.
  - 1. Independent Service: Keyswitch in car control station removes car from group operation and allows it to respond only to car calls. Key cannot be removed from keyswitch when car is in independent service. When in independent service, doors close only in response to the door close button.

## 2.4 SIGNAL EQUIPMENT

- A. General: Provide signal equipment for each elevator or group of elevators with hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements of acrylic or other permanent, nonyellowing translucent plastic.
- B. Car Control Stations: Provide manufacturer's standard semirecessed car control stations. Mount in return panel adjacent to car door, if not otherwise indicated.
  - 1. Include call buttons for each landing served and other buttons, switches, and controls required for specified car operation.
  - 2. Mark buttons and switches with manufacturer's standard identification for required use or function that complies with ASME A17.1.
  - 3. Mount controls at heights complying with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)."
- C. Emergency Communication System: Provide system that complies with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)." On activation, system dials preprogrammed number of monitoring station and identifies elevator location to monitoring station. System provides two-way voice communication without using a handset and provides visible signals that indicate when system has been activated and when monitoring station has responded. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.

- D. Car Position Indicator: For passenger elevator cars, provide illuminated-signal type, digital-display type, or segmented type, located above car door or above car control station. Also provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.
  - 1. Include travel direction arrows if not provided in car control station.
- E. Hall Push-Button Stations: Provide one hall push-button station at each landing for each elevator or group of elevators, but not less than one station for each four elevators in a group. For each group of passenger elevators, locate between two elevators at center of group or at location most convenient for approaching passengers.
  - 1. Provide units with flat faceplate for mounting with body of unit recessed in wall.
- F. Hall Lanterns: Provide units with illuminated arrows, but provide single arrow at terminal landings.
  - 1. Place lanterns either above or beside each hoistway entrance, unless otherwise indicated. Mount at a minimum of 72 inches (1829 mm) above finished floor.
  - 2. With each lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.
    - a. At manufacturer's option, audible signals may be placed on each car.
- G. Hall Position Indicators: Provide illuminated-signal type or digital-display type, located above each hoistway entrance at ground floor. Provide units with flat faceplate for mounting with body of unit recessed in wall.
  - 1. Integrate ground-floor hall lanterns with hall position indicators.
- H. Corridor Call Station Pictograph Signs: Provide signs matching hall push-button stations with text and graphics according to ASME A17.1, Appendix H.

## 2.5 DOOR REOPENING DEVICES

- A. Infrared Array: Provide door reopening devices with a uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams shall cause doors to stop and reopen.

## 2.6 PASSENGER ELEVATOR CAR ENCLOSURES

- A. General: Provide manufacturer's standard steel-framed car enclosures with nonremovable wall panels, suspended ceiling, trim, accessories, access doors, doors, power door operators, sills (thresholds), lighting, and ventilation.
  - 1. Floor finish is specified in another Section.
  - 2. Plastic-Laminate Wall Panels: Plastic laminate adhesively applied to 1/2-inch (13-mm) fire-retardant-treated particleboard with manufacturer's standard protective edge trim. Panels have a flame-spread rating of 25 or less, when tested according to ASTM E 84.
  - 3. Fabricate car with recesses and cutouts for signal equipment.
  - 4. Fabricate car door frame integrally with front wall of car.
  - 5. Stainless-Steel Doors: Flush, hollow-metal construction, fabricated from stainless steel.
  - 6. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick. Provide polished finish.

7. Luminous Ceiling: Fluorescent light fixtures and ceiling panels of translucent acrylic or other permanent rigid plastic complying with flammability requirements.
8. Handrails: Manufacturer's standard handrails, of metal indicated.

## 2.7 PASSENGER HOISTWAY ENTRANCES

- A. General: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.
- B. Materials and Fabrication: Provide manufacturer's standards but not less than the following:
  1. Stainless-Steel Frames: Formed stainless-steel sheet.
  2. Stainless-Steel Doors: Flush, hollow-metal construction, fabricated from stainless steel.
  3. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick. Provide polished finish.
  4. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

## 2.8 PASSENGER ELEVATORS

- A. Elevator, Building 1:
  1. Type: Under-the-car single cylinder.
  2. Rated Load: 2500 lb (1135 kg).
  3. Rated Speed: 125 fpm (0.64 m/s)
  4. Number of Stops: 4
  5. Front Openings: 4
  6. Rear Openings: 1
  7. Operation System: Selective collective automatic operation.
  8. Auxiliary Operations:
    - a. Independent service.
  9. Car Enclosures: As follows:
    - a. Inside Width: Manufacturers standard.
    - b. Inside Depth: Manufacturers standard.
    - c. Inside Height: Manufacturers standard.
    - d. Front Walls: Satin stainless steel with integral car door frames.
    - e. Car Fixtures: Satin stainless steel.
    - f. Side and Rear Wall Panels: Plastic laminate.
    - g. Reveals: Enameled steel.
    - h. Door Faces (Interior): Satin stainless steel.
    - i. Door Sills: Aluminum.
    - j. Ceiling: Luminous ceiling.
    - k. Handrails: Satin stainless steel, at side and rear walls.
    - l. Floor prepared to receive floor finish as specified.
  10. Hoistway Entrances: As follows:
    - a. Width: 36 inches (914 mm).
    - b. Height: 84 inches (2134 mm).
    - c. Type: Single-speed side sliding.
    - d. Frames: Satin stainless steel.
    - e. Doors: Satin stainless steel.



- f. Sills: Aluminum.
  - 11. Hall Fixtures: Satin stainless steel.
  - 12. Additional Requirements: As follows:
    - a. Provide inspection certificate in each car, mounted under acrylic cover with satin stainless-steel frame.
    - b. Provide protective blanket hooks in car and one complete set of full-height blankets.
  - 13. Electrical Requirements:
    - a. 30 hp.
- B. Elevator, Building 2:
- 1. Type: Under-the-car single cylinder.
  - 2. Rated Load: 2500 lb (1135 kg).
  - 3. Rated Speed: 125 fpm (0.64 m/s)
  - 4. Number of Stops: 5
  - 5. Front Openings: 4
  - 6. Rear Openings: 1
  - 7. Operation System: Selective collective automatic operation.
  - 8. Auxiliary Operations:
    - a. Independent service.
  - 9. Car Enclosures: As follows:
    - a. Inside Width: Manufacturers standard.
    - b. Inside Depth: Manufacturers standard.
    - c. Inside Height: Manufacturers standard.
    - d. Front Walls: Satin stainless steel with integral car door frames.
    - e. Car Fixtures: Satin stainless steel.
    - f. Side and Rear Wall Panels: Plastic laminate.
    - g. Reveals: Enameled steel.
    - h. Door Faces (Interior): Satin stainless steel.
    - i. Door Sills: Aluminum.
    - j. Ceiling: Luminous ceiling.
    - k. Handrails: Satin stainless steel, at side and rear walls.
    - l. Floor prepared to receive floor finish as specified.
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    - b. Height: 84 inches (2134 mm).
    - c. Type: Single-speed side sliding.
    - d. Frames: Satin stainless steel.
    - e. Doors: Satin stainless steel.
    - f. Sills: Aluminum.
  - 11. Hall Fixtures: Satin stainless steel.
  - 12. Additional Requirements: As follows:
    - a. Provide inspection certificate in each car, mounted under acrylic cover with satin stainless-steel frame.
    - b. Provide protective blanket hooks in car and one complete set of full-height blankets.
  - 13. Electrical Requirements:
    - a. 30 hp.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Verify critical dimensions, and examine supporting structure and other conditions under which elevator work is to be installed. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Excavation for Jack: Drill excavation in each elevator pit to accommodate installation of cylinders; comply with applicable requirements in Division 2 Section "Earthwork."
  - 1. Provide well casings as necessary to retain walls of well hole.
- B. Install cylinders in protective casings within well hole or casing. Before installing protective casing, remove water and debris from well hole or casing. Fill void space between protective casing and cylinder with fine sand.
  - 1. Align cylinders and fill space between well casing and protective casing with fine sand.
- C. Jack Protection:
  - 1. Prior to insertion of the jack unit in the jack hole, a recognized brand of corrosion-resisting tape shall be applied to the jack casing.
  - 2. This tape shall be spirally applied with a minimum overlap of 2".
  - 3. Special care shall be exercised until the jack is set to minimize damage to the tape.
- D. Install cylinders plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor. Seal between protective casing and pit floor with 4 inches (100 mm) of nonshrink, nonmetallic grout.
  - 1. Provide waterstop collar on the outside of the earth casing to seal the casing to the pit floor.
  - 2. Provide waterstop collar to seal between the earth casing and the jack unit.
- E. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- F. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to effectively prevent transmission of vibrations to structure and thereby eliminate sources of structure-borne noise from elevator system.
- G. Install piping above the floor, where possible. Where not possible, install underground piping in Schedule 40 PVC pipe casing assembled with solvent-cement fittings.
- H. Lubricate operating parts of systems as recommended by manufacturers.
- I. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay installation of sills

and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

- J. Leveling Tolerance: 1/4 inch (6 mm), up or down, regardless of load and direction of travel.
- K. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

### 3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.
- B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on elevators.

### 3.4 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of operational failure and other building emergencies. Train Owner's personnel in procedures to follow in identifying sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program.
- B. Make a final check of each elevator operation with Owner's personnel present and before date of Substantial Completion. Determine that operation systems and devices are functioning properly.

### 3.5 PROTECTION

- A. Temporary Use: Do not use elevators for construction purposes unless cars are provided with temporary enclosures, either within finished cars or in place of finished cars, to protect finishes from damage.
  - 1. Provide full maintenance service by skilled, competent employees of elevator Installer for elevators used for construction purposes. Include preventive 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 same parts and supplies as used in the manufacture and installation of original equipment.
  - 2. Provide protective coverings, barriers, devices, signs, and other procedures to protect elevators. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so that no evidence remains of correction 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.

END OF SECTION