

SECTION 14 24 00**HYDRAULIC ELEVATOR - NEW**

SPEC WRITER NOTE: Delete between //__// and paragraph content not applicable to project and write "not used" after title.

PART 1 - GENERAL**1.1 DESCRIPTION**

- A. This section specifies the engineering, furnishing and installation of the complete hydraulic elevator system as described herein and as indicated on the contract drawings.
- B. Items listed in the singular apply to each elevator in this specification except where noted.

SPEC WRITER NOTE: Edit or delete Subparagraphs C, D and E to suit the project. Add elevator schedules as needed.

- C. Passenger Elevator P__ must be oil hydraulic, microprocessor control system and power-operated car and hoistway doors. Elevator must be Class "A" loading rated as a minimum.
- D. Service/Passenger Elevator S__ must be oil hydraulic, microprocessor control system and power operated car and hoistway doors. Elevator must be Class "C3" loading rated as a minimum.
- E. Freight Elevator F__ must be oil hydraulic, microprocessor control system and power operated vertical bi parting hoistway doors and vertical sliding car gate. Elevator must be Class "C1" loading rated as a minimum.

ELEVATOR SCHEDULE	
Elevator Number	
Overall Platform Size	
Clear Inside Platform	
Rated Load - kg (lb)	
Contract Speed - m/s (fpm)	
Total Travel - m (ft)	
Floors Served	
Number of Openings	

ELEVATOR SCHEDULE	
Entrance Type & Size	
Plunger Size	

1.2 RELATED WORK

- A. Section 01 33 23 SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS.
- B. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire-rated construction.
- C. SECTION 09 06 00, SCHEDULE FOR FINISHES: As a master format for construction projects, to identify interior and exterior material finishes for type, texture, patterns, color and placement.
- D. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Requirements for seismic restraint of non-structural components.
- E. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section.
- F. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low Voltage power and lighting wiring.
- G. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- H. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for cables and wiring.
- I. Section 26 05 73, OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY: Requirements for installing the over-current protective devices to ensure proper equipment and personnel protection.
- J. Section 26 22 00, LOW-VOLTAGE TRANSFORMERS: Low voltage transformers.
- K. Section 26 24 16, PANELBOARDS: Low voltage panelboards.
- L. Section 26 43 13, TRANSIENT-VOLTAGE SURGE SUPPRESSION: Surge suppressors installed in panelboards.
- M. Section 26 51 00, INTERIOR LIGHTING: Fixture and ballast type for interior lighting.

1.3 QUALIFICATIONS

- A. Approval by the Contracting Officer is required for products and services of proposed manufacturers, suppliers, installers and must be

contingent upon submission of certificates by the Contractor stating the following:

1. Elevator contractor is currently and regularly engaged in the installation of elevator equipment as one of his principal products.
 2. Elevator contractor must have five (5) years of successful experience, trained supervisory personnel and facilities to install elevator equipment specified herein.
 3. Elevator Mechanic (Installer) must have passed a Mechanic Examination approved by the U.S. Department of Labor and have technical qualifications of at least five years of experience in the elevator industry or 10,000 hours of field experience working in the elevator industry with technical update training. Apprentices must be actively pursuing Certified Elevator Mechanic status. Certification must be submitted for all workers employed in this capacity.
- B. Welding at the project site must be performed by certified welders who have previously qualified by test as prescribed in American Welding Society Publications AWS D1.1 to perform the type of work required. Certificates must be submitted for all workers employed in this capacity. A welding or hot work permit is required for each day and must be obtained from the VAMC safety department. Request permit one day in advance.
- C. Electrical work must be performed by a Licensed Master Electrician and Licensed Journeymen Electricians as requirements by NEC. Certificates must be submitted for all workers employed in this capacity.
- D. Approval must not be given to elevator contractors and manufacturers who have established on prior projects, either government, municipal, or commercial, a record of unsatisfactory elevator installations, have failed to complete awarded contracts within the contract period and do not have the requisite record of satisfactory performing elevator installations of similar type and magnitude.
- E. Approval of Elevator Contractor's equipment must be contingent upon their providing factory training, engineering and technical support, including all manuals, wiring diagrams and tools necessary for adjusting, maintenance, repair and testing of equipment to the VA for use by the VA's designated Elevator Maintenance Service Provider.
- F. Identifying an elevator maintenance service provider that must render services within // one hour // two hours // of receipt of notification,

together with certification that the quantity and quality of replacement parts stock is sufficient to warranty continued operation of the elevator installation.

- G. Equipment within a group of hydraulic elevators must be the product of the same manufacturer.
- H. The Contractor must provide and install safety devices that have been subjected to tests witnessed and certified by an independent professional testing laboratory that is not a subsidiary of the firm that manufactures supplies or installs the equipment.

1.4 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification. Elevator installation , meet the requirements of the latest editions published and adopted by the United States Department of Veterans Affairs on the date contract is signed.
- B. Federal Specifications (Fed. Spec.):
 - J-C-30B - Cable and Wire, Electrical (Power, Fixed Installation)
 - J-C-580 - Cord, Flexible and Wire, Fixture
 - W-S-610 - Splice Connectors
 - W-C-596F - Connector, Plug, Electrical; Connector, Receptacle, Electrical
 - W-F-406E - Fittings for Cable, Power, Electrical and Conduit, Metal, Flexible
 - HH-I-558C - Insulation, Blankets, Thermal (Mineral Fiber, Industrial Type)
 - W-F-408E - Fittings for Conduit, Metal, Rigid (Thick-Wall and Thin-wall EMT Type)
 - RR-W-410 - Wire Rope and Strand
 - TT-E-489J - Enamel, Alkyd, Gloss, Low VOC Content
 - QQ-S-766 - Steel, Stainless and Heat Resisting, Alloys, Plate, Sheet and Strip
- C. American Society of Mechanical Engineers (ASME):
 - A17.1 - Safety Code for Elevators and Escalators
 - A17.2 - Inspectors Manual for Electric Elevators and Escalators
- D. National Fire Protection Association:
 - NFPA 13 - Standard for the Installation of Sprinkler Systems
 - NFPA 70 - National Electrical Code (NEC)
 - NFPA 72 - National Fire Alarm and Signaling Code
 - NFPA 101 - Life Safety Code

- NFPA 252 - Fire Test of Door Assemblies
- E. International Building Code (IBC)
- F. American Society for Testing and Materials (ASTM):
 A1008/A1008M-09 - Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High Strength Low-Alloy with Improved Formability
 E1042-02 - Acoustically Absorptive Materials Applied by Trowel or Spray
- G. Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS):
 SP-58 - Pipe Hangers and Supports
- H. Society of Automotive Engineers, Inc. (SAE):
 J517-91 - Hydraulic Hose, Standard
- I. Gages:
 For Sheet and Plate: U.S. Standard (USS)
 For Wires: American Wire Gauge (AWG)
- J. American Welding Society (AWS):
 D1.1 - Structured Welding Code - Steel
- K. National Electrical Manufacturers Association (NEMA):
 LD-3 - High-Pressure Decorative Laminates
- L. Underwriter's Laboratories (UL):
 486A - Safety Wire Connectors for Copper Conductors
 797 - Safety Electrical Metallic Tubing
- M. Institute of Electrical and Electronic Engineers (IEEE)
- N. Regulatory Standards:
 VA Barrier Free Design Handbook H-18-13
 VA Seismic Design Manual H-18-8
 Uniform Federal Accessibility Standards
- O. National Elevator Industry, Inc.
 NEII-1 Building Transportation Standards and Guidelines

SPEC WRITER NOTE: Edit section 1.5 to meet project requirement.

1.5 SUBMITTALS

- A. Submit in accordance with Specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA and SAMPLES.
- B. Before execution of work, furnish information to evidence full compliance with contract requirements for proposed items. Such information must include, as required: Manufacturer's Name, Trade Names, Model or Catalog Number, Nameplate Data (size, capacity and

rating) and corresponding specification reference (Federal or project specification number and paragraph). All submitted drawings and related elevator material must be forwarded to the Contracting Officer.

C. Shop Drawings:

1. Complete scaled and dimensioned layout in plan and section view showing the arrangement of equipment and all details of each elevator unit specified including:
 - a. Complete layout showing location of storage tank/pump assembly, controller, piping layout, outside diameter of cylinder/plunger assembly, size of car platform, car frame members and support assembly.
 - b. Car, guide rails, brackets, buffers and other components located in hoistway.
 - c. Rail bracket spacing and maximum vertical forces on guide rails in accordance with H-18-8 for Seismic Risk Zone 2 or greater.
 - d. Reaction at points of support and buffer impact loads.
 - e. Weight of principal parts.
 - f. Top and bottom clearances and over travel of the car.
 - g. Location of main line switch/shunt trip circuit breaker, switchboard panel, light switch and feeder extension points in the machine room.
2. Drawings of hoistway entrances and doors showing details of construction and method of fastening to the structural members of the building.
 - a. If drywall construction is used to enclose hoistway, submit details of interface fastenings between entrance frames and drywall.
 - b. Sill details including sill support.

D. Samples:

1. One each of stainless steel, 76 mm x 127 mm (3 in. x 5 in.).
2. One each of baked enamel, 76 mm x 127 mm (3 in. x 5 in.).
3. One each of color floor covering.
4. One each of protection pads, 76 mm x 127 mm (3 in. x 5 in.) if used.
5. One each car and hoistway Braille plate sample.
6. One each car and hall button sample.
7. One each car and hall lantern/position indicator sample.
8. One each wall and ceiling material finish sample.
9. One each car lighting sample.

- E. Name of manufacturer, type or style designation and applicable data of the following equipment must be shown on the elevator layouts:
1. Storage tank/pump assembly.
 2. Pump and motor, HP and RPM rating, Voltage, Starting and Full Load Ampere, Number of phases and Gallons per minute.
 3. Controller.
 4. Starters and Overload Current Protection Devices.
 5. Car Safety Device; Rupture Valve and Manual Shut Off Valves.
 6. Electric Door Operator; HP, RPM, Voltage and Ampere rating of motor.
 7. Hoistway Door Interlocks.
 8. Car Buffers; maximum and minimum rated load, maximum rated striking speed and stroke.
 9. Cab Ventilation Unit; HP rating and CFM rating.
- F. Complete construction drawings of elevator car enclosure, showing dimensioned details of construction, fastenings to platform, car lighting, ventilation, ceiling framing, top exits and location of car equipment.
- G. Complete dimensioned detail of vibration isolating foundations for storage tank/pump assembly.
- H. Dimensioned drawings showing details of:
1. All signal and operating fixtures.
 2. Car slide guides/roller guides.
 3. Hoistway door tracks, hangers and sills.
 4. Door operator, infrared curtain units.
- I. Cut sheets or drawings showing details of controllers and supervisory panels.
- J. Furnish certificates as required under: Paragraph "QUALIFICATIONS".

1.6 WIRING DIAGRAMS

- A Provide three complete sets of paper and one electronic set of field wiring and straight-line wiring diagrams showing all electrical circuits in the hoistway, machine room and fixtures. Install one set coated with an approved plastic sealer and mounted in the elevator machine room as directed by the Resident Engineer/Contracting Officer or authorized representative.
- B. In the event field modifications are necessary during installation, diagrams must be revised to include all corrections made prior to and during the final inspection. Corrected diagrams must be delivered to

the Resident Engineer/Contracting Officer within thirty (30) days of final acceptance.

- C. Provide the following information relating to the specific type of microprocessor controls installed:
 - 1. Owner's information manual, containing job specific data on major components, maintenance and adjustment.
 - 2. System logic description.
 - 3. Complete wiring diagrams needed for field troubleshooting, adjustment, repair and replacement of components. Diagrams must be base diagrams, containing all changes and additions made to the equipment during the design and construction period.
 - 4. Changes made during the construction and warranty period **must** be noted on the drawings in adequate time to have the finalized drawings reproduced for mounting in the machine room no later than six months prior to the expiration of the warranty period.

1.7 PERFORMANCE STANDARDS

- A. The elevators must meet the highest standards of the industry and specifically the following:
 - 1. Contract speed is high speed in either direction of travel with rated capacity load in the elevator. Speed variation under all load conditions, regardless of direction of travel, must not vary more than three (3) percent.
 - 2. The controlled rate of change of acceleration and retardation of the car must not exceed 0.1G per ft/s/s and the maximum acceleration and retardation must not exceed 0.2G per ft/s/s.
 - 3. Starting, stopping and leveling must be smooth and comfortable without appreciable steps of acceleration and deceleration.
- B. Passenger/Service door operators must open the car door and hoistway door at 76.2 cm (2.5 ft) per second and close at 30.5 cm (1 ft) per second.
Freight door operators must open and close at 30.5 cm (1 ft) per second.
- C. Pressure: Fluid system components must be designed and factory tested for 500 psi operating pressure.
- D. Floor level stopping accuracy must be within 3 mm (.125 in.) above or below the floor, regardless of load condition.
- E. Noise and Vibration Isolation: All elevator equipment including their supports and fastenings to the building, must be mechanically and

electrically isolated from the building structure to minimize objectionable noise and vibration transmission to car, building structure, or adjacent occupied areas of building.

- F. Sound Isolation: Noise level relating to elevator equipment operation in machine room must not exceed 80 decibels. All db readings must be taken three (3) feet off the floor and three (3) feet from equipment.
- G. Airborne Noise: Measured noise level of elevator equipment during operation must not exceed 50 decibels in elevator lobbies and 60 decibels inside car under any condition including door operation and car ventilation exhaust blower on its highest speed.

1.8 WARRANTY

- A. Submit all labor and materials furnished regarding elevator system and installation to terms of "Warranty of Construction" articles of FAR clause 52.246-21. The One-Year Warranty and Guarantee Period of Service must commence and run concurrent after final inspection, completion of performance test and upon acceptance of each elevator.
- B. During warranty period if a device is not functioning properly in accordance with specification requirements, more maintenance than the contract requires keeping device operational, device must be removed and a new device meeting all requirements must be installed as part of work until satisfactory operation of installation is obtained. Period of warranty must start anew for such parts from date of completion of each new installation performed, in accordance with foregoing requirements.

1.9 POWER SUPPLY

- A. Power supply requirements in each machine room, see Specification 26 05 19, Electrical specifications and Electrical drawings.
- B. Main Line Fused Disconnect Switch/Shunt Trip Circuit Breaker for each controller must be located inside the machine room at the strike jamb side of the machine room door and lockable in the "Off" position.
- C. Provide Surge Suppressors to protect the elevator equipment.

1.10 EMERGENCY POWER SUPPLY

- A. Emergency power supply, its starting means, transfer switch for transfer of elevator supply from normal to emergency power, two pair of conductors in a conduit from an auxiliary contact on the transfer switch (open or close contacts as required by Elevator Controller Manufacturer) to terminals in the group elevator controller and other related work must be provided by the Electrical Contractor.

- B. Upon loss of normal power supply there must be a delay before transferring to emergency power of 10 seconds minimum to 45 seconds maximum, the delay must be accomplished through an adjustable timing device.
- C. Prior to the return of normal power an adjustable timed circuit must be activated that will cause all cars to remain at a floor if already there or stop and remain at the next floor if in flight. Actual transfer of power from emergency power to normal building power must take place after all cars are stopped at a floor with their doors open.
- D. Car lighting circuits must be connected to the emergency power panel.

1.11 ELEVATOR MACHINE ROOM

- A. Provide a machine room that meets the requirements of ASME A17.1, NEC, NFPA and IBC. The elevator drive machine and elevator controller must be in the same code approved machine room.
- B. Provide stairs and landing for access to the machine room. The landing must be large enough to accommodate full opening of the door plus 61 cm (24 in.).
- C. Locate the shunt trip breaker/main line disconnect and machine room light switch on the lock side of the door inside the machine room.
- D. Locate sprinkler pipes to provide 213.3 cm (7 ft) head clearance. Do not locate sprinkler heads, heat detectors and smoke detectors directly over elevator equipment.

1.12 HOISTWAY LIGHTING

- A. Provide lighting throughout the entire hoistway with 3-way switches at the top and bottom of the hoistway accessible from elevator hoistway entrance prior to entering the pit or stepping onto the car top.
- B. Lighting must illuminate top of elevator cab when it is at the top floor and the pit when at the bottom floor.

1.13 TOOL CABINET

- A. Provide a metal parts/tool cabinet, having two shelves and hinged doors. Cabinet must be 1219 mm (48 in.) high, 762 mm (30 in.) wide and 457 mm (18 in.) deep.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Where stainless steel is specified, it must be corrosion resisting steel complying with Fed. Spec. QQ-S-766, Class 302 or 304, Condition A with Number 4 finish on exposed surfaces. Stainless steel must have the grain of belting in the direction of the longest dimension and surfaces

must be smooth and without waves. During installation stainless steel surfaces must be protected with a suitable material.

- B. Where cold rolled steel is specified it must be low-carbon steel rolled to stretcher level standard flatness, complying with ASTM A109.

2.2 MANUFACTURED PRODUCTS

- A. Materials, devices and equipment furnished must be of current production by manufacturers regularly engaged in the manufacture of such items. The elevator equipment, including controllers, door operators and supervisory system must be the product of manufacturers of established reputation, provided such items are capably engineered and produced under coordinated specifications to ensure compatibility with the total operating system.
- B. Manufacturers of equipment assemblies which include components made by others must assume complete responsibility for the final assembled unit. Components must be compatible with each other and with the total assembly for the intended service.
- C. Mixing of manufactures related to a single system or group of components must be identified in the submittals.
- D. Key operated switches provided for this elevator installation must be provided with four (4) keys for each individual switch or lock. Provide different key tumblers for different switch and lock functions. Each key must have a tag bearing a stamped or etched legend identifying its purpose.

2.3 CONDUIT AND WIREWAY

- A. Provide new conduit and wireway. Install electrical conductors, except traveling cables, in rigid zinc-coated steel or aluminum conduit, electrical metallic tubing or metal wireways. Rigid conduit smaller than 19 mm (.75 in.) or electrical metallic tubing smaller than 12.5 mm (.50 in.) electrical trade size must not be used. All raceways completely embedded in concrete slabs, walls, or floor fill must be rigid steel conduit. Wireway (duct) must be installed in the hoistway and to the controller and between similar apparatus in the elevator machine room. Fully protect self-supporting connections, where approved, from abrasion or other mechanical injury. Flexible metal conduit not less than 9.375 mm (.375 in.) electrical trade size may be used, not exceeding 45.7 cm (18 in.) in length unsupported, for short connections between risers and limit switches, interlocks and for other applications permitted by NEC.

- B. All conduits terminating in steel cabinets, junction boxes, wireways, switch boxes, outlet boxes and similar locations must have approved insulation bushings. Install a steel lock nut under the bushings if they are constructed completely of insulating materials. Protect the conductors at ends of conduits not terminating in steel cabinets or boxes by terminal fittings having an insulated opening for the conductors.
- C. Rigid conduit and EMT fittings using set screws or indentations as a means of attachment must not be used.
- D. Connect motors or other items subject to movement, vibration, or removal to the conduit or EMT systems with flexible, steel conduits.

2.4 CONDUCTORS

- A. Conductors must be stranded or solid coated annealed copper in accordance with Federal Specification J-C-30B for Type RHW or THW. Where 16 and 18 AWG are permitted by NEC, single conductors, or multiple conductor cables in accordance with Federal Specification J-C-580 for Type TF may be used provided the insulation of single conductor cable and outer jacket of multiple conductor cable is flame retardant and moisture resistant. Multiple conductor cable must have color or number coding for each conductor. Conductors for control boards must be in accordance with NEC. Joints or splices are not permitted in wiring except at outlets. Tap connectors may be used in wireways provided they meet all UL requirements.
- B. Provide all conduit and wiring between machine room, hoistway and fixtures.
- C. All wiring must test free from short circuits or ground faults. Insulation resistance between individual external conductors and between conductors and ground must be a minimum of one megohm.
- D. Where size of conductors is not given, voltage and amperes must not exceed limits set by NEC.
- E. Provide equipment grounding. Ground the conduits, supports, controller enclosure, motor, platform and car frame and all other non-current conducting metal enclosures for electrical equipment in accordance with NEC. The ground wires must be copper, green insulated and sized as required by NEC. Bond the grounding wires to all junction boxes, cabinets and wire raceways.
- F. Terminal connections for all conductors used for external wiring between various items of elevator equipment must be solderless pressure

wire connectors in accordance with Federal Specification W-S-610. The Elevator Contractor may, at his option, make these terminal connections on #10 gauge or smaller conductors with approved terminal eyelets set on the conductor with a special setting tool, or with an approved pressure type terminal block. Terminal blocks using pierce-through serrated washers are not acceptable.

2.5 TRAVELING CABLES

- A. All conductors to the car must consist of new flexible traveling cables conforming to the requirements of NEC. Traveling cables must run from the junction box on the car directly to the controller in the machine room. Junction boxes on the car must be equipped with terminal blocks. Terminal blocks having pressure wire connectors of the clamp type that meet UL 486A requirements for stranded wire may be used in lieu of terminal eyelet connections. Terminal blocks must have permanent indelible identifying numbers for each connection. Cables must be securely anchored to avoid strain on individual terminal connections. Flame and moisture resistant outer covering must remain intact between junction boxes. Abrupt bending, twisting and distortion of the cables must not be permitted.
- B. Provide spare conductors equal to 10 percent of the total number of conductors furnished, but not less than 5 spare conductors in each traveling cable.
- C. Provide shielded wires for the auto dial telephone system within the traveling cable, five (5) pair shielded wires for card reader, Ethernet (cables required for Wi-Fi and other systems, two (2) pair 14-gauge wires for 110 Volt power supply and wire for video display monitor if specified.
- D. Traveling cables that contact the hoistway or elevator due to sway or change in position, provide shields or pads to the elevator and hoistway to prevent damage to the traveling cables.
- E. Hardware cloth may be installed from the hoistway suspension point to the elevator pit to prevent traveling cables from rubbing or chafing and securely fastened and tensioned to prevent buckling. Hardware cloth is not required when traveling cable is hung against a flat wall.

2.6 CONTROLLER AND SUPERVISORY PANEL

- A. UL/CSA Labeled Controller: Mount all assemblies, power supplies, chassis switches and relays on a steel frame in a NEMA Type 1 General

Purpose Enclosure. Cabinet must be securely attached to the building structure.

- B. Properly identify each device on all panels by name, letter, or standard symbol which must be neatly stencil painted or decaled in an indelible and legible manner. Identification markings must be coordinated with identical markings used on wiring diagrams. The ampere rating must be marked adjacent to all fuse holders. All spare conductors to controller and supervisory panel must be neatly formed, laced and identified.
- C. Controller must be provided with wiring and components for additional future travel if required.

2.7 MICROPROCESSOR CONTROL SYSTEM

- A. Provide a microprocessor control system with absolute position/speed feedback to control dispatching, signal functions, door operation, pump motor and hydraulic valve control. Complete details of the components and printed circuit boards, together with a complete operational description, must be submitted for approval. Provide closed transition SCR soft start.
- B. Controller manufacturer must provide factory training, engineering and technical support, including all manuals, wiring diagrams and tools necessary for adjusting, maintenance, repair and testing of equipment to the VA for use by the VA's designated Elevator Maintenance Service Provider.
- C. Microprocessor dispatching system must evaluate building traffic demand including number of elevators in service, hall calls, car calls, elevator position, direction of travel, load in elevator, door status and select an elevator to answer hall calls for least possible passenger wait times.
- D. Provide low oil and hot oil shutdown features that must shut off the motor and pump and return the elevator to the lowest landing. Upon reaching the lowest landing, doors will open automatically allowing passengers to leave the elevator and then doors must close. All control buttons, except the door open button, alarm bell button and the call for help button must be made ineffective.

2.8 MACHINE ROOM MONITOR

- A. Provide a monitor in each machine room, separate monitors for each passenger elevator group and each service elevator group. Provide a separate keyboard for each monitor.

- B. The monitor must contain indicators to provide the following information:
1. The floor where each elevator is currently located.
 2. The direction that each elevator is currently traveling or is scheduled to travel.
 3. The location and direction of currently registered hall calls.
 4. Elevators that are currently out of service.
 5. Elevators that are currently bypassing hall calls.
 6. Elevators that are currently engaged in passenger transfers.
 7. Operations program under which entire group is currently operating.
 8. Zone divisions of the entire group.
 9. Door positions.
 10. Status indication for elevators on independent service, car top inspection, fire service, earthquake protection and activated stop switch and alarm bell.
- C. The maintenance terminal must be suitable for all troubleshooting procedures related to the specific type of microprocessor installed on this project.

2.9 EMERGENCY POWER OPERATION

- A. The control system for Elevator(s) must provide for the operation of at least one car per elevator group on emergency power upon failure of the normal power supply.
- B. Auxiliary equipment on elevator controllers, wiring between associated elevator controllers and wiring between elevator controllers and remote selector panel as required to permit the elevators to operate as detailed, must be provided by the Elevator Contractor.
- C. Upon loss of normal power supply there must be a delay before transferring to emergency power of 10 seconds minimum to 45 seconds maximum, the delay must be accomplished through an adjustable timing device. After adjusting delay, the associated elevators must function the same as on normal power or as follows:

SPEC WRITER NOTE: Selector switch is not required when all elevators in the group operate on Emergency Power at the same time.

1. Selector switch, Automatic position:
 - a. Not more than // one elevator // two elevators // at a time in each group must be automatically selected and returned to the

main floor, at contract speed, cycle its car and hoistway doors and shut down, with "Door Open" button remaining operable.

- b. As each elevator reaches the designated floor and shuts down, another elevator must start and return to the designated floor.
 - c. Elevators that have been manually removed from automatic service and are on independent service, fire service or medical emergency must receive an automatic return signal. Elevators on inspection service or out of service must not receive a signal.
 - d. When an elevator is given a signal to return and it is unable to start its movement to the designated floor within 30 seconds it must be by-passed. When an elevator is by-passed, another elevator must start and return.
 - e. This process must continue until all elevators have returned to the designated floor and shut down.
 - f. Any elevator or elevators by-passed on initial return signal must be signaled again.
 - g. When all cars in group have returned to designated floor, //one elevator // two elevators // all elevators // in each group must be designated for automatic operation. Individual cars in each group must restart at 5 second intervals.
 - h. Elevator(s) keyed on to medical emergency service in the car prior to transfer to auxiliary power operation, medical emergency service must be retained. This elevator must be the first automatically selected elevator to operate on emergency power operation and complete its selected call demand. The elevator will return to the designated floor after the key switch is reset to normal position.
2. Selector switch, Manual operation:
- a. Selector switch must be mechanically and electrically interlocked to prevent the selection of more than // one elevator // two elevators // from operating on auxiliary power.
 - b. The selector switch must have positions marked with the number of each elevator controlled. It must also have a position marked "Automatic". When the selector switch is set to the automatic position, the medical emergency service car must operate on emergency power operation, or if none, the last car arriving at the designated floor must operate on emergency power operation.

- c. Change in selection of elevators must be by means of the selection switch and must occur only when the previous selected elevator is stopped at the designated floor.
 - d. The selector switch must be locked out of operation when the system is in the normal mode of operation.
 - e. Locate the selector switch above the hall push button at the designated level. The key switch must be a tumbler type lock furnished with four keys. The enclosure faceplate must be identified "Emergency Power Control" with 12.5 mm (.50 in.) engraved letters filled with black paint.
- D. Prior to the return of normal power an adjustable timer circuit must activate that will cause all cars to remain at a floor if already there or stop and remain at the next floor if in flight. Actual transfer of power from auxiliary power to normal building power must take place after all cars are stopped at a floor with their doors open.

SPEC WRITER NOTE: If emergency power is not provided delete A-D and use E.

E. Emergency Rescue Operation:

Provide a power source to send the elevator to the lowest landing. After the elevator has leveled at the lowest landing, provide power to open the car and hoistway doors automatically. After a predetermined time, the doors must close. Power must stay applied to the door open button to reopen the doors from the inside of the elevator. The elevator must remain shut down at the bottom landing until normal power is restored. Install a sign on the controller indicating that power is applied to emergency rescue operator and door operator during loss of normal power.

2.10 FIREFIGHTER'S SERVICE

- A. Provide Firefighter's Service. Key switches must be barrel-key FEO-K1.
 - 1. Main Floor:
 - 2. Alternate Floor:
 - 3. Verify main and alternate floors with RE/CO or authorized representative.

2.11 INDEPENDENT SERVICE

- A. Provide an INDEPENDENT SERVICE // key switch on the face of the main car operating panel // or a toggle switch in the service operating panel // that must have its positions marked "ON" and "OFF". When the switch is in the "ON" position, the car must respond only to calls

registered on its car dispatch buttons and must bypass all calls registered on landing push buttons. The car must start when a car call is registered, car call button or door close button is pressed, car and hoistway doors are closed and interlock circuits are made. When switch is returned to "OFF" position, normal service must be resumed.

SPEC WRITER NOTE: Select elevators to respond on Medical Emergency. Delete Medical Emergency if not required.

2.12 MEDICAL EMERGENCY SERVICE - PATIENT CARE FACILITIES ONLY

- A. Provisions must be made for calling elevator(s) to floor served by the elevator on an emergency basis, operating independently from the dispatch signals and landing call signals.
- B. Install key switches in the floor landing push button fixtures above the push buttons.
- C. Provide a call registered light indicator adjacent to key switch. The key switch at the landings and in the car, must only be operable by authorized personnel with a key.
- D. When key switch is activated at any floor, the call register light indicator must illuminate at the call floor and inside the elevator. The elevator control system must instantly select an elevator to respond to the medical emergency call. Immediately upon selection, all car calls must be cancelled. If car is traveling away from the medical emergency call, it must slow down and stop at the nearest floor, maintain closed doors, reverse direction and proceed nonstop to the medical emergency call floor. If the car is traveling toward the medical emergency call floor, it must proceed to that floor nonstop. If at the time of selection, it is slowing down for a stop, the car must stop, maintain doors closed and start immediately toward the medical emergency floor.
- E. Arriving at the medical emergency floor, the car must remain with doors open for 30 seconds. After this interval has expired and the car has not been placed on medical emergency operation inside the car, the car must automatically return to normal service.
- F. Provide an LED illuminated indicator light next to the Medical Emergency key switch the same size as the Fire Service indicator.
 - 1. Locate a "Medical Emergency" key switch above call buttons in the main car operating panel for selecting medical emergency service. Activation of the key switch will allow the car to accept a car call for any floor, close doors and proceed nonstop to the floor desired.

2. After medical emergency call has been completed the elevator must return to normal operation after the key is removed.
- G. In the center of the rear cab panel provide a back lighted "MEDICAL EMERGENCY" LED illuminated display that must flash on and off continuously when the car is assigned to this operation and until it is restored to normal service. "MEDICAL EMERGENCY" indicator must be a photographic negative type 1828 mm (72 in.) to center above the floor, 152 mm (6 in.) wide X 76 mm (3 in.) high, with 12.5 mm (.50 in.) high letters legible only when illuminated.
- H. If the car being operated on "Independent Service", the medical emergency service indicator lights in the car operating panel and rear wall must be illuminated, buzzer must sound and the "Audio Voice" system must direct the attendant to return the car to automatic operation.
- I. If the car is out of service and unable to answer medical emergency calls, the call register light must not illuminate.
- J. Each key switch must have its identity legible and indelible engraved in faceplates. All lettering must be 6 mm (.25 in.) high, filled with black paint.
- K. When Phase I firefighter's recall is activated, it must over-ride elevators on medical emergency service and return them to the main or alternate fire service recall floor. When the fire emergency floor has been identified the attendants may complete their medical emergency run on Phase II firefighter's operation if life safety is not affected.

2.13 SEISMIC REQUIREMENTS

- A. Meet the requirements of VA Seismic Design Manual H-18-8.

2.14 PUMP, MOTOR AND VALVE ASSEMBLY

- A. Provide new pump assembly for the control of the elevator self-contained in a unit fabricated of structural steel. The unit must consist of a hydraulic fluid pump, AC motor, oil control valves with down speed regulator, muffler, piping and fittings.
- B. Submersible pump with the motor and oil control valve mounted above the tank are preferred to eliminate heat from the motor being transferred to the oil. Submersible motor and pump power units are acceptable but are best suited for lower traffic areas. Enclose V-belt power unit on four open sides with not less than 16-gauge steel removable panel sections. Provide a 50 mm (2 in.) minimum, 100mm (4 in.) maximum air space between the top of the panels and bottom of tank. Line panels on

the interior side with one-inch rigid acoustical insulation board. Install metal belt guard that can be removed with hand tools for servicing and inspection.

- C. Control valves must be electronically controlled. Hydraulic fluid flow must be controlled to ensure speed variation of not more than three (3) percent under all load conditions in either direction of travel. Locate the manual lowering valve, easily accessible, properly identified and not concealed within the storage tank. Mark the operating handle in red.
- D. Pump must be designed for hydraulic elevator service, having a steady discharge without pulsation to give smooth and quiet operation. Pump output must be capable of lifting and lowering the elevator car with rated capacity, with a speed variation of no more than three (3) percent between no load and full load. Hydraulic fluid by-pass must discharge directly into storage tank.
- E. Provide motor specifically designed for elevator service, synchronous speed of 1800 RPM, not to exceed nameplate full load current by more than 10% and rated 120 starts per hour without exceeding a rise of 40 degrees C.
- F. Provide isolation pads to prevent transmission of pump and motor vibration to the building.
- G. Install blowout-proof, non-hammering, oil-hydraulic muffler in the hydraulic fluid supply pressure line near power unit in machine room. Design muffler to reduce to a minimum any pulsation or noises that may be transmitted through the hydraulic fluid into the hoistway.

2.15 HYDRAULIC SYSTEM

- A. Construct the storage tank of sheet steel, welded construction and a steel cover with means for filling, a minimum one-inch protected vent opening and a valve drain connection. Tank must be sized to pass through machine room door as shown on drawings. Provide marked sight gauges to monitor hydraulic fluid level. Tank must be sized to hold volume of hydraulic fluid required to lift elevator to stop ring, plus a reserve of not less than ten gallons. Provide a baffle in the bottom of the tank to prevent entry of any sediment or foreign particles into hydraulic system. Baffle must also minimize aeration of hydraulic fluid. Permissible minimum hydraulic fluid level must be clearly indicated. Hydraulic fluid must be of good grade to ensure free flow

when cool and have minimum flash point of 380-400 degrees F. Provide initial supply of hydraulic fluid for operation of elevator.

1. Provide a means to maintain the fluid viscosity in the reservoir, pump and control valve at the manufacturer's recommended operating temperature.
 2. Provide a data plate on the tank frame indicating the characteristics of the hydraulic fluid used.
- B. Provide and install connections between the storage tank, pump, muffler, operating valves and cylinder complete with necessary valves, pipe supports and fittings. Pipe must be minimum schedule 40 steel with threaded, flanged, or welded mechanical couplings. Size of pipe and couplings between cylinder and pumping unit must be such that fluid pressure loss is limited to 10 percent.
- C. Hydraulic system working pressure must not exceed 500 psi under any load condition. Do not subject valves, piping and fittings to working pressure greater than those recommended by the manufacturer.
- D. Support all horizontal piping. Place hangers or supports within 305 mm (12 in.) on each side of every change of direction of pipeline and space supports not over 304.8 cm (10 ft) apart. Secure vertical runs properly with iron clamps at sufficiently close intervals to carry weight of pipe and contents. Provide supports under pipe to floor.
1. Provide all piping from machine room to hoistway, including necessary supports or hangers. If remote piping is underground or in damp inaccessible areas, install hydraulic piping thru PVC sleeve.
- E. Install pipe sleeves where pipes pass through walls or floors. Set sleeves during construction. After installation of piping, equip the sleeves with snug fitting inner liner of fire rated insulation.
- F. Provide an automatic shut-off valve in the oil supply line at the cylinder inlet. Weld inlet pipe to cylinder, threaded to receive shut-off valve. Activate the automatic shut-off valve when there is more than a ten percent increase in high speed in the down direction. When activated, this device must immediately stop the descent of the elevator and hold the elevator. The exposed adjustments of the automatic shut-off valve must have their means of adjustment sealed after being set to their correct position.
- G. Provide external tank shut-off valve to isolate hydraulic fluid during maintenance operations.

- H. Provide shut-off valves in the pit near the cylinder and in the machine room capable of withstanding 150 percent of design operating pressure. Each manual valve must have an attached handle.
- I. Provide oil-tight drip pan for assembled pumping unit, including storage tank. Pan must be not less than 16-gauge sheet steel, with one-inch sides.
- J. Components of the hydraulic system must be factory certified to withstand pressure equal to twice the calculated working pressure.

2.16 HYDRAULIC PLUNGER ASSEMBLY

- A. Provide new cylinder and plunger sized to lift gross load the height specified. Factory test the plunger assembly at a pressure equal to twice the calculated working pressure, for strength and to ensure freedom from leakage. Provide bottom of cylinder head with internal guide bearing and top of cylinder head with removable packing gland. Victaulic type packing gland head must not be permitted.
 - 1. Provide a bleeder valve located below the cylinder flange to release air or other gases from the system.
 - 2. Equip cylinder with drip ring below the packing gland to collect leakage of hydraulic fluid.
 - 3. Bolt the cylinder mounting brackets to footing channels that support the buffers.
- B. Install a flexible tubing scavenger line with an electrically operated pump between the piston drip ring and oil storage tank. Scavenger line, pump and strainers must operate independently of hydraulic fluid pressure. Equip scavenger pump with a water float designed to prevent operation of the pump should the pit flood and designed to be manually reset. Secure pump and reservoir to the pit channels.
- C. Plunger must be seamless steel tubing, turned smooth and true to within plus or minus .38 mm (0.015 in.) tolerance and no diameter change greater than .07 mm (0.003 in.) per-inch of length. Where plunger is multi-piece construction, machine the joints to assure perfectly matching surfaces.
 - 1. Secure plunger to underside of platform supporting beams with fastenings capable of supporting four times the weight of the plunger. The platen plate must incorporate piston to car vibration isolation.
 - 2. Provide a stop ring welded or screwed to the bottom of plunger that must prevent the plunger from leaving its cylinder.

- a. Plunger units that include future travel, locate the stop ring to permit only the actual travel and required runby.
3. Isolate plunger head from the platen plate to prevent corrosion or electrolysis.
4. Protect plunger, repair, or replace if gouged, nicked, or scored.

2.17 HYDRAULIC CYLINDER CASING AND WELL HOLE

- A. The casing must be iron or steel not less than 9.375 mm (.375-in.) thick, at least 152 mm (6 in.) larger in diameter than the cylinder.
- B. Provide PVC casing liner to fit inside steel casing. Fabricate liner with watertight bottom and a top flange gasket to seal plunger flange and form a complete, watertight, electrically non-conductive encasement of the entire unit.
- C. Provide suitable well hole to accommodate casing. Coordinate the drilling of well hole and setting of the cylinder with construction of concrete pit. Provide watertight joint between the casing and the pit floor at bottom of pit.
- D. Base bid on drilling hole in dirt, sand, rock, gravel, loam, boulders, hardpan, water, or other obstacles. Include the removal of all dirt and debris.

2.18 CAR BUFFERS

- A. Provide two new spring buffers for each elevator. Securely fasten buffers and supports to the pit channels and in the alignment with striker plates on elevator. Buffers must have a permanently attached metal plate indicating its stroke and load rating. Buffer anchorage must not puncture pit waterproofing.
- B. Provide pipe stanchions and struts as required to properly support the buffer.

2.19 GUIDE RAILS, SUPPORTS AND FASTENINGS

- A. Guide rails for car must be planed steel T-sections and weigh // 27.5 kg/m (18.5 lb/ft) // 22.5 kg/m (15 lb/ft) //.
- B. Securely fasten guide rails to the brackets or other supports by heavy duty steel rail clips.
- C. Provide car rail brackets of sufficient size and design to ensure substantial rigidity to prevent spreading or distortion of rails under any condition.
- D. Guide rails must extend from channels on pit floor to within 76 mm (3 in.) of the underside of the concrete slab or grating at top of hoistway with a maximum deviation of 3.2 mm (.125 in.) from plumb in

all directions. Provide a minimum of 19 mm (.75 in.) clearance between bottom of rails and top of pit channels.

- E. Guide rail anchorages in pit must be made in a manner that will not reduce effectiveness of the pit waterproofing.
- F. In the event inserts or bond blocks are required for the attachment of guide rails, the Contractor must furnish such inserts or bond blocks and must install them in the forms before the concrete is poured. Use inserts or bond blocks only in concrete or block work where steel framing is not available for support of guide rails. Expansion-type bolting for guide rail brackets will not be permitted.
- G. Guide rails must be clean and free of any signs of rust, grease, or abrasion before final inspection. Paint the shank and base of the T-section with two field coats of manufacturer's standard enamel.

2.20 NORMAL AND FINAL TERMINAL STOPPING DEVICES

- A. Mount new terminal slowdown switches and direction limit switches on the elevator or in hoistway to reduce speed and bring car to an automatic stop at the terminal landings.
 - 1. Switches must function with any load up to and including 100 percent of rated elevator capacity at any speed obtained in normal operation.
 - 2. Switches, when opened, must permit operation of elevator in reverse direction of travel.
- B. Mount final terminal stopping switches in the hoistway.
 - 1. Switches must be positively opened should the car travel beyond the terminal direction limit switches.
 - 2. Switches must be independent of other stopping devices.
 - 3. Switches, when opened, must remove power from pump motor and control valves preventing operation of car in either direction.

2.21 CROSSHEAD DATA PLATE AND CODE DATA PLATE

- A. Permanently attach a non-corrosive metal Data Plate to car crosshead.
- B. Permanently attach a Code Data Plate, in plain view, to the controller.

2.22 WORKMAN'S LIGHTS AND OUTLETS

- A. Provide duplex GFCI protected type receptacles and lamp, with guards on top of elevator car and beneath platform.
- B. The receptacles must be in accordance with Fed. Spec. W-C-596 for Type D7, 2-pole, 3-wire grounded type rated for 15 amperes and 125 volts.

2.23 CARTOP OPERATING DEVICE

- A. Provide a cartop operating device.

- B. The device must be activated by a toggle switch mounted in the device. The switch must be clearly marked "INSPECTION" and "NORMAL" on the faceplate, with 6 mm (.25 in.) letters.
- C. Movement of the elevator must be accomplished by the continuous pressure on a direction button and a safety button.
- D. Provide an emergency stop switch, push to stop/pull to run.
- E. Provide permanent identification for the operation of all components in the device.
- F. The device must be permanently attached to the elevator crosshead on the side of the elevator nearest the hoistway doors used for accessing the top of the car.

2.24 LEVELING DEVICE

- A. Elevator must be equipped with a new two-way leveling device to automatically bring the car to within 3 mm (.125 in.) of exact level with the landing for which a stop is initiated regardless of load in car or direction of travel.
- B. If the car stops short or travels beyond the floor, the leveling device, within its zone must automatically correct this condition and maintain the car within 3 mm (.125 in.) of level with the floor landing regardless of the load carried.

2.25 EMERGENCY STOP SWITCHES

- A. Provide an emergency stop switch, push to stop/pull to run, for each top-of-car device, pit, machine spaces, service panel and firefighter's control panel inside the elevator. Mount stop switches in the pit adjacent to pit access door, at top of the pit ladder 1219 mm (48 in.) above the bottom landing sill and 1219 mm (48 in.) above the pit floor adjacent to the pit ladder.
- B. Each stop switch must be red in color and must have "STOP" and "RUN" positions legibly and indelibly identified.

2.26 MAIN CAR OPERATING PANEL

- A. Provide new main car operating panel in the car enclosure on the front return panel for passenger/service elevators. The top floor car call push button must not be more than 1219 mm (48 in.) above the finished floor. "Vandal Resistant" car push buttons and indicator lights must be LED illuminated, round with a minimum diameter of 25 mm (1 in.). Each button must contain an integral registration LED light which must illuminate upon registration of a call and must extinguish when that call is answered.

- B. One-piece hinged front faceplate with edges beveled 15 degrees must have the firefighter's service panel recessed into the upper section and the service operation panel recessed into the lower section fitted with hinged doors. Doors must have concealed hinges, be in the same front plane as the faceplate and fitted with key operated locks. Secure the faceplate with stainless steel tamperproof screws.
- C. All terminology and tactile symbols on the faceplate must be on square or rectangular plates recessed into the faceplate with its surface flush with the surface of the faceplate. Use 6 mm (.25 in.) letters to identify all devices in the faceplate. The handicapped markings with contrasting background must be 12.5 mm (.50 in.) high raised .075 mm (.030 in.) on the plate. Surface mounted plates are not acceptable.
- D. The upper section must contain the following items in order listed from top to bottom:
1. Elevator number, 12.5 mm (.50 in.) high with black paint for contrast.
 2. Capacity plate information with black paint for contrast with freight loading class and number of passengers allowed.
 3. LED illuminated digital car position indicator with direction arrows.
 4. Emergency car lighting system consisting of a rechargeable battery, charger, controls and LED illuminated light fixture. The system must automatically provide emergency light in the car upon failure or interruption of the normal car lighting service and function irrespective of the position of the light control switch in the car. The system must maintain a minimum illumination of 1.0 foot-candle when measured 1219 mm (48 in.) above the car floor and approximately 305 mm (12 in.) in front of the car operating panel, for not less than four (4) hours.
 5. Firefighter's Emergency Operation Panel must be 1676 mm (66 in.) minimum to 1828 mm (72 in.) maximum to the top of the panel above finished floor.
 6. Firefighter's Emergency Indicator Light must be round with a minimum diameter of 25 mm (1 in.).
- SPEC WRITER NOTE: Delete Medical
Emergency if not require.
7. Medical Emergency key switch marked "MEDICAL EMERGENCY" with two positions labeled "ON" and "OFF" and Medical Emergency Indicator

Light located next to the key switch **must** be round with a minimum diameter of 25 mm (1 in.). Instruction for Medical Emergency operation must be adjacent to the key switch and light.

8. Key operated Independent Service Switch on the face of panel.
(Delete if inside service panel.)
 9. Provide a Door Hold Button on the faceplate above the call buttons. It must have "DOOR HOLD" indelibly marked on the button. Button must light when activated. When activated, the door must stay open for a maximum of one minute. To override hold timer, push a car call button or door close button.
 10. Provide round "Vandal Resistant" car push buttons and indicator lights, minimum diameter of 25 mm (1 in.) and LED illuminated, corresponding to the floors served. Car call buttons must be legibly and indelibly identified by a floor number, letter or symbol not less than 12.5 mm (.50 in.) high in the face of the button or indicator.
 11. Door Open and Door Close buttons must be located below the car call buttons. They must have "OPEN" and "CLOSE" legibly and indelibly identified by letters in the face of the respective button. The Door Open button must be located closest to the door jamb.

SPEC WRITER NOTE: Delete rear buttons if not required.

 - a. Rear Door Open and Rear Door Close buttons must be located below the Front Door Open and Front Door Close buttons. They must have "REAR OPEN" and "REAR CLOSE" legibly and indelibly identified by letters in the face of the respective button.
 12. Red Emergency Alarm button that must be located below the car operating buttons. Mount the emergency alarm button not lower than 875 mm (35 in.) above the finished floor. It must be connected to audible signaling devices. Provide audible signaling devices including the necessary wiring.
 13. Emergency Help push button must activate two-way communications by Auto Dial telephone system that is compatible with the VAMC's telephone system. Help button must be LED illuminated and flash when call is acknowledged. Legibly and indelibly label the button "HELP" in the face of the button with 12.5 mm (.50 in.) high letters.
- E. The service operation panel, in the lower section must contain the following items:

1. Light switch labeled "LIGHTS" for controlling interior car lighting with its two positions marked "ON" and "OFF".
2. Inspection switch that will disconnect normal operation and activate hoistway access switches at terminal landings. Switch must be labeled "ACCESS ENABLE" with its two positions marked "ON" and "OFF".
3. Three position switch labeled "FAN" with its positions marked "HIGH", "LOW" and "OFF" for controlling car ventilating blower.
4. Two position, spring return, toggle switch or push button to test the emergency light and alarm device. It must be labeled "TEST EMERGENCY LIGHT AND ALARM".
5. Independent Service switch labeled "ON" and "OFF". (Delete if key switch on face of panel).

SPEC WRITER NOTE: Freight elevator, provide emergency stop switch in the face of the car operating panel. Passenger or service elevator provide stop switch inside the service panel.

6. Two-position emergency stop switch, when operated, must interrupt power supply and stop the elevator independently of regular operating devices. Emergency stop switch must be marked "PUSH TO STOP" and "PULL TO RUN".

SPEC WRITER NOTE: Select location for Aux COP for type of elevator and edited first sentence.

2.27 AUXILIARY CAR OPERATING PANEL

- A. Provide an auxiliary car operating panel in the // front return panel opposite the main car operating panel // rear return panel // side wall of the elevator between the handrails immediately adjacent to the front entrance column strike jamb //. The auxiliary car operating panel must contain only those controls essential to passenger (public) operation. The auxiliary car operating panel faceplate must match the main car operating panel faceplate in material and general design. Secure the faceplate with stainless steel tamperproof screws.
 1. Provide round "Vandal Resistant" car push buttons and indicator lights, minimum diameter 25 mm (1 in.) and LED illuminated corresponding to the floors served. Car buttons and indicator lights must be legibly and indelibly identified by a floor number, letter, or symbol not less than 12.5 mm (.50 in.) high in the face of the

- button or indicator light corresponding to the main car operating panel buttons or indicator light.
2. Door "OPEN" and door "CLOSE" buttons must be closest to the door jamb and the alarm button must be 889 mm (35 in.) above the finished floor. The Door Open button must be located closest to the door.
 3. Cross-connect all buttons in the auxiliary car operating panels to their corresponding buttons in the main car operating panel. Registration of a car call must cause the corresponding button to illuminate in the main and auxiliary car operating panel.
 4. Emergency Help push button must activate two-way communications by auto dial telephone that is compatible with the VAMC's telephone system. Help button must be LED illuminated and flash when call is acknowledged. Legibly and indelibly label the button "HELP" in the face of the button with 12.5 mm (.50 in.) high letters.
- B. All terminology and tactile symbols on the faceplate must be on square or rectangular plates recessed into the faceplate with its surface flush with the surface of the faceplate. Use 6 mm (.25 in.) letters to identify all devices in the faceplate. The tactile symbols with contrasting background must be 12.5 mm (0.5 in.) high raised .075 mm (.030 in.) on the plate. Surface mounted plates are not acceptable.

2.28 CAR POSITION INDICATOR

- A. Provide an alpha-numeric digital car position indicator in the main car operating panel, consisting of numerals and arrows 63 mm (2.5 in.) high, to indicate position of car and direction of car travel. Locate position indicator at the top of the main car operating panel, illuminated by light emitting diodes.

2.29 AUDIO VOICE SYSTEM

- A. Provide digitized audio voice system. Audio voice must announce floor designations, direction of travel and special announcements. The voice announcement system must be a natural sounding human voice that receives messages and must comply with ADA requirements for audible car position indicators. The voice announcer must have two separate volume controls, one for the floor designations and direction of travel and another for special announcements. The voice announcer must have a full range loudspeaker, located on top of the cab. The audio voice unit must contain the number of ports necessary to accommodate the number of floors, direction messages and special announcements. Install voice

announcer per manufacturer's recommendations and instructions. The voice system must be the product of a manufacturer of established reputation. Provide manufacturer literature and list of voice messages.

1. Fire Service Message.
2. "Please do not block doors".
3. Provide special messages as directed by COR.

2.30 AUTO DIAL TELEPHONE SYSTEM

- A. Provide a complete, ADA compliant, auto dial communication system that is compatible with the VAMC's telephone system.
- B. Two-way communication device shall be in full compliance with ASME A17.1 Rule 2.27.1.1 (2019) or later editions.

2.31 CORRIDOR OPERATING DEVICES

- A. Provide new corridor operating device faceplates from not less than 3 mm (.125 in.) thick flat stainless steel with all edges beveled 15 degrees.
- B. Corridor push button faceplates must be sized to accommodate corridor pictograph on faceplate. The centerline of the landing push buttons must be 1067 mm (42 in.) above the corridor floor.
- C. Elevator Corridor Call Station Pictograph must be engraved in the faceplate.
- D. Fasten corridor operating devices and signal device faceplates with stainless steel tamperproof screws.
- E. All terminology and tactile symbols on the faceplate must be raised .030 inch with contrasting background, on square or rectangular plates recessed into the faceplate with its surface flush with the surface of the faceplate. The handicapped markings with contrasting background must be 12.5 mm (.50 in.) high raised .075 mm (.030 in.) on the plate, square or rectangular. Use 6 mm (.25 in.) letters to identify all other devices in the faceplate. Surface mounted plates are not acceptable.
- F. Provide //one // two // risers of landing call buttons for each elevator or group of elevators as shown on contract drawings.
- G. "Vandal Resistant" hall buttons and indicator lights must be LED illuminated upon registration of a call and shall extinguish when that call is answered.
- H. The direction of each button must be legibly and indelibly identified by arrows not less than 12.5 mm (.50 in.) high in the face of each button. Provide a corresponding Braille plate on the left side of each button.

- I. Hall call buttons must not re-open the doors while the car and hoistway doors are closing at that floor, the call must be registered for the next available elevator. Calls registered must be canceled if closing doors are re-opened by means of "DOOR OPEN" button or infrared curtain unit.
- J. Provide emergency power indicator light, medical emergency key switch and indicator light, fire service recall key switch and indicator light, firefighter's recall instruction, communication failure light, audible enunciator and reset key switch in the fixture at the designated main floor.
- K. Submit design of hall pushbutton fixtures for approval.

2.32 CORRIDOR ARRIVAL LANTERN/POSITION INDICATOR

- A. Provide new combination corridor lantern/position indicator digital display mounted above hoistway entrances at each floor in healthcare facilities. For non-healthcare facilities provide combination fixtures only at main and alternate fire recall floors unless specified for all floors. Provide each terminal landing with "UP" or "DOWN", minimum 63 mm (2.5 in.) high arrow lanterns and each intermediate landing with "UP" and "DOWN" arrow lanterns. Each lens must be LED illuminated of proper intensity, so shielded to illuminate individual lens only. The lenses in each lantern must be illuminated green to indicate "UP" travel and red to indicate "DOWN" travel. Lanterns must signal in advance of car arrival at the landing indicating the direction of travel. Corridor lanterns must not be illuminated when a car passes a floor without stopping. Each lantern must be equipped with an audible electronic chime which must sound once for "UPWARD" bound car and twice for "DOWNWARD" bound car. Audible signal must not sound when a car passes the floor without stopping. Provide adjustable sound level on audible signal. Car riding lanterns are not acceptable.
- B. Install alpha-numeric digital position indicator between the arrival lanterns. Indicator faceplate must be stainless steel. Numerals must be not less than 63 mm (2.5 in.) high with direction arrows. Cover plates must be readily removable for re-lamping. The appropriate direction arrow must be illuminated during entire travel of car in corresponding direction.

2.33 HOISTWAY ACCESS

- A. Provide new hoistway access switches for elevator at top terminal landing to permit access to top of car and at bottom terminal landing

to permit access to pit. Elevators with side slide doors, mount the access key switch 182.8 cm (6 ft) above the corridor floor in the wall next to the strike jamb.

- B. Exposed portion of each access switch or its faceplate must have legible, indelible legends to indicate "UP", "DOWN" and "OFF" positions.
- C. Each access switch must be a constant pressure cylinder type lock having not less than five pins or five stainless steel disc combination with key removable only when switch is in the "OFF" position.
- D. Lock must not be operable by any other key which will operate any other lock or device used for any other purpose at the VA Medical Center.
- E. Arrange the hoistway switch to initiate and maintain movement of the car. When the elevator is operated in the down direction from the top terminal landing, limit the zone of travel to a distance not greater than the top of the car crosshead level with the top floor. Submit design and location of access switches for approval.
- F. Provide emergency access for all hoistway entrances, keyways for passenger and service elevators.

2.34 HOISTWAY ENTRANCES: PASSENGER/SERVICE ELEVATORS

- A. Provide complete entrances with sills, sill supports, hangers, hanger supports, tracks, angle struts, unit frames, door panels, fascia plates, toe guards, hardware, bumpers, sight guards and wall anchors.
- B. Provide new one-piece stainless-steel sills grooved for door guides and recessed for fascia plates. Sills must have overall height of not less than 19 mm (.75 in.) set true, straight and level, with hoistway edges plumb over each other and top surfaces flush with finished floor. Hoistway entrance frames and sills must be grouted solid full length after installation.
- C. Construct hanger supports of not less than 9.375 mm (.375 in.) thick steel plate and bolted to strut angles.
- D. Structural steel angles 76 mm x 76 mm x 9.375 mm (3 in. x 3 in. x .375 in.) must extend from top of sill to bottom of floor beam above and must be securely fastened at maximum 457 mm (18 in.) on center and at each end with two bolts.
- E. Provide jambs and head soffits, of not less than 14-gauge stainless steel. Jambs and head soffits must be bolted/welded construction and provided with three anchors each side. Side jambs must be curved. Radius of curvature must be 89 mm (3.5 in.). Head jamb must be square

and must overhang corridor face of side jambs by 6 mm (.25 in.). Rigidly fasten jambs and head soffits to building structure and grouted solid. After installation, protect jambs and head soffits to prevent damage to finish during construction.

- F. Provide raised numerals or letters on cast, rear mounted plates for all openings. Numerals must be a minimum of 51 mm (2 in.) high, located on each side of entrance frame, with centerline of 1523 mm (5 ft) above the landing sill. The number plates must contain Braille.
- G. Provide unique car number on every elevator entrance at designated main fire service floor level, minimum 76 mm (3 in.) in height.
- H. Provide new stainless steel hoistway doors. Door panels must be flush hollow metal construction, not less than 32 mm (1.25 in.) thick, consisting of one continuous piece 16-gauge stainless steel on corridor side wrapped around the leading edge. Separate two plates by a sound-deadening material and reinforce by steel shapes welded to the plates at frequent intervals. Reinforce panels as required for installation of hangers, power-operating and door-opening devices. Top and bottom of door panels must have continuous stiffener channels welded in place. Reinforcement of the door panels must be a minimum of 1.0 mm (0.04 in.) in thickness and of the hat section type.
- I. Hang doors on two-point suspension hangers having sealed ball-bearing sheaves not less than 76 mm (3 in.) in diameter, with non-metallic sound-reducing tires. Equip hangers with adjustable ball-bearing rollers to take upward thrust of panels. Provide two removable non-metallic door gibs of approved material and a separate fire gib at the bottom of each door panel. Gibs must be replaceable without removing of door panel. One door panel for each entrance must bear a BOCA label, Underwriters' label, or other labels may be furnished provided they are based on fire test reports and factory inspection procedures acceptable to the COR. Fasten stainless steel sight guard of 14-gauge metal, extending full height of panel, to leading edge of fast speed panel of two-speed doors.
- J. Door panels for each entrance must bear a BOCA label, Underwriters' label or labels from other accredited test laboratories may be furnished provided they are based on fire test reports and factory inspection procedures acceptable to the RE/CO or authorized representative.

- K. Provide 14-gauge sheet steel fascia plates in hoistway to extend vertically from head of hanger support housing to sill above. Plates must be 76 mm (3 in.) wider than door opening of elevator and reinforced to prevent waves and buckles. Below bottom terminal landing and over upper terminal landing provide shear guards beveled back to and fastened to the wall.
- L. Equip each hoistway entrance with new electrical/mechanical interlock, functioning as hoistway unit system, to prevent operation of elevator until all hoistway doors are locked in the closed position unless car is operating in the leveling zone or hoistway access switch is used.
- M. Wiring installed from the hoistway riser to each door interlock must be NEC type SF-2 or equivalent.

2.35 CAR GUIDES

- A. Provide new adjustable roller guides each assembled on a substantial metal base, to permit individual alignment to the guide rails.
- B. Each guide must consist of not less than three (3) wheels, each with durable, resilient oil-resistant material tires rotating on ball bearings having sealed-in lubrication. Assemble rollers on a substantial metal base and mount to provide continuous spring pressure contact of all wheels with the corresponding rail surfaces under all conditions of loading and operation. Secure the roller guides at top and bottom on each side of car frame and counterweight frame. All mounting bolts must be fitted with nuts, flat washers, split lock washers and if required, beveled washers.
- C. Provide sheet metal guards to protect rollers on top of car.
- D. Minimum diameter of car rollers must be 152 mm (6 in.). The entire elevator car must be properly balanced to equalize pressure on all guide rollers. Cars must be balanced in post-wise and front-to-back directions. Test for this balanced condition must be witnessed at time of final inspection.
- E. Equip car with an auxiliary guiding device for each roller guide that must prevent the car from leaving the rails if the normal guides fail. These auxiliary guides must not, during normal operation, touch the guiding surfaces of the rails. Fabricate the auxiliary guides from hot rolled steel plate and mount between the normal guide shoes and the car frames. The auxiliary guides may be an extension of the normal guide shoe mounting plate if that plate is fabricated from hot rolled steel.

The portion of the auxiliary guide which must contacts the rail guiding surfaces.

F. Alternate Guide Shoes for service and freight elevators:

1. Provide each shoe with renewable non-metallic gibs of durable material having low coefficient of friction and long-wearing qualities, when operated on guide rails receiving infrequent, light applications of surfaces in the event of loss of the normal guides must be lined with an approved bearing material to minimize damage to the rail guiding rail lubricant. Gibs containing graphite or other solid lubricants are not acceptable.
2. Flexible guide shoes of approved design, other than swivel type, may be used provided they are self-aligning on all three faces of the guide rails.
3. Provide spring take-up in car guide shoes for side play between rails.

2.36 CAR FRAME: PASSENGER/SERVICE ELEVATORS

- A. Car frame must be constructed of channel stiles, crosshead, gussets and braces securely bolted and/or welded. The entire assembly must be constructed to withstand unequal loading of platform. Car frame members must be constructed to relieve the car enclosure of all strains.

2.37 CAR PLATFORM: PASSENGER/SERVICE ELEVATORS

- A. The platform must be designed to withstand the forces developed under the loading conditions specified. Provide car entrances with stainless steel sill with machined or extruded door guide and recessed for platform guard. Cover underside and all exposed edges of wood filled platform with sheet metal of not less than 27-gauge, with all exposed joints and edges folded under. Fire resistant paint is not acceptable. Platform must have flexible composition flooring not less than 3 mm (.125 in.) thick. For color, see Section 09 06 00, SCHEDULE FOR FINISHES. Adhesive material must be type recommended by manufacturer of flooring. Lay flooring flush with threshold plate and base.
- B. Provide a platform guard (toe guard) of not less than 12-gauge sheet-steel on the entrance side, extend 76 mm (3 in.) beyond each side of entrance jamb. Securely brace platform guard to car platform and bevel bottom edge at a 60-75-degree angle from horizontal. Install platform in the hoistway, so that the clearance between front edge and landing threshold must not exceed 32 mm (1.25 in.).

- C. Provide new isolation pads between the platform and platform frame. Use approved rubber pads or other approved material.
- D. Provide adjustable diagonal brace rods to hold platform firmly within car suspension frame.
- E. Balance car front to back and side to side. Provide balancing frame and weights, properly located, to achieve the required true balance.
- F. Provide a bonding wire between frame and platform.

SPEC WRITER NOTE: Cab interior is a basic design and can be modified to suit different building uses.

2.38 CAR ENCLOSURE: PASSENGER/SERVICE ELEVATORS

- A. Car enclosure must have a dome height inside the cab of 244 cm (8 ft).
- B. Securely fasten car enclosure to platform by through bolts located at intervals of not more than 457 mm (18 in.) running through an angle at the base of panels to underside of platform.
- C. Front return wall panel, entrance columns, entrance head-jamb and transom must be 14-gauge stainless steel. Transom must be full width of cab. Side and rear walls must be constructed of 14-gauge cold rolled steel. Coat exterior of walls with mastic sound insulation material approximately 2.5 mm (.09375 in.) thick followed by a prime coat of paint.
- D. Side and rear walls of passenger elevators may have raised panels covered in fire rated materials approved for use in elevator interior.
- E. Side and rear walls of service elevators, up to the center line of the top handrail, must be covered with stainless steel. Side and rear walls to the ceiling must be covered with // high pressure plastic laminate panels // stainless steel applied directly to the cab walls or raised panels //. Submit a method of fastening panels to steel walls.
- F. Construct canopy of not less than 12-gauge steel.
- G. Provide car top railings.
- H. Provide a hinged top emergency exit cover. Exit must be unobstructed when open and must have mechanical stops on the cover. Provide an exit switch to prevent operation of the elevator when the emergency exit is open.
- I. Provide duplex, GFCI protected receptacle in car. Locate flush-mounted receptacle on the centerline of the main car operating panel, 150 mm (6 in.) above the car floor.
- J. Lighting for passenger/service elevators:

1. Provide stainless steel hanging ceiling frame. Construct frame of 3.125 mm (.125 in.) thick x 38 mm (1.50 in.) wide x 38 mm (1.50 in.) high "T" and "L" sections divide ceiling into six panels.
 2. Provide LED illuminated car light fixtures above the ceiling panels. Maintain a minimum light level of 50-foot candles at 914 mm (36 in.) above the finished floor.
- K. Optional lighting for service elevators:
1. Provide car with indirect LED lamps mounted front to rear in lighting coves along each side of the cab ceiling, no hanging ceiling.
 2. Equip the lighting cove with asymmetrical reflectors having specular finish. Maintain a minimum light level of 50-foot candles 914 mm (36 in.) above finished floor at the car operating panels.
 3. Enclose the entire vertical space between the light trough outer edge and the cab canopy with approved opaque white or clear lumicite sheeting. Lumicite sheeting must be removable for cleaning and re-lamping.
- L. Provide a blower unit arranged to exhaust through an opening in the canopy. Provide a stainless or chrome plated fan grill around the opening. Provide 2-speed fan with rated air displacement of 250 cfm and 400 cfm at respective speeds. Mount fan on top of car with rubber isolation to prevent transmission of vibration to car structure. Provide screening over intake and exhaust end of blower. Provide a 3-position switch to control the unit in the service panel.
- M. Provide car enclosure with two sets of handrails with centerlines 762 mm and 1067 mm (30 in. and 42 in.) above the car floor, circumference not to exceed 152 mm (6 in.).
1. Locate handrails 38 mm (1.50 in.) from cab wall. Install handrails on // side and rear walls // side walls only for front and rear openings //. Conceal all handrail fastenings. Handrails must be removable from inside the car enclosure.
 2. Provide service elevators with flat stock handrails with the ends at the entrance turned back to the wall.
- N. Provide passenger car with center opening horizontal sliding doors and service car with center or side opening horizontal sliding doors constructed the same as hoistway doors. Door panels must be not less than 16-gauge sheet steel and not less than 32 mm (1.25 in.) thick flush type construction with the car side and leading edge wrapped in

one continuous piece of 16-gauge stainless steel. Top and bottom of door panels must have continuous stiffener channels welded in place. Reinforcement of the door panels must be approximately 1.0 mm (0.04 in.) in thickness and of the hat section type. Reinforce each door panel for hangers, interlock mechanism, opening and closing devices. Do not use hangers that are constructed integrally with the door panels.

- O. Hang doors on two-point suspension hangers having sealed ball-bearing sheaves not less than 76 mm (3 in.) in diameter, with non-metallic sound-reducing tires. Equip hangers with adjustable ball-bearing rollers to take upward thrust of panels. Provide two non-metallic door gibs on each door panel and a separate fire gib. Gibs must be replaceable without removing of door panel. One door panel for each entrance must bear a BOCA label, Underwriters' label, or other labels may be furnished provided they are based on fire test reports and factory inspection procedures acceptable to the COR. Fasten stainless steel sight guard of 14-gauge metal, extending full height of panel, to leading edge of fast speed panel of two-speed doors.
- P. Provide new hardware, tracks, gibs, separate fire gibs, gate switch, door drive clutch assemblies and door restrictor.
- Q. Provide one set of protective pads for service elevator of sufficient length to completely cover two sides, rear walls and front return of cab interior. Pads must consist of a minimum of 6 mm (.25 in.) thick glass fiber insulation securely sewn between flame resistant vinyl coated coverings. Color of the covering must be approved by the RE/CO or their representative. Provide stainless steel pad buttons or hooks, spaced at intervals of not more than 457 mm (18 in.) to adequately support pads.

2.39 POWER DOOR OPERATORS: PASSENGER/SERVICE ELEVATORS

- A. Provide a new high-speed heavy-duty door operator to automatically open the car and hoistway doors simultaneously when the car is level with the floor and automatically close the doors simultaneously at the expiration of the door-open time. Provide microprocessor door control with circuitry to constantly monitor and automatically adjust door operation based upon velocity, position and motor current. Motor must be of the high-internal resistance type, capable of withstanding high currents resulting from stall without damage to door operator/motor. The door operator must open the car door and hoistway door simultaneously, at a speed of 76.2 cm (2.5 ft) per second. Closing

speed of the doors must be 30.5 cm (1 ft) per second. Reversal of direction of the doors from the closing to opening operation, whether initiated by obstruction of the infrared curtain or the door "OPEN" button, must be accomplished within 38 mm (1.5 in.) maximum of door movement. Emphasis is placed on obtaining quiet interlock and door operation; smooth, fast, dynamic braking for door reversals and stopping of the doors at extremes of travel.

- B. Equip car doors with electric contact that prevents operation of car until doors are closed unless car is operating in leveling zone or hoistway access switch is used. Locate door contact to prevent its being tampered with from inside of car.
- C. Car and hoistway doors must be manually operable in an emergency without disconnecting the power door operating equipment unless the car is outside the unlocking zone.
 - 1. Doors to open by power unless the elevator is in the leveling zone.
 - 2. Provide infrared curtain unit. The device must cause the car and hoistway doors to reverse automatically to the fully open position should the unit be actuated while the doors are closing. Unit must function when the doors are not closed, except during firefighter's operation.
- D. Should the doors be prevented from closing for more than a predetermined adjustable interval of 20 to 60 seconds by operation of the curtain unit, the doors must stay open, the audio voice message and a buzzer located on the car must sound only on automatic operation. **Do not provide door nudging.**
 - 1. If an obstruction of the doors does not activate the photo-electric door control device and prevent the doors from closing for more than a predetermined adjustable interval of 15 to 30 seconds, the doors must reverse to the fully open position and remain open until the "Door Close" button re-establishes the closing cycle.
- E. Provide door "OPEN" and "CLOSE" buttons. When the door "OPEN" button is pressed and held, the doors, if in the open position, must remain open and if the doors are closing, they must stop, reverse and re-open. Momentary pressure of the door "CLOSE" button must initiate the closing of the doors prior to the expiration of the normal door open time.

SPEC WRITER NOTE: Delete sections 2.40
- 2.47 if freight elevator is not
required.

2.40 CORRIDOR OPERATING DEVICES: FREIGHT ELEVATORS

- A. Provide one riser of landing call buttons located on the door lock release side of the entrances for each freight elevator in this specification.
- B. Fixtures for intermediate landings must contain "UP" and "DOWN" buttons. Fixtures for terminal landings must contain a single "UP" or "DOWN" button.
- C. Each button must contain an integral registration LED light that must illuminate upon registration of a call and must extinguish when that call is answered.
- D. The direction of each button must be legibly and indelibly identified by arrows not less than 12.5 mm (.50 in.) high in the face of each button.
- E. Provide in each hall station a momentary pressure door "OPEN" button and a continuous pressure door "CLOSE" button. These devices must be inoperative unless the car is at the respective landing.

2.41 HOISTWAY ENTRANCES: FREIGHT ELEVATOR

- A. Hoistway doors must be power opened and closed vertical sliding, bi-parting doors, complete with frames, threshold, interlocks and accessories. Door panels must have Underwriter's label or equal.
- B. Door frames must be structural steel channels rigidly connected to hoistway with head members reinforced and welded at corners. Extend side frames full floor height to provide fastenings on inside of hoistway for door guides tracks.
- C. Sills must be metal plates of non-slip type not less than 9 mm (.375 in.) thick, same width as jamb openings and securely anchored to floor construction. Provide structural steel angles as fastenings required for thresholds.
- D. Construct door panels of not less than 11-gauge formed steel plates welded to frame angles and shaped to develop a maximum strength. Provide lower edge of upper steel plate panel with fire resistant, non-shearing, non-crushing resilient member, minimum 51 mm (2 in.) diameter. Rigid astragal overlapping meeting edge is prohibited. Provide upper edge of each lower steel plate panel with a metal sill supported at each side of door opening by adjustable stops and capable of carrying load equal to capacity of car.

- E. Provide each door panel frame with four fixed or adjustable, malleable iron, mill-grooved, guide shoes not less than 63 mm (2.50 in.). Securely fasten continuous, steel guide rails to hoistway construction.
- F. Connect door panels to each other with adjustable rods and flexible cable chains, running over double race, ball bearing, malleable iron, machined sheaves secured to door guide rail. Upper door panel must balance the bottom panel.
- G. Where pass type doors are required, attach pivoting metal lintel to the top of upper door panel to close space between door and hoistway wall.
- H. Provide upper panel of each door with one vision panel of polished clear wired glass secured on hoistway side. Area of the vision panel must reject a ball 152 mm (6 in.) in diameter.
- I. Provide pull straps on inside and outside faces of each manually operated hoistway door for manual opening and closing.
- J. Provide unique car number on every elevator entrance at designated level, minimum 76 mm (3 in.) in height.

2.42 ELECTRIC INTERLOCKS: BI-PARTING HOISTWAY FREIGHT DOORS

- A. Equip each hoistway door with interlocks that must prevent operating of car until doors are locked in closed position. Interlocks must prevent opening of door at landing from corridor side unless car is at rest at landing, in the leveling zone, or hoistway access switch is used. Provide tamperproof interlocks and lock both panels of doors together.
- B. Provide retiring cams or other devices for hoistway door interlocks securely fastened to cars and arranged to operate without objectionable noise and vibration.

2.43 CAR GUIDES: FREIGHT ELEVATORS

- A. Provide each shoe with renewable non-metallic gibs of durable material having low coefficient of friction and long-wearing qualities, when operated on guide rails receiving infrequent, light applications of rail lubricant. Gibs containing graphite or other solid lubricants are not acceptable.
- B. Guide shoes of approved design, other than swivel type, may be used provided they are self-aligning on all three faces of the guide rails.
- C. Provide spring take-up in car guide shoes for side play between rails.

2.44 CAR FRAME: FREIGHT ELEVATOR

- A. Car frame must be constructed of steel plates and structural shapes securely riveted, bolted, or welded together. No iron casting will be permitted. The entire assembly must be rugged construction and amply

braced to withstand unequal loading of platform. Car frame members must be constructed to relieve the car enclosure of all strains. Balance car front to back and side to side. Provide balancing weights and frames, properly located, to achieve the required true balance.

2.45 CAR PLATFORM: FREIGHT ELEVATOR

- A. The platform must be designed to withstand the forces developed under Class "C1" loading conditions. Cover underside and all exposed edges of wood filled platform with sheet metal of not less than 27-gauge with all exposed joints and edges folded under. Top flooring must consist of // first quality tongue-and-groove maple not less than 19 mm (.75 in.) thick and given 2 coats of liquid filler // steel or aluminum diamond plate not less than 4.5 mm (.1875 in.) thick //. Provide car entrance with a one-piece metal threshold with non-slip surface.
- B. Provide adjustable diagonal brace rods to hold platform firmly within car suspension frame.
- C. Provide a platform guard (toe guard) of not less than 12-gauge sheet-steel on the entrance side, extend 76 mm (3 in.) beyond each side of entrance jamb. Securely brace platform guard to car platform and bevel bottom edge at a 60-75-degree angle from horizontal. Clearance between front of platform and landing threshold must not exceed 32 mm (1.25 in.).
- D. Isolate the platform from the car frame by approved rubber pads or other equally effective means.
- E. Provide a bonding wire between frame and platform.

2.46 CAR ENCLOSURE: FREIGHT ELEVATOR

- A. Car enclosure walls and return panels from entrance columns to side wall must be sectional flush panels formed of not less than 12-gauge steel extending from the floor to underside of ceiling. Enclose the top with sectional flush steel panels not less than 12-gauge steel. Provide top of car with hinged emergency exit with a mechanical stop and an electrical contact that will prevent movement of the elevator when exit is open. Provide recess for car operating panel.
- B. Provide car entrance with power operated // one // two // section wire mesh vertical sliding gate. Gate must extend full width of car and constructed of not less than 11-gauge wire woven to 38 mm (1.50 in.) diameter mesh set in reinforced steel frame. Expanded metal of 10-gauge may be used in lieu of wire mesh.

- C. Equip car gate with guide shoes to run on vertical steel guides securely braced and held in rigid alignment. Connect gate to counterweights with chains running over ball or roller bearing sheaves securely fastened to guides. Counterweights must equally balance gate. Gate must not project into hoistway opening when raised. Equip car gate with electric contact.
- D. Provide LED illuminated car lights mounted flush with the inside of the ceiling. Maintain a minimum light level of 20-foot candles at the floor.
- E. Provide two permanently mounted stainless steel signs inside elevator. One sign must bear the **Class loading and markings**. The other sign must bear the legend "**THIS IS NOT A PASSENGER ELEVATOR. NO PERSONS OTHER THAN THE OPERATOR AND FREIGHT HANDLERS ARE PERMITTED TO RIDE ON THIS ELEVATOR**".
- F. Provide car top railing.

2.47 POWER DOOR OPERATORS: BI-PARTING FREIGHT DOORS AND CAR GATE

- A. Provide power operators for car gate and hoistway doors with // automatic open and // automatic close // button operated controls // to open and close the car and hoistway doors when the car is level with a floor. Microprocessor door control must have circuitry to continuously monitor and automatically adjust door operation based on velocity, position and motor current. Motors must have high-internal resistance, capable of withstanding high currents resulting from doors stalling without damage to the motor. Hoistway doors and car gate must open automatically when the car reaches floor level with the landing when a stop is made. Provide a timer to hold the car gates and hoistway doors open for an adjustable predetermined period up to 120 seconds.
- B. Operating speed for hoistway doors and car gate must be 30.5 cm (1 ft) per second during high-speed operation.
- C. Provide re-opening devices, safety shoe and infrared sensor on each car gate that must, in the event the car gates meet an obstruction while closing, immediately stop and re-open the car gate. Design this device and adjust it to minimize the possibility of injury to persons by the gate.
- D. The hoistway door must open two-thirds of its travel before the car door or gate starts to open. The car gate must close two-thirds of its travel before the hoistway door starts to close.

- E. Provide encoded speed control, time control or limit switches to control motors as the doors and gates approach their limits of travel in the opening and closing directions.
- F. Install electric power door operators inside the hoistway rigidly supported. Mount electric gate operator on the car on rigid framed supported members.
- G. Each door and gate must be manually operable in an emergency without disconnecting the power door operating equipment unless the car is outside the unlocking zone.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine work of other trades on which the work of this Specification depends. Report defects to the RECO or authorized representative in writing that may affect the work of elevator contractor.
- B. Examine elevator hoistway openings for plumb, level, in line and that elevator pit is proper size, waterproofed and drained with necessary access door and ladder.
- C. Examine machine room for proper illumination, heating, ventilation, electrical equipment and beams are correctly located complete with access stairs and door.
- D. If the Elevator Contractor requires changes in size or location of trolley beams, beam supports and trap doors, etc., to accomplish their work, changes must be justified, subject to approval of the Contracting Officer and include additional cost in their bid.
- E. Work required prior to the completion of the elevator installation:
 - 1. Supply of electric feeder wires to the terminals of the elevator control panel, including circuit breaker.
 - 2. Provide light and GFCI outlets in the elevator pit and machine room.
 - 3. Furnish electric power for testing and adjusting elevator equipment.
 - 4. Furnish circuit breaker panel in machine room for car and hoistway lights and receptacles.
 - 5. Supply power for cab lighting and ventilation from an emergency power panel specified in Division 26, ELECTRICAL.
 - 6. Machine room enclosed and protected from moisture, with self-closing, self-locking door and access stairs.
 - 7. Provide fire extinguisher in machine room.

- F. Provide to General Contractor for installation; inserts, anchors, bearing plates, brackets, supports and bracing including all setting templates and diagrams for placement.

3.2 ARRANGEMENT OF EQUIPMENT

- A. Arrange equipment in machine room so that major equipment components can be removed for repair or replacement without dismantling or removing other equipment in the same machine room. Locate controller near and visible to its respective hoisting machine.

3.3 WORKMANSHIP, INSTALLATION AND PROTECTION

- A. Installations must be performed by Certified Elevator Mechanics and Apprentices to best possible industry standards. Details of the installation must be mechanically and electrically correct. Materials and equipment must be new and without imperfections.
- B. Recesses, cutouts, slots, holes, patching, grouting, refinishing to accommodate installation of equipment must be included in the Contractor's work. All new holes in concrete must be core drilled.
- C. Structural members must not be cut or altered. Work in place that is damaged or defaced must be restored equal to original new condition.
- D. Finished work must be straight, plumb, level and square with smooth surfaces and lines. All machinery and equipment must be protected against dirt, water, or mechanical injury. At completion, all work must be thoroughly cleaned and delivered in perfect unblemished condition.
- E. Sleeves for conduit and other small holes must project 51 mm (2 in.) above concrete slabs.
- F. Exposed gears, sprockets and sheaves must be guarded from accidental contact.

3.4 CLEANING

- A. After completion of installation and prior to final inspection, all equipment must be thoroughly cleaned of grease, oil, cement, plaster, dust and other debris.
- B. Clean machine room and equipment.
- C. Perform hoistway clean down.
- D. Prior to final acceptance remove protective coverings from finished or ornamental surfaces. Clean and polish as required for type of material.

3.5 PAINTING AND FINISHING

- A. All equipment, except specified as architectural finish, must be painted one coat of approved color, conforming to manufacturer's standard.

- B. Hydraulic Pump Assembly must be painted with manufacturer's standard finish and color.
- C. Controller, sheave, car frame and platform, counterweight, beams, rails and buffers except their machined surfaces, cams, brackets and all other uncoated ferrous metal items must be painted one factory primer coat or approved equal.
- D. Stencil or apply decal floor designations not less than 101 mm (4 in.) high on hoistway doors, fascia, or walls within door restrictor areas. The color of paint used must contrast with the color of the surfaces to which it is applied.
- E. Elevator pump/motor machine, controller, main line switch/shunt trip circuit breaker, bolster channel and cross head of car must be identified by 101 mm (4 in.) high numerals and letters located as directed. Numerals must contrast with surrounding color and must be stenciled or decaled.
- F. Hoistway Entrances of Passenger and Service Elevators:
 - 1. Door panels must be given rust resistant treatment and a factory finish of one coat of baked-on primer and one factory finish coat of baked-on enamel.
 - 2. Fascia plates, top and bottom shear guards, dust covers, hanger covers and other metalwork, including built-in or hidden work and structural metal, (except stainless steel entrance frames and surfaces to receive baked enamel finish) must be given one approved prime coat in the shop and one field coat of paint of approved color.
- G. Hoistway Entrances of Freight Elevators:
 - 1. Metal surfaces of doors and frames must receive shop prime coat.
 - 2. Finish painting, after installation, must be one coat of paint of approved color.
- H. Elevator Cabs for Passenger and Service Elevators:
 - 1. Interior and exterior steel surfaces must be given rust resistant treatment before finish is applied.
 - 2. Interior steel surfaces must be factory finished with one coat of paint of approved color.
 - 3. Give exterior faces of car doors one finish coat of paint of approved color.
- I. Elevator Cabs for Freight Elevators:

1. Give interior of cab one prime coat and a minimum of one coat of paint of approved color.
2. Give exterior of cab one prime coat and one finish coat of paint of approved color.
3. All surfaces of door frames, door panels and cab interior surfaces that become damaged or marred must be restored to original condition before final acceptance of work.

3.6 PRE-TESTS AND TESTS

- A. Pre-test the elevators and related equipment in the presence of the Resident Engineer/Contracting Officer or authorized representative for proper operation before requesting final inspection. Conduct final inspection at other than normal working hours, if required by Resident Engineer.
 1. The VA must obtain the services of an Independent Qualified Elevator Inspector, QEI-1 Certified Elevator Inspector. The QEI must utilize an Elevator Acceptance Inspection Form to record the results of inspection and all testing and to identify safety code and contract deficiencies. Specific values must be provided for all tests required by ASME A17.1, ASME A17.2 and contract documents. After completion of inspection and testing, the QEI must sign a copy of the completed form and provide it to the Contracting Officer. Within 14 days of the inspection, the QEI must also prepare a formal inspection report, including all test results and deficiencies. After successful completion of inspection and testing, the QEI will complete, sign and provide a certificate of compliance provide by the VA.
 2. Government must provide electric power including necessary current for starting, testing and operating machinery of each elevator.
 3. Contractor must furnish the following test instruments and materials on-site and at the designated time of inspection: properly marked certified test weights, voltmeter, amp probe, thermometers, direct reading tachometer, megohm meter, vibration meter, sound meter, light meter, stopwatch and a means of two-way communication.
- B. Inspection of workmanship, equipment furnished and installation for compliance with specification.
- C. Full-Load Run Test: Elevators must be tested for a period of one-hour continuous run with full contract load in the car. The test run must

consist of the elevator stopping at every floor, in either direction of travel, for not less than five or more than ten seconds per floor.

- D. Speed Test: The actual speed of the elevator must be determined in both directions of travel with full contract load and no load in the elevator. Speed must be determined by certified tachometer. The actual measured speed of the elevator with all loads in either direction must be within three (3) percent of specified rated speed. Full speed runs must be quiet and free from vibration and sway.
- E. Temperature Rise Test: The temperature rise of the pump motor must be determined during the full load test run. Temperatures must be measured using thermometers. Under these conditions, the temperature rise of the equipment must not exceed 50 degrees Centigrade above ambient temperature. Test must start when all machine room equipment is within five (5) degrees Centigrade of the ambient temperature. Other tests for heat run on motors must be performed as prescribed by the Institute of Electrical and Electronic Engineers.
- F. Car Leveling Test: Elevator car leveling devices must be tested for accuracy of leveling at all floors with no load in car and with contract load in car in both directions of travel. Accuracy of floor level must be within plus or minus 3 mm (.125 in.) of level with landing floor for which the stop has been initiated regardless of load in car or direction of travel. The car leveling device must automatically correct over travel as well as under travel and must maintain the car floor within plus or minus 3 mm (.125 in.) of level with the landing floor regardless of change in load.
- G. Insulation Resistance Test: The elevator's complete wiring system must be free from short circuits and ground faults and the insulation resistance of the system must be determined by use of megohm meter, at the discretion of the Elevator Inspector conducting the test.
- H. Overload Devices: Test all overload current protection devices in the system at final inspection.
- I. Limit Stops:
 - 1. The position of the car when stopped by each of the normal limit switches with no load and with contract load in the car must be accurately measured.
 - 2. Final position of the elevator relative to the terminal landings must be determined when the elevator has been stopped by the final limits. The lower limit stop must be made with contract load in the

elevator. Elevator must be operated at inspection speed for both tests. Normal limit stopping devices must be inoperative for the tests.

- J. Working Pressure: Verify working pressure of the hydraulic system by pressure gauge placed in the system line. Take readings with no load and full load in car.
- K. Test automatic shut-off valve for proper operation.
- L. Operating and Signal System: The elevator must be operated by the operating devices provided and the operation signals and automatic floor leveling must function in accordance with requirements specified. Starting, stopping and leveling must be smooth and comfortable without appreciable steps of acceleration or deceleration.
- M. Performance of the Elevator supervisory system must be witnessed and approved by the elevator inspector and a representative of the Resident Engineer.
- N. Evidence of malfunction in any tested system or parts of equipment that occurs during the testing must be corrected, repaired, or replaced at no additional cost to the Government and the test repeated.
- O. If equipment fails test requirements and a re-inspection is required, the Contractor must be responsible for the cost of re-inspection; salaries, transportation expenses and per-diem expenses incurred by the Elevator Inspector and RE/CO or authorized representative.

3.7 INSTRUCTION OF VA PERSONNEL

- A. Provide competent instruction to VA personnel regarding the operation of equipment and accessories installed under this contract, for a period equal to one eight-hour workday. Instruction must commence after completion of all work and at the time and place directed by the Resident Engineer/Contracting Officer or authorized representative.
- B. Written instructions in triplicate relative to care, adjustments and operation of all equipment and accessories must be furnished and delivered to the RE/CO or authorized representative in independently bound folders. DVD recordings will also be acceptable. Written instructions must include correct and legible wiring diagrams, nomenclature sheet of all electrical apparatus including location of each device, complete and comprehensive sequence of operation, complete replacement parts list with descriptive literature and identification and diagrams of equipment and parts. Information must also include electrical operation characteristics of all circuits, relays, timers,

electronic devices and related characteristics for all rotating equipment.

- C. Provide supplementary instruction for any new equipment that may become necessary because of changes, modifications or replacement of equipment or operation under requirements of paragraph entitled "Warranty of Construction".

3.8 GUARANTEE PERIOD OF SERVICE: ELEVATOR MAINTENANCE SERVICE AND INSPECTIONS

- A. Provide complete maintenance service and inspections on each elevator installation for a period of one (1) year after completion and acceptance of each elevator in this specification by the Resident Engineer. This maintenance service must run concurrently with the warranty. Maintenance work must be performed by Certified Elevator Mechanics and Apprentices.
- B. This contract cover full maintenance including emergency call back service, inspections and servicing the elevators listed in the schedule of elevator. The Elevator Contractor must be required to perform the following:
 - 1. Monthly systematic examination of equipment.
 - 2. During each maintenance visit the Elevator Contractor must clean, lubricate, adjust, repair and replace all parts as necessary to keep the equipment in like new condition and proper working order.
 - 3. Furnishing all lubricant, cleaning materials, parts and tools necessary to perform the work required. Lubricants must be only those products recommended by the manufacturer of the equipment.
 - 4. As required, motors, controllers, selectors, leveling devices, operating devices, switches on cars and in hoistways, hoistway doors and car doors or gate operating device, interlock contacts, guide shoes, guide rails, car door sills, hangers for doors, car doors or gates and signal system must be cleaned, lubricated and adjusted.
 - 5. Guide rails and bottom of platforms must be cleaned every three months. Car tops and machine room floors must be cleaned monthly. Accumulated rubbish must be removed from the pits monthly. A general cleaning of the entire installation including all machine room equipment and hoistway equipment must be accomplished quarterly. Cleaning supplies and vacuum cleaner must be furnished by the Contractor.
 - 6. Maintain the performance standards set forth in this specification.

7. The operational system must be maintained to the standards specified hereinafter including any changes or adjustments required to meet varying conditions of hospital occupancy.
8. Maintain smooth starting, stopping, running and accurate leveling.
- C. Maintenance service must not include the performance of work required because if improper use, accidents and negligence for which the Elevator Contractor is not directly responsible.
- D. Provide 24-hour emergency call-back service that must consist of promptly responding to calls within two hours for emergency service should a shutdown or emergency develop between regular examinations. Overtime emergency call-back service must be limited to minor adjustments and repairs required to protect the immediate safety of the equipment and persons in and about the elevator.
- E. Service and emergency personnel must report to the Resident Engineer or his authorized representative upon arrival at the hospital and again upon completion of the required work. A copy of the work ticket containing a complete description of the work performed must be given to the RE, CO, or authorized representative.
- F. The Elevator Contractor must maintain a logbook in the machine room. The log must list the date and time of all bi-weekly examinations and all trouble calls. Each trouble call must be fully described including the nature of the call, necessary correction performed, or parts replaced.
- G. Written "Maintenance Control Program" must be in place to maintain the equipment in compliance with ASME A17.1 Section 8.6.

SPEC WRITER NOTE: Delete all spec writer notes including this one and correct paragraph spacing.

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