

SECTION 14 21 11**TRACTION CARTLIFT**

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 of the specification includes the engineering, furnishing, and modernization of the complete traction cartlift system as described herein and as indicated on the Contract drawings.
- B. Items listed in the singular apply to each cartlift in this specification, except where noted.
- C. Cartlift #C__ must be geared traction, microprocessor controller, AC VVVF motor control, central station dispatching, car leveling device, power operated car and hoistway doors and Class "C3" loading rated.

CARTLIFT SCHEDULE	
Cartlift Number	
Overall Platform Size	
Rated Load - kg(lb)	
Contract Speed - m/s(fpm)	
Total Travel - m/s(ft)	
Floors Served	
Number of Openings	
Type of Roping	
Entrance Type and 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 and 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 three years of successful experience, trained supervisory personnel, and facilities to install cartlift 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 made by welders and welding operators 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 satisfactorily performing elevator installations of similar type and magnitude.
- E. Approval of Elevator Contractor's equipment will 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. 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.
- F. Equipment within a group of electric traction cartlifts must be the product of the same manufacturer.
- G. 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. Cartlift installation must 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
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. Gauges:
- Sheet and Plate: U.S. Standard (USS)
- Wire: 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 Seismic Design Manual H-18-8

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 dumbwaiter 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 cartlift unit specified including:
 - a. Hoisting machines, controllers, governors, power conversion devices, and all other components located in machine room.
 - b. Car, counterweight, sheaves, supporting beams, guide rails, brackets, buffers, size of car platform, car frame members, and other components located in hoistway.
 - c. Rail bracket spacing and maximum vertical forces on guide rails in accordance with VA Seismic Design Manual H-18-8.
 - d. Reactions at points of supports and buffer impact loads.
 - e. Weights of principal parts.
 - f. Top and bottom clearances and over travel of car and counterweight.
 - 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, 75 mm x 125 mm (3 in. x 5 in.).
 2. One each hall button sample.
 3. One each hall lantern/position indicator sample.
 4. One each wall and ceiling material finish sample.
 5. 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 dumbwaiter layouts:
 1. Hoisting machine.
 2. Hoisting machine motor, HP rating, and RPM.
 3. Controller.
 4. Starters and overload current protection devices.
 5. Car and counterweight safety devices; Type "B" safeties, Governor, and Rope Gripper.
 6. Electric Door Operator; HP, RPM, Voltage, and Ampere rating of motor.
 7. Hoistway Door Interlocks.
 8. Car and Counterweight Buffers; maximum and minimum rated loads, maximum rated striking speed, and stroke.
 9. Cab Ventilation Unit; HP rating and CFM rating.
 10. Hoist and Compensation Ropes; breaking strength, allowable working load, and actual working load.
- F. Complete construction drawings of dumbwaiter enclosure, showing dimensioned details of construction, fastenings to platform, car lighting, and location of car equipment.
- G. Complete dimensioned detail of vibration-isolating foundation for traction hoisting machine.
- H. Dimensioned drawings showing details of:
 1. All signal and operating fixtures.
 2. Car and counterweight roller/slide guides.
 3. Hoistway door tracks, hangers, and sills.

- I. Cuts or drawings showing details of controller.
- J. Provide certificates as required under: Paragraph "QUALIFICATIONS".

1.6 WIRING DIAGRAMS

- A. Provide three complete sets of paper and one electronic set 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 cartlift machine room as directed by the Resident Engineer.
- 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 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 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 TOOL CABINET

- A. Provide a metal parts/tool cabinet, having two shelves and hinged doors. Cabinet size must be 1219 mm (48 in.) high, 750 mm (30 in.) wide, and 450 mm (18 in.) deep.

1.8 PERFORMANCE STANDARDS

- A. The cartlift 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 cartlift. Speed variation under all load conditions, regardless of direction of travel, must not vary more than three (3) percent.
 - 2. Starting, stopping, and leveling must be smooth without appreciable steps of acceleration and deceleration.

- B. The door operator must open the car door and hoistway door simultaneously at .3 m (1 ft) per second and close at .3 m (1 ft) per second.
- C. Floor level stopping accuracy must be within 3 mm (.125 in.) above or below the floor, regardless of load condition.
- D. Noise and Vibration Isolation: All cartlift 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.
- E. Sound Isolation: Noise level relating to cartlift equipment operation in machine room must not exceed 80 db. All db readings must be taken three (3) feet off the floor and three (3) feet from equipment.
- F. Airborne Noise: Measured noise level of cartlift equipment during operation must not exceed 50 db in cartlift lobbies under any condition including door operation.

1.9 WARRANTY

- A. Submit all labor and materials furnished regarding cartlift 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 cartlift.
- 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.

1.10 POWER SUPPLY

- A. For power supply in each machine room, see Specification 26 05 19, Electrical specifications, and Electrical drawings.
- B. Main Line 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.

1.11 EMERGENCY POWER SUPPLY

- A. Emergency power supply, its starting means, transfer switch for transfer of cartlift 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 Cartlift Controller Manufacturer) to terminals in the group cartlift 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.

1.12 MACHINE ROOM AND MACHINE SPACE

- A. Provide a machine room that meets the requirements of ASME A17.1, NEC, and IBC.
- 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 60 cm (24 in.).
- C. Locate the light switch on the lock side of the door inside the machine room.
- D. Locate sprinkler pipes to provide 210 cm (7 ft) head clearance. Do not locate sprinkler heads, heat detectors, and smoke detectors directly over cartlift equipment.

1.13 HOISTWAY LIGHTING

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

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 all stainless steel surfaces must be protected with suitable material.

- B. Where cold rolled steel is specified, it must be low-carbon steel rolled to stretcher leveled 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 cartlift 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 furnished in conjunction with component of this cartlift installation, provide 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 cable, in rigid zinc-coated steel or aluminum conduit, electrical metallic tubing or metal wireways. Rigid conduit smaller than 18.75 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. Wireways (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. cm (18 in.) in length unsupported, for short connections between risers and limit switches, interlocks, and for other applications permitted by NEC.

- B. All conduit 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 motor 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 conductor 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 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. 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.
- D. 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, and VVVF Drive for hoist motor control. Complete details of the components and printed circuit boards, together with a complete operational description, must be submitted for approval.
- 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.

2.8 EMERGENCY POWER OPERATION

- A. The control system for Cartlift(s) must provide for the operation of at least one cartlift per 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 cartlift controllers and remote selector panel as required to permit the cartlifts 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 cartlift must function the same as on normal power.

2.9 CALL-AND-SEND OPERATION: CARTLIFTS

- A. Car must be dispatched from landing by automatically/manually closing car door and hoistway door and pressing call button for the landing corresponding to floor to be served, provided interlocked circuits have been established.
- B. Car must be called to such landing by pressing button at floor to be served and must proceed to destination.
- C. Car door must be opened automatically/manually after car has stopped at landing.

- D. Landing push buttons must be ineffective during travel of car through hoistway and for sufficient time after car has stopped to allow automatic/manual opening of car door and hoistway door.

2.10 CORRIDOR OPERATING STATIONS

- A. Operating stations and control panel must be stainless steel, flush mounted in or adjacent to the hoistway entrances.
 - 1. All faceplates must have edges beveled at 15 degrees.
 - 2. Fasten all faceplates with non-corrosive stainless steel tamperproof screws.
 - 3. Operating push buttons in faceplates must be designed so that pressure on contact must be independent of pressure on operating push button.
 - 4. Each switch and operating device must have indelible, 6 mm (1/4 in.) high legends to indicate its identity and position.
- B. Provide each floor served by cartlift with a complete set of operating push buttons with 12.5 mm (.50 in.) numbers in the face of the button corresponding to the floors served. Push buttons must not protrude beyond the faceplate when in normal position. Call register lights must be LED illuminated located in the buttons. Illuminate the floor numeral corresponding to the call registered. Provide an "In Use" light in three panels to show when cartlift is in operation or the door is open.
- C. Provide cartlift with a control panel at the makeup area and as shown on drawings, containing the following:
 - 1. Key operated "ON/OFF" service switch.
 - 2. Call and Send buttons to upper floors.
 - 3. A red LED illuminated indicator light to indicate a malfunction in the system.

2.11 CORRIDOR LANTERN/POSITION INDICATOR

- A. Provide each cartlift with combination corridor lantern/position indicator digital display mounted over the hoistway entrances at each and every floor. Each lantern must contain a single stroke chime so connected that when the cartlift arrives at a landing, the chime must sound momentarily. The lenses in each lantern must be red LED illuminated. Lanterns must signal in advance of cartlift arrival at the landing. Audible signal must not sound when a cartlift passes the floor without stopping. Provide adjustable sound level on audible signal. Car riding lanterns are not acceptable.

- B. Provide alpha-numeric digital position indicators directly over hoistway landing entranceways between the arrival lanterns at each floor. Indicator faceplate must be stainless steel. Numerals must be not less than 25 mm (1 in.) high. Cover plates must be readily removable for re-lamping.
- C. Provide LED illumination in each compartment to indicate the position and direction the cartlift is traveling by illuminating the proper alpha-numeric symbol. When the cartlift is standing at a landing without direction established, arrows must not be illuminated.

2.12 MACHINE BEAMS

- A. Provide structural steel beams required for direct support of an attachment to building structure of hoist machine, deflector sheaves, overhead sheaves, governor, and rope dead-end hitch assemblies.
- B. Provide bearing plates, anchors, shelf angles, blocking, embedment, etc., for support and fastening of machine beams or equipment to the building structure.
- C. Provide hold-down bolts for offset hoist machines located beside or under hoistway where concrete hold-down pad is provided.

2.13 GEARLESS AND GEARED TRACTION MACHINE

- A. Provide geared/gearless traction machine with an AC motor, brake, drive sheave, and deflector sheave mounted in proper alignment on an isolated bedplate.
- B. Provide hoist machine mounted direct drive, digital, closed-loop velocity encoder.
- C. Drive sheaves must be free from cracks, sand holes, and other imperfections that would tend to injure the hoist ropes. Sheave must be turned smooth and true with rope grooves of proper design to insure maximum traction and maximum life of the hoist ropes. Traction sheave must be mechanically coupled to the hoist motor shaft centered in a positive manner.
- D. Hoisting machine brake must be drum or disc type and must stop and hold the cartlift with 125 percent of rated load.

2.14 DEFLECTOR SHEAVES

- A. Provide deflector sheaves with a metal basket type guard mounted below the sheave and a guard to prevent ropes from jumping out of grooves. Securely fasten guard to sheave support beams.
- B. Two-to-one idler sheaves on car and counterweight, if used, must be provided with metal guards that prevent foreign objects from falling

between ropes and sheave grooves and to prevent ropes from jumping out of grooves.

SPEC WRITER NOTE: If hoisting machine is located at bottom of hoistway or offset from hoistway, include paragraph C.

- C. Securely mount overhead sheaves on overhead beams in proper alignment with basement traction sheave, car and counterweight rope hitches or sheaves. Provide blocking beams where sheaves are installed on two or more levels.

2.15 HOIST ROPES

- A. Provide elevator with the required number and size of ropes to ensure adequate traction and required safety factor. Hoisting ropes must be pre-formed 8 x 19 or 8 x 25 traction steel, conforming to Federal Specification RR-W-410 with minimum nominal diameter of 0.50 inch.
- B. Securely attach a corrosion resistant metal data tag to one hoisting rope fastening on top of the elevator.

2.16 HOIST ROPE COMPENSATION

- A. Provide compensation when required by controller or drive machine manufacturer. Compensation must consist of a necessary number and size of encapsulated chains attached to the underside of car and counterweight frames.
 1. Provide pit guide to minimize chain sway.
 2. Provide take-up to compensate for hoist rope stretch.
 3. Pad areas where compensation may strike car or hoistway items.

2.17 GOVERNOR ROPE

- A. Governor Rope must be 6 x 19 or 8 x 19 wire rope, preformed traction steel, uncoated, fiber core, conforming to Federal Specification RR-W-410 with minimum nominal diameter of 0.375 in. having a minimum safety factor of five (5). Tiller rope construction is not acceptable.
- B. Under normal operation, rope must run free and clear of governor jaws, rope guards, and other stationary parts.
- C. Securely attach governor rope tag to governor rope releasing carrier.

2.18 SPEED GOVERNOR

- A. Provide Centrifugal type car driven governor to operate the car safety device // and counterweight governor to operate the counterweight safety device //. Governor must be complete with weighted pit tension sheave, governor release carrier and mounting base with protected cable sleeves.

- B. Provide overspeed switch and speed reducing switches when required.
- C. The governor rope clamping device must be designed to prevent appreciable damage to or deformation of the governor rope that results from the stopping action of the device operating the safety.
- D. Provide metal guard over top of governor rope and sheaves.
- E. Where the cartlift travel does not exceed 100 feet, the weight tension sheave may be mounted on a pivoted steel arm in lieu of operating in steel guides.

2.19 CAR // AND COUNTERWEIGHT // SAFETY DEVICE

- A. Provide "Type A Safeties" on the cartlift // and counterweight //.

2.20 ASCENDING CAR OVERSPEED PROTECTION

- A. Provide a device, direct acting on the suspension means, to prevent ascending over speed and unintended motion away from the landing.

2.21 CAR AND COUNTERWEIGHT BUFFERS

- A. Provide buffer(s) for each cartlift and each counterweight. Securely fasten buffers and supports to the pit channels and in the alignment with striker plates on cartlift and counterweight. Each installed buffer must have a permanently attached metal plate indicating its stroke and load rating. Buffer anchorage must not puncture pit waterproofing.

2.22 COUNTERWEIGHT

- A. Cartlift must be counterweighted to the extent of the weight of the car plus 40-50 percent of the rated capacity load, as required by controller manufacturer.
- B. Furnish two (2) tie rods with cotter pins and double nuts at top and bottom. Install counterweight retaining plates or other approved means on tie rods to prevent counterweight sub-weights from jumping and/or rattling. Both ends of tie-rods must be visible and accessible.

2.23 CAR AND COUNTERWEIGHT GUIDES

- A. Install on cartlift and counterweight frame four flexible sliding swivel guide shoes each assembled on a substantial metal base to permit individual self-alignment to the guide rails.
- B. 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.

- C. 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.
- D. Provide spring take-up in cartlift guide shoes for side play between rails.

2.24 GUIDE RAILS, SUPPORTS, AND FASTENINGS

- A. Guide rails for cartlift and counterweight must be planed steel T-sections and weigh // 12 kg/m (8 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 necessary rail brackets of sufficient size and design to secure substantial rigidity to prevent spreading or distortion of rails under any condition.
- D. Guide rails must extend from channels on pit floor to within 75 mm (3 in.) of the underside of the concrete slab or grating at top of hoistway with a maximum deviation of 3 mm (.125 in.) from plumb in all directions. Provide a minimum of 18 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.

2.25 NORMAL AND FINAL TERMINAL STOPPING DEVICES

- A. Mount 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 125 percent of rated elevator capacity at any speed obtained in normal operation.
 - 2. Switches, when opened, must permit operation of **cartlift** 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.

2.26 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.

2.27 WORKMAN'S LIGHTS AND OUTLETS

- A. Provide duplex GFCI protected type receptacles and lamps with guards on top of each cartlift. 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.

2.28 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 cartlift crosshead on the side of the cartlift nearest to the hoistway doors used for accessing the top of the cartlift.

2.29 LEVELING DEVICE

- A. Cartlift must be equipped with a two-way leveling device to automatically bring the cartlift to within 3 mm (.125 in.) of exact level with the landing for which a stop is initiated regardless of load in cartlift or direction of travel.
- B. If the cartlift 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.

2.30 EMERGENCY STOP SWITCHES

- A. Provide an emergency stop switch, push to stop/pull to run, for each cartop 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.

2.31 IN CAR OPERATING PANEL

- A. Recess car operating panel into side wall to prevent damage from carts.
 1. Stop Switch - push to stop/pull to run, red with contrasting letters.
 2. Light Switch - Toggle Switch on/off.
 3. Access Enable Key Switch - on/off.

2.32 HOISTWAY ACCESS

- A. Provide hoistway access switches for cartlift at top terminal landing to permit access to top of car, and at bottom terminal landing to permit access to pit. Mount the access key switch and the "On/Off" access enabled switches in the top and bottom corridor hall stations next to the hoistway entrance 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, locked door release system (key access) for cartlifts.

2.33 HOISTWAY ENTRANCES

- A. Each entrance must have bi-parting or vertical sliding doors.
- B. Frame must be not less than 16-gauge, stainless steel assembled at corners and secured with smoothly dressed, welded joints. Sill must be rigidly anchored and not less than 11-gauge stainless steel, and must be set true, straight, and level with hoistway edges plumb over each

other. Reinforce sill as indicated on the drawings. Sill must be grouted full length after installation.

- C. Provide each door panel frame with four fixed or adjustable, malleable iron, mill-grooved, guide shoes not less than 62 mm (2.5 in.). Weight and method of fastening to frames and hoistway, above and below, must conform to a standard practice of cartlift manufacturer. Provide gibs, struts from floor-to-floor, chains, and steel sheaves with sealed ball or roller bearings. Provide guides and stops for door travel.
- D. Door panels must be flush, hollow metal construction and bear a 1.5 hour Underwriters' "B" label, one inch thick, of not less than 16-gauge stainless steel on both sides. Panels must be reinforced. Interior of panels must be filled with fireproof material. Upper door section must be fitted with a safety non-crushing astragal and a glass vision panel of 6 mm (.25 in.) thick, wire glass not less than 75 mm (3 in.) nor more than 100 mm (4 in.) in diameter.
- E. Door operators must be heavy duty close loop power operators designed to automatically open car and hoistway doors upon arrival of car at each landing. Door must close automatically upon completion of loading and unloading cycles. Door "opening" and "closing" speed must be one foot per second. Design, construction, and installation of doors and power operator must preclude the possibility of doors opening until the car stop at a landing.
- F. Entrances must be installed and protected by plastic or paper covering to prevent damage during construction. Frames must be furnished with wall anchors to assure additional rigidity.
- G. Equip each hoistway door with an interlock, functioning as hoistway unit system, to prevent operation of the cartlift until all hoistway doors are locked in closed position.
- H. 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.
- I. Wiring installed from the hoistway riser to each door interlock must be NEC type SF-2 or equivalent.

2.34 CARTLIFT FRAME

- A. Car frame must be constructed of channel stiles, crosshead, gussets, braces, and cable hitch plate 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.

B. Provide a bonding wire between frame and platform.

2.35 CARTLIFT ENCLOSURE

A. Car must have width and depth required for contract load and constructed of minimum 14-gauge stainless steel except car floor must be minimum 10-gauge stainless steel. Car floor must be reinforced to provide adequate support for loading and unloading unit and withstand impact of wheeled carts.

1. Provide car entrance with vertical sliding or vertical bi-parting door constructed of sheet panels of stainless steel, guided, and connected to each other by cables running over sheaves mounted at top of car. Car door must be opened automatically and closed automatically by power operator. Provide automatic reversing edge on underside of upper door section or a curtain scanning device.

2. Provide a flush mounted light fixture in car ceiling. Light must be connected to illuminate automatically when car arrives at landing and hoistway door is opened and must be automatically extinguished when hoistway door is closed.

3. Provide metal nameplate in car showing name of manufacturer, rated load in pounds, and stamped, etched, or raised letters.

B. A service demand bell with a 75 mm (3 in.) diameter gong must be provided on the cartlift car. Bell must be arranged to sound when a pushbutton is pressed while the car is standing at a floor with the doors open.

C. Car top railings must be provided where required.

2.36 POWER DOOR OPERATOR

A. Provide door and gate operators with automatic open and // automatic // button operated // controls 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 cm (1 ft) per second during high speed operation.
- C. Provide re-opening devices, safety shoe and infrared sensor on the 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 Resident Engineer 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 or their supports and trap doors, etc., to accomplish their work, he must justify the changes, 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
 7. Provide fire extinguisher in machine room.
- F. Provide to General Contractor for installation stairs; inserts, anchors, bearing plates, brackets, supports and bracing including all templates and diagrams for placement.

3.2 ARRANGEMENT OF EQUIPMENT

- A. Arrange equipment in machine room setting 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 50 mm (2 in.) above concrete slabs.
- F. Hoist cables that are exposed to accidental contact in the machine room and pit must be completely enclosed with 16-gauge sheet metal or expanded metal guards.
- G. Exposed gears, sprockets, and sheaves must be guarded from accidental contact.

3.4 CLEANING

- A. Upon completion of installation and prior to final inspection, all equipment must be thoroughly cleaned of grease, oil, cement, plaster, 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 surfaces with regard to 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. Hoist machine, motor, must be factory 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 100 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. Cartlift hoisting machine, controller, governor, main line shunt trip circuit breaker, safety plank, and cross head of car must be identified by 100 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 cartlift:
 - 1. Door panels must be stainless steel with a brushed finish.
 - 2. Fascia plates, toe guards, dust covers, hanger covers and other metal work, including built-in or hidden work and structural metal, (except stainless steel entrance frames and surfaces to receive baked enamel finish) must be given an approved prime coat in the shop, and one field coat of paint of approved color.

3.6 PRE-TEST AND TEST

- A. Pre-test the cartlift and related equipment in the presence of the Resident Engineer or his 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 a third party QEI 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. Upon completion of inspection and testing, the QEI must sign a copy of the completed form and provide to the Contracting Officer. Within 2 weeks of the inspection, the QEI must also prepare a formal inspection report, including all test results and deficiencies. Upon successful completion of inspection and testing, the QEI will complete, sign, and provide a certificate of compliance with ASME A17.1.
 2. Government must furnish 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: certified test weights, voltmeter, megohm meter, amp-meter and amp probe, thermometers, direct reading tachometer, vibration meter, sound meter, light meter, and a means of two-way communication.
- B. Inspection of workmanship, equipment furnished, and installation for compliance with specifications.
- C. Balance Tests: The percent of counterbalance must be checked by placing test weights in car until the car and counterweight are equal in weight when located at the mid-point of travel. If the actual percent of counterbalance does not conform to the specification, the amount of counterweight must be adjusted until conformance is reached.
- D. Full-Load Run Test: Cartlift 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 cartlift stopping at all floors, in either direction of travel, for not less than five or more than ten seconds per floor.
- E. Speed Test: The actual speed of the cartlift must be determined in both directions of travel with full contract load and no load in the cartlift. Speed must be determined by applying a certified tachometer to the car hoisting ropes or governor rope. The actual measured speed of the cartlift 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.

- F. Temperature Rise Test: The temperature rise of the hoisting motor must be determined during the full load test run. Temperatures must be measured by the use of thermometers. Under these conditions, the temperature rise of the equipment must not exceed 50 degrees Centigrade above ambient temperature. Test must be started only when all parts of equipment are within five (5) degrees Centigrade of the ambient temperature at time of starting test. Other tests for heat runs on motors must be performed as prescribed by the Institute of Electrical and Electronic Engineers.
- G. Car Leveling Test: Cartlift leveling devices must be tested for accuracy of leveling at all floors with no load in car, balanced 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 any 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.
- H. Brake Test: The action of the brake must be prompt and a smooth stop must result in the up and down directions of travel with no load and rated load in the elevator. Down stopping must be tested with 125 percent of rated load in the cartlift.
- I. Insulation Resistance Test: The cartlift complete wiring system must be free from short circuits and grounds and the insulation resistance of the system must be determined by use of megohm meter, at the discretion of the Inspector conducting the test.
- J. Safety Devices and Governor Tests: The safety devices and governor must be tested.
- K. Overload Devices: Test all overload current protection devices in the system at final inspection.
- L. Limit Stops:
 - 1. The position of the car when stopped by each of the normal limit stops with no load and with contract load in the car must be accurately measured.
 - 2. Final position of the cartlift relative to the terminal landings must be determined when the cartlift has been stopped by the final

limits. The lower limit stop must be made with contract load in the cartlift. Cartlift must be operated at inspection speed for both tests. Normal limit stopping devices must be inoperative for the tests.

- M. Oil Buffer Tests: If provided, these tests must be conducted with operating device and limit stops inoperative and with contract load in the cartlift for the car buffer and with no load in the cartlift for the counterweight buffer. Preliminary test must be made at the lowest (leveling) speed. Final tests must be conducted at contract speed. Buffers must compress and return to the fully extended position without oil leakage.
- N. Operating and Signal System: The cartlift 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.
- O. 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.
- P. 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 representative of the Resident Engineer.

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 day. Instruction must commence after completion of all work and at the time and place directed by the Resident Engineer.
- B. Written instructions in triplicate relative to care, adjustments, and operation of all equipment and accessories must be furnished and delivered to the Resident Engineer 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 CARTLIFT GUARANTEE PERIOD OF SERVICE: MAINTENANCE SERVICE AND INSPECTIONS

- A. Furnish complete maintenance service and inspections on each cartlift installation for a period of one (1) year after completion and acceptance of each cartlift 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 will cover full maintenance including emergency call back service, inspections, and servicing the cartlifts listed in the schedule of elevators. The Elevator Contractor must 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 first class condition and proper working order.
 3. Furnish all lubricants, cleaning materials, parts and tools necessary to perform the work required. Lubricants must be products recommended by the manufacturer of the equipment.
 4. Equalizing tension, shorten or renew hoisting ropes where necessary to maintain the safety factor.
 5. 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, signal system, car safety device, governors, tension, and sheaves in pit must be cleaned, lubricated, and adjusted.
 6. Guide rails, overhead sheaves and beams, counterweight frames, 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.
7. Maintain the performance standards set forth in this specification.
 8. The operational system must be maintained to the standards specified hereinafter including any changes or adjustments required to meet varying conditions of hospital occupancy.
 9. Maintain smooth starting and stopping and accurate leveling.
- C. Maintenance service must not include the performance of work required as a result of 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 person and equipment using the cartlift.
 - 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 Resident Engineer or authorized representative.
 - F. The Elevator Contractor must maintain a log in the machine room. The log must list the date and time of all monthly 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.

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