



SECTION 14 21 00 - HEAVY DUTY TRANSIT TYPE MACHINE ROOM-LESS ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes heavy duty machine-room-less electric traction passenger and service elevators. Conventional geared or gearless equipment should be employed where passenger capacity needs or material movement needs exceed those offered within machine room-less product lines.

1.2 DEFINITIONS

- A. Definitions in the latest version of ASME A17.1 apply to work of this Section.
- B. Defective Elevator Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
- C. Service Elevator: A passenger elevator that is also used to carry freight.
- D. Reference to a device or a part of the equipment applies to the number of devices or parts required to complete the installation.

1.3 SUBMITTALS

- A. Refer to Section 14 20 00, 3.7.2.
- B. Product Data
 - 1. Submit manufacturer's product data for each product and material.
 - 2. Indicate manufacturer, trade names, and model numbers, components, arrangement, optional and accessories being provided.
 - 3. Include applicable literature, catalog material or technical brochures.
 - 4. Include material and equipment specifications, sizes, types, dimensions, weights, rated capacities, and performance curves.
 - 5. Include utility requirements for wiring, piping, and service connection data, motor sizes complete with electrical characteristics.
- C. Shop Drawings
 - 1. Six (6) copies of the layout and shop drawings shall be provided by the contractor for review within three weeks of notice to proceed.
 - 2. All drawings, views and details shall be developed and presented in accordance with ANSI Y14.3 Multi and Sectional View Drawings.



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3. Drawings shall clearly reflect dimensional data for elevator hoistways including cross references to building column lines and finish elevations depicted in the Contract Drawings.
4. Elevator layout shall be shown in three orthogonal views and shall include key dimensions, support details, power connection locations and power connection terminal points.
5. Shop drawings: Six (6) copies of the shop drawings shall be provided by the Installer. Submit approval layout drawings to scale. Drawings shall include, but not be limited to the following:
 - a. Car, guide rails, buffers and other components in hoistway.
 - b. Maximum rail bracket spacing.
 - c. Maximum loads imposed on guide rails requiring load transfer to the building structure.
 - d. Loads on hoisting beams.
 - e. Clearances and travel of car and counterweight run-by.
 - f. Clear inside hoistway and pit dimensions.
 - g. Location and sizes of access doors, hoistway entrances and frames.
 - h. Car & Hall signal and operating fixtures.
 - i. Remote wiring layouts for each elevator.
 - j. Refuge space on top of car and pit.
 - k. Control room, machine area, pit and hoistway layout.
 - l. Cab design, dimensions and layout.
 - m. Hoistway-door and frame details.
6. Complete assembly detail of machine, machine mounting, machine beam assembly, dead end hitch and beam assemblies, governors, safeties, counterweights, with all load calculations.
7. Shop drawings shall include complete schematic and connection diagrams for the controller and all electrical devices including a legend for components.
8. Controller information should include complete I/O list.
9. All drawings shall be provided on CD-ROM in AutoCAD 2008 format.

D. Samples

1. Submit six (6) samples minimum 4" by 4" in size of all finish materials including but not limited to the following:
 - a. Cab Flooring.
 - b. Ceiling, including surface material, supporting frame and light fixture.
 - c. Cab Interior including car door, front return, wall finish etc.
 - d. Fixture faceplate.
2. Samples shall be clearly labeled to reflect:
 - a. Project Name
 - b. Contract Number
 - c. Description of Sample

- E. Maintenance Control Programs:** within sixty (60) days after notice to proceed, and prior to installation, Installer shall submit detailed equipment specific interim and revenue service



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Maintenance Control Programs, showing functions to be performed and their scheduled frequency.

- F. Operating and Maintenance manuals: Prior to installation, Installer shall submit six (6) complete sets of Operation and Maintenance manuals for approval. After LAWA approval and prior to the beginning of acceptance testing, six (6) sets of the approved manuals shall be provided by the Installer. Provide all material on CD-ROM in a format approved by LAWA. The manuals shall include the following:
1. Complete table of contents.
 2. Complete instructions regarding operation and maintenance of equipment, including complete illustrated, exploded views of all assemblies, and a complete, illustrated, exploded view for identifying all system parts.
 3. Complete nomenclature of replaceable parts, part numbers, current cost, and warehouse location. If product source is another vendor, Installer shall include name and address of other vendor.
 4. Sample copies of a preventive maintenance chart.
 5. Descriptions of safety devices.
 6. Safety rules, tests, and procedures, including testing of all systems and subsystems.
 7. Procedures for adjusting all elevator equipment, including pictorials.
 8. Troubleshooting techniques.
 9. Detailed lubrication and cleaning schedule indicating weekly, monthly, quarterly, semiannual, and annual lubrication; and a description of each lubrication point, lubrication type, and specification.
 10. Control and schematic electrical wiring diagrams of controller, including wiring of safety devices to connections with remote indication and control panels for each elevator or group of elevators.
 11. Electrical layout showing placement of lighting, light switches, receptacles, light fixtures, disconnect switches, and convenience outlets in machinery/control room spaces and pits.
 12. Complete detailed drawings and wiring diagram of elevator system fault-finding device and connection to annunciator panel.
 13. As built drawings for final elevator installation, controller and truss wiring. Also provide As-built drawings on CD-ROM in AutoCAD 2008 format.
- G. Certification
1. The elevator manufacturer shall provide copies of all documents related to maintenance, safety, operations, design changes, modifications, retrofits, etc., which relate to any part, component, equipment, system, subsystem, or material and services applicable to the elevators provided.
 2. All of the above referenced shall be provided as it pertains to the original installation and for a period of ten (10) years after final acceptance of the last elevators provided under any contract.
 3. The referenced material shall be provided within thirty (30) days of publication or internal distribution by the elevator manufacturer. The material, even if labeled PROPRIETARY, shall be delivered without prejudice or delay and at no additional cost.
 4. Provide all material on CD-ROM in a format approved by the Owner.
- H. MSDS and product data sheets: Shall be submitted with an index listing each product, along with the application method of the product, approximate quantity of product per elevator and



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the component the product is applied to or associated with. The Installer shall allow 6 (six) weeks for review of MSDS.

- I. Senate Bill 1886 Submittals: Provide copies of all Code Authority/permit submittals.

1.4 QUALITY ASSURANCE

- A. Regulatory agencies: elevator design, materials, construction clearances, workmanship, and tests shall conform to the requirements of the codes and regulations listed in Part 1.5.
- B. Welding: Welding shall be performed in accordance with the requirements of AWS or CWB. Welders shall produce evidence of current certification by AWS or CWB.
- C. Requirements of Regulatory Agencies
 - 1. Installer shall obtain and pay for all necessary permits, and perform such tests as may be required for acceptance and approval of elevators by jurisdictional agencies.
 - 2. Installer shall notify the proper inspectors to witness required testing.
- D. Factory Visit
 - 1. The Installer shall provide for the costs of up to three of LAWA's representatives to visit the factory where the elevators are being manufactured, per contract, per unit type.
 - 2. Installer shall not ship the elevator without the approval of LAWA's representative after the conclusion of the factory visit.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packing, Shipping Packing, Shipping, Handling, and Unloading
 - 1. Accept equipment, materials, and other Products on site in factory containers, bundles, and shipping skids.
- B. Delivery and Acceptance at Site
 - 1. Deliver material in original packages, containers, skid loads, or bundles bearing brand names and identification of source of manufacture or supply.
 - 2. Inspect deliveries for damage.
- C. Storage and Protection
 - 1. Store materials inside under cover and in a dry location.
 - 2. Protect from weather, direct sunlight, surface damage, corrosion, and construction traffic and activity.
 - 3. Installer shall make necessary provisions to protect systems from damage, deterioration, and environmental conditions during installations and until elevator systems are fully operative.
- D. Handling
 - 1. Handle material to prevent damage to edges, ends, surfaces, and finishes.



1.6 INSTALLATION CONTRACT ACCEPTANCE, WARRANTY, INTERIM SERVICE AGREEMENT AND SERVICE AGREEMENT

- A. Warranty: The Contractor shall warrant in writing that all equipment manufactured and installed under this Contract be free of defects in design, materials, and workmanship, under normal use and service (“Warranty”) for a period of twelve (12) months. Defects in design, materials, and workmanship shall be repaired or replaced with all materials and labor at no additional cost to LAWA (“Warranty Work”). (Defects shall include, but not be limited to, noisy, rough, or substandard operation; failures; loose, damaged, and missing parts; and fluid leaks.)
- B. In addition to the Warranty
1. Contractor shall provide, concurrently with each Warranty Period, a 1-Year Preventative Maintenance (“PM”) service for all units.
 2. Beginning one year after the Contract Completion Date, the Contractor shall provide a 5-Year Extended Preventative and Routine Maintenance Service Agreement (“SA”), per Section 14 20 00, 3.7.2 and Exhibit A, for all units installed in this Contract.
 3. The 5-year SA period shall be executed in strict compliance with all of the terms and conditions set forth in Exhibit A (“Exhibit A”). Upon conclusion of the SA, the parties may mutually agree to extend the SA for an additional sixty (60) months, via a renewable option (“Option”).
- C. The Contract/Warranty, PM, Interim and SA services shall include all services necessary to maintain the equipment in proper working order for use at a major international airport including, but not limited to.
1. “Tasks”:
 - a. Inspection of completed installation and periodic testing to maintain elevators in completely operable, like new condition.
 - b. Provide preventative maintenance on elevators for a minimum of four (4) hours each month (Total On-Site Time). Provide monthly documentation of the same to LAWA.
 - c. Periodic lubrication of parts and equipment components as per OEM’s recommendation. Charts are to be provided for each elevator indicating when services are provided.
 - d. Perform work without removing elevators from service during peak traffic periods determined by LAWA as 7:00 a.m. to 10:30 p.m. daily.
 - e. Provide twenty (24) hour emergency service during the maintenance period consisting of a prompt response (within 30 minutes) to emergency request by telephone or otherwise from LAWA or designated representative if an elevator is inoperable or in case of injury, entrapment, or potential injury to persons.
 - f. Unlimited regular time callbacks are included with a required response time of one (1) hour. Regular time will be Monday through Friday, 8:00am to 4:30pm, exclusive of holidays. Overtime/Premium time call backs originating from an operational error related to the performance requirements of the equipment shall be borne by the Contractor.
 - g. All other services as required by Section 14 20 00, 3.7.2 and Exhibit A.



1.7 EXTENDED PREVENTATIVE AND ROUTINE MAINTENANCE SERVICE AGREEMENT

- A. The Contractor shall perform the SA (including all tasks listed herein and in Exhibit A) for a period of sixty (60) months from the date of Elevator Warranty expiration, or one year after the Contract Completion Date, whichever is later. A Faithful Performance Bond and a Payment Bond (“SA Bonds”), each for 100 percent of the contract price for the SA shall be submitted for LAWA approval no less than 30 days prior to Contract Completion Date. The SA Bonds shall be submitted to the City Attorney for approval as to form.
- B. Optional Second 5-year SA: No less than six (6) months prior to the conclusion of the 60 month SA, the parties may mutually agree to extend the SA (“Extended SA”) for a single, additional 60 month period at a cost no greater than 9percent more than the amount of the initial SA. Should the parties mutually agree, a Faithful Performance Bond and a Payment Bond, each for 100 percent of the contract price for the Extended SA shall be submitted for LAWA approval no less than one (1) month prior to the conclusion of the initial 60 month SA.
- C. All Contract Provisions, Appendices and Addenda, as well as the Conditions of Section 14 20 00, 3.7.2 and Exhibit A shall govern the SA and the Extended SA.

1.8 GUARANTEES

- A. Notwithstanding the Specifications forming a part of this Contract, any inspection or approval of the Work, or the existence of any patent or trade name, the Installer nevertheless unconditionally guarantees that the equipment furnished and installed hereunder shall be of the best quality, shall be fully fit for the purpose for which it is intended, and shall be of the heavy duty transit type in compliance with APTA guidelines unless augmented per these contract documents.

1.9 LAWA INSTRUCTION/DEMONSTRATION AND COORDINATION

- A. The manufacturer shall provide eight (8) hours of onsite demonstration and instructions to LAWA and existing service personnel upon completion of the elevator installation. Instructions are to include safety procedures, proper operation of all equipment, and routine maintenance procedures. All instructions and demonstrations are to be video recorded and remain the property of LAWA.
- B. Check operation of the elevators with LAWA’s personnel or designated representative present not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

PART 2 - PRODUCTS:

2.1 GENERAL:

- A. Installer shall furnish and install elevators that shall comply with the following requirements:



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1. All elevators supplied under this contract shall be the product of a single manufacturer.
- B. Subject to compliance with the requirements of the Section, Elevator Cab design shall be per Contract Drawings.

2.2 MATERIALS:

- A. Except where product conformance to specific standards is indicated on the Contract Drawings and in ASME/ANSI A17.1, OEM's standard materials and equipment may be used in elevator construction, subject to approval. Materials cited below are intended to establish the standard of quality for comparable materials used by the manufacturer.
- B. Structural Shapes, Plates, Sheets, and Tubing: ASTM A36 Steel.
- C. Sheet Steel: ASNI/ASTM A446, Grade B.
- D. Stainless Steel: ASTM A167, Type 316L
 1. Stainless steel with embossed texture to be rolled into exposed surface.
 2. Type 304 or 316L, match specified color/finish in drawings.
 3. No. 4: Directional polish (satin finish). Graining directions as shown or, if shown, in longest dimension.
 4. No. 8: Reflective polish (mirror finish).
 5. Textured: 5WL or 4LB as manufactured by Rigidized Metals or Windsor pattern 5-SM as manufactured by Rimex Metals or approved equal with .050 inches mean pattern depth with bright directional polish (satin finish).
 6. Burnished: Non-directional, random abrasion pattern.
- E. Aluminum: ASTM B211 or ASTM B221, Alloy 6061, T6.
- F. Flooring: as specified.
- G. Plastic Laminate: ASTM E84 Class A and NEMA LD3.1, Fire-Rated Grade (GP-50), Type 7, 0.050" plus or minus .005" thick, color and texture as follows:
 1. Exposed Surfaces: Color and texture selected by Architect.
 2. Concealed Surfaces: Provider's standard color and finish.
- H. Fire-Retardant Treated Particle Board Panels: Minimum 3/4 inch thick backup for natural finished wood and plastic laminate veneered panels, edged and faced as shown, provided with suitable anti-warp backing; meet ASTM E84 Class "I" rating with a flame-spread rating of 25 or less, registered with Local Authorities for elevator finish materials.
- I. Natural Finish Wood Veneer: Standard thickness, 1/40-inch thoroughly dried conforming to ASME/HPMA HP-1983, Premium Grade. Place veneer, tapeless spliced with grain running in direction shown, belt and polish sanded, book-matched. Species and finish designated and approved by Architect.
- J. Paint: Clean exposed metal parts and assemblies of oil, grease, scale, and other foreign matter and factory paint one shop coat of standard rust-resistant primer. After erection, provide one finish coat of industrial enamel paint. Galvanized metal need not be painted.



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- K. Prime Finish: Clean all metal surfaces receiving a baked enamel paint finish of oil, grease, and scale. Apply one coat of rust-resistant primer followed by a filler coat over uneven surfaces. Sand smooth and apply final coat of primer.
- L. Baked Enamel Finish: Prime finish per above. Unless specified "prime finish" only, apply and bake three (3) additional coats of enamel in the selected solid color.
- M. Glass: Laminated safety glass, minimum 9/16-inch thick, conforming to ANSI Z97.1 and CPSC 16 CFR Part 1201.

2.3 SPECIAL FEATURES:

- A. General
 - 1. Elevator size, arrangement and capacity shall be justified via thorough analysis of passenger and material transport needs and shall comply with design criteria specified in this Section 3.7.1 and 3.7.2. Elevators shall be provided in accordance with the requirements of CCR Title 8 and the ASME A17.1-Safety Code for Elevators and Escalators, hereinafter in this Section the "Code".
 - 2. Provide all material and equipment necessary for the complete execution of all elevator work as specified in this Section and as shown on the Contract Drawings.
 - 3. Provide hoistway guards for protecting hoistway during construction. In existing terminals, hoistway protection shall include high solid panels surrounding each hoistway opening at each floor.
 - 4. All electric equipment, conduit, fittings and wiring shall conform to the requirements of ANSI/NFPA No. 70 National Electric Code.
 - 5. Provide concrete inserts and other similar anchoring devices for the installation of guide rails, machinery and other elevator components. Epoxy ceiling anchors or epoxy side wall anchors shall not be permitted.
 - 6. Clearance around equipment located in each elevator control room and machine area shall comply with the applicable provisions of ANSI/NFPA No. 70 National Electrical Code.

2.4 SUMMARY OF FEATURES:

- A. Machine Room-Less Passenger Elevators

Elevator Use	Passenger C-3 Loading
Contract Load, in Pounds	4000 minimum
Contract Speed, in FPM	350 for travel distances of 20'-0" or more. 200 for travel distances of less than 20'-0"
Machine Location	Overhead in hoistway
Machine Type	Gearless
Type of Control	AC variable voltage, variable frequency



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Operation	Simplex selective collective or Group automatic
Platform Size	8'-0" wide by 6'-2" deep
Clear Car Inside	7'-8" wide by 5'-5" deep
Car and Hoistway Door Size	4'-0" wide by 7'-0" high
Car and Hoistway Door Type	Single speed, side slide center opening
Car and Hoistway Door Operation	Power operated. High-speed, heavy-duty (minimum opening speed 3.0 FPS)
Hoistway Entrance	As specified
Cab Enclosure	As specified
Car Operating Station	Dual
Direction Indicator	Hall
Hall Call Stations	Single riser
Special Features:	Fire Control Panel, Machine Room Monitor, Load Weighing Device, Communication System, Security Features, Handicap Features, Standby Power, Monitoring Features

B. A. Machine Room-Less Service Elevators

Elevator Use	Service C-3 Loading
Contract Load, in Pounds	5000 minimum
Contract Speed, in FPM	350 for travel distances of 20'-0" or more. 200 for travel distances of less than 20'-0"
Machine Location	Overhead in hoistway
Machine Type	Gearless
Type of Control	AC variable voltage, variable frequency
Operation	Simplex selective collective or Group automatic
Platform Size	6'-0" wide by 9'-4" deep
Clear Car Inside	5'-8" wide by 8'-4" deep
Car and Hoistway Door Size	4'-6" wide by 7'-0" high



Car and Hoistway Door Type	Two speed, side slide
Car and Hoistway Door Operation	Power operated. High-speed, heavy-duty (minimum opening speed 3.0 FPS)
Hoistway Entrance	As specified
Cab Enclosure	As specified
Car Operating Station	Single (Dual with front and rear entrances)
Direction Indicator	Hall
Hall Call Stations	Single riser
Special Features:	Fire Control Panel, Machine Room Monitor, Load Weighing Device, Communication System, Security Features, Handicap Features, Standby Power, Door Hold Button, Monitoring Features

2.5 CAR PERFORMANCE:

- A. Car Speed: $\pm 3\%$ of contract speed under any loading condition.
- B. Car Capacity: Safely lower, stop and hold 125% of rated load.
- C. Car Leveling Zone: $\pm 1/4"$ under any loading condition.
- D. Door Opening Time:
 - 1. Passenger Elevators: 1.8 seconds.
 - 2. Service Elevators: 3.0 seconds.
- E. Door Closing Time:
 - 1. Passenger Elevators: 2.7 seconds.
 - 2. Service Elevators: 5.1 seconds.
- F. Car Floor-to-Floor Performance Time: Seconds from start of doors closing until doors are $-3/4$ open and car level and stopped at next successive floor under any loading condition or travel direction. (Based on a floor height of 16'-0". Adjust .3 seconds per foot of travel for 200 fpm elevators and .2 seconds for 350 fpm elevators.)
- G. Car Ride Quality
 - 1. All elevators shall have a maximum decibel reading of 65 dBA with the doors closed during a run in the up direction, measured 5 feet above the floor in the center of the cab.
 - 2. All elevators shall have a maximum vibration of 15 milligrams in the X, Y and Z axis measured with an A95 filter.
 - 3. Acceleration and Deceleration: Smooth constant and not more than 3 feet/second² with initial ramp between 0.5 and 0.75 second.
 - 4. Sustained Jerk: Not more than 8 feet/second³.



2.6 DOOR OPERATOR EQUIPMENT

- A. Provide GAL's MOVFRW-HSL door operator with encoder-less VVVF drive or approved equal. Closed loop door operator designed to operate car and hoistway doors simultaneously at the speed specified. Door shall open automatically when car stops at landing to discharge passengers or to answer valid calls and close automatically after predetermined time interval has elapsed. The doors shall be capable of smooth and quiet operation without slam or shock. Door operator to have the following features.
1. 1/2 hp motor and heavy duty sprocket, chain, belt, and sheaves.
 2. Closed loop regulated speed performance.
 3. Hand-held keypad programming.
 4. Adjustments can be stored in the keypad and downloaded to another operator.
 5. Adjustable door obstruction reversal unit.
 6. Optical cams with LED indicators.
 7. Test switches for open, close, nudging and speed zone set up.
 8. Universal inputs for open, close, and nudging.
 9. Reversing switch to back up the door reversal device.
- B. Cab Door Interlock. The doors on cab doors shall be equipped with approved cab door interlocks of the cab unit system type tested as required by the Code.
1. Interlock shall prevent operation of the car away from a landing until doors are locked in the closed position. Interlock shall prevent doors from opening at any position within the hoistway and or landing from the cab side unless car is at rest at that landing, or is in the leveling zone and stopping at that landing.
 2. Provide an electric contact mounted on the car that will prevent the car from moving away from landing unless car doors are closed.
- C. Door Control Device
1. Door Protection – Electronic Entrance Detector Screen: Provide an electronic door detector device and or approved equal, which projects a three dimensional infrared curtain of light guarding the door opening. Arrange to reopen doors if one beam of the curtain is penetrated. Unit shall have transmitters and receivers spaced at a minimum distance to provide the maximum amount of protection within the height of the doorway. Systems, which have the availability to turn Off or On individual zones within the curtain, will not be allowed.
 2. Nudging Operation: After beams of door control device are obstructed for a predetermined time interval (minimum 20.0 – 25.0 seconds), a warning signal shall sound and doors shall attempt to close with a minimum of 2.5 foot pounds kinetic energy. Activation of the door open button shall override nudging operation and reopen doors.
 3. Interrupted Beam Time: When beams are interrupted during initial door opening, hold door open a minimum of 3.0 seconds. When beams are interrupted after the initial 3.0 second hold time, reduce time doors remain open to an adjustable time of approximately 1.0 – 1.5 seconds after beams are reestablished.
 4. Differential Door Time: Provide separately adjustable timers to vary time that doors remain open after stopping in response to calls.
 - a. Car Call: Hold open time adjustable between 3.0 and 5.0 seconds.
 - b. Hall Call: Hold open time adjustable between 5.0 and 8.0 seconds.



2.7 HOISTWAY EQUIPMENT

- A. Guide Rails
 - 1. Guides shall be steel T-section rails. Rail surfaces shall be machined smooth to ensure proper operation of guides. Rail ends shall be accurately machined with tongue and matching groove centrally located on web. Non wearing rail surfaces are to be painted in color selected by the Architect/LAWA.
 - 2. Guides shall be joined and installed in accordance with Section 2.23 of the Code.
 - 3. Guide rails are not to be in view from within the elevator cab.
- B. Car Buffers: Oil type with blocking and support for car contract speeds exceeding 200 fpm. Spring type for speeds of 200 fpm or less.
- C. Counterweight Buffers: Oil type with blocking and support for contract speeds exceeding 200 fpm. Spring type for speeds of 200 fpm or less.
- D. Roller Guides: Roller guides shall be mounted on top and bottom of the car and counterweight frames to engage the guide rails. Provide slide guides with renewable oil less inserts where C3 loading is required.
- E. Suspension Means: If steel core ropes are supplied, a means to provide constant lubrication shall be provided.
- F. Machine: AC gearless machine, with permanent magnet synchronous motor, direct current electromechanical disc brakes and integral traction drive sheave. Machine to be mounted to the car guide rail or support beam mounted at the top of the hoistway.
- G. Deflector Sheaves: Provide machined and grooved sheave for diameter of ropes. All bearings are to be shielded or sealed.
- H. Stop Switch: An enclosed stop switch, mounted in the pit of each elevator in accordance with the Code, shall prevent operation of elevator when switch is activated. Switch shall be of the type described in Rule 2.2.6 of the Code.
- I. Emergency Auxiliary Stop Switch: An enclosed stop switch, mounted in the over-head machine area and/or on the machine of each elevator in accordance with Rule 2.7 of the Code, shall prevent operation of elevator when switch is activated. Switch shall be of the type described in Rule 2.7 of the Code.
- J. Dead End Hitch Assemblies: Provide dead end hitch assemblies in accordance with engineered loading requirements.
- K. Counterweight: Counterweights shall consist of a steel frame welded or bolted together and necessary steel weight sections. These weight sections shall be held securely in place within the frame. A minimum of two (2) tie rods shall pass through the holes in all weight sections. Paint color as selected.
 - 1. A required counterweight screen where no compensation is used.
 - 2. The bottom of the counterweight shall have a buffer striking plate and means to attach knock-off blocks during rope stretch.



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- L. Idler Sheave: To be located directly above the counterweight frame and integral with counterweight frame. The sheave material shall be accurately machined of semi-steel of hardness BHN 220-250 or as per manufacturer's requirements.
- M. Governor: Friction type over-speed self-resetting governor rated for the duty of the elevator specified and to operate the car safety. The finish of pit tension sheave shall be factory paint.
 - 1. Locate the governor where the car or the counterweight in case of over-travel cannot strike it, and where there is adequate space for full movement of governor parts.
 - 2. An electrical governor overspeed protective switch that, where operated, shall remove from the driving machine motor and brake before or at the time of application of the safety.
 - 3. Seal and tag the governor with the running speed, tripping speed, and date last tested as required by Code.
 - 4. Operation/rest of the governor shall not require the installation of an overhead access panel. Status of the governor shall be capable of being monitored remotely at the elevator controller.
- N. Tension Sheave: Provide tension sheave in accordance with OEM's governor and car safety loading requirements.
- O. Terminal Limits: Limit switches shall slowdown and stop the car at the terminals if the primary automatic stopping system fails.
- P. Life Safety Provisions: Life safety hooks and/or other life safety devices for fall protection or prevention to be in accordance with OSHA standards/guidelines. Life safety hook, and/or other life safety devices locations to be coordinated and installed by the Installer.

2.8 MACHINE COMPONENTS

- A. Motor
 - 1. The motors shall be of the alternating current reversible asynchronous or synchronous type of a design adapted to the severe requirements of elevator service. Motor shall be capable of developing the torque required to meet or exceed an acceleration rate of 2 ft/sec² for the elevator car.
 - 2. A means to protect the windings and bearings from airborne dust shall be provided.
 - 3. Insulation of all windings shall be impregnated and baked to prevent absorption of moisture and oil. The insulation resistance between motor frame and windings shall not be less than one meg-ohm. The motor windings shall stand a dielectric test of twice the normal voltage plus 1000 RMS volts of 60 Hertz, alternating current for one minute.
 - 4. Motor leads in the conduit box shall have the same insulation class as the windings. Motor lead wire shall be rated 125 C and shall be sized for 105 C at the motor nameplate amperes at 1.0. Power Factor per Electrical Apparatus Service Association (EASA) recommendations. Leads are to be numbered for clockwise rotation when facing opposite the shaft end.
 - 5. The motor shall be designed to stand the severe loads encountered in elevator service and the windings shall have a minimum insulation temperature rating two ratings higher than the actual temperature rise of the motor, with a minimum rating of NEMA class F.
 - 6. The motor shall be designed to the ASME A17.1 rated load requirements.



B. Brake

1. Provide dual brakes that shall be of the self-adjusting fail-safe (spring applied and electrically released) type provided with a remotely operated, in the controller room, manual brake release and designed to meet the service factor demand of its intended use. Access panels at the top of hoistway shall not be required. Dual brakes shall operate independent of each other for ascending car over speed and unintended car movement. Provide operation to prevent the elevator from striking the hoistway overhead or unintended car movement per the requirements of Code.

C. Gearless Machine

1. Sheave: The sheave material shall be accurately machined of semi-steel of hardness BHN 220-250.
2. Anti-vibration Mounts: For machines that are support beam mounted, anti-vibration mounting pads are to be provided.

2.9 CONTROLLER

A. General

1. The elevator control equipment shall contain diagnostic capabilities as required for the ease of complete maintenance. The diagnostic system shall be an integral part of the controller and provide user-friendly interaction between the service person and the controls. All such systems shall be free from decaying circuits that must be periodically reprogrammed by the manufacturer.
2. Switch gear shall be mounted in cabinets and labeled terminal strips.
3. The Main controller shall be a non-proprietary programmable automation controller (PAC) based on SCADA compliant Allen Bradley CompactLogic™ 1769-L32E, or equal, to control and monitor the status of the elevator. The PAC shall be designed to communicate in TCP/IP format over Ethernet or approved equal.
4. The controller shall store the last 99 faults, accessible via laptop connection, panel view or remote communications.
5. Provide a copy of all working programs on approved computer medium as well as a printed program listing.
6. The Controller shall have one dedicated serial port, which supports RS-232-C signals. It must be usable for programming purposes or for access to remote programmers via modems.
7. Provide Lift-Net, or equal, ready serial port and signals. Elevator monitoring system shall be building monitoring system compatible and capable of monitoring various elevator control systems.

2.10 OPERATION

A. Simplex Selective Collective

1. Momentary pressure of car or hall button, other than landing at which car is parked, shall automatically start the car and dispatch the car to the corresponding floor for which that call was registered. If a call is registered at the floor when the car is idle, the doors shall automatically open.



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2. When the direction of travel has been established, the car shall answer all calls corresponding to the direction of travel and shall not reverse direction until all car and hall calls, in that direction, have been answered.
3. Calls registered for the opposite direction of car travel shall remain registered and shall be answered after car has completed its calls in the direction of travel.
4. If no car buttons are pressed, and car starts up in response to several down calls, the car shall answer highest down call first and then reverse to collect other down calls.
5. The car shall remain at the arrival floor for an adjustable interval to permit passenger transfer. Doors shall close after a predetermined interval after opening unless closing is interrupted by car door reversal device or door open button in car.

B. Group Automatic – Groups of Two or More Elevators:

1. Approved microprocessor-based, group dispatch, car and motion control systems as follows.
2. Include as a minimum, the following features:
 - a. Operate cars as a group, capable of balancing service and providing continuity of group operation with one or more cars removed from the system.
 - b. Register service calls from pushbuttons located at each floor and in each car. Slow cars and stop automatically at floors corresponding to registered calls. Make stops at successive floors for each direction of travel irrespective of order in which calls are registered except when bypassing hall calls to balance and improve overall service; stop only one car in response to a particular hall call. Assign hall calls to specific cars and continually review and modify those assignments to improve service. Simultaneous to initiation of slow-down of a car for a hall call, cancel that call. Render hall pushbutton ineffective until car doors begin to close after passenger transfer. Cancel car calls in the same manner. Give priority to coincidental car and hall calls in car assignment.
 - c. Operate system to meet changing traffic conditions on a service demand basis. Include provisions for handling traffic which may be heavier in either direction, intermittent or very light. As traffic demands change, automatically and continually modify group and individual car assignment to provide the most-effective means to handle current traffic conditions. Provide means to sense long-wait hall calls and preferentially serve them. Give priority to coincidental car and hall calls in hall call assignment. Accomplish car direction reversal without closing and reopening doors.
 - d. Use easily reprogrammable system software. Design basic algorithm to optimize service based on equalizing system response to registered hall calls and equalizing passenger trip time to shortest possible time.
 - e. Serve floors below main floor in a manner which logically minimizes delay in passing or stopping at main floor in both directions of travel. Provide manual means to force a stop at the main floor when passing to or from lower levels.
 - f. Required Features:
 - 1) Dispatch Protection: Backup dispatching shall function in the same manner as the primary dispatching.
 - 2) Delayed Car Removal: Automatically remove delayed car from group operation.



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- 3) Position Sensing: Update car position when passing or stopping at each landing.
 - 4) Hall Pushbutton Failure: Provide multiple power sources and separate fusing for pushbutton risers.
 - 5) Communication link: Provide serial or duplicate communication link for all group and individual car computers.
- C. Independent Service: Provide controls to remove elevator from normal operation and provide control of the elevator from car buttons only. Car shall travel at contract speed and shall not respond to corridor calls.
- D. Car Top Operation: Provide per Code requirements.
- E. Emergency Recall Operation (Fire Service): Provide operation and equipment per Code requirements. Contractor shall provide relays, wiring, and terminal strips to receive signals from the fire alarm system.
- F. Earthquake Operation: Provide operation and equipment per Code.
- G. Load Weighing: Provide automatic load weighing device set at approximately 80% of full load. The device when activated shall cause the elevator to bypass corridor calls and shall initiate dispatch of car at main terminal prior to elapse of normal dispatching interval. Provide adjustable setting from 50 to 80 percent of full load.
- H. Load Weighing Security Operation: Provide load weighing device to notify ACAMS Controller of weight status in elevator cab when in security mode of operation.
- I. Fan and Light Output Timer: Provide an adjustable timer (Range 1 to 10-minutes) that when activated will turn off the fan and light within the car. The time will start when the car becomes inactive.
- J. Door Hold Operation: Provide controls and a button within operating panel that shall hold the doors open for an adjustable period of 30 to 90 seconds. The following shall resume normal door operation.
1. Activation of door close button.
 2. Expiration of time period.
- K. Standby Power Panel and Operation – Contractor shall provide operation as follows: When standby power is detected by an input, one elevator at a time in each group, and single elevators, shall be returned to the main lobby one elevator at a time, and remain there with the doors open. Once all cars have been returned to the lobby, one elevator in each group, and single elevators may be selected to run under standby power. Selection of the cars shall be done automatically. This automatic selection may be overridden through manual selection. Provide necessary wiring and contacts to allow elevator systems to sequence under standby operation. Provide group selection switches in the fire control panel. Provide standby power indicators in the fire control panel and main floor hall station.



- L. Tenant Security Operation
 - 1. The Elevator Contractor shall coordinate with the Sections 28 13 00 - ACCESS CONTROL and ALARM MONITORING SYSTEM (ACAMS) and SECTION 28 23 00 VIDEO SURVEILLANCE SYSTEM (VSS) to provide elevator controls as described below:
 - a. Card readers shall be installed as directed adjacent to, and interfaced with the elevator call button. The call button will be enabled by an authorized card read of the ACAMS system.
 - b. Card readers with keypads shall be installed in each elevator cab and interfaced with the car buttons for as directed.
 - c. Access to and from secured floors shall be by card reader only.
 - d. Elevator departing unsecured floors shall require an authorized card read/PIN to enable the registration of a car call to access secured floors, as programmed in the ACAMS system through access permissions and levels.
 - e. Provide strobe in car transom that illuminates upon notification from ACAMS Controller that weight or motion is detected in elevator cab.
 - f. Fire Service Operation overrides the Security Service Operation.

2.11 HOISTWAY ENTRANCES

- A. Hoistway Frames and Doors
 - 1. Entrance frames shall be of welded and mitered construction for complete one-piece unit assembly. All frames shall be sound deadened and securely fastened to fixing angles mounted in the hoistway. Finish shall be 420 ferritic stainless steel per ASTM A 240/240M.
 - 2. Entrance frames shall be provided with an extended sill floor plate the full width and depth of each entrance frame assembly.
 - 3. Hoistway doors shall be reinforced and provided with operating mechanisms and door hangers. Door panels shall be hollow metal flush door construction, 16-gauge furniture steel. Fill with fireproof, sound deadening material. Provide reinforcement by formed vertical sections running full height of door. Doors shall be provided with two removable, non-metallic gibs with fire tabs, located at the leading and trailing edge of the door panel. There shall be no visible exposed or protruding fasteners.
 - 4. Provide die cast jamb markings (2 per entrance) mounted at 5'-0". Secure with adhesive and unexposed fasteners.
 - 5. Hoistway door hangers and door operator shall be as specified herein.
- B. Struts and Closer Support Angles: Hoistway entrances adjacent to non-load bearing walls (gypsum dry wall, gypsum block, etc.) shall have hanger housing and door closers supported by steel angles of adequate size. Angles shall be continuous between sill and building beams above and shall be bolted to the hanger support. For load bearing walls (masonry, concrete block), submit for approval Shop Drawings of the method to be used to support hanger housing and door closers on the wall.
- C. Landing Sills: Landing sills shall be designed for Class C-3 loading and shall conform to Section 2.11 of the Code and shall be extruded stainless steel sills supplied with grooves and



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trash slots for door guides and machine planed for minimum clearance. Mount sills on combination of concrete/grout and steel supports anchored to floor construction.

- D. Hanger Supports and Cover Plates: Hanger supports shall be T bolted to strut angles and closer support angles. Hanger cover plates shall be nominal 0.078 inch thick stainless minimum and shall extend, as indicated in the contact drawings. Covers shall be made in sections for convenient access when servicing hangers. Hanger sections above door openings shall be removable from within elevator car.
- E. Dust Cover: Dust cover shall be reinforced as necessary to ensure a flat even surface throughout. Dust cover shall extend at least the full width of door opening on each side and fastened to hanger housings. Dust cover shall extend above entrance opening as indicated on Contract drawings.
- F. Interlocks and Contacts:
 - 1. The doors at each hoistway entrance shall be equipped with approved hoistway door interlocks of the hoistway unit system type tested as required by the Code.
 - 2. Interlock shall prevent operation of the car away from a landing until doors are locked in the closed position. Interlock shall prevent doors from opening at any landing from the corridor side unless car is at rest at that landing, or is in the leveling zone and stopping at that landing.
 - 3. Hoistway door unlocking devices shall conform to the requirements of the Code and shall be provided to permit authorized persons to gain access to hoistway when car is away from landing. Ferrules shall be supplied for all hoistway unlocking device keyholes to protect elevator hoistway doors.
 - 4. Provide an electric contact mounted on the car that will prevent the car from moving away from landing unless car doors are closed.

2.12 CAB ENCLOSURE COMPONENTS

- A. General
 - 1. Elevator car and car components shall meet the applicable requirements of the Code. Car control station(s) and position indicator(s) shall be per Contract drawings.
 - 2. Entire car assembly, including car frame and platform, shall be free from warps, buckles, and squeaks and rattles. Joints shall be lightproof.
- B. Car Frame and Platform
 - 1. Loading Classification and Requirements: The elevator shall be designed for Class A C-3 freight elevator loading following the design data and formulas identified in the Code, including, but not limited to, the car frame, platform, sills and guides.
 - 2. Car frame and platform shall be welded galvanized steel units designed and fabricated in accordance with applicable requirements herein and Rule 2.14 of the Code.
 - 3. Protect car platform with fire retardant material. The platform shall be recessed as required to accept floor finish.
 - 4. Sub floor shall be suitably reinforced to support live loads of the elevator cab.



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- C. Car Guides: Car guides shall be designed for C3 loading. Provide spring dampened roller guides or swivel type oil less slide guides with renewable inserts.
- D. Sills: Car sills shall be extruded stainless steel sills supplied with grooves and trash slots for door guides and machine planed for minimum clearance. Provide with matching sill extensions to face of front return(s).
- E. Car Enclosures:
 - 1. General: The enclosure shall be adequately reinforced and ventilated to meet Code requirements. Provide sound-deadening mastic to exterior.
 - 2. Shell:
 - a. Passenger Elevators: Sides and back shall be 14-gauge sheet steel with baked enamel interior finish as selected by the Architect. Arrange shell to accept interior panels as indicated in drawings.
 - b. Service Elevators: Sides and back shall be 14-gauge, rigidized stainless steel sheet steel. Pattern 5WL or as selected by the Architect. Provide sample.
 - 3. Canopy: Provide minimum 8'-0" clear height under canopy. Reinforced 14-gauge stainless steel No. 4 brushed finish. Arrange for hinged top emergency exit including lock and electrical contact as required by Code.
 - 4. Suspended Ceiling and Lighting:
 - a. Provide as shown in Architect's drawings.
 - b. Provide clear access to the emergency exit per Code requirements.
 - 5. Floor Covering:
 - a. Passenger Elevators: Floor by others Wt/Ft = 10#.
 - b. Service Elevators: 1/4" checker plate stainless steel.
 - 6. Front Return Panels and Entrance Columns: 14-gauge sheet steel. Return panel shall be stationary type applied type. Provide faceplate to allow access to car station wiring and fixtures. Provide cabinets for special operating features and flush mounted speaker grills for the "Hands Free" telephone and intercom. Finish shall be stainless steel No. 4 brushed finish.
 - 7. Transoms: 14-gauge sheet steel finishes matching front return panels and entrance columns.
 - 8. Car Door Panels: Same construction as hoistway door panel. Finish shall be stainless steel No. 4 brushed finish.
 - 9. Handrails: Provide a 1 1/2" diameter stainless steel tubular handrail at the rear of each passenger elevator. Return ends to wall. Provide adequate mounting. Top of handrail to be 32" above the finished floor. Provide service elevators with side and rear wall mounted handrails and bumper rails. Return ends. Bolt handrails and bumper rails through car shell. Provide backing plates and captive nuts.
 - 10. Bases: Provide a 4" high base. Finish as shown in Architect's drawings.
 - 11. Pads and Hooks: Provide pad hooks and pads. Pad hooks shall be conspicuous type (buttons) at all walls. Mount pad hooks at sides and rear above suspended ceiling line.



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Pads shall cover all walls and front return panels and include cutouts for access to the operating fixtures.

12. Ventilation: Two-speed exhaust blower. Provide OE type in passenger elevators and AA type in service elevators.
- F. Emergency Car Lighting and Alarm System: Unit shall provide emergency light in car upon failure or interruption of normal car lighting. Emergency lighting unit shall provide a minimum illumination of 0.2 footcandles at 4' above car floor approximately 1' in front of main car operating panel for not less than 4 hours. Battery shall be 6 volt minimum, sealed rechargeable lead acid or equal. Battery charger shall be capable of restoring battery to full charge within 16 hours after resumption of normal power. Provide means within the car service panel for testing battery, lamps, and alarm bell. When multiple units are provided in a car all units shall illuminate. Illuminate a portion of normal car lighting.

2.13 SAFETIES

- A. General: Provide a governor actuated mechanical safety device mounted under the car platform and securely bolted to the car sling.
1. When tripped, the safety mechanism shall engage the rails with sufficient force to stop a fully loaded car with an average rate of retardation within the limits given by the ASME A17.1 Code for the capacity
 2. Make provisions to release the car safety. In no event shall the safety be released by downward motion of the car. Raising the car to reset the safety shall be allowed.
 3. Include an electrical safety plank switch that will interrupt the power to the hoist machine when the safety is set. Resetting the plank switch shall be separate from resetting the safety jaws.
 4. Install a car safety marking plate of corrosion resistant metal showing the data required by the Code.

2.14 SIGNAL DEVICES AND FIXTURES

- A. General: Provide vandal resistant signal fixtures and control devices for each elevator. Buttons and signals shall be tamper resistant of the illuminated type that light-up when activated and remain lit until call or other function has been fulfilled. All signal fixture and control device faceplates shall be nominal 0.135 inch thick, unless otherwise shown on the Contract Drawings.
- B. Car Operating Station
1. Provide car operating stations with faceplates flush with front returns. Station shall have illuminating pushbuttons numbered to conform to floors served. Buttons shall light to show registration and extinguish when car stops in response to a call. Buttons shall have a minimum dimension of 3/4", be raised 1/8" \pm 1/32" above the surrounding surface, be of square shouldered design, and have a detectable mechanical motion. A minimum clear space of 3/8" of other suitable means of separation shall be provided. Panel shall include an alarm bell button, Door Open and Door Close buttons. Provide an extended Door Hold button in each service elevator. All operating controls shall be located no higher than 48" above the car floor, the keyed in car stop switch and alarm button shall be located no lower than 35" above finished floor height. Provide in main car station a fire



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emergency service cabinet containing. Phase II emergency fire service switch, fire jewel, fireman's phone jack, fire operating instructions, Call Cancel button and Door Open and Door Close buttons. Provide second fire jewel outside of Phase II cabinet. Provide in the return panel an intercom grill and flush mounted speaker grill for the "Hands-free" telephone.

- a. Braille/Arabic designations shall be identified by a minimum of 5/8" Arabic numeral, standard alphabet character, or standard symbol immediately to the left of the control button. Braille shall be located immediately below the numeral, character or symbol. Controls and emergency equipment shall be identified by raised symbols, including but not limited to, door open, door close, alarm bell, emergency stop and telephone. The call button for the main entry floor shall be designated by a raised star at the left of the floor designations. Braille and Arabic designations shall be flush with inconspicuous mechanical mounting. The plaques shall have raised white colored numerals on a black background.
2. Provide a lockable service cabinet with concealed hinges. Cabinet door shall be flush with the faceplate with hairline joints. Door shall include a flush integral certificate frame for viewing the operating permit. The window shall be constructed of durable Plexiglas or similar material and be accessible from backside of locked door. Minimum window size to be 7" wide by 3" high.
 - a. Cabinet shall contain the following type controls:
 - 1) A light switch.
 - 2) Two speed fan switch.
 - 3) Inspection keyswitch, conforming to the ASME Code.
 - 4) Independent service keyswitch.
 - 5) Emergency light test button.
 - 6) Keyed stop switch.
 - 7) A duplex 120-volt, A.C. G.F.C.I convenience outlet.
3. Provide black paint filled (except as noted), engraved signage as follows with approved size and font.
 - a. Phase II firefighters' operating instructions on rear of locked Phase II compartment door.
 - b. Car number over main and auxiliary car operating panel.
 - c. "No Smoking" over main car operating panel. Include reference to Los Angeles Municipal Code.
 - d. Car capacity in pounds on main car operating panel. Include reference to Los Angeles Municipal Code.
 - e. 3/16" "Push for Alarm" and telephone usage instructions.
 - f. 1/8" City of Los Angeles Elevator Code anti-panic signage.
- C. Car Position Indicators: Provide segmented digital readout type with 2" high (minimum) indications. Locate at top of each car operating panel at a height no lower than 6'-6" above the finished floor. Indicator shall provide car position and direction of travel and include an adjustable electronic floor passing chime. As the car passes or stops at a floor served by the elevator, the corresponding designation shall illuminate, and an audible signal will sound. The audible signal shall be no less than 20-decibels with a frequency no higher than 1500.



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- D. Floor Annunciator: Provide digitized voice annunciator providing both male and female voices in a system capable of up to 5-minutes of speech. Messages shall include the following announcements:
1. Floor number.
 2. Notice of doors closing prior to nudging operation.
 3. Emergency operation announcements:
 - a. Firefighter's Service, "Elevator returning to lobby."
 - b. Seismic operation, "Elevator proceeding to next floor."
 - c. Car has exceeded it rated load, reduce load to resume operation.
 - d. Standby power activated, "Elevator returning to lobby," upon sequencing.
 - e. Security operation, "Elevator in Secure Operation, Exit Elevator Immediately", upon notification from ACAMS Controller.
 - f. Contractor/Installer to submit messages for Owner approval prior to fabrication.
- E. Hall Buttons
1. Provide one riser of vandal resistant hall pushbuttons. Station shall include flush mounted faceplate. Centerline of riser to be at 3'-6" above the finished floor. Buttons shall have a minimum dimension of 3/4", be raised 1/8" \pm 1/32" above the surrounding surface, be of square shouldered design, and have a detectable mechanical motion. A minimum clear space of 3/8" or other suitable means of separation shall be provided. Button design shall match those used on the car operating panel. Provide red and/or green LED illumination. Provide 3-position Code required Phase I key switch and operational instructions engraved minimum 1/8" high on the faceplate, at the main lobby. Incorporate fire service jewel and standby power jewels. Faceplate edges shall be relieved. Finish shall be stainless steel No. 4 brushed finish. Backfill for engraving shall be epoxy filled. Integral signs shall be as follows:
 - a. Fire Operational Instructions. Minimum 1/8" high lettering.
 - b. Fire Service Jewel. Minimum 1/8" high lettering.
 - c. Standby Power Indicators. Minimum 1/8" high lettering.
 2. Provide spanner type security fasteners. Finish matching faceplate.
 3. No objects adjacent to, and below, the hall push button station shall project more than 4-inches from the wall.
- F. Hall Lanterns: Provide UP and DOWN lanterns at intermediate landings, single lantern at terminal landings. Electronic chimes for each lantern shall sound once for up and twice for the down direction of travel. The lantern shall illuminate for corresponding direction of car travel and the chime shall sound when the elevator is at a predetermined distance from the scheduled floor stop. The design and location of the hall lanterns shall be as selected. Faceplate finish matching hall buttons.
- G. Hoistway Access Switches: Provide without faceplate in entrance frame side jamb at all top and bottom terminals.
- H. Fire Control Station: Provide a common control panel for all elevators, locate as directed. Panel to contain a digital readout type position and direction indicator per elevator; fireman's



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return switch per group or individual elevator as required; a jewel to indicate if doors are open at the fire egress floor per elevator; in car fire service jewel per elevator; space for fireman's phone jack; a cabinet containing fire service keys; engraved instructions for fire service operation; and emergency power selector switches and status indicators.

- I. Machine Room Monitors: Provide a monitor in each machine room capable of displaying status, position and critical items for trouble shooting the equipment.

2.15 COMMUNICATION SYSTEM

- A. Telephone System: Provide automatic dial "Hands-Free" telephone station located in the car station. A button shall suitably identify activation of auto dialer for the visually impaired. Speaker shall be mounted without faceplate or visible fasteners and located either behind the control station or within the telephone box. Communication shall be capable of being heard from any location within the car enclosure.
 1. Provide a telephone symbol minimum 2" high, and raised $\pm 1/32$ " with Braille indications adjacent to a separate activation button mounted on the control panel.
 2. Provide engraved emergency instructions above the activation button. Instructions shall read: "To use emergency telephone, press button below. Dialing will occur automatically."
 3. Provide a visual indication, approximately 3/4" in diameter, or a jewel that illuminates once a call has been received by the master station. Instructions under the visual indicator or within the lighted jewel shall read: "Assistance is on the way".
- B. Provide wiring from car to telephone terminal box in elevator machine room.
- C. Provide permanent means of communication between the elevator car and the machine room if required by Code.
- D. Provide installation of Life Safety speaker provided by others within the elevator cab. Provide wiring from car to Life Safety junction box in machine room.
- E. Bell Alarm System: Bell alarm system for each elevator shall be properly located within building and audible outside hoistway when activated by the Alarm call button on each car control station.

2.16 CENTRAL MONITORING SYSTEM

- A. Vertical Transportation Central Monitoring/Control System: Provide central monitoring and control system to monitor and record all the building's elevators, escalators and moving walks and their respective operations simultaneously. System shall be compatible with other building monitoring systems. Systems shall be capable of accommodating multiple elevator control systems from various manufacturers.
- B. General: In the event of an elevator shutdown or any other designated emergency, the elevator system shall automatically initiate a call to the Elevator Command Center (ECC). The ECC shall be capable of receiving the call, processing the data and routing the received data to the



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proper storage or output device, i.e., monitor, hard drive, printer, etc. The system shall have the ability to page designated personnel to notify them of an emergency event. The ECC shall store a chronological listing of the emergency reports received from each elevator. The user shall be able to view or print these reports. The following system hardware shall be provided:

1. Pentium based processor, 1.6GHz or faster.
2. 512 MB RAM.
3. 80 GB hard drive.
4. Parallel port.
5. CD-ROM drive.
6. SVGA card and monitor.
7. Parallel printer.
8. Ethernet connectivity.
9. Provide minimum 17-inch LCD monitor displaying real time activity of each group and each escalator and their respective operations status.

C. Provide a Graphical User Interface Central Monitoring System (CMS) with, but not limited to the following features:

1. Simulated hoistway and car configuration.
2. Individual elevator position.
3. Individual elevator car calls.
4. Individual elevator direction.
5. Individual elevator door position.
6. Individual elevator status of operation.
7. Individual elevator communication status.
8. Registered up and down hall calls.
9. Controller real-time clock date and time.
10. Group mode of operation.
11. Remote registration of car and hall calls. Send a car to any floor at any time, regardless of operation mode, i.e. normal operation, independent service, swing car operation, floor lockout, etc.
12. Floor lockout (hall and car).
13. Independent service to remove car from group to respond to car calls only.
14. VIP operation to send a car to any floor and remain there for a predetermined time reassigning all other calls to different cars automatically.
15. Car to lobby feature to call any car to the main lobby. Return car nonstop after answering preregistered car calls, and park with doors open for an adjustable time period of 60-90-seconds. Upon expiration of time, the car shall automatically resume to normal operation.
16. Standby power operation and selection.

D. As a minimum, the following reports shall be available from the CMS:

1. Average wait time for each hall call, in each direction of travel.
2. Number of hall calls registered per event or time period selected.
3. Emergency faults and events for the selected time period.
4. Number of hall calls answered per elevator.
5. Door dwell times.
6. Calculated car times including: door open times, door close time, floor-to-floor time.



2.17 WIRING AND ELECTRICAL INSTALLATION

A. Conduit and Wiring

1. Unless otherwise specified, all electrical conductors in the pits and hoistways, except traveling cable connections to the car shall be provided in rigid zinc-coated steel conduit with steel outlet boxes, except that a small amount of flexible conduit may be used where conduit is not subject to moisture or embedded in concrete. Terminal boxes and other similar items shall be of approved construction, thoroughly reinforced, and in no case less than number 12 USSG. All electrical boxes exceeding 150 cubic inches shall be supported independently of the conduits. The rigid conduit shall conform to the specifications here in before specified. All raceway shall be threaded rigid steel conduit. Flexible heavy-duty service cord, type SO, may be used between fixed car wiring and switches on car doors for door reversal devices.
2. All conduits terminating in steel cabinets, junction boxes, wire-ways, switch boxes, outlet boxes and similar locations shall have approved insulation bushings. If the bushings are constructed completely of insulation material, a steel locknut shall be installed under the bushing. At ends of conduits not terminating in steel cabinets or boxes, the conductors shall be protected by terminal fittings having an insulated opening for the conductors.
3. Conduit fittings and connections using set screws or indentations as a means of attachment are not permitted.
4. Connect motors and other components subject to movement or vibration, to the conduit systems with flexible conduit.
5. The Contractor shall furnish all materials and completely wire all parts of the electrical equipment of the elevators including electrical devices on hatch doors.
6. The conduits shall be of such size that the wires or cables can be readily installed and replaced, if necessary. No conduit or raceway shall be less than 3/4" trade size, except that for small devices such as door switches, interlocks, etc., 1/2" conduit may be used. The total overall cross sectional area of the wires contained in any conduit shall not exceed 40 percent of the internal area of the conduit.
7. Conduits shall be neatly and systematically run. All exposed conduit and boxes shall be supported by approved and substantial straps, hangers or clamps to the structural steel, reinforced concrete, or other approved supports. Riser conduits in hoistway shall be supported at each floor level.
8. All screws used for terminal connections of all wiring (control room, machine area, hoistway and pit) shall be provided with "star washers" of proper size and type.

B. Conductors

1. No joints or splices shall be permitted in wiring except at outlets. Tap connectors may be used in wire-ways provided they meet all UL requirements.
2. All wiring shall test free from short circuits or grounds. Insulation resistance between individual external conductors and between conductors and ground shall be not less than one meg-ohm.
3. Provide all necessary conduit and wiring between all remote control rooms, machine areas and hoistway.



C. Traveling Cables

1. Shall be Type EO, rated for a maximum of 300 volts, and shall comply with the requirements of UL Standard #62 and Articles 400 and 620 of ANSI/NFPA No.72
2. Travel cables shall include separate coaxial cable shielded for the communications system.
3. Provide 10 percent spares, but not less than 6 spare conductors in each traveling cable.
4. Provide four pairs of CAT 6A cables for communication, CCTV and security.
5. Provide separate traveling cables for car lighting and fan control circuits.
6. Provide traveling cable for telephone in the elevator car. Cable shall extend from junction box in hoistway to telephone box in car.
7. Provide traveling cable for car work lights.
8. All insulated wiring, control wiring and wiring in traveling cables shall be tag coded at their terminals in the motor room or controller location and hoistway junction box, elevator cab junction box, and push-button stations within the cab, and shall agree with the approved wiring diagrams.
9. All cabinets containing motor drives, filter boxes, transformers and power reactors shall be supported on rails and isolated from the base building structure with elastomer pads having a minimum static deflection of 3/8" (Mason Type N, or equivalent). All connections to and from the cabinetry shall be flexible in order not to compromise the isolation system. Use non-rigid conduit for the final electrical connection, with all other conduit supports and clamps provided on a neoprene sponge insert.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to commencing with the installation of elevator equipment, examine the following and verify that no irregularities exist that would affect the quality of execution of work specified.
1. Hoistway size and Plumbness
 2. Anchor brackets
 3. Sill Support
 4. Pit depth
 5. Overhead clearance

3.2 INSTALLATION

- A. Install elevator in accordance with the OEM's installation procedures and approved Shop Drawings. Install equipment so it may be easily removed for maintenance and repair. Install all equipment to afford maximum accessibility, safety, and continuity of operation.
- B. Verify that electrical wiring installation is in accordance with the OEM's submittal.
- C. Erect all items square, plumb, straight and accurately fitted with tight joints and intersections.
- D. Coordinate with the General Contractor to ensure that the installation of the elevators is not in conflict with the work performed of other trades.



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- E. Isolate non-compatible, dissimilar materials from each other by providing vibration isolation, gaskets or insulating compounds.
- F. Provide protective coverings for finished surfaces.
- G. Upon completion, touch up and restore damaged or defaced factory finished surfaces. Touch up any marred finishes and replace as directed.
- H. Remove protective coverings and clean exposed surfaces after completion.
- I. Welding shall comply with AWS D1.1. Identify field welds with welder's identification stamp.

3.3 FIELD TESTING

- A. General: After installation, the Installer shall inspect and test each elevator and related equipment to Owner's satisfaction that operation of every part of the equipment complies with this specification and with applicable requirements of ANSI A17.1 including sound level criteria specified herein. Elevator will be inspected in accordance with the following:
 - 1. Installer shall notify Owner seven (7) days prior to each scheduled test Installer shall perform testing in the presence of the Owner's representative. This test is in addition to those performed by The City of Los Angeles Elevator Inspector.
 - 2. Installer shall notify the appropriate local authorities having jurisdiction a minimum of seven (7) days in advance of final acceptance tests.
 - 3. Installer shall provide all instruments, materials, and labor required for tests specified herein.
- B. Acceptance Testing:
 - 1. Inspect and test the elevator and related equipment to the Owner's satisfaction that operation of every part of equipment complies with applicable requirements of ASME/ANSI A17.1 and local codes.
 - 2. Notification Requirements: Notify Owner a minimum of five (5) working days prior to each scheduled test.
 - 3. Full Load Run Test: Run elevator continuously a minimum of four (4) hours with full specified rated load, during which time car shall be stopped at top and bottom landings with a minimum standing period of 10 seconds at each landing.
 - 4. Speed Test: Make tests before and after full load tests. Using a tachometer on guide rail, determine actual speed of car in both directions of travel, both with full-specified rated load and no load in car. Tolerances for determining if car speeds meet the specified requirements are as follows:
 - a. Ascending and Descending Car Speed not more than 10 percent above or more than 10 percent below required speed.
 - b. Car Leveling Test: Determine accuracy of floor landing tests both before and after full load run tests. Minimum of 1/4 inch leveling must be maintained. Test accuracy of landing at all floors with full load and no load in car, in both directions of travel.



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- c. Electrical Tests: Ensure elevator wiring system is free of short circuits and accidental grounds. Test ground resistance of elevator structure, equipment, and raceways for continuity. Using meg ohm-meter, determine that insulation resistance of each circuit is more than one (1) meg ohm or higher as required by the cable manufacturer. Insulation resistance for motors shall be determined under actual conditions after installation.
 5. Acceptance: Elevator acceptance will be based upon elevators meeting requirements of Contract Documents and upon evidence of passing specified acceptance tests and inspections. Final testing will be after elevators are connected to permanent power.
 6. Test Reports: Within five (5) days after completion of a test, submit a test report stating type of test, test requirements, failures, or problems, and name of certifying Engineer and Title. Safety device failure or defective equipment shall be identified, with description of cause and corrective action taken.
 7. Failures for any reasons shall be identified with cause(s) and corrective action taken.
- C. Re-Inspection: If any equipment is found to be damaged or defective, or if the performance of the escalators does not conform to the requirements of the contract specifications or the Safety Code, no approval or acceptance of escalators shall be issued until all defects have been corrected. When the repairs and adjustments have been completed and the discrepancies corrected, the Owner and Owner's representative shall be notified and the escalators will be re-inspected. Rejected escalators shall not be used until they have been re-inspected and approved.
- D. The certificate of inspection for operational use will be issued to LAWA by the enforcing inspection agency. The certificate shall be posted in the elevator control room and in the car operating station.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train LAWA's maintenance personnel to operate, adjust, and maintain escalators.
- B. Check operation of escalators with LAWA's personnel present and before date of Completion. Determine that operation systems and devices are functioning properly.
- C. Check operation of escalators with LAWA personnel present not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

END OF SECTION 14 21 00