SECTION 14 21 00

ELECTRIC TRACTION ELEVATORS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Hoistway Construction

B. Machine Room

C. Equipment in Hoistway and Machine Room

D. Hoistway Entrances

E. Car and Hoistway Doors

F. Electronic Door Edge Sensor

G. Car Enclosure

H. Elevator Floor and Platform

I. Electrical Components

J. Controller

K. Remote Monitoring System

L. Signals and Operating Fixtures

M. Recessed Motion Sensing Unit

N. Cameras

O. Signs

P. Vibration Absorption Mounts

1.02 MEASUREMENT AND PAYMENT

A. General: The elevator will not be measured separately for payment but will be paid for as part of the indicated Contract lump sum price for elevator.

1. Elevator maintenance will be paid as lump sum price as indicated on the Bid Form.

2. Chargeable repairs will be paid separately for labor and maintenance as indicated on the Bid Form. Labor will be paid as unit price and material will be actual cost plus mark-up as indicated on the Bid Form.

1.03 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI A117.1 Guidelines For Accessible and Usable Buildings and Facilities-Providing Accessibility and Usability for Physically Handicapped People

2. ANSI Z97.1 Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test

B. American Society of Mechanical Engineers (ASME):

1. ASME A17.1 Safety Code for Elevators and Escalators

2. ASME A17.2 Inspectors Manual for Elevators and Escalators

3. ASME A17.3 Safety Code for Existing Elevators and Escalators includes Requirements for Electric and Hydraulic Elevators and Escalators

C. American Society for Testing and Materials (ASTM):

1. ASTM A36/A36M Specification for Carbon Structural Steel

2. ASTM A167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

3. ASTM A1008/A1008M Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability

4. ASTM B3 Specification for Soft or Annealed Copper Wire

5. ASTM B174 Specification for Bunch-Stranded Copper Conductors for Electrical Conductors

6. ASTM B209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate

7. ASTM B211 Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire

8. ASTM B308/B308M Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles

9. ASTM C864 Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers

10. ASTM C1048 Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass

11. ASTM D2240 Test Method for Rubber Property—Durometer Hardness

12. ASTM F36 Test Method for Compressibility and Recovery of Gasket Materials

D. American Welding Society (AWS):

1. AWS D1.1 Structural Welding Code - Steel

E. National Association of Architectural Metal Manufacturers (NAAMM):

1. AMP 503 Finishes for Stainless Steel

National Electrical Manufacturers Association (NEMA):

1. NEMA AB 1 Molded Case Circuit Breakers and Molded Case Switches

2. NEMA PB 1 Panelboards

F. National Elevator Industry, Inc. (NEII):

1. NEII-1 Building Transportation Standards and Guidelines

National Fire Protection Association

1. NFPA 70 National Electrical Code

2. NFPA 101 Life Safety Code

Steel Structures Painting Council (SSPC):

1. SSPC-SP 1 Solvent Cleaning

2. SSPC-SP 3 Power Tool Cleaning

G. Underwriters Laboratories Inc. (UL):

3. UL 1581 Reference Standard For Electrical Wires, Cables, And Flexible Cords

H. District Technical Manual – SCADA System Function Description.

1.04 REGULATORY REQUIREMENTS

A. In addition to the foregoing referenced standards, the regulatory requirements which govern elevator work of these Specifications include the following codes and regulations:

B. Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG Guidelines) 49 CFR Subtitle A, Part 37, Appendix A.

C. California Code of Regulations (CCR):

1. CCR Title 8, Industrial Relations, Division 1, Chapter 4, Subchapter 6, Elevator Safety Orders

2. CCR Title 24, Part 2, California Building Code (CBC)

3. CCR Title 24, Part 3, California Electrical Code

D. California Occupational Safety and Health Act (CAL/OSHA)

E. In the event of a conflict between codes, regulations, standards or these specifications, the most stringent requirement shall take precedence unless specifically required by the Engineer.

1.05 QUALITY ASSURANCE

A. Manufacturer's Qualifications: The design, engineering and manufacture of major elevator components such as, elevator car, door operators, safeties, governors, selectors, shall be of the same manufacturer, except where otherwise specified.

B. General: At the completion of the work, the elevator shall meet the minimum requirements of CCR Title 8, CCR Title 24, Part 2, NEC, ASME A17.1, A17.2, A17.3, and NFPA 101. Install per manufacturer's requirements and as specified herein.

C. Comply with AWS D1.1 standards for finished work and for qualifications of welding operators and corrosion protection.

D. The controller wiring shall be carried out in accordance with the minimum requirements of CCR, Title 24, Part 3, California Electrical Code.

1.06 SYSTEM DESCRIPTION

A. Elevator Type: Geared traction with AC motor, 480 V, 3 phase

B. Load Capacity: 3,500 pounds for Station Elevator and 4,000 for Parking Structure Elevator.

C. Speed: 125 to 150 feet per minute for Station Elevators and 250 feet per minute for Parking Structure Elevators, with maximum 5 percent speed variation under any loading condition in either direction.

D. Stops: As indicated.

E. Main Floor: Ground floor, unless otherwise specified in the Contract Specifications.

F. Entrance size: Minimum 3 feet 6 inches width by 7 feet high.

G. Travel: As indicated and verified in field.

H. Controller: The controller shall be a Designated Matching Product (DMP) as specified herein.

I. Machine Location: Overhead, typical.

J. Car Inside Dimension: Car minimum inside clear dimension shall be 80 inches x 63 inches for Passenger Station Elevators and 80 inches x 72 inches for Parking Structure Elevators from wall to wall.

K. Remote Monitoring System: Remote Monitoring System (RMS) shall be interface with existing BART monitoring system.

L. Electronic car door edge sensors: Sensors shall be a District Matching Product (DMP) as specified herein.

M. Car Enclosure: Passenger type.

N. Car Leveling Range: Plus or minus 1/4 inch under any loading condition, including cable stretch. Level into floor at all times, car shall not overrun floor and level back in either direction.

O. Comply with standards established in the NEII Building Transportation Standards and Guidelines, unless specified otherwise herein.

P. Doors: Car and hoistway doors shall be horizontal sliding, single speed center opening, stainless steel with a vision panel in each leaf.

1.07 DESIGN AND OPERATION REQUIREMENTS

A. Elevator System General Requirements:

1. Elevators shall be designed specifically for the operation, loading and environmental conditions encountered in extensively used, heavy duty rail transit systems and shall have a minimum design life of 20 years.

2. Elevators shall operate while exposed to sunlight, rain, airborne dust, and debris.

3. The final assembly of all components shall not pose hazardous conditions to the public or maintenance personnel. Surface irregularities, sharp edges, or protrusions in public or maintenance areas shall not be permitted.

4. Provide convenient and safe equipment access for inspection, cleaning, maintenance, repair, and replacement.

5. All gaps and running openings within regulatory tolerances shall be properly closed by the use of appropriate sealant or another approved means installed in accordance with the manufacturers' instructions.

6. For parts and equipment subject to wear and requiring periodic replacement, the Contractor shall furnish key and seat, nut, screws, or other removable and replaceable type mechanical fasteners. Such replacements shall not diminish original structural integrity. Use of rivets or similar type fasteners requiring physical deformation during field positioning will not be permitted.

7. The elevator equipment shall be quiet and smooth running and shall not exceed the following maximum noise output levels during all phases of operation:

   a. 80 dBA measured in the elevator machine room

b. 70 dBA measured in the elevator car

c. 70 dBA measured at the elevator hoistway entrances

8. Fire Protection: Contractor shall provide non-combustible materials for components.

B. Seismic Criteria:

1. Installation and equipment designed for static and for seismic conditions shall be provided in accordance with regulatory requirements.

2. Provide hardware necessary to protect motors, drives, and door operators.

3. Seismic design shall be based on the assumption that structures and equipment will be subjected to a maximum horizontal ground acceleration of 0.7g (70 percent of gravity). Design for seismic loading shall comply with the requirements of the California Code of Regulations including CBC, Chapter 16.

C. Power:

1. The main elevator power shall be 480 Vac, three phase, 60 Hertz.

2. As a minimum, three separate 120 Volt circuits shall be provided for each of the following: elevator car lighting, elevator pit and hoistway lighting and receptacles, and car camera. Any 120 Volt elevator control circuits shall be provided from the elevator controller by means of a step down transformer.

D. Elevator Controller:

1. Refer to Article 2.13 - Controller, herein. The controller for Station Elevators shall be a field programmable microprocessor based, simplex selective-collective, automatic operation with open loop, variable voltage, variable frequency control. The controller for Parking Structure Elevators shall be a field programmable microprocessor based, group automatic operation.

2. Elevator operation shall be by means of pushbuttons in the car, numbered to correspond to landings served, by CALL pushbuttons at terminal landings, and by UP and DOWN pushbuttons at intermediate landings.

3. The activation of one or more pushbuttons shall illuminate the pushbuttons and dispatch the nearest car to the designated landings in the order in which the landings are reached by the car, regardless of the order in which the calls were registered. When the car reaches the landing, the illumination of the corresponding pushbutton shall cease.

4. If hall calls are received for the opposite direction of travel, the car shall continue in the same direction until all calls in the initial direction are answered, then the car shall reverse direction to collect call in the opposite direction.

5. If no calls are registered and the car is unoccupied, the car shall remain at that landing until further calls are registered or shall be dispatched to the designated home landing and stop without door operation.

6. Special Operations:

a. Inspection Operation: Inside the car service cabinet within the Car Operating Panel, there shall be an Inspection key-operated switch for normal "run" or "inspection" operation. There shall be three means of car movement for inspection service; at the car top inspection station, inside the controller, and by the hoistway access key switches. Car movements initiated by the car-top inspection station or by the hoistway key switches shall be at low or full speed and disable the controller inspection switch. The controller shall be equipped with a toggle switch for low or high speed selection. The car will run either up or down by constant pressure on the up or down switches, provided the doors are closed and the safety circuit is made. Releasing the directional button will cause the car to stop immediately. Activating any of the run/stop switches to "stop" position will render the car inoperative. Turning the inspection switch to the "run" position will restore the car to automatic operation.

b. Independent Service: A key switch shall be provided in the car service cabinet to allow for independent service. The car can be removed from automatic operation and be operated manually. Independent service shall have full control of the starting, stopping, and direction of car travel. The car shall respond to car buttons only. The arrival gongs, hall lanterns, and hall calls shall be inoperative during independent service.

c. Operation Under Fire Conditions: Provide special fire service to comply with the minimum requirements of CCR Title 24, Part 2, California Building Code, Chapter 30 for State Fire Marshal (SFM) facilities, ASME A17.1, and local fire codes having jurisdiction. As a minimum, provide the following:

1) Phase I recall, three-position key switch at main (ground floor) level shall be integrated in hall call stations with engraved instructions. Fire alarm initiating devices shall be installed in machine rooms, each non-open air landing, and hoistways equipped with fire sprinklers. Elevator operation shall be in accordance with applicable codes.

2) Phase II fire service shall be provided. A three position key-operated switch shall be mounted in the Car Operating Panel and operate accordance with applicable codes.

3) All fire initiating alarm signals shall be routed only to the main station fire alarm panel. The station fire alarm panel shall initiate the appropriate signals to the elevator controller.

d. Operation under Earthquake Conditions: Provide seismic operation in accordance with the requirements of CCR Title 8. Provide a counterweight derailment device (ring and string). Each location shall be equipped with a seismic device in the Train Control Room, Auxiliary Communications Room, or elevator equipment room as indicated on the Contract Drawings that provides a set of dry contacts for the control of the elevators and escalators within that station or parking structure. If a seismic device is indicated in the Parking Structure elevator equipment room, that device shall also be equipped with a set of contacts to the communications room as indicated on the Contract Drawings.

Provide the wiring, raceway and elevator controller circuitry for the seismic control circuit or circuits.

e. Operation under Standby Power: Provide standby power to each elevator from the permanent emergency generator system. A control signal from the generator shall be provided to the elevator controller or elevator group to place the elevator or group of elevators in emergency power mode, which will cause the elevators to return to the designated floor and remain there with the doors open. If there are a group of elevators, power shall be provided to only one elevator at a time and automatically switch to the remaining elevators until all elevators have returned to the designated floor with the doors open.

7. The controller shall be equipped to provide remote control and indication signals to the Station Agents booth as specified in Article 2.15, Signals and Operating Fixtures.

   a. Car moving up (indication) for Station Elevators only.

   b. Car moving down (indication) for Station Elevators only.

   c. Concourse (control & indication, car call) for Station Elevators only.

   d. Street or Platform, one for each landing as required (control and indication, car call) for Station Elevators only.

   e. Car Occupied (indication) for Station Elevators only.

   f. Alarm (indication) for both Station and Parking Structure Elevators.

   g. Elevator shutdown (control and indication) for both Station and Parking Structure Elevators

8. The controller shall be equipped to provide the indication signals to the Remote Monitoring System as specified in Article 2.14, Remote Monitoring System.

9. The system shall utilize an automatic two-way leveling device to control the leveling of the car as specified in Article 1.06, System Description, under “Car Leveling Range”. Over travel, under travel, and rope stretch shall be compensated for and the car brought level to the landing sill.

10. All options or parameters shall be field programmable without the need for external devices. Programmable settings shall be stored in non-volatile memory.

11. An electro-mechanical switch shall open all power circuits to the brake. A single ground, short circuit or solid-state control failure shall not prevent the application of the brake.

12. The automatic leveling zone shall not extend more than 12 inches above or below the landing level, nor shall the doors begin to open until the car is within six inches of the landing. In addition, the inner landing zone shall not extend more than three inches above or below the landing. The car shall not move if it stops outside the inner leveling zone unless the doors are fully closed and locked.

13. The elevator controller shall be equipped with a toggle switch to disable the door operator power while still moving the car under independent service from the controller.

14. The controller shall have a brake pick switch that will shutdown the car as soon as possible or at the next landing should the brake fail to release in its intended manner.

E. Elevator Door and Hoistway Door Operation:

1. Hoistway doors and car doors shall:

   a. Open automatically and simultaneously when the car arrives at the destination landing.

   b. Be equipped for readily and independently adjustable door hold open times when car stops for a car or hall call. Main floor door hold times shall be adjustable independently of other floors.

   c. Close after hold open time interval has elapsed and no obstruction has been detected, or when the car is called or dispatched to another landing, or when either the car door close button or a car call is pushed.

2. Activation of the door close button in the car shall cancel door timer and close the doors provided there is no obstruction.

3. All closing times shall be adjustable from 5 seconds to 30 seconds without exceeding closing force specified herein.

4. Door Dwell Times: Door dwell times shall adjusted with initial settings as follows:

   a. Hall Call: 20 seconds

   b. Car Call: 10 seconds

   c. Reopening: 20 seconds

   d. Nudging: 16 seconds

F. Access Requirements: Signals and fixtures shall be as indicated on Contract Drawings and specified herein. Components may be rearranged upon Engineer's written approval. Location and arrangement of fixtures shall comply with Accessibility requirements of CCR Title 24, Part 2, California Building Code.

1.08 SUBMITTALS

A. General: Refer to Section 01 33 00 - Submittal Procedures, and Section 01 33 23 - Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.

B. Shop Drawings: Submit complete shop drawings and data including installation details and printed manufacturer's specifications for elevator car, control system, cable and counterweight system, emergency and safety system, door assembly, door operators, and others as required. Text font type and size shall be uniform throughout the set of shop drawings. Shop drawings and details shall including the following:

1. Car interior panel, reflected ceiling, flooring, and base material specification.

2. Signal Fixtures: Control buttons and lamps.

3. Hoistway Entrance: Hoistway and car doors, sills and sill supports for hoistway and car as indicated, door operators, drive and clutches.

4. Elevator doors and door operator. Provide components, layout detail complete with fastenings, etc.

5. Weights of car doors.

6. Indicate direction of stainless steel directional grain.

7. Paint schedule.

8. Wiring diagrams.

9. Complete power, control, and indication schematic diagrams. Provide wiring list and connection diagrams. Diagram shall include interface connections to the external system circuits, such as fire alarm, telephone, CCTV, and station agents booth. Provide the installation wiring lists for all devices, detailing each individual cable and wire number, color and terminal designation per elevator, used during the installation.

10. Assignments of all processor inputs/output conductors including position indicating system.

11. Traveling cables: Provide details of the traveling cable attachment on both ends.

12. Detail machines and drives sheave(s).

13. Car and counterweight guide rail supports and deflector sheave supports.

14. Remote Motion Sensor and elevator camera.

15. Limit switches and mounting detail.

16. Details of hoistway. Verify that auxiliary machine spaces located at the top of the hoistway shall have clear headroom of not less than 60 inches.

C. Engineering Data Including Design Calculations:

1. Submit separate data sheets for machine room heat release calculations, power requirements, conduit fill, and car and counterweight guide rails and supports. Power requirements shall indicate maximum and average power demands, and requirements for emergency power operation.

2. Structural design calculations for car and counterweight assemblies, car and counterweight guide rails and supports, machine assembly and machine beam bed plate supports and deflector sheave supports. Design calculations shall be performed by a Civil or Structural Engineer currently registered in the State of California.

D. Samples: Provide samples of materials and finishes exposed to public view. Include the following items:

1. Car finish floor, 12 x 12 inch panel.

2. Car finish wall and ceiling surfaces, 12 x 12 inch panel.

3. Buttons, switches and lamps.

4. All Braille signs, full size.

5. Traveling cables, 12 inch long.

6. Stainless steel for Car Operating Panel, 4 x 4 inch.

E. Product Data:

1. Submit manufacturers' design data and material specifications for all parts and equipment. Specifications shall include test methods required to verify compliance with specifications.

2. Product data for lubricants, sealers, paints, solvents and potentially hazardous substances shall be submitted for Engineer's review. The Contractor shall submit the necessary Material Safety Data Sheets.

F. Submit a Test Program for approval with a test schedule and test procedure format for every representative type of test indicated in Article 3.03 - Field Quality Control.

G. Test Reports: The Contractor shall submit a complete report describing the detail results of each regulatory test.

1.09 SPARE PARTS

A. General: Spare Parts shall be provided in accordance with Section 01 78 44 - Spare Parts and Maintenance Materials, as augmented by the following provisions.

B. Spare parts shall become the District's property and shall not be used by the Contractor for maintenance.

C. A "set" is the number of parts required for one fully operable elevator.

D. Recommended Spare Parts List: Submit for approval a List of recommended spare parts necessary to support maintenance for a period of two years. The Engineer will review the List, assign a District Stock Number to each item and return the List to the Contractor. The Contractor shall incorporate the District's Stock Number and resubmit the List, together with two additional sets of bar code labels to the District.

E. Minimum Required Spare Parts List. The Contractor shall provide the following spare parts:

1. Controller components as recommend by manufacturer: One set of each printed circuit board, relays, and fuses as approved by Engineer.

2. Door operator resistors of each type installed: One each

3. Car and hall buttons and lamps, arrival gong lamps: Two sets.

4. Car fluorescent lamps: Four each

5. Limit switches: Two each

6. Rollers for roller guides: Two of each size

7. Gibs: Two of each size used

F. Delivery: Notify the Engineer in writing 72 hours prior to any delivery. The notification shall identify the specific parts to be delivered. All spare parts shall be delivered no later than 30 days prior to the final acceptance of the elevator.

1.10 OPERATION AND MAINTENANCE DATA

A. Submit the following in accordance with Section 01 78 23 - Operation and Maintenance Data prior to acceptance.

1. Operation and maintenance manuals.

2. Wiring Diagrams: One laminated set mounted in machine room, and three full size sets delivered to the Engineer. Wiring diagrams shall be “As Built”, specific for this installation, and reference identification on drawings shall match points identified on terminals of controllers (wire lists are not acceptable). Wiring diagrams shall include interface and schematic diagrams.

3. Maintenance Tool and Software Manuals: Furnish maintenance tools and supporting software documentation required for the complete maintenance of the entire system including diagnostics and adjustment. Maintenance tools may be hand held or built into control system and shall be neither of the type requiring recharging or reprogramming nor of the automatic destruct type. The tool and supporting software may be programmed to operate only with this project's identification serial number.

1.11 MAINTENANCE SERVICES

A. Maintenance Program: Within 60 days after Notice to Proceed, and prior to installation, Contractor shall submit a detailed Maintenance Program, showing functions to be performed and their schedule. The Maintenance Program shall also include trouble call service and emergency repair service.

B. Maintenance Period: Contractor shall perform maintenance on the elevator for a period of twelve months after Substantial Completion and the unit is open for public use. Contractor will not be relieved of maintenance until Final Acceptance of the elevator is issued. At any time, the District reserves the right to terminate the Maintenance Period upon giving 30 days notice to the Contractor. During the Maintenance Period, provide complete continuing maintenance on entire elevator system. Maintenance shall include all work and materials needed to keep the equipment in perfect operating condition. Contractor shall coordinate and perform maintenance in a manner to result in minimum inconvenience to the public.

1. The Maintenance Period shall be extended at the Contractor's expense until the Operation and Maintenance Manual is accepted and delivered and the training is complete.

C. Elevator Access:

1. The Contractor shall inform the District's Power and Way office each time the elevator is removed from service and again when the elevator is returned to service. District-provided forms shall be completed for each occurrence and submitted monthly as required in Article 1.11.K. herein

2. Elevators are an essential part of BART facilities for service to mobility-impaired patrons. When routine maintenance is being performed during revenue hours, the Contractor shall be prepared to return the elevator to service within 15 minutes of a request by a patron at the elevator.

3. The Contractor shall notify the Engineer 48 hours in advance to request access to the equipment for routine or non-urgent work.

D. Work Hours for Maintenance:

1. Routine maintenance, non-urgent repairs, and warranty work shall be performed on no more than one elevator at a time at a station. Routine maintenance shall not be performed during revenue peak hours. Routine maintenance may also be performed during non-revenue hours. Refer to the Contract Specifications for a definition of revenue peak hours for the station.

2. Repairs (urgent repairs) required to return equipment to service shall be accomplished as soon as possible during revenue and non-revenue hours.

E. Inspection during Maintenance Period: Perform systematic inspection of each elevator system every two weeks; including adjustment and lubrication of elevator equipment when required as recommended by the manufacturer. Replace defective parts with new parts of same manufacture as required.

F. Follow-Up Tests: Test all safety devices at monthly intervals and submit written report on each test. Tests shall be performed during periods defined in Article 1.11.D.

G. Performance Standards:

1. Maintain the performance standard specified herein and maintain correct operation of all safety devices and circuits.

2. Maintain uniform starting, stopping and uniform riding qualities at all times.

H. Elevator Shutdowns:

1. Should an elevator become inoperative, the Contractor shall attend to the elevator within 4 hours of notification of such incident. If the incident occurs after 8:00 PM, the service representative shall be on-site no later than 7:30 AM the following day. The elevator shall be returned to service as quickly as possible.

2. Should there be a failure to comply with above, the Engineer may order the work to be done by others at the Contractor's expense. Such action by the Engineer will not affect the Contractor's responsibility to guarantee the work.

I. Final Service and Inspection: Two weeks before expiration of the Maintenance Period, the equipment shall be lubricated, fully serviced, adjusted to the standards designated herein and safety devices and emergency service operation shall be checked. Contractor shall re-lamp elevator car light fixture and pit light fixtures. The Engineer will make a complete inspection. All deficiencies shall be corrected. Any deficiencies not corrected shall result in the extension of the maintenance services until the deficiencies are corrected.

J. Contractor will not be responsible for cleaning and repair of elevator car walls and hoistway entrances, except if service required is due to detective materials or improper installation. Service personnel shall be responsible for cleaning of oil and grease residue from maintenance or repair.

K. Keep a work log on each elevator with the following information: Worker's name, date, time arrived, total time spent, parts inspected, adjustments and work done, and parts replaced. Every visit, regardless of purpose, shall be recorded in the log. The work logs shall be submitted to the Engineer at one-month intervals with the payment application.

L. Contractor shall maintain local stock of parts for maintenance throughout the Guaranty Period and the Maintenance Period. The Contractor shall not use the District’s spare parts during the Maintenance Period.

M. Chargeable Repairs: Contractor will not be responsible for trouble calls that are due to misuse, or accidents, or are otherwise not caused by the Contractor. Calls that result in adjustment of safety devices not accessible to the public will not be reimbursed. Contractor shall submit all documentation necessary to prove that a particular trouble call should be a Chargeable Repair. Contractor shall also submit all documentation necessary to justify the direct costs incurred. Service calls must be reported to Power and Way to be eligible for reimbursement.

1.12 RELIABILITY

A. Definitions:

1. Break-in Period: The initial period of operation of the elevator. There shall be only one break-in period for the elevator, regardless of maintenance or modification or other work done on the elevator before, during, or after the break-in period.

2. Failure: A malfunction, which can be verified, when the failure is corrected by replacing a part or making an adjustment. Exceptions to failure are conditions of misuse, vandalism, accidents, or negligence not caused by the Contractor.

3. Pattern Failures: The occurrence of multiple independent failures of the same primary replaceable item or adjustment in identical or equivalent applications.

4. Reliability Demonstration Test (RDT): A test to determine a reliability-associated parameter, such as available operating time, within defined statistical risks or with a specific statistical confidence.

B. Requirements:

1. Break-in period shall be for 72 hours starting after the Contractor has satisfactorily completed the installation.

2. Contractor shall operate the elevator at full load under normal modes of operation and be able to provide a 98 percent reliability as determined by the following formula:

   % Reliability = T/A
   T = Actual aggregate operating time for the elevator.
   A = Aggregate revenue operating time of Station which elevator is located.

C. Operational failures shall not result in the structural failure of a component with potential for bodily injury to a user.

D. Contractor shall take corrective action to eliminate pattern failures, regardless of total operating time accumulated. It is the responsibility of the Contractor to notify the District Power and Way that a unit has been returned to service after corrective actions or maintenance has been performed. The tracking of down time is determined by reports from the District Power and Way. Failure by the Contractor to report "returned to service" will result in lower reliability performance and will remain the responsibility of the Contractor.

E. The RDT is intended to test whether the elevator meets the 98 percent reliability minimum requirement.

1. The full RDT period shall coincide with the initial ninety (90) day OperationalPeriod Maintenance.

2. The Reliability requirement shall be maintained for all consecutive thirty (30) day periods.

F. The Contractor shall:

1. Collect the data and document the results of the RDT, perform all calculations, and issue the results.

2. Review all failure incident reports to ensure that only pertinent failures are included in the test results.

3. Review the data with the Engineer at interim stages of the RDT and at the final stage, prior to issuing the results.

G. When District determines that the RDT has failed for any consecutive 30 day period, the Contractor shall modify the elevator to a new configuration level and the RDT shall be repeated for a period of 90 day period to verify the new con- figuration. This process shall be repeated until the Contractor has satisfied the 98 percent reliability requirements for 90 consecutive days. During any additional RDT period, Contractor shall be responsible for maintaining, at no additional cost to the District, the affected elevator in accordance with Article 1.11, Maintenance Services, until such time as minimum reliability requirements have been met.

1.13 PERMITS:

A. Refer to General Conditions Article 7.4, Permits and Licenses, for the Contractor's responsibility to obtain and pay for necessary permits including permit to complete. Contractor shall submit required drawings and design calculations to State of California Elevator Division and a copy to the Engineer. The Contractor shall pay for Elevator Division's inspections, as applicable.

PART 2 - PRODUCTS

2.01 GENERAL

A. The general system description for the elevators, which include elevator make and type, number of stops, car and hoistway door and operators configuration and design, controller type, dimension of car floor and enclosure shall be as indicated.

B. Weatherproofing: Metal surfaces shall be hot-dipped galvanized, except nonferrous metals and stainless steel. Machined and operational areas shall be protected from corrosion by applying a rust preventative compound, oil or grease. Refer to Article 2.12, Electrical Components, for related requirements.

2.02 MATERIALS

A. Sheet Steel: ASTM A1007/A1008M, uncoated, pickled.

B. Fasteners: Hardware, including nuts, bolts, washers, screws, and other fastenings shall be stainless steel throughout, including hoistway entrance concrete anchors. Provide fastenings necessary for proper erection and assembly of work.

C. Stainless Steel: ASTM A167; Type 316, unless Type 316 does not exist for a particular item or shape; then Type 304.

D. Structural Steel: ASTM A36 for car platform and sling. Hoistway entrances shall be galvanized.

E. Aluminum: ASTM B209, B211, B221, and B308/B308M. ANSI 6061 or alloy and temper best suited for anodizing finish specified.

F. Engraving on stainless steel panels:

1. Size: As indicated.

2. Color: Backfill with black epoxy paint, except text and symbols for fire or emergency service shall be red epoxy paint.

3. Typeface: Univers 65 or Helvetica.

G. Grout: Non-staining, nonshrink as specified in Section 03 61 11 - Non-Shrink Grout, and appropriate to application:

2.03 FINISHES

A. For surfaces exposed-to-view by a mechanic, provide the following unless specified otherwise.

1. Structural Steel:

   a. Shop Prime: Degrease clean of foreign substances and apply one coat of zinc chromate or similar corrosion inhibiting primer compatible with finish paint selected. Exposed hoistway items shall be painted one additional coat of gray enamel paint.

   b. Touch-Up:

      1) Prime Surfaces: Use same paint as factory shop primer for field touch-up.

      2) Finish Painted Surfaces: Refinish whole panel with shop prime and finish paint as specified above.

B. Stainless Steel, Exposed to View: Satin, vertical directional grain or as indicated, NAAMM AMP No. 4 finish. Sanding medium shall not deposit particles in the grain that are capable of rusting. Provide NAAM AMP No. 4 finish on stainless steel not exposed to view when indicated.

C. New cast or machined non-stainless metal parts, including sling, counterweight frames, sheaves, brackets, non-stainless steel, sub floor, and similar parts which are not exposed to view and not specified to be galvanized shall be cleaned, primed and painted as follows:

1. After fabrication and immediately before shop painting, ferrous metalwork shall be power-tool cleaned in accordance with SSPC-SP-3 to remove mill scale, rust, grease, oil, and any other foreign matter. Welds shall be thoroughly wire brushed.

2. After power-tool cleaning and just before shop painting, ferrous metalwork shall be washed with solvent to remove dust and residue in accordance with SSPC-SP1.

3. Immediately after cleaning and solvent washing, ferrous metalwork shall be shop painted with one coat of corrosion resistive metal primer and finish coat of gray enamel paint.

D. Concealed structural members shall have prime coat specified herein or be galvanized.

E. Pit floor and walls up to level of first landing shall be painted gray with the Epoxy Floor Paint System specified in Section 09 91 00 - Painting.

F. Entire hoistway, except pit area, shall be painted white with Semi-Gloss Finish Paint System in accordance with Section 09 91 00 - Painting, as applicable to substrate. Raceway and other pre-finished items shall be painted to match.

G. If not otherwise indicated on the Contract Drawings, Machine Room floor shall be painted gray with the Epoxy Floor Paint System specified in Section 09 91 00 - Painting.

H. If not otherwise indicated on the Contract Drawings, the Machine Room walls and ceiling shall be painted white with Semi-Gloss Finish Paint System in accordance with Section 09 91 00 - Painting, as applicable to substrate.

2.04 HOISTWAY CONSTRUCTION

A. Hoistway shall be constructed of non-combustible material and of the fire rating indicated on the Contract Drawings.

B. The top of the hoistway shall be enclosed and watertight.

C. Provide a pit ladder from the lowest landing if the pit depth exceeds 30 inches.

D. The minimum vertical distance in the refuge area between the top of car enclosure and the overhead structure or other obstruction shall be not less than 60 inches when the car has reached its maximum upward movement.

E. Hoistway shall be vented with a louver of a minimum 3 square feet as indicated on the Contract Drawings. Refer to Section 08 90 00 - Louvers and Vents.

F. Hoistway shall have a floor drain or sump with drain as indicated on the Contract Drawings. Drains shall be connected to the Station's industrial waste line as indicated on the Contract Drawings. Sump covers shall be of galvanized grating that is mounted flush with the floor. Grating shall be removable and have openings not to exceed 1 inch.

G. Provide galvanized expanded metal, minimum 14 gauge, for barriers between hoistways. Expanded metal shall extend the entire height of the hoistway and shall be braced and support for a maximum deflection of one inch with a force of 100 lbs.

2.05 MACHINE ROOMS

A. Machine room and auxiliary machine spaces shall be sized to accommodate the elevator and related equipment as indicated on the Contract Drawings.

B. Machine rooms shall be equipped with smoke detectors as specified in Section 28 31 00 - Fire Detection and Alarm Systems, that interface with the elevator controller via the main fire alarm panel.

C. Refer to the Contract Drawings for ventilation or air conditioning provisions for machine.

D. Refer to Section 10 40 00 - Safety Specialties. Provide a rechargeable 10-pound, 4A-60B:C fire extinguisher with metal mounting bracket.

2.06 EQUIPMENT IN HOISTWAY AND MACHINE ROOM

A. Geared Traction Machine: Single worm geared traction type with motor, brake, worm, gear, drive shaft and gear case mounted in proper alignment on isolated heavy structural steel bedplate. Machine shall have ball or roller bearings, and meeting testing requirements without external cooling appurtenances. Run/Stop switch to be in close proximity to each drive. The machine shall be provided with an electromechanical brake. The brake shall be spring applied and electrically released. Swivel type brake shoes shall be applied to the braking surface simultaneously and with equal pressure by means of helical compression

springs. The brake electromagnet will be designed for quick release to provide smooth and gradual application of the brake shoes. Provide an indication to the controller that the brake has fully released, by means of a micro switch. Provide necessary circuitry and devices to provide an indication to the controller to disable power to the machine drive in the event the brake does not fully release, by means of a micro switch. The brake setting and method of measurement shall be permanently marked on the driving machine. Braking surfaces shall be protected from leaking machine fluid.

B. Provide AC motor, 480 Volt, 3 phase, with drip proof enclosure and heavy duty rated for minimum 120 starts per minute, 30 minute cycle. Motor shall be high slip 10 - 13 percent for Station Elevators and low slip 2 to 5 percent for Parking Structure Elevators. Motor horsepower shall be minimum 12.5 HP with self resetting internal thermal overload and speed encoder.

C. Guide rails: Contractor shall provide minimum 18.50 pounds/foot for the counterweight and main guide rails and necessary bracketing/supports

1. The guide rails shall be accurately machined standard "T" section guide rails with tongue and grooved joints for the car and counterweight, weighing not less than that specified in the ASME A17.1.

2. Machined splice plates shall be used to form the rail joints. Each splice plate shall be so located as not to interfere with the brackets and clips and not coincide within 24 inches of guide rollers when car is stopped at any landing.

3. Guide rails shall extend from the pit floor to the underside of the machine room floor at the top of the hoistway. Extend rails to the overhead as close to the hoistway ceiling and/or the machine assembly and/or deflector sheaves, as set forth in ASME A17.1 Section 2.23.8. A structural steel channel mounted to pit floor shall support guide rails.

4. Guide rail sections shall not be welded together or welded to mounting brackets.

5. The maximum lateral deflection of elevator guide rails shall be 0.5 inches.

D. Guide Shoes shall be of the heavy duty roller type guides that are rated for minimum of 10,000 lbs. load. Each roller guide shall consist of, as a minimum, a set of three sound reducing neoprene wheels with precision type ball bearings and held in contact with the rail surfaces by means of adjustable spring loaded devices. Roller guides shall run on dry unlubricated guide rails. Top of car and all of the counterweight guides shall be fitted with guards. Roller guides shall be securely bolted to the car frame at top and bottom with stainless steel fasteners and shall be properly aligned to be plumb in respect to rail surface. Roller guides shall provide smooth and quiet elevator operation. Balance car to ensure equal roller guide pressure will not to exceed manufacturer's recommendations. Nominal roller diameters shall be as follows:

Car	Counterweight
Minimum diameter 6 inches	Minimum diameter 4 inches

E. Hoist and Governor Ropes: Size and number to ensure proper wearing qualities and performance minimum eight strands wound around hemp core. Preformed wire ropes shall

be installed. Minimum size of hoist ropes shall be 1/2-inch and governor ropes shall be 3/8-inch.

F. Buffers: Buffers shall be of the spring type and sized per code requirements. Buffers shall be supported by a structural steel channel that is mounted to pit floor. A permanent marking plate shall be secured to each buffer indicating the manufacturer's name, part number, load rating, stroke and number of springs.

G. Counterweight: Sectional metallic weights securely fastened in structural frame. Provide 1/2-inch minimum thickness retainer plates at the top and bottom of the counterweight frames to span the guide rail tongue for its full-finished distance. The elevator shall be suitably counterbalanced for smooth and efficient operation. Cast iron or steel weights shall be contained in a steel frame equipped with roller guides. A minimum of two rods shall pass through from the top to the bottom member of the counterweight assembly and filler weights. The filler weights shall be restricted from movement in the frame assembly when proper counterbalance has been determined. The counterweight assembly shall equal the weight of the complete elevator car plus approximately 40 percent of the rated elevator load. A counterweight guard shall be installed at the bottom of the hoistway, according to the applicable code sections. Provide intermediate support brackets on the counterweight guide rails, as set forth in ASME A17.1, Section 8.4.8. Provide the necessary number of brackets so that the counterweight frame shall be within 2 brackets at all times. Intermediate brackets shall be minimum 5/8 inch by 5 inch material.

H. Safeties: Flexible guide clamp type mounted on underside of car frame.

I. Emergency Stop Switches: Provide emergency stop switches in hoistway pit and auxiliary machine spaces and located as required by State codes. Stop switches shall be watertight, red-colored, mushroom-type push/pull switch.

J. Hoistway Limits: Provide terminal and directional limit switches, access limit switches and final limit switches. Limit switches shall be heavy duty with NEMA 4 or 4X housings and heavy-duty mountings.

K. Ceiling height in the machinery room shall be a minimum of 9 feet above finished floor.

2.07 HOISTWAY ENTRANCES AT ALL LEVELS

A. General: Fabricate finish work smooth with flush surfaces and free from warps dents, scratches and buckles.

B. Hoistway doors shall include door unit frame, flush sills, strut angles, headers, hanger covers, fascia plates, toe guards, dust covers, and required hardware. Exposed surfaces shall be stainless steel. All structural steel shall be galvanized. Refer to Article 2.08 - Car and Hoistway Doors, herein.

C. Frames: Fabricate from minimum 14 gage stainless steel with side jambs in one continuous piece from sill to head section. Head and jamb fully welded mitered corner.

D. Front Return Panels: Provide full height 12-gage stainless steel, fixed returns.

E. Hangers and Tracks: Provide heavy-duty hangers and tracks to support the heavy vision panel doors that are the sheave type with minimum two-point suspension. Provide steel

sheaves with ball or roller bearings with resilient sound-absorbing tires and adjustable upthrust, flanged groove. All material shall be galvanized. Maximum load per hanger shall not exceed 100 pounds. Additional hangers shall be provided as required. Hanger bolts shall be a minimum 1/2 inch diameter.

F. Headers, Struts and Closer Angles: As required for entrance installation and door closer mechanism, manufactured from plate steel. Use full-length steel struts. Hanger headers, minimum 1/4-inch thick material, extending from strut to strut with minimum 3/8-inch thick angles. All material shall be galvanized.

G. Dust and Hanger Covers: Provide as required, 16-gage minimum, stainless steel, No. 4 finish. Provide hanger cover plates extending full length of door track.

H. Fascia, Toe and Head Guards: Minimum 16-gage stainless steel, No. 4 finish, reinforced fascia.

I. Sills: Provide sills constructed of extruded nickel silver alloy with non-slip surfaces and grooves suitable for guides. Installed sills shall be continuous from strut to strut. Welded parts are not acceptable. Mount the sills with recessed, flat head stainless steel screws or hidden "T" type fasteners. Provide a 16 gauge stainless steel plate to cover the exposed vertical face of the elevator door sills. Provide all support angles, levelers and necessary concrete filler under sill and grouting for a complete secure, level, and plumb installation. No plywood shall be used under the hoistway sills. Fasten the stainless steel plate with stainless flathead screws. Apply silicon caulk around all gaps and on top of the fasteners to prevent any liquid from seeping into the underlayment or hoistway edging angle. After sill installation, Contractor shall adjust the elevator door to suit the sill. Support angle and levelers shall be galvanized or stainless steel.

2.08 CAR AND HOISTWAY DOORS

A. General: All hoistway and car elevator doors shall be stainless steel with vision panels.

B. Door Panels: Car and hoistway door construction shall be reinforced structural steel with minimum 14-gage ASTM A167 Type 316 stainless steel No. 4 finish cladding, flush design, rolled profile, rigid construction to ensure rigidity. The door panel assembly and related equipment shall be designed to withstand the force requirement of ASME A17.1.

1. Provide full-length neoprene astragals on meeting door faces.

2. Mount doors on structural header, not on car enclosure.

3. Provide non-vision side wings of stainless steel, No. 4 finish.

4. Use torsion spring mechanical closures; do not use weight closures.

5. Door mechanisms shall not be visible in vision panels.

6. Exposed vertical door corners shall be smooth and seamless.

C. Door protection: Refer to Article 2.09 - Electronic Door Edge Sensor.

D. Door Guides: Door panels shall be guided at bottom with adjustable nonmetallic gibs sliding in a smooth threshold groove. Provide a minimum of two gibs per panel located 1 inch from each end. Gibs shall be secured with minimum 2 screws to bracket and bracket shall be secured to door with at least 3 stainless steel screws.

E. Vision Panels: Vision Panels shall be installed in such a way that vision panels on car and hoistway shall be aligned. Door vision panels shall be installed in accordance with the following:

F. Vision panel shall be minimum 10 inches wide, 60 inches high and center mounted. The bottom of the vision panel shall be 18 inches above finish floor. The glass vision panels shall meet ANSI Z97.1 and CCR Title 8, Elevator Safety Order Section 3034 requirements.

1. Glass: Glass shall be ASTM C1048, Kind FT, Type l, Class 1, Quality q3, meeting ANSI Z97.1. The rating of the glass shall be visible in each panel. Lamination inner layer of 0.060 inch polyvinyl butyral. Both glass layers shall be tempered, clear, 9/16-inch total thickness and shall be coated with anti-graffiti clear film coating.

2. Glazing Setting Blocks and Spacers: ASTM C864, semi-hard neoprene or vinyl rubber, 70 to 90 Shore A hardness when tested in accordance with ASTM D2240, of width equal to thickness of glass and long enough to limit load on each block to 15 psig. Minimum length of setting blocks shall be 3 inches.

3. Glazing Gaskets: Continuous, closed-cell, extruded neoprene manufactured for glazing in type of metal doors and frames. Color shall be black. Gaskets shall be capable of being compressed 40 percent of original size and shall have 100 percent recovery capability when tested in accordance with ASTM F36.

G. Hangers shall to be mounted to the doors with minimum 1/2” diameter bolts. Maximum load per hanger shall not exceed 100 pounds, additional hangers shall be provided as required. All fastening shall be stainless steel. Finish of all door equipment shall be galvanized.

H. Door Operator: Door operator shall be heavy-duty, closed loop speed regulated, by G.A.L. MOVFR, a Designated Matching Product. Structural support shall be independent of car enclosure. Door equipment and coverings shall be galvanized. Wire cables shall be stainless steel.

1. Test switches shall be provided for the set-up and calibration for opening, closing, nudging and speed zone. At least one hand-held programming tool shall be provided per elevator.

2.09 ELECTRONIC DOOR EDGE SENSOR

A. The door edge sensors shall be District Matching Product (DMP); “Panta 40 Plus”” manufactured by Janus Elevator Products, Inc., and shall be installed in accordance with the manufacturer recommendation. Install the door edge sensors along the edge of elevator doors outside of the car door frame structures.

B. Operation: The door edge sensor shall provide a full light curtain door protective system which does not rely on physical contact with, or the motion of, a person or object to inhibit door movement or initiate door reversal.

1. The system shall be able to detect a 2-1/2 inch diameter rod introduced at any position within the door movement and between the height of 1 inch above sill level and 3 inches below the car doorjamb.

2. Detection of intrusion into the protected area shall cause the doors, if fully open, to be held in the open position and, if closing, to stop and reverse to fully open position.

3. The first intrusion during a stop at any landing shall cancel the normal dwell time and substitute a door protective system time delay that shall be adjustable between 1 to 10 seconds commencing with removal of the intrusion. If, during this period, a further intrusion occurs, upon its removal, the same delay period shall apply and this cycle shall continue until traffic through the doorway ceases.

4. The doors shall commence to close immediately after the expiration of the determined period once the last intrusion has been removed.

5. If doors are prevented from closing for an adjustable period of 15 to 45 seconds, they shall proceed to close at reduced speed and a nagging buzzer within 75-85 dBA shall sound. Door closing force shall not exceed 2-1/2 ft-lbf when door re-opening device is not in operation.

6. If the system incorporates light beams, the light source shall not require the use of incandescent filament lamps but shall operate in the invisible portion of the light spectrum.

2.10 CAR ENCLOSURE

A. General: Provide complete car with appurtenances, appointments, and finishes as indicated. Finish work shall have smooth surfaces and free of buckles, scratches, dents, warps, squeaks and rattles. Joints shall be light proof. Fasteners shall not be visible except as indicated.

B. Car Walls: Car walls shall be stainless steel, no less than 14 gauge Type 316, NAAMM AMP 503 No. 4 finish, and reinforced structurally at least every 30 inches. Surfaces of the floor support, door guides, and wall panels up to 36 inches above platform shall be cleaned then treated with metal primer and rust prevention compound.

1. Vertical panels shall be reinforced to a minimum height of one foot by a steel plate with a thickness of 1/16 - inch or greater.

2. Reinforce bottom of car wall and underside of door with minimum 3 X 3 X 1/4 - inch galvanized steel angles.

3. There shall be a minimum 3 inch cove base around the entire perimeter of the cab, including the door walls. The radius of the coving shall be a minimum of 1-1/2 inches.

4. Wood shall be not be used above the platform.

5. Vision panels shall be installed in car walls to align with hoistway walls. An additional handrail shall be provided in front of vision panel if the vision panel is on the side wall. Vision panels shall be constructed in accordance with Article 2.08.E.

C. Contractor shall furnish and install resilient flooring in accordance with Article 2.11 - Elevator Floor and Platform.

D. Ceiling: Unitized stainless steel construction with emergency exit in accordance with regulatory requirements.

E. Car Ventilation: For all elevator cars, Contractor shall provide exhaust fan with sound isolation mounted on car roof or as per manufacturer's recommendation. Fan shall be two-speed squirrel-cage exhaust blower rated 200 cfm, 120 Vac. Fan speed shall be selected by switch located in the maintenance panel in the Car Operating Panel.

F. Motion sensor: Contractor's attention is directed to Article 2.16 - Recessed Motion Sensing Unit.

G. Car Lighting: Illumination level inside the car shall be 10 foot-candle measured at the floor level. The related work shall be performed in accordance with Section 26 50 00 - Lighting.

H. Emergency Lighting: Provide emergency lighting in accordance with CCR Title 8 and with a minimum five foot-candle level. Provide a charger-inverter battery unit with alarm bell mounted on top of car. The charger-inverter battery unit shall be gel-celled batteries providing 24 volts. Battery shall be sealed and have 10 year service life. The alarm bell shall be a 6 inch gong and shall be mounted to the battery pack and meet the ANSI code requirements for audibility. The unit shall include a pilot light and test switch, off-on switch, and a terminal strip. Input voltage shall be 115 Vac continuous and the output voltage shall be 115 Vac with a maximum 100 watts capacity. Loads shall include the car emergency lighting, alarm bell, and the transformer unit for the CCTV camera. Upon outage of normal power the unit shall, within five seconds, light two lamps of the normal car lighting fixtures. The unit shall have sufficient capacity to keep the lights in continuous operation for four hours including the alarm and CCTV camera for one hour. Provide a readily accessible switch mounted in the service cabinet for testing the unit.

I. Car Operating Panel (COP): The COP shall be located on the right side when standing facing the door from inside the cab. The COP shall be a stainless steel panel, with heavy duty, stainless steel spring-loaded hinges or continuous piano hinge, that is secured with flush barrel-type keyed latches. Hinged Car Operating Panel when opened shall have a minimum of 3 inch clearance from the finished floor. Contractor's attention shall be directed to Article 2.15, - Signals and Operating Fixtures, for related work.

J. Car Sill: As specified in Article 2.07 - Hoistway Entrances at All Levels, under Sills. Car sill shall be slightly higher than the finish floor, but shall not exceed 1/16 of an inch.

K. Handrails: Handrails shall be stainless steel, 1-1/2 inch tube or bar. Contractor shall also provide heavy duty stainless steel mounting brackets, fasteners, and other hardware. Fastening shall be 3/8-inch minimum in diameter. Each handrail shall support a minimum of 200 lbs. load.

L. Car shall be sound isolated from car frame.

M. Car Camera: Refer to Article 2.17 - Cameras, herein.

N. If the Engineer requests, car enclosure shall be pre-assembled at the factory prior to shipment for the Engineer's inspection.

2.11 ELEVATOR FLOOR AND PLATFORM

A. Car Frame and Platform: Provide structural carbon steel frame with anti corrosion primer and paint with gray finish color. Isolate platform from car frame by rubber pads and provide jacking bolts for pad replacement.

1. Provide 1/2-inch minimum thickness retainer plates or equal under the guide shoe mountings at the top and bottom of the car and counterweight frames to span the guide rail tongue for its full finished distance. All fastenings for guide shoes shall be stainless steel.

2. Allow recess for installation of finish flooring. Design platform and floor for 500 pounds concentrated live load, and 50 pounds per square foot.

B. Subfloor: Provide floor substrate consisting of 3/4-inch, plywood and 1/2-inch backerboard covered with stainless steel floor pan. The plywood shall be A-B, marine core, water resistant, pressure treated plywood. Any cuts or modification to plywood shall be treated with a wood preservative, containing a minimum of 10 percent copper naphthenate (copper green) sealer. Backerboard shall be compatible to HardiBacker 500 or equal. Backerboard shall be secured with adhesive and backerboard screws as recommended by manufacturer. The stainless steel floor pan shall be 11 gage and extending the entire floor area, including the cove base. Seams in plywood, backerboard, and stainless steel shall be staggered so as to not coincide. The floor pan shall be sectioned where required and constructed with watertight seams, fastened to the plywood substrate with stainless flat head wood screws on 4 inches centers from pan joints and spaced at 16 inches center to center. The floor pan fasteners shall be caulked, heads ground flush with pan surfaces and indented pan fasteners shall be covered with leveling compound. Concealed areas behind door returns shall be protected and covered with stainless steel and caulked.

C. Finish Flooring: Flooring shall be vinyl flooring, "Optima, light gray, Part Number 05864", a Designated Matching Product (DMP), as manufactured by Tarkett Inc. of Whitehall, Pa. 18052. Flooring shall be homogeneous polyvinyl chloride (PVC) with non-directional pattern and 0.080 inches thick seamless. Flat floor area shall be free of seams. All vinyl to vinyl seams in corners shall be welded with welding rod shall be same material as flooring, and matching color. Provide backing for cove base per flooring manufacturer's written recommendations. Flooring shall be continuous to edge of coving. All vinyl flooring to metal seams shall be caulked with clear silicon. Flooring shall require no wax or sealer and shall be resistant to urine.

D. Wood products will not be permitted above the stainless steel platform floor.

E. All gaps and running openings where the platform structure meets the surface of the finished openings shall be within the tolerances specified in the Elevator Safety Orders.

F. Platform floor shall slope so that one quart of water poured onto the wall shall flow towards the car door or car center so that liquid on the floor will not accumulate in the corners or near the floor perimeter of the car. The specified finish floor and stainless steel floor pan shall be constructed with watertight seams. There shall be no ridges or tripping hazards.

2.12 ELECTRICAL COMPONENTS

A. General: Electrical components shall comply with NFPA 70 and CCR, Title 24, Part 3, California Electrical Code. All wiring and conduit work shall be performed in accordance with Section 20 70 26 - Common Materials and Methods for Electrical Systems, and Section 26 05 24 - Low and Medium Voltage Wires and Cables, unless stated herein.

B. Weatherproofing: Electrical enclosures, penetrations and wiring shall be waterproof, NEMA Type 4 or 4X for Station Elevators and NEMA Type 4 for Parking Structure Elevators, unless otherwise specified. Wiring shall be in galvanized rigid steel (GRS) conduit with watertight fittings, except otherwise noted.

C. Raceways:

1. Fittings: Provide watertight fittings and hubs for all raceways and enclosures.

2. Provide mechanical protection for lighting fixtures on top and bottom of car, and in the elevator pit. Light fixtures shall be separately switched.

3. Raceways and conduits in hoistway shall be exposed. All conduits shall be galvanized rigid steel and minimum 3/4 inch. Liquid-tight flexible conduit may be routed to fixtures and switches, but shall not exceed 18 inches in length. Main hoistway raceway shall be hinged, NEMA type 12 wireway with zinc plated or stainless steel quick release hatches. Raceway joints shall be gasketed. Raceways shall be powder coated inside and out.

4. All terminal junction boxes in the hoistway and machine room shall be stainless steel, NEMA 4X. Pull boxes shall be powder coated steel enclosures, NEMA 12 or 4 for Station Elevators and NEMA 12 or 4X for Parking Structure Elevators.

5. Electrical metallic tubing (EMT) is not permitted for elevator related work.

6. Conduits shall be routed along walls and ceilings.

D. Electrical Wiring:

1. Wiring shall be color coded and identified with permanent imprinted embossed sleeves at all terminations throughout, including controller and junction boxes. Terminal strips shall be identified with unique numbering.

2. Conductors: Provide stranded copper conductors throughout, with individual wire color coded and/or labeled. Minimum wire size shall be 18 AWG. Conductors shall be designated uniformly throughout the system.

3. Label spares and each terminal as it corresponds to the controller schematic. Connections shall use insulated crimp connectors on terminal blocks located in control cabinets and junction boxes. The crimper shall be comparable to Panduit model CT-550 or equal. Do not use splices or similar connections in any wiring except at terminal blocks. Provide anti-corrosion protection compound on all high current connections throughout the system using product comparable to Thomas & Betts #CP-16 or equal.

4. Do not parallel conductors to increase current carrying capacity.

5. Do not use armored flexible metal conduit as grounding conductor.

6. Perform grounding of the elevator equipment in accordance with the manufacturer's instructions.

7. Provide dedicated conduits for the following circuits:

   a. Main power from the disconnect to the controller

   b. Motor power from the controller to the motor

   c. Speed decoder to the controller

E. Traveling Cables:

1. Provide two traveling cables between car and the controller via the "half-way box" in the hoistway. The steel support cable shall be flexible or extra-flexible, preformed, galvanized steel wire rope support strand. The steel core shall be insulated with polyvinyl chloride and cotton braided. An overall jacket of polyvinyl chloride (PVC) shall provide a smooth, flexible, abrasion-resistant covering. Cable shall comply with the flame test requirements in Paragraphs 1060.1 - 1060.9 of UL 1581 and shall be CSA FT-1 flame rated. The insulated conductors shall be soft annealed; bunched stranded, bare copper complies with ASTM B3 and B174. The conductors shall be insulated with a high quality 60 degrees C PVC and shall be rated at 300 Volts in accordance with the requirements of UL62, CSA C22.2 No.49 and NEC Articles 400 and 620. Provide a heavy duty, single eye, closed mesh multi-weave, stainless steel wire grip to support the traveling cable on both ends and properly anchor to relieve strain on individual conductors. Provide details of the cable attachments on each end. Protect cables from rubbing against hoistway or car parts.

2. One traveling cable (for power and control circuits) shall be continuous from elevator car to the controller in the elevator machine room. Provide a minimum of 10 spare conductors of minimum #18 AWG and two spare conductors of #14 AWG, which shall be terminated at both ends to a terminal block.

3. The second traveling cable (for communication circuits and CCTV coaxial cables) shall be continuous from the car to the communications interface cabinet in the elevator machine room. Provide a minimum of two pair spare communication conductors and one spare CCTV conductor, which shall be terminated at both ends to a terminal block. Route the coaxial cables and communication circuits in conduit to the Train Control Room or Communication Room.

4. The coaxial cable shall be 75-ohm exhibiting the characteristics of an RG6 and incorporate the added mechanical properties of a composite copper and copper-covered steel inner conductor, the deformation resistance of a cellular polypropylene dielectric, and a combination foil tape and copper braid for 100 percent shield coverage.

5. Communication circuits shall be a minimum six shielded twisted pair, # 22 AWG, soft-annealed, bare copper cable with a non-insulated drain wire. The shield shall be a laminated polyester and aluminum foil tape. The assembly shall be covered with an overall colored nylon or PVC jacket. Terminate both ends of the circuits to a terminal block.

F. Communications Interface Cabinet: Provide a NEMA 12, powder coated steel junction box mounted adjacent to the controller (group controller for Parking Structure Elevators) in the machine room. This cabinet shall terminate all the communication and control circuits which are routed between the elevator controllers and other equipment and shall include the following: fire alarm, station agent booth controls and indication, CCTV, emergency phone, remote monitoring signals, and seismic switch. All terminations shall be on a terminal strip. System circuits shall be grouped together on separate terminal boards or at least separated by two spare terminals between different systems. Provide feed-through coaxial BNC connectors mounted on a L-shape channel inside the junction box.

G. Disconnect Device: Provide a heavy-duty fused safety disconnect switch or a circuit breaker capable of being locked in the "OFF" position for each elevator in the machine room. The safety switch shall be sized for the total motor and controller electrical loads.

H. Car Inspection Station: Provide a car top inspection station to operate the car from the top. The inspection station shall include control switches for up, down, run, inspect, and stop and shall include an audible and visual alarm for emergency service. Inspection station shall also include a gasket sealed light fixture with a 25-watt compact fluorescent lamp with wire guard, glass globe and switch and provide a 20A, 120V GFCI duplex receptacle with weather-resistant cover and flip-lids.

I. Work Lights and Convenience Outlets: Provide the following:

1. Top of car: 15A, 120V, GFCI duplex receptacle on car top for CCTV camera power supply in weather-resistant outlet box with flip-lids.

2. Bottom of car: Gasket sealed light fixture with a 25-Watt compact fluorescent lamp with wire guard, glass globe and switch and a 20A, 120V GFCI duplex receptacle with weather-resistant cover and flip-lids. Fixture shall be accessible from the lowest hoistway landing.

3. Inside car - 15A, 120V, GFCI duplex receptacle in the car service panel.

4. Hoistway – Provide a gasketed sealed light fixture with a 25-watt compact fluorescent lamp with wire guard, glass globe and switch at the top of the hoistway and in the pit. Light switches shall operate both hoistway light fixtures and be enclosed in weatherproof box with flip-lids. Provide in hoistway pit a minimum of two duplex receptacles (20A, 120V) with GFCI protection in weather-resistant outlet box with flip-lids. Receptacles at the elevator pit shall be installed 36 inches above the pit floor.

5. Elevator Machine Room - Provide a minimum of two duplex receptacles (20A, 120V).

J. Provide the necessary red lockable safety switches to isolate 120 Volt power for auxiliary systems in the elevator car, such as car lighting, cameras and outlets. Mount switches in the elevator machine room adjacent to the controller. At the switches, label the power source and function for each switch.

K. Main Circuit Breaker: If a sprinkler system is installed in the hoistway 24 inches above pit floor or machine room, then the main 480 Volt circuit breaker shall be supplied with a shunt trip feature to isolate the main power supply to the elevator prior to the activation of

the fire sprinklers. The shunt trip shall be activated by heat detectors in the machine room and hoistway by means of the main fire alarm panel.

2.13 CONTROLLER

A. General: The work of this section shall be performed in accordance with Section 20 70 26 - Common Materials and Methods for Electrical Systems.

B. Controller: The programmable controller shall be Model PTC-AC for Station Elevators and Model IMC-AC using flux drive for Parking Structure Elevators for geared applications with isolation transformer for AC, line conditioner, and AC motor drive package, the District Designated Matching Product (DMP), as manufactured by Motion Control Engineering (MCE), Rancho Cordova, California. These indications are listed in Article 2.14 Remote Monitoring System and Article 2.15, Signals and Operating Fixtures. The controller panel shall be provided with data pocket made of high-impact thermoplastic mounted behind the door panel with 3-point latches and lockable. The controller cabinet shall be NEMA Type 4X, with minimum 8 inch floor stands and provided with the technical data, instruction manuals and other related materials about the controller enclosed therein. The motor starter shall be solid state.

C. Refer to Article 1.07, Design and Operation Requirements, under Elevator Controller, for operational requirements.

D. Each controller shall generate external indicating signals required by the remote monitoring system. Provide a terminal block in the controller cabinet and hard wire the RMS events' list. These event indicating signals shall be available from the termination points, i.e., dry RMS contact relays, such that the specified elevator fault and status event data can be automatically received by the existing District's Remote Escalator/Elevator Central Monitoring System (EERMS).

2.14 REMOTE MONITORING SYSTEM

A. The Contractor shall provide the signals to report any failures or out of service conditions to the existing District's Escalator/Elevator Remote Monitoring System. The existing EERMS was developed and is owned by the District. The EERMS communicates with the elevator controller through DeviceNet protocol with DeviceNet modules located in the Communications Interface Cabinet.

B. The Communications Interface Cabinet shall be equipped with Designated Matching Product, Allen Bradley DeviceNet module, Model 1791D-16BO and 25 post terminal strip. A 25 conductor cable shall be provided between the controller and Interface cabinet for the sole use of the EERMS. The EERMS shall be installed and wired according to the Contract Drawings. A communication cable in a dedicated conduit shall be provided from the Communications Interface Cabinet to the Train Control Room or Auxiliary Communication Room in the Station as indicated on the Contract Drawings.

C. Fault and Event List: The controller shall provide the following signals to the DeviceNet modules. These signals shall be reported instantaneously as the controller responds to the initial signal within the elevator system. In the event a monitored condition cannot be determined directly from the controller, the Contractor shall provide the necessary sensor device. The following safety circuits and conditions ("Events List") shall be established for reporting.

1. Door Lock
2. Loss of Power
3. Safety Circuit
4. Emergency Stop Button
5. Emergency Service (Fire Alarm or Earthquake)
6. Car at Top Landing
7. Car at Middle Landing (If applicable)
8. Car at Bottom Landing
9. In Service (ISV and ISRT signals in parallel)
10. Spare
11. Spare
12. Car Shutdown by Agent
13. Car Occupied
14. Mechanic On-Site (door switch and ISV signal)

2.15 SIGNALS AND OPERATING FIXTURES

A. General: Contractor shall provide fixtures and signals as follows, test complete system, correct any deficiencies in wiring and function and make complete system fully functional. Location and arrangement of fixtures and signs shall comply with the ADA and other code requirements.

B. Push Buttons:

1. Provide stainless steel, vandal resistant push buttons for each landing, door open, door close, car alarm and emergency phone call. Metal button top surface shall be flat and raised 1/8 inch from surface. Metal button shall be center illuminated with LED light. LED. units shall be long life type with standard wattage and type of lamps. A solid black plastic halo shall surround typical pushbuttons; red halos shall be surround alarm and phone buttons. Relays for push buttons shall be a Designated Matching Product (DMP), Type 015040 as manufactured by Innovation Industries, Inc. of Russellville, AR 72811. Push button assembly shall be a Designated Matching Product (DMP), Type 015040 as manufactured by Innovation Industries, Inc. of Russellville, AR 72811 or as required by the Engineer.

2. Operation of hall call button shall cause button to illuminate until car arrives. Operation of car call button shall cause button to illuminate until car reaches other landing.

C. Car Operating Panel (COP):

1. COP Faceplates: The faceplate shall be stainless steel, No. 4 finish or brushed aluminum, 1/8 inch minimum thickness, flush mounted.

2. COP Etchings: Except for pushbutton markings, all text shall be etched in faceplate and back-filled with black paint. Text related to the fire service shall be back filled with red paint. Lettering shall be as large as possible, but a minimum of 1/4 inch, unless otherwise indicated.

   a. Fire Service II instructions shall be etched in red lettering.

   b. The elevator number shall be etched into the faceplate with minimum 1/2 inch, black filled lettering. Elevator identification shall include the Station number for example “A20, Elevator No. 34”. The correct elevator number will be assigned by the Engineer.

   c. “No Smoking “ shall be etched with minimum 1 inch, red lettering.

   d. Elevator capacity shall be etched in black lettering.

3. COP Nameplates: Provide raised Braille Grade II, standard alphabetical characters for numerals or symbols as indicated to the left of the operating buttons and devices used by the public, in compliance with the Americans With Disabilities Act. Raised characters shall be white metal on black background without borderline on edges for Station Elevators and with borderline on edges for Parking Structure Elevators. Braille plates shall be surface mounted on control panel with concealed mechanical fasteners.

4. Fastening shall be flush, stainless steel tamper-proof screws of material matching faceplates.

5. Car alarm button: Provide dry contact for alarm initiation to Station Agent's Booth Annunciation console.

6. Car Position Indicators: Contractor shall provide a digital programmable position indicator in the Car Operating Panel. The displayed landings shall correlate with the push button nameplates and provide a directional arrow that shall be illuminated only while moving.

7. Exposed key switches shall be provide for Fire service only. See Article 2.15 G. herein for key type.

D. Service Cabinets: The Contractor shall provide a service cabinet in the Car Operating Panel. The service cabinet shall be behind a minimum 16-gage stainless steel hinged door with gasket seal. Keying shall be as designated by the Engineer. The service cabinet shall be mounted with hairline joints to car wall surface and have no unfilled openings. The service cabinet shall provide the following:

1. Inspection Service key switch

2. Independent Service key switch

3. Car light on/off toggle switch

4. Motion Sensor mode toggle switch

5. Fan Speed high, off, low toggle switch

6. Emergency Light illuminated test button

7. Emergency Exit Override toggle switch

8. Duplex GFI receptacle

E. Emergency Car Hands Free Telephone: Contractor shall furnish, install and test hands free telephone as required by Section 27 30 01 - Telephone Systems. Provide all work necessary to install the system to satisfactory operation.

1. Telephone panel shall include a text and Braille emergency telephone nameplate.

F. Hall Fixtures.

1. Chimes: Provide single chime for up and double chime for down direction. Chime volume shall be at least 75 dBA measured 5 feet from the hoistway door.

2. Hall lantern shall illuminate when car arrives. Provide vandal resistant, long-life LED directional lanterns with stainless steel faceplate for Station Elevators. Provide extruded white, long-life LED directional lanterns with stainless steel faceplate for Parking Structure Elevators. Provide both “up” (1 signal) and “down” (2 signals) arrow-shape signals at landings of 2-way travel. Light extinguishes when doors close. Lanterns shall not be mounted in the doorjamb.

3. Hall Call Panel: Provide hall call push buttons at each landing as specified herein under “Push Buttons”. Mount in a minimum 1/8” thick stainless steel faceplate. Surface mount faceplate with tamper proof fasteners. Hall call stations shall be located on right side of hoistway entrances at single elevator locations and be centered between entrances at group of elevators. Hall calls shall be identified with “Elevator Call” labels below the button. Labels shall include Braille lettering. Main floor hall call panel shall be equipped with fire service key switch and instructions. (Refer to Article 2.15G, Keys and Key-Operated Switches, for specifications for key switch.) Hall call panels at each level shall have the required “do not use in case of fire” instructions. All emergency instructions shall be etched in stainless steel faceplate and back-filled with red epoxy paint. Wording as approved by the applicable Fire Marshal.

G. Keys and Key-Operated Switches: Keys in the car and at hoistway entrance shall be round barrel, Fort Lock EX series keys to match District standard keys. The Engineer will provide specific key assignment. Key-operated switches shall be in compliance with regulatory requirements. Coordinate keyway and keying requirements with the Engineer. Keying shall be compatible with the existing BART lock system. BART keys for key operated switches and locks to be GEM, Fort lock, Chicago, barrel keys. Fire recall key-operated switch shall be on integral hall call fixture at Main floor.

H. Station Agent’s Booth Elevator Monitoring Indications: The elevator controller shall provide the remote control and indication signals to each Agent’s Booth in the Station as specified in Article 1.07, Design and Operation Requirements. Conductors for these signals

shall be rated for at least 300 Volts, shall have at least four spare conductors, and shall be routed in a dedicated conduit to the Station Agents Booth. Refer to the District Technical Manual – SCADA System Function Description.

2.16 RECESSED MOTION SENSING UNIT

A. The motion sensor shall be the District Designated Matching Product (DMP), CI-200, Version 2, 360o PIR occupancy sensor as manufactured by The Watt Stopper, Santa Clara, CA 95050. The motion sensor unit shall be recessed into the ceiling and routing of the control cable shall be in accordance with the Contract drawings. Provide a mounting bracket flush to the ceiling for the motion detector unit. The motion detector shall be located and adjusted so that movement of the doors does not generate a false occupancy. Provide the 120 Vac-power supply to the power pack unit of the motion detector.

B. Programmed Operation: If after a programmable length of time, an elevator car call has not been activated and the sensor detects elevator car occupancy, the car shall be programmable to proceed with either one of two courses of action. The choice of action shall be selectable by the motion detector switch in the service panel on the Car Operating Panel. The logic and circuitry of this alarm shall be incorporated into the controller circuit. Any auxiliary relay contact required to accomplish this feature shall be provided. This circuit shall be depicted in the schematic diagram of the controller. All occupancies, regardless of operation, shall be reported to the Station Agent's Booth.

C. Automatic Car Call Mode: Upon occupancy detection, the elevator shall automatically generate a car call to the opposite floor if a car call is not activated within an adjustable time of 5 to 30 seconds.

D. Nuisance Occupancy Mode: If a occupancy is detected without a car call for an adjustable time of 5 to 30 seconds, then the doors shall reopen and remain open with audible alarm until a car call or hall call is generated or the car is vacated.

2.17 CAMERAS

A. General: Provide cameras as specified in Section 28 41 29 - Closed Circuit Television Systems. Camera circuits shall be routed through the Communications Interface Cabinet in the machine room and to the Train Control Room or Communications Room via a dedicated CCTV conduit.

B. Car camera: A camera shall be mounted in the ceiling corner on the front wall opposite of the side of the Car Operating Panel. The camera shall be adjusted to observe patrons operating the Car Operating Panel. The camera shall be housed in a vandal resistant enclosure.

C. Elevator Entrance Cameras: A camera shall be provided for each elevator entrance. Cameras shall be located at least 8 feet above the finish floor and adjusted to view the entire entrance. Outdoor locations shall have a waterproof enclosure.

2.18 SIGNS

A. General: Hoistway and car signs shall be metal plates with black backgrounds and raised white lettering and Braille symbols with raised white borders, unless otherwise specified. Braille lettering shall be Grade II, comply with Americans With Disabilities Act and

located below alphabetical characters, numeral, or symbols. Signs shall be on separate plates flush-mounted with hairline joints and concealed mechanical fasteners in cars and surface-mounted with tamper-proof fasteners at elevator entrance locations.

B. Provide signs with Braille indicted landing identification on both sides of the door jamb at every landing. Lettering shall be 2 inches in height and shall be centered 60 inches above doorsill.

C. Provide Star of Life Signs on each side of doorjamb at the main landing. Signs shall be raised blue lettering and standard star of life symbol on a white background.

D. Refer to "Hall Call Panel" under Article 2.15, Signals and Operating Fixtures, herein for requirements for "Elevator Call" signs with Braille at each hall call station.

E. Provide "Station Agent Call" sign with Braille on hands-free white courtesy phones located near elevator entrances to avoid confusion between hall call stations.

F. Provide black laminated plastic sign with 1-1/2 inch lettering centered on each hoistway entrance header indicating the elevator number. Sign shall be without Braille and abbreviated as the following: "A20, ELEV. 33".

2.19 VIBRATION ABSORPTION MOUNTS

A. Vibration Isolation: Minimum 2-inch thick vibration-absorption mounts, designed to effectively prevent the transmission of vibrations to the structure, and thereby eliminate the sources of structure–borne noise resulting from the elevator system.

PART 3 - EXECUTION

3.01 PREPARATION

A. Hoistway: Examine the hoistway and supporting structure, and the conditions under which the elevator work is to be installed. Do not proceed with elevator installations until unsuitable conditions have been corrected. Hoistway pit shall be painted prior to installation of elevator equipment.

B. Electrical: Examine areas to receive elevators and verify that electrical rough-in is correct.

C. Machine Room walls and floor shall be painted prior to installation of elevator equipment.

D. Confirm that applicable submittals have been approved and applicable permits obtained prior to installation.

3.02 INSTALLATION

A. Welded Construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustments, inspection, maintenance and replacement of worn parts.

B. Vibration Isolation: Mount rotating and vibrating elevator equipment and components on vibration-absorption mounts.

C. Lubricate operating parts of systems as recommended by manufacturers.

D. Alignment: Coordinate installation of hoistway entrances with installation of elevator guides rails for accurate alignment of entrance with car.

1. Adjust sills and doors to provide smooth, trouble free operation.

2. Ensure guide rails plumb and parallel with maximum deviation from rail center- line of 1/16 inch per floor, noncumulative.

3. Install buffers with required blocking and supports.

4. Grout sills with nonshrink grout. Set units accurately aligned with finished floor at landings.

5. Mount sill plate with concealed fasteners.

6. Field repair damaged coatings and wrappings.

E. Controller: External connections to the equipment on each controller shall be made by means of approved cable thimbles or solderless cable lugs, or both, depending on the current to be carried.

F. Balance car to ensure equal guide shoe pressure on all shoes. Do not exceed manufacturer's recommendations.

3.03 FIELD QUALITY CONTROL

A. General

1. Notify the Engineer at least five days prior to each scheduled test. Perform testing in the presence of the Engineer.

2. Regulatory Agencies Inspection: Upon completion of the elevator, Contractor is responsible to provide instruments, weights and personnel to conduct tests required by regulatory agencies. Representatives of the regulatory agencies and the Engineer shall witness tests.

3. Overall elevator testing shall be performed after installation.

4. Contractor shall perform all safety tests on the elevator without load. All tests shall be recorded in detail and submitted to the Engineer for approval.

B. Acceptance Testing Requirement

1. The emergency phone, seismic switch, and fire service operation shall be tested prior to the State Inspection.

2. A one-hour heat and run test with full load shall be performed prior to State inspection. Performance and leveling tests shall be made before and after heat and run test. Heat and run test shall not exceed manufacturer's recommendations.

3. All the Station Agent's Booth signals shall be tested.

4. Measure and record horizontal acceleration and vibration.

5. Measure and record acoustical output levels in machine room and both inside and outside of car to ensure Contract requirements are meet.

6. Contractor shall test direction indicator system for proper operation.

C. Substantial Completion Inspection: District personnel shall perform a full operation and quality control inspection, known as the Substantial Completion Inspection, after the above items been completed. This inspection may occur prior to or after the State inspection. However, Substantial Completion for the elevator will not be granted until the State issues an operating permit and after the Substantial Completion Inspection is without any significant or numerous punch list items.

D. Final Acceptance Inspection: After the completion of the punch list, delivery of all submittals, performed the training, and the Maintenance Period is near completion, the Contractor shall notify the Engineer at least two weeks in advance to schedule the Final Acceptance inspection. This inspection shall verify that the punch list items have been completed and the elevator was properly maintained and is in proper working condition.

E. Corrections: Make corrections to defects or discrepancies at no cost to the District. Should discrepancies be such that re-examination and re-testing is required, the Contractor shall pay for costs including those of the Engineer.

3.04 MAINTENANCE

A. The Contractor shall perform maintenance service for the elevator in accordance with Article 1.11, Maintenance Services.

3.05 CLEANUP DURING CONSTRUCTION

A. The Contractor shall keep elevator area, elevator machine room, and the space allocated to the Contractor's work in a neat, safe and orderly condition.

3.06 FINAL CLEANING OF FACILITIES

A. Refer to Section 01 74 14 - Cleaning. Prior to final inspection by the Engineer, and after all elevator work is essentially complete, thoroughly clean facilities including hoistway enclosures and car, utilizing professional building cleaners where appropriate.

3.07 TRAINING

A. Training Program: The Contractor shall provide a program to train the District's operations, maintenance and training personnel in details of the elevator system components which were installed or modified to enable the District to operate, service and maintain the elevators. In regard to the work of this Section, these provisions supersede Section 01 79 00 - Demonstration and Training. As a minimum, training topics shall include controllers, door operators and drive system.

1. The Training Program shall include formal and informal instruction, as appropriate, and any models, mockups, documentation, and aids necessary to carry out the program.

2. Materials used in the Training Program shall be of durable construction and shall become the property of the District.

3. Assumptions:

   a. The Contractor shall assume that the personnel to be trained have only the basic skills pertinent to their craft as outlined in the District's job descriptions for the involved personnel.

   b. The Contractor shall assume that the District personnel to be trained by the training program have no knowledge of features of the equipment or systems to be taught.

4. Training Program Plan: The Training Program Plan shall be submitted, subject to approval by the Engineer, within 60 days of the Notice to Proceed and shall contain, at a minimum, the following data:

   a. A flow diagram indicating the logical progression of training to be conducted.

   b. A description of each course, including the number, description and duration for each lesson in the course.

   c. Resumes showing the qualifications of the proposed instructors.

   d. A list of all subcontractors or other equipment manufacturers to be used in the training program and a description of their responsibilities.

B. General: The training shall be provided to the District personnel with the operating procedures necessary to operate the systems. The courses shall include, but not be limited to, the following training:

1. Classroom training shall give course participants an understanding of the overall system operation.

2. Hands-on training shall give course participants actual maintenance experience.

C. Courses: Training shall consist of the Elevator System Maintenance Course.

1. The Elevator System Maintenance Course shall provide the District's maintenance workers and trainers with detailed knowledge of and hands-on experience with the system functional capabilities and overall operation in order to properly troubleshoot and maintain the following components: controller, door operators, drive components, signal, and safety devices. The course shall provide participants with a working knowledge of these items and its operation, maintenance, interfaces, and use of test equipment for diagnosing troubles.

2. The course shall provide theoretical background and hands-on experience in troubleshooting and repair procedures to permit participants to locate and repair system faults in a timely manner. Course shall include emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train personnel in the procedures to be followed in checking the source of operation failure or malfunction. Operation of diagnostic equipment shall be explained.

3. The course shall utilize the complete Operation and Maintenance Manual.

4. The course shall utilize actual hardware and photographs taken during the manufacturing process wherever possible. Actual hardware used for training must pass re-inspection and acceptance testing prior to being placed in service.

5. The course shall consist of a minimum of 8 hours of classroom training and 8 hours of hands-on in the field training. The training shall not exceed 8 hours per day.

6. The course shall be presented a total of four times: The Contractor shall present one session within 60 days after the acceptance of the first elevator and shall present the final session within 120 days prior to the completion of the last elevator.

7. The class size will be up to 10 participants per session.

D. Training Location and Classrooms: All training courses shall be conducted in facilities provided by the District. The facilities will be equipped with tables and chairs. The Contractor shall provide video players and projectors as required.

E. Instructors: Contractor shall provide qualified instructors. The instructors shall have previous formal classroom instruction training and relevant experience with the provided systems equipment in an operating environment.

1. The instructor shall present classes and instructions in person.

2. When prerecorded lectures are part of a training course, the instructor shall supplement the recorded material.

3. Instructors shall demonstrate a complete and thorough technical knowledge of the material being covered in the course. These instructors shall be thoroughly familiar with handbooks, guides, tools, test equipment, and other aids used in troubleshooting and repairing the equipment.

F. Training Reports: A grading system shall be established by the Contractor and approved by the Engineer to report the progress of each trainee during a course. Grading shall be kept strictly confidential and furnished only to personnel in the District that are designated by the Engineer. The grading system shall identify any requirements for further training for each participant.

G. Training Manuals and Equipment: Prepare training manuals to supplement the Operation and Maintenance Manuals and submit them to the Engineer for review and approval at least 90 days prior to the start of classroom instruction. The training manuals shall be prepared specifically for use as training aids. The Operation and Maintenance Manuals shall be the primary text.

1. Each course participant shall receive copies of the Operation and Maintenance Manual, Training Manuals, and other pertinent material prior to the commencement of all courses.

2. The Contractor shall provide the master and two additional copies of all Training Manuals and materials as reference documentation.

3. Upon completion of each course, Operation and Maintenance Manuals, Training Manuals, and Training Aids shall become the property of the District. Throughout the Contract and warranty periods, it shall be the responsibility of the Contractor to supply the District with any changes and revisions to the Training Manuals and other documentation.

4. The District reserves the right to copy all training materials and aids for use in District conducted training courses.

5. The Contractor shall provide all special tools; equipment, training aids, and any other materials required to train course participants. The number of special tools and other training equipment shall be adequate for the number of participants attending the course.

6. The District will provide the Contractor written comments on the Training, Training Manuals and equipment based upon the first sessions. The Contractor shall incorporate the comments and resubmit the documents 60 days prior to the last training sessions.

H. Videotaping:

1. Provide video training tape(s) covering complete troubleshooting of elevator drive/fault finder system for use by District's Instructors.

2. In addition, the Contractor may utilize prerecorded lectures as supplementary training material. These shall not serve as a replacement for a classroom instructor or as the primary training vehicle. The Contractor shall provide such videotapes to the District for retention and playback by the District's Instructors as reference documentation.

3. The District shall have the right to videotape training courses presented by the Contractor. The District shall also have the right to use these videotapes to train personnel in the future.

I. Final Deliverables. The final deliverables consist of:

1. Updated and corrected Training Manuals and attachments as specified.

2. Sets of participant's materials, 30 days prior to commencement of training. Quantity of materials per class size specified herein.
3. Any models, mockups, simulations, or other material that are not supplied elsewhere in this Contract and which are needed to stage the training program.

END OF SECTION 14 21 00