SECTION 14 24 00

HYDRAULIC ELEVATORS

PART 1 - GENERAL

1.01 SECTION INCLUDES

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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 unit 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

The requirements of the prevailing versions of the following standards at time of contract signing shall be met.

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 A572FR.50 Specification for Carbon Structural Steel

3. ASTM A53/A53M — Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

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

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

6. ASTM B3 — Specification for Soft or Annealed Copper Wire

7. ASTM B174 — Specification for Bunch-Stranded Copper Conductors for Electrical Conductors

8. ASTM B209 — Specification for Aluminum and Aluminum-Alloy Sheet and Plate

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

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

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

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

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

14. 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

F. National Electrical Manufacturers Association (NEMA):

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

2. NEMA PB 1 — Panelboards

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

1. NEII-1 Building Transportation Standards and Guidelines

H. National Fire Protection Association

1. NFPA 70 National Electrical Code

2. NFPA 101 Life Safety Code

3. NFPA 130 Fixed Guideway Transit and Passenger Rail Systems

I. Steel Structures Painting Council (SSPC):

1. SSPC-SP 1 Solvent Cleaning

2. SSPC-SP 3 Power Tool Cleaning

J. Underwriters Laboratories Inc. (UL):

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

K. District Technical Manual – SCADA System Function Description.

L. American Public Transit Association (APTA):

1. APTA RT-RP-FS-008-03

M. BART Facilities Standard Drawing AS08, AS09, AS10, AS11, Architectural Elevator Details.

1.04 REGULATORY REQUIREMENTS

A. In addition to the foregoing referenced standards, any regulatory requirements which govern elevator work of these Specifications shall include, but not be limited to, 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. The Contractor shall be responsible for integrating all elevator, machine room, station agent's booth and hoistway components to ensure a fully compliant, operable elevator system.

B. General: At the completion of the work, the elevator shall meet the 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: Hydraulic.

B. Load Capacity: 3,500.

C. Speed: 100 feet per minute, 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 42 inches width by 7 feet high.

G. Travel: As indicated and verified in field.

H. Controller: The controller shall be a District Matching Product (DMP) as specified herein (Ref. Appendix A).

I. Machine Room Location: Ground floor machine room as close as possible to hoistway.

J. Car Inside Dimension: Car inside clear dimension shall be a minimum of 80 inches wide x a minimum of 63 inches deep from wall to wall. Minimum height shall be 96 inches.

K. Remote Monitoring System: The Elevator Remote Monitoring System shall interface with the existing BART monitoring system (EERMS). As specified herein.

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

M. Car Enclosure: Passenger type.

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

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

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.

9. Hydraulic Pressure: Hydraulic components shall be factory tested for 500 psi. Maximum operating pressure shall be 400 psi.

10. Maximum reservoir oil temperature shall be 160 degrees F with outdoor temperature of 110 degrees F under continuous elevator use.

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, controllers, hydraulic reservoirs, and door operators.

3. Seismic design shall be based on the seismic requirements for elevators in ASME A.17.1 and Section 3137 (a) and (b) of the California Code of Regulations in effect in California at the time of Contract signing.

C. Power:

1. The main elevator power shall be 480 Vac, three phase, 60 Hertz. The power shall be supplied from the emergency power panel or bus.

2. As a minimum, three separate 120 Volt circuits shall be provided, one for each of the following loads: elevator car lighting and fan, 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 shall be a field programmable microprocessor based, simplex selective-collective, automatic operation, with closed loop, variable voltage, variable frequency control.

2. Elevator operation shall be by means of pushbuttons in the car, at terminal and intermediate landings, numbered to correspond to landings served, by CALL DEMAND 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 either remain at the current landing until further calls are registered or be dispatched to the designated, programmable, home landing and stop without door operation. Timing setting parameters shall be supplied by the Engineer.

6. Special Operations:

   a. Inspection Operation: Inside the car service cabinet within the Car Operating Panel, there shall be an Inspection key-operated switch keyed to EX 514 for normal "run" or "inspection" operation. There shall be three means of initiating 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 access 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 keyed to EX 513 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 mode.

   c. Operation Under Fire Conditions: Provide special fire service to comply with the requirements of latest revision 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 Fireman's Service recall, three-position key switch at main (egress floor) keyed to EX 515 level shall be integrated in hall call stations with engraved instructions.

      2) Fire alarm initiating devices shall be installed in machine rooms and each non-open air landing, and hoistways shall be equipped with a wall-mount fire sprinkler mounted at a nominal height of 22

inches above the pit floor. Elevator operation shall be in accordance with applicable codes.

3) Phase II fire service shall be provided. A three position key-operated switch keyed to EX 515 shall be mounted in the Car Operating Panel and operate accordance with applicable codes.

4) All initiating fire alarm signals shall be routed only to the main fire alarm panel through the command interface junction box located in the elevator equipment room. The station fire alarm panel shall initiate the appropriate signals to the elevator controller in accordance with applicable codes.

d. Operation under Loss of Power: The controller shall be equipped with a battery-powered lowering device to allow automatic lowering of elevator to lowest landing and opening of the doors. Elevator will then remain out of service.

e. Operation under Earthquake Conditions: Provide seismic operation in accordance with the requirement of CCR Title 8. Each station shall be equipped with a seismic device in the Train Control Room or Auxiliary Communication Room within the station. Provide the wiring, raceway and elevator control circuitry for the seismic control circuit.

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).

b. Car moving down (indication).

c. Concourse (control & indication, hall call activation).

d. Street or Platform, one for each landing as required (control and indication, hall call activation).

e. Car Occupied (indication).

f. Alarm (indication).

g. Elevator shutdown (control and indication).

8. 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.

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

10. The system shall utilize an automatic two-way leveling device to control the leveling of the car. Leveling range plus or minus ¼ inch under any loading conditions. Over travel and under travel shall be compensated for and the car brought level to the landing sill.

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

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.

E. Elevator Car 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 open 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 be fully adjustable 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 the latest CCR Title 24, Part 2, California Building Code and ASME A17.1.

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, hydraulic power pack, valves, jack assembly, 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, not less then 8 point font. Shop drawings and details shall include, but not be limited to the following:

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

2. Platform assembly.

3. Signal Fixtures: Control buttons and lamps.

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

5. Elevator doors and door operator. Provide components, layout detail complete with fastenings, etc. Include weight of doors

6. Weights of car doors.

7. Indicate direction of stainless steel directional grain.

8. Machine room layout.

9. Hoistway layouts, to include clearances, guide rails and buffers.

10. Paint schedule.

11. Wiring diagrams.

12. 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, EERMS, 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.

13. Assignments of all processor input/output conductors including position indicating system.

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

15. Hydraulic pumping system: Pump, valves, motor, and piping.

16. Hydraulic ram system: cylinder, casing, packing oil seal, jack oil collection trough, and oil scavenger system. Provide detail of ram to platen plate.

17. Motion Sensor and elevator camera.

18. Limit switches and mounting detail.

19. Submit detail for oil collection tank frame support assembly.

C. Engineering Data Including Design Calculations:

1. Submit separate data sheets for machine room heat release calculations based on 30 trips per hour for 2 hours, power requirements, conduit fill, and car guide shoes and hydraulic system. Power requirements shall indicate maximum and average power demands, and requirements for emergency power operation.

2. Submit structural design calculations for car assemblies, car guide rails and supports, ram and cylinder. Design calculations shall be performed and sealed by a Civil or Structural Engineer currently registered in the State of California.

3. Submit seismic calculations for oil collection tank frame support assembly.

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. Car and hall door, Astragal material.

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 (MSDS).

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 detailed results of each regulatory test.

H. Maintenance Program: The Contractor shall submit routine preventive maintenance program, showing functions to be performed and their scheduled frequency.

1.09 SPARE PARTS

A. General: Spare Parts shall be provided in accordance with Section 01 78 44 - Spare Parts and Maintenance Materials, 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, at a minimum, the following spare parts for each elevator installed:

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

2. Car and hall buttons and lamps, arrival gong lamps: Two sets of each type.

3. Car fluorescent lamps: Four each

4. Limit switches: Two each

5. Rollers for roller guides: Two of each size

6. Gibs: Two of each size used

7. Packing gland.

8. Car and hall door Astragal material: Three sets.

9. Complete Pana 40 door edge complete assembly with controller and cables.

10. Door clutch assembly

11. Hall door lock assembly

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 may consist of off-the-shelf manuals as described in section 01 78 23 – Operation and Maintenance Data, Article 1.06D. However, the manual shall also include a separate chapter or volume to identify the unique items and installations that are unique specifically to this contract, which is not covered, in the off-the-shelf manuals. This chapter shall meet the requirements of system manuals as specified in Section 01 78 23 – Operation and Maintenance Data, excluding articles 1.12C, 1.12D, and 1.12E. This chapter and all its contents, and all wiring diagrams shall be provided in electronic format as specified 01 78 23 – Operation and Maintenance Data, Article 1.11.

2. Wiring Diagrams: One set, half size or 11 X 17 inch, whichever is larger, shall be laminated and stored in the machine room, and full sized 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. Wiring Diagrams shall include the Elevator Communication Interface cabinet.

3. Maintenance Tools 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 (NTP), 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 (12) 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 the entire elevator system. Maintenance shall include all labor and materials required 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. All post-construction punch list items shall be completed before the maintenance period ends.

2. The Maintenance Period shall be extended at the Contractor's expense until the Operation and Maintenance Manual is accepted punch list items are completed and delivered and the training is complete.

C. Elevator Access:

1. The Contractor shall inform the District's Power Support desk and other departments or persons as directed by the Engineer 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 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 routine maintenance and inspection of each elevator system every two weeks and perform; 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 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 except if the incident occurs after 8:00 PM, the service representative may be on-site the following day no later than 7:30 AM. The elevator shall be returned to service as quickly as possible. No overtime shall be charged to the District unless given prior written approval by the Engineer.

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. 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 at no additional cost to the District.

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. Contractor personnel shall clean 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 of arrival, total time spent, back in service time, 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. Calls that result in adjustment of safety devices not

accessible to the public will not be reimbursed. Contractor shall submit all documentation necessary to substantiate why a particular trouble call should be a Chargeable Repair. Contractor shall also submit all documentation necessary to justify the direct and indirect costs incurred. Service calls must be reported to Power Support desk and other departments or persons as directed by the Engineer 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 Station Agent 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 provided to the Station Agent. 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 Operational Period 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 configuration. 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 any and all necessary permits including permit to complete. Contractor shall submit any required drawings and design calculations to State of California Elevator Division and a copy to the Engineer. The Contractor shall pay for all Elevator Division's inspections as applicable, including those occurring during the Maintenance Period.

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 in Articles 1.06 System Description and 1.07. Design and Operation Requirements

B. Weatherproofing: Metal surfaces shall be hot-dipped galvanized, except nonferrous metals and stainless steel, or as indicated. 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: All hardware, including nuts, bolts, washers, screws, and other fasteners shall be stainless steel throughout, including any concrete anchors. Provide all fasteners necessary for proper erection and assembly of work. Fasteners and hardware for hangers and tracks shall be Type 316 stainless steel.

C. Stainless Steel: ASTM A167; Type 316, unless Type 316 does not exist for a particular item. Type 304 may be used only as approved by the Engineer.

D. Structural Steel: ASTM A572 Grade 50 or ASTM A36 for car platform and sling. Hoistway entrances struts, headers, etc. 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. Stainless Steel Grade 316, Exposed to View by Public: 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.

B. New cast or machined non-stainless metal parts, including platform hydraulic reservoirs and framing, drip pans, hoist machine, platform, pit buffers, 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. Metalwork shall be coated with 100% Zinc thermal spray per AWS C2.23M/C2.23, NACE No. 12, SSPC-CS23.00.

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.

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

D. 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.

E. 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.

F. 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 with the fire rating required to meet the applicable Code requirements of the building but shall be a minimum 2-hr rated construction. Protrusions into hoistway equal to or exceeding 4 inches shall be beveled 75 degrees or greater to horizontal. Clearance from car to hoistway shall be 1 inch or greater.

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

C. 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.

D. 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.

E. 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 or 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.

F. Install fire-suppression sprinkler in hoistway pit in accordance with Section 21 13 13 Sprinkler System. Sprinkler head shall be located between 20 – 23 inches above the pit floor.

G. Install no pipes, conduits, or wiring in hoistway or machine room, except those used in connection with the direct operation of the elevator.

2.05 MACHINE ROOMS

A. Machine rooms and auxiliary machine spaces shall be sized to accommodate the elevator and related equipment with ample space for maintenance and replacement of all equipment located in the machine room. The machine room floor area shall be at least 150% of the square footage required by NEII 02 or 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 System. Detectors shall interface with the elevator controller via the main fire alarm panel.

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

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

E. Machine room shall not contain any equipment or items not related to the operation of the elevator.

2.06 EQUIPMENT IN HOISTWAY AND MACHINE ROOM

A. Casings, Cylinder and Plunger:

1. Outer Casing: Provide outer well Sch 20 steel pipe casing protected from corrosion with 20 mil. mastic coating. The steel casing shall be sealed to prevent water intrusion. Bottom may be sealed with a steel cap or with minimum 24” grout plug, as long as the casing will remain water free for the design life. Provide inner polyvinyl chloride (PVC) containment casing and cylinder. Diameter of inner casing shall be at least 6 inches larger than outsider diameter of wrapped cylinder pipe. PVC casing shall be schedule 80 and rated for minimum 100 psi. PVC joints shall be sealed and watertight. Bottom shall be sealed with PVC end cap. Inner casing shall extend above pit floor for snug fit against pit channels.

2. Cylinder: Cylinder shall be steel pipe, factory tested to 500 psi without evidence of failure. Cylinder shall be of one-piece construction or, if required due to length, threaded joint coupling may be used. Cylinder shall be cleaned in accordance with SSPC SP3. The cylinder shall be protected with a

minimum of 20 mils of epoxy and a double layer of self-adhesive black polyvinyl chloride tape. Epoxy shall be applied in coats. Tape shall be applied with a minimum of 50% overlap for a total thickness of 40 mils. Wrapping shall be applied in the shop.

3. The cylinder shall have a safety bulkhead with orifice sized for the elevator descent of 5 – 15 feet/minute in case the cylinder bottom fails. Weld of the safety head shall be minimum 1 inch from the bottom of the cylinder.

4. Cylinder shall be inspected on site by the Engineer prior to installation.

5. Plunger: Seamless steel pipe or tubing, made from ASTM A53, grade B steel turned and polished, maximum 0.010 inch out of round, and maximum 1/16 inch off straight line. Finish plunger surface to 12 mils or finer. Telescoping plungers or rams are not allowed. Sections shall be threaded and field welded.

6. Packing: Provide "unit" type packing to prevent oil leakage at oil drip ring.

B. Hydraulic Piping: Hydraulic Piping for elevators refer to Contract Specification Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing, and HVAC. The hydraulic piping provided shall comply with the following:

1. Minimum ASTM A53 Schedule 80 seamless steel pipe suitable for minimum 500 psi service pressure with a minimum safety factor of 3 ratio of burst pressure to service pressure. No hoses shall be used in any part of hydraulic piping. Provide a sound isolating coupling in oil line between jack and pumping plant. Support piping using vibration isolating closed spring hanger with one inch thick acoustic isolator.

2. Joints in concealed piping shall be butt-welded.

3. Provide polyvinyl chloride or polyethylene containment for hydraulic line and sensors between hoistway and hydraulic pumping unit. Containment wall thickness shall be 0.125 inches or greater.

4. Mainline strainer: Provide self-cleaning type, 40-mesh element, rated 500 psi, minimum.

5. Provide a sound isolation coupling in oil line located near the hydraulic tank.

6. Piping shall be sized to limit hydraulic oil velocity to 12 Ft./Sec. or less.

C. Pit Valves: Pit valves for isolating the cylinder and pumping unit shall be provided as approved by the Engineer with a pressure type, line rupture safety valve to shut off oil between cylinder head and pit valve. Activation of safety valve shall not void operation of lowering valve.

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

1. The guide rails shall be accurately machined elevator industry standard "T" section guide rails with tongue and grooved joints for the car, 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 minimum 1.5" thick located so it will not interfere with the brackets and clips and not be within 24 inches of any car guide rollers when car is stopped at any landing.

3. Extend rails to the overhead as close to the hoistway ceiling as set forth in ASME A17.1 Section 2.23.8. The maximum allowable deflection of the guide rail shall be 0.50 inch. A structural galvanized structural steel channel mounted to pit floor shall support the guide rails and buffers.

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.

6. The bottom 3 feet of the guide rails from the pit floor and brackets shall be painted with anti-corrosive paint or epoxy.

E. Guide Rail Rollers 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 a minimum of six (6) inch diameter and with precision type ball bearings that are 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 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 the 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 6". Sliding guide shoes may be permitted as approved by the Engineer.

F. Buffers: Buffers shall be of the spring type, specifically designed for elevator applications installed in pairs and sized per code requirements. Buffers shall be supported by a galvanized structural steel channel that is mounted to pit floor.

G. 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 heavy-duty watertight, red-colored, mushroom-type push/pull switch.

H. Hoistway Limits: Provide terminal and directional limit switches, access limit switches and final limit switches, as required by the Controller manufacturer. Limit

switches shall be heavy duty with NEMA 4 or 4X housings and heavy-duty mountings, fully adjustable +/- 6" minimum.

I. Hydraulic Oil Scavenger System: Provide a trough around the hydraulic cylinder packing gland assembly to collect any oil leakage. The oil-scavenging trough shall be equipped with a minimum 3/8 inch flexible transparent tubing. Tubing shall be suitable for oil use and have proper temperature rating. Contractor shall furnish and install an oil scavenging system at each elevator. The oil scavenger system shall collect all surplus oil from jack assembly and transfer surplus oil to a collection tank in the elevator machine room via an oil return pump. Each elevator shall have a dedicated collection tank in the elevator machine room.

1. Hydraulic Oil Return (Scavenger) Sump Pump and Transfer Tank: In the pit, provide electrically operated sealed-submersible scavenger pump, of approximately three gallons per hour, in waste oil transfer tank (approximately three gallon capacity) and float activated or other automatic means to pump oil to a 15 gallon oil collection tank, located in the machine room. See Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC, for oil return piping requirements. A flood control shall be included at all locations. A check valve shall be provided in the oil return line to prevent oil from flowing back into the transfer tank. The waste oil transfer tank shall be secured such that it will not be dislodged by water in the pit.

2. Provide a translucent or transparent PVC oil collection tank for oil scavenger system, which is compatible with hydraulic oil, of approximate 15-gallon capacity equipped with heavy duty gate valve type draining capability. Install in a convenient location, in accordance with the approved shop drawings, elevated at least 2 feet above the machine room floor. Tank frame support assembly shall be galvanized and anchored with stainless steel anchors. The tank shall be equipped with a hi-level switch with a Normally Closed (N.C.) dry contact to be used for generating an alarm condition to the Remote Monitoring System. Provide the conduits and wiring to the remote monitor unit located in the elevator machinery room.

J. Hydraulic Elevator Pumping Plant: Provide the complete hydraulic pumping assembly in accordance with the following:

1. General: The hydraulic pumping assembly shall be self-contained unit with sound reducing cabinet and sound isolated base. Provide secondary containment per CCR Title 24.

2. Hydraulic Pump:

a. Hydraulic pump shall be specially designed and manufactured for hydraulic elevator service, positive displacement type, designed for steady discharge with minimum pulsation, and smooth and quiet operation. Output of pump shall not vary more than 20 percent between no load and full load in the elevator car.

b. Submersible elevator hydraulic oil pump shall be minimum speed 1800 rpm, rated for minimum pressure of 400 pounds per square inch. Provide manual tank shut-off valve to allow replacement of pump without draining reservoir. The pump motor unit shall be installed with fasteners to enable removal of assembly without draining the tank, and all fasteners shall be accessible while tank is filled. Pump motor shall be center mounted.

3. Tank: The tank shall have a V-shaped bottom and capacity equal to plunger displacement plus 25 percent. Provide strainers, oil level gauge with a float switch, and device to maintain uniform oil temperature. Provide a tank cover of matching material equipped with a wire mesh screen and hinged access cover for adding oil to the tank. The access shall be minimum six by six inch with a one-inch deep recess with 50 mesh screen. Provide a minimum 3/4 inch gate valve at the lowest point of the tank accessible for drainage into a 5 gallon container. The tank shall be equipped with a thermostat and forced cooler sized to maintain oil temperature between 90 degrees F and 160 degrees F. Tank assembly shall be mounted on sound isolation pads.

4. Valves: Hydraulic control valve shall be integral (monobloc) type. Provide individual type valves with monobloc type by Maxton, ECCO, or equal. Provide manual lowering valve accessible to maintenance personnel without removing pumping plant enclosure panels. Valves shall be installed with grooved couplings so that removal, repair and adjustments can be performed without dismantling any piping. Provide piping and electrical wiring to controller and hoistway to ensure proper elevator operation. Including down speed regulation to maintain constant down speed regardless of load.

5. Pump Motor: Provide a submersible type pump/motor assembly. Electric motor shall be 480 volt, 3 phase that is specifically designed for hydraulic elevator service, standard manufacture, and duty rating in accordance with required speeds and loads, rated for minimum of 120 starts per hour. Motor shall be capable of operating at plus or minus 10 percent of normal feeder voltage and plus or minus 3 percent of feeder frequency without damage or interruption of elevator service. Minimum speed 1800 rpm. Provide heavy-duty motor, continuous rated, Class F or Class H insulation. Motor shall be provided with an internal self resetting thermal overload, integrated with controller safety circuit.

6. Muffler: Blowout proof type between pumping plant and cylinder.

7. Hydraulic Fluid: Provide non-toxic anti-wear, viscosity grade ISO VG-32 vegetable-based fluid readily biodegradable ISAE viscosity index of 200 or higher.

8. Contractor shall provide a low-level switch for the hydraulic unit oil reservoir. The low-level switch shall have a Normally Closed (N.C.) dry contact and shall be used in conjunction with the remote monitoring system. Provide the

conduits and wiring to the remote monitor unit located in the elevator machinery room. Signal shall enable the low oil operation at the controller.

K. Hydraulic Reservoir and Valve: Hydraulic control unit in a single housing, including:

1. High pressure relief valve, externally adjustable, capable of bypassing total oil flow without increasing back pressure in excess of 10 percent over the pressure required to barely open the valve.

2. Check valve shall be designed to close quietly, with no detectable reverse flow.

3. Automatic unloading of up start and up stop valve, externally fully adjustable, designed to bypass oil flow during start and stop of the elevator car motor assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, providing smooth up starts transition and up stops with soft stop feature.

4. Lowering valve and leveling valve shall be externally fully adjustable for drop-away speed, lowering speed, leveling speed, and stopping speed for smooth down starts transition and stops. The leveling valve shall be designed to level the car to the landing within 1/4 inch in the direction the car is moving.

5. Assembly shall be arranged so that adjustments can be made without removal of the assembly from the oil line or any other equipment.

6. Provide two quick-disconnect fittings on the hydraulic control unit for testing purposes, one to measure the high pressure portion and one to measure the static pressure. Fittings shall be compatible Aeroquip No. FD45-1002-02-02 (male) or equal. Provide a minimum 3-inch diameter liquid filled pressure gauge with a maximum scale of 600 psi and with a matching female fitting compatible with Aeroquip FD45-1003-02-02 or equal.

L. Ceiling height in the machinery room shall be a minimum of 9 ft about 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. All fasteners shall be type 316 stainless steel. Refer to Article 2.08, Car and Hoistway Doors, herein.

C. Frames: Fabricate from minimum 12 gage, type 316 No. 4 brush finish 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, type 316 stainless steel, No. 4 brush finish, fixed returns.

E. Hangers and Tracks: Provide heavy-duty hangers and tracks that are sheave type with minimum two-point suspension to support the heavy vision panel doors. Provide steel sheaves with ball or roller bearings with resilient sound-absorbing tires and adjustable upthrust, flanged groove tracks. All material shall have anti-corrosive treatment. 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, shall be manufactured from plate steel. Use full-length steel struts. Hanger headers, minimum 1/4-inch thick material, shall extend from strut to strut with minimum 3/8-inch thick angles. All metal parts materials shall be galvanized.

G. Dust and Hanger Covers: Provide as required, 16 gage minimum, type 316 stainless steel, No. 4 brush finish. Hanger cover plates shall extend full length of door track. All covers shall be removable using key hole style slots.

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

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 gage 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. Apply silicone caulk around all gaps and on top of the fasteners to prevent any liquid from seeping into the underlayment or hoistway edging angle. Support angle and levelers shall be galvanized or stainless steel. Sill shall be supported along its entire width and length. All sills shall be mounted higher than finished floor to allow drainage of sill.

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, 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.

7. Provide rubber stops to limit travel of all doors, both direction.

8. Full height 12 gage stainless steel, fixed return panels.

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 provided and installed in accordance with the following:

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 safety glazing materials used in building 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.

F. 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 fasteners shall be stainless steel. Finish of all door equipment shall be galvanized.

G. Door Operator: Door operator shall be heavy-duty, closed loop speed regulated Model MOVFR, manufactured by G.A.L. Inc., a Designated Matching Product. Structural support shall be independent of car enclosure with sound insulation. Door equipment and coverings shall be galvanized or plated. Wire relating cables shall be stainless steel.

1. Test switches shall be provided for the set-up and calibration for opening, closing, nudging and all speed adjustments. 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); "Pana 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. With minimum six (6) mounting brackets per door edge sensor.

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 60 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 anywhere in car, including floor and 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 flooring in accordance with Article 2.11, Elevator Floor and Platform.

D. 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. Sill and door pocket behind fully retracted door position shall have a smooth, upward curved surface to direct liquid back towards center of sill. Area of sill and door tracks behind door shall be accessible by a ½” diameter steam wand for cleaning and sanitation.

E. Ceiling: Unitized minimum 18 GA stainless steel construction with emergency exit in accordance with regulatory requirements.

F. 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 a key switch (keyed to EX 513) located in the maintenance panel in the Car Operating Panel.

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

H. Car Lighting: Illumination level inside the car shall be minimum 10 foot-candle measured at the floor level. Car lighting shall have T8 fluorescent light fixtures with luminous louver. Nor transparent plastic lenses are permitted. The related work shall be performed in accordance with Section 26 50 00 - Lighting.

I. 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.

J. Car Operating Panel (COP): Elevators shall have 2 COPs located on each side of the door. Each 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 keyed OEM to EX 514. 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.

K. All conduits and wires shall enter elevator car from top down, never from floor up.

L. 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.

M. 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.

N. Car shall be sound isolated from car frame.

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

P. 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 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. 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: Construct in accordance with standard drawing MS39 floor and Wall Details. The stainless steel floor pan shall be 11 gage and extending the entire floor area, including the cove base. Seams shall be staggered. The floor pan shall be sectioned where required and constructed with watertight seams, fastened to the substrate with stainless flat head 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 caulked.

C. Finish Flooring: Flooring shall be Precidium 550D-FR made by Quantum Technical Services, Edmonton Alberta, a District designated matching product.

D. Wood products will not be permitted anywhere inside or outside the elevator car.

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 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, 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.

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 that matches the controller schematic.

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. 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 carried (Amps) as approved by the Engineer.

4. Label each terminal and spares as they correspond 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. No more than 3 wires per terminal shall be allowed. Provide anti-corrosion protection compound on all high current connections throughout the system using a product comparable to Thomas & Betts #CP-16 or equal. All terminations shall be labeled.

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

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

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

8. 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 encoder to the controller

9. All door interlock wiring shall be heat resistant and shall be continuous without splices or terminations to or from the controller.

E. Traveling Cables:

1. Provide two traveling cables between car and the controller via the remote junction 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. Observe minimum radius requirements.

2. One traveling cable (for power and control circuits) shall be continuous from elevator car to the controller in the elevator machine room via the halfway box. 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) shall be continuous from the car to the Communications Interface Cabinet in the elevator machine room via the halfway box. Provide a minimum of two pair spare #22 AWG communication conductors terminated to Krone style termination blocks. Minimum of one pair spare #14 AWG conductors terminated to terminal blocks, minimum two coaxial cables (the minimum cable count shall be increased to include one spare terminated to feed-through coaxial BNC connectors), one six fiber optical fiber cable which shall be terminated to fiber patch panel with LC style connectors. All cables shall be terminated at both ends. Route the coaxial and optical fiber 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 one pair #14 AWG and 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.

6. Optical fiber cable shall have Mean Cycles Between Failures (MCBF) of 40,000 for less than 2dB loss. Fiber cable shall meet the following requirements:

    a. Multimode fiberoptic cable shall be OM4 cable, or approved equal compliant to the IEC 60793-2-10, Type A1a.3 Fiber and TIA/EIA-492 AAAD standard.

    b. 50/125 micron tight-buffered multimode optical fiber, covered with high-strength aramid yarn and jacketed with flame retardant PVC.

    c. Operating wavelength and bandwidth 160MHz.km at 1300 nm.

    d. Attenuation at 850 nm 3.75 dB/km max.

    e. Attenuation at 1300 nm 1.00 dB max.

    f. Core diameter 50 micrometers plus or minus 2 micrometers optimized for 550 meters.

    g. Cladding diameter 125 micrometer plus or minus 2 micrometeres.

h. Optical performance: The attenuation shall be measured in accordance with EIA TIA-455-61. The bandwidth shall be measured in accordance with EIA TIA-455-30 or EIA TIA-455-51.

F. Communications Interface Cabinet: Provide a NEMA 12, powder coated or galvanized steel junction box mounted adjacent to the controller 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, at a minimum, 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, unless specified otherwise herein, with each termination labeled. 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. Main 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. Underside 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 Motion 2000 for hydraulic applications 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. Provide hand-held programming tools, minimum two per facility.

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 remote monitoring system events' list. These event indicating signals shall be available from the termination points, i.e., dry RMS contact relay, 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 Products, Allen Bradley DeviceNet module, Model 1791D 16 BO and 25 Post terminal strip. A 25 conductor cable shall be provided between the controller and Interface cabinets for the sole use of the EERMS. The EERMS shall be installed and wired according to the Contract Drawings. A communication cable in the 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 Drawing.

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). If more than 3 landings, parallel all intermediate floor, and connect as Middle.
8. Car at Bottom Landing
9. In Service (ISV and ISRT signals in parallel)
10. Low Oil Level in Main Reservoir
11. High Oil Level in Collection Tank
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 buttons for hall call shall be through-engraved with illuminated direction arrows. An illuminated halo shall surround the pushbuttons. Halos surrounding the alarm and phone buttons shall be red. Button illumination shall be long-life, standard wattage LED. Push buttons for all car and hall, alarm, and hands-free phone shall be Monitor Controls Model TR-1100, manufactured by Monitor Controls, a division of Janus Elevator, a Designated Matching Product (DMP). Push button assembly for non illuminated functions, door close, door open shall be Monitor Controls, a Designated Matching Product (DMP) 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. Refer to BFS standard drawings for layout and details.

2. COP Faceplates: The faceplate shall be stainless steel, No. 4 finish, 1/8 inch minimum thickness, flush mounted. Refer to standard drawings for layout and details.

3. 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.

4. 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. Braille plates shall be surface mounted on control panel with concealed mechanical fasteners.

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

6. Car alarm button: Provide dry contact for alarm initiation to Station Agent's Booth Annunciation console. Activation of alarm button shall illuminate button as well as activate car alarm bell, by closure.

7. 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.

8. Exposed key switches shall be provided for the car stop switch only. See Article - 2.15 G. herein for key type.

9. Door shall have a permit holder with a minimum display window size of 8.75 inches wide and 4.5 inches high.

D. Service Cabinets: The Contractor shall provide a service cabinet in the Car Operating Panel. The service cabinet shall be behind a minimum 10-gage stainless steel hinged door with gasket seal. Keying shall be EX513. 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, EX514

2. Independent Service key switch, EX513

3. Car light on/off key switch, EX513

4. Motion Sensor mode key switch EX513

5. Fan Speed high, off, low key switch EX513

6. Emergency Light illuminated test button

7. Duplex GFI receptacle

8. Fire service panel and fire service keying all EX515

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. Green for up, red for down. Provide vandal resistant, long-life LED directional lanterns with stainless steel faceplate. 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 2.15 G, 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. Pictorials shall be supplied with the wording.

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 control and Monitoring Indications: Contractor shall provide and install station agents elevator console as approved the Engineer. 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 of 5 to 90 seconds 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 key 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 contacts 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 or next floor if a car call is not activated within an adjustable time of 5 to 30 seconds.

D. Nuisance Occupancy Mode: If an 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 main Car Operating Panel. The camera shall be adjusted to observe patrons operating the main 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 shall be 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 hall 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 x 5" inch lettering centered on each hoistway entrance header indicating the elevator number. Sign shall be without Braille and abbreviated as the following example: "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. Indicate vibration isolation material on all drawings.

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. Equipment installed without approved submittals shall be subject to possible rejection and removal at no to cost to District.

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, quiet 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. Set PVC casing and cylinder. Extend inner casing above pit floor for snug fit against pit channels.

G. Backfill voids between outer steel casing and PVC liner with clean dry neutral silica sand, well tamped. Space between PVC and cylinder shall be left void.

H. After cylinder is set, provide a watertight hydraulic laminating or epoxy resin seal between casing and cylinder to a minimum depth of 10 inches.

I. Plunger shall be installed straight, square, and plumb, and operation shall be free of any scraping, bumping, sticking or any irregular noises.

J. Install Sch 20 to outer steel casing with welded ½” thick bottom. Minimum 2’-0” concrete plug is also acceptable provided it ensures casing is water tight.

K. Sound Reduction:

1. Mount insulation panels on sides of power unit frame. Air-borne noise from motor and pump assembly shall be isolated.

2. Provide two or more sound isolation couplings in machine room oil line, between pump and jack.

L. 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 to ensure that these devices are communicating as intended with the BART operating system.

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 and functions and EERMS signals and functions shall be tested.

4. Contractor shall conduct NEII-1 performance tests with its own calibrated equipment as approved by the Engineer. Test results shall meet or exceed NEII-1 and shall be submitted to the Engineer for approval. The Engineer my witness the tests.

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.

7. Test hydraulic piping per Section 20 10 13 - Common Materials and Methods for Facility Services – Fires Suppression, Plumbing and HVAC.

C. Substantial Completion Inspection: District personnel will 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 certificate for the elevator will not be granted until the State issues an operating permit and all significant and most other punchlist items identified during the Substantial Completion Inspection have been corrected and approved by the Engineer.

D. Final Acceptance Inspection: After the completion of the punch list items, submission and approval of all deliverables, including Operating and Maintenance manuals, training, and the Maintenance Period is nearing completion, the Contractor shall notify the Engineer at least two weeks in advance to schedule the Final Acceptance inspection. This inspection will verify that the punch list items have been completed and the elevator was properly maintained and is in good 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.

F. Contractor shall provide a complete list of all parameter settings.

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. Contractor shall keep elevator area, elevator machine room, and the space allocated to the Contractor’s work and storage in a neat safe and orderly condition. The Engineer may, at any time during construction order a general cleanup of the site as a part of the Work, and there shall be no additional cost to the District therefore. The Contractor shall provide general daily clean-up and disposal service for removal of waste, rubbish, trash, and debris away from the jobsite. 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. The Contractor shall provide either a Controller Simulator approved by the Engineer, which will become District property, or a program to train the District’s operations, maintenance or training personnel in details of the elevator 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 supercede Section 01 79 00 – Demonstration and Training. As a minimum, training topics shall include controllers, door operators, and drive system. Training shall consist of one four-hour familiarization session for a ten-person group. Training shall include an overview of the system installed, highlighting any portion of the installation unique to the location with a questions and answers period.

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.

4. Training Program: The Training Program Plan shall be submitted, subject to approval by the Engineer, within 30 days of Substantial Completion 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. 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.

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

   e. Complete written and practical tests to be administered at the conclusion of each course module and grading system to evaluate the proficiency of each trainee. The grading system shall identify needs for further training as needed.

   f. All third party training materials which are proposed to be included in the training program.

   g. Draft of the training manual.

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 time-efficient manner. Course shall include emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. It shall train personnel in the procedures to be followed in checking the source of operation failure or malfunction. Operation of diagnostic equipment needed 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 first session within 60 days after the substantial completion of the first elevator. The final session shall be no later than 120 days after the first session.

7. Each class shall accommodate 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 as needed to make it relevant to the actual installation being taught.

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

F. 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. In addition to the copies provided for trainees, the Contractor shall provide the master and two additional copies of all Training Manuals and class 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 each course session (up to 40 in all).

6. The District will provide the Contractor written feedback 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.

G. 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.

H. Final training documentation:

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 to conduct the training program.

END OF SECTION 14 24 00