



San Francisco
International
Airport

A&E Standards

Building Systems – Elevators, Escalators, Moving
Walkways

Division 14 – Conveying Equipment

PREFACE

PURPOSE OF THIS DOCUMENT

The intent of this document is to disseminate the San Francisco International Airport's (SFO's or Airport's) expectations regarding the information presented to designers, engineers, general contractors and other industry specialists. The material provided in the following sections includes the minimal requirements, general information, design criteria, guide specifications and details for elevators, escalators and walkways installed at SFO. While this document addresses major areas of concern to SFO, it is not an all-inclusive document.

HOW TO USE THIS DOCUMENT

This document should be used as a resource for the development of project specific design documents including drawings, details and specifications. It is the responsibility of the design, engineering and construction professionals to adhere to all codes and regulations related to the content presented.

SCOPE

This section contains the Standards and Criteria for Elevators, Escalators and Walkways. Any questions or concerns regarding the items or equals specified must be submitted to the Standards Committee in writing. All final decisions regarding products shall be made at the Airport's discretion. If the Engineer of Record presents items that are not specified or named equals, they must be brought to the Standards Committee for evaluation of those products.

GENERAL INFORMATION

- A. The Contractor must possess a valid C-11 Contractor's License
- B. For Traction Elevator Modifications, a new power supply with disconnect and new wiring from the new disconnect to the elevator controller, heat sensor & shunt trip for the elevator machine room due to presence of existing fire sprinkler in the machine room is required. Existing smoke alarm must be connected to the elevator controller.
- C. All elevators shall be equipped with cab interior CCTV, cabling for all special systems, monitoring of status from the elevator control panel, and all special systems shall be accessible from a junction box provided at the side of the elevator control panel provided by the elevator contractor
- D. Midwest Security Supply is the preferred vendor. Please contact SFO for more information.

DRAWING REQUIREMENTS

- A. All design disciplines including the architectural/engineering sub-consultants and the trade bid package subcontractors shall prepare documents using Revit in the current version utilized by the Airport in compliance with the Airport's Building Information Modeling (BIM) Requirements as described in Document 00 73 87: BIM Requirements, unless waived by the Chief Development Officer.

- B. When Revit models may not be applicable, (for example, tasks with underground infrastructure beyond a building footprint), Civil 3D may be used to model utilities and applicable infrastructure if approved by the Chief Development Officer.
- C. Refer to technical specifications for As-Built requirements.
- D. Documents and plans submitted to SFO shall be searchable using PDFs with live text. This includes, but is not limited to, text and symbols. The document shall also provide the capability to turn layers on and off. Any project using legacy documents which may be composed image files shall be converted to live text via Optical Character Recognition (OCR).

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SECTION 14 01 20 – TRACTION ELEVATORS

PART 1 – GENERAL

1.1 SUMMARY

- A. General: Relocate and install elevator component as outlined, complete inclusive of interface with other trades, as shown and specified in accordance with the requirements of the Contract Documents and codes having jurisdiction.

1.2 REFERENCES

- A. Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and Municipal authorities having jurisdiction.
 1. ASME A17.1 Safety Code for Elevators and Escalators
 2. CCR Title 8 Elevator Safety Orders
 3. SFO Standard
 4. National Electrical Code
 5. American National Standards Institute (ANSI)
 6. American Society for Testing and Materials (ASTM)
 7. Underwriters Laboratories Inc. (UL): Building Materials Directory. Materials tested, labeled and inspected by Warnock Hersey International are acceptable upon approval of authorities.

1.3 SUBMITTALS

- A. Shop Drawing: Submit shop drawing showing new location of hall button fixture being relocated; elevation only.
- B. Record Document: Submit complete set of record documents with all changes made during installation of the Work so as to represent a complete set of As-Installed documents.

1.4 QUALITY ASSURANCE

- A. Certifications: Obtain and pay for necessary inspection certificates from governing authorities.

PART 2 – ELEVATOR REQUIREMENTS

Type:	Traction
Capacity:	TBD
Stops:	TBD
Horse Power:	TBD
Car Platform:	Re-use existing
Control:	New nonproprietary VVVF microprocessor drive. Acceptable drive: Swift, MCE or equivalent with 10 years of proven tract of good record in the similar facilities. Decaying circuitry, limiting access codes and hand-held plug-in units of proprietary design will not be accepted. Provide ventilated cabinet with Hinge doors and internal

	cooling fan. Install 12"X14"x 8" interface J-box at the side with terminal blocks.
Motor:	New AC motor
Car top station:	New Car top inspection stations
Wirings:	New machine room wirings, car top wiring, hoistway, hallway Stations, emergency lights and traveling cable with COAX cable. Additional wiring for telephone, paging system, CCTV, and life/safety. Dedicated power supply for cab light with switch in the machine room. New GFCI receptacle in the machine room.
COP:	New Car Operating Panel to meet current ADA requirement & CODE, with integrated car direction/car position indicator, hand free telephone, and mounting bracket for conveyance permit, lockable panel for fire service, lockable service cabinet for other switches, Install or engrave the elevator number on the COP.
Doors:	New GAL Mover closed loop door operator New infrared door safety devices New door rollers and interlock New front door car rollers New door Gibs New door jamb Braille and other signage as per code requirement New surface mount hall stations Re-clad hoistway and car doors each opening
Safety Device:	Rope grippers as per code requirement New earthquake device as required by code
Elevator Cab:	New elevator cab panels New ceiling lights & diffusers New handrails

2.1 Simplex Selective Collective:

- A. General: Arrange for Simplex Selective Collective Operation. Operate elevator from a single riser of landing buttons and from operating devices in car.
- B. Operation: Momentary pressure of one or more car or landing buttons, other than those for landing at which car is standing, starts car, and causes car to stop at first landing for which a car or landing call is registered corresponding to direction in which car is traveling. Stops made in order in which landings are reached, irrespective of sequence in which calls are registered.
- C. Door Control: A car without registered car calls arriving at a floor where both up and down hall calls are registered responds to the call in the direction of car travel. If no car call is registered for further travel in that direction, lantern immediately indicates changed direction without closing and reopening doors. Direction lantern to remain illuminated until doors are fully closed.

2.2 Two-Stop Collective Operation:

- A. General: Operate elevator from single button landing stations and operating buttons in car.

- B. Operation: Landing or car buttons causes car to start and proceed to that floor. Doors open automatically when car arrives. When car is traveling away from a registered landing call, call remains registered and car responds on next trip.
- C. Inspection Operation: Key access and top of car station operates elevator at contract speed or 100 fpm, whichever is less; provide key switch in service cabinet to activate operation. Mount key access switches in hoistway entrance frame without faceplates or integrate the access switch with the hallway call button.

2.3 SPECIAL OPERATIONS

- A. Independent Service: Provide system to operate elevator from car buttons only, independent of all other operations; activate operation through key switch in service cabinet. Doors remain open when car is at landing until car button for another landing is constantly pressed; if several car calls are registered, constant pressure on DOOR CLOSE button will affect closing of doors after each stop.
- B. Anti-Nuisance Service: Provide system by means of load weighing transducer that will cancel all car calls in event that three times number of car calls that are registered as there are passengers in car allowing 150 pounds per person. System using false call answering is unacceptable.
- C. Fireman's Emergency: Provide Fireman's Emergency Operation in accordance with code. Elevators to return to main floor via activation of lobby detectors and/or lobby recall switch. Include alternate fire floor operation.
- D. Earthquake Emergency: Arrange to operate under FIREMAN'S EMERGENCY OPERATION after activation of a derailment device. Include a collision switch as part of the operation.

2.4 MACHINE/CONTROLLER ROOM EQUIPMENT

- A. General: Provide equipment to fit space and structural conditions shown. Permanently number equipment with numerals 4" high corresponding to elevator number. Paint machine room floor with machine gray epoxy paint
- B. Hoist Machines
 - 1. General: Use existing machine, clean and paint.
 - 2. Traction Machine: Check brake, drive sheave and deflector sheave for proper alignment.
 - 3. Machine Support: Check anchors, angles, blocking, and support for tightness. Ensure that all anchors, angles, and support are properly secure, tight, and aligned.
 - 4. Motors: Provide VVVF type AC motor rated for 50 °C rise under continuous operation.
- C. Controllers: Provide ventilated cabinet with hinged doors and internal cooling fans with 12"x14"x8" interface J-box at the side of the controller cabinet. Wire to identified terminal block studs. Provide permanently marked symbols or letters identical to those on wiring diagrams adjacent to each component.
- D. Power Conversion Unit: Generate power using IGBT inverter and shunt transistors, having a 12 kHz switching frequency. Design unit to limit current, suppress noise and not produce voltage transients back into mainline feeders. Provide necessary filters, chokes and isolation to effectively prevent noise transmission to public spaces and elevator cabs.

- E. Guiderails:
 1. Check for proper alignment and support.
 2. Check roller guide assembly for damage and replace roller guide wheels.
- F. Hoist and Governor Ropes:
 1. Hoist: Replace hoistway ropes
 2. Governor: Replace governor rope

2.5 WIRING

- A. General: Use only copper conductors; run in metal conduit or galvanized duct. Provide 10% spare conductors in conduit, duct and wire runs. No splices in wiring; connect wiring directly to terminal blocks in control cabinets or junction boxes.
- B. Traveling Cables: Provide lighting, communication, coax cable, and control wiring circuits in traveling cables, from machine room to car connection point. Include a minimum of 15 spare pairs of shielded communication wires. Provide means to prevent cables from rubbing or chafing against hoistway, structural beams, elevator equipment and the car.
- C. Work Light and Plug Receptacle: Provide pendant-mounted work light on top of car with lamp guard and plug receptacle.
- D. Conduit: Where provided use EMT type conduit. Include flexible conduit to sound isolated equipment and components.
- E. Emergency Communication: Provide for emergency phone in each elevator. Run four (4) pairs of continuous unspliced shielded twisted wire from the emergency phone in the car operating panel to the elevator machine room 12" x 14" x 8" interface junction box; junction box provided as part of this work.
- F. Coaxial Circuit: Provide for closed circuit television camera (CCTV) in the elevator. Run continuous unspliced 4 pair of 22AWG shielded cable from the elevator car ceiling to the elevator machine room 12" x 14" x 8" interface junction box.

2.6 SIGNALS AND FIXTURES

- A. General: Provide signals and fixtures as specified and shown; arrangement of buttons and devices as directed by Architect. Unless otherwise specified provide manufacturer's standard circular buttons and devices with square edge stainless steel buttons and LED illuminating halo. Generate audible signals electronically and provide adjustable volume chimes for each device. All graphics to be engraved on fixture without separate attached plates. Mount faceplates and cabinet doors with hairline joints flush with adjacent surfaces.
- B. Car Operating Panel:
 1. General: Provide with illuminating pushbutton halos conforming to floors served. Button halo lights to show registration and extinguish when call is answered; include door open and door close buttons.
 2. Type A: Integral with swing front returns.

- C. Car Position Indicator:
 - 1. General: Provide indications to correspond to floor designations.
 - 2. Type A: Vacuum fluorescent or LED type; minimum 2" high indications. Provide as integral part of car operating panel.

- D. Communication Provisions:
 - 1. General: Provide as an integral part of car operating panel.
 - 2. Type A: Provide emergency hand free-communication device with automatic dialer as an integral part of car operating panel; mount operating button, indicator light, and two-way communication speaker in panel, as directed by Architect. Alarm button and help button work as one. Provide CCTV camera, access control biometrics, and Airport BAS. Engrave emergency summons instructions on panel as directed by Architect.

- E. Service Cabinet: Provide for each elevator with lockable door. Refer to Appendix B: SFO Elevator Lock Standards for lock and keying for elevator locks and switched standards. Provide as an integral part of car operating panel; location, design and arrangement as directed by Architect. Include the following devices:
 - 1. Car light switch.
 - 2. Blower key switch.
 - 3. Utility receptacle.
 - 4. Independent service key switch.
 - 5. Inspection key switch.
 - 6. Switch to test emergency lighting system.
 - 7. Make provisions to mount operating permit behind flush window in door.

- F. Hall Buttons:
 - 1. General: Provide with illuminating button halos; intermediate fixtures with two buttons and terminal fixtures with one button. Button halos light to indicate hall call registration and extinguish when call is answered. Fabricate from materials matching hall push-button, with text and graphics as required by authorities having jurisdiction stating "IN CASE OF FIRE USE STAIRWAY FOR EXIT DO NOT USE ELEVATOR."
 - 2. Type A: Manufacturer's standard design; 11-gauge stainless steel faceplate. Mount with tamper resistant fasteners.

- G. Hall Lanterns:
 - 1. General: Provide white up and down waiting passenger lanterns at intermediate landings and single up or down lantern at terminal landings. Indications to light white; provide each fixture with a chime which sounds once for up direction and twice for down direction. Appropriate lantern illuminates and chime sounds approximately four seconds prior to car's arrival at the floor, indicating intended direction of travel.
 - 2. Type A: Custom glass etched lenses in transom.

3. Type B: Manufacturer's standard design; round type with 11-gauge stainless steel faceplate. Mount with tamper resistant fasteners.
- H. Fire Recall Switch: Incorporate fire recall switch into hall button fixture of the elevators; fixture assembly to include fire recall switch and call button(s). Fixture to be single faceplate design with operating instructions on faceplate. Size, configuration, arrangement and engraving of graphics on faceplate as directed by Architect.

2.7 DOOR OPERATION AND CONTROL

- A. Door Operator: Provide master high-speed closed loop door operator to open and close car and hoistway doors quietly and smoothly. Mount operator independently of car enclosure or cab mount with adequate sound control to prevent noise transmission into elevator cab.
1. Speed: Opening; 2½ fps. Closing; maximum allowable by code.
 2. Operation: Provide separate and adjustable timers to establish minimum passenger transfer time for car stops and hall stops. Arrange to adjust transfer time at Dispatching Landing separately from typical floor landings.
- B. Door Protection:
1. Safety Device: Provide electronic safety edge as manufactured by JANUS or approved equal; edge to extend full height of opening. Locate to ensure device is not damaged when door edge is struck. Provide Model Pana-Forty, or approved equal.
 2. Operation: Protect door opening with multiple light beams covering the entire door opening; arrange to reopen doors when beam(s) are interrupted, reestablishing beam(s) permits doors to close. Doors remain open as long as light beam(s) is interrupted. Provide nudging feature to close doors at reduced speed and sound buzzer on car when doors are prevented from closing for fifteen seconds; time to be adjustable from five seconds to one minute. Provide adjustable passenger transfer door dwell times.

2.8 WALL PANELS

- A. Stainless Steel Panel and Wainscot:
1. Fabrication of Stainless Steel Metal Work Exposed to View: Use smooth materials free of surface blemishes.
 2. Surface Flatness and Edges for Exposed Work: Cold-rolled, cold-finished, cold-drawn, stretcher leveled, medium cut and otherwise produced to highest commercial standard for flatness with edges and corners sharp and true.
 3. Alloys and Temper: Unless otherwise indicated, provide specific alloy which will weld and machine properly, finish to match Architect's sample and other work in same area, indicated to have same finish. Use temper or hardness providing greatest strength and durability consistent with necessary forming, fabrication, and finishing process.
 4. Type: ANSI Type 302 or 304 (at fabricator's option), except as otherwise shown. Comply with the following general standards, with specific type, alloy heat treatment and finish required to produce specified work. Where no other finish is indicated, finish products at mill to No. 4 directional finish and protect with adhesive paper covering.
 - a. Plate: ASTM A167

- b. Bar Stock: ASTM A276.
 - c. Tubing and Rods: ASTM A269.
 - d. Extruded Shapes: To match design profiles shown.
5. Fasteners:
- a. Exposed: Allen head stainless steel. Provide countersunk surfaces in plates or bars to receive fasteners.
 - b. Concealed: When concealed panel clips are used, provide finished sheet material of adequate gauge to resist oil canning or telegraphing at clip.
 - c. Welding Electrodes: Alloy and type required for strength, workability, compatibility and color match after grinding smooth and finishing. Finish welded areas to match control samples.
- B. Stainless Steel Bar Stock Wainscot Assembly:
- 1. Fabrication of Stainless Steel Metal Work Exposed to View: Use smooth materials free of surface blemishes.
 - 2. Surface Flatness and Edges for Exposed Work: Cold-rolled, cold-finished, cold-drawn, stretcher leveled, medium cut and otherwise produced to highest commercial standard for flatness with edges and corners sharp and true.
 - 3. Bar Stock Assembly: Weld threaded studs to bar stock at 12" O.C. and within 2" of ends. Straighten after welding if required to ensure horizontal line. Drill holes in stainless steel panel to template matching bar stock with studs. Anchor studs securely and permanently from behind panel prior to application of panel clips.

2.9 FABRICATION

- A. General: Fabricate as shown and specified; make work smooth and free from warps, buckles, squeaks, and rattles; joints light proof. No visible fastenings except as indicated. Assemble all panels with continuous rubber gasket between panels.
- B. Car Body: 14-gauge; material as specified. One (1) piece shell panels extend from floor to canopy; fabricate wall panel system (car shell and finished panels) to limit wall deflection to 1/8" when subject to a 150-pound load applied horizontally at any point on wall.
- C. Canopy: 12-gauge steel sheet; finish paint and color as selected by architect. Provide light tight baffle and hinged emergency exit.
- D. Car Doors: New SS cladding and new gibs
- E. Emergency Lighting: Provide system utilizing normal car fixtures connected to self-contained power supply located on car top; system to be capable of providing power to emergency lights for a period of six hours.
- F. Light Trough:
 - 1. General:
 - a. Design and construct fixtures in accordance with UL requirements and bearing UL label. Locate labels on fixture out of public view.

- b. Secure removable lower reflectors or faceplates in manner which prevents accidental dropping or opening; provide safety chain.
 - c. Provide incandescent lamps and porcelain lamp sockets with brass screw shell and for lamps 30 watts and larger.
 - d. Fabricate fixture with continuous reflector. Factory assemble corner units with no visible corner seams. Provide vertical reflector ends for fixtures adjacent to walls. Provide inside reveal trim at fixture edges.
 - e. Factory mark mounting frame to indicate frame orientation with respect to lighted wall. Mount label on inside of reflector indicating proper orientation with respect to lighted wall. Color and finish vertical and canted reflectors in specular anodized aluminum, as specified herein; Architect to review reflector color and finish.
 - f. Design fixture for relamping from below without removing or opening fixture assembly.
 - g. Provide 50W R-20 lamps. Connect lamps to a Lutron N1500H dimmer or approved equal; locate dimmer on car top or as directed by Architect.
2. Materials:
- a. If steel is used, fabricate of minimum 18-gauge cold-rolled sheets. Use minimum 16-gauge where required for structural rigidity and to prevent racking, twisting, sagging or tin canning. Provide gauge and type of steel for brackets, clips, etc. for intended functions. Bonderize steel before painting.
 - b. If sheet or extruded aluminum is used, fabricate fixture parts (except reflector) from clear, anodized aluminum. Use this coating as base for painted aluminum finishes. Provide sheet aluminum alloy and thickness to provide equivalent strength and dent resistance of 18-gauge cold-rolled steel. Aluminum extrusion shall have minimum wall thickness of 0.100".
3. Paint Finish:
- a. Unless otherwise noted finish portions of fixtures which are not visible when installed with manufacturer's standard color baked enamel or equivalent paint with minimum dry film thickness of 1½ mil. Paint portions of fixtures, which are not visible, but affect fixtures efficiency with high reflectance white paint with exception of optical aluminum reflectors.
 - b. Paint visible portions, where directed, with baked enamel or equivalent paint of minimum 1½ mil dry film thickness.
4. Reflectors:
- a. Fabricate of high purity aluminum (99.85%) or Alzak lighting sheet blanks of sufficient gauge to be independently rigid and resistant to dents.
 - b. Finish with chemical brightening, coloring, anodizing and appropriate cleaning steps (Alzak process or equivalent). Provide surface texture, specular reflectivity, total reflectivity, image clarity and color to be selected matching Architect sample. Control finishing process to ensure no visually detectable variations exist when lighted. Reflectors with lighted visual appearances differing more than approved range not acceptable.
 - c. Finish in light silver color unless otherwise noted.
 - d. Wiring: Conform to UL requirements.

- G. Sound Deadening: Spray to back of cab walls; 1/8" minimum thickness.
- H. Ventilation:
1. Provide two-speed squirrel cage exhaust blower. Mount on canopy with flush substantially stainless steel grille.
- I. Removable Panels:
1. General: Design with minimum joints for expansion, contraction, and installation considerations. Finish faces and edges as shown and specified.
 2. Construction: Construct panels in accordance with dimensional and design requirements indicated, details, elevations, and schedules.
 3. Workmanship: Fabricate work by skilled workmen to Architect's satisfaction. Reinforce as required to ensure rigid, secure assembly. Leave exposed surfaces free from dents, tool marks, warpage, buckle, glue, and open joints. Accurately fit joints, corners and miters. Conceal fastenings. Tighten threaded connections so threads are concealed.
 4. Fastening: Except where otherwise shown, specified or directed, Contractor has option on methods of assembly and joining provided results are satisfactory with Architect. Use manufacturer's proven methods producing required standards of workmanship subject to Architect's review. Conceal fastenings.
 5. Finish: Shop apply transparent finish in clean, dustproof environment. Sand lightly between coats to provide smooth, medium rubbed effect finish matching Architect's sample.
 6. Assembly: Fit and assemble work in shop insofar as practicable. Mark and disassemble units which are too large for shipment to project site, retaining units in sizes as large as possible for shipment and erection.
 7. Ceiling: Fabricate as indicated and specified. Provide concealed hinged, with concealed latch at side for access to emergency exit and overhead lighting. Coordinate hatch location with suspended ceiling pattern indicated.
- J. Lighting:
1. General: Where fluorescent lighting is used, provide T8 lamps with electronic ballast; ballast to be energy saving, super low heat, rapid start, high power factor type Class A sound rated with UL Class P thermal protection and CBM/ETL certified. Arrange for ready replacement of lamps and ballasts.
 2. Type and design as shown and specified; incandescent and fluorescent lighting as detailed on drawings. Provide C.J. Lighting Co., Inc. Plainview, New York fixtures; Model No. 1930 in size as indicated on drawings.
 3. Emergency Lighting: Provide system utilizing normal car fixtures or locate separate fixture out of public view.
- K. Wall Panels: Custom stainless steel wall panels (TBD).
- L. Handrail: Custom bar stock handrail

2.10 HOISTWAY ENTRANCES

- A. General: Provide braille and Arabic indications as shown and specified; submit samples.
- B. Braille/Arabic Indications: Provide separate metal plates or numerals as shown and specified; mounted with concealed mechanical fastenings. Plate indications to be mounted flush with jamb face, provided with steel back support plate, and mounted with hairline joints between edge of plate and jamb cutout; background of plate to be painted in epoxy paint with color as directed by Architect.
 - 1. Stainless Steel Entrance Frames: Provide separate stainless steel Arabic numerals and pin mounted braille; finish to be blackened stainless steel. Location, design, finish, and configuration, as directed and shown on drawings.
 - 2. Painted Finish Entrance Frames: Provide cast white silicon bronze metal plates; finish, size and configuration as directed by Architect and shown on drawings.
- C. Caduceus Symbol: Provide separate white silicon bronze metal plates mounted with concealed mechanical fastenings; mount flush with hairline joints. Provide same design, finish, color and mounting as braille plate indications on jambs.
- D. Submittals
 - 1. Shop Drawings: Submit shop drawings for each condition. Include plans, sections, and elevations at $\frac{1}{2}'' = 1'$ scale, and detail sections at $6'' = 1'$ scale. Show arrangement, alignment, jointing, anchorage and accessory items; specify finishes.
- E. Finishes
 - 1. Steel Sheet:
 - a. Shop Prime: Clean of foreign substances. Apply baked on coat of mineral filler and primer; sand each coat smooth.
 - b. Finish Paint: Three (3) coats low sheen baked enamel; sand each coat smooth; color as selected.
- F. Stainless Steel: No. 4 satin long grain finish, unless otherwise specified; provide with graining as shown and directed by Architect.
- G. Touch-Up; Painted Surfaces.
 - 1. General: Field touch-up abraded and damaged surfaces; use same paint as factory.
 - 2. Baked Enamel Finish: No touch-up permitted; refinish whole panel.
- H. Braille/Arabic Indications: Blackened stainless steel numerals and pin braille as specified; design, color, and finish to match sample in Architects office.

2.11 EQUIPMENT

- A. General: Provide entrance assemblies bearing 1½ hour UL label. Paint all exposed ferrous metal black.
- B. Doors: Flush type door panels without visible astragal or retainer, with doors in closed position, hollow metal type construction; minimum 16-gauge steel sheet construction with 2 removable gibs per panel. Provide sight guards of same material and finish as door panels. Where facing is applied to door panels, provide minimum 16-gauge thickness.

- C. Transom Hall Lantern: Provide design with hall lantern as an integral part, as shown on drawings.
- D. Fascia, Toe Guards, Dust and Hanger Covers: Minimum 16-gauge steel sheet. Hanger covers extend full width of door track; section above door removable from within car.
- E. Sills: Clean and polish existing sills
- F. Access Switches: Provide at top and bottom floor served for each elevator located in jamb, mounted flush with finished face of entrance jamb or integrate with hallway call button. Refer to Appendix B: SFO Elevator Lock Standards for locks and keying for elevator locks and switches standards.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine elevator areas to receive Work for compliance with requirements for installation tolerances and other conditions affecting performance. Examine hoistway openings, pits, overheads, and machine rooms as constructed and verify critical dimensions; examine supporting structure and other conditions under which elevator Work is to be modified.
- B. Installation: Remedy conditions detrimental to the proper and timely completion of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Field Measurements: Verify dimensions before proceeding with Work. Obtain field measurements for Work accurately fitted to other construction.
- D. Documentation: Prepare a written report, endorsed by the Elevator Contractor, listing dimensional discrepancies and conditions detrimental to performance or indicating that dimensions and conditions were found to be satisfactory.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions, and per requirements of regulatory agencies. Finished work strong, rigid, neat in appearance and free from defects. Make plain surfaces smooth and free from warps and buckles; apply molded members straight and true; make connections between various members tight to eliminate possible vibrations.
- B. Exposed Work: Carefully flush fit in neat first-class workmanlike manner; securely fasten by heavy metal reinforcements on back. After making joints, dress, if necessary; leave no construction marks. Make joints neat and as close as possible at joints between removable and fixed portions.
- C. Sound Control: Mount rotating and vibrating equipment on vibration-isolating mounts as specified, to minimize transmission to building structure.
- D. Lubrication: Lubricate operating parts of the system, including hoist ropes, as recommended by the manufacturer.
- E. Alignment: Coordinate installation of hoistway entrances with installation of elevator guiderails, for accurate alignment of entrances with car opening.

- F. Manufacturer's Nameplates: Including trademarks and other identifying symbols; not permitted on surfaces visible to public.
- G. Graphics: Engrave on fixtures when visible to public; Helvetica Medium, unless otherwise directed.
- H. Fasteners: Not permitted on surfaces exposed to public view, except as specified. Where specified and shown, fasteners exposed to public view to be #10-32 tamper resistant Security Torx type; material and finish to match adjacent surface.
- I. Key Switches: All key switches to be Medeco type, keyed as directed. Refer to appendix B: SFO Elevator Lock Standards for locks and keying for elevator locks and switches standards. Do not provide any keys with locks and switches unless directed to do so by SFO Locksmith.
- J. Attic Stock: Provide 2 units for every type of switch and lock specified in this section as attic stock.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of the elevator installation and before permitting use, either temporary or permanent, of elevators, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.
- B. Tests: Provide required personnel, test instruments and equipment to assist Owner, Architect, and Consultants in making following tests.
 - 1. Performance: Check following for compliance with Design Criteria and Performance requirements, as specified.
 - a. Contract speed.
 - b. Floor to floor times.
 - c. Vertical acceleration, deceleration.
 - d. Leveling.
 - e. Door operation.
 - 2. Motor Control:
 - a. Full load test on Normal and Standby Power.
 - b. Starting.
 - c. Load weighing.
 - 3. Operations: Demonstrate Automatic and Special Operations comply with Contract Documents.
- C. Inspections: Assist Owner, Architect, and Consultants in making inspections to assure workmanship and equipment comply with Contract Documents.
- D. Correction: Replace or remedy defects and discrepancies at no cost to Owner.
- E. Protection: Protect finished surfaces until Substantial Completion; replace damaged material.

3.4 MAINTENANCE SERVICE

- A. Submit a one (1) year full maintenance plan or duration determined by project team.
- B. Submit OEM (Original Equipment Manufacturer) recommended maintenance in compliance with the current code and approved by SFO's Mechanical Maintenance Department. Bid documents shall

ensure that asset data and maintenance schedules are properly entered into the Airport's asset maintenance management system (MAINSAVER).

- C. Inform SFO Duty Managers' Office at Tel 650-821-5222 when contemplating equipment removal and/or reentry into service. Log all the repair record.
- D. Perform emergency service, 24/7, that is: 24 hours, 7 days during normal working hours and after hours, with response time of one (1) hour or less.

3.5 DEMONSTRATION

- A. General: Manufacturer's factory-authorized service representative to train Owner's personnel in the operation of the elevator systems; refer to related sections.
- B. Equipment: Check operation of each elevator with Owner's personnel present and before substantial completion. Determine that operational systems and devices are functioning properly.
- C. Instruction: Instruct Owner's personnel in proper use, maintenance, adjustment, and repair of each system.

END OF SECTION 14 01 20

SECTION 14 01 30 – ESCALATOR MODIFICATION

PART 1 – GENERAL

1.1 SUMMARY

- A. General: Supply and install heavy duty escalator that are designed for traffic-loading conditions that are heavier than that of standard commercial duty requirement to fit within the existing escalator truss and floor opening.
- B. Dimensional Design: Manufacturer to design system to fit within the existing escalator Truss and floor opening and new machine decking floor plates must level with the existing finished floor.

1.2 REFERENCES

- A. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and Municipal authorities having jurisdiction.
 - 1. American Society of Mechanical Engineers (ASME) A17.1 Safety Code and Amendments for Elevators and Escalators
 - 2. California Code of Regulation (CCR) Title 8 Elevator Safety Orders
 - 3. Americans with Disabilities Act (ADA)
 - 4. California Building Code (CBC)
 - 5. California Electrical Code (CEC)
 - 6. American Iron and Steel Institute (AISI)
 - 7. American Society for Testing and Materials (ASTM)
 - 8. American National Standards Institute (ANSI)
 - 9. American Welding Society (AWS)

1.3 SYSTEM DESCRIPTION

- A. Design Criteria: Escalator systems to be designed in accordance with current ASME A17.1 and CCR Title 8, unless specified otherwise. In the case of conflicts between codes, regulations, or standards the most stringent requirement is to take precedence, unless it conflicts with State or Local code requirements.
 - 1. Operation: Provide system with smooth operation free from jars and bumps.
 - 2. Contract Speed: Provide variable speed escalator with proximity sensors for traffic detection subject to the following conditions: Provide means to isolate and by-pass the sleep mode when not in use.
 - a. The escalator controller shall be arranged so that the rate of acceleration and deceleration shall not exceed more than 1' per second square (0.3 m per second square) when transitioning between speeds.
 - b. Failure of a single proximity sensor, including its associated circuitry shall cause the escalator to revert to its normal operating speed at an acceleration of not more than 1' per sec. square.

- c. Automatic deceleration shall not occur before a period of time has elapsed since the last passenger detection that is less than three times the time it takes a passenger to ride from one landing to the other landing.
 - d. Detection of any passenger shall cause the escalator to reach full speed of 100 ft/min. before a passenger walking at 4 ½ ft/s reaches the comb plate.
 - e. The passenger detection means must detect someone before they come within 6¾' of the escalator comb plate teeth.
 - f. Detection of any passenger approaching against the direction of escalator travel shall cause the escalator to reach full speed before a passenger, walking at 4½ ft/sec. reaches the comb plate and cause the escalator alarm to sound. The alarm shall sound in three pulse.
 - g. The minimum speed of the escalator shall not be less than 10 ft/min.
 - h. There shall be a minimum of two means of detecting passenger at each end of the escalator for redundancy. Coordinate the location and method of mounting with the SFO Architect.
- 3. Sound Control: The escalator noise level shall not exceed 55 DB when measured at a height of 3' above any point of the escalator.
 - 4. Vibration: Escalator to be designed for a maximum velocity reading of 0.40" per second.

1.4 SUBMITTALS

- A. Product Data: Provide Manufacturer's specifications, catalog cuts or renderings of items exposed to public view.
- B. Samples: Provide samples for all materials and finishes exposed to public view; 12" x 12" panels or 24" lengths, as applicable. Architects review to establish and control criteria for graining, color, texture, workmanship, and joint tolerances. Other requirements are Contractor's responsibility. Submit additional samples as required to complete Architect's review and selection.
- C. Shop Drawings:
 - 1. General: Complete shop and erection drawings; additional if specifically requested.
 - 2. Layouts: Provide plan and section in ½" scale; indicate required clearances around equipment.
 - 3. Provide details in 1½" or 3" scale.
- D. Record Documents:
 - 1. General: Submit complete sets of record documents with all changes made during installation of the work so as to represent a complete set of As-Build documents.
 - a. Wiring Diagram: Single line diagrams, control diagrams for each system explaining operation and with complete referencing system between sheets. Show component location within system, terminals with numbers, connection between components, and conductor identification.
 - b. OEM Manual: Maintenance and operating instruction, including parts lists, for each escalator system. Assemble manuals for component parts into single binders.

- c. Submit and complete asset inventory sheet supplied by SFO upon completion of the installation.

1.5 QUALIFICATIONS

- A. All personnel/elevator mechanics need to be badged when working within SFO's property, including CBP areas. Badging to be requested by Contractor Company. SFO is not responsible for cost or time required to gain Contractor badges.
- B. Contractor Requirements: Provide required insurances certificates for approval, which include: General Liability Insurance Certificate with Endorsement Certificate; Auto Liability Insurance Certificate with Endorsement Certificate; Worker's Compensation Liability Certificate; Waiver of Subrogation; and any other insurance required by SFO.

1.6 QUALITY ASSURANCE

- A. Certifications: Obtain and pay for necessary inspection certificates from governing authorities.
- B. Pre-Engineering Conference: Prior to commencement of work, schedule a meeting at mutually agreeable time to review methods and procedure to be used to achieve design and Performance Requirements. Architect, Architect's Consultants, Structural Engineer, Contractor, Contractor's Field Superintendent, and Escalator Contractor's Engineer(s) and Field Superintendent to attend meeting.

1.7 PERFORMANCE REQUIREMENTS

- A. Wind Loads – Structural Design Basis: Verify existing structure & design for the proposed escalator
- B. Seismic Design – Structural Design Basis: Verify existing structure & design for the proposed escalator
- C. Live Loads – Structural Design Basis: Verify existing structure & design for the proposed escalator
- D. Power Supply – Check existing power supply for compatibility with the proposed escalator.
- E. Commencement of Work – Do not proceed with work until unsatisfactory conditions are corrected.

PART 2 – – PRODUCTS

2.1 MANUFACTURERS

- A. Qualifications: One of the following manufacturers, or approved equal or better.
 - 1. KONE Elevator Company
 - 2. Mitsubishi Elevator Company
 - 3. Otis Elevator Company
 - 4. Schindler Elevator Company
 - 5. ThyssenKrupp Elevator Company

2.2 EQUIPMENT

- A. Escalator Schedule: list is intended as a general description of the escalator characteristics. Escalator No. ES (List actual units to be modernized).

1. Size: To fit into existing truss
2. Step Speed: 100 fpm
3. Floors Served: TBD
4. Balustrade: Existing to be replaced
5. Number of Flat Steps: 3 steps

2.3 MATERIALS

- A. Aluminum: Controlled alloy and temper best suited to produce specified finish.
- B. Stainless Steel: ASTM A167, Type 302 or 304.
- C. Steel: ASTM A36.

2.4 FINISHES

- A. Aluminum: Controlled alloy and temper best suited to produce specified finish; AA M12 non-specular gloss fabricated.
- B. Machinery, Equipment and Steel Sheet: Degrease and shop paint; manufacturer's standard rust-inhibiting primer. Paint equipment black.
- C. Stainless Steel: No. 4 satin long grain finish; unless otherwise specified.

2.5 EQUIPMENT DISPERMENT

- A. Removed Equipment: Remove from the site all existing escalator equipment, components and materials that are replaced or unused. Equipment removed from the site becomes the property of the Escalator Contractor, unless directed otherwise. Properly dispose of removed equipment according to environmentally sound practices.

2.6 EQUIPMENT

- A. Drive Machine: Drive machine specially designed above the standard heavy duty escalator mounted within the upper escalator pit, outside the escalator steps for ease of access. Provide with accurately machined gears; worm and gear or helical gear type. The complete drive unit including the brake and speed governance system must be easily accessible without removal of steps.
- B. Drive Motor: Provide motor(s) which drives only one escalator. Provide alternating current motor designed to develop high starting torque with low starting current not more than four times as the running current. Motor rating must be above the standard commercial escalator product.
- C. Brake: Provide an electrically released and mechanically or magnetically applied brake per current Code. Design for a maximum accumulated static and dynamic load for the number of exposed steps on the incline, in accordance with ASME 17.1. An auxiliary main-shaft brake shall be provided per existing Code requirement.
- D. Controller: Provide enclosed controller panels with ventilated cabinet and hinged or removable doors, located inside truss. Controller unit to be light weight for easy removal by person or provide means for mechanical assistance to remove controller from pit area.

1. Provide a non-propriety microcomputer based control system to perform all functions of escalator operation and safety control. Decaying circuitry, limiting access codes and hand-held plug-in units of proprietary design will not be accepted. The escalator controller and fault diagnostic system shall include a clear text display in English to allow immediate identification of the cause of a shutdown. The display shall be located in the controller in the upper pit of the escalator. Operation of the fault diagnostic system shall be possible at the display point via menus and keypads adjacent to or contained as part of the display system. All control system and drive components containing memory or sensitive components to be properly shielded from line pollution, electrical spikes and brown outs to prevent damage to the equipment. Provide connection to the SFO BAS system for continuous monitoring by SFO.

2.7 OPERATING AND SAFETY DEVICES

- A. General: Provide safety devices including the following and others as may be included in applicable safety codes specified. Switches to be non-automatic re-setting and control circuits arranged so that after a switch is tripped it will be impossible to start escalator until safety switch or switches are reset.
- B. Starting Switches: Provide spring return type key operated starting switches for manual starting, located at landings so all the steps are within sight. Key must be MEDECO to match SFO keying System. Refer to Appendix B: SFO Elevator Lock Standards for locks and keying for elevator locks and switches standards.
- C. Emergency Stop Button: Provide emergency stop button with audible alarm at the lower and upper newel ends in a single housing with a push button type; material and finish to match adjacent finish. Emergency stop button designated red and protected against accidental contact; cover to be unlocked and readily removable for access. Cover to be marked: EMERGENCY STOP; LIFT COVER; PUSH BUTTON. Letter shall be minimum ½" high for EMERGENCY STOP and 3/16" for other wording. Ensure that emergency stop buttons are sufficiently visible and submit locations to SFO for approval.
- D. Governor: Provide speed governor to interrupt power to the drive machine in the event the speed of the steps exceeds allowable limits or unintended reversal in direction per current CODE; governor to be manual reset type.
- E. Disconnected Motor Safety Device: If the drive motor is attached to a gear reducer by means other than a continuous shaft, mechanical coupling, or toothed gearing, a device shall be provided that will cause the electric power to be removed from the driving machine motor and brake if the motor becomes disconnected from the gear reducer; device shall be manual reset type.
- F. Broken step Chain Device: Provide a device which causes interruption of power to the drive machine if a step chain breaks or excessive chain stretch; device to be manual reset type.
- G. Broken Drive Chain Device: Provide a device which causes the application of the brake on the main drive shaft and stops the escalator; device to be manual reset type.
- H. Escalator Pit Decking Floor Plate Switch: Provide a device which causes interruption of power to the drive machine and brake when access cover is opened or removed.
- I. Reversal Device: Provide a device which causes interruption of power at the drive machine motor and brake in the case of accidental reversal of travel in the up direction; device to be manual reset type.

- J. Up-Thrust Device: Provide a step up-thrust device which causes interruption of power at the drive machine motor and brake should a step be dislodge against the up-thrust track or a foreign object get wedged against the riser and the tread of adjacent step at the lower curve.
- K. Missing Step Device: Provide a device that detect a missing step and stops the escalator prior to the gap from the missing step exiting the comb plate; device to be manual reset type.
- L. Step Level Device: Provide step level device located at the top and bottom of the escalator. Device to detect step movement displacement of 0.125" or greater at the riser end at either side of the step. When activated, device causes interruption of power at the drive machine and brake before the step enters the comb plate; device to be manual reset type.
- M. Comb-Step Device: Provide a comb plate impact device which causes interruption of power to the drive machine motor and brake if comb plate is moved from the normal working position when objects are lodged between the comb plate and the treads. Setting to comply with the current ASME 17.1 guidelines.
- N. Handrail Speed Monitoring Device: Provide a device which causes the interruption of power to the drive machine motor and brake if the handrail speed deviates from the escalator step speed above the allowable speed by the governing body; device to be manual reset type. Speed monitoring device must be able to program with the sleep mode device if in use.
- O. Handrail Inlet Device: Provide a device at the entrance of the handrails into the balustrades which causes the interruption of power to the drive machine motor and brake if either an object becomes caught between the handrail and the guard.
- P. Skirt Obstruction Device: Provide four devices, two at each landing which causes the interruption of the power to the drive machine and brake if an object is accidentally wedged between the step and the skirt.
- Q. Demarcation Lights: Provide green step demarcation LED lights located below the step at the lower and upper landing. Arrange lamp fixtures parallel to the comb plates located directly below the comb plate teeth line.
- R. Skirt Safety Brushes: Provide safety brushes on both sides of the inner balustrade from the bottom to the upper section of the escalator to prevent accidental entrapment of body parts, shoes, clothing and other foreign object between the edge of the step and the balustrade. Provide lights every other steps below the safety brushes with flushed finished with the balustrade surface.
- S. Sign: Provide Hold Handrail and other warning signs at each landing. Signs to be approximately 4" wide by 1 ½" long and include all code required graphics. Warning sign to use International NO sign, and include NO running, NO sitting on Handrail, NO Baggage Carts, NO strollers, NO Wheelchair, NO Walker, NO Sitting On Steps, NO Bare Feet, and NO Loose Laces.

2.8 WIRING

- A. General: Use only copper conductors: run in metal conduit or galvanized duct. Provide 10% spare conductors in conduit, duct and wire runs. No splices in wiring; connect wiring directly to terminal blocks in control cabinets or junction boxes.
- B. Work Light and Plug Receptacles: Provide in machine and pit areas; including lamp guards.

- C. Conduit: Where provided use EMT type conduit. Include flexible conduit to sound isolated equipment and components.

2.9 WELLWAY EQUIPMENT

- A. Truss: Existing truss shall be retained. Existing truss shall be thoroughly cleaned from oil, grease, dirt, and debris and shall be painted with epoxy resin primer prior to installation of the replacement escalator. Check and repair existing truss for any defect including alignment, bending and broken welds.
- B. Drip Pans: Provide of oil tight construction beneath truss along its entire length. Extend pan full width of truss and be of smooth construction to collect oil and dirt droppings.
- C. Tracks: Fabricate from steel, reinforced and rigidly mounted to existing truss to ensure smooth finished track surface; install and support to assure proper alignment and smooth operation.
- D. Step Chain: High grade steel links with hardened pins connecting adjacent steps and arranged to distribute load evenly over engage drive sprockets. The chain shall have Synthetic or neoprene roller with sealed ball bearings and with minimum dynamic load capacity of 2,200 lbs. on each link pin in order to provide a silent run of step band.
- E. Steps: The steps shall be fully die cast aluminum and provide spray-on or applied sound reducing material on underside of each step. Step risers shall be groove and inter mesh with leading edge of the adjacent step tread. Steps shall be powder-coated with a black finish. Each step shall be provided with yellow powder-coated demarcation lines on each side adjacent to the skirt panel and at the rear edge of the step tread. Plastic demarcation line is not acceptable. Step rollers shall consist of aluminum bodies fitted sealed bearings and long-life neoprene vulcanized to the body. Entire step shall be removable from unit without disturbance of balustrade or step chain.
- F. Handrails: Provide handrails manufactured by Escalator Handrail Company or equal. Handrail shall be laminated canvas and rubber construction running on brass, bronze, aluminum or steel guides fastened to and matching curvature of balustrade. Use of nylon or plastic guide material is not acceptable. In order to reduce wear and specific strain, the handrail shall be pressed against a rubber-rimmed driving wheel by a heavy-duty cluster roller assembly only. Newel ends shall be furnished with rollers fitted with bearings to minimize handrail wear. Handrail color shall be black.
- G. Balustrade:
 1. General: Extend newel type balustrades without miters or angular corners at both ends of escalator. Deck end to blend smoothly over an approximate distance of 24" from its full width down to the width of the handrail guide. Balustrade finished height from the step tread shall meet the existing ASME 17.1 code requirement. Make certain portions removable to permit access for maintenance & repair.
 2. Design: Transparent tempered glass panels constructed in accordance of ANSI Z97.1 with a minimum thickness of 3/8" shall be provided. Glass to be cantilevered structural type without mullions; glass joint shall be vertical in reference to the landing's horizontal plane; locate joints to align with exterior architectural treatment. Panel size and configuration between working points and at ends as directed by SFO architect.
 3. Decking: Fabricate from sturdy AISI 304 SS to form flat and even surfaces with concealed fastening. Support with minimum 14-gauge material unless adequately reinforce to resist movement and denting. Panel joints to align with glass module. Decking profiles on both sides

of the step running line shall be parallel to the step running line and shall transition in wide arcs from horizontal to incline portions of the escalator.

4. Skirt Panels: Fabricate from reinforced AISE 304 brushed No. 4 SS to resist denting. Wood or composite backer reinforcement is not permitted. Skirt panels shall be designed and constructed to provide a flush transition between the skirt and inner decking above with no protruding edges. Skirt panel shall be designed and constructed to maintain a uniform clearance between the step treads to meet current ASME 17.1 Code. Extend skirt beyond comb plates and wrap around base of newel. No plastic material is permitted in any portion of the skirt including the face plate.

2.10 LANDINGS

- A. Comb Plates: Provide exchangeable die cast aluminum comb segments with non-slip surface within the upper and lower modules of the escalator with powdered coated yellow stripe finished. Designed comb plate teeth to accurately meshed with the step tread to meet existing code requirement. The area where the steps enter the comb plates shall be illuminated by green comb plate lights, installed in the skirt panel at both sides of the escalator. Provide continuous voice messages at the end of the escalator to advise passengers on safety. Coordinate with SFO for any voice message for approval prior to activation.
- B. Landing Plates: Provide floor plates to cover the entire area of landing within the outline of the truss. Provide stainless steel trim frame of 3/16 of an inch wide around outside of floor plate. Fabricate plates of ribbed aluminum with non-slip surfaces and in sections of a size and weight capable of being handled easily by one person. No logos or any marking of the manufacturer is permitted on the decking or any part of the escalator that is visible from outside of the escalator.
- C. Proximity Sensors: Install proximity sensors in a SS bollard to meet the minimum acceptable distance as per code from the comb plates with a horizontal SS metal tubing, extending past the newel, parallel to the balustrade on both sides. Submittal must be made prior to installation.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine escalator areas to receive Work for compliance with requirements for installation tolerances and other conditions affecting performance. Examine openings as constructed and verify critical dimensions.
- B. Installation: Remedy conditions detrimental to the proper and timely completion of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Field Measurements: Verify dimensions before proceeding with Work. Obtain field measurements for Work accurately fitted to existing escalator truss and related components.
- D. Documentation: Prepare a written report, endorsed by the Escalator Contractor, listing dimensional discrepancies and conditions detrimental to performance or indicating that dimensions and conditions were found to be unsatisfactory.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions, and per requirements of regulatory agencies. Finish work neat in appearance and free from defects. Make plain surfaces smooth and free from warps and buckles; apply molded members straight and true; make connections between various members tight to eliminate possible vibrations.
- B. Exposed Work: Carefully flush fit in neat first-class workmanlike manner; securely fasten by heavy metal reinforcements on back. After making joints, dress, if necessary; leave no construction marks. Make joints neat and as close as possible at joints between removable and fixed portions.
- C. Welded Construction: Provide welded connections for installing escalator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- D. Manufacturer's Nameplates: Including trademarks and other identifying symbols; not permitted on surfaces visible to public.
- E. Key Switches: All key switches to be MEDECO type, keyed as directed. Refer to Appendix B: SFO Elevator Lock Standards for locks and keying for elevator locks and switches standards. Provide key for each switch unless otherwise directed; include master key to operate all switches, unless restricted by code.
- F. Attic stock: Provide 920 units for every type of switch and lock specified in this section as attic stock.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of the escalator installation and before permitting use, either temporary or permanent, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.
- B. Inspections: Assist Owner, Architect, and Consultants in making inspections to assure workmanship and equipment comply with Contract Documents.
- C. Correction: Replace or remedy defects and discrepancies at no cost to SFO
- D. Protection: Protect finished surfaces until Substantial Completion; replace damaged material.

3.4 DEMONSTRATION

- A. General: Manufacturer's factory-authorized service representative to train Owner's personnel in the operation of the escalator systems.
- B. Equipment: Check operation of each escalator with Owner's personnel present and before Substantial completion. Determine that operational systems and devices are functioning properly.
- C. Instruction: Instruct Owner's personnel in proper use, maintenance, adjustment, and repair of each system.
- D. Spare Parts: Provide the following spare parts upon completion of the installation of the escalators:
 1. Four (4) proximity sensors.
 2. One (1) main motor drive

3. One (1) CPU board
4. Two (2) brakes
5. Four (4) key switches
6. One (1) complete emergency stop switch assembly
7. 25 pieces of left comb plate segment
8. 25 pieces of right comb plate segment
9. 50 pieces of center comb plate segment

3.5 WARRANTY

- A. The installer of escalator shall warrant for 2 years from date of acceptance against defects in materials and workmanship. Repair and replace defective work without extra cost to SFO.

3.6 MAINTENANCE SERVICE

- A. Submit a one (1) year full maintenance plan or duration determined by project team.
- B. Submit OEM (Original Equipment Manufacturer) recommended maintenance in compliance with the current code and approved by SFO's Mechanical Maintenance Department. Bid documents shall ensure that asset data and maintenance schedules are properly entered into the Airport's asset maintenance management system (MAINSAVER).
- C. Inform SFO Duty Managers' Office at Tel 650-821-5222 when contemplating equipment removal and/or reentry into service. Log all the repair record.
- D. Perform emergency service, 24/7, that is: 24 hours, 7 days during normal working hours and after hours, with response time of one (1) hour or less.

3.7 NON-PERFORMANCE OF WORK

- A. Work will be considered not to have been performed when any of the following conditions:
 1. Required maintenance and repair are not being met.
 2. Contractor fails to response on callback within specified time frame.
- B. In the event of non-performance of work by the Contractor, SFO shall have the right to correct the non-performance by using another contractor, or by any means it deems necessary and reasonable. Direct cost incurred by the SFO for the performance of such work shall be deducted from payments made to the Contractor.

END OF SECTION 14 01 30

SECTION 14 21 00 – ELECTRIC TRACTION ELEVATORS

PART 1 – – GENERAL

1.1 SUMMARY

- A. General: Fabricate and install elevators complete inclusive of hoistway systems, machine room equipment and interface with other trades, as shown and specified in accordance with the requirements of the Contract Documents and codes having jurisdiction.
- B. Dimensional Design: Elevator hoistways, pits and equipment rooms shall be shown in the Contract Documents to indicate spaces allocated for elevator equipment. Structural system has been fixed to provide support in accordance with elevator systems specified. Provide elevator systems to fit within the dimensions and design as shown and specified.
- C. Related Sections:
 - 1. Supports: As shown on drawings, to carry structural loads imposed by elevator equipment.
 - 2. Power Feeders: To terminals on controllers, including main-line disconnect switch; three phase.
 - 3. Provide 12" x 14" x 8" interface J-box at the side of the elevator controller cabinet with terminal blocks.
 - 4. Lighting Circuits: To terminals on controllers for each car, including disconnect switch; 120 VAC, single phase.
 - 5. Phone Line: Dedicated phone line to each elevator for a hand free telephone system. Stop button and alarm button in the elevator cab work as one.
- D. Coax Cable for CCTV Camera.
- E. Communication Speaker: Life safety/paging system speaker installed above car ceiling.
- F. Pair of sealed #18 AWG wire from elevator machine room to the nearest SSR/HSQ RTU for SFO BAS.
- G. Conduit: With pull wire, from hoistway of each group at Level 01 to locations of indicator and control panels.
- H. Standby Signal: From back contact on normal/standby transfer switch to control systems.
- I. Smoke Detectors: In elevator lobbies with wiring to elevator machine rooms.

1.2 REFERENCES

- A. Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and Municipal authorities having jurisdiction.
 - 1. American Society of Mechanical Engineers (ASME) A17.1: Safety Code for Elevators and Escalators
 - 2. California Code of Regulations (CCR) Title 8 Elevator Safety Orders

3. Americans with Disabilities Act (ADA)
4. California Building Code (CBC)
5. SFO Building Automation System (BAS)

1.3 SYSTEM DESCRIPTION

A. Design Criteria

1. General: Provide equipment to fit space and structural conditions shown.
2. Performance:
 - a. Contract Speed: Within 3% under any loading conditions.
 - b. Floor-to-Floor Time: Measure from start of door closing at one floor to 3/4 open door, car level and stopped at next floor; typical floor height of 14'-0". Incorporate system which initiates movement of elevator within 0.2 seconds after makeup of hoistway door interlocks.
 - c. Vertical Acceleration and Deceleration: Maximum 4' per second squared. Maximum jerk; 8' per second cubed.
 - d. Leveling: Stop elevator automatically, without noticeable hunting, to within 1/8" under all loading conditions. Correct for over and/or under travel from any cause, by returning elevator imperceptibly to the floor. Initiate re-leveling to limit creep to less than 1/4".
3. Motor Control:
 - a. Equipment: Operate at plus or minus 10% of normal feeder voltage and plus or minus 3% of normal feeder frequency without damage or interruption of elevator service. Include protective devices to prevent damage on over or under voltage conditions and loss of phase or reverse of phase.
 - b. Control System: Operate hoist motor continuously at contract speed and load for a one-hour period, stopping at each floor for no more than 10 seconds per stop. Under same conditions, elevator system not to adversely affect stability of voltage and frequency controls of emergency generator set or loads connected to emergency power bus during standby power operation.

B. Sound Control:

1. General: Provide effective sound isolation for all equipment to prevent noise transmission to public spaces and elevator cab. Utilize Mason Industries SWM waffle pads from approved with 0.10" static deflection, or approved equal; minimum thickness one inch (1"). Provide all bolted isolated connections with Mason Industries type HG neoprene grommets and washers.
2. Machine Room: Provide effective isolation of all machines, control cabinets, drive systems and chokes/filters from building structure to prevent noise and vibration transmission to public spaces. Sound isolation to limit ambient noise at the equipment to an A-weighted sound pressure level not exceeding 60 dB, when measured 3' from any component under all loading conditions.
3. Electrical Isolation: Provide electrical filter/reactor between controls and drive machine motor to minimize noise transmission.

4. **Guiderails:** Install guiderails aligned to obtain the quietest operation possible. Vertical rail tolerance to be within 0.06" per 100'.
5. **Cars:** Provide effective sound isolation of all car sheaves to prevent noise and vibration transmission to elevator car.
6. **Wiring:** Provide flexible power connections to all isolated equipment; use Seal-Tite or approved equal.
7. **Control Switches:** Provide optical or solid-state control switches in hoistways were allowed by code, to eliminate structure-borne noise associated with mechanical switches.

1.4 SUBMITTALS

A. General:

1. **Submittals:** Submit samples in accordance with sections pertaining to Submittals.
2. **Architect's Sample Review:** Architect review to establish and control criteria for graining, color, texture, workmanship, and joint tolerances. Other requirements are Contractor's responsibility. Submit additional samples as required to complete Architect's review and selection.

B. Product Data: Provide Manufacturer's specifications, catalog cuts or renderings of items exposed to public view.

C. Samples: Provide samples for all materials and finishes exposed to public view; 12" x 12" panels or 24" lengths, as applicable. Architects review to establish and control criteria for graining, color, texture, workmanship, and joint tolerances. Other requirements are Contractor's responsibility. Submit additional samples as required to complete Architect's review and selection.

D. Shop Drawings:

1. **General:** Complete shop and erection drawings of following; additional if specifically requested. Initial submittal to be complete, including layouts, all operating fixtures, hoistway entrances, car interior finishes and design data information.
2. **Layouts:** Provide plan and section of hoistways, pits, and machinery spaces in 1/2" scale; indicate required clearances around equipment. Provide details in 1 1/2" or 3" scale. Include static and dynamic loads imposed on building structure. Include details of equipment isolation; provide details in 3" scale.
3. **Data:** Provide machine room heat release, diversity factor and power requirements on shop drawings or on separate data sheets.

E. Record Documents:

1. **General:** Submit complete sets of record documents with all changes made during installation of the work so as to represent a complete set of As-Installed documents.
2. **Shop Drawings:** Complete As-Installed shop and erection drawings.
3. **Wiring Diagrams:** One-line diagrams, control diagrams for each system explaining operation, and with complete referencing system between sheets. Show component location within system, terminals with numbers, connection between components, and conductor identification.

4. Maintenance and Operating Manuals: Maintenance and operating instructions, including parts lists, for each elevator system. Assemble manuals for component parts into single binders and identify for each elevator.
5. Use asset inventory sheets to use in Asset Maintenance Management Program MAINSAVER.

1.5 QUALITY ASSURANCE

- A. Certifications: Obtain and pay for necessary inspection certificates from governing authorities.
- B. Pre-Engineering Conference: Prior to commencement of work, schedule a meeting at mutually agreeable time to review methods and procedure to be used to achieve design and Performance Requirements. Architect, Architect’s Consultants, Structural Engineer, Contractor, Contractor’s Field Superintendent, and Elevator Contractor’s Engineer(s) and Field Superintendent to attend meeting.

1.6 PERFORMANCE REQUIREMENTS

- A. Wind Loads – Structural Design Basis: Importance Factor: As per on Structural Design Basis Sheets.
- B. Seismic Design – Structural Design Basis: Importance Factor: As per Structural Design Basis Sheets.
- C. Live Loads – Structural Design Basis: Importance Factor: As per Structural Design Basis Sheets.

PART 2 – – PRODUCTS

2.1 MANUFACTURERS

- A. One of the following manufacturers, or approved equal:
 1. KONE Elevator Company
 2. Mitsubishi Elevator Company
 3. Otis Elevator Company
 4. Schindler Elevator Company
 5. ThyssenKrupp Elevator Company

2.2 EQUIPMENT

- A. Elevator Schedule: Refer to Drawings and Specifications; drawings take precedence over the following list, which is intended as a general description of the elevator characteristics.
- B. Elevator No. EL new (new elevator):

Type:	Traction
Capacity:	TBD
Speed:	350 fpm
Stops/Opening:	TBD, In line
Clear Inside:	TBD
Operation:	Four stop Collective (TBD)
Special Operation:	Independent Service Anti-nuisance Standby Power

	Fireman's Emergency Earthquake Emergency
Compensation:	As required
Hoistway Entrance:	Center Opening 4'-6" Wide by 8'-0" High

C. Elevator No. EL Existing, Complete Modernization:

Type:	TBD
Capacity:	TBD
Stops:	TBD
Horse Power:	TBD
Car Platform:	Re-use existing
Control:	New nonproprietary VVVF microprocessor drive. Acceptable drive: swift, MCE or equivalent with 10 years of proven tract of good record in the similar facilities. Decaying circuitry, limiting access codes and hand-held plug-in units of proprietary design will not be accepted. Provide ventilated cabinet with Hinge doors and internal cooling fan. Install 12" x 14" x 8" interface J-box at the side with terminal blocks.
Motor:	New gearless (direct drive) permanent magnet AC motor
Car top station:	New Car top inspection stations
Wirings:	New machine room wirings, car top wiring, hoistway, hallway Stations, emergency lights and traveling cable with COAX cable. Additional wiring for telephone, paging system, CCTV, and life/safety. Dedicated power supply for cab light with switch in the machine room. New GFCI receptacle in the machine room.
COP:	New Car Operating Panel to meet current ADA requirement & CODE, with integrated car direction/car position indicator, hand free telephone, and mounting bracket for conveyance permit, lockable panel for fire service, lockable service cabinet for other switches, Install or engrave the elevator number on the COP with epoxy filled.
Doors:	New GAL Mover closed loop door operator New infrared door safety devices New door rollers and interlock New front door car rollers New door Gibs New door jamb Braille and other signage as per code requirement New surface mount hall stations Re-clad hoistway and car doors each opening
Safety Device:	Rope grippers as per code requirement New earthquake device as required by code
Elevator Cab:	New elevator cab panels to match T2 (UEI) New ceiling lights & diffusers to match T2 (UEI) New handrails to match T2 elevators (UEI)

2.3 MATERIALS

- A. Aluminum: Controlled alloy and temper best suited to produce specified finish.
- B. Plywood Underlayment: NBS PS-1, A-D Exterior Grade Douglas Fir. Fire treat per AWPA with a paintable, water soluble, fire-retardant formulation; UL FR-S fire hazard classification.
- C. Steel Sheet: ASTM A366; uncoated, pickled, free from defects.
- D. Stainless Steel: ASTM A167, Type 302 or 304.
- E. Steel: ASTM A36.

2.4 FINISHES

- A. Aluminum: Controlled alloy and temper best suited to produce specified finish; AA M12 non-specular gloss fabricated.
- B. Machinery and Equipment: Degrease and shop paint; manufacturer's standard rust-inhibiting primer. Paint hoistway equipment black.
- C. Steel Sheet:
 - 1. Shop Prime: Clean of foreign substances. Apply baked on coat of mineral filler and primer; sand each coat smooth.
 - 2. Finish Coat: Three coats low sheen baked enamel; sand each coat smooth; color as selected.
- D. Stainless Steel: No. 4 satin long grain finish, unless otherwise specified.
- E. Touch-Up; Painted Surfaces: Field touch-up abraded and damaged surfaces; use same paint as factory. No touch-up permitted; re-finish whole panel.

2.5 CONTROL SYSTEMS

- A. General: Provide a non-proprietary microcomputer based control system to perform functions of elevator motion, car operation, group supervisory and door control. Decaying circuitry, limiting access codes and hand-held plug-in units of proprietary design will not be accepted. Include hardware required to connect, transfer, interrupt power, and protect motors against overloading. Properly shield each controller cabinet containing memory equipment from line pollution. Design system to accept reprogramming with minimum down time. Provide connection to the SFO BAS system for continuous monitoring by SFO. Provide system equal to following or approved equal:
 - 1. KONE – KCM831
 - 2. Mitsubishi-AI
 - 3. Otis-Elevonic
 - 4. Schindler-Miconic
 - 5. ThyssenKrupp-Swift
- B. Group Automatic Operation: (If applicable)

1. General: Arrange for automatic operation through car and landing buttons in conjunction with multiple zoning supervisory systems. Cars automatically slow down and stop level at floors in response to car and landing calls with stops made in numerical sequence irrespective of order in which buttons are pressed. Landing call canceled when answered.
 2. Zoning: Dispatching landing; Park one car in low zone which consists of the dispatching landing. Divide the remainder of building into equal zones with one car randomly assigned to each zone. Cars park in assigned zone with doors closed.
 3. Hall Call Assignment: Assign registered hall calls to car which will provide the best response time. Car assignment and response time determined by computing relative factors such as distance, service to previously assigned car and hall calls, car load, direction, door and car motion status, and coincidence of car and hall calls. Continuously compute these factors and assign best car available to answer call. A car without registered car calls arriving at a floor where both up and down hall calls are registered initially respond to the hall call in the direction that car was traveling. If no car call is registered for further travel in that direction, lantern immediately indicates changed direction without closing and reopening doors.
 4. Load Weighing: Provide cars with adjustable load weighing device initially set at 50% of rated capacity; use electronic load weighing transducer. Activation automatically dispatches car without waiting for normal dispatching interval. Device causes car to bypass hall calls. Activation is signaled by constant illumination of LED in service cabinet.
 5. Morning Peak: Recognized by a car leaving the Lobby in the up direction filled to a predetermined capacity during a preset clock period. Return all cars to Lobby and park one with up direction lantern illuminated and doors open. Cars are dispatched from the lobby based on passenger load and frequency of previous departures; fully loaded cars dispatched immediately. System operates until end of clock period.
 6. Down Peak: Recognized by a car arriving at the lobby filled to a predetermined capacity during a preset clock period. Assignment of a car to lobby ceases and travels up to assist the other cars. When cars arrive at lobby and discharge passengers, they immediately dispatch upward. System operates until end of clock period.
 7. Two-Way Traffic: System computes relative factors noted in Hall Call Assignment and determines the number of elevators required to remain in operation to provide maximum efficiency in serving passenger requirements. Cars not actively responding to registered calls park in assigned zone available for dispatching to assigned calls. System maintains requirement for zone car to return to dispatch landing.
 8. Delayed Car: If, for any reason, a car is delayed after it receives a start signal, system transfers the call to another car. When cause of delay is corrected car automatically returns to normal operation.
- C. Simplex Selective Collective:
1. General: Arrange for Simplex Selective Collective Operation. Operate elevator from a single riser of landing buttons and from operating devices in car.
 2. Operation: Momentary pressure of one or more car or landing buttons, other than those for landing at which car is standing, starts car, and causes car to stop at first landing for which a car or landing call is registered corresponding to direction in which car is traveling. Stops made in order in which landings are reached, irrespective of sequence in which calls are registered.

3. Door Control: A car without registered car calls arriving at a floor where both up and down hall calls are registered responds to the call in the direction of car travel. If no car call is registered for further travel in that direction, lantern immediately indicates changed direction without closing and reopening doors. Direction lantern to remain illuminated until doors are fully closed.
- D. Two-Stop Collective Operation:
1. General: Operate elevator from single button landing stations and operating buttons in car.
 2. Operation: Landing or car buttons causes car to start and proceed to that floor. Doors open automatically when car arrives. When car is traveling away from a registered landing call, call remains registered and car responds on next trip.
 3. Inspection Operation: Key access and top of car station operates elevator at contract speed or 100 fpm, whichever is less; provide key switch in service cabinet to activate operation. Mount key access switches in hoistway entrance frame without faceplates.

2.6 SPECIAL OPERATIONS

- A. Independent Service: Provide system to operate elevator from car buttons only, independent of all other operations; activate operation through key switch in service cabinet. Doors remain open when car is at landing until car button for another landing is constantly pressed; if several car calls are registered, constant pressure on DOOR CLOSE button will affect closing of doors after each stop.
- B. Anti-Nuisance Service: Provide system by means of load weighing transducer that will cancel all car calls in event that three times number of car calls that are registered as there are passengers in car allowing 150 pounds per person. System using false call answering is unacceptable.
- C. Standby Power:
1. Operation: Provide a standby power mode of operation which automatically evacuates elevator, to main landing without responding to car or landing calls. System subsequently permits manual selection of an elevator with switches in machine room. If an elevator fails to return to its main landing within 90 seconds, it is automatically disconnected from automatic return feature and left for later manual selection and evacuation. Standby generator sized to run one elevator from each group simultaneously.
 2. Activation: Initiated by switching electrical feeder to elevator distribution panel, from normal to standby. Provide indicator light in machine room to receive signal from automatic transfer switch and to indicate AUTOMATIC EVACUATION. If applicable, provide switch for selecting elevator to operate on standby power. Preselect one elevator by leaving switch in selected position.
- D. Fireman's Emergency: Provide Fireman's Emergency Operation in accordance with code. Elevators to return to designated floor via activation of lobby detectors and/or lobby recall switch. Refer to Appendix B: SFO Elevator Lock Standards for locks and keying for elevator locks and switches standards. Include alternate fire floor operation.
- E. Card Reader Access: Install card reader to gain access to any and all levels as desired. Car calls to designated levels on tenant security will not register without prior activation from coded card to enable activation of floor buttons. Feature can be overridden by INDEPENDENT or EMERGENCY SERVICE operation.

- F. Earthquake Emergency: Arrange to operate under FIREMAN'S EMERGENCY OPERATION after activation of a derailment device. Include a collision switch as part of the operation.

2.7 MACHINE/CONTROLLER ROOM EQUIPMENT

- A. General: Provide equipment to fit space and structural conditions shown. Permanently number equipment with numerals 4" high corresponding to elevator number.
- B. Hoist Machines, Elevators No. new:
 - 1. General: Provide machines to operate within specified temperature range. Provide anti-friction bearings with easy access for lubrication. Provide means to service secondary and deflecting sheaves from machine room.
 - 2. Traction Machine: Mount motor, brake, drive sheave and deflector sheave in proper alignment on common bedplate. Machine armature, drive sheave, and brake drum to be dynamically balanced at place of manufacture at twice operating RPM.
 - 3. Machine Support: Provide necessary machine beams, bearing plates, anchors, angles, and blocking required for the installation and support of the elevator equipment. Include all required anchor bolts, templates, and blocking required for the installation and support of the equipment.
 - 4. Motors: Provide direct drive/gearless VVVF type AC motor rated for 50 °C rise under continuous operation.
- C. Controllers: Provide ventilated cabinet with hinged doors and internal cooling fans with 12" x 14" x 8" interface J-box at the side of the controller cabinet. Wire to identified terminal block studs. Provide permanently marked symbols or letters identical to those on wiring diagrams adjacent to each component.
- D. Power Conversion Unit: Generate power using IGBT inverter and shunt transistors, having a 12 kHz switching frequency. Design unit to limit current, suppress noise and not produce voltage transients back into mainline feeders. Provide necessary filters, chokes and isolation to effectively prevent noise transmission to public spaces and elevator cabs.

2.8 HOISTWAY EQUIPMENT

- A. Hoist Machines
 - 1. General: Provide machines to operate within specified temperature range. Provide anti-friction bearings with easy access for lubrication.
 - 2. Traction Machine: Mount motor, brake, and drive sheave in proper alignment on common frame. Machine armature, drive sheave, and brake drum to be dynamically balanced at place of manufacture at twice operating RPM.
 - 3. Machine Support: Provide necessary machine beams, bearing plates, anchors, angles, and blocking required for the installation and support of the elevator equipment. Include all required anchor bolts, templates, and blocking required for the installation and support of the equipment.
Motors:
 - 4. Provide VVVF type AC motor rated for 50 °C rise under continuous operation.
- B. Guiderails:

1. Size: Provide of adequate size to suit conditions shown; minimum guiderail size 15 lb/ft.
 2. Installation: Mount directly to building structure with suitable brackets, non-corrosive type shims and sliding rail clips. Align rails plumb within 1/16" from top to bottom of hoistway; stop rails short of overhead to allow for building compression. Locate joints so fishplates will not interfere with rail clips and brackets as a result of building compression.
- C. Terminal Stopping and Slowdown Devices: Provide with noiseless operation.
- D. Buffers: Provide required blocking and supports as required.
- E. Platform:
1. General: Steel frame with steel or wood underfloor; provide platform isolation. Provide ¾" plywood underlayment over underfloor; install underlayment after final assembly of car shell.
 2. Recess underlayment to accept terrazzo flooring; assume weight of flooring material is 300 pounds.
- F. Guide Shoes: Roller type with 3 sound reducing rubber rollers per assembly; spring loaded. Mount to top of car frame and underside of safety device. Car rollers; maximum 400 rpm, counterweight rollers; maximum 1,000 rpm.
- G. Car frame, Safety and Governor:
1. Car frame: Welded or bolted steel channel construction. Provide steel retainer plates at top of car frame designed to engage the entire machined surface of the guiderail, located between car frame and base of roller guide assembly.
 2. Safety: Type B, flexible guide clamp.
 3. Governor: Centrifugal type. Provide tension sheave assembly with non-metallic guides for noiseless operation.
- H. Hoist and Governor Ropes:
1. Hoist: Traction steel or belt type; fasten with adjustable shackles.
 2. Governor: Traction steel type; fasten with adjustable shackles.
- I. Counterweights: Provide with steel subweights; include provisions to eliminate rattling. Provide sufficient blocking to allow for rope stretch without increasing overhead clearance height. Provide steel retainer plates at top and bottom of frame designed to engage the entire machined surface of the guiderail, located between frame and base of roller guide assembly.
- J. Compensation:
1. General: If required, provide proper number and size to adequately compensate weight of hoist rope and traveling Cables
 2. Chain: Provide encapsulated chain with guides to assure quiet operation; Republic Wire and Cable Co's. Whisper-Flex, or approved equal.

- K. Car Balance: Statically and dynamically balance elevator cars to minimize roller guide wheel loading. Do not exceed 15-pound maximum pressure on an empty car with car located at third points of the hoistway.

2.9 WIRING

- A. General: Use only copper conductors; run in metal conduit or galvanized duct. Provide 10% spare conductors in conduit, duct and wire runs. No splices in wiring; connect wiring directly to terminal blocks in control cabinets or junction boxes.
- B. Traveling Cables: Provide lighting, communication, coax cable, and control wiring circuits in traveling cables, from machine room to car connection point. Include a minimum of 15 spare pairs of shielded communication wires. Provide means to prevent cables from rubbing or chafing against hoistway, structural beams, elevator equipment and the car.
- C. Work Light and Plug Receptacle: Provide pendant-mounted work light on top of car with lamp guard and plug receptacle.
- D. Conduit: Where provided use EMT type conduit. Include flexible conduit to sound isolated equipment and components.
- E. Emergency Communication: Provide for emergency phone in each elevator. Run 4 pairs of continuous unspliced shielded twisted wire from the emergency phone in the car operating panel to the elevator machine room 12"x14"x 8" interface junction box; interface box provided as part of this work.
- F. Coaxial Circuit: Provide for closed circuit television camera (CCTV) in the elevator. Run continuous unspliced 4 pair of 22AWG shielded cable from the elevator car ceiling to the elevator machine room 12"x14"x8" interface junction box.
- G. Card Reader: Provide for card reader security system in each elevator. Run continuous unspliced four (4) pair of 22AWG shielded cable from the elevator car COP to the elevator machine room 12" x 14" x 8" interface junction box. Provide necessary wiring between elevator control systems and interface panel, as directed.

2.10 SIGNALS AND FIXTURES

- A. General: Provide signals and fixtures as specified and shown; arrangement of buttons and devices as directed by Architect. Unless otherwise specified provide manufacturer's standard circular buttons and devices with square edge stainless steel buttons and LED illuminating halo. Generate audible signals electronically and provide adjustable volume chimes for each device. All graphics to be engraved on fixture without separate attached plates. Mount faceplates and cabinet doors with hairline joints flush with adjacent surfaces.
- B. Car Operating Panel:
 - 1. General: Provide with illuminating pushbutton halos conforming to floors served. Button halo lights to show registration and extinguish when call is answered; include door open and door close buttons.
 - 2. Type A: Integral with swing front returns.
- C. Car Position Indicator:

1. General: Provide indications to correspond to floor designations.
 2. Type A: Vacuum fluorescent or LED type; minimum 2" high indications. Provide as integral part of car operating panel.
- D. Communication Provisions:
1. General: Provide as an integral part of car operating panel.
 2. Type A: Provide emergency hand free-communication device with automatic dialer as an integral part of car operating panel; mount operating button, indicator light, and two-way communication speaker in panel, as directed by Architect. Alarm button and help button work as one. Provide CCTV camera, access control biometrics, and Airport BAS. Engrave emergency summons instructions on panel as directed by Architect.
- E. Service Cabinet: Provide for each elevator with lockable door. Refer to Appendix B: SFO Elevator Lock Standards for locks and keying for elevator locks and switches standards. Provide as an integral part of car operating panel; location, design and arrangement as directed by Architect. Include the following devices:
1. Car light switch.
 2. Blower key switch.
 3. Utility receptacle.
 4. Independent service key switch.
 5. Inspection key switch.
 6. Switch to test emergency lighting system.
 7. Make provisions to mount operating permit behind flush window in door.
- F. Hall Buttons:
1. General: Provide with illuminating button halos; intermediate fixtures with two buttons and terminal fixtures with one button. Button halos light to indicate hall call registration and extinguish when call is answered.
 2. Type A: Manufacturer's standard design; 11-gauge stainless steel faceplate. Mount with tamper resistant fasteners.
- G. Hall Lanterns:
1. General: Provide white up and down waiting passenger lanterns at intermediate landings and single up or down lantern at terminal landings. Indications to light white; provide each fixture with a chime that sounds once for the "up" direction and twice for the "down" direction. Appropriate lantern illuminates and chime sounds approximately four seconds prior to car's arrival at the floor, indicating intended direction of travel. Hall lanterns need to be clearly visible across the entire bank of elevators.
 2. Type A: Custom glass etched lenses in transom.
 3. Type B: Manufacturer's standard design; round type with 11-gauge stainless steel faceplate. Mount with tamper resistant fasteners.
- H. Fire Recall Switch: Incorporate fire recall switch into hall button fixture of the elevators; fixture assembly to include fire recall switch and call button(s). Fixture to be single faceplate design with

operating instructions on faceplate. Size, configuration, arrangement and engraving of graphics on faceplate as directed by Architect. Refer to Appendix B: SFO Elevator Lock Standards for locks and keying for elevator locks and switches standards.

- I. Emergency Power Signage: Incorporate illuminated sign into hall button fixture for each elevators; fixture assembly to include sign, fire recall switch, and call button(s). Fixture to be single faceplate design with operating instructions on faceplate. Size, configuration, arrangement and engraving of graphics on faceplate as directed by Architect.
- J. Signals and Fixtures Schedule:
 - 1. Elevators No. NEW & EXISTING
 - a. Car Operating Panel: Type A; Qty: Two Each
 - b. Car Position Indicator: Type A; Qty: Two Each
 - c. Communication Provision: Type A
 - d. Hall Button Fixtures: Two Risers Type A at All Floors
 - e. Hall Lanterns: Type A at All Floors

2.11 INTERCOMMUNICATION SYSTEM

- A. General: Provide intercommunication system complete with talk back speakers, required auxiliary equipment, and wiring and conduit. Include a preamplifier and associated equipment required to receive input from building.
- B. Machine Room Stations:
 - 1. General: Arrange to communicate with the remote station in the elevator or all stations simultaneously; include following devices
 - 2. Combination speaker-microphone.
 - 3. Selector buttons for each station in system.
 - 4. A button for simultaneous conversation with all stations in system.
 - 5. Hand free communication device.
 - 6. Reset button to disconnect call and reset selection buttons to free system for next call.
 - 7. Volume control knob.
- C. Remote Stations: Provide combination speaker/microphone in each elevator car. Mount above car suspended ceiling, as directed by Architect.

2.12 DOOR OPERATION AND CONTROL

- A. Door Operator: Provide master high-speed closed loop door operator to open and close car and hoistway doors quietly and smoothly. Mount operator independently of car enclosure or cab mount with adequate sound control to prevent noise transmission into elevator cab.
 - 1. Speed: Opening; 2½ fps. Closing; maximum allowable by code.

2. Operation: Provide separate and adjustable timers to establish minimum passenger transfer time for car stops and hall stops. Arrange to adjust transfer time at Dispatching Landing separately from typical floor landings.
- B. Door Protection:
1. Safety Device: Provide electronic safety edge as manufactured by JANUS or approved equal; edge to extend full height of opening. Locate to ensure device is not damaged when door edge is struck. Provide Model Pana-Forty, or approved equal.
 2. Operation: Protect door opening with multiple light beams covering the entire door opening; arrange to reopen doors when beam(s) are interrupted, reestablishing beam(s) permits doors to close. Doors remain open as long as light beam(s) is interrupted. Provide nudging feature to close doors at reduced speed and sound buzzer on car when doors are prevented from closing for fifteen seconds; time to be adjustable from five seconds to one minute. Provide adjustable passenger transfer door dwell times.

PART 3 – – EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine elevator areas to receive Work for compliance with requirements for installation tolerances and other conditions affecting performance. Examine hoistway openings, pits, overheads, and machine rooms as constructed and verify critical dimensions; examine supporting structure and other conditions under which elevator Work is to be installed.
- B. Installation: Remedy conditions detrimental to the proper and timely completion of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Field Measurements: Verify dimensions before proceeding with Work. Obtain field measurements for Work accurately fitted to other construction.
- D. Documentation: Prepare a written report, endorsed by the Elevator Contractor, listing dimensional discrepancies and conditions detrimental to performance or indicating that dimensions and conditions were found to be satisfactory.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions, and per requirements of regulatory agencies. Finished work strong, rigid, neat in appearance and free from defects. Make plain surfaces smooth and free from warps and buckles; apply molded members straight and true; make connections between various members tight to eliminate possible vibrations.
- B. Exposed Work: Carefully flush fit in neat first-class workmanlike manner; securely fasten by heavy metal reinforcements on back. After making joints, dress, if necessary; leave no construction marks. Make joints neat and as close as possible at joints between removable and fixed portions.
- C. Welded Construction: Provide welded connections for installing elevator Work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.

- D. Sound Control: Mount rotating and vibrating equipment on vibration-isolating mounts as specified, to minimize transmission to building structure.
- E. Lubrication: Lubricate operating parts of the system, including hoist ropes, as recommended by the manufacturer.
- F. Alignment: Coordinate installation of hoistway entrances with installation of elevator guiderails, for accurate alignment of entrances with car opening. Set hoistway sills flush with finished floor surface at each landing; fill spaces under and around sill solid with non-shrink nonmetallic grout.
- G. Manufacturer's Nameplates: Including trademarks and other identifying symbols; not permitted on surfaces visible to public.
- H. Graphics: Engrave on fixtures when visible to public; Helvetica Medium, unless otherwise directed.
- I. Fasteners: Not permitted on surfaces exposed to public view, except as specified. Where specified and shown, fasteners exposed to public view to be #10-32 tamper resistant Security Torx type; material and finish to match adjacent surface.
- J. Key Switches: All key switches to be Medeco type, keyed as directed. Refer to Appendix B: SFO Elevator Lock Standards for locks and keying for elevator locks and switches standards. Provide separate key for each switch unless otherwise directed; include master key to operate all switches, unless restricted by code.
- K. Attic Stock: Provide 2 keys for every type if switch and lock specified in this section as attic stock.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of the elevator installation and before permitting use, either temporary or permanent, of elevators, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.
- B. Tests: Provide required personnel, test instruments and equipment to assist Owner, Architect, and Consultants in making following tests.
 - 1. Performance: Check following for compliance with Design Criteria and Performance requirements, as specified.
 - a. Contract speed.
 - b. Floor to floor times.
 - c. Vertical acceleration, deceleration.
 - d. Leveling.
 - e. Door operation.
 - 2. Motor Control:
 - a. Full load test on Normal and Standby Power.
 - b. Starting.
 - c. Load weighing.
 - 3. Operations: Demonstrate Automatic and Special Operations comply with Contract Documents.

- C. Inspections: Assist Owner, Architect, and Consultants in making inspections to assure workmanship and equipment comply with Contract Documents.
- D. Correction: Replace or remedy defects and discrepancies at no cost to Owner.
- E. Protection: Protect finished surfaces until Substantial Completion; replace damaged material.

3.4 DEMONSTRATION

- A. General: Manufacturer's factory-authorized service representative to train Owner's personnel in the operation of the elevator systems; refer to Division 1.
- B. Equipment: Check operation of each elevator with Owner's personnel present and before substantial completion. Determine that operational systems and devices are functioning properly.
- C. Instruction: Instruct Owner's personnel in proper use, maintenance, adjustment, and repair of each system.

END OF SECTION 14 21 00

SECTION 14 24 00 – HYDRAULIC ELEVATORS

PART 1 – – GENERAL

1.1 SUMMARY

- A. This section includes hydraulic passenger and service elevators.

1.2 REFERENCES

- A. Comply with the following:

1. ASME A17.1, Section 2.27 “Emergency Operation and Signaling Devices.”
2. NFPA 13, Section 8.15.5 “Elevator Hoist Ways and Machine Rooms.”
3. NFPA 70 National Electrical Code.
4. NFPA 72, Chapter 21 “Emergency Control Functions and Interfaces,” and Chapter 24, “Emergency Communications Systems.”
5. NFPA 80 Fire Doors and Windows.
6. SFO Standards
7. California Code of Regulations, Title 8, Elevator Safety Orders
8. ADA Americans with Disabilities Act
9. California Building Code
 - a. Chapter 30 “Elevators and Conveying Systems.”
 - b. 1007.4 “Elevators” for elevators used as an accessible means of egress.
10. California Fire Code, Section 607 “Elevator Recall and Maintenance.”
11. SFO Building Automation System (BAS).
12. International Organization for Standardization (ISO)
13. American Society for Testing and Materials (ASTM)
14. Underwriters Laboratories Inc. (UL): Building Materials Directory. Materials tested, labeled and inspected by Warnock Hersey International are acceptable upon approval of authorities.
15. International Code Council (ICC)

1.3 DEFINITIONS

- A. Definitions in ASME A17.1/CSA B44 apply to work of this Section.
- B. Service Elevator: A passenger elevator that is also used to carry freight.

1.4 ACTION SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, travel distances, and maximum loads. Include product data for car enclosures, hoistway entrances, and operation, control, and signal systems.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment.
 - 2. Include large-scale layout of car-control station.
 - 3. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
- C. Samples for Initial Selection: For finishes involving color selection.
- D. Samples for Verification: For exposed car, hoistway door and frame, and signal equipment finishes; 3" (75-mm-) square samples of sheet materials; and 4" (100-mm) lengths of running trim members.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Seismic Qualification Certificates: For elevator equipment, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.
- D. Sample Warranty: For special warranty.
- E. Attic Stock: Submit two additional units of each lock and key switch, one scavenger sump pump assembly, & one hydro control valve.
- F. Design Submittals: Comply applicable codes and standards including, but not limited, to those listed in 2.2A Regulatory Requirements.
- G. Use asset inventory sheets to use in asset maintenance management program – MAINSAVER.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
 - 1. Owner's Manual and Wiring Diagrams.
 - 2. Parts list, with recommended parts inventory.
- B. Inspection and Acceptance Certificates and Operating permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
- C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard one-year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: ISO-9001 Manufacturer Certified and ISO-14001 Environmental Management System Certified, with a minimum of 10 years' experience in manufacturing, installing, and servicing elevators of the type required for the project.
 - 1. Single source required for the power unit, controller, signal fixtures, door operators, cab, entrances, and major elevator operating equipment.
- B. Installer Qualifications: Elevator manufacturer or an authorized representative who is trained and approved by manufacturer, and has not less than five years installing elevators equal in character and performance to the project elevators.
- C. Fire-Rated Entrance Assemblies: Opening protective assemblies including frames, hardware, and operation shall comply with ASTM E2074, UL 10(B), and NFPA 80. Entrance assembly units must have Class B or better fire rating.
- D. Inspections: Engage a qualified independent testing agency to perform inspections.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials, components and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.9 COORDINATION

- A. Coordinate installation of sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
- B. Furnish well casing and coordinate delivery with related excavation work.
- C. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways, pits, and machine rooms.

1.10 WARRANTY

- A. **Manufacturer's Special Warranty:** Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
 - 2. **Warranty Period:** One year from date of Substantial Completion.

1.11 MAINTENANCE SERVICE

- A. Submit a one (1) year full maintenance plan or duration determined by project team.
- B. Submit OEM (Original Equipment Manufacturer) recommended maintenance in compliance with the current code and approved by SFO's Mechanical Maintenance Department. Bid documents shall ensure that asset data and maintenance schedules are properly entered into the Airport's asset maintenance management system (MAINSAYER).
- C. Inform SFO Duty Managers' Office at Tel 650-821-5222 when contemplating equipment removal and/or reentry into service. Log all the repair record.
- D. Perform emergency service, 24/7, that is: 24 hours, 7 days during normal working hours and after hours, with response time of one (1) hour or less.

PART 2 – – PRODUCTS

2.1 MANUFACTURERS

- A. **Basis-of-Design Product:** Subject to compliance with requirements, provide ThyssenKrupp Elevator or approved comparable product by one of the following:
 - 1. American Crescent Elevator Mfg. Corp.
 - 2. Fujitec America, Inc.
 - 3. KONE Inc.
 - 4. Minnesota Elevator, Inc.
 - 5. Mowrey Elevator Co.
 - 6. Otis Elevator Co.
 - 7. Schindler Elevator Corp.
 - 8. Schumacher Elevator Co.
 - 9. ThyssenKrupp Elevators

2.2 PERFORMANCE REQUIREMENTS

- A. **Accessibility Requirements:** Comply with Section 407 in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.

- B. Seismic Performance: Elevator system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and shall comply with elevator safety requirements for seismic risk Zone 2 or greater in ASME A17.1/CSA B44.
1. The term “withstand” means “the system will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event.”
 2. Affected peak velocity acceleration (Av) for Project's location is greater than or equal to 0.20 (seismic risk Zones 3 and 4).
 3. Provide earthquake equipment required by ASME A17.1/CSA B44.
 4. Provide seismic switch required by ASCE/SEI 7.
 5. Design earthquake spectral response acceleration short period (Sds) for Project is 1.280 g.
 6. Project’s Seismic Design Category: D.
 7. Elevator Component Importance Factor: 1.0.

2.3 ELEVATORS

- A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturers' standard components shall be used, as included in standard elevator systems and as required for complete system. Provide sound isolation at equipment to prevent noise transmission to public spaces and elevator cab.
- B. Elevator Description:
1. Elevator: Hydraulic
 2. Type: Holeless, beside-the-car, single-acting, single cylinder.
 3. Rated Load: TBD.
 4. Freight Loading Class for Service Elevators: Class A.
 5. Rated Speed: TBD.
 6. Operation System: Single automatic, approved equivalent to ThyssenKrupp SWIFT.
 7. Security Features: Prox car access control, to connect to Airport’s Lenal Access Control System.
 8. Car Enclosures:
 - a. Inside Width: 68” (1727 mm) from side wall to side wall.
 - b. Inside Depth: 101” (2565 mm) from back wall to front wall (return panels).
 - c. Inside Height: 96” (2438 mm) to underside of ceiling.
 - d. Front Walls (Return Panels): Satin stainless steel, No. 4 finish with integral car door frames.
 - e. Car Fixtures: Satin stainless steel, No. 4 finish.
 - f. Side and Rear Wall Panels: To match T2 elevators by UEI (Unique Elevator Interior, Inc.).
 - g. Reveals: Satin stainless steel, No. 4 finish.

- h. Door Faces (Interior): Satin stainless steel, No. 4 finish.
- i. Door Sills: Extruded aluminum, mill finish.
- j. Ceiling: Luminous ceiling
- k. Handrails: 1½" (38 mm) round satin stainless steel, No. 4 finish, at sides and rear of car.
- l. Floor: TBD.
- m. Ventilation: Manufacturer's standard exhaust fan, mounted on the car top.
- n. Car Top Inspection: Provide a car top inspection station with an "Auto-Inspection" switch, and "emergency stop" switch, and constant pressure "up and down" direction and safety buttons to make the normal operating devices inoperable. Mount in the door operator assembly.

2.4 HOISTWAY ENTRANCES

- A. Width: TBD.
- B. Height: TBD.
- C. Type: Two-speed side sliding.
- D. Frames: Satin stainless steel, No. 4 finish.
- E. Frames at Other Floors: Satin stainless steel, No. 4 finish.
- F. Doors: Satin stainless steel, No. 4 finish.
- G. Doors at Other Floors: Satin stainless steel, No. 4 finish.
- H. Sills: Aluminum, mill finish.
- I. Interlocks: Equip each hoistway entrance with an approved type interlock tested as required by code. Provide door restriction devices as required by code.
- J. Door Hanger and Tracks: Provide sheave Type 2 point suspension hangers and steel tracks for each hoistway horizontal sliding door.

2.5 HALL FIXTURES

- A. Satin stainless steel, No. 4 finish.

2.6 ADDITIONAL REQUIREMENTS

- A. Provide inspection certificate in each car, mounted under acrylic cover with frame made from Satin stainless steel, No. 4 finish.
- B. Provide hooks for protective pads and one complete set of full-height protective pads.
- C. Provide service cabinet with lockable door as part of the car operating panel that includes car light switch, blower key switch, independent service key switch, inspection key switch, emergency light

test switch, and utility receptacle. Refer to Appendix B: SFO Elevator Lock Standards for locks and keying for elevator locks and switches standards.

- D. Provide interchangeable core in Airport Proprietary Keyway only where a full size mortise cylinder is needed for a particular level over-ride button function on button panel in coach. Refer to "Door Hardware" section for cylinder detail and construction cores.
- E. Provide 12" x 14" x 8" interface j-box, mounted at the side of the elevator controller cabinet or adjacent space.
- F. All keying systems to match existing Airport Medeco Key System.
- G. Provide elevator number on the car operating pane.

2.7 SYSTEMS AND COMPONENTS

- A. Pump Units: Positive-displacement type with a maximum of 10% variation between no load and full load and with minimum pulsations.
 - 1. Pump shall be submersible type with submersible squirrel-cage induction motor, and shall be suspended inside oil tank from vibration isolation mounts or shall be tank-top- mounted type with fan-cooled, squirrel-cage induction motor, and shall be mounted on oil tank with vibration isolation mounts and enclosed in prime-painted steel enclosure lined with 1" (25-mm-) thick, glass-fiber insulation board.
 - 2. Motor shall have solid-state starting.
 - 3. Motor shall have variable-voltage, variable-frequency control.
- B. Hydraulic Silencers: System shall have hydraulic silencer containing pulsation-absorbing material in blowout-proof housing at pump unit.
- C. Piping: Size, type, and weight of piping as recommended by elevator manufacturer, with flexible connectors to minimize sound and vibration transmissions from power unit.
- D. Hydraulic Fluid: Use readily biodegradable hydraulic oil.
- E. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work. Device installation is specified in another Section.
- F. Protective Cylinder Casing: PVC or HDPE pipe casing complying with ASME A17.1/CSA B44, of sufficient size to provide not less than 1" (25-mm) clearance from cylinder and extending above pit floor. Casing shall have means of monitoring effectiveness to comply with ASME A17.1/CSA B44.
- G. Corrosion-Protective Filler: A nontoxic, petroleum-based gel formulated for filling the space between hydraulic cylinder and protective casing. Filler shall be electrically nonconductive, displace or absorb water, and gel or solidify at temperatures below 60 °F (16 °C).
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Hydro Safe Oil Division, Inc.; No-Ox-Id Liquid Elevator Casing Filler E-800.
 - b. Union-Gard, a division of Dome Services L.L.C.; Union-Gard 160.

- H. Car Frame and Platform: Welded or bolted steel units.
- I. Guides: Roller guides; polymer-coated, nonlubricated sliding guides; or sliding guides with guide-rail lubricators. Provide guides at top and bottom of car and counterweight frames.

2.8 OPERATION SYSTEMS

- A. General: Provide a non-propriety microcomputer based control system to perform function of elevator motion, car operation, and door control. Acceptable microcomputer: Swift, MCE or equal with 10 years of good tract of records in the similar facilities. Decaying circuitry, limiting access codes, and hand-held plug-in units of propriety design will not be accepted. Provide connection to the SFO BAS for continuous monitory. Provide p properly shield controller cabinet containing memory equipment from line pollution. Provide ventilated cabinet with hinge doors and internal cooling fan mounted on the adjacent wall. Must be protected from environmental extremes and excessive vibrations.
 - 1. Automatic Light and Fan shut down: Operation system must evaluate the system activity and automatically turn off the cab lighting and ventilation fan during periods of inactivity. Settings must be field programmable.

2.9 DOOR REOPENING DEVICES

- A. Infrared Array: Operation: Protect door opening with multiple light beams covering the entire door opening; arrange to reopen doors when beam(s) are interrupted, reestablishing beam(s) permits doors to close. Doors remain open as long as light beam(s) is interrupted. Provide nudging feature to close doors at reduced speed and sound buzzer on car when doors are prevented from closing for fifteen seconds; time to be adjustable from five seconds to one minute. Provide adjustable passenger transfer door dwell times.
- B. Operation: AC controlled units with oil check or deviations will not be accepted. Subject to compliance with requirements, provide one of the following:
 - 1. Direct current motor driven heavy duty operator designed to operate the car and hoistway doors simultaneously.
 - 2. Closed-loop, microprocessor controlled motor-driven linear door operator with adjustable torque limits.
- C. Electrically cushion door movements at limits of travel.
- D. Arrange door operating mechanism for manual operation in event of power failure.
- E. Doors must open automatically when the car arrives at the landing, and must automatically close after an adjustable time interval or when the car is dispatched to another landing.
- F. No Un-Necessary Door Operation: The following are necessary door operations. Do not allow doors to open for unnecessary operations.
 - 1. Stopping for a car or hall call.
 - 2. Answering a car or hall call at the present position.
 - 3. Selected as a dispatch car.

- G. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.
- H. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is not registered before the door closes to within 6" of fully closed, the travel will reverse and the door will reopen to answer the other call.
- I. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.
- J. Limited Door Reversal: If the doors are closing and the infra-red beam(s) is interrupted, the doors will reverse and reopen partially. After the obstruction is cleared, the doors will begin to close.
- K. Door Open Watchdog: If the doors are opening, but do not fully open after a field adjustable time, the doors will recycle closed then attempt to open six times to try and correct the fault.
- L. Door Close Watchdog: If the doors are closing, but do not fully close after a field adjustable time, the doors will recycle open then attempt to close six times to try and correct the fault.
- M. Door Close Assist: When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied to possibly overcome mechanical resistance or differential air pressure and allow the door to close.

2.10 CAR ENCLOSURES

- A. General: Provide steel-framed car enclosures with nonremovable wall panels, with car roof, access doors, power door operators, and ventilation.
 - 1. Provide standard railings complying with ASME A17.1/CSA B44 on car tops where required by ASME A17.1/CSA B44.
- B. Materials and Finishes: Manufacturer's standards, but not less than the following:
 - 1. Subfloor: Provide one of the following:
 - a. Exterior, underlayment grade plywood, not less than 5/8" (15.9-mm) nominal thickness.
 - b. Exterior, C-C Plugged grade plywood, not less than 7/8" (22.2-mm) nominal thickness.
 - 2. Floor Finish: TBD.
 - 3. Stainless-Steel Wall Panels: Flush, hollow-metal construction; fabricated from stainless- steel sheet.
 - 4. Fabricate car with recesses and cutouts for signal equipment.
 - 5. Fabricate car door frame integrally with front wall of car.
 - 6. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet or by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
 - 7. Sight Guards: Provide sight guards on car doors.

8. Sills: Extruded metal, with grooved surface, ¼" (6.4 mm) thick.
9. Luminous Ceiling: Fluorescent light fixtures and ceiling panels of translucent acrylic or other permanent rigid plastic.

2.11 HOISTWAY ENTRANCES

- A. Hoistway Entrance Assemblies: Manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Frame size and profile shall accommodate hoistway wall construction.
 1. Where gypsum board wall construction is indicated, frames shall be self-supporting with reinforced head sections.
- B. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies shall comply with NFPA 80 and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing at as close-to-neutral pressure as possible according to NFPA 252 or UL 10B.
 1. Fire-Protection Rating: 1½ hours.
- C. Materials and Fabrication: Manufacturer's standards, but not less than the following:
 1. Stainless-Steel Frames: Formed from stainless-steel sheet.
 2. Stainless-Steel Doors and Transoms: Flush, hollow-metal construction; fabricated from stainless-steel sheet or by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal.
 3. Sight Guards: Provide sight guards on doors matching door edges.
 4. Sills: Extruded metal, with grooved surface, ½" (6.4 mm) thick.
 5. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M.

2.12 HOISTWAY EQUIPMENT

- A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood subfloor. Underside of the platform shall be fireproofed. The car platform shall be designed and fabricated to support one-piece loads weighing up to 25% of the rated capacity.
- B. Sling: Steel stiles affixed to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.
- C. Guide Rails: Steel, omega shaped, fastened to the building structure with steel brackets.
- D. Guide Shoes: Slide guides shall be mounted on top and bottom of the car.
- E. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on a steel template that is fastened to the pit floor or continuous channels fastened to the elevator guide rail or securely anchored to the pit floor. Provide extensions if required by project conditions.
- F. Jack: Twin post holeless. Two jacks piped together, mounted one on each side of the car with a polished steel hydraulic plunger housed in a sealed steel casing having sufficient clearance

space to allow for alignment during installation. Each plunger shall have a high pressure sealing system which will not allow for seal movement or displacement during the course of operation. Each Jack Assembly shall have a check valve built into the assembly to allow for automatically re-syncing the two plunger sections by moving the jack to its fully contracted position. The jack shall be designed to be mounted on the pit floor or in a recess in the pit floor. Each jack section shall have a bleeder valve to discharge any air trapped in the section. Provide a hydraulic scavenger pump assembly to collect smear hydraulic oil from the jack assembly and pump it back to the main hydraulic tank in the elevator machine room.

1. Jack unit must be of sufficient size to lift the gross load of the height specified. Factory test jack to insure adequate strength and freedom from leakage.
 2. Brittle material, such as gray cast iron, will not be accepted.
- G. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the landings and correct for overtravel or undertravel. Self-leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.
- H. Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary code compliant pipe and fittings shall be provided to connect the power unit to the jack unit. Provide proper grade oil as specified by the manufacturer of the power unit.

2.13 SIGNAL EQUIPMENT

- A. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements with LEDs, with permanent antimicrobial protection.
- B. Car Operating Panel: Provide manufacturer's standard recessed or semi-recessed car-control stations. Mount in return panel adjacent to car door unless otherwise indicated. Design must be submitted for approval prior to installation.
1. Mark buttons and switches for required use or function. Use both tactile symbols and Braille.
 2. Provide "No Smoking" sign matching car-control station, either integral with car-control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.
- C. Fire Recall Switch: Provide with lockable cabinet. Refer to Appendix B: SFO Elevator Lock Standards for locks and keying for elevator locks and switches standards. Integrate with car operating panel and include operating instructions.
- D. Emergency Communication System: Hands-free two-way voice communication system to SFO Communication Center integrated to the car operating panel. The help button and the stop button must work as one.
1. Refer to California Fire Code for emergency voice/alarm communication paging requirements.
 2. Provide Emergency Call Button.
- E. Provide power and communication for CCTV.
- F. Shunt Trip: Refer to California Fire Code Section 607.5 and California Building Code Section 3006.5 for shunt trip requirements. Coordinate and include audible/visible annunciation in/at elevator car and fire alarm control unit.

- G. Firefighters' Two-Way Telephone Communication Service: Provide required conductors in traveling cable for firefighters' two-way telephone communication service. Integrate with car operating panel; no cabinet is required.
- H. Provide 2 units for every type of switch and lock specified in this section as attic stock.
- I. Travelling Cable: Include Coax Cable for CCTV and 15 additional pairs of shielded communication cables.
- J. Car Position Indicator: Provide illuminated, digital-type car position indicator, located above car door or above car-control station. Also, provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served. Include travel direction arrows if not provided in car-control station.
- K. Column Mounted Car Riding Lantern: Provide a car riding lantern at the entrance of the elevator cab that, when illuminated, indicates the intended direction of travel. The lantern must illuminate and a signal must sound when the car arrives at a floor at which it will stop. The lantern shall remain illuminated until the door(s) begin to close. Mount faceplates with hairline joints flush with adjacent surfaces.
 - 1. Car Annunciator: Provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.
- L. Hall Push-Button Stations: Provide one hall push-button station at each landing.
 - 1. Provide red-illuminating LED halo pushbutton risers with permanent antimicrobial protection.
 - 2. Provide one pushbutton riser with faceplates having a brushed stainless steel finish.
 - a. Incorporate Phase 1 firefighter's service key switch, with instructions, into the hall station at the designated level(s).
 - 3. Equip units with buttons for calling elevator and for indicating applicable direction of travel.
 - 4. Provide telephone jack in each unit for firefighters' two-way telephone communication service.
- M. Emergency Pictorial Signs: Fabricate from materials matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, stating "IN CASE OF FIRE USE STAIRWAY FOR EXIT DO NOT USE ELEVATOR." Provide one sign at each hall push-button station unless otherwise indicated.

2.14 FINISH MATERIALS

- A. General: Provide the following materials for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated.
- B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, commercial steel, Type B, exposed, matte finish.
- C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
- D. Stainless-Steel Bars: ASTM A 276, Type 304.
- E. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.

- F. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Verify critical dimensions and examine supporting structure and other conditions under which elevator work is to be installed.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Excavation for Cylinder: Drill well hole in elevator pit to accommodate installation of cylinder.
- B. Provide well casing as necessary to retain well-hole walls.
- C. Install cylinder in protective casing within well hole. Before installing protective casing, remove water and debris from well hole.
- D. Install cylinder plumb and accurately center for elevator car position and travel. Anchor securely in place, supported at pit floor. Seal between protective casing and pit floor with 4" (100 mm) of nonshrink, nonmetallic grout.
- E. Install cylinder plumb and accurately center for elevator car position and travel. Anchor securely in place, supported at pit floor and braced at intervals as needed to maintain alignment. Anchor cylinder guides at spacing needed to maintain alignment and avoid overstressing guides.
- F. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS workmanship and welding operator qualification standards.
- G. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.
- H. Install piping above the floor, where possible. Install underground piping in casing.
- I. Lubricate operating parts of systems as recommended by manufacturers.
- J. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- K. Leveling Tolerance: ¼" (6 mm), up or down, regardless of load and travel direction.
- L. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.
- B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevators.

3.4 PROTECTION

- A. Temporary Use: Comply with the following requirements for elevator used for construction purposes:
 - 1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
 - 2. Provide strippable protective film on entrance and car doors and frames.
 - 3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
 - 4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
 - 5. Do not load elevators beyond their rated weight capacity.
 - 6. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleanup, and adjustment as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
 - 7. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.5 DEMONSTRATION

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

3.6 MAINTENANCE – see Section 14 21 00, Part 2 for details

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include twelve months' full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 1. Perform maintenance during normal working hours.

2. Perform emergency callback service during normal working hours with response time of two hours or less.

END OF SECTION 14 24 00

SECTION 14 25 00 – ELEVATOR CARS

PART 1 – – GENERAL

1.1 SUMMARY

- A. Provide elevator car finishes, complete, as shown and specified per Contract Documents.
- B. Perform work necessary to provide a complete elevator car including wall panels, front returns and doors, ceiling, and associated components.
- C. Related Sections:
 - 1. Finish Floor: For elevators new & existing, provide Terrazzo flooring.
 - 2. Communication Speaker: Life safety/paging speaker installed above car ceiling, refer to relevant sections.
 - 3. CCTV Camera: Installed inside cars, refer to relevant sections.

1.2 REFERENCES

- A. Comply with the following:
 - 1. SFO Standards
 - 2. Underwriters Laboratories Inc. (UL): Building Materials Directory. Materials tested, labeled and inspected by Warnock Hersey International are acceptable upon approval of authorities.
 - 3. American National Standards Institute (ANSI)

1.3 QUALITY ASSURANCE

- A. Installation: Performed by manufacturer. Begin work in elevator cabs following completion of elevator manufacturers' work, with exception of final performance of adjustment.

1.4 SUBMITTALS

- A. General:
 - 1. Submittals: Submit samples in accordance with section pertaining to Submittals.
 - 2. Architect's Sample Review: Architect review to establish and control criteria for graining, color, texture, workmanship, and joint tolerances. Other requirements are Contractor's responsibility. Submit additional samples as required to complete Architect's review and selection.
- B. Samples:
 - 1. Stainless Steel Bar: Provide 12" long.
 - 2. Stainless Steel Plate: Provide 12" square with 1/32" wide by 1/16" deep saw cut separating different specified finishes.

- C. Fabricated Samples:
1. Handrail: Provide 12" long rail including support and end condition.
 2. Wainscot: Provide finished back unit with stainless steel and stainless steel bar stock assembly; 2' long by height of panel.
 3. Ceiling Grill Assembly: Provide 2' square sample with stainless steel grill, laminated glass, and unistrut hanger components.
 4. Panels: Provide three 12" square samples of wall panel above wainscot. Provide assembly of three samples showing joinery assemblies; extent shown on drawings.
 5. Coined Edge: Provide 12" long showing sharpness and finish to be achieved in finished work.
 6. Light Trough: Provide ceiling assembly 2' long.
- D. Shop Drawings: Submit shop drawings for each condition. Include plans and elevations at $\frac{1}{2}'' = 1'$ scale, and detail sections at $3'' = 1'$ scale. Show arrangement, alignment, jointing, anchorage and accessory items; specify finishes.
- E. Certification of Fire-Retardant Treatment: Provide certification stating name of fire retardant salts used and compliance with local building code requirements.
- F. Warranty:
1. Wall Panels: Provide written guarantee, signed by Fabricator and Installer. Guarantee elevator car wall panels against warping and delamination for a period of five years.
 2. Laminated Glass: Provide a 5-year warranty, directly to the Airport, warranting against deterioration of laminated glass. Deterioration of laminated glass is defined as the development of manufacturing defects including edge separation or delamination which materially obstructs vision through glass. Upon notification of such defect, within the warranty period, make necessary replacements at the convenience of the Airport.

1.5 ENVIRONMENTAL CONDITIONS

- A. Do not erect paneling and trim in areas which are wet, damp, not climatically controlled, or which still require work by other trades which may damage or disfigure panels or trim.

1.6 DELIVERY AND STORAGE

- A. Protect paneling with heavy duty canvas, heavy kraft paper cartons, or other material capable of protecting finished material at factory prior to shipment. Mark each unit with identification required for installation.
- B. Protect panels and trim during handling, transit and storage to prevent damage and deterioration. Store in dry place, protected from weather, and soiling. Stack in accordance with manufacturer's instructions.
- C. Do not deliver paneling and trim until storage area is sufficiently dry so work will not be damaged by excessive changes in moisture content.

1.7 ATTIC STOCK

- A. General: To be determined after the award of the project

PART 2 – – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Qualifications: As manufactured by elevator manufacturer, one of following, or approved equal.
 1. Elevator Interiors & Design
 2. Hauenstein and Burmeister Inc.
 3. Tyler Elevator Products

2.2 MATERIALS

- A. Aluminum: Controlled alloy and temper best suited to produce specified finish.
- B. Particleboard: Willamette Industries Duraflake FR, or approved equal. Flame spread 25 or less when tested per ASTM E84; UL listed.
- C. Steel Sheet: ASTM A366, 16-gauge uncoated, pickled, free from defects; stretcher leveled.
- D. Sound Deadener: 3M's Coating EC1000, Presstite's No. 105A, Vibradamp Corp.'s No. 111, or approved equal; asphaltic based compound for spray application; black.
- E. Stainless Steel:
 1. Plate: ASTM A167, Type 302 or 304
 2. Bar Stock: ASTM A276.
 3. Extrusions: ASTM A276.
- F. Steel: ASTM A36.
- G. Glass:
 1. General: ASTM C1036 Type I, Class 1, Quality q³.
 2. Laminated Glass: ASTM C1172, two sheets of glass permanently factory laminated under heat and pressure with two interlayers of 0.015" thick translucent white heat strengthened, plasticized polyvinyl butyral by Monsanto made specifically for laminating glass. Two ¼" thick glass sheets, Starfire White translucent manufactured by PPG Industries Santa Ana, California. Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets in an autoclave utilizing heat plus pressure.
 - a. Prior to laminating, cut glass to required sizes and profiles as determined by accurate measurement of openings to be glazed, making allowances for require edge clearances. Cut and process edges in accordance with glass manufacturer's recommendations. Do not cut or treat edges in the field.
- H. Stainless Steel Grill: Stainless steel grill as manufactured by Kadee Industries Cleveland, Ohio; model number KD58. Provide finish and graining as specified.

2.3 FINISHES

A. Steel Sheet:

1. Shop Prime: Clean of foreign substances. Apply baked-on coat of mineral filler and primer; sand each coat smooth.
2. Finish Paint: 3 coats low sheen baked enamel; sand each coat smooth; color as selected by Architect

B. Stainless Steel:

1. Plain: No. 4 satin long grain finish, unless otherwise specified; provide with graining as shown and directed by Architect; match sample in Architect's office.
2. Patterned: Rimex Metals 5-SM, Rigidized Metal's No. 5WL, or approved equal.
3. Plate: No. 4 satin long grain finish; match sample in Architect's office.
4. Grill: No. 4 stain long grain finish; match sample in Architect's office.

C. Steel Sheet Ceiling Panels:

1. Shop Primed: Clean of foreign substances. Apply baked-on coat of mineral filler and primer; sand each coat smooth.
2. Finish Paint: Baked enamel paint; semi-gloss finish. Custom color as selected by Architect.

D. Touch-Up; Painted Surfaces:

1. General: Field touch-up abraded and damaged surfaces; use same paint as factory.
2. Baked Enamel Finish: No touch-up permitted; refinish whole panel.

2.4 GLAZING MATERIALS

A. Structural Silicone Rubber Sealant "STSG": ASTM C920, class and use as best suited for the intended purpose; provide one of the following:

1. "Ultraglaze 4000 Silicone Structural Glazing Sealant" (General Electric Company).
2. "795 Silicone Building Sealant" (Dow Corning Corporation).

B. Glazing System for Structural Glazed Ceiling Glass:

1. Glazing Spacers: Continuous preformed silicone strips, 50 +/- 5 Shore A durometer hardness, shape as shown. Type I Preformed Silicone Rubber (General Electric Corporation), designed not to adhere to the structural glazing sealant.
2. Compressible Rod: Types as shown, or as required for proper Performance of the Sealant in the specific joint, which is compatible with sealant, and as recommended by sealant manufacturer. Provide the following; "Sofrod" (Applied Extrusion Technology).

2.5 WALL PANELS

A. Stainless Steel Panel and Wainscot:

1. Fabrication of Stainless Steel Metal Work Exposed to View: Use smooth materials free of surface blemishes.
 2. Surface Flatness and Edges for Exposed Work: Cold-rolled, cold-finished, cold-drawn, stretcher leveled, medium cut and otherwise produced to highest commercial standard for flatness with edges and corners sharp and true.
 3. Alloys and Temper: Unless otherwise indicated, provide specific alloy which will weld and machine properly, finish to match Architect's sample and other work in same area, indicated to have same finish. Use temper or hardness providing greatest strength and durability consistent with necessary forming, fabrication, and finishing process.
 4. Type: ANSI Type 302 or 304 (at fabricator's option), except as otherwise shown. Comply with the following general standards, with specific type, alloy heat treatment and finish required to produce specified work. Where no other finish is indicated, finish products at mill to No. 4 directional finish and protect with adhesive paper covering.
 - a. Plate: ASTM A167
 - b. Bar Stock: ASTM A276.
 - c. Tubing and Rods: ASTM A269.
 - d. Extruded Shapes: To match design profiles shown.
 5. Fasteners:
 - a. Exposed: Allen head stainless steel. Provide countersunk surfaces in plates or bars to receive fasteners.
 - b. Concealed: When concealed panel clips are used, provide finished sheet material of adequate gauge to resist oil canning or telegraphing at clip.
 - c. Welding Electrodes: Alloy and type required for strength, workability, compatibility and color match after grinding smooth and finishing. Finish welded areas to match control samples.
- B. Stainless Steel Bar Stock Wainscot Assembly:
1. Fabrication of Stainless Steel Metal Work Exposed to View: Use smooth materials free of surface blemishes.
 2. Surface Flatness and Edges for Exposed Work: Cold-rolled, cold-finished, cold-drawn, stretcher leveled, medium cut and otherwise produced to highest commercial standard for flatness with edges and corners sharp and true.
 3. Bar Stock Assembly: Weld threaded studs to bar stock at 12" O.C. and within 2" of ends. Straighten after welding if required to ensure horizontal line. Drill holes in stainless steel panel to template matching bar stock with studs. Anchor studs securely and permanently from behind panel prior to application of panel clips.

2.6 FABRICATION

- A. General: Fabricate as shown and specified; make work smooth and free from warps, buckles, squeaks, and rattles; joints light proof. No visible fastenings except as indicated. Assemble all panels with continuous rubber gasket between panels.

- B. Car Body: 14-gauge; material as specified. One (1) piece shell panels extend from floor to canopy; fabricate wall panel system (car shell and finished panels) to limit wall deflection to 1/8" when subject to a 150-pound load applied horizontally at any point on wall.
- C. Canopy: 12-gauge steel sheet; finish paint and color as selected by architect. Provide light tight baffle and hinged emergency exit.
- D. Return Panels:
 - 1. Passenger Elevators: To height of door opening, 14-gauge swing return panel with concealed hinges and operating buttons mounted integrally. Stainless steel return panel coined edges to be back cut, overbent, then returned to 90° corner. Grind bulb edge to sharp, crisp knife-like edge. Provide two 1/8" diameter holes on jamb side for lock access.
 - 2. Service and Baggage Elevators: To height of door opening, 14-gauge fixed type return panel with operating buttons mounted in separate fixture faceplate.
- E. Door Transom: 14-gauge; material as specified. If clad, use minimum 16-gauge material. One (1) piece construction with no exposed joinery.
- F. Car Doors: Flush type hollow metal, sound deadened, horizontal sliding. Provide 2 door gibs per panel. Fabrication and cladding minimum 16-gauge material. Make provisions to prevent rattling.
- G. Emergency Lighting: Provide system utilizing normal car fixtures connected to self-contained power supply located on car top; system to be capable of providing power to emergency lights for a period of six hours.
- H. Light Trough:
 - 1. General:
 - a. Design and construct fixtures in accordance with UL requirements and bearing UL label. Locate labels on fixture out of public view.
 - b. Secure removable lower reflectors or faceplates in manner which prevents accidental dropping or opening; provide safety chain.
 - c. Provide incandescent lamps and porcelain lamp sockets with brass screw shell and for lamps 30 watts and larger.
 - d. Fabricate fixture with continuous reflector. Factory assemble corner units with no visible corner seams. Provide vertical reflector ends for fixtures adjacent to walls. Provide inside reveal trim at fixture edges.
 - e. Factory mark mounting frame to indicate frame orientation with respect to lighted wall. Mount label on inside of reflector indicating proper orientation with respect to lighted wall. Color and finish vertical and canted reflectors in specular anodized aluminum, as specified herein; Architect to review reflector color and finish.
 - f. Design fixture for relamping from below without removing or opening fixture assembly.
 - g. Provide 50W R-20 lamps. Connect lamps to a Lutron N1500H dimmer or approved equal; locate dimmer on car top or as directed by Architect.
 - h. Submit LED units for approval.

2. Materials:
 - a. If steel is used, fabricate of minimum 18-gauge cold-rolled sheets. Use minimum 16-gauge where required for structural rigidity and to prevent racking, twisting, sagging or tin canning. Provide gauge and type of steel for brackets, clips, etc. for intended functions. Bonderize steel before painting.
 - b. If sheet or extruded aluminum is used, fabricate fixture parts (except reflector) from clear, anodized aluminum. Use this coating as base for painted aluminum finishes. Provide sheet aluminum alloy and thickness to provide equivalent strength and dent resistance of 18-gauge cold-rolled steel. Aluminum extrusion shall have minimum wall thickness of 0.100".
3. Paint Finish:
 - a. Unless otherwise noted finish portions of fixtures which are not visible when installed with manufacturer's standard color baked enamel or equivalent paint with minimum dry film thickness of 1½ mil. Paint portions of fixtures, which are not visible, but affect fixtures efficiency with high reflectance white paint with exception of optical aluminum reflectors.
 - b. Paint visible portions, where directed, with baked enamel or equivalent paint of minimum 1½ mil dry film thickness.
4. Reflectors:
 - a. Fabricate of high purity aluminum (99.85%) or Alzak lighting sheet blanks of sufficient gauge to be independently rigid and resistant to dents.
 - b. Finish with chemical brightening, coloring, anodizing and appropriate cleaning steps (Alzak process or equivalent). Provide surface texture, specular reflectivity, total reflectivity, image clarity and color to be selected matching Architect sample. Control finishing process to ensure no visually detectable variations exist when lighted. Reflectors with lighted visual appearances differing more than approved range not acceptable.
 - c. Finish in light silver color unless otherwise noted.
5. Wiring: Conform to UL requirements.
- I. Sound Deadening: Spray to back of cab walls; 1/8" minimum thickness.
- J. Ventilation:
 1. Elevators No. new & existing: Two-speed squirrel cage exhaust blower. Mount on canopy with flush substantially stainless steel grille.
- K. Removable Panels:
 1. General: Design with minimum joints for expansion, contraction, and installation considerations. Finish faces and edges as shown and specified.
 2. Construction: Construct panels in accordance with dimensional and design requirements indicated, details, elevations, and schedules.
 3. Workmanship: Fabricate work by skilled workmen to Architect's satisfaction. Reinforce as required to ensure rigid, secure assembly. Leave exposed surfaces free from dents, tool marks, warpage, buckle, glue, and open joints. Accurately fit joints, corners and miters. Conceal fastenings. Tighten threaded connections so threads are concealed.

4. Fastening: Except where otherwise shown, specified or directed, Contractor has option on methods of assembly and joining provided results are satisfactory with Architect. Use manufacturer's proven methods producing required standards of workmanship subject to Architect's review. Conceal fastenings.
5. Finish: Shop apply transparent finish in clean, dustproof environment. Sand lightly between coats to provide smooth, medium rubbed effect finish matching Architect's sample.
6. Assembly: Fit and assemble work in shop insofar as practicable. Mark and disassemble units which are too large for shipment to project site, retaining units in sizes as large as possible for shipment and erection.
7. Ceiling: Fabricate as indicated and specified. Provide concealed hinged, with concealed latch at side for access to emergency exit and overhead lighting. Coordinate hatch location with suspended ceiling pattern indicated.

L. Lighting:

1. General: Where fluorescent lighting is used, provide T8 lamps with electronic ballast; ballast to be energy saving, super low heat, rapid start, high power factor type Class A sound rated with UL Class P thermal protection and CBM/ETL certified. Arrange for ready replacement of lamps and ballasts.
2. Elevators No. new & existing: Type and design as shown and specified; incandescent and fluorescent lighting as detailed on drawings. Provide C.J. Lighting Co., Inc. Plainview, New York fixtures; Model No. 1930 in size as indicated on drawings.
3. LED lighting shall be submitted for approval.
4. Emergency Lighting: Provide system utilizing normal car fixtures or locate separate fixture out of public view.

2.7 ELEVATORS - NEW & EXISTING

- A. Car Body: Walls; 14-gauge steel sheet, design to accept removable panels. Clear height under canopy
- B. Front Return: Full swing type as shown. 14-gauge stainless steel, with operating buttons mounted integrally.
- C. Transom: Fixed type; same material and finish as front return. Design transom for easy access to CCTV camera through car operating panel.
- D. Car Doors: Face with stainless steel
- E. Ceiling: Custom design, as shown and specified.
- F. Lighting: Custom light trough, as shown and specified.
- G. Wall Panels: Custom stainless steel wall panels, as shown and specified.
- H. Handrail: Custom bar stock handrail, as shown.
- I. Sill: Milled stainless steel; same design as hoistway entrance sills (NEW ELEVATOR).

- J. Flooring to be consistent with design intent.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Examine supporting structure and condition under which work is to be installed. Notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Install paneling in strict compliance with manufacturer's recommendations and final shop drawings.
- C. Back prime panels surfaces to be concealed in finished work. Perform back priming immediately upon receipt at project site.
- D. Install metal work with utmost care. Use experienced, skilled mechanics accustomed to installation of custom architectural work. Assemble, fit and attach unassembled sections with concealed connections.
- E. Firmly secure panels to previously prepared grounds, furring, framing and other backings. Fit to adjacent materials carefully to not damage materials.
- F. Install paneling over wall surfaces by concealed metal clips, hangers or blind fasteners in accordance with final shop drawings.
- G. Maintain true, plumb and level alignment of paneling and trim. Maintain reveals and exposed panel terminating edges in constant line and width.
- H. Restore finish or replace panels after installation to eliminate unsatisfactory appearance determined by Architect.
- I. Structural Sealant Glazed Units:
 1. Provide face shims for all glass structurally glazed to separate glass from edges of angle frame. Located face shims opposite each other and no farther than 24" apart and no closer than 12" to a corner. Make bite of spaces; on glass a nominal 1/4" or greater.
 2. Provide continuous glazing spacers, sized and located to allow for sealant dimensions.
 3. Where joint filler is used as backup for sealants, install filler continuously to depth and shape specified by sealant manufacturer for proper application and performance of products. Apply joint filler accurately to form the joint profile shown. 4. Install bond breaker in joints as shown and wherever recommended by the sealant manufacturer to prevent bond of the sealant to surfaces where such bond might impair the Work.
 4. Prime or seal substrate in accordance with the instructions of the sealant manufacturer. Apply sealants in continuous beads without open joints, voids or air pockets so as to provide continuous seal for the entire joint length.
 5. Apply sealants to the depth and width ratios recommended by the sealant manufacturer.
 6. Refer to Appendix B: SFO Elevator Lock Standards for locks and keying for elevator locks and switches standards.

END OF SECTION 14 25 00

SECTION 14 26 00 – HOISTWAY ENTRANCES

PART 1 – – GENERAL

1.1 SUMMARY

- A. General: Provide hoistway entrances, complete, as shown and specified per Contract Documents.
- B. Other Applicable Sections: Following apply to Work under this Section.
 - 1. Section 14 21 00 – ELECTRIC TRACTION ELEVATORS
 - 2. Section 14 25 00 – ELEVATOR CARS

1.2 REFERENCES

- A. Comply with the following:
 - 1. SFO Standards
 - 2. Underwriters Laboratories Inc. (UL): Building Materials Directory. Materials tested, labeled and inspected by Warnock Hersey International are acceptable upon approval of authorities.
 - 3. American Society for Testing and Materials (ASTM)

1.3 DESIGNATIONS

- A. General: Provide braille and Arabic indications as shown and specified; submit samples.
- B. Braille/Arabic Indications: Provide separate metal plates or numerals as shown and specified; mounted with concealed mechanical fastenings. Plate indications to be mounted flush with jamb face, provided with steel back support plate, and mounted with hairline joints between edge of plate and jamb cutout; background of plate to be painted in epoxy paint with color as directed by Architect.
 - 1. Stainless Steel Entrance Frames: Provide separate stainless steel Arabic numerals and pin mounted braille; finish to be blackened stainless steel. Location, design, finish, and configuration, as directed and shown on drawings.
 - 2. Painted Finish Entrance Frames: Provide cast white silicon bronze metal plates; finish, size and configuration as directed by Architect and shown on drawings.
- C. Caduceus Symbol: Provide separate white silicon bronze metal plates mounted with concealed mechanical fastenings; mount flush with hairline joints. Provide of same design, finish, color and mounting as braille plate indications on jambs.

1.4 SUBMITTALS

- A. Samples: Submit the following samples in accordance with section pertaining to samples.
 - 1. Arabic Numerals and Pin Braille: Provide sample with floor numeral Number 1 and braille pin symbol representing those to be applied to entrance jamb; mount on stainless steel plate. Include call button and arrange button, numeral and braille matching that being provided in car.
 - 2. Stainless Steel Jambs:

- a. Provide 12" length showing finish jamb edge and profile for conventional square jamb design.
 - b. Provide 24" x 24" sample showing custom design plate jamb and flush transom design. Sample to show junction at side and head jamb including section of transom panel.
 - c. Provide 24" x 24" sample showing custom design plate jamb. Sample to show junction at side and head jamb.
 - d. Provide 24" x 24" sample showing typical prime finish jamb. Sample to show junction at side and head jamb.
- B. Shop Drawings: Submit shop drawings for each condition. Include plans, sections, and elevations at $\frac{1}{2}" = 1'$ scale, and detail sections at $6" = 1'$ scale. Show arrangement, alignment, jointing, anchorage and accessory items; specify finishes.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. As manufactured by the elevator manufacturer, one of the following, or approved equal.
 - 1. Hauenstein and Burmeister, Inc.
 - 2. Tyler Elevator Products

2.2 MATERIALS

- A. Steel Sheet: ASTM A366; uncoated, pickled, free from defects; stretcher leveled for 18-gauge and lighter.
- B. Sound Deadener: 3M's Coating EC1000, Presstite's No. 105A, Vibradamp Corp.'s No. 111, or approved equal; asphaltic based compound for spray application; black.
- C. Stainless Steel:
 - 1. Sheet Steel: ASTM A167, Type 302 or 304.
 - 2. Bar Stock: ASTM A276, Type 302 or 304.
- D. Steel: ASTM A36. HOISTWAY ENTRANCES 14260-2.

2.3 FINISHES

- A. Steel Sheet:
 - 1. Shop Prime: Clean of foreign substances. Apply baked on coat of mineral filler and primer; sand each coat smooth.
 - 2. Finish Paint: 3 coats low sheen baked enamel; sand each coat smooth; color as selected.
- B. Stainless Steel: No. 4 satin long grain finish, unless otherwise specified; provide with graining as shown and directed by Architect.
- C. Touch-Up; Painted Surfaces.
 - 1. General: Field touch-up abraded and damaged surfaces; use same paint as factory.

- 2. Baked Enamel Finish: No touch-up permitted; refinish whole panel.
- D. Braille/Arabic Indications: Blackened stainless steel numerals and pin braille as specified; design, color, and finish to match sample in Architects office.

2.4 EQUIPMENT

- A. General: Provide entrance assemblies bearing 1½ hour UL label. Paint all exposed ferrous metal black.
- B. Unit Frames:
 - 1. General: Fabricate entrance frames from 14-gauge material to form one-piece unit frame. Apply effective sound deadening material to inside of frame. Construct side and head jambs in one-piece.
 - 2. Subframe Construction: Provide shop prime finish entrance subframes with bolted construction and plate cladded; plate side and head jambs to be flush. Subframe condition to be wider and higher than clear opening to provide a finished opening sized as shown; provide complete frame assembly including finished plate cladding as shown on drawings. Stainless steel plate entrances to have directional pattern at junction of side and head jamb forming 45° angle at intersection of graining.
 - 3. Bolted Construction: Provide 2" wide side and head jambs with bolted construction.
- C. Doors: Flush type door panels without visible astragal or retainer, with doors in closed position, hollow metal type construction; minimum 16-gauge steel sheet construction with 2 removable gibs per panel. Provide sight guards of same material and finish as door panels. Where facing is applied to door panels, provide minimum 16-gauge thickness.
- D. Transom Hall Lantern: Provide design with hall lantern as an integral part, as shown on drawings.
- E. Struts and Headers: Provide for support of entrances and related hardware.
- F. Fascia, Toe Guards, Dust and Hanger Covers: Minimum 16-gauge steel sheet. Hanger covers extend full width of door track; section above door removable from within car.
- G. Sills: Provide full width of hoistway with machined grooves. Design car and hoistway sills of matching pattern. Visible fasteners not permitted.
- H. Access Switches: Provide at top and bottom floor served for each elevator; location in jamb, design, and configuration as shown and directed by Architect. For all entrances with stainless steel finish provide key switch lock only without bezel; engrave graphics directly to entrance jamb. For prime steel entrances provide manufacturers standard bezel. Key switch and bezel mounted flush with finished face of entrance jamb. Refer to Appendix B: SFO Elevator Lock Standards for locks and keying for elevator locks and switches standards.

PART 3 – – EXECUTION

3.1 INSTALLATION

- A. General: As specified under Section 14 21 00 pertaining to Electric Traction Elevators.

- B. Verification of Conditions: Examine elevator areas to receive Work for compliance with requirements for installation tolerances and other conditions affecting performance. Examine hoistway openings, pits, overheads, and machine rooms as constructed and verify critical dimensions; examine supporting structure and other conditions under which elevator Work is to be installed.

3.2 ENTRANCE SCHEDULE

- A. Elevators No. EL new
 - 1. Frames: Stainless steel
 - 2. Doors: Stainless steel
 - 3. Transom/Lantern: Stainless steel
 - 4. Sills: Milled stainless steel (NEW ELEVATOR)
 - 5. Sill Extensions: Milled stainless steel (NEW ELEVATOR)
 - 6. Construction: Subframes with plate jambs. (NEW ELEVATOR)

3.3 MAINTENANCE SERVICE

- A. Submit a one (1) year full maintenance plan or duration determined by project team.
- B. Submit OEM (Original Equipment Manufacturer) recommended maintenance in compliance with the current code and approved by SFO's Mechanical Maintenance Department. Bid documents shall ensure that asset data and maintenance schedules are properly entered into the Airport's asset maintenance management system (MAINSAVER).
- C. Inform SFO Duty Managers' Office at Tel 650-821-5222 when contemplating equipment removal and/or reentry into service. Log all the repair record.
- D. Perform emergency service, 24/7, that is: 24 hours, 7 days during normal working hours and after hours, with response time of one (1) hour or less.

END OF SECTION 14 26 00

SECTION 14 31 00 – ESCALATORS

PART 1 – – GENERAL

1.1 SUMMARY

- A. General: Fabricate and install escalators complete inclusive of escalator truss, and interface with fascias and ceilings, as shown and specified per Contract Documents.
- B. Dimensional Design: Escalator well ways have been sized to show a general arrangement of the equipment. Structural steel and floor openings will be altered, if necessary, to accommodate manufacturer's standard dimensions if different from what is shown in the Contract Documents.
- C. Related Sections:
 - 1. Supports: As shown on drawings, to carry structural loads imposed by escalator equipment.
 - 2. Power Feeders: To terminals on controllers, including main-line disconnect switch located in the upper end of the truss; three phase.
 - 3. Lighting and Duplex Receptacles: In truss at upper and lower ends.
 - 4. Covering: For exterior of escalators beyond edges of deck covers, including covering for truss and soffit; assume the covering and mounting hardware has a weight of 10 pounds per square foot.
 - 5. Conduit: From upper end of truss to locations of indicator and control panels.
 - 6. Floor Openings: With pits and truss supports at upper and lower ends only, including bearing plates in concrete construction.

1.2 REFERENCES

- A. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and Municipal authorities having jurisdiction.
 - 1. American Society of Mechanical Engineers (ASME) A17.1 Safety Code for Elevators and Escalators
 - 2. California Code of Regulations (CCR) Title 8 Elevator Safety Orders
 - 3. Americans with Disabilities Act (ADA)
 - 4. American National Standards Institute (ANSI)
 - 5. California Building Code (CBC)
 - 6. Underwriters Laboratories Inc. (UL): Building Materials Directory. Materials tested, labeled and inspected by Warnock Hersey International are acceptable upon approval of authorities.
 - 7. American Society for Testing and Materials (ASTM)
 - 8. American Welding Society (AWS)

1.3 SYSTEM DESCRIPTION

A. Design Criteria:

1. Codes: Escalator systems to be designed in accordance with ANSI A17.1 and CCR Title 8, unless specified otherwise. In the case of conflicts between codes, regulations, or standards the most stringent requirement is to take precedence, unless it conflicts with State or Local code requirements.
2. Design: Escalator design and installation to be the manufacturer's standard-duty heavy duty for commercial applications in accordance with one of the following, or approved equal.
 - a. KONE – ECO3000HD
 - b. Mitsubishi – Z-HD
 - c. Otis – 510 NTE
 - d. Schindler – 9300AE-TR
 - e. ThyssenKrupp- Tugela
3. Operation: Provide system with smooth operation free from jars and bumps.
4. Contract Speed: Provide manufacturers standard operating speed; 100 fpm. Operate within 3% of normal speed under any loading condition.
5. Equipment: Operate at plus or minus 10% of normal feeder voltage and plus or minus 3% of feeder frequency without damage or interruption of escalator service. Include protective devices to prevent damage on over or under voltage conditions, loss of phase, or reverse of phase.

B. Sound Control:

1. Noise: At ambient temperature; do not exceed 58 Db operating noise of escalators at a point 42" above any portion thereof.
2. Vibration: Escalators to be designed for a maximum velocity reading of 0.40" per second.
3. Wiring: Provide flexible power connections to all isolated equipment; use Seal-tight or approved equal.

1.4 SUBMITTALS

- A. Product Data: Provide Manufacturer's specifications, catalog cuts or renderings of items exposed to public view; refer to section pertaining to Submittals.
- B. Samples: Provide samples for all materials and finishes exposed to public view; 12" x 12" panels or 24" lengths, as applicable. Architects review to establish and control criteria for graining, color, texture, workmanship, and joint tolerances. Other requirements are Contractor's responsibility. Submit additional samples as required to complete Architect's review and selection.
- C. Shop Drawings:
 1. General: Complete shop and erection drawings of following; additional if specifically requested. Initial submittal to be complete, including layouts, all operating fixtures, hoistway entrances, car interior finishes and design data information.
 2. Layouts: Provide plan and section of hoistways, pits, and machinery spaces in 1/2" scale; indicate required clearances around equipment. Provide details in 1 1/2" or 3" scale. Include static and

dynamic loads imposed on building structure. Include details of equipment isolation; provide details in 3" scale.

3. Data: Provide machine room heat release, diversity factor and power requirements on shop drawings or on separate data sheets.

D. Record Documents:

1. General: Submit complete sets of record documents with all changes made during installation of the Work so as to represent a complete set of As-Installed documents.
2. Shop Drawings: Complete As-Installed shop and erection drawings.
3. Wiring Diagrams: One-line diagrams, control diagrams for each system explaining operation, and with complete referencing system between sheets. Show component location within system, terminals with numbers, connection between components, and conductor identification.
4. Maintenance and Operating Manuals: Maintenance and operating instructions, including parts lists, for each escalator system. Assemble manuals for component parts into single binders and identify for each group or escalator.
5. Use asset inventory sheets to use in Asset Maintenance Management Program MAINSAVER.

1.5 QUALITY ASSURANCE

- A. Certifications: Obtain and pay for necessary inspection certificates from governing authorities.
- B. Pre-Engineering Conference: Prior to commencement of work, schedule a meeting at mutually agreeable time to review methods and procedure to be used to achieve design and Performance Requirements. Architect, Architect's Consultants, Structural Engineer, Contractor, Contractor's Field Superintendent, and Escalator Contractor's Engineer(s) and Field Superintendent to attend meeting.

1.6 PERFORMANCE REQUIREMENTS

- A. Wind Loads – Structural Design Basis: Importance Factor: See Structural Design Basis (Sheet S0.1.1).
- B. Seismic Design – Structural Design Basis: Importance Factor: See Structural Design Basis (Sheet S0.1.1).
- C. Live Loads – Structural Design Basis: Importance Factor: See Structural Design Basis (Sheet S0.1.1).

PART 2 – – PRODUCTS

2.1 MANUFACTURERS

- A. Escalator Systems: One of the following manufacturers, or approved equal.
 1. KONE Elevator Company
 2. Mitsubishi Elevator Company
 3. Otis Elevator Company
 4. Schindler Elevator Company
 5. ThyssenKrupp Elevator Company

2.2 EQUIPMENT

- A. Escalator Schedule: Refer to Drawings and Specifications; drawings take precedence over the following list, which is intended as a general description of the escalator characteristics.
- B. Escalator No. ES

Size:	40" Step Width
Step Speed:	100 FPM
Floors Served:	TBD
Balustrade:	Glass
Number of Flat Steps:	TBD

2.3 MATERIALS

- A. Aluminum: Controlled alloy and temper best suited to produce specified finish.
- B. Glass: Clear tempered with beveled edges; Z97.1.
- C. Steel Sheet: ASTM A366; uncoated, pickled, free from defects.
- D. Sound Deadener: 3M's Coating EC-1000, Presstite's No. 105A, Vibradamp Corp's. No. 111, or approved equal; asphaltic based compound for spray application; black.
- E. Stainless Steel: ASTM A167, Type 302 or 304.
- F. Steel: ASTM A36.

2.4 FINISHES

- A. Aluminum: Controlled alloy and temper best suited to produce specified finish; AA M12 non-specular gloss fabricated.
- B. Machinery, Equipment, and Steel Sheet: Degrease and shop paint; manufacturer's standard rust-inhibiting primer. Paint equipment black.
- C. Stainless Steel: No. 4 satin long grain finish, unless otherwise specified.

2.5 MACHINE EQUIPMENT

- A. Drive Machine: Drive machine specially designed for escalator service; provide with accurately machined gears; worm and gear or helical gear type. Connect main drive shaft by toothed gearing, coupling, or chain. Provide vibration isolation, of an approved type, which effectively prevents transmission of machine vibration to escalator steps and building structure.
- B. Drive Motor: Provide motor(s) which drives only one escalator. Motor to be alternate current induction type designed to develop high starting torque with low starting current. Motor to be moderate speed, rated for 700 °C temperature rise Class F, and for continuous service.
- C. Brake: Provide an electrically released and mechanically or magnetically applied brake per Code. The Service and auxiliary brake to have a deceleration rate of not more than 3' per second squared. Design

for a maximum accumulated static and dynamic load for the total number of exposed steps on the incline, in accordance with ANSI A17.1.

- D. **Controller:** Provide enclosed controller panels with ventilated cabinet and hinged or removable doors, located inside truss. Controller unit to be light weight for easy removal by person or provide means for mechanical assistance to remove controller from pit area. Provide a microcomputer based control system to perform all functions of escalator operation and safety control. Include hardware and software required to connect, transfer, interrupt power, and protect motors against overloading. Software design to allow for easy adjustment, reconfiguration and alteration of escalator performance parameters through diagnostic tool, or onboard function keys or key board. All control system and drive components containing memory or sensitive components to be properly shielded from line pollution, electrical spikes and brown outs to prevent damage to the equipment. Provide a remote control device cord mounted with push button controls for maintenance; direction switch to be key type. System to accept alterations, adjustments and reprogramming through diagnostic device with minimum down time. As a part of the complete system provide all tools and devices necessary to adjust, reconfigure and maintain the systems, components, and devices. Tools to provide Ownership the ability to service, adjust, test and maintain the equipment.

2.6 OPERATING AND SAFETY DEVICES

- A. **General:** Provide safety devices including the following and others as may be included in applicable safety codes specified. Switches to be self-resetting and control circuits arranged so that after a switch is tripped it will be impossible to start escalator until safety switch or switches are reset.
- B. **Starting Switches:** Provide spring return type key operated starting switches for manual starting, located at landings so all the steps are within sight. Refer to Appendix B: SFO Elevator Lock Standards for locks and keying for elevator locks and switches standards.
- C. **Emergency Stop Button and Starting Switch:** Provide emergency stop button and starting switch at the lower and upper newel ends in a single housing; material and finish to match adjacent finish. Emergency stop button designated red and protected against accidental contact; cover to be unlocked and readily removable for access. Cover to be marked EMERGENCY STOP; MOVE (SLIDE/LIFT) COVER; PUSH BUTTON. Letters shall be minimum ½" high for EMERGENCY STOP AND 3/16" for other wording. Function and operating positions of switches and buttons to be identified with engraved characters which are visible from the standing position. Starting switch to be spring return type and emergency stop button to be push type. Refer to Appendix B: SFO Elevator Lock Standards for locks and keying for elevator locks and switches standards. To submit location for approval.
- D. **Governor:** Provide speed governor to interrupt power to the drive machine in the event the speed of the steps exceeds allowable limits per code; governor to be manual reset type.
- E. **Broken Step Chain Device:** Provide a broken step chain device which causes interruption of power to the drive machine if a step chain breaks; device to be manual reset type.
- F. **Broken Drive Chain Device:** Provide a broken drive chain device which causes application of the brake on the main drive shaft and stops the escalator if the drive chain parts; device to be manual reset type.
- G. **Machine Area Stop Switch:** Provide a machine area stop switch, which causes interruption of power to the drive machine and brake, where access is provided.

- H. Reversal Device: Provide a reversal stop device which causes interruption of power at the drive machine motor and brake in the case of accidental reversal of travel in the up direction; device to be manual reset type.
- I. Up-Thrust Device: Provide a step up-thrust device which causes interruption of the power at the drive machine motor and brake should a step be dislodged against the up-thrust track at the lower curve.
- J. Step Level Device: Provide a step level device located at the top and bottom of the escalator. Device to detect step movement displacement of 1/8" or greater at the riser end at either side of the step. When activated, device causes escalator to stop prior to the step entering the comb plate; device to be manual reset type.
- K. Drive Connector Device: Provide a device which applies the brake in the event the drive motor becomes disconnected from the gear box, provided the drive motor is attached by means other than a continuous shaft, coupling or toothed gearing; device to be manual reset type.
- L. Handrail Speed Monitoring Device: Provide a handrail speed monitoring device that causes activation of the alarm whenever the speed of either handrail deviates from the step speed by more than 15%. Device to interrupt power to the drive machine motor and brake in the event over speeding continues for more than 2 seconds; device to be manual reset type.
- M. Handrail Switch: Provide a handrail entry device at each newel. Operation to be in the entry direction only. Device to be manual reset type. The device interrupts the power to the drive machine motor and brake if either, an object becomes caught between the handrail and the guard, or an object approaches the area between the handrail and the guard.
- N. Missing Step Device: Provide a missing step device that detects a missing step and stops the escalator prior to the gap from the missing step exiting the comb plate; device to be manual reset type.
- O. Comb-Step Device: Provide a comb-step impact device; device to be manual reset type. The device interrupts the power to the drive machine motor and brake if either, a horizontal force in the direction of travel is applied exceeding 112 lb/ft at either side or exceeding 225 lb/ft at the center of the front edge of the comb plate, or a resultant vertical force in the upward direction is applied exceeding 150 lb/ft at the center of the front of the comb plate.
- P. Demarcation Lights: Provide green step demarcation lights located below the step at the lower and upper landing; three fluorescent lamp fixtures as a minimum at each landing. Arrange lamp fixtures parallel to the comb plate (leading edge) with the first lamp located directly below the teeth line. Space lamps accordingly between the side edges of the steps and the skirt panel. Lights to be UL labeled.
- Q. Skirt Obstruction Device: Provide skirt obstruction devices which cause interruption of the power if an object is accidentally engaged between the step and skirt, as the step approaches the comb plate.
- R. Fault Finders: Provide a suitable electronic fault finding system with memory for each escalator to indicate source of trouble, should there be a failure of any components. Fault finders to be readily accessible and separately identify each safety device in case of failure. Provide means to remotely monitor all functions of the fault finder through a standard RJ11 connector.
- S. Remote Monitoring: Provide an integrated control system that continuously monitors all escalator system functions. Should the system detect a fault has occurred, the control system automatically transmits a signal via a built-in modem directly to the escalator service mechanic or local escalator

service company office for an immediate response. System responses to faults including but not limited to alarm bell, door lock, door safety system, earthquake detector, limit switch, low oil, etc. Modem device to utilize a conventional phone line; RJ11 or RJ55 connection. Ensure escalator alarm system is tied into existing Building Automation System.

2.7 WIRING

- A. General: Use only copper conductors; run in metal conduit or galvanized duct. Provide 10% spare conductors in conduit, duct and wire runs. No splices in wiring; connect wiring directly to terminal blocks in control cabinets or junction boxes.
- B. Work Light and Plug Receptacles: Provide in machine and pit areas; include lamp guards.
- C. Conduit: Where provided use EMT type conduit. Include flexible conduit to sound isolated equipment and components.

2.8 WELLWAY EQUIPMENT

- A. Truss: Design and construct from structural steel to safely carry entire load of moving stairway including parts, full capacity load, weight of exterior balustrade, truss coverings, and soffits as shown. Provide enclosure as required by code. Truss design to be parallel with ceiling and incline; radius truss design at upper transition point is unacceptable. Locate truss supports to suit structural conditions at upper and lower ends only. Provide seismic connection at lower end of truss to allow longitudinal movement of truss. Slip connection at accommodate movement as shown on structural drawings.
- B. Drip Pans: Provide of oil tight construction beneath truss along its entire length. Extend pan full width of truss and be of smooth construction to collect oil and dirt droppings.
- C. Tracks: Fabricate from steel, reinforced and rigidly mounted to truss to ensure smooth finished track surface; install and support to assure proper alignment and smooth operation of running gear under all conditions; maximum spacing not to exceed 4' between track supports.
- D. Step Chains: High grade steel links with hardened pins connecting adjacent steps and arranged to distribute load evenly over engaged drive sprockets. Synthetic composition or rubber rollers with sealed ball bearings to provide a continuous chain design which permits inspection and operation while running without steps in place.
- E. Steps: Steel or aluminum construction adequately reinforced to maintain alignment under maximum eccentric loading conditions and sufficiently fastened to the drive chain or link axles. Provide spray-on or applied sound reducing material on underside of each step. Step rollers shall have hermetically sealed ball bearings and be tired with polyurethane tires which prevent flat spots. Treads and riser to be cleated die cast aluminum. Step tread to be painted black and sand exposed cleat faces to a natural finish. The entire step assembly shall be treated with not less than one coat of zinc chromate primer and one coat of aluminum enamel for corrosion resistance. Face of riser shall constantly mesh with adjacent steps. Entire step shall be removable from unit without disturbance of balustrade or step chains.
- F. Handrails: Provide handrails manufactured by Escalator Handrail Company, or approved equal. Handrails to be laminated canvas and rubber construction running on brass, bronze, aluminum or steel guides fastened to and matching curvature of balustrade. Uses of nylon impregnated with molybdenum disulfide guides are acceptable. Laminated type shall be spliced and vulcanized with inconspicuous smooth joint. The handrail color shall be black. Provide guards per code.

G. Balustrade:

1. General: Extended newel type balustrades without miters or angular corners at both ends of escalator. Deck end to blend smoothly over an approximate distance of 24" from its full width down to the width of the handrail guide. Make certain portions removable to permit access for lubrication and adjustments.
2. Design: Transparent tempered glass minimum 3/8" thick; glass in accordance with ANSI Z97.1 requirements. Glass to be cantilevered structural type without mullions; provide with vertical joints; locate joints to align with exterior architectural treatment as shown on drawings. Panel size and configuration between working points and at ends as directed by Architect and shown on drawings.
3. Decking: Fabricate from stainless steel to form flat and even surfaces with concealed fastenings. Support with minimum 14-gauge material unless adequately reinforced to resist movement. Reinforce decking to resist denting. Panel joints to align with glass module. Decking to be custom designed to accommodate edge return detail shown on drawings.
4. Skirt Panels: Fabricate from minimum 14-gauge steel construction, reinforced to resist denting. Provide positive adjustment maintaining a uniform clearance to step treads of not more than 1/8". Extend beyond comb plates and wrap around base of newel. Finish skirt panels with manufacturers standard finish.
5. Deck Edge Return: Provide edge return assembly where decks meet architectural finishes. Provide custom edge return on outside edge of escalator decks; design and configuration as shown on architectural drawings and directed by Architect.
6. Barricades: Fabricate from material as shown on drawings. Provide barricades and fasteners as shown on drawings, and as directed by Architect.

- H. Signs: Provide Hold Handrail and Warning signs at each landing. Signs to be approximately 4" wide x 7½" long and include all code required graphics. Warning sign to picture a person holding the hand of a child and using the handrail of the escalator; include appropriate verbiage. Warning sign to use International NO sign and include No Running, No Sitting On Handrail, No Bag Cars or Strollers, No Sitting On Steps, No Bare Feet, and No Loose Laces. Design, finish, and graphics, as directed by Architect.

2.9 LANDINGS

- A. Braille and Arabic Indications: Provide separate cast metal plates mounted with concealed mechanical fastenings; mount flush with hairline joints. Layout, arrangement, and configuration as directed by Architect. Background of indications painted selected color in epoxy paint.
- B. Comb plates: Provide die cast aluminum comb plates with non-slip surface and removable tooth sections at intersection of steps and comb plate; provide with powder coated OSHA safety yellow finish. Design to allow for not less than three or more than seven sections per comb plate assembly.
- C. Landing Plates: Provide of finish matching steps, to cover entire area of landings within the outline of the truss and supported on truss. Provide stainless steel trim frame 1/8" wide around outside of floor plate; face to align with floor plate. Fabricate plates of ribbed aluminum with non-slip surfaces, and in sections of a size and weight capable of being handled easily by one person.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine escalator areas to receive Work for compliance with requirements for installation tolerances and other conditions affecting performance. Examine well way openings and pits as constructed and verify critical dimensions; examine supporting structure and other conditions under which escalator Work is to be installed.
- B. Installation: Remedy conditions detrimental to the proper and timely completion of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Field Measurements: Verify dimensions before proceeding with Work. Obtain field measurements for Work accurately fitted to other construction.
- D. Documentation: Prepare a written report, endorsed by the Escalator Contractor, listing dimensional discrepancies and conditions detrimental to performance or indicating that dimensions and conditions were found to be unsatisfactory

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions, and per requirements of regulatory agencies. Finished work strong, rigid, neat in appearance and free from defects. Make plain surfaces smooth and free from warps and buckles; apply molded members straight and true; make connections between various members tight to eliminate possible vibrations.
- B. Exposed Work: Carefully flush fit in neat first-class workmanlike manner; securely fasten by heavy metal reinforcements on back. After making joints, dress, if necessary; leave no construction marks. Make joints neat and as close as possible at joints between removable and fixed portions.
- C. Welded Construction: Provide welded connections for installing escalator Work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- D. Lubrication: Lubricate operating parts of the system as recommended by the manufacturer.
- E. Alignment: Coordinate installation of truss for accurate alignment with building architecture.
- F. Manufacturer's Nameplates: Including trademarks and other identifying symbols; not permitted on surfaces visible to public.
- G. Graphics: Engrave on fixtures when visible to public; Helvetica Medium, unless otherwise directed.
- H. Fasteners: Not permitted on surfaces exposed to public view, except as specified. Where specified and shown, fasteners exposed to public view to be #10-32 tamper resistant Security Torx type; material and finish to match adjacent surface.
- I. Key Switches: All key switches to be MEDECO type, keyed as directed. Refer to Appendix B: SFO Elevator Lock Standards for locks and keying for elevator locks and switches standards. Provide separate key for each switch unless otherwise specified.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of the escalator installation and before permitting use, either temporary or permanent, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.
- B. Tests:
 - 1. General: Provide required personnel, test instruments and equipment to assist Owner, Architect, and Consultants in the demonstration of the equipment.
 - 2. Vibration: Using a Bruel and Kjaer Model 2516 Integrating Vibration Meter, or approved equal, measure vibration velocity along the entire run of the exposed travel of the steps. Provide printed recordings for each escalator.
- C. Inspections: Assist Owner, Architect, and Consultants in making inspections to assure workmanship and equipment comply with Contract Documents.
- D. Correction: Replace or remedy defects and discrepancies at no cost to Owner.
- E. Protection: Protect finished surfaces until Substantial Completion; replace damaged material.

3.4 DEMONSTRATION

- A. General: Manufacturer's factory-authorized service representative to train Owner's personnel in the operation of the escalator systems. Refer to Division 1 Section.
- B. Equipment: Check operation of each escalator with Owner's personnel present and before Substantial Completion. Determine that operational systems and devices are functioning properly.
- C. Instruction: Instruct Owner's personnel in proper use, maintenance, adjustment, and repair of each system.

3.5 MAINTENANCE SERVICE

- A. Submit a one (1) year full maintenance plan or duration determined by project team.
- B. Submit OEM (Original Equipment Manufacturer) recommended maintenance in compliance with the current code and approved by SFO's Mechanical Maintenance Department. Bid documents shall ensure that asset data and maintenance schedules are properly entered into the Airport's asset maintenance management system (MAINSAYER).
- C. Inform SFO Duty Managers' Office at Tel 650-821-5222 when contemplating equipment removal and/or reentry into service. Log all the repair record.
- D. Perform emergency service, 24/7, that is: 24 hours, 7 days during normal working hours and after hours, with response time of one (1) hour or less.

END OF SECTION 14 31 00

SECTION 14 32 00 – MOVING WALKS

PART 1 – – GENERAL

1.1 SUMMARY

- A. General: Supply and install heavy duty moving walks that are designed for traffic-loading conditions that are heavier than that of standard commercial duty requirement to fit within the existing floor opening.
- B. Dimensional Design: Manufacturer to design system to fit within the existing floor opening (For Modernization) and new machine decking floor plates must level with the existing finished floor. Moving walk design shall include the stainless steel covering along the entire exterior run of the moving walk, pit and truss supports of both ends, including bearing support along the run of the moving walk.

1.2 SYSTEM DESCRIPTION

- A. Design Criteria: Moving Walk systems to be designed in accordance with current ASME A17.1 and CCR Title 8, unless specified otherwise. In the case of conflicts between codes, regulations, or standards the most stringent requirement is to take precedence, unless it conflicts with State or Local code requirements.
- B. Operation: Provide system with smooth operation free from jars and bumps
- C. Contract Speed: Provide variable speed moving walk with proximity sensors for traffic detection subject to the following conditions:
 - 1. Provide means to isolate and by-pass the sleep mode when not in use.
 - 2. The moving walk controller shall be arranged so that the rate of acceleration and deceleration shall not exceed more than one foot (1') per second square (0.3 m per second square) when transitioning between speeds.
 - 3. Failure of a single proximity sensor, including its associated circuitry shall cause the moving walk to revert to its normal operating speed at an acceleration of not more than one foot (1') per sec. square.
 - 4. Automatic deceleration shall not occur before a period of time has elapsed since the last passenger detection that is less than three times the time it takes a passenger to ride from one landing to the other landing.
 - 5. Detection of any passenger shall cause the moving walk to reach full speed of 100 ft/min. before a passenger walking at 4½" ft/s reaches the comb plate.
 - 6. The passenger detection means must detect someone before they come within 6¾' of the moving walk comb plate teeth.
 - 7. Detection of any passenger approaching against the direction of moving walk travel shall cause the moving walk to reach full speed before a passenger, walking at 4½ ft/sec. reaches the comb plate and cause the moving walk alarm to sound. The alarm shall sound in three pulse.
 - 8. The minimum speed of the escalator shall not be less than 10 ft/min.

9. There shall be a minimum of two means of detecting passenger at each end of the moving walk for redundancy. Coordinate the location and method of mounting with the SFO Architect.
- D. Sound Control: The moving walk noise level shall not exceed 55 DB when measured at a height of 3' above any point of the escalator.
- E. Vibration: Moving walk to be designed for a maximum velocity reading of 0.40" per second.

1.3 SUBMITTALS

- A. Product Data: Provide Manufacturer's specifications, catalog cuts or renderings of items exposed to public view.
- B. Samples: Provide samples for all materials and finishes exposed to public view; 12" x 12" panels or 24" lengths, as applicable. Architects review to establish and control criteria for graining, color, texture, workmanship, and joint tolerances. Other requirements are Contractor's responsibility. Submit additional samples as required to complete Architect's review and selection.
- C. Shop Drawings:
 1. General: Complete shop and erection drawings; additional if specifically requested.
 2. Layouts: Provide plan and section in 1/2" scale; indicate required clearances around equipment.
 3. Provide details in 1 1/2" or 3" scale.
- D. Record Documents:
 1. General: Submit complete sets of record documents with all changes made during installation of the work so as to represent a complete set of As-Build documents.
 - a. Wiring Diagram: Single line diagrams, control diagrams for each system explaining operation and with complete referencing system between sheets. Show component location within system, terminals with numbers, connection between components, and conductor identification.
 - b. OEM Manual: Maintenance and operating instruction, including parts lists, for each moving walk system. Assemble manuals for component parts into single binders.
 - c. Submit and complete asset inventory sheet supplied by SFO upon completion of the installation.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and Municipal authorities having jurisdiction.
 1. Current ASME A17.1 Safety Code and amendments for Elevators, Escalators and moving walks
 2. 2013 CCR Title 8 Elevator Safety Orders
 3. 2013 Americans with Disabilities Act (ADA)
 4. 2013 California Building Code (CBC)
 5. 2013 California Electrical Code (CEC)

- B. Certifications: Obtain and pay for necessary inspection certificates from governing authorities.
- C. Pre-Engineering Conference: Prior to commencement of work, schedule a meeting at mutually agreeable time to review methods and procedure to be used to achieve design and Performance Requirements. Architect, Architect's Consultants, Structural Engineer, Contractor, Contractor's Field Superintendent, and Moving Walk Contractor's Engineer(s) and Field Superintendent to attend meeting.

1.5 PERFORMANCE REQUIREMENTS

- A. Wind Loads – Structural Design Basis: Verify existing structure & design for the proposed Moving Walks
- B. Seismic Design – Structural Design Basis: Verify existing structure & design for the proposed Moving Walks
- C. Live Loads – Structural Design Basis: Verify existing structure & design for the proposed Moving Walks
- D. Power Supply – Check existing power supply for compatibility and code compliance with the proposed moving walks.
- E. Commencement of Work – Do not proceed with work until unsatisfactory conditions are corrected.

PART 2 – – PRODUCTS

2.1 MANUFACTURERS

- A. Qualifications: One of the following manufacturers, or approved equal or better.
- B. KONE Elevator Company
- C. Mitsubishi Elevator Company
- D. Otis Elevator Company
- E. Schindler Elevator Company
- F. ThyssenKrupp Elevator Company

2.2 EQUIPMENT

- A. Moving Walk Schedule: list is intended as a general description of the moving walk characteristic.
 1. Size: To fit into existing floor opening (For Modernization).
 2. Pallet Speed: 100 fpm
 3. Balustrade: TBD

2.3 MATERIALS

- A. Aluminum: Controlled alloy and temper best suited to produce specified finish.
- B. Stainless Steel: ASTM A167, Type 302 or 304.

- C. Steel: ASTM A36.

2.4 FINISHES

- A. Aluminum: Controlled alloy and temper best suited to produce specified finish; AA M12 non-specular gloss fabricated.
- B. Machinery, Equipment and Steel Sheet: Degrease and shop paint; manufacturer's standard rust-inhibiting primer. Paint equipment black.
- C. Stainless Steel: No. 4 satin long grain finish; unless otherwise specified.

2.5 EQUIPMENT DISPERMENT

- A. Removed Equipment: (For Modernization) Remove from the site all existing moving walks equipment, components and materials that are replaced or unused. Equipment removed from the site becomes the property of the Moving Walk Contractor, unless directed otherwise. Properly dispose of removed equipment according to environmentally sound practices.

2.6 EQUIPMENT

- A. Drive Machine: Drive machine specially designed above the standard heavy duty moving walk mounted within the moving walk pit, outside the moving walk pallets for ease of access. Provide with accurately machined gears; worm and gear or helical gear type. The complete drive unit including the brake and speed governance system must be easily accessible without removal of steps.
- B. Drive Motor: Provide motor(s) which drives only one moving walk. Provide alternating current motor designed to develop high starting torque with low starting current not more than four times as the running current. Motor rating must be above the standard commercial escalator product.
- C. Brake: Provide an electrically released and mechanically or magnetically applied brake per current Code. Design for a maximum accumulated static and dynamic load for the number of exposed steps on the incline, in accordance with ASME 17.1 2013. An auxiliary main-shaft brake shall be provided per existing Code requirement.
- D. Controller: Provide enclosed controller panels with ventilated cabinet and hinged or removable doors, located inside truss. Controller unit to be light weight for easy removal by person or provide means for mechanical assistance to remove controller from pit area.
- E. Provide a non-propriety microcomputer based control system to perform all functions of moving walk operation and safety control. Decaying circuitry, limiting access codes and hand-held plug-in units of proprietary design will not be accepted. The moving walk controller and fault diagnostic system shall include a clear text display in English to allow immediate identification of the cause of a shutdown. The display shall be located in the controller in the pit of the moving walk. Operation of the fault diagnostic system shall be possible at the display point via menus and keypads adjacent to or contained as part of the display system. All control system and drive components containing memory or sensitive components to be properly shielded from line pollution, electrical spikes and brown outs to prevent damage to the equipment. Provide connection to the SFO BAS system for continuous monitoring by the SFO.

2.7 OPERATING AND SAFETY DEVICES

- A. General: Provide safety devices including the following and others as may be included in applicable safety codes specified. Switches to be non-automatic re-setting and control circuits arranged so that after a switch is tripped it will be impossible to start moving walk until safety switch or switches are reset.
- B. Starting Switches: Provide spring return type key operated starting switches for manual starting, located at both landings so all the steps are within sight. Key must be MEDECO to match SFO keying system.
- C. Emergency Stop Button: Provide emergency stop button with audible alarm at both newel ends in a single housing with a push button type; material and finish to match adjacent finish. Emergency stop button designated red and protected against accidental contact; cover to be unlocked and readily removable for access. Cover to be marked: EMERGENCY STOP; LIFT COVER; PUSH BUTTON. Letter shall be minimum ½" high for EMERGENCY STOP and 3/16" for other wording. Submit location for approval.
- D. Governor: Provide speed governor to interrupt power to the drive machine in the event the speed of the pallets exceeds allowable limits or unintended reversal in direction per current code; governor to be manual reset type.
- E. Disconnected Motor Safety Device: If the drive motor is attached to a gear reducer by means other than a continuous shaft, mechanical coupling, or toothed gearing, a device shall be provided that will cause the electric power to be removed from the driving machine motor and brake if the motor becomes disconnected from the gear reducer; device shall be manual reset type.
- F. Broken Treadway Device: Provide a device which causes interruption of power to the drive machine if a pallet chain breaks or excessive chain stretch; device to be manual reset type.
- G. Broken Drive Chain Device: Provide a device which causes the application of the brake on the main drive shaft and stops the moving walk; device to be manual reset type.
- H. Moving Walk Pit Decking Floor Plate Switch: Provide a device which causes interruption of power to the drive machine and brake when access cover is opened or removed.
- I. Reversal Device: Provide a device which causes interruption of power at the drive machine motor and brake in the case of accidental reversal of travel in the up direction; device to be manual reset type.
- J. Missing Pallet Device: Provide a device that detect a missing pallet and stops the moving walk prior to the gap from the missing pallet exiting the comb plate; device to be manual reset type.
- K. Pallet Level Device: Provide pallet level device located at the both ends of the moving walk. Device to detect pallet movement displacement of 0.125" or greater at the riser end at either side of the step. When activated, device causes interruption of power at the drive machine and brake before the step enters the comb plate; device to be manual reset type.
- L. Comb-Step Device: Provide a comb plate impact device which causes interruption of power to the drive machine motor and brake if comb plate is moved from the normal working position when objects are lodged between the comb plate and the treads. Setting to comply with the current ASME 17.1 guidelines.
- M. Handrail Speed Monitoring Device: Provide a device which causes the interruption of power to the drive machine motor and brake if the handrail speed deviates from the moving walk pallet speed

above the allowable speed by the governing body; device to be manual reset type. Speed monitoring device must be able to program with the sleep mode device if in use.

- N. Handrail Inlet Device: Provide a device at the entrance of the handrails into the balustrades which causes the interruption of power to the drive machine motor and brake if either an object becomes caught between the handrail and the guard.
- O. Skirt Obstruction Device: Provide four devices, two at each landing which causes the interruption of the power to the drive machine and brake if an object is accidentally wedged between the step and the skirt.
- P. Demarcation Lights: Provide green pallet demarcation LED lights located below the pallets at both ends. Arrange lamp fixtures parallel to the comb plates located directly below the comb plate teeth line.
- Q. Sign: Provide Hold Handrail and other warning signs at each landing. Signs to be as large as possible but not smaller than 4" wide x 1½" long and include all code required graphics. Warning sign to use International NO sign, and include NO running, NO sitting on Handrail, NO Baggage Carts, NO strollers, NO Wheelchair, NO Walker, NO Sitting On Steps, NO Bare Feet, and NO Loose Laces.

2.8 WIRING

- A. General: Use only copper conductors: run in metal conduit or galvanized duct. Provide 10% spare conductors in conduit, duct and wire runs. No splices in wiring; connect wiring directly to terminal blocks in control cabinets or junction boxes.
- B. Work Light and Plug Receptacles: Provide in machine and pit areas; including lamp guards.
- C. Conduit: Where provided use EMT type conduit. Include flexible conduit to sound isolated equipment and components.

2.9 WELLWAY EQUIPMENT

- A. Truss: (For Modernization) Existing truss shall be retained. Existing truss shall be thoroughly cleaned from oil, grease, dirt, and debris and shall be painted with epoxy resin primer prior to installation of the replacement moving walk. Check and repair existing truss for any defect including alignment, bending and broken welds.
- B. Drip Pans: Provide of oil tight construction beneath truss along its entire length. Extend pan full width of truss and be of smooth construction to collect oil and dirt droppings.
- C. Tracks: Fabricate from steel, reinforced and rigidly mounted to existing truss to ensure smooth finished track surface; install and support to assure proper alignment and smooth operation.
- D. Step Chain: High grade steel links with hardened pins connecting adjacent steps and arranged to distribute load evenly over engage drive sprockets. The chain shall have Synthetic or neoprene roller with sealed ball bearings and with minimum dynamic load capacity of 2,200 lbs. on each link pin in order to provide a silent run of step band.
- E. Steps: The steps shall be fully die cast aluminum and provide spray-on or applied sound reducing material on underside of each step. Step risers shall be groove and inter mesh with leading edge of the adjacent step tread. Steps shall be powder-coated with a black finish. Each step shall be provided

with yellow powder-coated demarcation lines on each side adjacent to the skirt panel and at the rear edge of the step tread. Plastic demarcation line is not acceptable. Step rollers shall consist of aluminum bodies fitted sealed bearings and long-life neoprene vulcanized to the body. Entire step shall be removable from unit without disturbance of balustrade or step chain.

- F. Handrails: Provide handrails manufactured by Escalator Handrail Company or equal. Handrail shall be laminated canvas and rubber construction running on brass, bronze, aluminum or steel guides fastened to and matching curvature of balustrade. Use of nylon or plastic guide material is not acceptable. In order to reduce wear and specific strain, the handrail shall be pressed against a rubber-rimmed driving wheel by a heavy-duty cluster roller assembly only. Newel ends shall be furnished with rollers fitted with bearings to minimize handrail wear. Handrail color shall be black.
- G. Balustrade:
 1. General: Extend newel type balustrades without miters or angular corners at both ends of moving walk. Deck end shall blend smoothly over an approximate distance of 24" from its full width down to the width of the handrail guide. Balustrade finished height from the step tread shall meet the existing ASME 17.1 code requirement. Make certain portions removable to permit access for maintenance & repair.
 2. Design: Transparent tempered glass panels constructed in accordance of ANSI Z97.1 with a minimum thickness of 3/8" shall be provided. Glass to be cantilevered structural type without mullions; glass joint shall be vertical in reference to the landing's horizontal plane; locate joints to align with exterior architectural treatment. Panel size and configuration between working points and at ends as directed by SFO architect.
 3. Decking: Fabricate from sturdy AISI 304 SS to form flat and even surfaces with concealed fastening. Support with minimum 14-gauge material unless adequately reinforce to resist movement and denting. Panel joints shall align with glass module. Decking profiles on both sides of the step running line shall be parallel to the step running line and shall transition in wide arcs from horizontal to incline portions of the moving walk.
 4. Skirt Panels: Fabricate from reinforced AISE 304 brushed No. 4 SS to resist denting. Wood or composite backer reinforcement is not permitted. Skirt panels shall be designed and constructed to provide a flush transition between the skirt and inner decking above with no protruding edges. Skirt panel shall be designed and constructed to maintain a uniform clearance between the step treads to meet current ASME 17.1 Code. Extend skirt beyond comb plates and wrap around base of newel. No plastic material is permitted in any portion of the skirt including the face plate.

2.10 LANDINGS

- A. Comb Plates: Provide exchangeable die cast aluminum comb segments with non-slip surface within the entrance and exit modules of the moving walk with powdered coated yellow stripe finished. Designed comb plate teeth to accurately meshed with the step tread to meet existing code requirement. The area where the steps enter the comb plates shall be illuminated by green LED comb plate lights, installed in the skirt panel at both ends of the moving walk. Provide continuous voice messages at the end of the escalator to advice passengers on safety. Coordinate with SFO for any voice message for approval prior to activation.
- B. Landing Plates: Provide floor plates to cover the entire area of landing within the outline of the truss. Provide stainless steel trim frame of 3/16 of an inch wide around outside of floor plate. Fabricate plates of ribbed aluminum with non-slip surfaces and in sections of a size and weight capable of being

handled easily by one person. No logos or any marking of the manufacturer is permitted on the decking or any part of the escalator that is visible from outside of the escalator.

- C. Proximity Sensors: Install proximity sensors in a SS bollard to meet the minimum acceptable distance as per code from the comb plates with a horizontal SS metal tubing, extending past the newel, parallel to the balustrade on both sides. Submittal must be made prior to installation.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine moving walk areas to receive Work for compliance with requirements for installation tolerances and other conditions affecting performance. Examine openings as constructed and verify critical dimensions.
- B. Installation: Remedy conditions detrimental to the proper and timely completion of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Field Measurements: Verify dimensions before proceeding with Work. Obtain field measurements for Work accurately fitted to existing escalator truss and related components.
- D. Documentation: Prepare a written report, endorsed by the Moving Walk Contractor, listing dimensional discrepancies and conditions detrimental to performance or indicating that dimensions and conditions were found to be unsatisfactory.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions, and per requirements of regulatory agencies. Finish work neat in appearance and free from defects. Make plain surfaces smooth and free from warps and buckles; apply molded members straight and true; make connections between various members tight to eliminate possible vibrations.
- B. Exposed Work: Carefully flush fit in neat first-class workmanlike manner; securely fasten by heavy metal reinforcements on back. After making joints, dress, if necessary; leave no construction marks. Make joints neat and as close as possible at joints between removable and fixed portions.
- C. Welded Construction: Provide welded connections for installing moving walk work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- D. Manufacturer's Nameplates: Including trademarks and other identifying symbols; not permitted on surfaces visible to public.
- E. Key Switches: All key switches to be MEDECO type, keyed as directed. Provide key for each switch unless otherwise directed; include master key to operate all switches, unless restricted by code.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of the escalator installation and before permitting use, either temporary or permanent, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.

- B. Inspections: Assist Owner, Architect, and Consultants in making inspections to assure workmanship and equipment comply with Contract Documents.
- C. Correction: Replace or remedy defects and discrepancies at no cost to SFO.
- D. Protection: Protect finished surfaces until Substantial Completion; replace damaged material.

3.4 DEMONSTRATION

- A. General: Manufacturer's factory-authorized service representative to train Owner's personnel in the operation of the moving walk systems.
- B. Equipment: Check operation of each moving walk with Owner's personnel present and before Substantial completion. Determine that operational systems and devices are functioning properly.
- C. Instruction: Instruct Owner's personnel in proper use, maintenance, adjustment, and repair of each system.
- D. Spare Parts: Provide the following spare parts upon completion of the installation of the moving walks:
 1. Four (4) proximity sensors.
 2. One main motor drive
 3. One CPU board
 4. Two (2) brakes
 5. Four (4) key switches
 6. Two complete emergency stop switch assembly
 7. 25 pieces of left comb plate segment
 8. 25 pieces of right comb plate segment
 9. 50 pieces of center comb plate segment

3.5 WARRANTY

- A. The installer of moving walk shall warrant for one full year from date of acceptance against defects in materials and workmanship. Repair and replace defective work without extra cost to SFO.

3.6 MAINTENANCE SERVICE

- A. Submit a one (1) year full maintenance plan or duration determined by project team.
- B. Submit OEM (Original Equipment Manufacturer) recommended maintenance in compliance with the current code and approved by SFO's Mechanical Maintenance Department. Bid documents shall ensure that asset data and maintenance schedules are properly entered into the Airport's asset maintenance management system (MAINSAVER).
- C. Inform SFO Duty Managers' Office at Tel 650-821-5222 when contemplating equipment removal and/or reentry into service. Log all the repair record.
- D. Perform emergency service, 24/7, that is: 24 hours, 7 days during normal working hours and after hours, with response time of one (1) hour or less.

3.7 NON-PERFORMANCE OF WORK

- A. Work will be considered not to have been performed when any of the following conditions:
 - 1. Required maintenance and repairs are not being met.
 - 2. Contractor fails to respond on callback within specified time frame.

- B. In the event of non-performance of work by the Contractor, SFO shall have the right to correct the non-performance by using another contractor, or by any means it deems necessary and reasonable. Direct cost incurred by the SFO for the performance of such work shall be deducted from payments made to the Contractor.

END OF SECTION 14 32 00

APPENDIX A – MASTER LIST OF MANUFACTURERS

This section provides the Master List of Manufacturers approved by SFO for the use of Elevators, Escalators and Walkways, organized by section and subsection.

14 01 30 – ESCALATOR MODIFICATION

ESCALATOR

1. KONE Elevator Company.
2. Mitsubishi Elevator Company
3. Otis Elevator Company.
4. Schindler Elevator Company
5. ThyssenKrupp Elevator Company.
6. Approved Equal

WELLWAY EQUIPMENT HANDRAILS

1. Escalator handrail Company
2. Approved Equal

KEY SWITCHES

1. MEDECO
2. Or equal.

14 21 00 – ELECTRIC TRACTION ELEVATORS

ELECTRIC TRACTION ELEVATOR

1. KONE Elevator Company
2. Mitsubishi Elevator Company
3. Otis Elevator Company
4. Schindler Elevator Company
5. ThyssenKrupp Elevator Company
6. Approved Equal

MICROCOMPUTER BASED CONTROL SYSTEMS

1. KONE – KCM831
2. Mitsubishi – AI
3. Otis - Elevonic
4. Schindler- Miconic
5. ThyssenKrupp-Swift
6. Approved Equal

CHAINS – HOISTWAY EQUIPMENT

1. Republic Wire and Cable Co
2. Whisper-Flex, or
3. Approved Equal

DOOR PROTECTION – SAFETY DEVICE

1. JANUS
2. Approved Equal
3. KEY SWITCHES

4. MEDECO

14 24 00 – HYDRAULIC ELEVATORS

HYDRAULIC ELEVATORS

- 1. American Crescent Elevator Mfg. Corp.
- 2. Fujitec America, Inc.
- 3. KONE Inc.
- 4. Minnesota Elevator, Inc.
- 5. Mowrey Elevator Co.
- 6. Otis Elevator Co.
- 7. Schindler Elevator Corp.
- 8. Schumacher Elevator Co.
- 9. ThyssenKrupp Elevators

14 25 00 – ELEVATOR CARS

ELEVATOR CAR (including wall panel, front returns and door, ceiling and associated components)

- 1. Elevator Interiors and Design.
- 2. Hauenstein and Burmeister Inc.
- 3. Tyler Elevator Products.
- 4. Or approved equal

PARTICLEBOARD

- 1. Willamette Industries Duraflake FR.
- 2. Or approved Equal

LAMINATED GLASS

- 1. Monsanto
- 2. Starfire White translucent manufactured - Industries Santa Ana
- 3. Or approved equal

STAINLESS STEEL GRILL

- 1. Kadee Industries Cleveland, Ohio

14 26 00 - Hoistway Entrances

- 1. Hauenstein and Burmeister, Inc.
- 2. Tyler Elevator Products.
- 3. Or approved equal.

14 31 00 – ESCALATORS

ESCALATOR

- 1. KONE Elevator Company.
- 2. Mitsubishi Elevator Company
- 3. Otis Elevator Company.
- 4. Schindler Elevator Company
- 5. ThyssenKrupp Elevator Company.
- 6. Or approved equal

HANDRAILS

1. Escalator Handrail Company
2. Or approved equal

14 32 00 – MOVING WALKS

1. MOVING WALKS
2. KONE Elevator Company
3. Mitsubishi Elevator Company
4. Otis Elevator Company
5. Schindler Elevator Company
6. ThyssenKrupp Elevator Company
7. Or approved equal

KEYS

1. MEDECO
2. Or approved equal

HANDRAILS

1. Escalator Handrail Company
2. Or approved equal

KEY SWITCHES

1. MEDECO
2. Or approved equal

APPENDIX B – SFO ELEVATOR LOCK STANDARDS

MEDECO KEY SYSTEM						
PREFERRED VENDOR: MIDWEST SECURITY SUPPLY						
Switch Function	Key Removal	Contacts	Action	P/N	Keying	SFO Designation
Fire Recall-Car	Check Code	A-NO B-NO C-NO	Maintained	65W2650T-131-26-K8	B9098-2AA	ELRE
Fire Recall-Hall	Check Code	A-NO B-NO C-NO	Maintained	65W2650T-132-26-K8	B9098 2AA	ELRE
Stop Switch	A, B	A-NO/NC B-NO/NC	Maintained	65W2650T-102-26-K8	B9098 3AA	ELIS
Hoistway Access	B	A-NO/NC B-NO CONTACT C-NO/NC	Momentary	ASOO3192	6K 7103DPF	HOIS
Inspection	A, B	A-NO/NC B-NO/NC	Maintained	65W2650T-102-26-K8	6K 7103DPF	HOIS
Independent	A, B	A-NO/NC B-NO/NC	Maintained	65W2650T-102-26-K8	B9098 3AA	ELIS
Light	A, B	A-NO B-NC	Maintained	65W2650T-102-26-K8	B9098 3AA	ELIS
Fan	A, B	A-NO B-NC	Maintained	65W2650T-102-26-K8	B9098 3AA	ELIS
Service Cabinet		NONE	N/A	60W0950T-219-26-K8	B9098 3AA	ELIS
Fire Recall Cabinet		NONE	N/A	60W0350T-239-26-K8	B9098 2AA	ELRE
Escalator Switch		A-NO B-NO C-NO	Momentary	AS003192	B9098 1AA	MEEW

NOTE:

1. For Serviced Cabinet and Fire Recall Cabinet, check cam configuration for the mounting
2. For all key cylinders check mounting opening (like; "D" or Double D at what angle) for proper orientation of the key



San Francisco
International
Airport

Standards Adoption

The "Building Systems – Elevators, Escalators, Moving Walkways" Version 3.1, March 2018 standards were adopted by the Standards Committee on April 5th, 2018, and are effective immediately.

Confirmed:

A handwritten signature in black ink, consisting of several loops and a long, sweeping line extending upwards and to the right. The signature is positioned above a horizontal line.

Geoffrey W. Neumayr, Standards Committee Chair