

SECTION 14 24 00

HYDRAULIC ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes modernization of one (1) hydraulic passenger elevator, including but not limited to:
  1. All engineering, equipment, labor, and permits required to satisfactorily complete elevator modernization required by Construction Documents.
  2. Cartage and Hoisting: All required staging, hoisting and movement to, on, and from the site including new equipment, reused equipment, or dismantling and removal of existing equipment.
  3. Unless specifically identified as “Reuse,” “Retain,” or “Recondition,” provide new equipment. All retained equipment to be reconditioned to “like new” condition and shall meet all performance requirements of this specification.
  4. Hoistway, pit, and machine room barricades as required.
- B. Related work required by this section (turnkey):
  1. Hoistway and Pit
    - a. Fire caulking at pipe openings in machine rooms and hoistways.
    - b. Wall blockouts and fire rated closure for control and signal fixture boxes which penetrate walls.
    - c. Protect open hoistways and entrances during construction per OSHA Regulations.
    - d. Provide pit ladder.
    - e. Patching of lobby walls as necessary where hall stations are modified.
  2. Machine Room – Modifications as required for Code approved enclosure.
  3. Electrical Service, Conductors, and Devices
    - a. Lighting and GFCI convenience outlets in pit and machine room.
    - b. Three-phase mainline copper power feeder with true earthen grounding to terminals of each elevator controller in the machine room with protected, lockable “open” disconnecting means with auxiliary contacts to allow Elevator Contractor to electronically interlock battery power lowering unit.
    - c. Single-phase copper power feeder to each elevator controller for car lighting and exhaust blower with individual protected, lockable “open” disconnecting means located in machine room.
    - d. ~~Fire alarm initiating devices in each elevator lobby and each machine room to initiate firefighters’ return feature. Provide alarm initiating signal wiring from hoistway or machine room connection point to elevator controller terminals. Device in machine room and at top of hoistway to provide signal for general alarm and discrete signal for Phase II firefighters’ operation. All piping and wiring in public spaces to be discrete.~~
- C. Weigh the elevator prior to modernization to confirm compliance with Code requirements for added weight.

## 1.2 DEFINITIONS

- A. Terms used are defined in the latest edition of the Safety Code for Elevators and Escalators, ASME A17.1.
- B. Defective Elevator Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
- C. Reference to a device or a part of the equipment applies to the number of devices or parts required to complete the installation.
- D. Substantial Completion: The work shall be considered Substantially Complete when the last elevator has been inspected and permit issued by the State of California Elevator Division and the elevator has been put into operation for its intended use.
- E. Non-Proprietary: Systems that can be installed, adjusted, and repaired using on-board diagnostic features, and product manuals, and which do not require proprietary tools or manuals, and have unlimited access.

## 1.3 SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for the following specified components:
  - 1. Hydraulic power unit.
  - 2. Hydraulic control and rupture valve.
  - 3. Hydraulic jack.
  - 4. Door operator and related hardware.
  - 5. Microprocessor controller.
  - 6. Guide shoes.
  - 7. Signal fixtures.
  - 8. Entrance jamb floor identification plates.
- B. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating machine room layout, lobby elevations, relationships with other construction, and locations of equipment and signals.
  - 1. Include detailed drawing of hydraulic jack installation showing PVC liner and seal at pit floor.
  - 2. Include large-scale layout of car control station and hall fixtures.
  - 3. Include electrical requirements based on the speed and capacity specified to include maximum and average power demands. Design for existing electrical power supply.
  - 4. Include elevator equipment heat output for design of machine room cooling.
  - 5. Indicate any variations from existing conditions.
- C. Samples: For exposed finishes of cars, hoistway doors and frames, and signal equipment; 3-inch-square Samples of sheet materials; and 4-inch lengths of running trim members.
- D. Operation and Maintenance Data: Provide Owner's Manuals with operation and maintenance instructions to include: manufacturers contact information, manufacturer's reference and serial

numbers, operating instructions, recommended spare parts lists, maintenance recommendations and schedules.

- E. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

#### 1.4 PERMIT, TESTING, AND INSPECTION

- A. Obtain and pay for permit, license, and inspection fee necessary to complete installation.
- B. Perform test required by governing authority in accordance with procedure described in ASME A17.2 Guide for Inspection of Elevators, Escalators, and Moving Walks in the presence of Authorized Representative.
- C. Supply personnel and equipment for test and final review by Consultant, as required.

#### 1.5 DOCUMENT AND SITE VERIFICATION

- A. To discover and resolve conflicts or lack of definition which might create problems, Contractor must review Construction Documents and site conditions for compatibility with its product prior to submittal of quotation. Review existing structural, electrical provisions, and mechanical provisions for compatibility with Contractor's products. Purchaser will not pay for change to structural, mechanical, electrical, or other systems required to accommodate Contractor's equipment.
- B. Site Condition Inspection:
  - 1. Prior to beginning installation of equipment, examine hoistway and machine room areas. Verify no irregularities exist which affect execution of work specified.
  - 2. Do not proceed with installation until work in place conforms to project requirements.

#### 1.6 QUALITY ASSURANCE

- A. Compliance with Regulatory Requirements: All components and work shall comply with the most stringent applicable provisions of the following codes, laws and/or authorities, including revisions and changes in effect:
  - 1. CCR Title 8, Elevator Safety Orders.
  - 2. Guide for Inspection of Elevators, Escalators, and Moving Walks, ASME A17.2.
  - 3. National Electrical Code, NFPA 70.
  - 4. Local Fire Authority.
  - 5. Requirements of CBC and all other codes, ordinances, and laws applicable within the governing jurisdiction.
  - 6. Life Safety Code, NFPA 101.
- B. Accessibility Requirements: Comply with the Americans with Disabilities Act (ADA) and California Building Code, Title 24.

#### 1.7 DESIGN CRITERIA

- A. Provide equipment to fit within the existing spaces and structural conditions.

- B. Performance:
1. Contract Speed: within 5% of the specified speed under any loading conditions
  2. Floor-to-floor performance time: Measured from the start of doors closing at one floor until doors are  $\frac{3}{4}$  open and the car is stopped at the next successive floor in either condition under any loading condition, based on 10'-0" floor height: 17.5 seconds
  3. Door Open Time: From start of opening to fully opened: 3.1 seconds
  4. Door Close Time: From start of closing to fully closed: 4.0 seconds
  5. Door Dwell Times: Comply with accessibility requirements and provide separate adjustable timers for car and hall calls with initial settings as follows:
    - a. Hall Calls: 5.0-6.5 seconds
    - b. Car Calls: 5.0-6.5 seconds
    - c. Interrupted Door Beam: 1.0-1.5 seconds
  6. Nudging: Adjustable with initial setting of 20 seconds. If doors fail to close after the set time, doors close at reduced speed and pressure and activate nudging buzzer
  7. Leveling: Within 1/8-in. under any loading condition. Level into floor at all times, do not overrun floor and level back.
  8. Vertical Acceleration and Deceleration: Maximum 4 feet per second<sup>2</sup>. Maximum Jerk: 8 feet per second<sup>3</sup>.
- C. Operating Qualities: The Owner's Representative will judge riding quality of car and enforce the following requirements. Make all necessary adjustments.
1. Starting and stopping shall be smooth and comfortable. Slowdown, stopping and leveling shall be without jars or bumps.
    - a. Acceleration and deceleration: Maximum 2.5 ft. per second squared
    - b. Jerk: 35 feet per second cubed
    - c. Vertical Vibration: Maximum 30 mg
    - d. Horizontal Vibration: Maximum 30 mg peak-to-peak measured at full speed for full travel in both directions
  2. Full Speed Ride: Free from vibration and sway.
- D. Sound Control:
1. Vibration: Sound isolate all equipment from building structure to prevent objectionable noise and vibration transmission to occupied building spaces including; hydraulic power unit, controller, piping,
  2. Airborne Noise: Maximum acoustical output level of:
    - a. 85 dBA measured in machine room
    - b. 65 dBA measured in elevator car during all sequences of operation
    - c. 70 dBA measured in elevator lobbies
- E. Motor Control: Operate at plus or minus 10% of normal feeder voltage 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.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging.

- B. Store materials, components, and equipment off the ground, under cover, and in a dry location. Handle according to manufacturer's written recommendations to prevent damage, deterioration, or soiling.

#### 1.9 COORDINATION

- A. Coordinate installation of sleeves, block outs, and items that are embedded in concrete or masonry for elevator equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.
- B. Coordinate sequence of elevator installation with other work to avoid delaying the Work.
- C. Coordinate locations and dimensions of other work relating to the elevator including pit ladder, and electrical service, electrical outlets, lights, and switches in pits and machine rooms.

#### 1.10 WARRANTY

- A. Material and workmanship of installation shall comply in every respect with Construction Documents. Correct defective material or workmanship which develops within one year from date of Substantial Completion of all work to satisfaction of the Purchaser and Consultant at no additional cost, unless due to ordinary wear and tear, or improper use or care by Purchaser.
- B. Defective is defined to include, but not be limited to: operation or control system failures, car performance below required minimum, excessive wear, unusual deterioration, or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise, or vibration, and similar unsatisfactory conditions.
- C. Retained Equipment: Check, clean, modify, repair, or replace all retained components and parts so that each component and its parts are in like new operating condition. Retained equipment must be compatible for integration with new systems. All retained equipment shall be covered under the warranty provisions above. No proration of equipment or parts shall be allowed on preventive maintenance contract between the Contractor and Purchaser.

#### 1.11 MAINTENANCE SERVICE

- A. Warranty Maintenance:
  - 1. Provide maintenance service for a period of one year beginning at Substantial Completion.
  - 2. Warranty Maintenance costs shall not be included in the elevator contract and shall be invoiced to and paid by the Purchaser monthly as building operating expense during the warranty period. Warranty Maintenance costs shall be firm without escalation during the Warranty Period.
  - 3. The scope of maintenance service shall be as defined in the Elevator Preventive Maintenance Agreement as included with these documents.
- B. Continuing Maintenance:
  - 1. Provide continuing maintenance service beginning at the end of the Warranty Maintenance period.
  - 2. The scope of maintenance service shall be as defined in the Elevator Preventive Maintenance Agreement as included with these documents.

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## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Approved Manufacturers: Elevator equipment shall be as manufacturer by one of the following:
1. Hydraulic Machines: Boremax, EECO, ITI Hydraulink, ThyssenKrupp, Otis, Schindler.
  2. Hydraulic Jacks: Boremax, EECO, ITI Hydraulink, ThyssenKrupp.
  3. Controllers: Elevator Controls Corp., MCE, KONE, ThyssenKrupp, Otis, Schindler.
  4. Hydraulic valves: Maxton, ThyssenKrupp, EECO.
  5. Door Operators: GAL, KONE, Wittur, ThyssenKrupp, Otis, Schindler or approved equal.
  6. Signal Fixtures: EPCO, ERM, MAD, Innovation, KONE, ThyssenKrupp.
    - a. Push Buttons: Style PB-37 by Innovation Industries or approved equal.
- B. Substitutions: Include major components from the above listed manufacturers only. Substitution of products by other manufacturers will be considered by providing supporting documentation acceptable to the Consultant that the proposed substitutes are of equal or higher quality and performance characteristics than the specified products. Identify the source of all in the proposal.

### 2.2 EQUIPMENT SUMMARY

- A. Elevator Description:
- |                       |                           |
|-----------------------|---------------------------|
| 1. St. of CA ID Nos.: | 053510                    |
| 2. Capacity:          | 3000 lbs.                 |
| 3. Speed:             | 100 fpm                   |
| 4. Car Weight:        | 2500 lbs. (Per St. of CA) |
| 5. Type:              | Passenger                 |
| 6. OEM:               | Atlas Elevator            |
| 7. Installation Date: | 1971                      |
| 8. Entrance Type:     | Side Opening              |
| 9. Entrance Size:     | 3'-6" w. x 7'-0" h.       |
| 10. Floors Served:    | 1-3                       |
| 11. Stops/Openings:   | 3 in-line                 |

### 2.3 CONTROL SYSTEMS

- A. General: Provide a non-proprietary microprocessor based control system as required to perform the functions of elevator motion, car operation, and door control
1. Include sleep mode that turns car lights and fan off when there is no demand; provide adjustable time between normal operation and activation of sleep mode.
  2. 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.
  3. Stop car within 1/8" above or below the landing sill. Maintain stopping zone regardless of load in car, direction of travel, or distance between landings.

- B. Operation of Individual Elevators:
1. Include hardware necessary to protect hoist motors and door operators. Software shall control group and simplex program operations.
  2. Design the control system to accept reprogramming with no shutdown of system.
  3. Controllers containing memory equipment must be properly shielded from line feeder pollution.
  4. Elevator operation shall be simplex selective cancellation collective automatic control in accordance with the following:
    - a. The control and indicating devices and supplementary service modes to be provided, together with the basic functioning of these and of power doors, door protective devices and similar items, are detailed in the relevant paragraphs of this specification.
    - b. Car and landing calls in each direction of travel shall be answered in the order in which required floors are approached by the car, provided that the call is registered sufficiently in advance of the car's arrival to permit a stop to be made.
    - c. Provide "anti-nuisance service" whereby all car calls will be canceled if the load weighing device detects that an abnormal number of calls are registered given the number of passengers in the car. System using false call answering to accomplish this is not acceptable.
  5. Fault Diagnostic System:
    - a. Provide a diagnostic system for microprocessor systems capable of determining faults most difficult to find. It shall constantly monitor the condition of all car computers. When variances occur from the normal mode, the change or fault shall be detected, the location of the elevator, time of day, number of times fault occurred, along with fault code message shall be stored on memory. This information shall be retrievable and shall be displayed on a CRT monitor in the machine room.
    - b. The data link required to monitor all car computers shall be permanent. Installation requiring disconnect/reconnect of data line to retrieve specific car data is unacceptable.
- C. Selective Collective Operation:
1. Arrange for Selective Collective automatic operation. Operate elevator from a single riser of landing buttons and from operating device in car.
  2. 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. Double door operation not permitted. If an up-traveling car has a passenger for an intermediate floor and a down call is registered at that floor, with no calls above car, it travels to floor, opens door to let passenger out, then lights down direction lantern and accepts waiting passenger without closing and reopening doors.
- D. Other Operations:
1. Load Weighing: provide means for weighing car passenger load. Control system to provide dispatching at main floor in advance of normal intervals when car is filled to capacity. Provide hall call by-pass when the car is filled to preset percentage of rated capacity and traveling in down direction. Field adjustment range: 10% - 100%.

2. Independent Service: Provide controls for operation of each car from its pushbuttons only. Close doors by constant pressure on the desired destination floor button or door close button. Open doors automatically upon arrival at selected floor.
- E. Firefighters' Service: Provide equipment and operation in accordance with Code requirements.
- F. Automatic Car Stopping Zone: Stop car within 1/8" above or below the landing sill. Maintain stopping zoned regardless of load in car, direction of travel, distance between landings, rope stretch or slippage.
- G. Remote Monitoring and Diagnostics: Equip each controller with standard ports, interface boards, and drivers to accept maintenance, data logging, fault finding diagnostic and monitoring computers, keyboards, modems, and programming tools. The system shall be capable of driving remote color CRT monitors that continually scan and display the status of each car and call.
- H. Door Operation: Automatically open doors when car arrives at main floor. At expiration of normal dwell time, close doors. Reopen doors when car is designated for loading.
- I. Standby Lighting and Alarm: Car mounted battery unit with solid-state charger to operate alarm bell and car emergency lighting. Battery to be rechargeable with minimum 5-year life expectancy. Include required transformer. Provide constant pressure test button in service compartment of car operation panel. Provide lighting integral with portion of normal car lighting system.
- J. Battery-Powered Lowering:
  1. Upon loss of normal power, provide controls to automatically lower the car at inspection speed to the designated landing. If the car is at a floor, open the doors, and shut down. If the car is in motion between floors are lowered to the designated floor, open the doors, and shut down. If the car is in motion below the designated floor, lowered to the next lower floor, open their doors, and shut down. System includes rechargeable battery and automatic recharging system.
  2. Upon restoration of normal power, the elevator shall automatically resume normal operation.

## 2.4 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. Tag spares inside controller cabinet.
- B. Traveling cables: provide lighting, Communication, and control wiring circuits in traveling cables from machine room to car connection point. Include a minimum of four (4) 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 work light on top of car with lamp guard and plug receptacle.



- D. Conduit: where provided use EMT type conduit. Include a flexible conduit to sound isolated equipment and components. All piping and wiring shall be discrete and not visible in public spaces, i.e. conduit required for smoke detectors in public lobbies.

## 2.5 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. Stainless Steel: ASTM A 240/A 240M, Type 304
  - 1. Satin Finish: No. 4 (US 32D), grain to run in the longest dimension
  - 2. Patterned: 6SL by Rigidtex
- C. Fire-Retardant Treated Particle Board Panels: Minimum ¾" thick backup for natural finished wood and plastic laminate veneered panels, edged and faced as shown, provided with suitable anti-warp backing; meet ASTM E84 Class "T" rating with a flame-spread rating of 25 or less, registered with local authorities for elevator finish materials.
- D. Plastic Laminate: ASTM E84 Class A and NEMA LD3.1, Fire-Rated Grade (GP-50), Type 7, 0.050" ±.005" thick, color and texture as follows:
  - 1. Concealed Surfaces: Manufacturer's standard color and finish.
- E. Manufacturers' Nameplates:
  - 1. Manufacturer's name plates and other identifying markings shall not be affixed on surfaces exposed to public view. This requirement does not apply to Underwriter's Laboratories and code required labels.
  - 2. Each major component of mechanical and electrical equipment shall have identification plate with the Manufacturer's name, address, model number, rating, and any other information required by governing codes.

## 2.6 MACHINE ROOM EQUIPMENT

- A. General: Arrange equipment within the available controller space. Coordinate related electrical and mechanical work.
- B. Power Unit: New compact dry or submersible type with isolated base. Include motor, pump, and valves. Tank capacity to be 25% more than required for normal jack displacement.
- C. Hydraulic Control Valve: New hydraulic control valve to control starting, stopping, and accurate leveling as manufactured by Blain, Bucher, or approved equal.
- D. Sound Isolation Couplings and shut off valves: Provide no less than two sound isolation couplings between the power unit and hydraulic jacks. Provide manual shut off valves at power unit in machine room and in the pit.
- E. Controller: As standard with approved manufacturer; overload relays in three legs of power circuit and in loop circuit; cabinets with NEMA-1 enclosures and doors arranged with locks or

mechanical latches. Provide permanently marked symbols or letters identical to those on wiring diagrams adjacent to each component.

1. The controller wiring shall be carried out in a neat and workmanlike manner in accordance with relevant requirements of National Electric Code.
2. All external connections to the equipment on each controller shall be made by means of approved cable thimbles and/or solder less cable lugs, depending on the current to be carried.
3. Condenser activated or dash pot timers, motors or incandescent globes for dampening acceleration and deceleration steps are unacceptable.
4. Main contactors or starter switches shall be horsepower rated and are not to be mounted directly to the steel cabinets, to ensure quiet operation of controllers.
5. The controllers must be properly shielded from line feeder pollution.

## 2.7 HOISTWAY EQUIPMENT

- A. Guide Rails: Retain existing guide rails, realign as required to provide smooth ride. Provide supplemental rail brackets and or backing as required by Code or to enhance car ride quality. Clean and remove all dust, dirt, and rust. Check and tighten all fastenings.
- B. Guide Shoes: New car roller type guide shoes with neoprene tires, minimum ¾-in. wide, fully adjustable and spring loaded to provide continuous contact with rail surfaces. Balance car to insure equal guide shoe pressure on all wheels and not exceed manufacturer's recommendations.
- C. Hydraulic Jack Assembly - New:
  1. Cylinder: Constructed of steel pipe of sufficient thickness and suitable for the required operating pressure. Provide the top of the cylinder with a cylinder head and drip ring to collect any oil seepage. Provide cylinder with an internal guide ring and self-adjusting packing. Apply a rust inhibitor and corrosion resistant compound to the exposed outer surface of the cylinder. Provide a means to bleed air from the jack unit.
  2. Plunger: Single stage design, seamless steel pipe or tubing, minimum Schedule 80. Plunger shall be no more than 0.010 inch out of round and straight within 1/16-in. Protect during shipping and installation to avoid damage. If plunger is gouged, scarred, or shows visible tool marks, it shall be replaced. Finish shall be 12 micro inches or finer. Plunger with follower guides is not acceptable.
  3. Platen Isolation: Provide minimum ¾-in. steel plate between top of plunger and car frame with one inch rubber or neoprene isolation material.
  4. Packing: Provide packing which inhibits leaking of oil with drip ring.
- D. Cylinder and Well Casing - New:
  1. Well: The Elevator Contractor shall familiarize himself with existing conditions and be responsible for removing the existing jack and casing if necessary and drilling a well for installation of the new cylinder. Include a minimum of twelve (12) 55-gallon drums of spoils removal in accordance with EPA requirements.
  2. Casing: If required to prevent the well hole from collapse, provide steel casing sufficiently greater in diameter than the cylinder to allow for a plumb installation and of proper depth to retain hole and provide structural integrity of PVC casing. Provide minimum 10-gauge corrosion resistant well casing with watertight joints. Weld seams solid at multiple casing joints. Provide a steel ring at top of casing to be keyed into pit floor. Provide watertight seal at bottom using 24-in. thick non-shrink concrete plug of type.

3. Provide minimum Schedule 40 PVC casing with watertight sealed couplings, bottom end caps, and inspection ports.
  4. Installation: Set cylinder and PVC casing within steel casing and backfill to stabilize the bottom with clean dry sand or pea gravel. After cylinder is set, provide a watertight seal between PVC and top of cylinder. Plunger and cylinder shall be plumb within 1/16-in.
- E. Pit Channels and Shut Off Valves: New steel pit channels to support jack assembly and transmit loads to building structure. Provide intermediate stabilizers as required. Provide ball valve in oil line adjacent to jack.
- F. Buffers: New spring type buffers with pit support channels and blocking as required.
- G. Earthquake Valve: Provide Code required earthquake rupture valve in pit.
- H. Car Frame and Platform: Retain existing, check, and tighten all fastenings. Reinforce as required for to minimize deflection. Provide new black painted or galvanized apron.
- I. Terminal Stopping: New normal and final limit devices.
- J. Floor Numbers: Stencil paint 4" high floor designations in contrasting color on inside face of hoistway doors or hoistway fascia in location visible from within car

## 2.8 DOOR OPERATING EQUIPMENT

- A. Door Operator: New, high speed, heavy duty, linear drive type machine capable of opening doors at no less than 2.5 fps. Reverse door direction upon interruption of infrared beams in no more than 2 ½-in. of movement. Provide solid state control with closed loop circuitry to constantly monitor and automatically adjust door operation based on velocity, position, and motor current. Maintain consistent, smooth, and quiet door operation at all floors, regardless of door weight or air pressure.
- B. Door Tracks: New car and hoistway entrance door tracks.
- C. Door Hangers: New car and hoistway entrance door hangers, rollers, and eccentrics.
- D. Door Clutch: New, heavy duty clutch, linkage arms, drive blocks, and pickup rollers or cams to provide positive, smooth, quiet door operation. Design clutch so car doors can be closed while hoistway doors remain open.
- E. Door Closers: New door reel closers, helical groove type design by SmarTork or approved equal.
- F. Interlocks and gate switches: New.
- G. Door Gibs: New heavy-duty door gibbs with fire tabs, equal to The Enforcer by Sees Inc.
- H. Restricted Opening Devices: New vane type door restrictors equal to The Restrictor by Sees Inc. or approved equal, as required by Code to prevent opening of car doors outside the unlocking zone. Plunger type restrictors are not acceptable.

## 2.9 DOOR REOPENING DEVICES

- A. Infrared Array: Provide door reopening devices with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams shall cause doors to stop and reopen.
- B. 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.

## 2.10 CAR ENCLOSURES

- A. Retain existing car enclosure. Remove existing interior finishes and provide the following new interior finishes:
  - 1. Front return, and Entrance Frame: Provide new stainless steel cladding of return and entrance. Provide cutout in return for applied car operating panel.
  - 2. Doors: Provide new minimum 16-gauge reinforced furniture steel clad with minimum 18-gauge satin finish stainless steel. Cladding shall wrap leading and trailing edge of panel a minimum of 1/2" on rear side.
  - 3. Wall Finish: Provide horizontal patterned stainless-steel wainscot below handrails, satin stainless-steel chair rail behind handrails, and vertical plastic laminate panels above as selected by Owner. All panels to be removable 3/4" panels faced and edged with finish material on MDF substrate with 3/4" satin stainless steel reveal between panels.
  - 4. Base: 4-in. satin stainless steel, flush with finished wall panels. Provide concealed vents.
  - 5. Handrail: 1 1/2" diameter satin stainless steel at rear wall.
  - 6. Suspended Ceiling: Faced and edged with satin stainless steel on MDF substrate.
  - 7. Lighting: Provide LED fixtures with wiring and hookup. Coordinate with emergency lighting requirements
  - 8. Flooring: Architectural rubber flooring by Norament as selected by Owner.
  - 9. Ventilation: Provide new 2-speed cab exhaust fan, Morrison model OE.
  - 10. Protection Pads and Buttons: Provide one set vinyl protection pads for side walls and front return. Include cutouts for car operating panel and permanently mounted stainless steel buttons.

## 2.11 HOISTWAY ENTRANCES

- A. General: Retain and recondition, provide new hardware as specified.
- B. Frames: Retain Existing – examine and clean for smooth unobstructed operation of doors. Clean and polish sills; check and tighten all fastenings. Replace door bumpers at each entrance.
- C. Door Panels: Retain and recondition existing. New heavy-duty door gibs with fire tabs, equal to The Enforcer by Sees Inc. Replace damaged or missing vision guards.
- D. Sills: Retain and recondition existing. Check, clean, and tighten fastenings.
- E. Fascia, Toe Guards, and Hanger Covers: New 16-gage hanger covers and hoistway fascia where required, paint black.

- F. Handicapped Floor Identification Plates: Provide new raised braille and alpha characters, numerals, or symbols similar to those for car stations of size required by governing authority. Locate on each entrance jamb at 60-in. above floor indicating floor designation. Material and finish of plates shall match hall button station faceplates. Provide with contrasting background and mounting means similar to those on car panels. Braille designation shall be to the left of the raised character.

## 2.12 SIGNAL EQUIPMENT

- A. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been completed. Provide white illuminating push buttons over the entire face of the button for car and hall push buttons. Provide blue illuminating LED direction lanterns and position indicators with adjustable electronic tones for all audible devices. Locate and operate all devices in conformance with accessibility requirements.
- B. Car Operating Panels: Provide a single car operating panel in the front return. Panels shall be hinged and constructed of stain stainless steel and shall cover all existing openings in the return.
1. Applied type panel.
  2. Identify floor buttons, alarm buttons, door open button, and door close button with Braille /tactile symbols. Configure plates per local building code accessibility standards.
  3. Provide push button and plates in an oval design. Push buttons to be fully illuminating over the entire surface of the button. Locate floor buttons in a single row with the highest buttons at 48-in. Locate emergency push-to-call and alarm button at 35-in.
  4. Provide minimum 3/4-in. diameter raised floor pushbuttons which illuminate to indicate car registration.
  5. Provide alarm button to ring bell located on the car. Illuminate button when activated.
  6. Provide firefighters' locked box and devices as required by Code.
  7. Provide lockable service compartment with recessed flush door, key removable in locked position only. Door material and finish to match car operating panel faceplate. Inside surface of door shall contain an integral horizontal flush window for displaying the elevator operating permit. Include the following toggle type switches with function and operating positions identified by permanent signage or engraved legend:
    - a. Inspection switch.
    - b. Light switch.
    - c. Three-position fan switch.
    - d. Constant pressure emergency light test button.
    - e. 120-volt GFCI duplex outlet.
    - f. Stop switch.
  8. Provide engraved and black painted capacity and elevator number on service cabinet door.
  9. Car Position Indicator: Provide discrete digital position indicator with direction of travel arrows.
- C. In-Car Direction Lantern: New discrete digital display type in each entrance jamb of the cab. Illuminate blue.
- D. Emergency Communication System: Mount behind speaker pattern in car operating panel, above operating buttons. Provide system that complies with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." On activation, system

dials preprogrammed number of monitoring station and identifies elevator location to monitoring station. System provides two-way voice communication without using a handset and provides a red illuminating LED indicator to signal that indicate when system has been activated and when monitoring station has responded.

- E. Hall Push-Button Stations: Provide flush mounted hall push-button stations at each landing with satin stainless-steel faceplate to include A17.1 Appendix H pictograph. Pushbutton design to match buttons in car operating panel. Provide Firefighters' Phase II devices and instruction in main floor hall station.
- F. Hall Position Indicator: Provide a 1-in. digital discrete type indicator with car direction arrows at main floor. Combine with hall push button station.
- G. Hoistway Access Switches: Provide new key switches with satin stainless-steel faceplate in entrance jamb at top and bottom landings.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification of Conditions: Examine elevator hoistways, machine rooms, and other work areas for compliance with requirements for installation tolerances and other conditions affecting performance of the finished installation. Submit written report listing any deficiencies or discrepancies that will adversely affect the performance and installation. Do not proceed with work until conditions have been corrected.
- B. Field Measurements: Verify dimensions before proceeding with the work.

### 3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions and in compliance with requirements of AHJ or other regulatory agencies. Install all components in accordance with specifications and approved shop drawings. 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 components tight to eliminate possible vibrations.
- B. Install all equipment so it may be easily removed for maintenance and repair.
- 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 Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to minimize transmission of vibrations to structure and thereby minimize structure-borne noise from elevator system.
- E. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.

- F. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- G. Manufacturer's nameplates, trademarks, or other identifying symbols not allowed on surfaces visible to the public.
- H. Leveling Tolerance: 1/8 -in. up or down, regardless of load and direction of travel.

### 3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of 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. Operating Test: Perform all testing as required by Code authorities and as required to demonstrate operation and performance in compliance with these specifications.
- C. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on elevators.

### 3.4 FINAL CLEANING AND PAINTING

- A. Clean all hoistways and elevator equipment and remove all rust, filings, welding slag, rubbish, loose plaster, mortar drippings, extraneous construction materials, dirt, and dust, including walls, building beams, sill ledges, and divider beams.
- B. Restore all work areas and routes, including floors, walls, and ceilings, to their original condition.
- C. Clean down surfaces and areas which require final painting and finishing work. Cleaning includes removal of rubbish, broom cleaning of floors, removal of any loose plaster or mortar, dust, and other extraneous materials from finish surfaces, and surfaces that will remain visible after the work is complete.
- D. Paint machine room floor and pit floors with two coats of paint appropriate for these spaces.

### 3.5 FINAL REVIEW REQUIREMENTS

- A. Final review and evaluation of the finished work will be conducted by the Consultant. Notify the Consultant in writing no less than five (5) days prior to the elevators being ready for review. Provide all labor, materials, and equipment necessary to aid in this review and evaluation.
- B. The installation is considered ready for final review when all tests and inspections by AHJs and inspecting authorities have been completed, permits received, final adjusting of all equipment is finished, and elevators restored to regular operation.

- C. Consultant will provide a written punch-list identifying any performance or material deficiencies not in compliance with the specifications. Final Field Review and evaluation will include the following characteristics or conditions at a minimum:
  - 1. Performance evaluation will be conducted under full load and no-load conditions
  - 2. Perform a one hour full load run test, stopping for 10 seconds at each landing, to verify hear rise of less than 50<sup>0</sup> C. in motor winding.
  - 3. Floor to floor and door performance times.
  - 4. Elevator speed.
  - 5. Ride quality including starting, acceleration, full speed ride, deceleration, stopping, and noise level.
  - 6. Door operation, noise level, and closing pressure.
  - 7. Testing of specified features and operations.
  
- D. Provide the consultant with a completed punch-list verifying that all punch-list items have been addressed and corrected. Consultant will conduct a back-check to verify

### 3.6 PURCHASER'S INFORMATION

- A. Owner's Manuals: Provide one neatly bound hard copy and one electronic copy of all manufacturer's information, parts lists, straight-line as-installed wiring diagrams, parts list, lubrication charts, operating instructions. Summary page at beginning of manual to identify and include specific information including; complete manufacturer information, model, serial number, for each major component to include but not limited to: controller, door operator, signal fixtures, guide shoes.
  
- B. Provide complete software for controller equipment installed.

END OF SECTION 14 21 00