

## SECTION 142001

### ELECTRIC TRACTION ELEVATOR MODERNIZATION

#### PART 1 - GENERAL

##### 1.1 STIPULATIONS

- A. The specification sections "General Conditions of the Construction Contract," "Special Conditions," and "Division 1 - General Requirements" form a part of this section by this reference thereto and shall have the same force and effect as if printed herewith in full.

##### 1.2 SUMMARY

- A. Section includes modernization of electric traction passenger Elevator No. 7.
- B. Related Requirements:
  - 1. Section 099600 "High Performance Coatings" for field painting of steel hoistway frames, doors and car steel.
  - 2. Division 09 for finish flooring in elevator cars.
  - 3. Section 142113 "Electric Traction Freight Elevators" for modernization of electric traction Elevator No. 8.
  - 4. Section 283111 "Digital, Addressable Fire-Alarm System" Fire-Alarm System" for smoke detectors in elevator lobbies to initiate emergency recall operation and heat detectors in shafts and machine rooms to disconnect power from elevator equipment before sprinkler activation and for connection to elevator controllers.

##### 1.3 DEFINITIONS

- A. Definitions in ASME A17.1/CSA B44 apply to work of this Section.

##### 1.4 SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. 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 and standby power operation control panel.
  - 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; 12-inch-square Samples of sheet materials; and 12-inch lengths of running trim members.
- E. Qualification Data: For Installer.
- F. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service including standby power generator, as shown and specified, are adequate for elevator system being provided.
- G. Sample Warranty: For special warranty.
- H. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
  - 1. In addition to items specified elsewhere for Operation and Maintenance Data, include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.
- I. Inspection and Acceptance Certificates and Operating Permits: As required by the Pennsylvania Department of Labor & Industry (L&I) Elevator Division unrestricted elevator use.
  - 1. Contractor shall prepare the L&I Elevator Division LIBI-26 Application for Construction and Alteration of a Lifting Device.
    - a. Coordinate seal and signature of the application with the Professional.
  - 2. Contractor shall provide a variance from the L&I Elevator Division for all existing non-complying conditions in the elevator machine room, such as the clearances beneath the transverse beams bisecting the machine room.

#### 1.5 QUALITY CONTROL

- A. Installer Qualifications: Elevator manufacturer or an authorized representative who is trained and approved by manufacturer.

#### 1.6 CONTRACTOR'S SUPERINTENDENT

- A. The Contractor shall assign a competent project superintendent and Labor during the work progress and any necessary assistant, all satisfactory to the Department and the Professional. The superintendent shall represent the Contractor and all instructions given to him shall be as binding as if given to the Contractor.

#### 1.7 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.

## 1.8 COORDINATION

- A. Coordinate locations and dimensions of other work relating to electric traction 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.

## 1.9 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.
- 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.
  - Warranty Period: One year from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 GENERAL DESCRIPTION

- A. Elevators PE7. A Total of one (1) Elevator:

1. Quantity:	One (1) Passenger Elevator
2. Type:	Geared Overhead Traction
3. Capacity (lbs.):	PE7 - 2500 / Retain Existing
4. Speed (fpm):	PE7 – 300 F.P.M. / Retain Existing
5. Travel in Feet:	Field Verify / Retain Existing
6. Number of Landings:	PE7 – – Six (6) @ G, 1, 2, 3, 4, 5
7. Front:	PE7 - – Six (6) @ G, 1, 2, 3, 4, 5 Retain Existing
8. Rear:	None
9. Operation:	PE7 – Simplex Operation (New)
10. Control:	Microprocessor Control (New)
11. Number of Pushbutton Risers	One riser (1) (New)
12. Platform Size:	PE7 – 46" x 80" Retain Existing
13. Guide Rails:	Steel T's / Retain Existing
14. Buffers:	Hydraulic Buffers / Retain Existing
15. Cab Enclosure:	Refer to cab drawings for modernization
16. Car Door Size:	PE7 – 40" x 84"
17. Hoistway Door Size:	PE7 – 40" x 84"
18. Door Operation:	Side Speed Side Slide – steel doors (New car door panels – New Door Operators)
19. Fixture and Signals:	Standard Fixtures (New)
20. Machine Type:	Geared Traction (New)
21. Machine Location:	Overhead
Power Supply:	480 VAC / 3 Phase / 60 HZ (Confirm and retain existing)

## 2.2 CONTROL FEATURES/FUNCTIONS

### A. Simplex Automatic Selective Collective Operation (New)

1. The elevator shall automatically travel to landings for which a call demand exists. Stops in response to calls that are registered in either the car or corridor push-button stations shall occur in the natural order of progression in which the floors are encountered, depending on the direction of car travel, and irrespective of the order in which calls are registered. In responding to corridor calls, the elevator shall answer only those demands that correspond to the direction in which the car is traveling.
2. Call acknowledgment lights provided in both the car and corridor push-button fixtures shall be extinguished as the car begins its slowdown approach to the corresponding landing. Immediately after cancellation, a corridor call shall be inoperative until the elevator doors have completed their dwell time in the open position and commenced their closing cycle.

### B. Motion Control (New)

1. Smooth stepless acceleration and deceleration of the elevator car shall be provided in either direction of travel during both single and multiple floor runs. The amplitude of acceleration and deceleration shall not exceed  $4.5 \text{ ft/sec}^2$ . The maximum velocity which the elevator achieves in either direction of travel while operating under load conditions that vary between empty car and full rated load shall be within  $\pm 2\%$  of the rated speed.
2. Floor leveling accuracy of  $\pm 1/4"$  as measured between the car entrance threshold and the landing sill on any given floor shall be provided. This accuracy standard shall be maintained under varying load conditions and without need for releveling corrections caused by overshooting or stopping short of the floor (spotting).
3. Brake-to-brake elapsed time during a typical elevator one floor run shall not exceed 5.5 seconds. Timing, as measured between initial brake lift and the moment the brake sets with the car position level at the next adjacent floor, shall remain consistent under varying load conditions in either direction of travel.
4. Elapsed flight time during a typical elevator one floor run shall not exceed 12.0 seconds. Timing, as measured between the moment door closing operations begin and when the doors are  $3/4"$  open at the next adjacent floor, shall remain consistent under varying load conditions in either direction of travel. Pre-opening operation shall be available should it be requested by ownership or their representative.

### C. Car/Landing Door Operation (New)

1. Car and landing doors shall be arranged to operate in unison without excessive noise or slamming in either direction of travel. Door opening speeds of two (2) feet per second shall be provided in conjunction with closing speeds of 1.0 foot per second in accordance with governing code. Door operation shall be arranged to commence as the car enters its final leveling approach to a landing. In no case shall the door opening cycle conclude before the car comes to a complete stop at floor level.
2. Door open and door close elapsed time shall be measured between the moment car door operation in either direction begins and the instant at which that particular cycle is completed.
3. When responding to either a car or corridor call, the amount of time that the elevator doors remain stationary in the open position shall be adjustable anywhere up to sixty (60) seconds. Door open dwell time for corridor calls shall be separate of that for car calls, and in both cases, dwell time shall be canceled whenever any of the infrared beams projected across the car entrance are momentarily interrupted by passenger transfers, followed by a reduced door open dwell time of approximately one (1) second (adjustable) after the beam is reestablished.

4. Where door protective devices are provided, the operation of the device by physical contact (mechanical safety-edge) or the interruption of one or more infrared light beams (dual or multi-beam non-contact) during the close cycle shall cause the immediate reversing of the doors to the full open position.
5. The door closing cycle shall be arranged so that, in the event the door protective devices become continually obstructed after the normal door open dwell time has expired, and following a time interval of approximately thirty (30) seconds (adjustable), a warning tone shall sound and the door closing cycle shall commence at reduced speed and torque per ASME A17.1 Code requirements.
6. Each new car operating station shall be provided with a "door open" pushbutton. Pressure on the "door open" button shall cause doors in the full open position to remain so and doors engaged in the close cycle to reverse direction and assume the full open position so long as pressure remains applied to the button. The "door open" buttons shall also control the open cycle during Phase II - Emergency In-car Operation. The "door close" pushbutton shall function on Independent Service, Attendant Service or Phase II - Emergency In-car Operation as well as during normal automatic operations.
7. Repeated attempts by the power door operator mechanisms to open or close the doors at any landing shall be monitored by the new microprocessor-control system. In the event the doors should fail to cycle properly after a preset (adjustable) number of attempts, the car shall either travel to the next stop or remove itself from service, depending upon whether the malfunction is in the open or close cycle.
8. Each set of landing doors shall be provided with an automatic self-closing mechanism arranged so that, if for some reason the car should leave the landing while the landing doors are unlocked, the closing device shall immediately close and lock the doors.
9. Car doors shall be arranged so as to prevent their being manually opened from inside the car unless the elevator is positioned within a floor landing zone.

D. Car Door Operation (New)

1. Car door shall be arranged to operate in unison with the corridor door safety interlock release mechanism. Car door opening speeds of two (2) feet per second shall be provided in conjunction with closing speeds of 1.0 foot per second in accordance with governing code. Door operation shall be arranged to commence after the car enters its final leveling approach to a landing. In no case shall the door opening cycle conclude before the car comes to a complete stop at floor level with machine brake set.
2. When responding to either a car or corridor call, the amount of time that the elevator car door remains stationary in the open position shall be adjustable anywhere up to sixty (60) seconds. Door open dwell time for corridor calls shall be separate of that for car calls, and in both cases, dwell time shall be canceled whenever the doors are fully open and a car call is registered.
3. The new car operating station shall be provided with a "door open" and "door close" pushbutton. Pressure on the "door open" button shall cause the car door in the full open position to remain so and doors engaged in the close cycle to reverse direction and assume the full open position so long as pressure remains applied to the button. The "door close" pushbutton shall function on Independent Service, Attendant Service and Phase II – Emergency In-car Operation as well as during normal automatic operations.
4. Repeated attempts by the power car door operator mechanisms to open or close the car doors at any landing shall be monitored by the new microprocessor control system. In the event the doors should fail to cycle properly after a preset (adjustable) number of attempts, the car shall either travel to the next stop or remove itself from service, depending upon whether the malfunction is in the open or close cycle.
5. Car door shall be arranged so as to prevent it being manually opened from inside the car unless the elevator is positioned within a floor landing zone per A17.1 Standards.

E. Hoistway Access Operation (New)

1. Provision shall be made to allow access to the hoistway through the use of hoistway access switches.
2. Operating the access switch shall permit the car to be moved at slow speed (inspection speed) with the doors open to allow authorized persons to obtain access to the top of the elevator car.
3. Access operation must be code compliant and conform to the current A17.1 Code for elevators and escalators.

F. Fire Emergency Operation (New)

1. Phase I - Emergency Recall Operation shall be provided for each car in accordance ASME/ANSI A17.1 code as modified under the applicable local or State law.
2. Each main car operating station shall be provided with an indicator light and warning buzzer, each of which shall become activated whenever Phase I Operation is engaged. The warning buzzer shall cease to function once the car has completed the recall sequence and is positioned at the designated recall landing. The indicator light shall remain illuminated as long as Phase I Operation is activated.
3. A three-position, key-operated switch shall be provided on the designated recall landing to manually activate Phase I Operation. When activated, Phase I Operation shall be arranged so that in order to reset normal service, all cars must first be returned to the designated recall landing, after which the Phase I key-switch must be turned to the "OFF" position.
4. Phase II - Emergency Recall In-Car Operation shall be provided for each car in accordance with ASME A17.1 code as modified under local or State law.
5. Each main car operating station shall be equipped with a three-position, key-operated switch to engage Phase II Operation on elevators which have completed the Phase I recall sequence, and which are parked at the designated recall landing or alternate floor landing. Subsequent to activating Phase II Operation on any elevator, that elevator must be returned to the designated recall landing in order to discontinue that service mode.
6. Each main car operating station shall be provided with a "CALL CANCEL" pushbutton that functions only under Phase II operating mode. When activated, pressing the "CALL CANCEL" button shall cause any previously registered car calls to cancel per ASME standards.
7. Each main car operating station shall incorporate the National Standard fire logo and/or operating instructions, engraved and red color filled, as required by the applicable local or State law requirements.

G. Smoke Detector System (New)

1. The elevator contractor shall coordinate with the .4 Electrical Contractor to provide a complete smoke detector system for elevator recall to comply with the governing authority's requirements and ASME A17.1 as approved or modified under local law. The new system shall be configured as follows:
  - a. Smoke detectors shall be installed in the elevator lobby at each floor, top of hoistway, in pit areas and associated elevator machine room in accordance with NFPA No. 72A through 72E, Automatic Fire Detectors, Chapter 4. The activation of a smoke detector in any elevator lobby or associated elevator machine room other than the designated level (first floor) shall cause all cars in all groups that serve that lobby to return non-stop to the designated level (ground floor). If the smoke detector at the designated level (ground floor) is activated, the cars shall return to an alternate level (first floor) unless the Phase 1 key-operated switch is in the "firemen service" position. Smoke detectors and/or smoke detector system shall not be self-resetting.
  - b. Elevator recall system shall incorporate a minimum number of zones as follows:

- 1) Zone 1: Ground Floor.
- 2) Zone 2: Alternate Floor (first floor).
- 3) Zone 3: Machine Room.
- 4) Zone 4: Top of shaft way.
- 5) Zone 5: Pit.
- 6) Zone 6: Fire hat.
- 7) Zone 7: To all typical landings serviced.

- c. The smoke detectors required for elevator recall shall be part of the building fire alarm system upgrade. All additional programming needed to allow the "tie in" to occur shall be at the expense of the elevator contractor.
- d. Regarding Item c above, should any modifications to the existing fire alarm be required as part of the utilization of that system, the elevator contractor shall take full responsibility for its operation. Additionally, any cost associated with the above referenced work shall be included in the project pricing. No change orders shall be applicable under any circumstances.

#### H. Emergency Power Operation (New)

1. Provisions shall be included in all of the new elevator control systems whereby, immediately after transferring to the building emergency power system, all affected elevators shall automatically return to the main fire recall landing in progressive numerical sequence at normal operating speed. Car and corridor calls shall become inoperative, and all previously registered calls shall be canceled. As the car arrives at the designated landing, it shall park out of service with its door in the open position.
2. Upon completion of the recall process, one elevator shall respond as if it were in normal power mode (see Section 2.8 Fixtures for specific information regarding the panel). Upon power removal and normal power being restored to the building, a pre-initiation input to the elevator controller's computer shall cause the elevator to stop at the nearest available floor, if not already stopped, open its doors and wait for a power confirmation from a switch gear and the power with usable characteristics has been restored. The unit may then be allowed to go back into service.
3. An emergency power generator is present and in working order, including switch gear operation. The elevator contractor shall size, confirming all new loads to be acceptable for the new proposed elevator equipment, and provide all necessary connections and tie ins required to make the emergency generator functional and perform in a code compliant and acceptable manner.
4. The emergency power control panel shall have capacity to add two new 5,000 lb. MLR traction elevators to be added to the State Museum via future Phase 6.
5. Locate the emergency power control panel in Fire Command G-40A.

#### I. Independent Service Operation (New)

1. The car operating station shall be equipped with a key-operated switch labeled "IND SER". When placed in the "on" position, this switch shall cause the elevator to bypass all corridor calls and to travel directly to any floor chosen by registration of a car call. During Independent Service Operation, the elevator doors shall remain open at any landing until the door close or car call registration pushbutton, is pressed and maintained until the doors are fully closed.
2. In case an elevator is operating on the Independent Service mode and the Fire Emergency Recall system becomes activated, following a period of approximately forty-five (45) seconds, the elevator shall automatically override Independent Service Operation and engage Phase I - Fire Emergency Recall Operation.
3. If more than one (1) car call is registered, all registered car calls shall extinguish when the elevator stops in response to the first call.

J. Load Weighing (New)

1. A positive means shall be provided to continuously monitor the amount of load being transported by the elevator car. The system shall be used to preload static motor drives, activate control features that include anti-nuisance operation, load dispatch operation, and load non-stop operation where applicable. The anti-nuisance feature shall operate at loads not exceeding 200 lbs., whereas load dispatch and load non-stop shall be set to function at 65% of the rated loading capacity for the initial set up and adjustment procedure.

K. Car Security Operating Controls (New)

1. Provide necessary software/hardware to operate security feature for all car calls and each floor push button for all landings served.
2. Arrange special key operated switch located in the COP (behind locked door) to override the security system functions.
3. Override security controls with fire emergency controls in accordance with code and local laws.
4. Provide all Security System Interface and Camera Control Wiring as necessary including "wire and terminations" to operate the above referenced control systems. Mounting the card readers and security cameras shall be the responsibility of the Security Contractor, however the elevator contractor shall allow access and supply assistance on an as needed basis free of additional charge should access be requested.
  - a. Provide necessary provisions (including software) for security service for each elevator and its associated interface between outside vendor (Security Company) and elevator system.
  - b. Provide and identify a manual override toggle switch on the exterior of the group or master controller that will remove all of the units from security mode. The switch must be identified by a permanent label with lettering at least three (3) inches tall and shall be accessible by building personal.
  - c. Power Supplies and incidentals required for the card readers and or security cameras shall be supplied by the security contractor. The elevator contractor shall supply the appropriate power source (120 VAC) to the vicinity in which the power source is required to operate the security contractor's equipment in an efficient and acceptable manner.
  - d. Should an interface box need to be utilized between the security contractor and elevator equipment the security company shall supply and mount the box in an acceptable location. The elevator contractor shall provide the appropriate pipe and wire to accomplish the required tasks and shall work together with the security contractor to terminate and make the appropriate connections as required in both the elevator controller and interface box.
  - e. Provide the required wiring for card reader access and camera controls to be included in the traveling cables. Before ordering the wire the elevator contractor shall confirm the type of wire required with the security company. Splicing of wire or wires will not be accepted.

L. Provide Fire Service interface provisions (New)

1. Provide to tie in and make operational fire emergency control interface provisions consisting of primary, alternate and flashing hat subject to activation by fire sensing devices (ref. NFPA 72E, Chapter 4) located in the elevator machine rooms, the hoistways, or in the elevator lobby on any landing other than the designated fire recall landing (Main Floor). The contacts shall be wired to an electrical junction box located inside each elevator machine room for connection to the elevator control systems by the Contractor. Each wire shall be clearly labeled with its control function.



## 2.3 MACHINE ROOM EQUIPMENT

### A. Control Equipment (New)

1. A new microprocessor-based elevator control system shall be provided. This equipment shall utilize digital logic to calculate optimum acceleration and deceleration patterns for the car to follow during each run. Closed-loop distance and velocity feedback shall be provided to monitor the degree to which actual performance of the elevator car conforms to the desired speed profile. Basic systems operating software shall be stored in non-volatile, electrically programmable read only memory (EPROM), whereas, field adjustable parameters shall be stored in an electrically erasable programmable read only memory (EEPROM).
2. Elevator control relays, contactors, switches, capacitors, resistors, fuses, circuit breakers, overload relays, power supplies, circuit boards, static motor drive units, wiring terminal blocks and related components shall be totally enclosed inside a free-standing metal cabinet with hinged access doors. Control equipment cabinets shall be provided with forced air ventilation to prevent overheating of the electrical components housed therein.
3. All electrical wiring inside the control equipment cabinet, whether done in the factory or at the job site, shall be performed in a neat, workmanlike manner. All field wiring shall terminate at stud blocks provided inside the control equipment cabinet for that purpose. Each wiring terminal shall be clearly identified according to the nomenclature used on the "as built" wiring diagrams. No more than two (2) field wires may be connected to any single terminal stud. Spare wires shall be tagged according to their point of termination, bundled, and neatly placed at the bottom of the control equipment cabinet.
4. Alphanumeric identification symbols shall be permanently affixed to each electrical component housed within the control equipment cabinet. These identification symbols shall be identical to those depicted on the "as built" wiring diagrams.
5. A 14" or larger CRT display monitor shall be provided inside the elevator machine room for diagnostic purposes. By means of graphic depiction, information available on the screen shall include:
  - a. An overview of car and corridor calls currently existing within the system.
  - b. Elevator operating status.
  - c. Elevator position, direction of travel and velocity.
  - d. The open/close status of elevator doors.
  - e. The current operational status of each CPU input and output.
  - f. A sequential history of faults detected within the control system over the previous thirty (30) days.
6. In case placement of new elevator control equipment cabinets inside the machine rooms should interfere with direct sight lines between the main line disconnect switch and rotating equipment belonging to the affected elevator, an auxiliary locking disconnect switch shall be provided. The mounting location of this auxiliary disconnect switch shall be chosen so as to provide clear sight of the associated rotating equipment.

### B. Worm Geared Traction Machines (New – with New AC Motor)

1. Machine Beams (Existing)
  - a. Provide additional support beams, angles, plates, bearing plates, blocking steel members, etc., to support new machine, governors, dead end hitches, deflector and overhead sheaves from existing machine beams if applicable. Contractor is required to verify adequacy of existing machine support and report any inadequacies via an RFI in eBuilder.
2. Geared Traction Machine and Deflector Sheave (New)

- a. Provide a new worm-gear traction machine with motor, DC brake and demountable drive sheave, mounted in proper alignment on a common bedplate. The worm shall be accurately machined from steel and provided with a single end, double race ball bearing thrust. The worm gear shall be made from a phosphor bronze rim, accurately cut, fitted and bolted to a cast iron spider. The drive sheave shall be a demountable casting from the best grade of metal with a Brinell hardness of 215 to 230, and shall be machined with grooves, providing maximum traction with a minimum of cable and sheave wear. Provide means for lubricating the machine. The gear housing shall have a gasketed hole to inspect the gear.
- b. Provide machine with an electro-mechanical brake. The brake shall be spring applied and electrically released. Swivel type brake shoes shall be applied to the braking surface simultaneously and with equal pressure by means of helical compression springs. Design the brake electro-magnet for quick release to provide smooth and gradual application of brake shoes.
- c. Span the distance between the car and counterweight with an accurately grooved new deflector sheave. Mount the new deflector sheave to the bedplate in the machine room. Provide sheave guards to prevent ropes from jumping off grooves and to prevent possible entrapment on both sides of the floor penetrations.
- d. Provide sound reducing vibration isolation elements at all support points of the elevator hoisting motors and machines. Elements between the hoisting machine (unitized base) and machine support beams shall be similar to triple (3) layer ribbed neoprene pads, separated by appropriate steel shims as manufactured by Mason Industries, Type W pads, at 50 durometers, loaded for 40 psi. All bolts through isolation elements, where necessary, are to incorporate resilient washers and bushings.
- e. Provide hoist cable guards at the car and counterweight drop side of the hoisting machine sheave to prevent accidental contact with the hoisting cables. The guard shall extend from the point where the hoisting cables penetrate the machine room floor slab to a point beyond where the cables contact the traction and new deflector sheaves. The guards shall also be constructed so as to conceal pinch-points between cables and sheave grooves.

### 3. Machine Brake (New)

- a. Provide the hoisting machine with a spring applied and electrically released electromechanical brake. Swivel type brake shoes shall be applied to the braking surface simultaneously and with equal pressure by means of helical compression springs. Design brake electromagnet for quick release to provide smooth and gradual application of the brake shoes.
- b. Brakes shall be designed and adjusted to safely hold 125% of rated full load capacity in accordance with applicable code.

### 4. AC Drive Motor (New)

- a. Provide a new variable speed, reversible alternating current induction motor with high starting torque and low starting current, rated for 50° C (122° F) during continuous operation, designed for this particular elevator application.
  - 1) Ensure that adequate ventilation of internal stator windings and rotating element is provided to prevent overheating with thermal overload protection.

- b. The new hoist motor housing shall have a rigid cast iron stator frame for maximum strength and rigidity. Core Plate stator laminations shall be press fit into frame and properly secured. Stator windings shall be insulated with Mylar Paper laminate, formed and fit to core.
- c. New rotating element shall be fabricated from drawn bars machined and fitted in slots with end rings brazed together. Complete rotating element shall be dynamically balanced for vibration-free operation.
- d. Motor shaft shall be manufactured from carbon hot rolled steel for maximum strength.
- e. Properly align new hoisting motor and make all necessary electrical connections to the control circuitry.

C. VVVF AC Drive (New)

- 1. A solid-state, variable voltage, variable frequency (VVVF), 3-phase AC hoist motor drive system shall be provided as an integral part of the new microprocessor-based equipment. The primary component of this VVVF drive system shall be a low-noise, flux-vector inverter device, featuring a digital LED readout and touch-key pad, designed to facilitate software parameter adjustments, monitor systems' operation and display fault codes.
- 2. In addition to an inverter, the VVVF drive unit shall consist of a separate dynamic braking module to reduce hoist motor deceleration time, a resistor bank to absorb power regenerated by the hoist motor, and a HP rated 3-phase AC contactor with overload protection to disconnect the inverter from the hoist motor whenever the elevator is stopped.
- 3. The system shall be designed and configured with countermeasures for noise generated by the pulse-width modulated (PWM) inverters. Countermeasures shall include but are not limited to, control of radiated noise via inverter and/or motor cables, conducted noise through power lines, induction noise and ground noise.
  - a. Inverter device shall be encased in metal and properly grounded independently.
  - b. A noise filter for the input power line shall be provided to prevent penetration into radios, wireless equipment and detectors.
  - c. Provide interconnection wiring and ground cables in accordance with the manufacturer's design requirements.

D. Governor (New)

- 1. Provide a speed governor, located overhead, to operate the car safety.
  - a. Maintain the proper tension in the governor rope with a weighted tension sheave located in the pit. Springs used to develop the tension are not acceptable.
  - b. Provide rope grip jaws, designed to clamp the governor rope to actuate the car safety upon a predetermined overspeed downward. Rope grip jaws directly coupled to the governor mechanism so as to float with governor movement shall not be permitted.
  - c. Centrifugal type governors shall trip and set rope jaws within 60 degrees of governor sheave rotation after reaching rated tripping speed.
  - d. Design the governor rope-tripping device so that no appreciable damage to or deformation of the governor rope shall result from the stopping action of the device in operating the car safety.
  - e. Provide an electrical governor overspeed protective device which, when operated, shall remove power from the driving machine motor and brake before or at the application of the safety. The setting for the overspeed switches shall be as prescribed in the ASME A17.1 Code.

- 1) Locate and enclose the switch to ensure that excess lubrication will not enter the switch enclosure.
- 2) Overspeed switches shall operate in both direction of travel on systems employing static power drive units.

f. Seal and tag the governor with the running speed, tripping speed and date last tested.

E. Equipment Isolation (New)

1. Provide sound reducing vibration isolation elements at all support points of elevator controller, solid-state motor drives, isolation transformers, hoisting motors and machines. The elements for controllers, solid-state motor drives and isolation transformers shall be similar to double deflection neoprene-in-shear mounts, as manufactured by Mason Industries, Type ND, with 0.35" static deflection under design load ratings. Elements between the hoisting machine (unitized base) and machine support beams shall be similar to triple (3) layer ribbed neoprene pads, separated by appropriate steel shims as manufactured by Mason Industries, Type W pads, at 50 durometers, loaded for 40 psi. All bolts through isolation elements, where necessary, are to incorporate resilient washers and bushings.

F. Deflector and Idler Sheaves (New)

1. Provide new overhead and/or machine room wire rope cable deflector sheaves with related apparatus and structural mounting supports.
2. Locate and size new sheaves to maximize use of available clearances maintaining the present car and counterweight hitch drops.
3. New support bearings shall be of a roller type designed for a minimum of twice the total load calculation equipped with pressure activated or other suitable lubrication devices.
4. Required mounting beams and structural supports shall be interfaced with existing building structures modified under the terms of this contract for the new design rated and located loading.
5. Provide sheave guards for all apparatus and secure same to supporting building elements.

G. Ascending Car Overspeed Protection Device (New)

1. Provide a device designed to prevent an ascending elevator from striking the hoistway overhead structure.
2. The device shall decelerate the car with any load up to the rated capacity by applying an emergency brake.
  - a. The device shall detect an ascending car overspeed condition of not greater than 10% higher than the speed that the car governor is set to trip.
  - b. The device, when activated, shall prevent operation of the car until the device is manually reset.
  - c. The device shall meet the requirements of the ASME A17.1 Safety Code as may be modified by the Authority Having Jurisdiction.

H. Unintended Car Movement Protection Device (New)

1. Provide a device to prevent unintended car movement away from the landing when the car and hoistway doors are not in the closed and locked.
  - a. The device shall prevent such movement in the event of failure of:

- 1) The electric driving machine motor
  - 2) The brake
  - 3) The machine shaft or shaft coupling
  - 4) Gearing
  - 5) Control system
  - 6) Any component upon which the speed of the car depends
  - 7) Suspension ropes and the drive sheave of the traction machine are excluded.
- b. The device shall prevent operation of the car until the device is manually reset.
- c. The device shall meet the requirements of the ASME A17.1 Safety Code as may be modified by the Authority Having Jurisdiction.

## 2.4 HOISTWAY APPARATUS

### A. Car and Counterweight Guide Rail Systems (Reuse)

1. Car and counterweight guide rails, fish plates, rail brackets, backing support and related attachments shall be inspected to determine if unfavorable conditions exist that diminish the structural integrity of any component. In the event substandard conditions are disclosed by means of this inspection, the Contractor shall immediately inform the Department and the Professional as to the exact nature of said problems and then undertake whatever repairs and/or replacements the Professional may deem appropriate to remedy the situation.
2. Each stack of car and counterweight guide rails shall be individually examined to determine if excessive compression has occurred from building settlement. In the event such conditions are found to exist, each affected stack shall be cut off enough to relieve pressure. Jacking bolts shall be provided underneath each stack of both car and counterweight guide rails.
3. Each stack of car and counterweight guide rails shall be realigned so that total deviation from plumb in any direction does not exceed 1/8" over the entire length of the hoistway and that DBG measurements never vary more than .030".
4. As required, car guide rails joints shall be individually filled, filed and sanded in order to eliminate minor variations in adjoining machined surfaces.
5. Apart from the guide rail systems' reconditioning work specified herein, the Contractor shall perform whatever additional work may be required so that side-to-side and front-to-back acceleration of the elevator car traveling at full rated speed in either direction over the entire length of the hoistway with loads varying from empty car to full rated load never exceeds 18 milli-g peak to peak.

### B. Counterweight Assembly (Reuse)

1. The existing counterweight assembly shall be refurbished to as new condition and reused. Individual counterweight frame members shall be inspected for any indication of damage and to determine if the overall assembly is twisted, racked, or otherwise distorted. In case any of these conditions are found to exist, the Contractor shall immediately inform the Department and the Professional about the exact nature of the problem and undertake whatever corrective action the Professional may deem appropriate to remedy the situation. All fastenings between counterweight frame members shall be individually examined, tightened and if necessary renewed.
2. The amount of filler weight placed within the counterweight frame shall be adjusted so the weight of the entire counterweight assembly is equal to that of the renovated elevator car, plus 40-50% of its rated loading capacity. Filler weights shall be held securely in place at all times with tie rods passing through holes in both the weights and the counterweight frame. Tie rods shall be secured on each end with double lock nut and a cotter pin arrangement.

- C. Roller Guides (New) (Car & Counterweight)
1. Provide rubber tired, spring loaded, adjustable roller guides top and bottom of the car and counterweight frames for all elevators.
  2. Design three-wheel roller guides to run on unlubricated guides and equip them with 16-gauge cover guards.
- D. Hoist Cables and Governor Cables (New)
1. Existing wire rope hoisting and governor cables shall be removed and replaced with new.
    - a. Hoisting Cables - New pre-formed traction steel wire ropes, specifically constructed for elevator applications, shall be provided for suspension of the elevator car and counterweight assembly. New hoist cables shall be identical in number and construction to those which are currently in use.
    - b. Governor Cables - New pre-formed traction steel wire ropes, specifically constructed for elevator applications, shall be provided for governor cables. Governor cables shall be arranged so as to pass over top of the governor sheave in the machine room and underneath the tail-end sheave located in the pit. Both ends of the governor cable shall be attached to the safety release carrier. Governor cable diameter and method of fastening shall be in accordance with Section 206 of ASME A17.1 elevator safety code.
  2. Hoist cable fastenings shall be accomplished by use of individual tapered rope sockets or wedge type with adjustable shackles. General design requirements for cable shackles and the method of securing wire rope shall conform to ASME A17.1 elevator safety code.
  3. Broken hoist cable shackle springs shall be replaced on an as-needed basis.
- E. Normal and Final Terminal Stopping Devices (New)
1. Provide normal terminal stopping devices to stop the car automatically from any speed obtained under normal operation within the top and bottom overtravel, independent of the operating devices, final terminal stopping device and the buffers.
  2. Provide final terminal stopping devices to stop the car and counterweight automatically from the speed specified within the top clearance and bottom overtravel.
  3. The terminal stopping devices shall have rollers with rubber or other approved composition tread to provide silent operation when actuated by the fixed cam in the hoistway.
- F. Electrical Conduit, Wiring and Traveling Cable (New)
1. New rigidly supported EMT conduit, flexible metal conduit and galvanized steel trough shall be utilized throughout the hoistway.
    - a. Both EMT and flexible conduit shall be connected on either end by use of compression fittings and secured in place with metal clamps sized in accordance with the diameter of conduit utilized. Wire or plastic wire ty-raps shall not constitute an acceptable means of fastening.
    - b. The use of flexible metal conduit shall be limited to runs not greater than 3' in length.
    - c. All abandoned or unused electrical conduit shall be removed from the hoistway.
  2. New electrical wiring shall be provided. All wiring shall be stranded copper conductors, manufactured in compliance with ANSI/ASTM B174-71 and UL 62 requirements, and polyvinyl chloride insulation complying with ETT requirements of UL 62 and Article 400 of the National Electric Code.

3. Electrical wiring provided for hoistway interlocks shall be of a flame-retardant type, capable of withstanding temperatures of at least 392 degrees Fahrenheit. Conductors shall be Type SF or the equivalent thereof.
  - a. Each run of electrical conduit or duct shall contain no less than 10% spare wires and, in any case, no fewer than five (5) spare wire.
  - b. Crimp-on type wire terminals shall be used where possible.
4. New traveling cables shall be provided. Each traveling cable shall be provided with a flame- and water-resistant polyvinyl chloride jacket. Electrical wiring shall consist of stranded copper conductors, manufactured in compliance with ANSI/ASTM B174-71 and UL 62 requirements, and polyvinyl chloride insulation complying with ETT requirements of UL 62 and Article 400 of the National Electric Code.

Each traveling cable shall contain no less than 10% spare wires.

- a. Traveling cables exceeding 100' in length shall be provided with a steel wire rope support strand from which the cable shall be suspended.
- b. Traveling cables must be contained within an approved electrical conduit to within 6' of the final suspension point in the hoistway.
- c. Each new traveling cable shall be arranged to provide no fewer than six (6) individually shielded pairs of 22-gauge wire and arranged to contain no less than one (1) coaxial cable for CCTV remote monitoring, and the required quantity of CAT 6 cables for the communication system.
- d. Traveling cable conductors that terminate at a hoistway center box shall be connected to stud block provided for that purpose. Each wiring terminal shall be clearly identified by its nomenclature as shown on the "as built" wiring diagrams and solderless, crimp-on type wire terminals shall be used where possible.
- e. The attachment of a traveling cable to the underside of the elevator car shall be performed so that a minimum loop diameter of 30x the cable diameter is provided.

#### G. Hoistway Projections and Setbacks

1. The top surface of any setback or projection in the hoistway that measures 2" or more in width shall be beveled at an angle of not less than 75 degrees from horizontal. Each bevel plate shall be constructed from prime painted 14 gauge cold-rolled steel and installed so as to conform to Rule 100.6 of ASME A17.1 elevator safety code.

## 2.5 PIT APPARATUS

### A. Existing Car and Counterweight Buffers (Reuse)

1. The present spring buffers shall be reused in place. All springs, supports and related equipment shall be checked to assure it conforms to governing Codes. If repair or replacement of components is required, they shall be included under this specification. In case problems are found to exist, the Contractor shall immediately inform the Department and the Professional and then undertake whatever repairs and/or replacements the Professional may deem appropriate to remedy the situation. Surface rust shall be removed from all reused components.
2. Upon substantial completion of all work described in the project specifications, buffers shall undergo testing in accordance with ASME A17.1 Code.

### B. Governor Cable Tension Assembly (New)

1. Provide a new governor cable tension assembly.
  - a. Maintain the proper tension in the governor rope with a weighted tension sheave located in the pit. Springs used to develop the tension are not acceptable.
  - b. The sheave shall be of proper diameter and set directly plumb with the governor cable drop to prevent the cable from pulling off of the sheave at an angle.
  - c. Lubrication fittings shall be provided on the assembly.
  - d. The assembly shall have necessary cable guards to prevent accidental contact of the cable/sheave by service personnel. Guards shall also be provided to prevent the governor cable from jumping off of the sheave.

C. Pit Stop Switch (New)

1. As pit depth exceeds 66", each elevator pit shall be provided with two (2) push/pull or toggle switches that are conspicuously designated "EMERGENCY STOP". Both of these stop switches, shall be located immediately adjacent to the pit access ladder. One of the stop switches shall be placed approximately 48" above the pit floor while the other stop switch shall be positioned approximately 18" above the hoistway entrance sill on the lowest landing served. These switches shall be arranged so as to prevent the application of power to the hoist motor or machine brake when either one is placed in the "off" position.

## 2.6 HOISTWAY ENTRANCES

A. Hoistway Entrances (Reuse)

1. Hoistway entrance sills, sill supports, entrance frames, headers, header supports, and door panels shall be reused and refurbished.
  - a. Hoistway entrances that have become distorted or bent shall be straightened, plumbed, reset to the proper width dimension and reinforced as necessary.
  - b. Provide each existing door panel with two new removable laminated plastic composition guides, arranged to run in existing sill grooves with a minimum clearance. The guide mounting shall permit their replacement without removing the door from the hangers. A steel fire stop shall be enclosed in each guide.
  - c. Provide the meeting edge of center opening doors with new low profile continuous rubber astragal bumper strips. These strips shall be relatively inconspicuous when the doors are closed. Also, provide rubber bumpers at the top and bottom of each section of door to stop them at their limit of travel in the opening direction.
  - d. Provide necessary new fascias. 14-gauge steel fascia plates shall extend at least the full width of the door and be secured at hanger support and sill with oval head machine screws. Reinforce fascia to allow not more than 1/2" of deflection.
  - e. Provide fascia plates where the clearance between the edge of the loading side of the platform and the inside face of the hoistway enclosure exceeds the code allowed clearance.
  - f. Provide necessary new toe guards - Provide 14-gauge steel toe guards to extend 12" below any sill not protected by fascia. The toe guards shall extend the full width of the door and shall return to the hoistway wall at a 15-degree angle and be firmly fastened. They should be in accordance with current code.
  - g. Remove oil, dirt and impurities on new and existing apparatus and give a factory coat of rust inhibitive paint to all exposed surfaces of struts, hanger supports, covers, fascias, toe guards, dust covers and other ferrous metal.



- h. Remove and patch existing access holes (escutcheon) at each landing. Provide to cover existing holes (hoistway side only) in door panels as necessary to retain any sound deadening materials that may be present in the door panels. Repaint hoistway doors to match existing colors. Provide new escutcheon access with approved barrel inserts as per applicable code.
- i. Provide new non-vision wings (sight guards) the full length of the hoistway doors and paint them black.
- j. Provide new braille marking plates at each entrance frame. Remove existing braille plates and replace at the code dictated height.
- k. Provide proper support under all hoistway sills. Un-grouted or incorrectly supported sill shall be re-supported in an approved manner.
- l. Provide new hoistway entrance sills of the same materials as existing if they are bent or distorted beyond repair.
- m. Clean all sills "car and hoistway" to a new like condition. If either are bent or distorted in any way they shall be replaced with new that matches the existing finishes.
- n. Prep and paint hoistway frames and doors. Refer to Specification Section 099600 "High Performance Coatings."

B. Landing Door Tracks, Hangers, Closers, Interlocks and Related Appurtenances (New)

- 1. Formed or extruded steel landing door hanger tracks as manufactured by G.A.L. Corporation or an approved equal shall be provided. closures
- 2. Each landing door panel shall be suspended from a pair of new door hanger assemblies that are compatible with the new hanger tracks. Hanger assemblies shall be directly mounted to the door panel using 3/8" diameter or better hardware. In the event the job-site condition dictates the use of spacers between hanger assemblies and the landing door panel, solid steel blocks shall be provided for that purpose. Jacking bolts or G.A.L. manufactured "U" shaped spacers are not acceptable for this application. Hanger assemblies shall be adjusted or shimmed so that door panels are suspended in a plumb manner with no more than 3/8" vertical clearance to the cab entrance threshold. Upthrust rollers shall be adjusted for minimal operating clearance against the bottom edge of the hanger track.
- 3. Each set of multi-speed or single speed side slide doors shall be provided with a new sill-mounted type CL-5 spring closing/relating mechanism as manufactured by G.A.L. Corporation or an approved equal.
- 4. Each set of landing doors shall be provided with a complete new Type "MO" electromechanical interlock assembly for side sliding equipment as manufactured by G.A.L. Corp. or an approved equal. Each interlock assembly shall consist of a switch housing with contacts, lock keeper, clutch engagement/release subassembly, and all associated linkages.
- 5. Non-typical mounting arrangements for interlocks and/or related mechanisms must receive prior approval from the Professional.
- 6. Each hoistway door interlock assembly shall be provided with an emergency release mechanism utilizing a drop-leaf type access key at all landings served.

C. Hoistway Door Hangers, Sheaves and Tracks (New)

- 1. Provide a sheave type two-point suspension hanger and track for each hoistway door. Sheaves shall be hardened steel, not less than 3 1/4 inches in diameter with sealed grease-packed precision ball bearing.
- 2. The upthrust shall be taken by a roller mounted on the hanger and arranged to ride on the underside of the track.
- 3. The track shall be of formed cold rolled steel or cold drawn steel and shall be rounded on the track surface to receive the hanger sheaves. The track shall be removable and shall not be integral with the header.

D. Interlocks, Contacts and Unlocking Devices (New)

1. Equip each elevator hoistway door with a positive interlock which shall prevent the operation of the elevator unless all elevator doors are closed and maintained closed when elevator is away from the landing. The interlocks shall also prevent the opening of a hoistway door from the landing side unless the car is within the landing zone and is either stopped or being stopped at that level. Retiring cams used to actuate interlock shall be securely fastened to car construction and shall be designed to operate without objectionable noise, shock or jar. Design interlocks so that they are not easily accessible from the landing side.

E. Hoistway Side Slide Type Hoistway Doors (Existing)

1. Reuse existing hoistway doors. Provide all new hardware per this specification section.
2. Prep and paint door panels. Refer to Specification Section 099600 "High Performance Coatings."

2.7 CAR APPARATUS/FRAME

A. Car Frame (Reuse)

1. The existing car frame assembly shall be refurbished to as-new condition and reused. Individual car frame members, platform isolation framework, door operator support structure, related bracing and appurtenances shall be inspected for any indication of damage and to determine if the overall assembly is twisted, racked or otherwise distorted. In case any of these conditions are found to exist, the Contractor shall immediately inform the Professional and then undertake whatever corrective action the Professional may deem appropriate to remedy the situation. All fastening between the aforementioned components shall be individually examined, tightened and if necessary renewed.
  - a. Provide new elastomer isolation pads for all existing platforms.
2. The existing car frame, door operator support structure and related bracing shall be modified or reconfigured as necessary in order to accommodate the new cab enclosure and/or related master door operating equipment specified herein.
3. The elevator car shall undergo static balancing upon substantial completion of all work described in the project specifications and subsequent to any car interior refinishing or cab replacement work performed in conjunction with the project.

B. Platform (Reuse)

1. Existing platform shall be modified to accommodate the new apparatus specified herein.
  - a. Underside of platform shall be refurbished and treated with fire-rated material.
  - b. Top of platform shall be refurbished with marine grade plywood set to receive new finished floor covering. Refer to Specification Section 096519 "Resilient Tile Flooring."
  - c. Provide a new safety access "hole ring and cover assembly" to match selected cab finishes.

C. Safety (Reuse)

1. The existing governor actuated car safety device shall be retained, overhauled and upgraded for current code compliance.
2. Readjust safety for proper operation in accordance with current ASME A17. design standards.
3. Check the existing safety-operated switch (plank-switch) for proper adjustment and operation. Provide a new plank-switch where none currently exists.
4. Provide and check the existing safety release tool for proper adjustment and operation. Mount the releasing tool in the machine room in plain sight on the machine room wall. Provide a label above the tool stating that it shall not be removed from the machine room.

D. Automatic Leveling/Releveling Device (New)

1. Equip the elevator with a floor-leveling device which shall automatically bring the car to a stop within 1/4" of floor with any floor for which a stop has been initiated regardless of load or direction of travel. This device shall also provide for releveling which shall be arranged to automatically return the elevator to the floor in the event the elevator should move below or above floor level in excess of 1/4".
2. The leveling device may be separate from, or an integral part of the hoistway encoding and positioning system.

E. Master Door Operating System (New)

1. Furnish and install a new heavy-duty master electric power door operator on the elevator car. Design this operator to operate the car and hoistway door simultaneously. (GAL manufactured type "MOVFR" or approved equal).
  - a. Designate this type of operator as a high-speed operator. Design the door panels to operate at an average opening speed of 2.0 feet per second. Automatic closing of the car and hoistway doors shall be required and the closing speed shall be approximately 1 foot per second. Reduce this closing speed as required to limit the kinetic energy of the closing doors to the values permitted by the ASME Code.
  - b. The doors shall operate smoothly without a slam in both the opening and closing directions. Cushion the doors in their final movement in both directions of travel by electrical means (dynamic braking) only. Air dashpots or hydraulic dampening will not be accepted. Use electrical power to open and close the doors.
  - c. In case of interruption or failure of electric power from any cause, the door operating mechanism shall be so designed that it shall instantly permit emergency manual operation of both the car door and the hoistway door, and the hoistway door shall continue during emergency operation to be self-locking, and self-closing. The door operator shall operate in conjunction with or be equipped with all interlocks and safety contacts specified.
  - d. Construct all door operating levers of heavy steel members. All pivot points shall have either ball or roller bearings, or bronze bushings, of ample size. All brackets and other supports required to support door operating mechanism shall be furnished and installed.
  - e. Provide all new attachments, arms, clutch and related hardware as well as zone-lock devices as required by applicable local codes and ASME A17.1 standards.

F. Car Doors and Car Sill (New)

1. Provide standard 1" to 1.1/4" thick, 14-gauge hollow metal flush construction panels, reinforced for power operation and insulated for sound deadening.

2. Paint the hoistway side of each panel black and face the cab side with 14-gauge stainless steel.
3. The panels shall have no binder angles and welds shall be continuous, ground and invisible.
4. Drill and reinforce panels for installation of door operator hardware, door protective device, door gibs, etc.
  - a. Provide each door panel with two removable laminated plastic composition guides, arranged to run in the sill grooves with minimum clearance.
  - b. The guide mounting shall permit their replacement without removing the door from the hangers.
5. Provide the meeting edge of center opening doors with new low-profile rubber astragal bumper strips.
6. Provide a new car sill that matches the interior of the existing cab finishes. Secure the car sill in an appropriate manner as to provide an acceptable base and support so as not to allow the sill to cave in or otherwise allow deformation.

G. Car Door Hangers, Sheaves, Tracks and Door Clutch (New)

1. Provide a sheave type two-point suspension hanger and track for each car door. Sheaves shall be hardened steel, not less than 3 1/4 inches in diameter with sealed grease packed precision ball bearing.
2. The upthrust shall be taken by a roller mounted on the hanger and arranged to ride on the underside of the track.
3. The track shall be of formed cold rolled steel or cold drawn steel and shall be rounded on the track surface to receive the hanger sheaves. The track shall be removable and shall not be integral with the header.
4. Provide a new gate switch that connects directly to the car door track. The gate switch shall prevent movement of the elevator until such time as it signals the control equipment that the car door has physically closed.
5. Install a new car gate switch and adjust the switch to be code compliant.
6. Install a new door clutch to operate with the new door equipment.

H. Door Reopening Device (New)

1. Provide an infrared curtain door protection system.
2. The doors shall be prevented from closing from an open position if a person interrupts any one of the light rays. When the doors are closing, any interruption of the protective light field shall cause both the car and corridor doors to reverse. The doors shall start to close when the protection system is free of any obstruction.
3. The infrared curtain protective system shall have:
  - a. Height of protective field not less than 71" above the sill.
  - b. Where a horizontal infrared light beam system is used:
    - A minimum of 47 light beams.
    - Accurately positioned infrared lights to conform to the requirements of the applicable handicapped code.
  - c. Modular design to permit on board test operation and replacement of all circuit boards without removing the complete unit.
  - d. Controls to shut down the elevator when the unit fails to operate properly.

I. Top-of-Car Operating Station (New)

1. A new operating station shall be provided on top of the elevator car. This station shall be installed so that the controls are plainly visible and readily accessible from the hoistway entrance without stepping on the car.
2. The new top-of-car operating station shall be provided with the following control devices and appurtenances:
  - a. A push/pull or toggle switch designated "EMERGENCY STOP" shall be arranged so as to prevent the application of power to the hoist motor or machine brake when in the "off" position.
  - b. A toggle switch designated "INSPECTION" to activate the top of car Inspection Service Operation.
  - c. Pushbutton designated "Up", "Down" and "Safe" to operate the elevator on Inspection Service (the "Safe" button shall be arranged to operate in conjunction with either the "Up" or "Down" button).
  - d. An indicator light and warning buzzer that are subject to activation under Phase I - Fire Emergency Recall Operation.

J. Car Enclosure Work Lights and Receptacles (New)

1. The top and bottom of each car shall be provided with a permanent lighting fixture and 110-volt receptacle. Light control switches shall be located for easy accessibility from the hoistway entrance. Where sufficient overhead clearance exists, the car top lighting fixture shall be extended no less than 24" above the crosshead member of the car frame. Light bulbs shall be guarded so as to prevent breakage or accidental contact.

K. Emergency Exit (Top)

1. Ensure they operate as per code and provide or have proper electrical contacts and mechanical locks on the exterior of the cab enclosure.
2. Should side exits exist they shall be securely bolted shut so that they cannot be used in accordance with applicable code.
3. Provide additional support to the emergency exit hatch that will prevent it from giving way and falling into the elevator cab.

L. Car Door Zone Lock Restrictor (New)

1. Provide a car door zone lock restrictor.
2. In case of interruption or failure of electric power from any cause, the door operating mechanism shall permit emergency manual operation of both the car door and the hoistway door within the floor landing zone.
  - a. The hoistway door shall continue to be self-locking and self-closing.
  - b. The door operator shall operate in conjunction with or be equipped with all gate switches and safety contacts required by ASME A17.1 Code.
  - c. Provide zone-lock devices as required by applicable local codes and ASME A17.1

## 2.8 FIXTURES (NEW)

### A. Main Car Operating Panels (New)

1. Provide main and auxiliary car operating pushbutton panels on the inside front return panel of the car. The main panel shall be mounted on the right side while standing inside the cab looking into the hallway.
2. The pushbuttons provided for each floor served shall cause the car to travel to the floor on momentary pressure of the button.
3. The pushbuttons shall become individually illuminated as they are pressed. The button lights shall be extinguished as the calls are answered. LED-type bulbs are required to be utilized on all fixtures.
4. The operating panel shall include:
  - a. A call button for each floor served.
  - b. "Door open" / "Door close" buttons.
  - c. "Alarm" button (Interfaced with emergency alarm).
  - d. "Emergency Stop" switch per local law.
  - e. Hardwired hands-free communication system with call acknowledging feature and A.D.A. design provisions for direct communication to the Capitol Police Command Center (IMCS) in the East Wing of the Capitol.
  - f. Three (3) position firefighter key operated switch, call cancel button and illuminated visual/audible signal system with mandated signage engraved per ASME Standards and/or local law requirements.
  - g. Provide a locked service cabinet flush mounted and containing the keyswitches required to operate and maintain the elevator, including, but not limited to:
    - 1) Independent service switch
    - 2) Light switch.
    - 3) Multiple speed fan switch.
    - 4) G. F. I. duplex receptacle.
    - 5) Emergency light test button and indicator.
    - 6) Inspection Service Operation key switch.
    - 7) Inspection Service Operation key switch.
    - 8) Security override Operation keyed switch. (The keyed switch shall be cut differently than all other switches and provide the standard on/off type function.)
  - h. Car operating panel shall be flush mounted with swing type, one-piece faceplate with heavy-duty concealed hinges.
  - i. The auxiliary operating panel shall provide space for a card reader unit to be mounted behind a plexiglass panel centrally located within easy access for ADA accessibility the riding public.
  - j. Car operating panel shall incorporate a red digital LED floor position indicator, emergency light lens unit and black-filled engraved unit I.D. number or other nomenclature, as approved by the Professional, with a "No Smoking" advisory and the rated passenger load capacity.
  - k. Provide the Car operating panel "full length design" as to cover all pre-existing cutouts or blemishes.
  - l. The certificate frame shall be incorporated into and made part of the fixture.

- B. Car Position Indicator (New) (Incorporate into Car operating panels)
1. The position of the car in the hoistway shall be indicated by the illumination of the position indicator numeral corresponding to the floor at which the car has stopped or is passing.
  2. Provide 2" high, 10-segment red LED type position indicator with direction arrows, integral with the car operating panel.
    - a. Provide Lexan cover lens with hidden support frame behind fixture plate to protect the indicator readout,
    - b. Provide audible floor passing signal per ADA standards.
- C. Voice Annunciator (New)
1. Provide a voice annunciator in each elevator. Coordinate size, shape and design with Designer and other trades. The system shall include, but not limited to:
    - a. Solid state digital speech annunciator.
    - b. A recording feature for customized messages.
    - c. Playback option.
    - d. Built-in voice amplifier.
    - e. Master volume control located and identified for easy access.
    - f. Audible indication for selected floor, floor status or position, direction of travel and nudging.
  2. Locate all associated equipment in a single, clearly labeled enclosure located either in the machine room and/or on car top or COB station.
- D. Traveling Lanterns Car Direction Lantern (New)
1. Provide a traveling lantern with visual and audible signal in the edge of the return post. The lens shall project a minimum of 1/4" and shall be of solid plexiglass. Use tamperproof screws and mount stainless steel faceplate flush with hairline joint.
  2. Car lantern shall indicate the direction of travel when doors are 3/4 open.
  3. The unit shall sound once for the "up" direction and twice for the "down" direction.
- E. Surface-Mounted Corridor Push Button Stations (New)
1. Provide new corridor push buttons as further described:
    - a. Provide two risers of new surface-mounted push button signal fixtures with faceplates per the drawings at each landing. Each new signal fixture shall consist of a illuminating push buttons measuring 3/4" at their smallest dimension as selected by the Professional. New signal fixtures shall be installed directly over top of recessed mounting utilized by the existing corridor fixtures and shall be positioned so as to achieve a centerline button height of 42" above the floor. New signal fixture faceplates shall be installed both plumb and flush to the finished wall.
    - b. Each intermediate landing shall be provided with signal fixtures containing two (2) push buttons while terminal landings shall be provided with fixtures containing a single push button. These buttons shall be arranged to become illuminated on an individual basis as "up" or "down" calls are registered and shall remain so until canceled.
    - c. Provide engraving or laser etching of each cover plate with fire logo as indicated on the drawings.
- F. Cab Emergency Lighting (New) (Incorporate into each Car operating panel)

1. Provide an emergency lighting system to power an emergency lighting fixture and associated components incorporated in the car for at least four (4) hours in accordance with ANSI A17.1 code requirement.
2. Provide nickel cadmium batteries and a charger and mount the power pack on top of car.
3. Arrange for completely automatic operation when normal power is interrupted.
4. Provide a test button and indicator light in the car station.
5. Incorporate lighting lens unit within car operating panel (flush mounted).

G. Cab Enclosure Fan (New)

1. Provide a new exhaust type two-speed fan unit with cover grill, mounting accessories and necessary cab enclosure modifications.
2. New fan unit shall include self-lubricating motor with housing rubber mounted for sound vibration isolation.
3. Provide a multi-speed keyswitch in the elevator cab enclosure for control of fan unit.
4. Provide necessary new wiring and approved conduit to properly connect fan unit with power source and control keyswitch.

H. Fixture Attachment, Finish and Design

1. Graphics shall be as indicated on the drawings and as selected by the Professional.
2. The faceplates shall be stainless steel 1/8" thick minimum.
  - a. No. 4 directional finish.
3. Mount fixtures with tamperproof screws. The screw and keyswitch cylinder finishes shall match faceplate finish.
4. Where key-operated switches and/or key-operated cylinder locks are furnished in conjunction with any component of the installation, keys for each individual switch or lock shall be furnished, stamped or permanently tagged to indicate function.

2.9 SPECIAL REQUIREMENTS - ADA

A. Handicapped Requirements (ADAAG)

1. Locate door-reopening devices at 5" and 29" above the finish floor when individual contact projection apparatus is employed.
2. Locate the alarm button and emergency stop switch at 35", and floor and control buttons not more than 48" above the finished floor.
3. Provide raised markings in the panel to the left of the floor and control buttons. Letters and numbers shall be a minimum of 5/8" and raised .03" and shall be in contrasting color to the call buttons and cover plate.
4. The centerline of the hall pushbuttons shall be 42" above the finished floor.
5. The hall arrival lanterns or cab direction lantern provided shall sound once for the "up" direction and twice for the "down" direction. Design and locate fixtures(s) per Federal standards.
6. Replace any floor designation plates that are missing at each entrance and on both sides of jamb at a height of 60" above the floor. Designations shall be 2" high, raised .03" on a contrasting color background matching the existing.
  - a. Use cast metal plates and polished numbers secured with tamper-proof hardware if applicable. Replacements must match existing plates.
7. Provide an audible signal to tell passenger that the car is stopping or passing a floor served by the elevator.



8. Provide signal controls for passenger entry/exit transitions per Federal standards.
9. Ensure sill-to-sill running clearances do not exceed 1-1/4" at all landings served.
10. Provide visual call acknowledgment signal for cab emergency intercommunication device.

## 2.10 COMMUNICATIONS AND EMERGENCY SIGNALING DEVICES

### A. Harding Communication System:

1. Provide an automatic connection, hands-free two-way speaker in the new car station without a separate faceplate. All components shall be mounted to the back of the panel.
  - a. Provide Harding ICE-217-010 VoIP intercom station.
    - 1) The above item has been approved by the Department as a Proprietary Item. No other item will be accepted. Article 9, Paragraph 9.6, Substitution of Materials, of the General Conditions to the Construction Contract does not apply to the above item.
2. The system shall be arranged to automatically communicate with the Capitol Police at the IMCS in the East Wing of the Capitol via the COWPA Network. Provide an automatic shut-off feature and a pushbutton to initiate a call.
3. The communication system shall be turned on by pressing the emergency alarm or designated pushbutton in the car panel. It shall automatically contact Capitol Police and alert them that there is a problem in the elevator.
4. Provide nicad battery backup to ensure operation under all conditions.
5. The Elevator Contractor shall install the instrument and all wiring, terminating it as an RJ-45 jack in the elevator machine room. The RJ-45 jack will provide connectivity to COWPA via the 5<sup>th</sup> floor IDF room.
6. All connections from the RJ-45 jack to the communication system shall be done by the Elevator Contractor. Provide dedicated CAT 6 and spare CAT 6 traveling cables as required for the Harding Communications System.
7. The entire system shall be designed and located in accordance with A.D.A. Standards to include visible call acknowledging, engraved advisories, etc.
8. The .4 Electrical Contractor shall provide the RJ-45 jack in the machine room and CAT 6 cable to the 5<sup>th</sup> floor IDF room.
9. The Client Agency shall arrange to have the Office of Administration IT provide a network address and connectivity to the IMCS.

### B. Emergency Alarm/Battery Back-up and Common Alarm Bell (New)

1. Provide a new car-mounted battery unit including solid-state charger and testing means enclosed in common metal container.
  - a. The battery shall be rechargeable nickel cadmium with a 10-year minimum life expectancy.
  - b. The alarm bell shall be mounted directly to the battery/charger unit and connected to sound when any alarm pushbutton or stop switch in the car enclosure is operated.
  - c. The bell shall be configured to operate from power supplied by the building emergency power generator.
2. Provide a new common alarm bell located in the elevator pit.

- a. The bell shall be configured to operate when the alarm or stop switch of any elevator is activated, during both normal and battery back-up power conditions.
- b. Existing common alarm bells may be rehabilitated and reused providing they meet the intent of this section and applicable codes.

## PART 3 - EXECUTION

### 3.1 EQUIPMENT MANUFACTURERS

- A. The following manufacturers' equipment and materials, or equivalent as approved by the Professional, for use on this project. Other equipment not specifically mentioned shall be considered for approval on an individual basis by the Professional.
  - 1. Controller - Smartrise Engineering, GAL Galaxy, ESI Controls.
  - 2. Tracks, Hangers, Interlocks and Door Operators - G.A.L.
  - 3. Fixtures - G.A.L., EPCO, Monitor, C.E. Electronics, Innovation, PTL.
  - 4. Door Protective Device - Janus, G.A.L., T.L. Jones, Tri-Tronics.
  - 5. Entrances/Entrance Door Panels - EDI/ECI, EMCO, SmartTork.
  - 6. Machines - Torin Drive International, Hollister-Whitney
  - 7. Motors and Motor Generators - Torin, Imperial Electric, General Electric, Baldor, Reuland.
  - 8. VVVF Power Drives - Mitsubitsi, MagneTek, Yaskawa.
  - 9. Guide Rails - AFD Industries.
  - 10. Electrical Traveling Cables – Draka.
  - 11. Guide Shoes/Rollers – ELSCO.
  - 12. Wire Ropes - Paulsen, Bethlehem, Alps, Draka.

### 3.2 INSPECTION BY THE PROFESSIONAL

- A. Study the Contract Documents with regard to the work as specified and required so as to ensure its completeness.
- B. Examine surface and conditions to which this work is to be attached or applied and notify the Professional in writing, via an RFI in eBuilder, if conditions or surfaces are detrimental to the proper and expeditious installation of the work. Starting the work shall imply acceptance of the surfaces and conditions to perform the work as specified.
- C. Verify, by measurements at the job site, dimensions affecting the work. Bring field dimensions which are at variance with those on the accepted shop drawings to the attention of the Department and the Professional. Obtain the decision regarding corrective measures before the start of fabrication of items affected.
- D. Cooperate in the coordination and scheduling of the work of this section with the work of other sections so as not to delay job progress.

### 3.3 INSTALLATION

- A. Modernize the elevators, using skilled workmen in strict accordance with the final accepted shop drawings and other submittals.
- B. Comply with the code, manufacturer's instructions and recommendations.

- C. Coordinate work with the work of other building functions for proper time and sequence to avoid delays and to ensure right-of-way of system. Use lines and levels to ensure dimensional coordination of the work.
- D. Accurately and rigidly secure supporting elements within the shaftways to the encountered construction within the tolerance established.
- E. Provide and install motors, switches, controls, safety and maintenance and operating devices in strict accordance with the submitted wiring diagrams and applicable codes and regulations having jurisdiction.
- F. After installation, touch up in the field, surfaces of shop primed elements which have become scratched or damaged.
- G. Lubricate operating parts of system as recommended by the manufacturer.

### 3.4 PROTECTION AND CLEANING

- A. Adequately protect surfaces against accumulation of paint, mortar, mastic and disfiguration or discoloration and damage during shipment and installation.
- B. Upon completion, remove protection and thoroughly clean work and have it free from discoloration, scratches, dents and other surface defects.
- C. The finished installation shall be free of defects. Before final completion and acceptance of the building, repair and/or replace defective work, to the satisfaction of the Department and the Professional, at no additional cost.

### 3.5 BARRICADES AND HOISTWAY SCREENING

- A. The Contractor shall provide whatever barricades are necessary in order to maintain adequate protection of areas in which work specified by the Contract Documents is being performed, including open hoistway entrances. Fabrication and erection as all barricades shall be in compliance with applicable OSHA regulations.
- B. As required, the Contractor shall provide temporary wire mesh screening in the hoistway and of any elevator undergoing work specified in the Contract Documents. This screening shall be installed in such a manner as to completely segregate the hoistway from that of adjacent elevators. Screening shall be constructed from .041" diameter wire in a pattern that rejects passage of a 1" diameter ball.

### 3.6 PERFORMANCE AND OPERATING REQUIREMENTS

- A. Passenger elevators shall be adjusted to meet the following performance requirements:
  1. Speed: within 5% of rated speed under any loading condition.
  2. Leveling: within 1/4" under any loading condition.
  3. Typical Floor-to-Floor Time: Recorded from the doors start to close on one floor until they are 3/4 open at the next floor.  
Passenger Elevators: PE7 - 16.0 seconds.
  4. Door Operating Times for 42" center opening:
    - Opening - 1.6 seconds
    - Closing - 2.6 seconds

5. Door dwell time for hall calls: 4.0 seconds with Advance lantern signals.  
Door dwell time for hall calls: 5.0 seconds without Advance lantern signals.  
Door dwell time for car calls: 3.0 seconds.
6. Reduced non-interference door dwell time: 1.0 seconds.

B. Maintain the following ride quality requirements for the passenger elevators:

1. Noise levels inside the car shall not exceed the following:
  - a. Car at rest with doors closed and fan off - 40 dba.
  - b. Car at rest with doors closed, fan running - 55 dba.
  - c. Car running at high speed, fan off - 50 dba.
  - d. Door in operation - 60 dba.
2. Horizontal accelerations, peak to peak shall not exceed 18 milli g in the frequency range of 1 to 10 Hz.
3. Amplitude of acceleration and deceleration shall not exceed 4 feet per second, per second. A sustained jerk shall not be more than twice the acceleration. The rate of change in the acceleration/deceleration rate shall not be more than 8.0 ft/sec.<sup>3</sup>.

### 3.7 INSPECTIONS

- A. Upon completion of the work phase for the elevator modernization specified herein, the Contractor shall, at its own expense, arrange and assist with whatever inspections that are required by the L&I Elevator Division.

### 3.8 ACCEPTANCE TESTING

- A. The Contractor shall provide at least five (5) days prior written notice to the Department and the Professional regarding the exact date on which work specified in the Contract Documents will reach completion on any single unit of vertical transportation equipment. In addition to conducting whatever testing procedures may be required by local inspecting authorities in order to gain approval of the completed work, and before seeking approval of said work by the Department and the Contractor shall perform certain other tests in the presence of the Professional. To that end, the Contractor shall provide test instruments, test weights, and qualified field labor as required to safely operate the elevator under load conditions that vary from empty car to full rated load and, in so doing, to successfully demonstrate compliance with applicable performance standards set forth in the project specifications with regard to:

1. Sustained high-speed velocity of the elevator in either direction of travel;
2. Brake-to-brake running time between adjacent floors;
3. Floor leveling accuracy;
4. Ride quality inside the elevator car;
5. Load settings at which anti-nuisance, load dispatch, and load non-stop features are activated.

- B. Upon completion of work specified in the Contract Documents on the last car in any group of elevators, and in conjunction with the aforementioned testing procedures, the Contractor shall carry out additional testing of group dispatch/supervisory control features in the presence of the Professional. To that end, the Contractor shall provide test instruments and qualified field labor as required to successfully demonstrate:

1. The back-up operating mode for group dispatch failure;
2. Simulated and actual emergency power operation;

3. Restricted access security features;
4. Zoning operations and floor parking assignments;
5. Up/down peak operation;
6. Response to corridor calls that fall into the "long-wait" category;
7. Lobby dispatch operations.

### 3.9 SUBSTANTIAL COMPLETION

- A. The work shall be deemed "Substantially Complete" for an individual unit or group of units when, in the opinion of the Professional, the unit is complete, such that there are no material and substantial variations from the Contract Documents, and the unit is fit for its intended purpose.
  1. L&I Elevator Division testing shall be completed and approved in conjunction with inspection for operation of the unit; a certificate of operation or other required documentation issued; and remaining items mandated for final acceptance completion are limited to minor punch list work not incorporating any life safety deficiencies.
  2. The issuance of a substantial completion notification shall not relieve the Contractor from its obligations hereunder to complete the work.
  3. Final completion cannot be achieved until all deliverables, including but not limited to training, spare parts, manuals, and other documentation requirements, have been completed

END OF SECTION 142001

## SECTION 142003

### ELECTRIC TRACTION FREIGHT ELEVATOR MODERNIZATION

#### PART 1 - GENERAL

##### 1.1 STIPULATIONS

- A. The specification sections "General Conditions of the Construction Contract," "Special Conditions," and "Division 1 - General Requirements" form a part of this section by this reference thereto and shall have the same force and effect as if printed herewith in full.

##### 1.2 SUMMARY

- A. Section includes modernization of electric traction freight Elevator No. 8.
  - 1. Section 055000 "Metal Fabrications" for the following:
    - a. Pit ladders.
  - 2. Section 099600 "High Performance Coatings" for field painting of steel components.
  - 3. Section 283111 "Digital, Addressable Fire-Alarm System" for smoke detectors in elevator lobbies to initiate emergency recall operation and heat detectors in shafts and machine rooms to disconnect power from elevator equipment before sprinkler activation and for connection to elevator controllers.

##### 1.3 DEFINITIONS

- A. Definitions in ASME A17.1/CSA B44 apply to work of this Section.

##### 1.4 SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information.
- 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. 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. Qualification Data: For Installer.

- E. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service including standby power generator, as shown and specified, are adequate for elevator system being provided.
- F. Sample Warranty: For special warranty.
- G. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
  - 1. In addition to items specified elsewhere for Operation and Maintenance Data, include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.
- H. Inspection and Acceptance Certificates and Operating Permits: As required by the Pennsylvania Department of Labor & Industry (L&I) Elevator Division unrestricted elevator use.
  - 1. Contractor shall prepare the L&I Elevator Division LIBI-26 Application for Construction and Alteration of a Lifting Device.
    - a. Coordinate seal and signature of the application with the Professional.
  - 2. Contractor shall provide a variance from the L&I Elevator Division for all existing non-complying conditions in the elevator machine room, such as the clearances beneath the transverse beams bisecting the machine room.

#### 1.5 QUALITY CONTROL

- A. Installer Qualifications: Elevator manufacturer or an authorized representative who is trained and approved by manufacturer.

#### 1.6 CONTRACTOR SUPERINTENDENT

- A. The Contractor shall assign a competent project superintendent and Labor during the work progress and any necessary assistant, all satisfactory to the Department or the Professional. The superintendent shall represent the Contractor and all instructions given to him shall be as binding as if given to the Contractor.

#### 1.7 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.

#### 1.8 COORDINATION

- A. Coordinate locations and dimensions of other work relating to electric traction freight 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.

## 1.9 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.
- 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.
  - Warranty Period: One year from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 GENERAL DESCRIPTION

- A. Elevators FRT8 A Total of one (1) Elevator:

1.	Quantity:	One (1) Freight Elevator
2.	Type:	Geared Overhead Traction
3.	Capacity (lbs.):	FRT 8 - 8000 / Retain Existing
4.	Speed (fpm):	FRT 8 – 150 F.P.M. / Retain Existing
5.	Travel in Feet:	Field Verify / Retain Existing
6.	Number of Landings:	FRT 8 – Six (6) @ G, 1, 2, 3, 4, 5
7.	Front:	FRT 8, – Six (6) @ G, 1, 2, 3, 4, 5 Retain Existing
8.	Rear:	None
9.	Operation:	FRT 8 – Simplex Operation (New)
10.	Control:	Microprocessor Control (New)
11.	Number of Pushbutton Risers	One riser (1) (New)
12.	Platform Size:	FRT 8 – 9'5" x 16'3" / Retain Existing
13.	Guide Rails:	Steel T's / Retain Existing
14.	Buffers:	Spring Buffers / Retain Existing
15.	Cab Enclosure:	No work performed to cab during the Modernization
16.	Car Door Size:	FRT 8 Front 10' Tall" x 16'3" / Rear 10'Tall x 12'7"
17.	Hoistway Door Size:	FRT 8 Front 10' Tall" x 16'3" / Rear 10' Tall x 12'7"
18.	Door Operation:	Peelle Door Operator, (New gate and door panels – New Door Operators)
19.	Fixture and Signals:	Standard Fixtures (New)
20.	Machine Type:	Geared Traction (New)
21.	Machine Location:	Overhead
22.	Power Supply:	480 VAC / 3 Phase / 60 HZ (Confirm and retain existing)



## 2.2 CONTROL FEATURES/FUNCTIONS

### A. Simplex Automatic Selective Collective Freight Operations (New)

1. The elevator shall automatically travel to landings for which a call demand exists. Stops in response to calls that are registered in either the car or corridor push-button stations shall occur in the natural order of progression in which the floors are encountered, depending on the direction of car travel, and irrespective of the order in which calls are registered. In responding to corridor calls, the elevator shall answer only those demands that correspond to the direction in which the car is traveling.
2. Call acknowledgment lights provided in both the car and corridor push-button fixtures shall be extinguished as the car begins its slowdown approach to the corresponding landing. Immediately after cancellation, a corridor call shall be inoperative until the elevator doors have completed their dwell time in the open position and commenced their closing cycle.

### B. Motion Control (New)

1. Smooth stepless acceleration and deceleration of the elevator car shall be provided in either direction of travel during both single and multiple floor runs. The amplitude of acceleration and deceleration shall not exceed  $4.5 \text{ ft/sec}^2$ . The maximum velocity which the elevator achieves in either direction of travel while operating under load conditions that vary between empty car and full rated load shall be within  $\pm 2\%$  of the rated speed.
2. Floor leveling accuracy of  $\pm 1/4"$  as measured between the car entrance threshold and the landing sill on any given floor shall be provided. This accuracy standard shall be maintained under varying load conditions and without need for releveling corrections caused by overshooting or stopping short of the floor (spotting).
3. Brake-to-brake elapsed time during a typical elevator one floor run shall not exceed 5.5 seconds. Timing, as measured between initial brake lift and the moment the brake sets with the car position level at the next adjacent floor, shall remain consistent under varying load conditions in either direction of travel.
4. Elapsed flight time during a typical elevator one floor run shall not exceed 12.0 seconds. Timing, as measured between the moment door closing operations begin and when the doors are  $3/4"$  open at the next adjacent floor, shall remain consistent under varying load conditions in either direction of travel. Pre-opening operation shall be available should it be requested by ownership or their representative.

### C. Freight Elevator/Bi Parting Landing Door Operation (New)

1. Freight car and Bi Parting landing doors shall be arranged to operate in unison without excessive noise or slamming in either direction of travel. Door opening speeds shall be consistent in conjunction with closing speeds in accordance with governing code. Door operation shall be arranged to commence as the car enters its final leveling approach to a landing. In no case shall the door opening cycle conclude before the car comes to a complete stop at floor level.
2. Door open and door close elapsed time shall be measured between the moment car door operation in either direction begins and the instant at which that particular cycle is completed.
3. When responding to either a car or corridor call, the amount of time that the elevator doors remain stationary in the open position shall be adjustable anywhere up to sixty (60) seconds. Door open dwell time for corridor calls shall be separate of that for car calls, and in both cases, dwell time shall be canceled whenever the door close push button is depressed.

4. Where door protective devices are provided, the operation of the device by physical contact (mechanical safety-edge or sensor edge) or the interruption of one or more infrared light beams (dual or multi-beam non-contact) during the close cycle shall cause the immediate reversing of the doors to the full open position.
5. The door closing cycle shall be arranged so that, in the event the door protective devices become continually obstructed after the normal door open dwell time has expired, and following a time interval of approximately thirty (30) seconds (adjustable), a warning tone shall sound and the door closing cycle shall commence at reduced speed and torque per ASME A17.1 Code requirements if applicable.
6. Repeated attempts by the power door operator mechanisms to open or close the doors at any landing shall be monitored by the new microprocessor-control door system. In the event the doors should fail to cycle properly after a preset (adjustable) number of attempts, the door controller shall be capable of removing the door power system from operation.

D. Car Door Operation (New)

1. Car door shall be arranged to operate in unison with the corridor door safety interlock release mechanism. Door opening speeds shall be consistent in conjunction with closing speeds in accordance with governing code. Door operation shall be arranged to commence after the car enters its final leveling approach to a landing. In no case shall the door opening cycle conclude before the car comes to a complete stop at floor level with machine brake set.
2. When responding to either a car or corridor call, the amount of time that the elevator car door remains stationary in the open position shall be adjustable anywhere up to sixty (60) seconds.
3. Repeated attempts by the power car door operator mechanisms to open or close the car doors at any landing shall be monitored by the new microprocessor door control system. In the event the doors should fail to cycle properly after a preset (adjustable) number of attempts, the door controller shall be capable of removing the door power system from operation.

E. Hoistway Access Operation (New)

1. Provision shall be made to allow access to the hoistway through the use of hoistway access switches.
2. Operating the access switch shall permit the car to be moved at slow speed (inspection speed) with the doors open to allow authorized persons to obtain access to the top of the elevator car.
3. Access operation must be code compliant and conform to the current A17.1 Code for elevators and escalators.

F. Fire Emergency Operation (New)

1. Phase I - Emergency Recall Operation shall be provided for each car in accordance ASME/ANSI A17.1 code as modified under the applicable local or State law.
2. Each main car operating station shall be provided with an indicator light and warning buzzer, each of which shall become activated whenever Phase I Operation is engaged. The warning buzzer shall cease to function once the car has completed the recall sequence and is positioned at the designated recall landing. The indicator light shall remain illuminated as long as Phase I Operation is activated.
3. A three-position, key-operated switch shall be provided on the designated recall landing to manually activate Phase I Operation. When activated, Phase I Operation shall be arranged so that in order to reset normal service, all cars must first be returned to the designated recall landing, after which the Phase I key-switch must be turned to the "OFF" position.

4. Phase II - Emergency Recall In-Car Operation shall be provided for each car in accordance with ASME A17.1 code as modified under local or State law.
5. Each main car operating station shall be equipped with a three-position, key-operated switch to engage Phase II Operation on elevators which have completed the Phase I recall sequence, and which are parked at the designated recall landing or alternate floor landing. Subsequent to activating Phase II Operation on any elevator, that elevator must be returned to the designated recall landing in order to discontinue that service mode.
6. Each main car operating station shall be provided with a "CALL CANCEL" pushbutton that functions only under Phase II operating mode. When activated, pressing the "CALL CANCEL" button shall cause any previously registered car calls to cancel per ASME standards.
7. Each main car operating station shall incorporate the National Standard fire logo and/or operating instructions, engraved and red color filled, as required by the applicable local or State law requirements.

G. Smoke Detector System (New)

1. The elevator contractor shall coordinate with the .4 Electrical Contractor to provide a complete smoke detector system for elevator recall to comply with the governing authority's requirements and ASME A17.1 as approved or modified under local law. The new system shall be configured as follows:
  - a. Smoke detectors shall be installed in the elevator lobby at each floor, top of hoistway, in pit areas and associated elevator machine room in accordance with NFPA No. 72A through 72E, Automatic Fire Detectors, Chapter 4. The activation of a smoke detector in any elevator lobby or associated elevator machine room other than the designated level (first floor) shall cause all cars in all groups that serve that lobby to return non-stop to the designated level (ground floor). If the smoke detector at the designated level (ground floor) is activated, the cars shall return to an alternate level (first floor) unless the Phase 1 key-operated switch is in the "firemen service" position. Smoke detectors and/or smoke detector system shall not be self-resetting.
  - b. Elevator recall system shall incorporate a minimum number of zones as follows:
    - 1) Zone 1: Ground Floor.
    - 2) Zone 2: Alternate Floor (first floor).
    - 3) Zone 3: Machine Room.
    - 4) Zone 4: Top of shaft way.
    - 5) Zone 5: Pit.
    - 6) Zone 6: Fire hat.
    - 7) Zone 7: To all typical landings serviced.
  - c. The smoke detectors required for elevator recall shall be part of the building fire alarm system upgrade. All additional programming needed to allow the "tie in" to occur shall be at the expense of the elevator contractor.
  - d. Regarding Item c above, should any modifications to the existing fire alarm be required as part of the utilization of that system, the elevator contractor shall take full responsibility for its operation. Additionally, any cost associated with the above referenced work shall be included in the project pricing. No change orders shall be applicable under any circumstances.

#### H. Emergency Power Operation (New)

1. Provisions shall be included in all of the new elevator control systems whereby, immediately after transferring to the building emergency power system, all affected elevators shall automatically return to the main fire recall landing in progressive numerical sequence at normal operating speed. Car and corridor calls shall become inoperative, and all previously registered calls shall be canceled. As the car arrives at the designated landing, it shall park out of service with its door in the open position.
2. Upon completion of the recall process, one elevator shall respond as if it were in normal power mode (see Section 2.8 Fixtures for specific information regarding the panel). Upon power removal and normal power being restored to the building, a pre-initiation input to the elevator controller's computer shall cause the elevator to stop at the nearest available floor, if not already stopped, open its doors and wait for a power confirmation from a switch gear and the power with usable characteristics has been restored. The unit may then be allowed to go back into service.
3. An emergency power generator is present and in working order, including switch gear operation. The elevator contractor shall size, confirming all new loads to be acceptable for the new proposed elevator equipment, and provide all necessary connections and tie ins required to make the emergency generator functional and perform in a code compliant and acceptable manner.
4. The emergency power control panel shall have capacity to add two new 5,000 lb. MLR traction elevators to be added to the State Museum via future Phase 6.
5. Locate the emergency power control panel in Fire Command G-40A.

#### I. Independent Service Operation (New)

1. The car operating station shall be equipped with a key-operated switch labeled "IND SER". When placed in the "on" position, this switch shall cause the elevator to bypass all corridor calls and to travel directly to any floor chosen by registration of a car call. During Independent Service Operation, the elevator doors shall remain open at any landing until the door close or car call registration pushbutton, is pressed and maintained until the doors are fully closed.
2. In case an elevator is operating on the Independent Service mode and the Fire Emergency Recall system becomes activated, following a period of approximately forty-five (45) seconds, the elevator shall automatically override Independent Service Operation and engage Phase I - Fire Emergency Recall Operation.
3. If more than one (1) car call is registered, all registered car calls shall extinguish when the elevator stops in response to the first call.

#### J. Car Security Operating Controls (New)

1. Provide necessary software/hardware to operate security feature for all car calls and each floor push button for all landings served.
2. Arrange special key operated switch located in the COP (behind locked door) to override the security system functions.
3. Override security controls with fire emergency controls in accordance with code and local laws.
4. Provide all Security System Interface and Camera Control Wiring as necessary including "wire and terminations" to operate the above referenced control systems. Mounting the card readers and security cameras shall be the responsibility of the Security Contractor, however the elevator contractor shall allow access and supply assistance on an as needed basis free of additional charge should access be requested.
  - a. Provide necessary provisions (including software) for security service for each elevator and its associated interface between outside vendor (Security Company) and elevator system.

- b. Provide and identify a manual override toggle switch on the exterior of the group or master controller that will remove all of the units from security mode. The switch must be identified by a permanent label with lettering at least three (3) inches tall and shall be accessible by building personal.
- c. Power Supplies and incidentals required for the card readers and or security cameras shall be supplied by the security contractor. The elevator contractor shall supply the appropriate power source (120 VAC) to the vicinity in which the power source is required to operate the security contractor's equipment in an efficient and acceptable manner.
- d. Should an interface box need to be utilized between the security contractor and elevator equipment the security company shall supply and mount the box in an acceptable location. The elevator contractor shall provide the appropriate pipe and wire to accomplish the required tasks and shall work together with the security contractor to terminate and make the appropriate connections as required in both the elevator controller and interface box.
- e. Provide the required wiring for card reader access and camera controls to be included in the traveling cables. Before ordering the wire the elevator contractor shall confirm the type of wire required with the security company. Splicing of wire or wires will not be accepted.

K. Provide Fire Service interface provisions (New)

- 1. Provide to tie in and make operational fire emergency control interface provisions consisting of primary, alternate and flashing hat subject to activation by fire sensing devices (ref. NFPA 72E, Chapter 4) located in the elevator machine rooms, the hoistways, or in the elevator lobby on any landing other than the designated fire recall landing (Main Floor). The contacts shall be wired to an electrical junction box located inside each elevator machine room for connection to the elevator control systems by the Contractor. Each wire shall be clearly labeled with its control function.

## 2.3 MACHINE ROOM EQUIPMENT

A. Control Equipment (New)

- 1. A new microprocessor-based elevator control system shall be provided. This equipment shall utilize digital logic to calculate optimum acceleration and deceleration patterns for the car to follow during each run. Closed-loop distance and velocity feedback shall be provided to monitor the degree to which actual performance of the elevator car conforms to the desired speed profile. Basic systems operating software shall be stored in non-volatile, electrically programmable read only memory (EPROM), whereas field adjustable parameters shall be stored in an electrically erasable programmable read only memory (EEPROM).
- 2. Elevator control relays, contactors, switches, capacitors, resistors, fuses, circuit breakers, overload relays, power supplies, circuit boards, static motor drive units, wiring terminal blocks and related components shall be totally enclosed inside a free-standing metal cabinet with hinged access doors. Control equipment cabinets shall be provided with forced air ventilation to prevent overheating of the electrical components housed therein.
- 3. All electrical wiring inside the control equipment cabinet, whether done in the factory or at the job site, shall be performed in a neat, workmanlike manner. All field wiring shall terminate at stud blocks provided inside the control equipment cabinet for that purpose. Each wiring terminal shall be clearly identified according to the nomenclature used on the "as built" wiring diagrams. No more than two (2) field wires may be connected to any single terminal stud. Spare wires shall be tagged according to their point of termination, bundled, and neatly placed at the bottom of the control equipment cabinet.

4. Alphanumeric identification symbols shall be permanently affixed to each electrical component housed within the control equipment cabinet. These identification symbols shall be identical to those depicted on the "as built" wiring diagrams.
  5. A 14" or larger CRT display monitor shall be provided inside the elevator machine room for diagnostic purposes. By means of graphic depiction, information available on the screen shall include:
    - a. An overview of car and corridor calls currently existing within the system.
    - b. Elevator operating status.
    - c. Elevator position, direction of travel and velocity.
    - d. The open/close status of elevator doors.
    - e. The current operational status of each CPU input and output.
    - f. A sequential history of faults detected within the control system over the previous thirty (30) days.
  6. In case placement of new elevator control equipment cabinets inside the machine rooms should interfere with direct sight lines between the main line disconnect switch and rotating equipment belonging to the affected elevator, an auxiliary locking disconnect switch shall be provided. The mounting location of this auxiliary disconnect switch shall be chosen so as to provide clear sight of the associated rotating equipment.
- B. Worm Geared Traction Machines (New – with New AC Motor)
1. Machine Beams (Existing)
    - a. Provide additional support beams, angles, plates, bearing plates, blocking steel members, etc., to support new machine, governors, dead end hitches, deflector and overhead sheaves from existing machine beams if applicable. Contractor is required to verify adequacy of existing machine support and report any inadequacies via an RFI in eBuilder.
  2. Geared Traction Machine and Deflector Sheaves (New)
    - a. Provide a new worm-gearred traction machine with motor, DC brake and demountable drive sheave, mounted in proper alignment on a common bedplate. The worm shall be accurately machined from steel and provided with a single end, double race ball bearing thrust. The worm gear shall be made from a phosphor bronze rim, accurately cut, fitted and bolted to a cast iron spider. The drive sheave shall be a demountable casting from the best grade of metal with a Brinell hardness of 215 to 230, and shall be machined with grooves, providing maximum traction with a minimum of cable and sheave wear. Provide means for lubricating the machine. The gear housing shall have a gasketed hole to inspect the gear.
    - b. Provide machine with an electro-mechanical brake. The brake shall be spring applied and electrically released. Swivel type brake shoes shall be applied to the braking surface simultaneously and with equal pressure by means of helical compression springs. Design the brake electro-magnet for quick release to provide smooth and gradual application of brake shoes.
    - c. Span the distance between the car and counterweight with an accurately grooved new deflector sheave. Mount the new deflector sheave to the bedplate in the machine room. Provide sheave guards to prevent ropes from jumping off grooves and to prevent possible entrapment on both sides of the floor penetrations.
    - d. Provide sound reducing vibration isolation elements at all support points of the elevator hoisting motors and machines. Elements between the hoisting machine (unitized base) and machine support beams shall be similar to triple (3) layer ribbed neoprene pads, separated by appropriate steel shims as manufactured by Mason Industries, Type W pads, at 50 durometers, loaded for 40 psi. All bolts through isolation elements, where necessary, are to incorporate resilient washers and bushings.

- e. Provide hoist cable guards at the car and counterweight drop side of the hoisting machine sheave to prevent accidental contact with the hoisting cables. The guard shall extend from the point where the hoisting cables penetrate the machine room floor slab to a point beyond where the cables contact the traction and new deflector sheaves. The guards shall also be constructed so as to conceal pinch-points between cables and sheave grooves.

3. Machine Brake (New)

- a. Provide the hoisting machine with a spring applied and electrically released electromechanical brake. Swivel type brake shoes shall be applied to the braking surface simultaneously and with equal pressure by means of helical compression springs. Design brake electromagnet for quick release to provide smooth and gradual application of the brake shoes.
- b. Brakes shall be designed and adjusted to safely hold 125% of rated full load capacity in accordance with applicable code.

4. AC Drive Motor (New)

- a. Provide a new variable speed, reversible alternating current induction motor with high starting torque and low starting current, rated for 50° C (122° F) during continuous operation, designed for this particular elevator application.
  - 1) Ensure that adequate ventilation of internal stator windings and rotating element is provided to prevent overheating with thermal overload protection.
- b. The new hoist motor housing shall have a rigid cast iron stator frame for maximum strength and rigidity. Core Plate stator laminations shall be press fit into frame and properly secured. Stator windings shall be insulated with Mylar Paper laminate, formed and fit to core.
- c. New rotating element shall be fabricated from drawn bars machined and fitted in slots with end rings brazed together. Complete rotating element shall be dynamically balanced for vibration-free operation.
- d. Motor shaft shall be manufactured from carbon hot rolled steel for maximum strength.
- e. Properly align new hoisting motor and make all necessary electrical connections to the control circuitry.

C. VVVF AC Drive (New)

- 1. A solid-state, variable voltage, variable frequency (VVVF), 3-phase AC hoist motor drive system shall be provided as an integral part of the new microprocessor-based equipment. The primary component of this VVVF drive system shall be a low-noise, flux-vector inverter device, featuring a digital LED readout and touch-key pad, designed to facilitate software parameter adjustments, monitor systems' operation and display fault codes.
- 2. In addition to an inverter, the VVVF drive unit shall consist of a separate dynamic braking module to reduce hoist motor deceleration time, a resistor bank to absorb power regenerated by the hoist motor, and a HP rated 3-phase AC contactor with overload protection to disconnect the inverter from the hoist motor whenever the elevator is stopped.
- 3. The system shall be designed and configured with countermeasures for noise generated by the pulse-width modulated (PWM) inverters. Countermeasures shall include; but are not limited to, control of radiated noise via inverter and/or motor cables, conducted noise through power lines, induction noise and ground noise.

- a. Inverter device shall be encased in metal and properly grounded independently.
- b. A noise filter for the input power line shall be provided to prevent penetration into radios, wireless equipment and detectors.
- c. Provide interconnection wiring and ground cables in accordance with the manufacturer's design requirements.

D. Governor (New)

- 1. Provide a speed governor, located overhead, to operate the car safety.
  - a. Maintain the proper tension in the governor rope with a weighted tension sheave located in the pit. Springs used to develop the tension are not acceptable.
  - b. Provide rope grip jaws, designed to clamp the governor rope to actuate the car safety upon a predetermined overspeed downward. Rope grip jaws directly coupled to the governor mechanism so as to float with governor movement shall not be permitted.
  - c. Centrifugal type governors shall trip and set rope jaws within 60 degrees of governor sheave rotation after reaching rated tripping speed.
  - d. Design the governor rope-tripping device so that no appreciable damage to or deformation of the governor rope shall result from the stopping action of the device in operating the car safety.
  - e. Provide an electrical governor overspeed protective device which, when operated, shall remove power from the driving machine motor and brake before or at the application of the safety. The setting for the overspeed switches shall be as prescribed in the ASME A17.1 Code.
    - 1) Locate and enclose the switch to insure that excess lubrication will not enter the switch enclosure.
    - 2) Overspeed switches shall operate in both direction of travel on systems employing static power drive units.
  - f. Seal and tag the governor with the running speed, tripping speed and date last tested.

E. Equipment Isolation (New)

- 1. Provide sound reducing vibration isolation elements at all support points of elevator controller, solid-state motor drives, isolation transformers, hoisting motors and machines. The elements for controllers, solid-state motor drives and isolation transformers shall be similar to double deflection neoprene-in-shear mounts, as manufactured by Mason Industries, Type ND, with 0.35" static deflection under design load ratings. Elements between the hoisting machine (unitized base) and machine support beams shall be similar to triple (3) layer ribbed neoprene pads, separated by appropriate steel shims as manufactured by Mason Industries, Type W pads, at 50 durometers, loaded for 40 psi. All bolts through isolation elements, where necessary, are to incorporate resilient washers and bushings.

F. Deflectors and Idler Sheaves (New)

- 1. Provide new overhead and/or machine room wire rope cable deflector sheaves with related apparatus and structural mounting supports.
- 2. Locate and size new sheaves to maximize use of available clearances maintaining the present car and counterweight hitch drops.
- 3. New support bearings shall be of a roller type designed for a minimum of twice the total load calculation equipped with pressure activated or other suitable lubrication devices.



4. Required mounting beams and structural supports shall be interfaced with existing building structures modified under the terms of this contract for the new design rated and located loading.
5. Provide sheave guards for all apparatus and secure same to supporting building elements.

G. Ascending Car Overspeed Protection Device (New)

1. Provide a device designed to prevent an ascending elevator from striking the hoistway overhead structure.
2. The device shall decelerate the car with any load up to the rated capacity by applying an emergency brake.
  - a. The device shall detect an ascending car overspeed condition of not greater than 10% higher than the speed that the car governor is set to trip.
  - b. The device, when activated, shall prevent operation of the car until the device is manually reset.
  - c. The device shall meet the requirements of the ASME A17.1 Safety Code as may be modified by the Authority Having Jurisdiction.

H. Unintended Car Movement Protection Device (New)

1. Provide a device to prevent unintended car movement away from the landing when the car and hoistway doors are not in the closed and locked.
  - a. The device shall prevent such movement in the event of failure of:
    - 1) The electric driving machine motor
    - 2) The brake
    - 3) The machine shaft or shaft coupling
    - 4) Gearing
    - 5) Control system
    - 6) Any component upon which the speed of the car depends
    - 7) Suspension ropes and the drive sheave of the traction machine are excluded.
  - b. The device shall prevent operation of the car until the device is manually reset.
  - c. The device shall meet the requirements of the ASME A17.1 Safety Code as may be modified by the Authority Having Jurisdiction.

I. Freight Door Control Equipment (New)

1. A new microprocessor-based Freight door control system shall be provided. Closed-loop distance and velocity feedback shall be provided to monitor the degree to which actual performance of the elevator car conforms to the desired speed profile. Basic systems operating software shall be stored in non-volatile, electrically programmable read only memory (EPROM), whereas, field adjustable parameters shall be stored in an electrically erasable programmable read only memory (EEPROM).

## 2.4 HOISTWAY APPARATUS

A. Car and Counterweight Guide Rail Systems (Reuse)

1. Car and counterweight guide rails, fish plates, rail brackets, backing support and related attachments shall be inspected to determine if unfavorable conditions exist that diminish the structural integrity of any component. In the event substandard conditions are disclosed by means of this inspection, the Contractor shall immediately inform the Department and the Professional as to the exact nature of said problems and then undertake whatever repairs and/or replacements the Professional may deem appropriate to remedy the situation.
2. Each stack of car and counterweight guide rails shall be individually examined to determine if excessive compression has occurred from building settlement. In the event such conditions are found to exist, each affected stack shall be cut off enough to relieve pressure. Jacking bolts shall be provided underneath each stack of both car and counterweight guide rails.
3. Each stack of car and counterweight guide rails shall be realigned so that total deviation from plumb in any direction does not exceed 1/8" over the entire length of the hoistway and that DBG measurements never vary more than .030".
4. As required, car guide rails joints shall be individually filled, filed and sanded in order to eliminate minor variations in adjoining machined surfaces.
5. Apart from the guide rail systems' reconditioning work specified herein, the Contractor shall perform whatever additional work may be required so that side-to-side and front-to-back acceleration of the elevator car traveling at full rated speed in either direction over the entire length of the hoistway with loads varying from empty car to full rated load never exceeds 18 milli-g peak to peak.

B. Counterweight Assembly (Reuse)

1. The existing counterweight assembly shall be refurbished to as new condition and reused. Individual counterweight frame members shall be inspected for any indication of damage and to determine if the overall assembly is twisted, racked, or otherwise distorted. In case any of these conditions are found to exist, the Contractor shall immediately inform the Department and the Professional about the exact nature of the problem and undertake whatever corrective action the Professional may deem appropriate to remedy the situation. All fastenings between counterweight frame members shall be individually examined, tightened and if necessary renewed.
2. The amount of filler weight placed within the counterweight frame shall be adjusted so the weight of the entire counterweight assembly is equal to that of the renovated elevator car, plus 40-50% of its rated loading capacity. Filler weights shall be held securely in place at all times with tie rods passing through holes in both the weights and the counterweight frame. Tie rods shall be secured on each end with double lock nut and a cotter pin arrangement.

C. Slide Guides (New) (Car & Counterweight)

1. Provide new sliding-type guide shoes and securely bolt them to the car frame at top and bottom.

D. Hoist Cables and Governor Cables (New)

1. Existing wire rope hoisting, and governor cables shall be removed and replaced with new.
  - a. Hoisting Cables - New pre-formed traction steel wire ropes, specifically constructed for elevator applications, shall be provided for suspension of the elevator car and counterweight assembly. New hoist cables shall be identical in number and construction to those which are currently in use.

- b. Governor Cables - New pre-formed traction steel wire ropes, specifically constructed for elevator applications, shall be provided for governor cables. Governor cables shall be arranged so as to pass over top of the governor sheave in the machine room and underneath the tail-end sheave located in the pit. Both ends of the governor cable shall be attached to the safety release carrier. Governor cable diameter and method of fastening shall be in accordance with Section 206 of ASME A17.1 elevator safety code.
  2. Hoist cable fastenings shall be accomplished by use of individual tapered rope sockets or wedge type with adjustable shackles. General design requirements for cable shackles and the method of securing wire rope shall conform to ASME A17.1 elevator safety code.
  3. Broken hoist cable shackle springs shall be replaced on an as-needed basis.
- E. Normal and Final Terminal Stopping Devices (New)
  1. Provide normal terminal stopping devices to stop the car automatically from any speed obtained under normal operation within the top and bottom overtravel, independent of the operating devices, final terminal stopping device and the buffers.
  2. Provide final terminal stopping devices to stop the car and counterweight automatically from the speed specified within the top clearance and bottom overtravel.
  3. The terminal stopping devices shall have rollers with rubber or other approved composition tread to provide silent operation when actuated by the fixed cam in the hoistway.
- F. Electrical Conduit, Wiring and Traveling Cable (New)
  1. New rigidly supported EMT conduit, flexible metal conduit and galvanized steel trough shall be utilized throughout the hoistway.
    - a. Both EMT and flexible conduit shall be connected on either end by use of compression fittings and secured in place with metal clamps sized in accordance with the diameter of conduit utilized. Wire or plastic wire ty-raps shall not constitute an acceptable means of fastening.
    - b. The use of flexible metal conduit shall be limited to runs not greater than 3' in length.
    - c. All abandoned or unused electrical conduit shall be removed from the hoistway.
  2. New electrical wiring shall be provided. All wiring shall be stranded copper conductors, manufactured in compliance with ANSI/ASTM B174-71 and UL 62 requirements, and polyvinyl chloride insulation complying with ETT requirements of UL 62 and Article 400 of the National Electric Code.
  3. Electrical wiring provided for hoistway interlocks shall be of a flame-retardant type, capable of withstanding temperatures of at least 392 degrees Fahrenheit. Conductors shall be Type SF or the equivalent thereof.
    - a. Each run of electrical conduit or duct shall contain no less than 10% spare wires and, in any case, no fewer than five (5) spare wire.
    - b. Crimp-on type wire terminals shall be used where possible.
  4. New traveling cables shall be provided. Each traveling cable shall be provided with a flame and water resistant polyvinyl chloride jacket. Electrical wiring shall consist of stranded copper conductors, manufactured in compliance with ANSI/ASTM B174-71 and UL 62 requirements, and polyvinyl chloride insulation complying with ETT requirements of UL 62 and Article 400 of the National Electric Code.

Each traveling cable shall contain no less than 10% spare wires.

- a. Traveling cables exceeding 100' in length shall be provided with a steel wire rope support strand from which the cable shall be suspended.
- b. Traveling cables must be contained within an approved electrical conduit to within 6' of the final suspension point in the hoistway.
- c. Each new traveling cable shall be arranged to provide no fewer than six (6) individually shielded pairs of 22-gauge wire and arranged to contain no less than one (1) coaxial cable for CCTV remote monitoring and required quantity of CAT 6 cables for the communications system.
- d. Traveling cable conductors that terminate at a hoistway center box shall be connected to stud block provided for that purpose. Each wiring terminal shall be clearly identified by its nomenclature as shown on the "as built" wiring diagrams and solderless, crimp-on type wire terminals shall be used where possible.
- e. The attachment of a traveling cable to the underside of the elevator car shall be performed so that a minimum loop diameter of 30x the cable diameter is provided.

G. Hoistway Projections and Setbacks

1. The top surface of any setback or projection in the hoistway that measures 2" or more in width shall be beveled at an angle of not less than 75 degrees from horizontal. Each bevel plate shall be constructed from prime painted 14 gauge cold-rolled steel and installed so as to conform to Rule 100.6 of ASME A17.1 elevator safety code.

2.5 PIT APPARATUS

A. Existing Car and Counterweight Buffers (Reuse)

1. The present spring buffers shall be reused in place. All springs, supports and related equipment shall be checked to assure it conforms to governing Codes. If repair or replacement of components is required, they shall be included under this specification. In case problems are found to exist, the Contractor shall immediately inform the Department and the Professional and then undertake whatever repairs and/or replacements the Professional may deem appropriate to remedy the situation. Surface rust shall be removed from all reused components.
2. Upon substantial completion of all work described in the project specifications, buffers shall undergo testing in accordance with ASME A17.1 Code.

B. Governor Cable Tension Assembly (New)

1. Provide a new governor cable tension assembly.
  - a. Maintain the proper tension in the governor rope with a weighted tension sheave located in the pit. Springs used to develop the tension are not acceptable.
  - b. The sheave shall be of proper diameter and set directly plumb with the governor cable drop to prevent the cable from pulling off of the sheave at an angle.
  - c. Lubrication fittings shall be provided on the assembly.
  - d. The assembly shall have necessary cable guards to prevent accidental contact of the cable/sheave by service personnel. Guards shall also be provided to prevent the governor cable from jumping off of the sheave.

C. Pit Stop Switch (New)

1. As pit depth exceeds 66", each elevator pit shall be provided with two (2) push/pull or toggle switches that are conspicuously designated "EMERGENCY STOP". Both of these stop switches, shall be located immediately adjacent to the pit access ladder. One of the stop switches shall be placed approximately 48" above the pit floor while the other stop switch shall be positioned approximately 18" above the hoistway entrance sill on the lowest landing served. These switches shall be arranged so as to prevent the application of power to the hoist motor or machine brake when either one is placed in the "off" position.

2.6 HOISTWAY ENTRANCES

A. Landing Door Tracks, Hangers, Hoistway Doors and Gates, Gibs, Relating Chains, Interlocks and Related Appurtenances (New)

1. Formed or extruded steel landing door hanger tracks as manufactured by Peelle Corporation or an approved equal shall be provided.
2. Each bi parting landing door panel shall be suspended from a pair of new door relating chain hanger assemblies that are compatible with the new assemblies. Guide assemblies shall be directly mounted to the door panel using the appropriate hardware. Guide assemblies shall be adjusted or shimmed so that door panels are suspended in a plumb manner with no more than the code mandated vertical clearance to the cab entrance threshold. The doors shall be adjusted for minimal operating clearance against the bottom edge of the hanger track.
3. Non-typical mounting arrangements for interlocks and/or related mechanisms must receive prior approval from the Professional.
4. Each hoistway door interlock assembly shall be provided with an emergency release mechanism utilizing the appropriate type access key at all landings served.

B. Retiring Cams (New)

1. Remove the existing retiring cam and provide a new assembly capable of operating in the same fashion as the original assembly.
2. Adjust for proper operation in accordance with current ASME A17.1 design standards.
3. Check the engagement and operability of the new retiring cam to confirm that it will operate with reliability and longevity as designed by the manufacture.

C. Master Freight Door Operating System (New to be interfaced with the new Controls)

1. Furnish and install a new heavy-duty Freight door master electric power door operator on the elevator car top. Design this operator to operate the Freight car and hoistway door simultaneously.
  - a. Designate this type of operator as a heavy duty operator. Design the door panels to operate at an average opening speed. Automatic closing of the car and hoistway doors shall be required and the closing speed shall be code complaint. Reduce this closing speed as required to limit the kinetic energy of the closing doors to the values permitted by the ASME Code.
  - b. The doors shall operate smoothly without a slam in both the opening and closing directions. Cushion the doors in their final movement in both directions of travel by electrical means (dynamic braking) only. Air dashpots or hydraulic dampening will not be accepted. Use electrical power to open and close the doors.

- c. In case of interruption or failure of electric power from any cause, the door operating mechanism shall be so designed that it shall instantly permit emergency manual operation of both the car door and the hoistway door, and the hoistway door shall continue during emergency operation to be self-locking, and self-closing. The door operator shall operate in conjunction with or be equipped with all interlocks and safety contacts specified.
- d. Construct all door operating levers of heavy steel members. All pivot points shall have either ball or roller bearings, or bronze bushings, of ample size. All brackets and other supports required to support door-operating mechanism shall be furnished and installed.

D. Car Door Hangers, Sheaves, Tracks and Gate Switch (New)

- 1. Provide a heavy duty type suspension hangers and tracks for each car door. Sheaves shall be hardened steel with sealed grease packed precision ball bearing.
- 2. The sliding door gibs/retainers shall be door mounted on the door assembly and arranged to ride on the side of the track.
- 3. The track shall be of formed cold rolled steel or cold drawn steel and shall be rounded on the track surface to receive the hanger sheaves. The track shall be removable.
- 4. Provide a new gate switch that connects directly to the car door track. The gate switch shall prevent movement of the elevator until such time as it signals the control equipment that the car door has physically closed.

E. Door Reopening Device (New)

- 1. Provide a code compliant gate door protection system.
- 2. The doors shall be prevented from closing from an open position if a person interrupts its direction of travel. When the doors are closing, any interruption of the protective shield shall cause both the car and corridor doors to reverse. The doors shall start to close when the protection system is free of any obstruction.

F. Refer to Specification Section 099600 "High Performance Coatings."

2.7 CAR APPARATUS/FRAME

A. Car Frame (Reuse)

- 1. The existing car frame assembly shall be refurbished to as-new condition and reused. Individual car frame members, platform isolation framework, door operator support structure, related bracing and appurtenances shall be inspected for any indication of damage and to determine if the overall assembly is twisted, racked or otherwise distorted. In case any of these conditions are found to exist, the Contractor shall immediately inform the Professional and then undertake whatever corrective action the Professional may deem appropriate to remedy the situation. All fastening between the aforementioned components shall be individually examined, tightened and if necessary renewed.
  - a. Provide new elastomer isolation pads for all existing platforms.
- 2. The existing car frame, door operator support structure and related bracing shall be modified or reconfigured as necessary in order to accommodate the new cab enclosure and/or related master door operating equipment specified herein.
- 3. The elevator car shall undergo static balancing upon substantial completion of all work described in the project specifications and subsequent to any car interior refinishing or cab replacement work performed in conjunction with the project.

B. Platform (Reuse)

1. Existing platform shall be modified to accommodate the new apparatus specified herein.
  - a. Underside of platform shall be refurbished and treated with fire-rated material.
  - b. Top of platform shall be refurbished with marine grade plywood set to receive new 12-gauge diamond plate floor.
  - c. Provide a new safety access "hole ring and cover assembly" to match selected cab finishes.

C. Safety (Reuse)

1. The existing governor actuated car safety device shall be retained, overhauled and upgraded for current code compliance.
2. Readjust safety for proper operation in accordance with current ASME A17. design standards.
3. Check the existing safety-operated switch (plank-switch) for proper adjustment and operation. Provide a new plank-switch where none currently exists.
4. Provide and check the existing safety release tool for proper adjustment and operation. Mount the releasing tool in the machine room in plain sight on the machine room wall. Provide a label above the tool stating that it shall not be removed from the machine room.

D. Automatic Leveling/Releveling Device (New)

1. Equip the elevator with a floor-leveling device which shall automatically bring the car to a stop within 1/4" of floor with any floor for which a stop has been initiated regardless of load or direction of travel. This device shall also provide for releveling which shall be arranged to automatically return the elevator to the floor in the event the elevator should move below or above floor level in excess of 1/4".
2. The leveling device may be separate from, or an integral part of the hoistway encoding and positioning system.

E. Top-of-Car Operating Station (New)

1. A new operating station shall be provided on top of the elevator car. This station shall be installed so that the controls are plainly visible and readily accessible from the hoistway entrance without stepping on the car.
2. The new top-of-car operating station shall be provided with the following control devices and appurtenances:
  - a. A push/pull or toggle switch designated "EMERGENCY STOP" shall be arranged so as to prevent the application of power to the hoist motor or machine brake when in the "off" position.
  - b. A toggle switch designated "INSPECTION" to activate the top of car Inspection Service Operation.
  - c. Pushbutton designated "Up", "Down" and "Safe" to operate the elevator on Inspection Service (the "Safe" button shall be arranged to operate in conjunction with either the "Up" or "Down" button).
  - d. An indicator light and warning buzzer that are subject to activation under Phase I - Fire Emergency Recall Operation.

F. Car Enclosure Work Lights and Receptacles (New)

1. The top and bottom of each car shall be provided with a permanent lighting fixture and 110-volt receptacle. Light control switches shall be located for easy accessibility from the hoistway entrance. Where sufficient overhead clearance exists, the car top lighting fixture shall be extended no less than 24" above the crosshead member of the car frame. Light bulbs shall be guarded so as to prevent breakage or accidental contact.

G. Emergency / Access Top Door (Top)

1. Ensure they operate as per code and provide or have proper electrical contacts and mechanical locks on the exterior of the cab enclosure.
2. Should side exits exist they shall be securely bolted shut so that they cannot be used in accordance with applicable code.
3. Provide additional support to the emergency exit hatch that will prevent it from giving way and falling into the elevator cab.

H. Finishes: Refer to Specification Section 099600 "High Performance Coatings."

2.8 FIXTURES (NEW)

A. Main Car Operating Panels (New)

1. Provide main and auxiliary car operating pushbutton panels on the inside front return panel of the car. The main panel shall be mounted on the right side while standing inside the cab looking into the hallway.
2. The pushbuttons provided for each floor served shall cause the car to travel to the floor on momentary pressure of the button.
3. The pushbuttons shall become individually illuminated as they are pressed. The button lights shall be extinguished as the calls are answered. LED-type bulbs are required to be utilized on all fixtures.
4. The operating panel shall include:
  - a. A call button for each floor served.
  - b. "Door open" / "Door close" buttons.
  - c. "Alarm" button (Interfaced with emergency alarm).
  - d. "Emergency Stop" switch per local law.
  - e. Door open hold push button / Parameter adjustable
  - f. Harding hands-free communication system with call acknowledging feature and A.D.A. design provisions for direct communication to the Capitol Police Command Center (IMCS) in the East Wing of the Capitol.
  - g. Three (3) position firefighter key operated switch, call cancel button and illuminated visual/audible signal system with mandated signage engraved per ASME Standards and/or local law requirements.
  - h. Provide a locked service cabinet flush mounted and containing the key switches required to operate and maintain the elevator, including, but not limited to:
    - 1) Independent service switch
    - 2) Light switch.
    - 3) Multiple speed fan switch.
    - 4) G. F. I. duplex receptacle.
    - 5) Emergency light test button and indicator.
    - 6) Inspection Service Operation key switch.



- 7) Security override Operation keyed switch. (The keyed switch shall be cut differently than all other switches and provide the standard on/off type function)
  - i. Car operating panel shall be flush mounted with swing type, one-piece faceplate with heavy-duty concealed hinges.
  - j. The auxiliary operating panel shall provide space for a card reader unit to be mounted behind a plexiglass panel centrally located within easy access for ADA accessibility the riding public.
  - k. Car operating panel shall incorporate a red digital LED floor position indicator, emergency light lens unit and black-filled engraved unit I.D. number or other nomenclature, as approved by Professional, with a "No Smoking" advisory and the rated passenger load capacity.
  - l. Provide the Car operating panel "full length design" as to cover all pre-existing cutouts or blemishes.
  - m. The certificate frame shall be incorporated into and made part of the fixture.
  
- B. Car Position Indicator (New) (Incorporate into Car operating panels)
  - 1. The position of the car in the hoistway shall be indicated by the illumination of the position indicator numeral corresponding to the floor at which the car has stopped or is passing.
  - 2. Provide 2" high, 10-segment red LED type position indicator with direction arrows, integral with the car operating panel.
    - a. Provide Lexan cover lens with hidden support frame behind fixture plate to protect the indicator readout,
    - b. Provide audible floor passing signal per ADA standards.
  
- C. Voice Annunciator (New)
  - 1. Provide a voice annunciator in each elevator. Coordinate size, shape and design with Designer and other trades. The system shall include, but not limited to:
    - a. Solid state digital speech annunciator.
    - b. A recording feature for customized messages.
    - c. Playback option.
    - d. Built-in voice amplifier.
    - e. Master volume control located and identified for easy access.
    - f. Audible indication for selected floor, floor status or position, direction of travel and nudging.
  - 2. Locate all associated equipment in a single, clearly labeled enclosure located either in the machine room and/or on car top or COB station.
  
- D. Car Direction Lantern (New)
  - 1. Provide a traveling lantern with visual and audible signal in the edge of the return post. The lens shall project a minimum of 1/4" and shall be of solid plexiglass. Use tamperproof screws and mount stainless steel faceplate flush with hairline joint.
  - 2. Car lantern shall indicate the direction of travel when doors are 3/4 open.
  - 3. The unit shall sound once for the "up" direction and twice for the "down" direction.
  
- E. Surface-Mounted Corridor Push Button Stations (New)
  - 1. Provide new corridor push buttons as further described:

- a. Provide two risers of new surface-mounted push button signal fixtures with elongated faceplates shall be provided on each landing. Each new signal fixture shall consist of a illuminating push buttons measuring 3/4" at their smallest dimension as selected by the Professional. New signal fixtures shall be installed directly over top of recessed mounting utilized by the existing corridor fixtures and shall be positioned so as to achieve a centerline button height of 42" above the floor. New signal fixture faceplates shall be installed both plumb and flush to the finished wall.
- b. Each intermediate landing shall be provided with signal fixtures containing two (2) push buttons while terminal landings shall be provided with fixtures containing a single push button. These buttons shall be arranged to become illuminated on an individual basis as "up" or "down" calls are registered and shall remain so until canceled.
- c. Provide engraving of each cover plate with fire logo, no smoking or other advisory, in compliance with code and as selected by Professional, to help fill the extension face cover void.

F. Cab Emergency Lighting (New) (Incorporate into each Car operating panel)

- 1. Provide an emergency lighting system to power an emergency lighting fixture and associated components incorporated in the car for at least four (4) hours in accordance with ANSI A17.1 code requirement.
- 2. Provide nickel cadmium batteries and a charger and mount the power pack on top of car.
- 3. Arrange for completely automatic operation when normal power is interrupted.
- 4. Provide a test button and indicator light in the car station.
- 5. Incorporate lighting lens unit within car operating panel (flush mounted).

G. Fixture Attachment, Finish and Design

- 1. Graphics shall be selected by the Professional.
- 2. The faceplates shall be stainless steel, 1/8" thick minimum.
  - a. No. 4 directional finish.
- 3. Mount fixtures with tamperproof screws. The screw and keyswitch cylinder finishes shall match faceplate finish.
- 4. Where key-operated switches and/or key-operated cylinder locks are furnished in conjunction with any component of the installation, keys for each individual switch or lock shall be furnished, stamped or permanently tagged to indicate function.

2.9 COMMUNICATIONS AND EMERGENCY SIGNALING DEVICES

A. Harding Communication System:

- 1. Provide an automatic connection, hands-free two-way speaker in the new car station without a separate faceplate. All components shall be mounted to the back of the panel.
  - a. Provide Harding ICE-217-010 VoIP intercom station.
    - 1) The above item has been approved by the Department as a Proprietary Item. No other item will be accepted. Article 9, Paragraph 9.6, Substitution of Materials, of the General Conditions to the Construction Contract does not apply to the above item.

2. The system shall be arranged to automatically communicate with the Capitol Police at the IMCS in the East Wing of the Capitol via the COWPA Network. Provide an automatic shut-off feature and a pushbutton to initiate a call.
3. The communication system shall be turned on by pressing the emergency alarm or designated pushbutton in the car panel. It shall automatically contact Capitol Police and alert them that there is a problem in the elevator.
4. Provide nicad battery backup to ensure operation under all conditions.
5. The Elevator Contractor shall install the instrument and all wiring, terminating it as an RJ-45 jack in the elevator machine room. The RJ-45 jack will provide connectivity to COWPA via the 5<sup>th</sup> floor IDF room.
6. All connections from the RJ-45 jack to the communication system shall be done by the Elevator Contractor. Provide dedicated CAT 6 and spare CAT 6 traveling cables as required for the Harding Communications System.
7. The entire system shall be designed and located in accordance with A.D.A. Standards to include visible call acknowledging, engraved advisories, etc.
8. The .4 Electrical Contractor shall provide the RJ-45 jack in the machine room at CAT 6 cable to the 5<sup>th</sup> floor IDF room.
9. The Client Agency shall arrange to have the Office of Administration IT provide a network address and connectivity to the IMCS.

**B. Emergency Alarm/Battery Back-up and Common Alarm Bell (New)**

1. Provide a new car-mounted battery unit including solid-state charger and testing means enclosed in common metal container.
  - a. The battery shall be rechargeable nickel cadmium with a 10-year minimum life expectancy.
  - b. The alarm bell shall be mounted directly to the battery/charger unit and connected to sound when any alarm pushbutton or stop switch in the car enclosure is operated.
  - c. The bell shall be configured to operate from power supplied by the building emergency power generator.
2. Provide a new common alarm bell located in the elevator pit.
  - a. The bell shall be configured to operate when the alarm or stop switch of any elevator is activated, during both normal and battery back-up power conditions.
  - b. Existing common alarm bells may be rehabilitated and reused providing they meet the intent of this section and applicable codes.

**PART 3 - EXECUTION**

**3.1 PRE-APPROVED EQUIPMENT MANUFACTURERS**

- A. The following manufacturers' equipment and materials, or equivalent as approved by the Professional, for use on this project. Other equipment not specifically mentioned shall be considered for approval on an individual basis by the Professional.
1. Controller - Smartrise Engineering, GAL Galaxy, ESI Controls.
  2. Tracks, Hangers, Interlocks and Door Operators – Peellee, Courion.
  3. Fixtures - G.A.L., EPCO, Monitor, C.E. Electronics, Innovation, PTL.
  4. Door Protective Device - Janus, G.A.L., T.L. Jones, Tri-Tronics.
  5. Entrances/Entrance Door Panels - EDI/ECI, EMCO, SmartTork.
  6. Machines - Torin Drive International, Hollister-Whitney

7. Motors and Motor Generators - Torin, Imperial Electric, General Electric, Baldor, Reuland.
8. VVVF Power Drives - Mitsubitsi, MagneTek, Yaskawa.
9. Guide Rails - AFD Industries.
10. Electrical Traveling Cables – Draka.
11. Guide Shoes/Rollers – ELSCO.
12. Wire Ropes - Paulsen, Bethlehem, Alps, Draka.

### 3.2 INSPECTION BY THE PROFESSIONAL

- A. Study the Contract Documents with regard to the work as specified and required so as to ensure its completeness.
- B. Examine surface and conditions to which this work is to be attached or applied and notify the Professional in writing, via an RFI in eBuilder, if conditions or surfaces are detrimental to the proper and expeditious installation of the work. Starting the work shall imply acceptance of the surfaces and conditions to perform the work as specified.
- C. Verify, by measurements at the job site, dimensions affecting the work. Bring field dimensions which are at variance with those on the accepted shop drawings to the attention of the Professional. Obtain the decision regarding corrective measures before the start of fabrication of items affected.
- D. Cooperate in the coordination and scheduling of the work of this section with the work of other sections so as not to delay job progress.

### 3.3 INSTALLATION

- A. Modernize the elevators, using skilled workmen in strict accordance with the final accepted shop drawings and other submittals.
- B. Comply with the code, manufacturer's instructions and recommendations.
- C. Coordinate work with the work of other building functions for proper time and sequence to avoid delays and to ensure right-of-way of system. Use lines and levels to ensure dimensional coordination of the work.
- D. Accurately and rigidly secure supporting elements within the shaftways to the encountered construction within the tolerance established.
- E. Provide and install motors, switches, controls, safety and maintenance and operating devices in strict accordance with the submitted wiring diagrams and applicable codes and regulations having jurisdiction.
- F. After installation, touch up in the field, surfaces of shop primed elements which have become scratched or damaged.
- G. Lubricate operating parts of system as recommended by the manufacturer.

### 3.4 PROTECTION AND CLEANING

- A. Adequately protect surfaces against accumulation of paint, mortar, mastic and disfiguration or discoloration and damage during shipment and installation.

- B. Upon completion, remove protection and thoroughly clean work and have it free from discoloration, scratches, dents and other surface defects.
- C. The finished installation shall be free of defects. Before final completion and acceptance of the building, repair and/or replace defective work, to the satisfaction of the Department and the Professional, at no additional cost.

### 3.5 BARRICADES AND HOISTWAY SCREENING

- A. The Contractor shall provide whatever barricades are necessary in order to maintain adequate protection of areas in which work specified by the Contract Documents is being performed, including open hoistway entrances. Fabrication and erection as all barricades shall be in compliance with applicable OSHA regulations.
- B. As required, the Contractor shall provide temporary wire mesh screening in the hoistway and of any elevator undergoing work specified in the Contract Documents. This screening shall be installed in such a manner as to completely segregate the hoistway from that of adjacent elevators. Screening shall be constructed from .041" diameter wire in a pattern that rejects passage of a 1" diameter ball.

### 3.6 PERFORMANCE AND OPERATING REQUIREMENTS

- A. Passenger elevators shall be adjusted to meet the following performance requirements:
  - 1. Speed: within 5% of rated speed under any loading condition.
  - 2. Leveling: within 1/4" under any loading condition.
- B. Maintain the following ride quality requirements for the freight elevator:
  - 1. Horizontal accelerations, peak to peak shall not exceed 18 milli g in the frequency range of 1 to 10 Hz.
  - 2. Amplitude of acceleration and deceleration shall not exceed 4 feet per second, per second. A sustained jerk shall not be more than twice the acceleration. The rate of change in the acceleration/deceleration rate shall not be more than 8.0 ft/sec.<sup>3</sup>.

### 3.7 INSPECTIONS

- A. Upon completion of the work phase for the elevator modernization specified herein, the Contractor shall, at its own expense, arrange and assist with whatever inspections that are required by the L&I Elevator Division.

### 3.8 ACCEPTANCE TESTING

- A. The Contractor shall provide at least five (5) days prior written notice to the Department and the Professional regarding the exact date on which work specified in the Contract Documents will reach completion on any single unit of vertical transportation equipment. In addition to conducting whatever testing procedures may be required by local inspecting authorities in order to gain approval of the completed work, and before seeking approval of said work by the Department and the Contractor shall perform certain other tests in the presence of the Professional. To that end, the Contractor shall provide test instruments, test weights, and qualified field labor as required to safely operate the elevator under load conditions that vary from empty car to full rated load and, in so doing, to successfully demonstrate compliance with applicable performance standards set forth in the project specifications with regard to:

1. Sustained high-speed velocity of the elevator in either direction of travel;
2. Brake-to-brake running time between adjacent floors;
3. Floor leveling accuracy;
4. Ride quality inside the elevator car;
5. Load settings at which anti-nuisance, load dispatch, and load non-stop features are activated.

B. Upon completion of work specified in the Contract Documents on the last car in any group of elevators, and in conjunction with the aforementioned testing procedures, the Contractor shall carry out additional testing of group dispatch/supervisory control features in the presence of the Professional. To that end, the Contractor shall provide test instruments and qualified field labor as required to successfully demonstrate:

1. The back-up operating mode for group dispatch failure;
2. Simulated and actual emergency power operation;
3. Restricted access security features;
4. Zoning operations and floor parking assignments;
5. Up/down peak operation;
6. Response to corridor calls that fall into the "long-wait" category;
7. Lobby dispatch operations.

### 3.9 SUBSTANTIAL COMPLETION

A. The work shall be deemed "Substantially Complete" for an individual unit or group of units when, in the opinion of the Professional, the unit is complete, such that there are no material and substantial variations from the Contract Documents, and the unit is fit for its intended purpose.

1. Governing authority testing shall be completed and approved in conjunction with inspection for operation of the unit; a certificate of operation or other required documentation issued; and remaining items mandated for final acceptance completion are limited to minor punch list work not incorporating any life safety deficiencies.
2. The issuance of a substantial completion notification shall not relieve the Contractor from its obligations hereunder to complete the work.
3. Final completion cannot be achieved until all deliverables, including but not limited to training, spare parts, manuals, and other documentation requirements, have been completed.

END OF SECTION 142003