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Guidelines for Automatic Passenger's Elevators Upgrade and Alteration MODERNIZATION OF TRACTION ELEVATORS

World Plaza Building
268 Luis Muñoz Rivera Avenue
San Juan, P.R.



MAY 12, 2025

Electrical Traction Passenger's Elevators Upgrade and Alteration

PART 1 – GENERAL

1.1 PROJECT INFORMATION

Project Name: Electrical Traction Passenger's Elevators Upgrade and Alteration

Location: World Plaza Building

Address: 268 Luis Muñoz Rivera Avenue San Juan, P.R.

Seismic zone: 2 or greater

1.2 DESCRIPTION

This specification sets out the minimum requirements for full modernization of two (2) passenger elevators at the World Plaza Building. Both elevators are a passenger simplex system. The work would encompass the replacement of all the components of the elevator which have become most affected by wear and tear, water, and normal use over an extended period. Major Modernization is a reasonably straight forward exercise in that, except for the car and counterweight guide rails, the counterweight itself, car and others which are retained. This will provide the building with one elevator which has a life expectancy of 15 to 18 years and is compliant with the current ASME 17.1-2019 code.

The elevators included in this guide are independent from one another and are in two different areas of the building. These elevators have the characteristic that their machine room is situated at a basement-like level, and therefore, their traction machine must be suited to this specific design. Modernizing basement traction elevators involves upgrading components and systems to enhance safety, efficiency, and functionality. Key considerations include upgrading the control system, motor, traction system, and safety features like redundant brakes and overspeed protection. Energy efficiency improvements, like switching to AC motors and fixtures, are part of the modernization.

The work shall include, but not be limited to the following:

1. Testing and adjustment of all elevators related to controls and equipment.

2. Preventive maintenance and maintenance **free** service for a 3-month period shall be provided by the Elevator Contractor, beginning at the time of written Final Acceptance of the work by the Owner. The Elevator Contractor shall furnish to the Owner all appropriate certificates, instruction manuals, schematic diagrams, software documentation, and maintenance manuals, within 30 days of final acceptance of the work.
3. The Elevator Contractor shall be responsible for obtaining and paying payment of any required installation/building permits fees for the installation of the elevator(s).

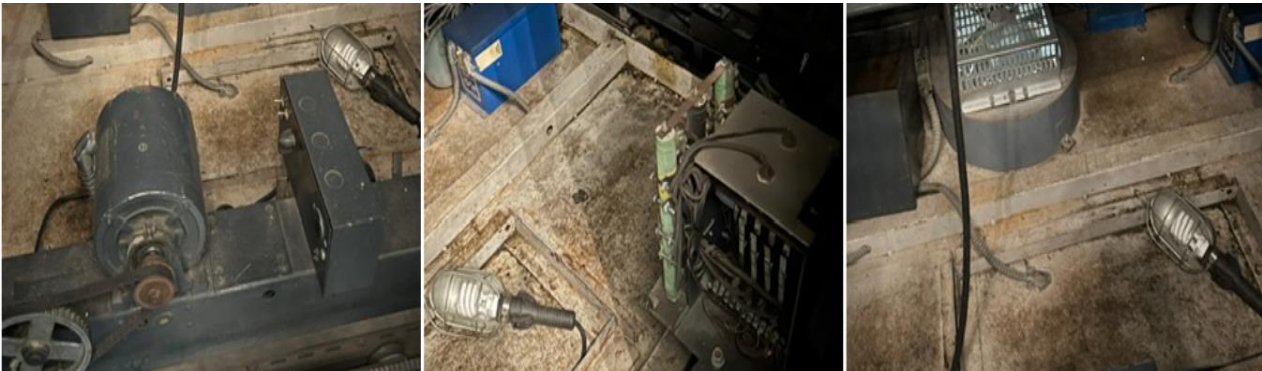
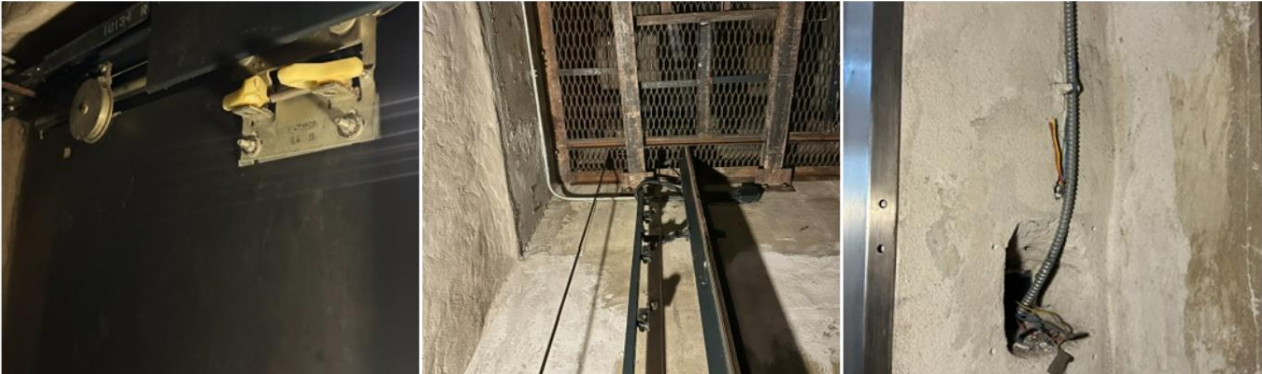
1.3 EXISTING CONDITION

Below are photos of the existing condition of the equipment. The characteristics of these elevators are as follows:

Elevator Number	LOBBY ELEVATOR #11 A-2	FLOOR 21 to 23 ELEVATOR #10
Brand	Westinghouse	Westinghouse
Original Year	1971	1973
Speed	200 fpm	200 fpm
Capacity	2,000 lbs	2,000 lbs
Stops	2	3
Door type	Single side FRONT AND REAR	Single side
Condition	In service	In service
Machine room	Basement	Basement

LOBBY ELEVATOR #11 A-2







ELEVATOR #10





1.4 SCOPE OF WORK

This proposal includes the furnishing and installation of elevator equipment as hereinafter specified. It is the intention of this proposal to outline broadly the equipment required, **but not** to cover details of design and construction. The following is a summary of the scope of work.

LOBBY ELEVATOR #11 A-2

This elevator includes specific features that distinguish it from a standard model:

- The machine room is located at a basement level, which means the traction cable configuration is not 1:1.
- It is equipped with both front and rear doors, requiring two door operators.
- The governor is installed inside the hoistway, making it necessary for the controller to have an automatic reset function when the governor is activated.

MACHINE ROOM

1. Replace controller with VVVF type drive to achieve the purpose of lower power consumption. It shall comply with ANSI 17.1 - 2019 code. The control panel shall include a means of detecting: unintentional motion, overspeed on rise and fall, safety redundancy in operation, friction loss, seismic motion, fire phase, power loss and emergency plant usage, etc. It must include a diagnostic system without the use of a special tool. **In addition, a dedicated reset system or button for the governor must be provided and accessible to authorized personnel.** Install line filters or chokes to prevent electrical surges from the building's electrical system.
2. The traction machine to be installed shall be of the **gear-type (with gearbox) and horizontal shaft**, specifically designed for installation in a machine room located at the basement level. It shall consist of an alternating current (AC) motor with either forced or natural ventilation, mechanically coupled to a gearbox with helical or worm gears, with a horizontal output shaft aligned to the drive sheave. The machine shall include an **electromechanical service brake**, with dual-coil operation, mounted directly on the motor or gearbox shaft. In addition, an **independent or redundant emergency brake** shall be provided, in compliance with **ASME A17.1-2019 Sections 2.19 and 2.20**, designed to activate in the event of failure of the main brake or under critical conditions, and capable of stopping and holding the elevator car under rated load. Both brakes shall be certified, capable of holding the elevator stationery in the event of a power failure and shall

<p>be easily accessible for inspection. The complete machine assembly shall be mounted on vibration-damping supports, be compatible with variable voltage variable frequency (VVVF) drive systems and meet all safety and performance requirements established by ASME A17.1-2019.</p>
<p>3. Replace traction ropes. The minimum safety factor of the traction ropes for these units will be 7.97. The ropes should be those recommended by the traction machine manufacturer and designed for elevator use.</p>
<p>4. Provide seismic sensor</p>
<p>5. Connect smoke detectors to the control panel.</p>
<p>OVER THE CAB (WELL)</p>
<p>1. Refurbish corridor doors and tacks. Replace rollers, eccentrics, spirators, gibs, nilon and provide fire slippers.</p>
<p>2. Replace the governor, its deflector and cable. The governor must be specific about the speed of the equipment. Governors of other speeds are not acceptable for adjustment. The governor nameplate must include all code required information which includes the pull through. The electrical switch shall open positively activated by the governor.</p>
<p>3. Replace final limits, leveling limits, and selector system.</p>
<p>4. Replace the inspection box above the cab. It must provide a receptacle and lighting. It must have a safety integrity certification (SIL). It must have a speed sensor device.</p>
<p>5. Replace cab rollers and counterweight. These should be adjustable to obtain smooth movement of the equipment.</p>
<p>6. Replace the door operator with a LINEAR TYPE and variable frequency technology. The operator must provide label indicating door open and close times. Provide a door monitoring system. Elevator door lock monitoring is a safety feature that prevents the elevator from moving when the elevator doors do not close properly.</p>
<p>7. Replace hoistway door locks. The hoistway door locks shall comply with all applicable requirements of ASME A17.1-2019, specifically those outlined in Section 2.11 regarding locking and interlocking devices. The locks must be certified and designed to prevent the hallway door from opening unless the elevator car is properly positioned at that landing, and to ensure the door is securely closed before the car is permitted to move. The locking devices shall be fully compatible with the proposed door operator, both electrically and mechanically, allowing proper and secure engagement with the door clutch mechanism. Locks shall be designed for heavy-duty operation, vandal resistance, and easy inspection and maintenance, and shall meet all safety, retention force,</p>

and redundancy requirements as applicable.
<p>8. Provide door restrictor.</p> <ul style="list-style-type: none"> ✓ The car door must be opened from the outside without the use of a special tool. ✓ If a power supply is used for this system, it shall have a 1hr power supply after the power goes out. This power source will have a monitoring that if the battery is low will have an audible signal. The battery should have a date when it expires. ✓ - If the cabin is within the unlocking zone, the cabin door shall open without exerting force from the operator, the operator shall cut off the power.
9. Provide emergency hatch safety switch.
10. Refurbish safety under the cabin. The safety measures should be dismantled at the start of the project to determine its condition. Replace it if necessary.
11. Clean shaft, paint over cabin.
12. Replacement of traveling cables. The traveling cable must be provided to allow the use of cameras inside the cabin.
13. Replacement of the wiring inside the shaft and cabin. Restore ducts that show corrosion.
14. Perform cabin balance. If necessary, add or remove "weights" to the counterweight.
15. Provide seismic derailment on the counterweight.
PIT
1. Reconditioning cabin and counterweight Buffers.
2. Replace the emergency stop button on pit.
3. Recondition pit with paint.
INSIDE CABIN
1. Replace the car operating panel (COP). Must comply with ADA handicapped law including audible signal, emergency lamp, Phase II fire system, inspection, etc. It must comply with the 2019 Code. The stop switch inside the cab must activate the alarm. A visual signal labeled "EARTHQUAKE MODE" shall be provided on the car push button panel. This may be part of an alphanumeric message display panel.
<p>2. Emergency Communication System - Emergency Communication (Telephones) - Communication systems required by ASME A 17.1-2019 shall be provided including and not limited to the following:</p> <ul style="list-style-type: none"> ✓ The button that actuates the system must have a telephone symbol. ✓ Must have a panel that displays a message that will be activated by authorized personnel to acknowledge that the call has been connected. ✓ The panel shall display messages that allow communication between authorized personnel and the trapped person. This should include any

<p>passenger who is unable to communicate verbally or hear.</p> <ul style="list-style-type: none"> ✓ An automatic answering system is not allowed to be used. The call must be answered by authorized personnel. ✓ The system must have operating instructions. ✓ A video display must be provided to observe passengers inside the cabin anywhere within the cabin.
<p>3. Provide cabin door reopening system (infrared curtain). This component, when detecting an object, shall reopen the cabin and corridor doors. It shall be out of operation when a reduction of the closing kinetic energy is detected. It must meet the requirements of detecting objects within 18 inches and be able to self-monitor, among other functions. This component shall comply with ASME A 17.1-2019. (Front and Rear)</p>
<p>4. Provide traveling lanterns and Audio Voice (verbal announcement) system that indicates floors verbally.</p>
<p>5. Cabin decoration. Decoration materials must comply with ASTM E 84, ANSI/UL 723, CAN/ULC-S102, and ASTM E 648. ALLOWENCE of \$13,000.00 per cabin.</p>
<p>6. Replacement of cab exhaust fan.</p>
<p>7. Replacement of the cab door and track. Provide car door locks, rollers, and eccentrics. The door must be stainless steel clad. Replace the sill. (Front and Rear)</p>
<p>CORRIDOR</p>
<p>1. Provide A ASME A 17.1-2019 compliant corridor pushbutton panels - Include a "Do not use elevators in case of fire" sign. This control panel must include the system that monitors the telephone line (COMMUNICATION FAILURE). The Phase I Fire text should be red on a contrasting background or vice versa.</p>
<p>2. Provide a sign saying, "IN CASE OF FIRE DO NOT USE ELEVATORS, USE STAIRS". The same must be engraved on the pushbutton panel.</p>
<p>3. Provide Braille plaque on door frames and elevator identification number.</p>
<p>4. Provide "Access Switches" on end floors. They can be part of the corridor button panel.</p>
<p>OTHER</p>
<p>1. Provide electrical drawings and manuals of the unit.</p>
<p>2. Perform free fall tests and 5-year tests.</p>
<p>3. Apply for installation permit from the Department of Labor.</p>

FLOOR 21 to 23 ELEVATOR #10

This elevator includes specific features that distinguish it from a standard model:

- The machine room is located at a basement level, which means the traction cable configuration is not 1:1.
- The elevator system is equipped with two governors. One ensures the safety of the cabin, while the other serves as an additional safety measure for the main governor. This design complies with the ASME A17.1-2019 standard, specifically regarding elevators with floating pits.

MACHINE ROOM

1. Replace controller with VVVF type drive to achieve the purpose of lower power consumption. It shall comply with ANSI 17.1 - 2019 code. The control panel shall include a means of detecting: unintentional motion, overspeed on rise and fall, safety redundancy in operation, friction loss, seismic motion, fire phase, power loss and emergency plant usage, etc. It must include a diagnostic system without the use of a special tool. **In addition, a dedicated reset system or button for the governor must be provided and accessible to authorized personnel.** Install line filters or chokes to prevent electrical surges from the building's electrical system.
2. The traction machine to be installed shall be of the **gear-type (with gearbox) and horizontal shaft**, specifically designed for installation in a machine room located at the basement level. It shall consist of an alternating current (AC) motor with either forced or natural ventilation, mechanically coupled to a gearbox with helical or worm gears, with a horizontal output shaft aligned to the drive sheave. The machine shall include an **electromechanical service brake**, with dual-coil operation, mounted directly on the motor or gearbox shaft. In addition, an **independent or redundant emergency brake** shall be provided, in compliance with **ASME A17.1-2019 Sections 2.19 and 2.20**, designed to activate in the event of failure of the main brake or under critical conditions, and capable of stopping and holding the elevator car under rated load. Both brakes shall be certified, capable of holding the elevator stationery in the event of a power failure and shall be easily accessible for inspection. The complete machine assembly shall be mounted on vibration-damping supports, be compatible with variable voltage variable frequency (VVVF) drive systems and meet all safety and performance requirements established by ASME A17.1-2019.
3. Replace traction ropes. The minimum safety factor of the traction ropes for these units will be 7.97. The ropes should be those recommended by the traction

machine manufacturer and designed for elevator use.
4. Provide seismic sensor
5. Connect smoke detectors to the control panel.
OVER THE CAB (WELL)
1. Refurbish corridor doors and tacks. Replace rollers, eccentrics, spirators, gibs, nilon and provide fire slippers.
2. Replace both governors, its deflector and cable. The governor must be specific about the speed of the equipment. Governors of other speeds are not acceptable for adjustment. The governor nameplate must include all code required information which includes the pull through. The electrical switch shall open positively activated by the governor.
3. Replace final limits, leveling limits, and selector system.
4. Replace the inspection box above the cab. It must provide a receptacle and lighting. It must have a safety integrity certification (SIL). It must have a speed sensor device.
5. Replace cab rollers and counterweight. These should be adjustable to obtain smooth movement of the equipment.
6. Replace the door operator with a variable frequency technology. The operator must provide label indicating door open and close times. Provide a door monitoring system. Elevator door lock monitoring is a safety feature that prevents the elevator from moving when the elevator doors do not close properly.
7. Replace hoistway door locks. The hoistway door locks shall comply with all applicable requirements of ASME A17.1-2019 , specifically those outlined in Section 2.11 regarding locking and interlocking devices. The locks must be certified and designed to prevent the hallway door from opening unless the elevator car is properly positioned at that landing, and to ensure the door is securely closed before the car is permitted to move. The locking devices shall be fully compatible with the proposed door operator , both electrically and mechanically, allowing proper and secure engagement with the door clutch mechanism. Locks shall be designed for heavy-duty operation, vandal resistance, and easy inspection and maintenance, and shall meet all safety, retention force, and redundancy requirements as applicable.
8. Provide door restrictor. <ul style="list-style-type: none"> ✓ The car door must be opened from the outside without the use of a special tool. ✓ If a power supply is used for this system, it shall have a 1hr power supply after the power goes out. This power source will have a monitoring that if the battery is low will have an audible signal. The battery should have a

<p>date when it expires.</p> <ul style="list-style-type: none"> ✓ - If the cabin is within the unlocking zone, the cabin door shall open without exerting force from the operator, the operator shall cut off the power.
9. Provide emergency hatch safety switch.
10. Refurbish safety under the cabin. The safety measures should be dismantled at the start of the project to determine its condition. Replace it if necessary.
11. Clean shaft, paint over cabin.
12. Replacement of traveling cables. The traveling cable must be provided to allow the use of cameras inside the cabin.
13. Replacement of the wiring inside the shaft and cabin. Restore ducts that show corrosion.
14. Perform cabin balance. If necessary, add or remove "weights" to the counterweight.
15. Provide seismic derailment on the counterweight.
PIT
1. Reconditioning cabin and counterweight Buffers.
2. Replace the emergency stop button on pit.
3. Recondition pit with paint.
4. A safety electrical switch shall be provided on the pit door, in accordance with the requirements of Section 2.15 of ASME A17.1-2019 , designed to automatically cut power to the elevator car or prevent its operation if the pit door is open. This switch must be connected to the elevator control system in such a way that any opening of the pit door disables the elevator and prevents the car from moving, ensuring the safety of maintenance or inspection personnel accessing the pit. The switch shall be a positive-contact type , with immediate cutoff action, and be resistant to adverse environmental conditions such as humidity or dust.
INSIDE CABIN
1. Replace the car operating panel (COP). Must comply with ADA handicapped law including audible signal, emergency lamp, Phase II fire system, inspection, etc. It must comply with the 2019 Code. The stop switch inside the cab must activate the alarm. A visual signal labeled "EARTHQUAKE MODE" shall be provided on the car push button panel. This may be part of an alphanumeric message display panel.
2. Emergency Communication System - Emergency Communication (Telephones) - Communication systems required by ASME A 17.1-2019 shall be provided including and not limited to the following: <ul style="list-style-type: none"> ✓ The button that actuates the system must have a telephone symbol. ✓ Must have a panel that displays a message that will be activated by authorized personnel to acknowledge that the call has been connected. ✓ The panel shall display messages that allow communication between

<p>authorized personnel and the trapped person. This should include any passenger who is unable to communicate verbally or hear.</p> <ul style="list-style-type: none"> ✓ An automatic answering system is not allowed to be used. The call must be answered by authorized personnel. ✓ The system must have operating instructions. ✓ A video display must be provided to observe passengers inside the cabin anywhere within the cabin.
<p>3. Provide cabin door reopening system (infrared curtain). This component, when detecting an object, shall reopen the cabin and corridor doors. It shall be out of operation when a reduction of the closing kinetic energy is detected. It must meet the requirements of detecting objects within 18 inches and be able to self-monitor, among other functions. This component shall comply with ASME A 17.1-2019.</p>
<p>4. Provide traveling lanterns and Audio Voice (verbal announcement) system that indicates floors verbally.</p>
<p>5. Cabin decoration. Decoration materials must comply with ASTM E 84, ANSI/UL 723, CAN/ULC-S102, and ASTM E 648. ALLOWENCE of \$13,000.00 per cabin.</p>
<p>6. Replacement of cab exhaust fan.</p>
<p>7. Replacement of the cab door and track. Provide car door locks, rollers, and eccentrics. The door must be stainless steel clad. Replace the sill.</p>
<p>CORRIDOR</p>
<p>1. Provide A ASME A 17.1-2019 compliant corridor pushbutton panels - Include a "Do not use elevators in case of fire" sign. This control panel must include the system that monitors the telephone line (COMMUNICATION FAILURE). The Phase I Fire text should be red on a contrasting background or vice versa.</p>
<p>2. Provide a sign saying, "IN CASE OF FIRE DO NOT USE ELEVATORS, USE STAIRS". The same must be engraved on the pushbutton panel.</p>
<p>3. Provide Braille plaque on door frames and elevator identification number.</p>
<p>4. Provide "Access Switches" on end floors. They can be part of the corridor button panel.</p>
<p>OTHER</p>
<p>4. Provide electrical drawings and manuals of the unit.</p>
<p>5. Perform free fall tests and 5-year tests.</p>
<p>6. Apply for installation permit from the Department of Labor.</p>

1.5 QUALIFICATIONS

- A. Owner's approval is required for proposed manufacturer, suppliers and installers products or services upon submission by the Elevator's Company, accompany of a certificate stating the following:
- i. The Elevator Contractor is currently and regularly engaged in the installation of elevator equipment as one of its principal products.
 - ii. The Elevator Contractor shall have five (5) years of successful experience, trained supervisory personnel, and facilities to install elevator equipment specified herein.
 - iii. The Elevator Contractor shall submit a list of five or more prior building installations where all the elevator equipment he proposes to furnish on this project has performed satisfactorily together under conditions of normal use. The list shall include projects that have been in operation for a period of not less than two years preceding the date of these specifications; include the names and addresses of the building and the names of the administrators.
- B. The traction elevators cannot use special diagnostic tools. The diagnosis must be performed on the control panel itself.
- C. The Elevator Contractor shall provide and install safety devices that have been subjected to tests witnessed and certified by an independent professional testing laboratory that is not a subsidiary of the firm that manufactures supplies or installs the equipment.

1.4 APPLICABLE PUBLICATIONS

- a. The publications listed below form a part of this specification. The elevator installation shall meet the requirements of the latest editions published and adopted by PROSHA on the date the contract is signed.
- b. American Society of Mechanical Engineers (ASME):
- c. . A17.1 - Safety Code for Elevators and Escalators - 2019
- d. ...A17.2 - Inspectors Manual for Electric Elevators and Escalators - 2019
- e. National Fire Protection Association:
- f.NFPA 13 - Standard for the Installation of Sprinkler Systems
- g. ...NFPA 70 - National Electrical Code (NEC)
- h. ...NFPA 72 - National Fire Alarm and Signaling Code
- i. NFPA 101 - Life Safety Code

- j. NFPA 252 - Fire Test of Door Assemblies
- k. International Building Code (IBC).
- l. American Society for Testing and Materials (ASTM):
- m. Underwriter's Laboratories (UL)
- n. ANSI A-117.1 – Accessible and usable Buildings and Facilities Accessible to, and Usable by, the Physically Handicapped.

1.5 SUBMITTALS

- A. Before execution of work, furnish information to evidence full compliance with contract requirements for proposed items. Such information shall include, as required: Manufacturer's Name, Trade Names, Model or Catalog Number, Nameplate Data (size, capacity, and rating) and corresponding specification reference. All submitted drawings and related elevator material shall be forwarded to the Owner.
- B. Name of manufacturer, type or style designation, and applicable data of the following equipment shall be provided:
 - i. Hoisting Machine.
 - ii. Controller.
 - iii. Governor
 - iv. COP and hall buttons
 - v. Electric Door Operator; HP, RPM, Voltage, and Ampere rating of motor.
 - vi. Hoistway Door Interlocks.

1.6 WIRING DIAGRAMS AND MANUALS

- A. Provide three complete sets of field wiring and straight-line wiring diagrams showing all electrical circuits of the controller. Maintained one set in the elevator machine room. In the event field modifications are found necessary during installation, diagrams shall be revised to include all corrections made prior to and during the final inspection.
- B. Provide the following information relating to the specific type of microprocessor controls installed:
 - i. Owner's information manual, containing job specific data on major components, maintenance, and adjustment.
 - ii. System logic description.
 - iii. Complete wiring diagrams needed for field troubleshooting, adjustment, repair, and replacement of components. Diagrams

shall be base diagrams, containing all changes and additions made to the equipment during the design and construction period.

- iv. Changes made during the warranty period shall be noted on the drawings in an adequate time to have the finalized drawings reproduced for mounting in the machine room no later than six months prior to the expiration of the warranty period.

- C. Provide written information necessary for proper maintenance and adjustment of the equipment prior to final acceptance as follows:
 - a. Lubricating instructions and recommended lubricant grade.
 - b. Parts catalogs and maintenance manuals.
 - c. Include any special tools, passwords and manuals that are required for maintenance, trouble shooting, adjustments or performance of safety tests for the Owner's use.
 - d. If the Company requires the Owner to sign a lease for a special trouble-shooting tool, a copy of the agreement, with all costs associated with its use, shall be submitted with the bid.

1.7 WORK SCHEDULE

- A. Before starting work submit a detailed work schedule for approval and arrange with owner sequence of procedure, means of access to premises, space for storage, use of approaches, corridors, stairways, elevators, location of temporary partitions, disposal of trash and recyclable materials. No work may begin on any elevator until all materials for that elevator have been delivered to the site and verified by the Owner's Representative. The phasing of work on the elevators shall be coordinated with the Owner's Representative.

1.8 SAFETY PRECAUTIONS

- A. Elevator Contractor Responsibility: The Elevator Contractor shall assume full responsibility and liability for compliance with applicable codes, standards and regulations pertaining to the health and safety of personnel during execution of the Work and shall hold the Government harmless for any action on the Elevator Contractor's part, or that of the Elevator Contractor's employees or sub-Elevator Contractors, that results in illness, injury, or death.
- B. First Aid and Emergency Response Requirements: The Elevator Contractor shall provide emergency first aid equipment. Additionally, a 110-pound ABC-rated fire extinguisher should be maintained on-site as well as absorbent material of sufficient quantity to collect any spill which might occur during this project.
- C. The Elevator Contractor shall provide for site visitors Personal Protective

Equipment (PPE) per OSHA for use during their visits.

- D. It shall be the obligation of the Elevator Contractor to maintain a free and clear passageway in each elevator lobby. Parts and tools shall be kept within the confines of entrance partitions. Trash and debris shall be removed daily.
- E. The Elevator Company shall provide protection, barricades and coverings required by local ordinances, and shall maintain lights and/or signals as a warning during the work; removing same when completed.

1.9 REMOVAL OF MATERIALS AND EQUIPMENT

A. Material and equipment that are not specified to be reused or retained under contract shall be removed daily from the site at the expense of the Elevator Contractor. The Elevator Contractor shall receive title to all material and equipment not specified to be reused as of date of withdrawal from service. Equipment replaced under this specification will become the property of the Elevator Company. The Elevator Company should be responsible for disposing in the correct way the unused equipment from the premises.

1.10 PERFORMANCE STANDARDS

- A. The elevators shall meet the highest standards of the industry and specifically the following:
 - i. Contract speed is average speed in either direction of travel with rated capacity load in the elevator. Speed variation under all load conditions, regardless of direction of travel, shall not vary more than three (3) percent.
 - ii. The controlled rate of change of acceleration and retardation of the car shall not exceed 0.1G per ft/s/s and the maximum acceleration and retardation shall not exceed 0.2G per ft/s/s.
 - iii. Starting, stopping, and leveling shall be smooth and comfortable without appreciable steps of acceleration and deceleration.
- B. Passenger door operator shall open the car door and hoistway door at 2.5-feet per second and close at 1-foot per second. Freight door operators should open and close at 1 foot per second.
- C. Floor level stopping accuracy shall be within 3 mm (.125 in.) above or below the floor, regardless of load condition.
- D. Noise and Vibration Isolation: All elevator equipment including their support and fastenings to the building, shall be mechanically and electrically isolated from the building structure to minimize objectionable noise and vibration transmission to car, building structure, or adjacent occupied areas of building.

- E. Sound Isolation: Noise level relating to elevator equipment operation in the machine room shall not exceed 80 db. All dBA readings shall be taken three (3) feet off the floor and three (3) feet from the equipment.
- F. Airborne Noise: Measured noise level of elevator equipment during operation shall not exceed 50 dBA in elevator lobbies and 60 dBA inside car under any condition including door operation and car ventilation exhaust blower on its highest speed.

1.11 WARRANTY

- A. The One-Year Warranty shall commence and run concurrently after final inspection, completion of performance test, and upon acceptance of each elevator.
- B. During the warranty period if a device is not functioning properly in accordance with specification requirements, more maintenance than the contract requires keeping device operational, the device shall be removed and a new device meeting all requirements shall be installed as part of the work until satisfactory operation of installation is obtained. The warranty shall start anew for such parts from the date of completion of each new installation performed, in accordance with the foregoing requirements.

1.12 POWER SUPPLY

- A. Main Line Fused Disconnect Switch/Shunt Trip Circuit Breaker for each controller shall be located inside the machine room at the strike side of the machine room door and lockable in the "Off" position.
- B. Provide Surge Suppressors to protect the elevator equipment.

1.13 EMERGENCY POWER SUPPLY (IF APPLY)

- A. Emergency power supply, its starting means, transfer switch for transfer of elevator supply from normal to emergency power, two pairs of conductors in a conduit from an auxiliary contact on the transfer switch (open or close contacts as required by Elevator Controller Manufacturer) to terminals in the group elevator controller and other related work shall be provided by the Electrical Elevator Contractor.
- B. Upon loss of normal power supply there shall be a delay before transferring to emergency power of 10 seconds minimum to 45 seconds maximum, the delay shall be accomplished through an adjustable timing device.
- C. Prior to the return of normal power an adjustable timed circuit shall be activated that will cause all cars to remain on the floor if already there or stop and remain on the next floor if in flight. The actual transfer of power from emergency power

to normal building power shall take place after all cars are stopped on a floor with their doors open.

- D. Car lighting circuits shall be connected to the emergency power panel.
- E. Provide the signal from the generator to the machine room so that the elevators can know when they are working in emergency power.

1.14 ELEVATOR MACHINE ROOM

- A. Reuse the existing machine room and meet the requirements of ASME A17.1, NFPA 70, NFPA 101 and IBC. The elevator drive machine and elevator controller shall be in the same code approved machine room.
- B. Locate the shunt trip breaker/main line disconnect and machine room light switch at the lock side of the door inside the machine room. (IF APPLY)
- C. Locate sprinkler pipes, if required, to provide seven 213.3 cm (7 ft) head clearance. Do not locate sprinkler heads, heat detectors, and smoke detectors directly over elevator equipment. (IF APPLY)

1.15 ELEVATOR SERVICE

- A. To discover and resolve conflicts or lack of definition which might create problems, Elevator Company must review Contract Documents and site conditions for compatibility with its product prior to submittal of quotation. Review existing structural, electrical, and mechanical provisions for compatibility with the Company's products. The owner will not pay for changes to structural, mechanical, electrical, or other systems required to accommodate the Company's equipment.
- B. The Elevator Company shall furnish adequate equipment and use great care in the hoisting and handling of materials and equipment so as not to damage adjacent and existing construction. All damage to the existing building, adjacent structures, walks, drives, and facilities caused by the Company's work shall be repaired by the Company, at no additional cost to the Owner.

1.16 ADDITIONAL EQUIPMENT

- A. Additional equipment required to operate specified equipment manufactured and contemplated for this installation shall be furnished and installed. The cost of such equipment shall be included in the base bid.

1.17 ELEVATOR ELECTRICAL REQUIREMENTS

All electrical equipment placement and installation shall be coordinated with the elevator Company and shall not be located until elevator equipment is installed or

coordination has been arranged with the elevator Company's equipment placement.

A. The following items are part of the Owner responsibilities:

- a. GFI Receptacles: GFI receptacles shall be required in all elevator machine rooms, machinery spaces and elevator pit areas. ASME A17.1 NEC, 620.23(C) & 620.24(C).
- b. Lighting Required in Elevator Machine Rooms: Fluorescent light fixtures should be provided in elevator machine rooms (and machinery spaces when present). Lighting shall be adequate to work on all equipment without shadowing. ASME A17.1.
- c. Lighting Required in Elevator Pits: Four foot, 2 tubes, guarded fluorescent light fixtures shall be required in all elevator pits. The location shall be determined after coordination with the elevator Company so that the light fixture is located out of the way of all elevator equipment. ASME A17.
- d. Bulls Eye (Simplex) Receptacles: Bulls eye (simplex) receptacle for Sump pumps (not – GFI) on a designated circuit, shall be required in all elevator pits, for the elevator pit sump pump. $\frac{3}{4}$ -inch conduit is required to the sump pump. *(ONLY IF THE PIT HAS SUMP PUMP)*
- e. Main Line Breaker or Disconnect (lockable, fused or breaker, a listed device): Shall be supplied in all elevator machine rooms in sight of elevator motor and controller and adjacent to machine room entry door, one disconnects required for the elevator. A label on the disconnect is required stating the location of the overcurrent protection device. NEC 620-51.
- f. Car Lighting Disconnect: A separate branch circuit shall supply the car lights, receptacles(s), auxiliary lighting power source, and ventilation on each elevator car. It shall be fused/breaker and lockable and shall be supplied in all elevator machine rooms. One disconnects required for each elevator. A label stating the location of the supply side overcurrent protection device is required on the disconnect. NEC 620.22(A) & 620.51(D).
- g. Light outlet for the elevator, pit and machine room, as indicated by your elevator Company.
- h. Smoke Hole: Is required floor elevators of 5 stops or more if the machine room has air conditioning.
- i. The door to access to machine room must be fire rated 1 1/2hr labeling.

- j. Lighting, convenient GFCI outlets, cooling and ventilation of machine room. Machine room temperature to be maintained between 55° F and 90° F (13° C and 32° C) or between manufacturing specifications. Relative humidity to be maintained at 95% or less non-condensing.
- k. It requires all machine room, ABC type fire extinguisher. This will be accessible from the door that provides access to these rooms.
- l. Elevator Firefighter's Service is required per ASME A17.1 Rule 2.27.3. Elevator Firefighter's Service wiring and interconnections to automatic sprinkler systems or heat and smoke sensing devices furnished by others.
- m. Emergency Phone and Data Line: Conduit shall be provided by electrical Company in all elevator machine rooms to the elevator controller. Electrical Company shall provide electrical conduits for both the emergency elevator phone and required data line to the elevator machine room, to the elevator controller, and terminated on the elevator controller with coordination from the elevator Company.
- n. Provide the signal from the generator to the machine room so that the elevators can know when they are working in emergency power.

B. The following will be the Company's responsibilities:

- a. **Electrical Component NEC Clearances:** Clearances around all electrical equipment in the elevator machine room shall comply with NEC 110-26 electrical clearances requirements. The electrician's work and equipment placement shall be coordinated with the elevator Company's equipment placement. NEC 620.5
- b. **Electrical Piping Runs:** All electrical piping runs provided by the electrical Company and elevator Company to the elevator equipment shall be run overhead or in a manner which does not restrict access to and around any equipment.

1.18 CONTROL OF SMOKE AND HOT GASES (IF APPLY)

- A. When required by the building code, the hoistway shall be provided with means to prevent the accumulation of smoke and hot gases.
- B. Where hoistway pressurization is provided, it shall be designed, installed, and maintained so as not to impede elevator operation.

1.19 SUBSTANTIAL COMPLETION

A. Elevator Company:

Notify the Owner's Representative in writing that the project, or designated portion thereof, is substantially complete. Upon completion of the preliminary Elevator Consultant punch list, the Elevator Contractor shall submit the following:

- i. Operation and maintenance data.
- ii. Guarantees and warranties.
- iii. Interfacing information.
- iv. Keys and Manuals
- v. Electrical Drawings.

1.20 CORRECTION OF INSTALLED DEFECTIVE WORK

A. As part of the warranty, the Elevator Contractor is responsible for the following: Repair or remove and replace defective installation.

- a. Restore damaged substrates and finishes.
- b. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and proper adjustment of operating equipment.
- c. Restore permanent facilities used during construction to their specified condition.
- d. Remove and replace damaged surfaces that are exposed to view if the surfaces cannot be repaired without visible evidence of repair.

1.21 CHANGES IN SCOPE AND EXTRA WORK

- a. The Owner may at any time make changes to the specifications, plans and drawings, omit work, and require additional work to be performed by the Elevator Contractor.
- b. Each such addition or deletion to the Contract shall require the Owner and the Elevator Contractor to negotiate a mutually acceptable adjustment in the contract price, and, for the Elevator Contractor to issue a change order describing the nature of the change and the amount of price adjustment.
- c. The Elevator Contractor shall make no additions, changes, alterations,

or omissions or perform extra work except on written authorization of the Owner.

- d. Each change order shall be executed by the Elevator Contractor, Owner, and the Consultant.

1.22 REMOVAL OF MATERIALS AND EQUIPMENT

- A. Material and equipment that are not specified to be reused or retained under contract must be removed daily from the site at the expense of the Elevator Contractor.

PART 2 – PRODUCTS

2.1 MANUFACTURED PRODUCTS

- A. Materials, devices, and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items. The elevator equipment, including controllers, door operators, and supervisory systems shall be the product of manufacturers of established reputation, provided such items are capably engineered and produced under coordinated specifications to ensure compatibility with the total operating system.
- B. Manufacturers of equipment assemblies which include components made by others shall assume complete responsibility for the final assembled unit. Components shall be compatible with each other and with the total assembly for the intended service.
- C. Mixing of manufactures related to a single system or group of components shall be identified in the submittals.
- D. If key operated switches are furnished in conjunction with components of this elevator installation, furnish four (4) keys for each individual switch or lock. Provide different key tumblers for different switch and lock functions. Each key shall have a tag bearing a stamped or etched legend identifying its purpose.
- E. Pre-approved Equipment Manufacturers
 - 1. The following manufacturers' equipment and materials have been pre-approved for use on this project.
 - 2. Other equipment not specifically mentioned shall be considered for approval on an individual basis.
 - 3. Certain Original Equipment Manufacturers' equipment is acceptable unless otherwise specified.
 - a. Controller – Elevator Controls, GAL - Galaxy, approved equal.
 - b. Hangers' rollers, Interlocks and Door Operators - G.A.L., ECI approved equal.
 - c. Fixtures - G.A.L., EPCO, Monitor, E-Motive USA, C.E. Electronics, Innovation, PTL, MAD, National.
 - d. Door Protective Device - Janus, Adams, G.A.L., T.L. Jones, Tri-Tronics.
 - a. Machines – Torin, HW approved equal.
 - b. Motors - Imperial Electric, General Electric, Baldor, Reuland

- Electric.
- c. VVVF Power Drives - Yaskawa, TorqMax.
 - d. Electrical Traveling Cables - Draka, James Monroe
 - e. Guide Shoes/Rollers – ELSCO, G.A.L.
 - f. Wire Ropes - Paulsen, Bethlehem, Wayland, Draka.
 - g. Intercommunications/Telephones - RATH, Three King, Janus, approved equal.
 - h. Doors – Columbia, Kothler or approved equal.
2. Original Equipment Manufacturers may substitute their own branded equipment subject to the following:
- a. All requirements of the specifications are met regarding performance, appearance, serviceability, and support.
 - b. A full stock of all regular and critical replacement parts required for this project are maintained at a facility near the project site. Any parts not stocked at the above-mentioned facility shall be identified with the location of the nearest source and shall be available for next-day delivery upon demand.
 - c. All parts and software shall be made available for purchase by a qualified elevator maintenance firm with one-business day delivery without direct Owner involvement.
 - d. All specialized tools, equipment, software, and passwords required to maintain, repair, adjust the operation, and perform code mandated inspections are provided to the Owner as part of the base installation.
 - e. Technical support of the product(s) shall be available to the Owner's elevator service provider.

2.2 CONDUIT AND WIREWAY

- A. Reuse existing ones where possible and provide new conduit and wireway where needed. Install electrical conductors, except traveling cable connected to the elevator, in rigid zinc-coated steel or aluminum conduit, electrical metallic tubing or metal wireways. Rigid conduit smaller than .75 inch or electrical metallic tubing smaller than .50-inch electrical trade size shall not be used. All raceways completely embedded in concrete slabs, walls, or floor fill shall be rigid steel conduit. Wireway (duct) shall be installed in the hoistway and to the controller and between similar apparatus in the elevator machine room. Fully protects self-supporting connections, where approved, from abrasion or other mechanical

injury. Flexible metal conduit not less than .375-inch electrical trade size may be used, not exceeding 18 inches in length unsupported, for short connections between risers and limit switches, interlocks, and for other applications permitted by NEC.

- B. All conduit terminating in steel cabinets, junction boxes, wireways, switch boxes, outlet boxes and similar locations shall have approved insulation bushings. Install a steel lock nut under the bushings if they are constructed completely of insulating materials. Protect the conductors at ends of conduits not terminating in steel cabinets or boxes by terminal fittings having an insulated opening for the conductors.
- C. Rigid conduct and EMT fittings using set screws or indentations as a means of attachment shall not be used.
- D. Connect motor or other items subject to movement, vibration or removal to the conduit or EMT systems with flexible, steel conduits.

2.3 CONDUCTORS

- A. Remove existing and provide new conductors, excluding the traveling cables. Conductors shall be stranded or solid coated annealed copper. Multiple conductor cables shall have color or number coding for each conductor. Conductors for control boards shall be in accordance with NEC. Tap connectors may be used on wireways provided they meet all UL requirements.
- B. Provide all conduct and wiring between machine room, hoistway and fixtures.
- C. All wiring must test free from short circuits or ground faults. Insulation resistance between individual external conductors and between conductors and ground shall be a minimum of one megohm.
- D. Where the size of conductor is not given, voltage and amperes shall not exceed limits set by NEC.
- E. Provide grounding equipment. Ground the conduits, supports, controller enclosure, motor, platform and car frame, and all other non-current conducting metal enclosures for electrical equipment in accordance with NEC. The ground wires shall be copper, green insulated and sized as required by NEC. Bond the grounding wires to all junction boxes, cabinets, and wire raceways.

2.4 TRAVELING CABLES

- A. Remove existing and provide new flexible traveling cables conforming to the requirements of NEC. Traveling cables shall run from the junction box on the car directly to the controller. Junction boxes on the car shall be equipped with terminal blocks. Cables shall be securely anchored to avoid strain on individual terminal connections. Flame and moisture resistant outer covering must remain

intact between junction boxes. Abrupt bending, twisting and distortion of the cables shall not be permitted.

- B. Provide spare conductors equal to 10 percent of the total number of conductors furnished, but not less than 5 spare conductors on each traveling cable.
- C. Provide shielded wires for the auto dial telephone system within the traveling cable, five (5) pair shielded wires for card readers, one (1) RG-6 Ethernet cable for **Wi-Fi**, two (2) pair 14-gauge wires for 110 Volt power supply, camera and wire for video display monitor if specified.
- D. If traveling cables contact the hoistway or elevator due to sway or change in position, provide shields or pads to the elevator and hoistway to prevent damage to the traveling cables.
- E. Hardware cloth may be installed from the hoistway suspension point to the elevator pit to prevent traveling cables from rubbing or chafing and securely fastened and tensioned to prevent buckling. Hardware cloth is not required when traveling cable is hung against a flat wall.

2.5 CONTROLLER AND SUPERVISORY PANEL

- A. Remove existing and provide new UL/CSA Labeled Controller. Mount all assemblies, power supplies, chassis switches, and relays on a steel frame in a NEMA Type 1 General Purpose Enclosure. The cabinet shall be securely attached to the building structure.
- B. Properly identify each device on all panels by name, letter, or standard symbol which shall be neatly stencil painted or decaled in an indelible and legible manner. Identification markings shall be coordinated with identical markings used on wiring diagrams. The ampere rating shall be marked adjacent to all fuse holders. All spare conductors to controller and supervisory panel shall be neatly formed, laced, and identified.

2.6 MICROPROCESSOR CONTROL SYSTEM

- A. Provide a new microprocessor control system with absolute position/speed feedback to control dispatching, signal functions, door operation, and VVVF Drive for hoist motor control. Complete details of the components and printed circuit boards, together with a complete operational description, shall be submitted for approval.
- B. Motion Control
 - 1. Smooth stepless acceleration and deceleration of the elevator car shall be provided in either direction of travel during both single and multiple floors runs.

2. Use digital logic to calculate optimum acceleration and deceleration patterns during each run.
 - a. The amplitude of acceleration and deceleration shall not exceed 2.6 - 2.8 ft./sec² for geared and MRL traction, and 3.5 - 4 ft./sec² for gearless traction elevators.
 - b. The maximum jerk rate shall be 1.5 to 2.0 times the acceleration and deceleration.
 - c. 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 3% of the rated speed.
 3. 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.
 - a. 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.
 4. Elapsed flight time during a typical elevator one floor run shall not exceed values as further specified.
 - a. 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.
- C. A variable voltage, variable frequency AC drive system shall be provided.
1. Power for the system will be taken from the building 3 phase power supply. Provide line filters or chokes to prevent electrical peaks or spikes from feeding back into the building power system. Motor speed and torque will be controlled by varying the frequency and amplitude of the AC. A digital velocity encoder shall be provided on the motor giving feedback to the controller on motor speed and position. Provide line filters, noise spikes or notching suppressors to ensure other computer-operated equipment in the building will not be affected.

2. The drive system should be designed to suppress noise and prevent transient voltage feedback into the building power supply. Transformers and filter networks shall be utilized to ensure that waveform distortion and harmonic content will not adversely affect the operation of standby generator and other equipment.
3. The power for the system is to be protected for phase loss and phase unbalance protection.
4. The drive system shall meet or exceed all requirements of IEEE 519 1981 standard for general systems. The position selector shall be part of the microprocessor system. The car position in the hoistway shall be digitized through a primary position encoder. The microprocessor control system should store the floor position and slow down points in memory.
5. The drive control system shall be a dual-loop feedback system based primarily on car position. The velocity profile shall be calculated by the microprocessor control system producing extremely smooth and accurate stops. The velocity encoder shall permit accurate position/velocity feedback and shall permit fast and accurate control of acceleration and deceleration.

D. Modernization Requirement - Auto Reset System for the Governor in the Control Panel

The control panel of the traction elevator must be upgraded to include an auto-reset system for the governor located in the elevator pit. This system must be capable of automatically resetting the governor to its normal operating state in the event of a failure or activation of the safety mechanism, without the need for manual intervention. The control panel must be designed to continuously monitor the status of the governor and, upon detecting an anomaly that triggers the safety mechanism, must execute the auto-reset process to restore the system's functionality without compromising the elevator's safety. This system must comply with the safety standards outlined in ASME A17.1-2019, ensuring its proper operation and guaranteeing that the elevator can safely and efficiently resume operation following a temporary interruption or failure of the governor.

2.7 EMERGENCY POWER OPERATION (ONLY IF APPLY)

- A. Standby Power Operation: On activation of standby power, cars are returned to a designated floor and parked with doors open. One car is returned at a time, with priority given to loaded cars.
- B. Upon loss of normal power supply there shall be a delay before transferring to emergency power of 10 seconds minimum to 45 seconds maximum, the delay shall be accomplished through an adjustable timing device.

Prior to the return of normal power an adjustable timer circuit shall be activated that will cause all cars to remain on the floor if already there or stop and remain on the next floor if on flight. The actual transfer of power from emergency power to normal building power shall take place after all cars are stopped on the floor with their doors open.

2.8 FIREFIGHTER'S SERVICE

A. Provide Firefighter's Service.

1. Main Floor:
2. Alt. Floor:
3. Verify main and alternate floors with owner.
4. Smoke Detectors: Smoke detection devices that are designated for actuation of Elevator Phase I "FIRE SERVICE" response in each elevator lobby, and machine room shall be NEW by others.
 - i. Elevator lobby smoke detectors shall activate only the elevators sharing the corresponding or common lobby.
 - ii. An elevator or group of elevators serving separate isolated areas of the same floor shall have an independent smoke detection system.
 - iii. Machine room smoke detectors shall activate fire recall for each elevator with equipment located in that machine room.

2.9 INDEPENDENT SERVICE

- ### **A. Provide an INDEPENDENT SERVICE key switch on the face of the main car operating panel that shall have its positions marked "ON" and "OFF". When the switch is in the "ON" position, the car shall respond only to calls registered on its car dispatch buttons and shall bypass all calls registered on landing push buttons. The car should start when a car call is registered, car call button or door close button is pressed, the car and hoistway doors are closed, and interlock circuits are made. When the switch is returned to the "OFF" position, normal service shall be resumed.**

2.10 LOAD WEIGHING (IF APPLY)

- ### **A. Provide means for weighing carload for each elevator. When the load in a car reaches an adjustable predetermined level of the rated capacity, that car shall bypass registered landing calls until the load in the car drops below the predetermined level. Calls passed by in this manner shall remain registered for the next car. The initial adjustment of the load weighing bypass setting shall be 60 to 100 percent.**

2.11 ANTI-NUISANCE FEATURE

- A. If the weight in the car is not commensurate with the number of registered car calls, cancel car calls. Systems that employ either load weighing or door protective device for activation of this feature are acceptable.

2.12 SEISMIC REQUIREMENTS

- A. Meet the requirements ASME A 17.1-2019 for alteration.
- B. Support and maintain hoisting machines, controllers, supervisory panels, governors, and pit sheaves in place to prevent any component from sliding, rotating, overturning, or jumping under conditions imposed by seismic forces.
- C. Support and maintain hoisting machines, controllers, supervisory panels, governors, and pit sheaves in place to prevent any component from sliding, rotating, overturning, or jumping under conditions imposed by seismic forces.
- D. Provide a seismic sensor to activate seismic operation. One per group of elevators.
- E. Two counterweight derailment sensing wires vertically on the car side of the counterweight the entire height of travel. The counterweight frame shall be equipped with four derailment rings. New counterweight displacement switch. In the event the switch is activated, the corresponding elevator shall stop immediately and then proceed in the direction away from the counterweight to the next floor at a speed not exceeding 0.76 m/s (150 FPM). Upon arrival at the next floor, the elevator shut down with its door open. An indicator pilot light shall illuminate when the counterweight derailment detector is activated. This pilot shall be fully identified and shall be in the machine room indicator panel, or if no machine room indicator panel is specified, locate pilot light in a conspicuous place on the front of the elevator controller, not obstructed by controller door panels.

2.13 ELEVATOR MACHINE BEAMS

- A. Reuse existing beams and add blocking beams as required by machine manufacturers.

2.14 TRACTION HOIST MACHINE

- A. The traction machine to be installed shall be of the **gear-type (with gearbox) and horizontal shaft**, specifically designed for installation in a machine room located at the basement level. It shall consist of an alternating current (AC) motor with either forced or natural ventilation, mechanically coupled to a gearbox with helical or worm gears, with a horizontal output shaft aligned to the drive sheave.

The machine shall include an **electromechanical service brake**, with dual-coil operation, mounted directly on the motor or gearbox shaft. In addition, an **independent or redundant emergency brake** shall be provided, in compliance with **ASME A17.1-2019 Sections 2.19 and 2.20**, designed to activate in the event of failure of the main brake or under critical conditions, and capable of stopping and holding the elevator car under rated load. Both brakes shall be certified, capable of holding the elevator stationery in the event of a power failure and shall be easily accessible for inspection. The complete machine assembly shall be mounted on vibration-damping supports, be compatible with variable voltage variable frequency (VVVF) drive systems and meet all safety and performance requirements established by ASME A17.1-2019.

- B. Provide hoist machine mounted direct drive, digital, closed-loop velocity encoder.
- C. Drive sheaves shall be free from cracks, sand holes, and other imperfections that would tend to damage the hoist ropes. Sheave shall be turned smooth and true with rope grooves of proper design to insure maximum traction and maximum life of the hoist ropes.
- D. Hoisting machine brakes shall be drum or disc type and shall stop and hold the elevator with 125 percent of rated load.

2.15 DEFLECTOR SHEAVES

- A. Provide new deflector sheaves with a metal guard and a guard to prevent ropes from jumping out of grooves. Securely fasten guard to sheave support beams.

2.16 HOIST ROPES

- A. Provide the elevator with the required number and size of new ropes to ensure adequate traction and the required safety factor.
- B. Securely attach a corrosion resistant metal data tag to one hoisting rope fastening on top of the elevator.

2.17 HOIST ROPE COMPENSATION (ONLY IF APPLLY)

- A. Provide compensation when required by the controller manufacturer. Compensation shall consist of the necessary number and size of encapsulated chains attached to the underside of the car and counterweight frames.
 - 1. Provide pit guide to minimize chain sway.
 - 2. Provide take-up adjustment to compensate for hoist rope stretch.
 - 3. Pad areas where compensation may strike cars or hoistway items.

2.18 GOVERNOR ROPE

- A. New governor rope shall be 6 x 19 or 8 x 19 wire rope, preformed traction steel, uncoated, fiber core, conforming to Federal Specification RR-W-410 with minimum nominal diameter of 0.375 inch having a minimum safety factor of 5. Tiller rope construction is not acceptable.
- B. Under normal operation rope shall run free and clear of governor jaws, rope guards, and other stationary parts.
- C. Securely attach the governor rope tag to governor rope releasing carrier.

2.19 SPEED GOVERNOR

- A. Provide a new centrifugal car driven by the governor to operate the car safety device. The governor shall be complete with weighted pit tension sheave, governor release carrier and mounting base with protected cable sleeves.
- B. Provide overspeed switches, and speed reduce switches when required.
- C. The governor rope clamping device should be designed to prevent appreciable damage to or deformation of the governor rope that results from the stopping action of the device operating safely.
- D. Provide metal guard over top of governor rope and sheaves.
- E. Where the elevator travel does not exceed 100 feet, the weight tension sheave may be mounted on a pivoted steel arm in lieu of operating in steel guides.

2.20 CAR SAFETY DEVICE

- A. Reuse existing car safety devices. Clean, adjust, lubricate, and test. Replace worn, damaged, or missing parts as needed.

2.21 ASCENDING CAR OVERSPEED PROTECTION

- A. Provide new devices to prevent ascending over speed and unintended motion away from the landing when the doors are not closed or locked.

2.22 UNINTENDED CAR MOVEMENT PROTECTION DEVICE

- A. Provide a device to prevent unintended car movement away from the landing when the car and hoistway doors are not 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) Machine 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 the operation of the car until the device is manually reset.
 - c. The device shall meet the requirements of the ASME A17.1-2019 Safety Code.
- B. Emergency Brake**
1. Provide a mechanical device, independent of the normal braking system, that will stop the elevator should it overspeed or move in an unintended manner.
 2. The device used may be arranged to apply force to the car or counterweight rails, suspension or compensation ropes, drive sheave or brake drum.
 3. The emergency brake shall be provided with a marking plate indicating the range of total masses (car with attachments and its load) for:
 - a. The range of speeds at which it is set to operate.
 - b. Criteria such as rail lubrication requirements that may be critical to the performance.

2.23 CAR AND COUNTERWEIGHT BUFFERS OR SPRING

- A. Recondition the buffers or spring for each car and each counterweight. Securely fasten buffers and supports to the pit channels and in the alignment with striker plates on car and counterweight. Each installed buffer shall have a permanently attached metal plate indicating its stroke and load rating.

2.24 COUNTERWEIGHTS

- A. The counterweight should be cleaned and all missing or damaged bolts, tie rods, and frames members shall be replaced.
- B. Sub-weights should be added or removed from the counterweights frame to provide a counterbalance equal to the weight of the complete car and 40 to 50

percent of the rated capacity, as required by the controller manufacturer. New sub-weights shall be cast iron, flame cut hot rolled steel or cast lead.

- C. Reuse existing counterweight guard. If compensation chains are required remove counterweight guards.

2.25 GUIDE RAILS, SUPPORTS, AND FASTENINGS

- A. Retain existing cars and counterweight guide rails and brackets.
- B. Thoroughly clean all guide rails of dust, grease, oil, rust, and other foreign substances. File and remove all rough edges and surfaces and tighten bracket bolts and guide clips for smooth and quiet operation of car and counterweight.
- C. Elevator Contractor may provide new roller guide assemblies, of equal or greater quality, in lieu of rebuilding the existing, as part of the base bid subject to the approval of the Consultant. Costs associated with replacement shall also be included in the base bid cost.

2.26 NORMAL AND FINAL TERMINAL STOPPING DEVICES

- A. Mount new terminal slowdown switches and direction limit switches on the elevator or in hoistway to reduce speed and bring car to an automatic stop at the terminal landings.
 - 1. Switches shall function with any load up to and including 125 percent of rated elevator capacity at any speed obtained in normal operation.
 - 2. Switches, when opened, shall permit the operation of the elevator in the reverse direction of travel.
- B. Mount new final terminal stopping switches in the hoistway.
 - 1. Switches should be positively open should the car travel beyond the terminal direction limit switches.
 - 2. Switches shall be independent of other stopping devices.
 - 3. Switches, when opened, shall remove power from the hoist motor, apply hoist machine brake, and prevent operation of car in either direction.

2.27 CROSSHEAD DATA PLATE AND CODE DATA PLATE

- A. Permanently attach a non-corrosive metal Data Plate to car crosshead.
- B. Permanently attach a non-corrosive Code Data Plate to the controller.

2.28 WORKMAN'S LIGHTS AND OUTLETS

- A. Provide new duplex GFCI protected type receptacles and lamps with guards on top of each elevator car. The receptacles shall be in accordance with NEC, rated as 15 amperes and 125 volts.

2.29 CARTOP OPERATING DEVICE

- A. Provide a new cartop operating device.
- B. The device shall be activated by a toggle switch mounted in the device. The switch shall be clearly marked "INSPECTION" and "NORMAL" on the faceplate, with 6 mm (.25 in.) letters.
- C. Movement of the elevator shall be accomplished by continuous pressure on the direction button and a safety button.
- D. Provide an emergency stop switch, push to stop/pull to run.
- E. Provide permanent identification for the operation of all components in the device.
- F. The device shall be permanently attached to the elevator crosshead on the side of the elevator nearest to the hoistway doors used for accessing the top of the car.

2.30 CAR LEVELING DEVICE

- A. Car shall be equipped with a new two-way leveling device to automatically bring the car to within 3 mm (.125 in.) of exact level with the landing for which a stop is initiated regardless of load in car or direction.
- B. If the car stops short or travels beyond the floor, the leveling device within its zone shall automatically correct this condition and maintain the car within 3 mm (.125 in.) of level with the floor landing regardless of the load carried.

2.31 EMERGENCY STOP SWITCHES

- A. Provide an emergency stop switch, push to stop/pull to run, for the top-of-car device, pit, machine space, service panel and firefighter control panel inside the elevator. Mount stop switches in the pit adjacent to pit access door, at top of the pit ladder 1220 mm (48 in.) above the bottom landing sill and 1220 mm (48 in.) above the pit floor adjacent to the pit ladder.
- B. Each stop switch shall be red in color and shall have "STOP" and "RUN" positions legibly and indelibly identified.

2.32 MAIN CAR OPERATING PANEL

- A. Provide a new main car operating panel in the car enclosure on the front return panel for passenger elevators. The top floor car call push button shall not be more than 1220 mm (48 in.) above the finished floor. Car call push buttons and indicator lights shall be LED illuminated, round with a minimum diameter of 25 mm (1 in.). Each button shall contain an integral registration LED white light which shall illuminate upon registration of a call and shall extinguish when that call is answered.

- B. One-piece tilt panel shall have the firefighter's service panel recessed into the upper section and the service operation panel recessed into the lower section fitted with hinged doors. Doors shall have concealed hinges, be in the same front plane as the faceplate and fitted with key operated locks. Secure the faceplate with stainless steel tamperproof screws.
- C. All terminology and tactile symbols on the faceplate shall be on square or rectangular plates recessed into the faceplate with its surface flush with the surface of the faceplate. Use 6 mm (.25 in.) letters to identify all devices in the faceplate. The tactile symbols with contrasting background shall be 12.5 mm (0.5 in.) high raised .075 mm (.030 in.) on the plate. Surface mounted plates are not acceptable.
- D. The upper section shall contain the following items in order listed from top to bottom:
1. Elevator number, 12.5 mm (.50 in.) high with black paint for contrast.
 2. Capacity plate information with black paint contrasting freight loading class and number of passengers allowed.
 3. LED illuminated digital car position indicator with direction arrows.
 4. Emergency car lighting system consisting of a rechargeable battery, charger, controls, and LED illuminated light fixture. The system shall automatically provide emergency light in the car upon failure or interruption of the normal car lighting service, and function irrespective of the position of the light control switch in the car. The system shall maintain a minimum illumination of 1.0 foot-candle when measured 1200 mm (48 in.) above the car floor and approximately 300 mm (12 in.) in front of the car operating panel, for not less than four (4) hours.
 5. Firefighter's Emergency Operation Panel shall be 167.6 mm (66 in.) minimum to 1830 mm (72 in.) maximum to the top of the panel above finished floor.
 6. Firefighter's Emergency Indicator Light shall be round with a minimum diameter of 25 mm (1 in.).
 7. Key operated Independent Service Switch or toggle switch inside service panel.
 8. Provide a Door Hold Button on the faceplate next to the Independent Service Key Switch. It shall have "DOOR HOLD" indelibly marked on the button. Button shall light when activated. When activated, the door shall stay open for a maximum of one minute. To override the hold timer, push the car call button or door close button.
 9. Complete set of round car call push buttons, minimum diameter of 25 mm (1 in.), and LED white light illuminated, corresponding to the floors served. Car call buttons shall be legibly and indelibly identified by a floor number and/or letter not less than 12.5 mm (.50 in.) high in the face of the call button.

10. Door Open and Door Close buttons shall be located below the car call buttons. They shall have "OPEN" and "CLOSE" legibly and indelibly identified by letters in the face of the respective button. The Door Open button shall be located closest to the door jamb.
 11. Red Emergency Alarm button that shall be located below the car operating buttons. Mount the emergency alarm button not lower than 888 mm (35 in.) above the finished floor. It shall be connected to audible signaling devices. Provide audible signaling devices including the necessary wiring.
 12. Emergency Help push button shall activate two-way communications by Auto Dial telephone system that is compatible with the Recuse Entity telephone system. The help button shall be LED white light illuminated and flash when call is acknowledged. Legibly and indelibly label the button "HELP" in the face of the button with 12.5 mm (.50 in.) high letters.
- E. The service operation panel in the lower section shall contain the following items:
1. Light switch labeled "LIGHTS" for controlling interior car lighting with its two positions marked "ON" and "OFF".
 2. Inspection switch that will disconnect normal operation and activate hoistway access switches at terminal landings. Switch shall be labeled "ACCESS ENABLE" with its two positions marked "ON" and "OFF".
 3. Three position switch labeled "FAN" with its positions marked "HIGH", "LOW" and "OFF" for controlling car ventilating blower.
 4. Two-position Spring return toggle switch or push button to test the emergency light and alarm device. It shall be labeled "TEST EMERGENCY LIGHT AND ALARM".
 5. Two-position toggle switch labeled "Independent Service" with its positions marked "ON" and "OFF".
 5. Two-position emergency stop switch, when operated, shall interrupt power supply, and stop the elevator independently of regular operating devices. Emergency stop switch shall be marked "PUSH TO STOP" and "PULL TO RUN".

2.33 AUDIO VOICE SYSTEM

- A. Provide a digitized audio voice system. Audio voice shall announce floor designations, direction of travel, and special announcements. The voice announcement system shall be a natural sounding human voice that receives messages and shall comply with ADA requirements for audible car position indicators. The voice announcer shall have two separate volume controls, one for the floor designations and direction of travel, and another for special announcements. The voice announcer shall have a full range loudspeaker, located on top of the cab. The audio voice unit shall contain the number of ports

necessary to accommodate the number of floors, direction messages, and special announcements. Install voice announcer per manufacturer's recommendations and instructions. The voice system shall be the product of a manufacturer of established reputation. Provide manufacturer literature and a list of voice messages.

1. Fire Service Message.
2. "Please do not block doors".
3. Seismic Operation.
4. Others

2.34 CAR EMERGENCY SIGNALING DEVICES

- A. Furnish and install a complete ADA compliant auto dial telephone.
- B. Provide a two-way communication device in the car with automatic dialing, tracking and recall features with shielded wiring to car controller in machine room. Provide dialer with automatic rollover capability with two numbers.
A means of communication shall be provided in or adjacent to a car operating panel. The push button shall be visible and permanently identified with the "PHONE" symbol (see 2.26.12.1). The identification shall be on or adjacent to the phone push button. The communications means shall be initiated when the push button is actuated.
- C. On the same panel as the phone a message shall be displayed push button that is activated by authorized personnel to acknowledge that communications are established. The message shall be extinguished permitted to be where necessary to display a new message [see 2.27.1.1.3 (d) and (e)] or when the communications are terminated.
- D. On the same panel as the phone push button, messages shall be displayed which permit authorized personnel to communicate with and obtain responses from a trapped passenger(s) including a passenger(s) who cannot verbally communicate or cannot hear.
- E. On the same panel as the phone push button a message shall be displayed that is activated by authorized personnel to indicate when help is on the way. The message shall continue to be displayed until a new message is displayed [see 2.27.1.1.4 (c)] or the communications are terminated.
- F. A means to display videos to observe passengers at any location on the car floor to authorized personnel for entrapment assessment shall be provided.
- G. Operating instructions shall be incorporated with or adjacent to the means of communication outside the car. Instructions shall conform to 2.27.7.3.



2.35 CORRIDOR OPERATING DEVICES

- A. Provide new operating elevator and signal devices from not less than 3 mm (.125 in.) thick flat stainless steel with all edges beveled 15 degrees.
- B. Corridor push button faceplates shall be sized to accommodate corridor pictograph on faceplate. The centerline of the landing push buttons shall be 15- to 48 inches above the corridor floor.
- C. Elevator Corridor Call Station Pictograph shall be engraved on the faceplate.
- D. Fasten all car and corridor operating device and signal device faceplates with stainless steel tamperproof screws.
- E. All terminology and tactile symbols on the faceplate shall be raised by .030 inch with contrasting background, on square or rectangular plates recessed into the faceplate with its surface flush with the surface of the faceplate. The handicapped markings with contrasting background shall be 12.5 mm (0.5 in.) high raised .030 inch on the plate, square or rectangular. Use 6 mm (.25 in.) letters to identify all other devices in the faceplate. Surface mounted plates are not acceptable.
- F. Provide one riser of landing call buttons for each group of elevators.
- G. Each button shall contain an integral registration LED white light which shall illuminate upon registration of a call and shall extinguish when that call is answered.
- H. The direction of each button shall be legibly and indelibly identified by arrows not less than 12.5 mm (.50 in.) high on the face of each button.
- I. Landing push buttons shall not re-open the doors while the car and hoistway doors are closing at that floor, the call shall be registered for the next available elevator. Calls registered shall be canceled if closing doors are re-opened by means of "DOOR OPEN" button or infrared curtain unit.
- J. Provide a separate fixture above the hall button fixture for emergency power indicator light, fire service recalls key switch and indicator light, fire recall instruction, communication failure light, communication audible enunciator, and reset key switch at the designated main floor.

- K. Remove old fixtures, repair, and refinish walls.
- L. Submit design of hall pushbutton fixtures for approval.
- M. Remove old fixtures, repair, and refinish walls.

2.36 CAR LANTERN

- A. Provide elevators with new car lantern indicators mounted on the car door entrances.
- B. Provide means to indicate direction of elevator travel in response to a call. Lanterns shall light with the door open movement and shall stay lit until doors begin to close. Audible signal shall sound when the lantern is lit and shall sound once for up travel and twice for down travel.
- c. Remove old fixtures, repair, and refinish walls.

2.37 HOISTWAY ACCESS

- A. Provide new hoistway access switches for elevators at top terminal landing to permit access to top of car, and at bottom terminal landing to permit access to pit.
- B. Exposed portion of each access switch or its faceplate shall have legible, indelible legends to indicate "UP", "DOWN", and "OFF" positions.
- C. Each access switch shall be a constant pressure cylinder type lock having not less than five pins or five stainless steel disc combination with key removable only when switch is in the "OFF" position.
- D. Arrange the hoistway switch to initiate and maintain movement of the car. When the elevator is operated in the down direction from the top terminal landing, limit the zone of travel to a distance not greater than the top of the car crosshead level with the top floor. Submit design and location of access switches for approval.
- E. Provide emergency access for all hoistway entrances, keyways for passengers and service elevators.

2.38 HOISTWAY ENTRANCES: PASSENGER ELEVATORS

- A. Clean and reuse existing hoistway sills, hanger supports, strut angles, fascia plates and toe guards.
- B. Replace all damaged or missing dust covers.
- C. Provide new gibs, nylon, separate fire gibs, door rollers, door locks, drive roller assemblies and sill mounted closes.
- F. Provide Braille plates on both sides of door frame entrances located 152.3 cm (60 in.) to center above finished floor. Replace damaged or missing Braille plates.

- G. Provide unique car numbers on every elevator entrance at designated main fire service floor level, minimum 76 mm (3 in.) in height.
- H. Equip each hoistway entrance with a new electrical/mechanical interlock, functioning as a hoistway unit system, to prevent operation of car until all hoistway doors are locked in closed position.
- I. Wiring installed from the hoistway riser to each door interlock shall be NEC type SF-2 or equivalent.

2.39 CAR AND COUNTERWEIGHT GUIDES

- A. Install four new adjustable roller guides, each assembled on a substantial metal base, to permit individual alignment to the guide rails.
- B. Each guide shall consist of not less than three (3) wheels, each with a durable, resilient oil-resistant material tire rotating on ball bearings sealed-in lubrication. Assemble rollers on a substantial metal base and mount to provide continuous spring pressure contact of all wheels with the corresponding rail surfaces under all conditions of loading and operation. Secure the roller guides at top and bottom on each side of car frame and counterweight frame. All mounting bolts shall be fitted with nuts, flat washers, split lock washers, and if required, beveled washers.
- C. Provide sheet metal guards to protect rollers on top of cars and counterweights.
- D. Minimum diameter of car rollers shall be 152 mm (6 in.). The entire elevator car should be properly balanced to equalize pressure on all guide rollers. Cars shall be balanced in post-wise and front-to-back directions. A test for this balanced condition shall be witnessed at the time of final inspection.
- E. Minimum diameter of counterweight rollers shall not be less than 101 mm (4 in.). Properly balance counterweight frame to equalize pressure on all guide rollers. The Elevator Contractor have the option of furnishing, for counterweight only, mechanically adjusted roller guide in lieu of spring-loaded roller guides as specified.
- F. Equip the car and counterweight with an auxiliary guiding device for each guide shoe which shall prevent the car or counterweight from leaving the rails if the normal guides fail. These auxiliary guides shall not, during normal operation, touch the guiding surfaces of the rails. The auxiliary guides may be an extension of the normal guide shoe mounting plate if that plate is fabricated from hot rolled steel. The portion of the auxiliary guide that contacts the rail guiding surfaces in the event of loss of the normal guides shall be lined with an approved bearing material to minimize damage to the rail guiding surfaces.

2.40 CAR FRAME: PASSENGER ELEVATORS

- A. Reuse the existing car frame. Tighten bolts and replace missing bolts.

2.41 CAR PLATFORM: PASSENGER ELEVATORS

- A. Provide a platform guard (toe guard) of not less than 12-gauge sheet-steel on the entrance side, extending 76 mm (3 in.) beyond each side of the entrance jamb. Securely brace platform guard to car platform, and bevel bottom edge at a 60-75-degree angle from horizontal. Install the platform in the hoistway, so that the clearance between front edge and landing threshold shall not exceed 32 mm (1.25 in.).

2.42 CAR ENCLOSURE: PASSENGER ELEVATORS

- A. Front return wall panel, entrance columns, entrance head-jamb and transom shall be 14-gauge stainless steel. Transom shall be full of cabs. Side and rear walls shall be constructed of 14-gauge cold rolled steel. Coat exterior of walls with mastic sound insulation material approximately 2.5 mm (.09375 in.) thick followed by a prime coat of paint.
- B. The side and rear walls of passenger elevators may have raised panels covered in fire rated materials approved for use in elevator interior.
- C. Side and rear walls of service elevators, up to the center line of the top handrail, shall be covered with stainless steel. The side and rear walls to the ceiling shall be covered with high pressure plastic laminate panels.
- D. Provide car top railings.
- E. Provide a hinged top emergency exit cover. Exit shall be unobstructed when open and shall have mechanical stops on the cover. Provide an exit switch to prevent operation of the elevator when the emergency exit is open.
- F. Lighting for passenger/service elevators:
- G. Provide a hanging ceiling frame.
- H. Provide LED illuminated car light fixtures above the ceiling panels. Maintain a minimum light level of 50-foot candles at 914 mm (36 in.) above the finished floor.
- I. Provide car enclosure with two sets of handrails with centerlines 762 mm and 1067 mm (30 in. and 42 in.) above the car floor.
- J. Provide car door and new hardware, tracks, gibs, separate fire gibs, gate switch, door drive clutch assemblies and door restrictor.
- K. Provide one set of protective pads for service elevators of sufficient length to completely cover two sides, rear walls and front return of the cab interior. Pads shall consist of a minimum of 6 mm (.25 in.) thick glass fiber insulation securely sewn between flame resistant vinyl coated coverings. Provide stainless steel pad buttons or hooks, spaced at intervals of not more than 457 mm (18 in.) to adequately support pads.
- L. Provide an exhaust fan.

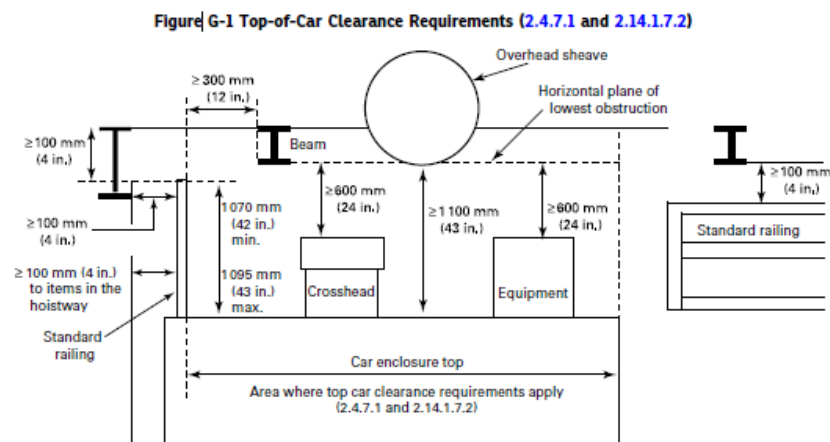
M. Provide flooring.

THE OWNER WILL CHOOSE THE DECORATION IN ITS ENTIRETY. WHAT IS PRESENTED HERE IS A GUIDE. ALLOWENCE of \$13,000.00 per cabin.

2.43 TOP OF CAR STANDARD RAILING

- A. A standard railing shall be new on the outside perimeter of the car enclosure top on all sides where the perpendicular distance between the edges of the car enclosure top and the adjacent hoistway enclosure exceeds 300 mm (12 in.) horizontal clearance and on sides where there is no hoistway enclosure. If clearances require the standard railing to be located more than 100 mm (4 in.) from the edge of the outside perimeter of the car enclosure top, the top of the car enclosure outside of the railing shall be clearly marked. The marking shall consist of alternating 100 mm (4 in.) diagonal red and white stripes.

- B. A standard railing shall be substantially constructed of metal and shall consist of a top rail, intermediate rail or equivalent structural member or solid panel, and toe-board. The top rail shall have a smooth surface, and the upper surface shall be located at a vertical height of 1 070 mm (43 in.) from the working surface. The intermediate rail or equivalent structural member or solid panel shall be located approximately centered between the top rail and the working surface.



2.44 POWER DOOR OPERATORS: PASSENGER ELEVATORS

- A. Provide new high-speed LINEAL door operator to automatically open the car and hoistway doors simultaneously when the car is level with the floor and automatically close the doors simultaneously at the expiration of the door-open time. Provide microprocessor door control with circuitry to constantly monitor and automatically adjust door operation based upon velocity, position, and motor current. Motor shall be of the high-internal resistance type, capable of withstanding high currents resulting from stall without damage to door operator/motor. The door operator shall open the car door and hoistway door simultaneously, at a speed up to 76.2 cm (2.5 ft) per second. The closing speed of the doors shall be 305 mm (1 ft) per second. Reversal of direction of the doors from the closing to opening operation, whether initiated by obstruction of the infrared curtain or the door "OPEN" button, shall be accomplished within 38 mm (1.50 in.) maximum of door movement. Emphasis is placed on obtaining quiet interlock and door operation; smooth, fast, dynamic braking for door reversals, and stopping of the doors at extremes of travel.
- B. **Equip car doors with electric contact** that prevents operation of the car until doors are closed unless car is operating in a leveling zone or hoistway access switch is used. Locate door contact to prevent its being tampered with from inside of car.
- C. Car and hoistway doors shall be manually operable in an emergency without disconnecting the power door operating equipment unless the car is outside the unlocking zone.
1. It shall not be possible for the doors to open by power unless the elevator is within the leveling zone.
 2. Provide infrared curtain unit. The device shall cause the car and hoistway doors to reverse automatically to the fully open position should the unit be actuated while the doors are closing. Units shall function when the doors are not closed, except during firefighters' operation.
- D. Should the doors be prevented from closing for more than a predetermined adjustable interval of 15 to 30 seconds by operation of the curtain unit, the doors shall stay open, the audio voice message and a buzzer located on the car shall sound only on automatic operation. Do not provide door nudging.
1. If an obstruction of the doors should not activate the photo-electric door control device and prevent the doors from closing for more than a predetermined adjustable interval of 15 to 30 seconds, the doors shall reverse to the fully open position and remain open until the "Door Close" button re-establishes the closing cycle.
- E. Provide doors with the "OPEN" and "CLOSE" buttons. When the door "OPEN" button is pressed and held, the doors, if in the open position, shall remain open

and if the doors are closing, they shall stop, reverse and re-open. Momentary pressure of the door "CLOSE" button shall initiate the closing of the doors prior to the expiration of the normal door opening time.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine the work of other trades on which the work of this section depends. Report defects to the owner in writing that may affect the work of the Elevator Contractor.
- B. Examine machine room for proper illumination, ventilation, electrical equipment, and beams are correctly located complete with access stairs and door.
- C. Before fabrication, take necessary job site measurements. Check measurement of space for equipment and means of access for installation and operation. Obtain dimensions from site for preparation of submittals.
- E. Work required prior to the completion of the elevator installation:
 - 1. Supply of electric feeder wires to the terminals of the elevator control panel, including circuit breaker.
 - 2. Provide light and GFCI outlets in the elevator pit and machine room.
 - 3. Furnish electric power for testing and adjusting elevator equipment.
 - 4. Furnish circuit breaker panel in machine room for car and hoistway lights and receptacles.
 - 5. Supply power for cab lighting and ventilation.
 - 6. Machine room enclosed and protected from moisture, with self-closing, self-locking door, and access stairs.
 - 7. Provide a fire extinguisher in the machine room.

3.2 ARRANGEMENT OF EQUIPMENT

- A. Arrange equipment in the machine room so that major equipment components can be removed for repair or replacement without dismantling or removing other equipment in the same machine room. Locate controller near and visible to its respective hoisting machine.

3.3 WORKMANSHIP, INSTALLATION, AND PROTECTION

- A. Installations shall be performed by Trained Mechanic and Apprentices to the best possible industry standards. Details of the installation shall be mechanically and electrically corrected. Materials and equipment shall be new and without imperfections.
- B. Recesses, cutouts, slots, holes, patching, grouting, refinishing to accommodate installation of equipment shall be included in the Elevator Contractor's work. All new holes in concrete shall be drilled.
- C. Structural members shall not be cut or altered. Work in a place that is damaged or defaced shall be restored equal to original new condition.

- D. Finished work shall be straight, plumb, level, and square with smooth surfaces and lines. All machinery and equipment shall be protected against dirt, water, or mechanical injury. On completion, all work shall be thoroughly cleaned and delivered in perfect unblemished condition.
- E. Sleeves for conduit and other small holes shall project 50 mm (2 in.) above concrete slabs.
- F. Hoist cables that are exposed to accidental contact in the machine room and pit shall be completely enclosed with 16-gauge sheet metal or expanded metal guards.
- G. Exposed gears, sprockets, and sheaves shall be guarded from accidental contact.

3.4 CLEANING

- A. Clean machine room and equipment.
- B. Perform hoistway clean down.
- C. Prior to final acceptance remove protective coverings from finished or ornamental surfaces. Clean and polish surfaces regarding type of material.

3.5 PAINTING AND FINISHING

- A. All equipment shall be painted one coat of approved color, conforming to manufacturer's standard.
- B. Hoist machine, motor, shall be factory painted with manufacturers' standard finish and color.
- C. Controller, sheave, car frame and platform, counterweight, beams, rails and buffers except their machined surfaces, cams, brackets and all other uncoated ferrous metal items shall be painted one factory primer coat or approved equal.
- D. Stencil or apply decal floor designations not less than 100 mm (4 in.) high on hoistway doors, fascia, or walls within door restrictor areas. The color of paint used shall contrast with the color of the surfaces to which it is applied.
- E. Elevator hoisting machine, controller, governor, main line shunt trip circuit breaker, safety plank, and crosshead of car shall be identified by 100 mm (4 in.) high numerals and letters located as directed. Numerals shall contrast with surrounding color and shall be stenciled or decaled.
- F. Hoistway Entrances of Passenger Elevators:
 - 1. Door panels, except stainless steel surfaces, shall be given rust resistant treatment and a factory finish of one coat of baked-on primer and one factory finish coat of baked-on enamel.
 - 2. Fascia plates, top and bottom shear guards, dust covers, hanger covers, and other metalwork, including built-in or hidden work and structural metal (except stainless steel entrance frames and surfaces to receive baked enamel finish)

- shall be given one approved prime coat in the shop, and one field coat of paint of approved color.
- G. Elevator Cabs for Passenger Elevators:
1. Interior and exterior steel surfaces shall be given rust resistant treatment before the finish is applied.
 2. Interior steel surfaces shall be factory finished with one coat of paint of approved color.
 3. Give exterior faces of car doors one finish coat of paint of approved color.
- H. Elevator Cabs for Passenger:
1. Interior and exterior steel surfaces shall be given rust resistant treatment before the finish is applied.
 2. Interior steel surfaces shall be factory finished with one coat of paint of approved color.
 3. Give exterior faces of car doors one finish coat of paint of approved color.

3.6 PRE-TESTS AND TESTS

- A. Pre-test the elevators before requesting final inspection.
1. The Owner shall obtain the services of an Independent Elevator Inspector. The Elevator Inspector must utilize a PROSHA Inspection Form to record the results of inspection and all testing and to identify safety code and contract deficiencies. Specific value must be provided for all tests required by ASME A17.1, ASME A17.2, and contract documents. Within 2 weeks of the inspection, the Independent Elevator Inspector must also prepare a formal inspection report, including all test results and deficiencies. Upon successful completion of inspection and testing, the Independent Elevator Inspector will complete, sign, and provide a certificate of compliance provided by the Owner.
 2. Elevator Contractor shall furnish the following test instruments and materials on-site and at the designated time of inspection: properly marked certified test weights, voltmeter, amp probe, thermometers, direct reading tachometer, megohm meter, vibration meter, sound meter, light meter, stopwatch, and a means of two-way communication.
- B. Inspect workmanship, furnished equipment, and installation for compliance with specification.
- C. Balance Tests: The percentage of counterbalance shall be checked by placing test weights in the car until the car and counterweight are equal in weight when located at the mid-point of travel. If the actual percentage of counterbalance does not conform to the specification, the amount of counterweight shall be adjusted until conformance is reached.

- D. Full-Load Run Test: Elevator shall be tested for a period of half-hour continuous run with full contract load in the car. The test run shall consist of the elevator stopping at every floor, in either direction of travel, for not less than five or more than ten seconds per floor.
- E. Speed Test: The actual speed of the elevator shall be determined in both directions of travel with full contract load and no load in the elevator. The actual measured speed of the elevator with all loads in either direction shall be within three (3) percent of the specified rated speed. Full speed runs shall be quiet and free from vibration and sway.
- F. Car Leveling Test: Elevator car leveling devices shall be tested for accuracy of leveling at all floors with no load in car and with contract load in car, in both directions of travel. Accuracy of floor level shall be within plus or minus 3 mm (.125 in.) of level with landing floor for which the stop has been initiated regardless of load in car or direction of travel. The car leveling device shall automatically correct over travel as well as under travel and shall maintain the car floor within plus or minus 3 mm (.125 in.) of level with the landing floor regardless of change in load.
- G. Brake Test: The action of the brake shall be prompt, and a smooth stop shall result in the up and down directions of travel with no load and rated load in the elevator. The down stopping shall be tested with 125 percent of rated load in the elevator.
- H. Safety Devices: Car and counterweight safety devices shall be tested.
- I. Overload Devices: Test all overload current protection devices in the system at final inspection.
- J. Limit Stops:
 - 1. The position of the car when stopped by each of the normal limit switches with no load and with contract load in the car shall be accurately measured.
 - 2. Final position of the elevator relative to the terminal landings shall be determined when the elevator has been stopped by the final limits. The lower stop limit shall be made with contract load in the elevator. The elevator should be operated at inspection speed for both tests. Normal limit stopping devices shall be inoperative for the tests.
- K. Oil Buffer Tests: These tests shall be conducted with an operating device and limit stops inoperative and with contract load in the elevator for the car buffer and with no load in the elevator for the counterweight buffer. The preliminary test shall be made at the lowest (leveling) speed. Final tests shall be conducted at contract speed. Buffers shall compress and return to the fully extended position without oil leakage.
- L. Operating and Signal System: The elevator shall be operated by the operating devices provided and the operation signals and automatic floor leveling shall

function in accordance with the specified requirements. Starting, stopping, and leveling shall be smooth and comfortable without appreciable steps of acceleration or deceleration.

M. If equipment fails test requirements and are-inspection are required.

--- E N D ---