
PART 1 - GENERAL

1.1 SUMMARY

- A. **DESIGN TEAM: HYDRAULIC ELEVATORS MUST BE APPROVED BY FACILITIES & INFRASTRUCTURE PRIOR TO DESIGN.**
- B. This Section includes hydraulic elevators. Conventional gearless equipment should be employed where passenger capacity needs, or material movement needs, exceed those offered within hydraulic product lines.

1.2 DEFINITIONS

- A. Definitions in the latest version of ASME A17.1 apply to work of this Section.
- B. Defective Elevator Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
- C. Service Elevator: A passenger elevator that is also used to carry freight.
- D. Reference to a device or a part of the equipment applies to the number of devices or parts required to complete the installation.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Refer to Section 14 20 00, Vertical Transportation, General.

1.4 QUALITY ASSURANCE

- A. Regulatory agencies: elevator design, materials, construction clearances, workmanship, and tests shall conform to the requirements of the codes and regulations listed in Section 14 20 00, Vertical Transportation, General.
- B. Welding: Welding shall be performed in accordance with the requirements of AWS or CWB. Welders shall produce evidence of current certification by AWS or CWB.
- C. Requirements of Regulatory Agencies
 - 1. Installer shall obtain and pay for all necessary permits and perform such tests as may be required for acceptance and approval of elevators by jurisdictional agencies.
 - 2. Installer shall notify the proper inspectors to witness required testing.

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- D. Factory Visit:
1. The Installer shall provide for the costs of up to three Port of Seattle representatives to visit the factory where the elevators are being manufactured, per contract, per unit type.
 2. Installer shall not ship the elevator without the approval of Port of Seattle's representative after the conclusion of the factory visit.

1.5 SUBMITTALS

- A. Refer to Section 14 20 00, Vertical Transportation, General.
- B. Product Data:
1. Submit manufacturer's product data for each product and material.
 2. Indicate manufacturer, trade names, and model numbers, components, arrangement, optional and accessories being provided.
 3. Include applicable literature, catalog material or technical brochures.
 4. Include material and equipment specifications, sizes, types, dimensions, weights, rated capacities, and performance curves.
 5. Include utility requirements for wiring, piping, and service connection data, motor sizes complete with electrical characteristics.
- C. Shop Drawings:
1. Include plans, elevations, sections, and large-scale details indicating openings at each landing, machine room/equipment space layout, coordination with building structure, relationships with other construction, and locations of equipment.
 2. Include cab and entrance drawings, including dimensions, finishes and details.
 3. Include large-scale layout of car operating panels and hall fixtures.
 4. Indicate maximum dynamic and static loads imposed on building structure at points of support and maximum and average power demands.
 5. Power Confirmation Information: Include motor horsepower, code letter, starting current, full-load running current, and demand factor.
 6. All shop drawings submitted must be signed and sealed by an Engineer licensed in the state of Washington.
- D. Samples for Initial Selection: For finishes, including finished metals, materials with involving surface treatments, paint, and color selection.
- E. Maintenance Control Programs: within sixty (60) days after notice to proceed, and prior to installation, Installer shall submit detailed equipment specific interim and revenue service Maintenance Control Programs, showing functions to be performed and their scheduled frequency.
- F. Operating and Maintenance Manuals:
1. Description and sequence of operation of all equipment installed, including operating use for Building Personnel and tenants, as well as system troubleshooting manuals for technicians.

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2. Maintenance instructions and procedures of all vertical transportation equipment installed, including parts lists, for each elevator system.
 3. Lubrication charts indicating all lubricating points and type of lubricant recommended for all equipment.
 4. Complete parts catalogs for all replaceable parts.

G. Tools:

1. The following equipment is furnished upon completion and before final payment:
 - a. The Elevator Contractor provides all the necessary tools, including laptop, hand-held devices, required software and manuals, required to troubleshoot, adjust, synchronize, calibrate, repair, and maintain the vertical transportation systems, as well as perform all necessary procedures to perform all safety tests as required by code and local governing authority.
 - b. Owner's equipment and software is updated regularly to properly troubleshoot, adjust, synchronize, calibrate, repair, maintain and test the vertical transportation systems. All equipment and/or software is of the same version as issued to technicians maintaining the vertical transportation systems.
 - c. The Elevator Contractor provides a backup copy of any software that resides on the troubleshooting tool.
 - d. Upon cancellation of service agreement, the Elevator Contractor provides all updates indicated above.

1.6 JOB CONDITIONS

- A. General: Refer to Section 14 20 00, Vertical Transportation, General.

1.7 DELIVERY, STORAGE, AND HANDLING

A. General:

1. The protection of all equipment and exposed finishes is the responsibility of the Elevator Contractor during delivery, handling, and installation until final acceptance of elevator equipment.
2. The Elevator Contractor replaces damaged materials with new, at no additional cost for material and labor.

- B. Delivery and Storage: It is the responsibility of the Elevator Contractor to properly store and protect all materials in space provided or designated by the Contractor against damage, stains, scratches, corrosion, weather, construction debris and environmental conditions.

- C. Hoisting: All required hoisting and movement of equipment is the responsibility of the Elevator Contractor.

1.8 COORDINATION

- A. General: Refer to Section 14 20 00, Vertical Transportation, General.
- B. Coordinate installation of VT equipment with integral anchors, and other items that are embedded in concrete or masonry for VT equipment. Furnish templates, sleeves, escalator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
- C. Coordinate sequence of VT installation with other work to avoid delaying the Work.

1.9 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair, restore, or replace elevator equipment that fails due to defective materials or poor workmanship within specified warranty period.
- B. Warranty Period: Twelve (12) months from date of Substantial Completion:
 - 1. The Elevator Contractor guarantees that the materials and workmanship of the apparatus installed by them and any subcontractor, under this contract, is first class in every respect and that they will make good on any defects not due to ordinary wear and tear or improper use, which may develop within one year from the date of final acceptance of all equipment.
 - 2. Manufacturer's warranty to repair or replace defective products or their components in the event of defects within a specified period.
 - 3. Neither the final payment nor any provisions of the contract documents relieve the Elevator Contractor of any obligation provided by law. They shall remedy any defects and pay all expenses for any damage to other work.
 - 4. The warranty as outlined above, for all devices, starts from the date of final acceptance of each device, by the Owner, of all work specified and intended under these contract documents.
 - 5. All other services as required by Section 14 20 00, Vertical Transportation, General.

1.10 MAINTENANCE

- A. General:
 - 1. All maintenance is performed according to the guidelines stated in manufacturer's Maintenance and Operations manuals.
 - 2. Maintenance records for each device, including lubrication logs, check charts, are provided in each control room.
- B. Construction Maintenance:
 - 1. Upon substantial completion of a device, after receiving sign-off from the governing authorities and acceptance from Consultant and/or Contractor, the device may be accepted for service before completion of the entire project.
 - 2. During the Construction Maintenance period, the necessary preventive maintenance is performed on a scheduled basis.

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3. Provide the necessary protection of the hoistway entrances and sills, hoistway fixtures, cab interiors and fixtures and car door sills.
 4. Replacement or repair of components, due to misuse by others, is the responsibility of the Contractor/Owner.
 5. Perform emergency callback service during normal working hours.
 6. Include 24-hour-per-day, 7-day-per-week emergency callback service with response time of sixty minutes or less.
- C. Warranty Maintenance:
1. Upon final acceptance of each device, subsequent to receiving acceptance and sign-off from the governing authorities and final acceptance, each device is accepted for full operation.
 2. The warranty maintenance period begins for each device when all conditions in the above paragraph are met and will continue for a specified period.
 - a. Warranty Maintenance Period may begin at different times for each elevator.
 3. The warranty maintenance program includes the following:
 - a. Monthly examinations, including adjustments, cleaning, and lubrication of equipment.
 - b. 24-hour Emergency Call back service is provided at no additional cost to Owner.
 - c. Replacement of components as required, using only components produced by the original manufacturer.
 - d. Each control room is equipped with a lockable storage cabinet to contain the necessary spare parts. See Specification 01 79 00 for spare parts list.

PART 2 - PRODUCTS

2.1 REFERENCES

- A. Definitions: Terms used are defined in the latest edition of the Safety Code for Elevators and Escalators, ASME A17.1.
- B. American Society of Mechanical Engineers:
 1. ASME A17.1 - Safety Code for Elevators and Escalators.
 2. ASME A17.2 – Guide for Inspection of Elevators, Escalators, and Moving Walks.
 3. ASME A17.5 – Elevator and Escalator Electrical Equipment.
 4. ASME A17.6 – Standard for Elevator Suspension, Compensation, and Governor Systems.
- C. International Building Code (IBC)
- D. National Fire Protection Association (NFPA):
 1. NFPA 70 – National Electric Code.
 2. NFPA 80 – Fire Doors and Windows.
 3. NFPA 101 – Life Safety Code.
- E. Washington Administrative Code, WAC.

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- F. American National Standard Institute (ANSI): A117.1 - Accessible and Usable Buildings and Facilities.
 - G. 2010 ADA Standards for Accessible Design, Section 407.

2.2 MANUFACTURERS

- A. Subject to compliance with project requirements, provide products by one of the following:
 - 1. Electric Traction Passenger Elevator Systems (**DESIGN TEAM TO CONFIRM WITH PORT OF SEATTLE FOR SPECIFIC PROJECTS**):
 - a. Minnesota Elevator Incorporated
 - b. Mitsubishi Electric Corporation
 - c. Otis Elevator Company
 - d. Schindler Elevator Corporation
 - e. TK Elevator
 - f. Manufacturer's standard components, including machines, controllers, door equipment, fixtures, and cab enclosures, are approved.

2.3 FIELD CONDITIONS

- A. Seismic:
 - 1. Elevator system withstands the effects of earthquake motions determined according to SEI/ASCE 7 and complies with elevator safety requirements for seismic risk Zone 2 or greater in ASME A17.1/CSA B44.
 - 2. The term "withstand" means the system will remain in place without separation of any parts when subjected to the seismic forces specified.
 - 3. Provide earthquake equipment required by ASME A17.1/CSA B44.
 - 4. Provide Alpha-Numeric display if Earthquake Mode is needed.
 - 5. Provide seismic switch required by SEI/ASCE 7.
 - 6. Design earthquake spectral response acceleration short period (Sds): As Shown on Structural Drawings.
 - 7. Occupancy Category: As Shown on Structural Drawings.
 - 8. Project Seismic Design Category: As Shown on Structural Drawings.
 - 9. Elevator Component Importance Factor (Ip): As Shown on Structural Drawings.

2.4 PERFORMANCE REQUIREMENTS

- A. Car Speed: $\pm 10\%$ of contract speed in the up direction, $+10\%/-20\%$ of contract speed in the down direction, under unloaded condition.
- B. Car Capacity: Safely lower, stop and hold 125% of rated load.
- C. Car Stopping Zone: $\pm 1/4"$ under any loading condition.

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- D. Pressure: Fluid system components shall be designed for maximum operating pressure of 500 psi.
 - E. Car Ride Quality:
 - 1. Acceleration and Deceleration: Smooth, constant, and not less than 1.5 feet/second².
 - 2. Sustained Jerk: Not more than twice the rate of acceleration.
 - F. Noise and Vibration Control:
 - 1. Airborne Noise:
 - a. Measured noise level of elevator equipment and its operation does not exceed 55 dBA inside car under any condition including door operation and car ventilation exhaust blower on its highest speed.
 - b. Limit noise level in the control room relating to elevator equipment and its operation to no more than 80 dBA.
 - 2. Vibration Control: All elevator equipment is mechanically isolated from the building structure.

2.5 ELEVATORS

- A. Passenger Elevators Description:
 - 1. Elevator Identification: **As detailed on the Contract Drawings.**
 - 2. Capacity: 2500 lbs. / 3500 lbs. / 4000 lbs. Passenger (**Design Team to determine capacities**)
 - 3. Class of Loading: Class A.
 - 4. Contract Speed: 150 fpm.
 - 5. Machine: Hydraulic pump.
 - 6. Machine Location: Adjacent at bottom landing.
 - 7. Motor Control: Single speed AC with electronic soft start with closed transition.
 - 8. Floors Served: As detailed on the Contract Drawings.
 - 9. Openings: As detailed on the Contract Drawings.
 - 10. Minimum Clear Height to Underside of Canopy: 10'-0" high.
 - 11. Entrance Size: As detailed on the Contract Drawings.
 - 12. Entrance Type: **Single-speed, side-opening or Center-opening.**
 - 13. Hydraulic Type: Dual jack holeless.
 - 14. Cabs ambulance gurney compliant size.
- B. Service Elevators Description:
 - 1. Elevator Identification: As detailed on the Contract Drawings.
 - 2. Capacity: 5000 lbs.
 - 3. Class of Loading: Class C3.
 - 4. Contract Speed: 150 fpm
 - 5. Machine: Hydraulic pump.
 - 6. Machine Location: Adjacent at bottom landing.
 - 7. Motor Control: Single speed AC with electronic soft start with closed transition.
 - 8. Floors Served: As detailed on the Contract Drawings.
 - 9. Openings: As detailed on the Contract Drawings.
 - 10. Minimum Clear Height to Underside of Canopy: 10'-0" high.
 - 11. Entrance Size: As detailed on the Contract Drawings.

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12. Entrance Type: Two-speed, side-opening.
 13. Cabs ambulance gurney compliant size.

2.6 MATERIALS

- A. Steel:
 1. Sheet Steel (Furniture Steel for Exposed Work): Stretcher-leveled, cold-rolled, commercial quality carbon steel, complying with ASTM A366, matte finish.
 2. Sheet Steel (for Unexposed Work): Hot-rolled, commercial quality carbon steel, pickled and oiled, complying with ASTM A568/A568M-03.
 3. Structural Steel Shapes and Plates: ASTM A36.
- B. Stainless-steel:
 1. Type 302, 304, or 316 complying with ASTM A240, with standard tempers and hardness required for fabrication, strength, and durability.
 - a. No. 4 Satin: Directional polish finish with grain in the longest direction.
- C. Aluminum:
 1. Extrusions per ASTM B221; sheet and plate per ASTM B209.
- D. Nickel-Silver: Extruded:
 - a. C77600 nickel-silver
 - b. Hot extruded, temper code M30
- E. Fire-Retardant Treated Particle Board Panels:
 1. Minimum 3/4" thick backup for natural finished wood and plastic laminate veneered panels, edged and faced as shown, provided with suitable anti-warp backing.
 2. Meet ASTM E84 with a flame-spread rating and smoke development rating.
- F. Paint Finishes:
 1. General:
 - a. Clean exposed metal parts and assemblies of oil, grease, scale, and other foreign matter and factory paint one shop coat of standard rust-resistant primer.
 2. Prime Finish:
 - a. Apply one coat of rust-resistant primer followed by a filler coat over uneven surfaces.
 3. All equipment and metal work installed under this contract, which does not have a baked enamel or special architectural finish, and which is exposed in the hoistway, is cleaned, and painted one field coat of enamel.
- G. Glass: Laminated safety glass, minimum 9/16" thick.

2.7 OPERATION

- A. Nudging Operation:

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1. After beams of door reopening device are obstructed for a predetermined time interval, sound warning signal, and attempt to close doors.
 2. Activation of the door open button overrides nudging operation and reopens doors.
- B. Independent Service:
1. When feature is activated from within the car, allow control of car from buttons and controls inside the car.
 2. Close doors by constant pressure on desired destination floor button or door close button.
 3. Open doors automatically upon arrival at selected floor.
- C. Battery Rescue Operation:
1. Upon loss of normal power automatically lower car to the bottom landing.
 2. Upon arrival at the landing, the elevator doors shall open automatically and remain open until regular door time has expired; the elevator shall then be removed from service.
 3. The auxiliary power source shall be provided via 12-volt D.C. rechargeable battery units installed in machine room.
 4. Upon restoration of normal power, the elevator shall automatically resume normal operation.
- D. Firefighters' Emergency Operation: Provide equipment and operation in accordance with code requirements.
- E. Interface to Building Management Systems:
1. The elevator monitoring system shall be capable of interfacing and exchanging data with third-party building management systems including Siemens, Landis AND Staefa, Johnson Controls, SCADA.
 2. Information shall be exchanged by Modbus protocol, open protocol or other suitable methods as required.
- F. Card/Proximity Reader Security System:
1. Provide provisions inside all cars for reader unit.
 2. Mount reader unit as directed by Architect. Connect to card reader via traveling cable to terminal interface and relays in control room.
 3. Provide output signal to facilitate system tracking of floor access.
- G. Floor Lockout:
1. Provide means to limit access to building floors as follows:
 - a. Individual floor lockout means in security control panel to prevent registration of car calls to any selected secure floor.
 - b. Programmable system which can limit access at certain times of the day as well as extended periods of the calendar year.
 - c. Arrange system so that independent service overrides security system.
 - d. Arrange system so that firefighters' service overrides security system.
 - e. Actuate hall lantern each time car arrives at main lobby during secure mode operation.

- f. Provide warning light and/or signal in group control panel to indicate an attempt to register unauthorized destinations or to open car doors when car is moving or parked at a secured floor.
- g. Provide reset switch or button to cancel warning light and signal.

2.8 MACHINE ROOM EQUIPMENT

- A. Arrange equipment in spaces shown on drawings.
- B. Tank:
 - 1. The tank shall be designed and constructed so that when completely filled the factor of safety shall not be less than 4, based on the ultimate strength of material.
 - 2. The tank shall be covered and vented.
 - 3. The tank shall be provided with a means for checking liquid level. Such means shall be accessible without the removal of any covers or other part.
- C. Pump Unit:
 - 1. Assembled unit consisting of dry positive displacement pump, induction motor, master-type control valves combining safety features, holding, direction, bypass, stopping, manual lowering functions, shut off valve, oil reservoir with protected vent opening, oil level gauge, outlet strainer, drip pan, muffler, all mounted on isolating pads.
 - 2. Oil Cooler:
 - a. Provide oil cooler with adjustable thermostat.
 - b. Installation of unit must be coordinated with Architect to allow ventilation of unit outside of the elevator machine room.
 - 3. Submersible pump motor shall be permitted up to 50 HP.
- D. Landing System: Solid-state, magnetic, or optical type.
- E. Controller:
 - 1. Compartment:
 - a. UL/CSA labeled.
 - b. Securely mount all assemblies, power supplies, chassis switches, relays, etc., on a substantial, self-supporting steel frame.
 - c. Completely enclose equipment with covers.
 - d. Provide means to prevent overheating.
 - 2. Relay Design:
 - a. Magnet operated with contacts of design and material to insure maximum conductivity, long life, and reliable operation without overheating or excessive wear.
 - b. Provide wiping action and means to prevent sticking due to fusion.
 - c. Contacts carrying high inductive currents shall be provided with arc deflectors or suppressors.
 - 3. Microprocessor Hardware:
 - a. Provide built-in noise suppression devices that provide a high level of noise immunity on all solid-state hardware and devices.
 - b. Provide power supplies with noise suppression devices.

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- c. Isolate inputs from external devices (such as pushbuttons) with opto-isolation modules.
 - d. Design control circuits with one leg of power supply grounded.
 - e. Safety circuits shall not be affected by accidental grounding of any part of the system.
 - f. System shall automatically restart when power is restored.
 - g. System memory shall be retained in the event of power failure or disturbance.
 - h. Equipment shall be provided with Electro Magnetic Interference (EMI) shielding within FCC guidelines.
 - 4. Wiring:
 - a. CSA labeled copper for factory wiring.
 - b. Neatly route all wiring interconnections and securely attach wiring connections to studs or terminals.
 - c. Provide labels for all extra or spare wires, neatly organized at base of controller cabinet.
 - 5. Permanently mark components (relays, fuses, PC boards, etc.) with symbols shown on wiring diagrams.
 - 6. Provide control panel compliant with UL 508A SB.SCCR of 5000A required.
- F. Electrical Wiring and Wiring Connections:
- 1. Auxiliary Disconnect: Provide controller or machine mounted auxiliary, lockable “open” disconnect.
 - 2. Conductors and Connections:
 - a. Copper throughout with individual wires coded and connections on identified studs or terminal blocks.
 - b. Use no splices or similar connections in wiring except at terminal blocks, control compartments, or junction boxes.
 - 3. Conduit:
 - a. Galvanized steel conduit, EMT, or duct.
 - b. Flexible conduit length not to exceed 3’-0”.
 - 4. Traveling Cables:
 - a. Tag spares in machine room.
 - b. Provide cables from controller to car top.
 - 5. Auxiliary Wiring:
 - a. Provide machine room demarcation junction boxes for the fire alarm initiating devices, emergency two-way communication system, firefighters’ phone, , CCTV, , security system and card reader interface terminals and relays.
 - b. Provide conduit, wiring and connections for the fire alarm initiating devices, emergency two-way communication system, firefighters’ phone, CCTV, security system and card reader interface terminals and relays, machine room junction box to each car controller in machine room.
- G. Muffler:
- 1. Provide in discharge oil line near pump unit.
 - a. Design shall dampen and absorb pulsation and noise in the flow of hydraulic fluid.
 - b. Muffler shall be an air charged or non-baffled design.

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- H. Piping and Oil:
 - 1. Provide piping, connections and oil for the system.
 - 2. Buried piping shall be secondarily contained with watertight Schedule 40 PVC sleeves between elevator machine room and pit.
 - 3. A minimum of two sound isolation couplings shall be provided between the pump unit and oil line and the oil line and jack unit.
 - 4. Provide 2-90° joints to reduce vibration and create wave diffraction.
 - 5. Provide isolated pipe stands or hangers.
 - I. Shut-Off Valve:
 - 1. Provide oil line shut off valve in the machine room or accessible from outside the hoistway.
 - 2. Provide second valve in pit adjacent to jack unit.
 - J. Pressure Switch: Provide oil pressure sensitive switch to automatically close and prevent loss of oil in cylinder upon loss of pressure in oil supply line.

2.9 HOISTWAY EQUIPMENT

- A. Guide Rails:
 - 1. Planed steel T-sections for car and counterweight of suitable size and weight for the application, including seismic reactions. Include brackets for attachment to building structure.
- B. Terminal Stopping: Provide normal and final devices.
- C. Electrical Wiring and Wiring Connections:
 - 1. Conductors and Connections:
 - a. Copper throughout with individual wires coded and connections on identified studs or terminal blocks.
 - b. The use of splices or similar connections in wiring except at terminal blocks, control compartments, or junction boxes is prohibited.
 - c. Provide 20% spare conductors for each wire type.
 - d. Run spare wires from car connection points to individual elevator controllers in the equipment space.
 - 2. Conduit:
 - a. Galvanized steel conduit, EMT, or duct.
 - b. Flexible conduit between isolated equipment, length not to exceed 3'-0".
 - 3. Traveling Cables:
 - a. Flame and moisture-resistant outer cover.
 - b. Prevent traveling cable from rubbing or chafing against hoistway or equipment within hoistway.
 - c. Provide five pair of shielded wires of minimum.
 - d. Provide for future CCTV provisions two pair of shielded 18-gauge wire within traveling cable from car controller to car top junction box, plus excess loop at both ends.
 - e. Provide two pair of 18-gauge wire for CCTV power.

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- f. Identify all wiring, including spares, in controls.
 - 4. Auxiliary Wiring: Provide conduit, wiring and connections for systems specified.
 - D. Entrance Equipment:
 - 1. Two-point hanger roller with non-metallic roller surface and suspension with eccentric upthrust roller adjustment.
 - 2. Bar or formed, cold-drawn removable steel door tracks with smooth roller contact surface.
 - 3. Door Interlocks: Operable door locks without retiring cam.
 - 4. Door Closers: Spring, spirator, weighted, or jamb/strut mounted.
 - E. Floor Numbers: Stencil paint 4" high floor designations in contrasting color on inside face of hoistway doors and hoistway fascia. Must be visible from within car.

2.10 HOISTWAY ENTRANCES

- A. Entrance Assemblies:
 - 1. Complete entrances bearing fire labels from a certified testing laboratory approved by authority having jurisdiction.
 - 2. Provide entrance assemblies bearing 1-1/2hr label.
- B. Frames:
 - 1. Bolted and lapped head to jamb assembly.
 - 2. Provide Numerical floor designation/Tactile marking plates:
 - a. Centered at 60" above finished floor.
 - b. Located on both side jambs of all entrances.
 - c. Minimum 4" in height.
 - d. Tactile indications below floor designation.
 - e. Permanently fastened.
 - 3. Provide plates at main egress landing with "Star" designation.
 - 4. For designated emergency car, provide "Star of Life" cast designation plates at height of 78"-84" above finished floor on both side jambs at all floors.
- C. Door Panels: 16-gauge steel, formed construction without binder angles. Provide leading edges of center-opening doors with rubber astragals. Construct door panels with interlocking, stiffening ribs.
- D. Sight Guards: Same material, finish, and height as hoistway entrance door panels.
- E. Sills:
 - 1. Passenger Elevators: Extruded aluminum
 - 2. Service Elevators: Stainless-steel or extruded Nickel silver.
- F. Sill Supports:
 - 1. Structural or formed steel designed to support sill load.
 - 2. Design to eliminate need for grout under the sill.

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- G. Fascia, Platform Guards and Hanger Covers: 16-gauge furniture steel with Contractor's standard finish.
 - H. Struts and Headers:
 - 1. Provide support of all entrances to building structure including connections to building structure.
 - 2. Provide door open bumpers on entrances equipped with vertical struts.
 - I. Finish of Frames and Doors: Satin finish stainless-steel. **DESIGN TEAM: Coordinate Jamb detail with adjacent finishes so elevator jambs are proud of wall finishes.**
 - J. Hoistway Access:
 - 1. Hoistway Access Switches: Mount in entrance frame side jamb at top floor.

2.11 PIT EQUIPMENT

- A. Buffers: Provide spring type with blocking and support channels.
- B. Hydraulic Jack Assembly:
 - 1. Cylinders:
 - a. Seamless steel pipe.
 - b. Design head to receive unit-type packing and provide means to collect oil at cylinder head and return automatically to oil reservoir.
 - c. Provide secondary containment/cylinder protection.
 - d. Provide head assembly access ladders and platforms.
 - e. Provide cylinder stabilizer bracketing between guide rails as required.
 - 2. Plungers:
 - a. Polished seamless steel tubing or pipe.
 - b. If plunger length exceeds 24'-0", provide two or more sections not exceeding 16'-0" in length, or coordinate installation of longer unit at the jobsite.
 - c. Join sections by internal threaded couplings.
 - d. Multiple section jack units shall be factory polished while assembled and marked.
 - e. Isolate plunger from car frames.
 - 3. Provide dual jack holeless application.
- C. Jack Support and Fluid Shut-Off Valves:
 - 1. Provide steel pit channels to support jack assembly and transmit loads to building structure.
 - 2. Provide intermediate stabilizers as required.
 - 3. Provide manual on/off valves in oil lines adjacent to pump unit and jack units in pit.
- D. Overspeed Valves:
 - 1. Provide a pressure sensitive, mechanically actuated, seismic safety valve.
 - 2. Connect valve directly to jack assembly inlet.
- E. Scavenger Pump: Provide electrically operated scavenger pump to collect oil at cylinder head and return directly to oil reservoir in elevator machine room.

F. Refuge Space: Identify and clearly mark refuge space in the pit.

G. Pit Access:

1. Hoistway Access Key Switch:
 - a. Provide key switch at lowest terminal landing.
 - b. Mount in entrance frame side jamb.
2. Provide pit stop switches.

2.12 CAR EQUIPMENT

A. Frame: Welded or bolted or formed steel channel construction to meet load classification specified.

B. Platform:

1. Design and construct to accommodate load classification requirements.
 - a. Provide Class “A” construction for passenger elevators.
 - b. Provide Class “C3” construction for service elevators.
 - c. Accommodate floor and subfloor thickness.
2. The car platform consists of a steel frame with necessary steel stringers, all securely welded together.
3. Isolate the passenger elevator platform.
 - a. The support frame includes rubber pads on which the platform rests.
 - b. No mechanical connections between platform and frame.

C. Platform Guard: Minimum 21”, 14-gauge steel, reinforced and braced to car platform front with Manufacturer’s standard finish.

D. Cartop Guard Rail: Provide a railing system provided on the outside perimeter of the car top on all sides where the horizontal distance between the edges of the car top and the adjacent hoistway enclosure exceeds 12 inches.

E. Car Guides: Roller type with three or more spring dampened, sound-deadening rollers per shoe.

F. Cab Steadying Plates:

1. Provide and install top of car steadying plates.
2. Isolate using non-metallic guides or rollers.

G. Sills:

1. One-piece extrusion with extension between car entrance columns to face of car front return.
2. Extruded extension to match finish of sill.
3. Passenger Cars: Extruded Aluminum.
4. Service Cars: Stainless-Steel or extruded Nickel silver.

H. Door Panels:

1. Sandwich construction without binder angles.

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- 2. Provide one leading edges of doors with rubber astragals.
 - 3. Provide a minimum of two gibs per panel, one at leading and one at trailing edge with gibs in the sill groove entire length of door travel.
 - 4. Construct door panels with interlocking, stiffening ribs.
- I. Door Hangers:
- 1. Two-point suspension.
 - 2. Hanger roller with non-metallic surface and eccentric roller adjustment.
- J. Door Track: Bar or formed, cold-drawn removable steel track with smooth roller contact surface.
- K. Door Header: Construct of minimum 12-gauge steel, shape to provide stiffening flanges.
- L. Door Electrical Contact:
- 1. Prohibit car operation unless car door is closed.
 - 2. Provide car door interlock to prevent opening of car doors outside the unlocking zone, where clearance between the car platform and hoistway enclosure exceeds code maximum on the loading side.
- M. Door Clutch:
- 1. Heavy-duty clutch, linkage arms, vane assembly and pickup rollers or cams to provide positive, smooth, quiet door operation.
 - 2. Design clutch so car doors can be closed while hoistway doors remain open.
- N. Restricted Opening Device: Provide mechanical car-door restrictor to prevent opening of doors when outside unlocking zone.
- O. Door Operator: High speed, heavy-duty door operator capable of opening doors at no less than 1.5 fps.
- P. Door Reversing Device:
- 1. Infrared Reopening Device:
 - a. Black fully enclosed device with full screen infrared matrix or multiple beams extending vertically along leading edge of each door panel to minimum height of 74" above finished floor.
 - 2. Nudging Operation:
 - a. After door close is obstructed for a predetermined time interval (minimum 20.0-25.0 seconds), warning signal sounds, and doors close with a maximum of 2.5 foot-pounds kinetic energy.
 - b. Door open button overrides nudging operation and reopen doors.
- Q. Car Operating Panel:
- 1. Passenger Elevators:
 - a. Two car operating panels without faceplates consisting of a metal box containing the vandal resistant operating fixtures, mounted behind the car swing return panels.

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- b. Suitably identify floor buttons, alarm button, door open button, door close button and emergency push-to-call button with flat stainless tactile symbols raised or flush mounted.
 - c. Pushbuttons: Provide minimum 3/4" diameter raised or flush floor pushbuttons which illuminate to indicate call registration.
 - d. Locate operating controls no higher than 48" above the car floor; no lower than 35" for emergency push-to-call button and alarm button.
 - e. Locked Firefighters Operation Panel:
 - 1) Including the following features:
 - a) Phase II fire access switch.
 - b) Firefighters' visual indication.
 - c) Call cancel button.
 - d) Stop switch, manually operated.
 - e) Door open button.
 - f) Door close button.
 - g) Floors served.
 - f. Provide "door open" button to stop and reopen doors or hold doors in open position.
 - g. Provide "door close" button to activate door close cycle.
2. Service Elevators:
- a. One car operating panel with faceplates for front opening and two car operating panels for front and rear opening consisting of a metal box containing the vandal resistant operating fixtures, mounted behind the car stationary front and rear return panels.
 - b. Suitably identify floor buttons, alarm button, door open button, door close button and emergency push-to-call button.
 - c. Pushbuttons: Provide minimum 3/4" diameter raised floor pushbuttons which illuminate to indicate call registration.
 - d. Locate operating controls no higher than 48" above the car floor; no lower than 35" for emergency push-to-call button and alarm button.
 - e. Locked Firefighters Operation Panel:
 - 1) Including the following features:
 - a) Phase II fire access switch.
 - b) Firefighters' visual indication.
 - c) Call cancel button.
 - d) Stop switch, manually operated.
 - e) Door open button.
 - f) Door close button.
 - g) Floors served.
 - f. Provide "door open" button to stop and reopen doors or hold doors in open position.
 - g. Provide "door close" button to activate door close cycle.
3. Service Compartment:
- a. Provide lockable service compartment with recessed flush door.
 - b. Include the following controls in lockable service cabinet with function and operating positions identified by permanent signage or engraved legend:
 - 1) Access switch.
 - 2) Light switch.
 - 3) Fan switch.

- 4) Independent service switch.
- 5) Constant pressure test button for battery pack emergency lighting.
- 6) 120-volt, AC, GFCI protected electrical convenience duplex outlet.
4. No visible manufacturer's name, logo, or other branding.

R. Car Top Control Station:

1. Mount to provide safe access and utilization while standing on car top.
2. Operating device contains Up and Down direction buttons, a Run button, an Inspection/Automatic switch and Emergency Stop switch.

2.13 CAR ENCLOSURE

A. Passenger Elevators: Provide complete as specified herein.

1. Shell:
 - a. Reinforced formed furniture steel panels with baked enamel interior finish.
 - b. Provide concealed ventilation cutouts.
2. Canopy:
 - a. Reinforced formed furniture steel panels with lockable, contacted, hinged emergency exit.
 - b. Interior finish white reflective baked enamel.
3. Swing Return Panels and Integral Entrance Columns: Swing entire unit on substantial pivot points for service access to car operating panels.
4. Transom: Reinforced furniture steel clad with satin stainless-steel full width of enclosure.
5. Base: Baked enamel or Stainless-steel with concealed ventilation cutouts.
6. Finish Floor Covering: Furnished under other sections.
7. Interior Wall Finish: Removable panels faced and edged, with finish as selected. (Design Team to Select.)
8. Ventilation: 3-speed blower mounted to car canopy.
9. Lighting: LED downlights.
10. Suspended Ceiling: Stainless-steel panels.
11. Handrails:
 - a. Minimum 1¼" diameter stainless-steel tubular grab bar with backing plates and captive nuts across side and rear walls where there are not entrances.
 - b. Return handrail/guardrail ends to car walls.
12. Pads and Buttons covering side and rear walls and adjacent front returns.

B. Service Elevators: Provide complete as specified herein:

1. Shell:
 - a. Reinforced textured finish stainless-steel formed panels no more than 18" wide with light-proof joints.
 - b. Provide concealed ventilation cutouts.
2. Canopy:
 - a. Reinforced furniture steel formed panels with lockable, contacted, hinged emergency exit.
 - b. Interior finish white reflective baked enamel.

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3. Stationary Return Panels: Reinforced furniture steel clad with satin or textured finish stainless-steel.
 4. Entrance Columns and Transom: Reinforced furniture steel clad with satin finish stainless-steel.
 5. Base: Baked enamel or stainless-steel with concealed ventilation cutouts.
 6. Finish Floor Covering: Furnished under other sections.
 7. Ventilation: 3-speed blower mounted to car canopy.
 8. Lighting:
 - a. LED fixture flush mounted in canopy with steel guard over fixtures on car top.
 - b. Provide protective LED covers.
 9. Handrails/Guardrails:
 - a. Two rows.
 - b. Top handrail line minimum 1½" diameter stainless-steel grab bar with backing plates and captive nuts.
 - c. Lower guardrail line 4" x 3/8" solid stainless-steel flat stock bars mounted on both sides and rear of the car, where applicable.
 - d. Return handrail/guardrail ends to car walls.
 10. Pads and Buttons covering side and rear walls and adjacent front returns.

2.14 HALL CONTROL STATIONS

- A. Pushbuttons:
 1. Vandal Resistant Construction.
 2. Include pushbuttons for each direction of travel that illuminate to indicate call registration.
 3. Include engraved message and pictorial representation prohibiting use of elevator during fire or other emergency as part of faceplate or on separate engraved plate.
 4. Pushbutton design matches car operating panel pushbuttons.
 5. Provide vandal resistant pushbutton and light assemblies.
 6. Provide LED illumination.
 7. Provide Phase I Fire Service key switch, engraved operating instructions and illuminating jewel.
 8. Provide communication check failure indication and silence key switch.
 9. Provide illuminating jewels indicating standby power status.
 10. Incorporate all items required by Code at the primary egress level into a single hall fixture.

2.15 SIGNALS

- A. Hall Direction Lantern:
 1. Provide at each entrance to indicate travel direction of arriving car. Arrow-Shape only.
 2. Illuminate up or down LED lights and sound tone once for up and twice for down direction prior to car arrival at floor.
 3. Pre-Security Elevators: Provide vandal resistant lantern and light assemblies consisting of series of dots or lines for maximum visibility.
 4. Post-Security Elevators: Provide non-vandal resistant, surface-mount lantern which is proud of faceplate for increased visibility.

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- 5. Lanterns to remain illuminated until the elevator doors close.
 - B. Car Direction Lantern:
 - 1. Provide flush-mounted car lantern in all car entrance columns.
 - 2. Illuminate light until the car doors start to close.
 - 3. Pre-Security Elevators: Provide vandal resistant lantern and light assemblies consisting of series of dots or lines for maximum visibility.
 - 4. Post-Security Elevators: Provide non-vandal resistant, surface-mount lantern which proud of plate for increased visibility.
 - 5. Lanterns to remain illuminated until the elevator doors close.
 - C. Car Position Indicator:
 - 1. Alpha-numeric digital indicator containing floor designations and direction arrows a minimum of 2" high to indicate floor served and direction of car travel.
 - 2. Locate fixture in above each car operating panel.
 - D. Fixture Faceplate Material and Finish:
 - 1. Stainless-steel all fixtures.
 - 2. Tamper resistant fasteners for all public facing fastenings.
 - E. Floor Passing Tone: Provide an audible tone of no less than 20 decibels and frequency of no higher than 1500 Hz, to sound as the car passes or stops at a floor served.
 - F. Voice Synthesizer: Provide electronic device with easily reprogrammable message and female voice to announce car direction, floor, emergency exiting instructions.

2.16 COMMUNICATION

- A. Car Communication System:
 - 1. Hands-Free Phone System: Two-way communication instrument in car with automatic dialing, tracking, and recall features. Provide wireless 5G/LTE connectivity. System must be approved by the Port of Seattle, Facilities and Infrastructure team.
 - 2. [DESIGN TEAM TO CONFIRM WIRELESS 5G/LTE CONNECTIVITY IS AVAILABLE. ALTERNATE IS ANALOG PHONE SERVICE.]
 - 3. Emergency Personnel Communication:
 - a. Communication system is provided allowing emergency personnel to establish communications with each elevator individually.
 - b. On the same car operating panel as the phone push button, provide capability to communicate with and obtain responses from passengers.
 - c. Speaker volume must be tested and approved by the Port of Seattle, Facilities and Infrastructure team.
 - d. Provide display video capability for entrapment assessment.
 - 4. Communication for Deaf, Hard of Hearing and Speech Impaired:
 - a. On the same car operating panel as the phone push button, provide capability to communicate visually with and obtain responses from passengers, including those passengers who cannot communicate verbally or hear.

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- b. Minimum screen size of 6" for visual display.
 - c. Provide shielded twisted pair wiring to communicate to control room.
 - d. Device shall be open-sourced and capable of being monitored by any entity as selected by the owner. All software, hardware, and training cost associated with the device shall be included within this project. Associated monthly monitoring costs will not be accepted.
 - 5. Intercom System:
 - a. General:
 - 1) Provide intercommunication system complete with talkback speaker, required auxiliary equipment and wiring.
 - 2) Intercom volume must be tested and approved by the Port of Seattle, Facilities and Infrastructure team.
 - 3) A battery backup system is provided for the two-way conversation system.
 - B. Remote Monitoring:
 - 1. Provide 24-hours per day, 7-days per week. System to capture faults or system shutdowns in real-time occurrence. System must be approved by the Port of Seattle, Facilities and Infrastructure team.
 - 2. Communicate faults or shutdowns to reception system, enabling automatic dispatch of technicians.
 - 3. Remote Monitoring carrier must be approved by the Port of Seattle, Facilities and Infrastructure team.
 - C. Elevator Management System and Information:
 - 1. General: **[DESIGN TEAM TO CONFIRM WIRELESS 5G/LTE CONNECTIVITY IS AVAILABLE. ALTERNATE IS ANALOG PHONE SERVICE.]**
 - a. Utilizing wireless 5G/LTE connectivity, each controller provides an extensive list of output information, including data logging, fault logs operational events, performance information including car speed, floor to floor times, and door times.
 - b. The system is real time, capable of driving remote monitors or computer terminal systems connected via Intranet system, that continually display the status of each car and call.
 - 2. The system displays all units in a group and separate units on one screen in a graphical format and record the following information for each monitored unit:
 - a. Group status.
 - b. Individual car status with expandable menus.
 - c. Service Driven Outages.
 - d. Maintenance Activity Indicators.
 - 3. Faults monitored with visual and audible alarm, triggered by combinations of any of the above status points.
 - a. Transmit email when any monitored faults occur.

2.17 FIREFIGHTERS' CONTROL PANEL

- A. Firefighters' Control Panel:
 - 1. Locate in building fire control room or as directed by Contractor.

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2. Fixture faceplate, stainless-steel, satin finish, includes the following features:
 - a. Car position and direction indicator, digital-readout, or LCD flat screen color monitor.
 - 1) Identify each position indicator with car number and group identification.
 - b. Indicator showing operating status of car.
 - c. Manual car standby power selection switches and power status indicators.
 - d. Two-position firefighters' emergency return switches and indicators with engraved red filled instructions.
 - e. Floors served
 - f. Designate FSAE elevators.
 - g. Identify all indicators and manual switches.
 3. Provide wiring to control panel.
 - a. Coordinate size and location of conduit with Contractor.
- B. Firefighters' Key Box:
1. Flush-mounted box with lockable hinged cover.
 2. Engrave instructions for use on cover per Local Fire Authority requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to beginning installation of equipment examine hoistway and control room areas.
- B. Verify no irregularities exist that affect execution of work specified.
- C. Verify electrical power location and characteristics in coordination with equipment requirements.
- D. Do not proceed with installation until work in place conforms to project requirements.

3.2 INSTALLATION

- A. Install all equipment in accordance with Contractor's instructions, referenced codes, specification, and approved submittals.
- B. Install control room equipment with clearances in accordance with referenced codes and specification.
- C. Install all equipment so it may be easily removed for maintenance and repair.
- D. Provide any required hoisting/safety beams.
- E. Install all equipment to afford maximum accessibility, safety, and continuity of operation.

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- F. Clean all architectural finishes and replace or restore any surfaces damaged during construction to like new condition.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.

3.4 CONSTRUCTION TOLERANCES

- A. Install rails plumb and align vertically with tolerance of 1/16" in 100'-0".
- B. Secure joints without gaps and file any irregularities to a smooth surface.

3.5 ADJUSTING

- A. Static balance car to equalize pressure of guide shoes on guide rails.
- B. Dynamically balance car and counterweight.
- C. Lubricate all equipment in accordance with Contractor's instructions.
- D. Adjust motors, power conversion units, brakes, controllers, leveling switches, limit switches, stopping switches, door operators, interlocks, and safety devices to achieve specified performance levels.

3.6 CLEANING

- A. Keep work areas orderly and free from debris during progress of project.
- B. Remove packaging materials on a daily basis.
- C. Remove all loose materials and filings resulting from work.
- D. Clean Control room equipment and floor.
- E. Clean hoistways, car, car enclosure, entrances, operating and signal fixtures.
- F. Clean pit equipment and floor.

3.7 DEMONSTRATION:

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate all aspects of elevators while in normal operation.
- B. Determine that operation systems and devices are functioning properly.

3.8 PROTECTION

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

END OF SECTION 14 24 00