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SECTION 14240
HYDRAULIC ELEVATORS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Hydraulic elevator(s) as follows:

B. All engineering, equipment, labor, and permits required to satisfactorily complete elevator installation required by Contract Documents.

C. Applicable conditions of General, Special, and Supplemental Conditions, and Division 1.

D. Preventive maintenance as described herein.

1.02 DEFINITIONS

A. Terms used are defined in the latest edition of the Safety Code for Elevators and Escalators, ASME A17.1.

B. Reference to a device or a part of the equipment applies to the number of devices or parts required to complete the installation.

C. Provisions of this specification are applicable to all elevators unless identified otherwise.

D. The term Owner shall include the Owner and/or the Owner’s representative.

1.03 QUALITY ASSURANCE

A. Approved Manufacturers: Alternate Providers must receive approval of Owner at least 14 calendar days prior to bid date.

1. Elevator Control/Landing Systems: Computerized Elevator Control Corporation, Elevator Controls, Minnesota Elevator, Motion Control Engineering.


6. Fixtures: EPCO, GAL Manufacturing, Innovation Industries

7. Freight Vertical Bi-Parting Door: Courion, EMS, Peelle
B. Compliance with Regulatory Agencies: Comply with most stringent applicable provisions of following Codes, laws, and/or Authorities, including revisions and changes in effect;
   1. Safety Code for Elevators and Escalators, ASME A17.1
   2. Guide for Inspection of Elevators, Escalators, and Moving Walks, ASME A17.2
   3. Elevator and Escalator Electrical Equipment, ASME A17.5
   4. National Electrical Code, NFPA 70
   5. Americans with Disabilities Act, ADA
   6. Local Fire Authority
   7. Requirements of IBC and all other Codes, Ordinances and Laws applicable within the governing jurisdiction
   9. Uniform Federal Accessibility Standard, UFAS

C. Warranty:
   1. Material and workmanship of installation shall comply in every respect with Contract Documents. Correct defective material or workmanship which develops within one year from date of final acceptance of all work to satisfaction of Owner at no additional cost, unless due to ordinary wear and tear, or improper use or care by Purchaser. Perform maintenance in accordance with terms and conditions indicated in the Preventive Maintenance Agreement.
   2. Defective is defined to include, but not limited to; operation or control system failures, car performance below required minimum, excessive wear, unusual deterioration or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise or vibration, and similar unsatisfactory conditions.
   3. Make modifications, requirements, adjustments and improvements to meet performance requirements in Parts 2 and 3.

1.04 DOCUMENT VERIFICATION

In order to discover and resolve conflicts or lack of definition which might create problems, Provider must review Contract Documents for compatibility with its product prior to submittal of quotation. Purchaser will not pay for change to structural, mechanical, electrical, or other systems required to accommodate Provider’s equipment.

1.05 SUBMITTALS

A. Within 60 calendar days after award of contract and before beginning equipment fabrication, submit shop drawings and required materials for review as outlined in Division I. Allow 30 calendar days for response to initial submittal.
   1. Scaled or Fully Dimensioned Layout: Plan of pit, hoistway and machine room with Component Listing, indicating equipment arrangement, elevation section of hoistway, details of car enclosures, hoistway entrances, and car/hall signal fixtures, and component listing.
   2. Design Information: Indicate equipment lists, reactions, and design information on layouts.
4. Fixtures: Cuts, samples, or shop drawings.
5. Finish Material: Submit 3” x 12” samples of actual finished material for Architect review of color, pattern, and texture. Compliance with other requirements is the exclusive responsibility of the Provider. Include, if requested, signal fixtures, lights, graphics, Braille plates, and details of mounting provisions.

B. Acknowledge and/or respond to review comments within 14 calendar days of return. Promptly incorporate required changes due to inaccurate data or incomplete definition so that delivery and installation schedules are not affected. Provider’s revision response time is not justification for equipment delivery or installation delay.

1.06 PERMIT, TEST AND INSPECTION
A. Obtain and pay for permit, license, and inspection fee necessary to complete installation.
B. Perform test required by Governing Authority in accordance with procedure described in ASME A17.2 Guide for Inspection of Elevators, Escalators, and Moving Walks in the presence of Authorized Representative.
C. Supply personnel and equipment for test and final review by Owner, as required in Part 3.

1.07 MAINTENANCE
A. Warranty Maintenance:
   1. Provide preventive maintenance and 24-hour emergency callback service for one year commencing on date of final acceptance by Purchaser. Systematically examine, adjust, clean, and lubricate all equipment. Repair or replace defective parts using parts produced by the Provider of installed equipment. Maintain elevator machine room, hoistway, and pit in clean condition.
   2. Use competent personnel, acceptable to the Purchaser, supervised and employed by Provider.
   3. The warranty maintenance period specified in Item 1 above shall be extended one (1) month for each three (3) month period in which equipment related failures average more than twice per unit per month.

PART 2 PRODUCTS

2.01 MATERIALS
A. Steel:

B. Stainless Steel: Type 302 or 304 complying with ASTM A240, with standard tempers and hardness required for fabrication, strength and durability. Apply mechanical finish on fabricated work in the locations shown or specified, (Federal Standard and NAAMM nomenclature), with texture and reflectivity required to match Architect’s sample. Protect with adhesive paper covering.
   1. Satin: Directional polish finish (US32D)). Graining directions as shown or, if not shown, in longest dimension.
   3. Textured: 5WL as manufactured by Rigidized Metals or Windsor pattern as manufactured by Rimex Metals or approved equal with .050 inches mean pattern depth with bright directional polish (satin finish).

C. Aluminum: Extrusions per ASTM B221; sheet and plate per ASTM B209.

D. Plastic Laminate: ASTM E84 Class A and NEMA LD3.1, Fire-Rated Grade (GP-50), Type 7, 0.050” ±.005” thick, color and texture as follows;
   1. Exposed Surfaces: Color and texture selected by Architect.
   2. Concealed Surfaces: Provider’s standard color and finish.

E. Fire-Retardant Treated Particle Board Panels: 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; meet ASTM E84 Class “I” rating with a flame-spread rating of 25 or less, registered with Local Authorities for elevator finish materials.

F. Paint: 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. After erection, provide one finish coat of industrial enamel paint. Galvanized metal need not be painted.

G. Prime Finish: Clean all metal surfaces receiving a baked enamel paint finish of oil, grease, and scale. Apply one coat of rust-resistant primer followed by a filler coat over uneven surfaces. Sand smooth and apply final coat of primer.

H. Baked Enamel Finish: Prime finish per above. Unless specified “prime finish” only, apply and bake three (3) additional coats of enamel in the selected solid color.

2.02 OPERATION

A. Approved non-proprietary microprocessor-based car and landing systems are as follows:
   1. Computerized Elevator Controls Corporation: Swift Meridian
   2. Elevator Controls Corporation: H900
   3. Minnesota Elevator: Vertitron
4. Motion Control Engineering: HMC

B. Selective Collective Microprocessor Based: Operate car without attendant from pushbuttons in car and located at each floor. When car is available, automatically start car and dispatch it to floor corresponding to registered car or hall call. Once car starts, respond to registered calls in direction of travel and in the order the floors are reached.

Do not reverse car direction until all car calls have been answered, or until all hall calls ahead of car and corresponding to the direction of car travel have been answered.

Slow car and stop automatically at floors corresponding to registered calls, in the order in which they are approached in either direction of travel. As slowdown is initiated for a hall call, automatically cancel hall call. Cancel car calls in the same manner. Hold car at arrival floor an adjustable time interval to allow passenger transfer.

Answer calls corresponding to direction in which car is traveling unless call in the opposite direction is highest (or lowest) call registered.

Illuminate appropriate pushbutton to indicate call registration. Extinguish light when call is answered.

C. Duplex Selective Collective Microprocessor Based: Operate cars without attendants from pushbuttons in cars and located at each floor. When cars are available, park one car at main floor (“home” car). Park other car where last used (“free” car).

Respond to car calls and hall calls above main floor using the “free” car. Once a car has started, respond to registered calls in the direction of travel and in the order the floors are reached.

Do not reverse car direction until all car calls have been answered, or until all hall calls ahead of the car and corresponding to the direction of car travel have been answered.

Slow cars and stop automatically at floors corresponding to registered calls in the order in which they are approached in either direction of travel. As slowdown is initiated for a hall call, automatically cancel hall call. Cancel car calls in the same manner. Hold car at arrival floor an adjustable time interval to allow passenger transfer.

Answer calls corresponding to direction in which car is traveling unless call in the opposite direction is the highest (or lowest) call registered.

When the “free” car is clearing calls, start “home” car to respond to:
1. A call registered on “home” car pushbuttons.
2. An up hall call registered below “free” car.
3. An up or a down call registered above “free” car while “free” car is traveling down.
4. A hall call when “free” car is delayed in its normal operation for a predetermined period.
When both cars are clearing calls, stop only one car in response to any registered hall call. Return the first car to clear its calls to main floor. Should last service required bring both cars to main floor, the first arriving car becomes the “free” car.

Illuminate appropriate pushbutton to indicate call registration. Extinguish light when call is answered.

D. Group Automatic:

1. Include as a minimum, the following features:
   a. Operate cars as a group, capable of balancing service and providing continuity of group operation with one or more cars removed from the system.
   b. Register service calls from pushbuttons located at each floor and in each car. Slow cars and stop automatically at floors corresponding to registered calls. Make stops at successive floors for each direction of travel irrespective of order in which calls are registered except when bypassing hall calls to balance and improve overall service; stop only one car in response to a particular hall call. Assign hall calls to specific cars and continually review and modify those assignments to improve service. Simultaneous to initiation of slow down of a car for a hall call, cancel that call. Render hall pushbutton ineffective until car doors begin to close after passenger transfer. Cancel car calls in the same manner. Give priority to coincidental car and hall calls in car assignment.
   c. Operate system to meet changing traffic conditions on a service demand basis. Include provisions for handling traffic which may be heavier in either direction, intermittent or very light. As traffic demands change, automatically and continually modify group and individual car assignment to provide the most-effective means to handle current traffic conditions. Provide means to sense long-wait hall calls and preferentially serve them. Give priority to coincidental car and hall calls in hall call assignment. Accomplish car direction reversal without closing and reopening doors.
   d. Use easily reprogrammable system software. Design basic algorithm to optimize service based on equalizing system response to registered hall calls and equalizing passenger trip time to shortest possible time.
   e. Serve floors below main floor in a manner which logically minimizes delay in passing or stopping at main floor in both directions of travel. Provide manual means to force a stop at the main floor when passing to or from lower levels.

2. Required Features:
   1) Dispatch Protection: Backup dispatching shall function in the same manner as the primary dispatching.
   2) Delayed Car Removal: Automatically remove delayed car from group operation.
   3) Position Sensing: Update car position when passing or stopping at each landing.
   4) Hall Pushbutton Failure: Provide multiple power sources and separate fusing for pushbutton risers.
5) Communication link: Provide serial or duplicate communication link for all group and individual car computers.
   g. Include on-board diagnostics.

E. Other Items:
   1. Low Oil Control: In the event oil level is insufficient for travel to the top floor, provide controls to return elevator to the main level and park until oil is added.
   2. Independent Service: Provide controls for operation of each car from its pushbuttons only. Close doors by constant pressure on desired destination floor button or door close button. Open doors automatically upon arrival at selected floor.

F. Firefighters’ Service: Provide equipment and operation in accordance with Code requirements.

G. Automatic Car Stopping Zone: Stop car within 1/4” above or below the landing sill. Maintain stopping zone regardless of load in car, direction of travel, distance between landings.

H. Remote Monitoring and Diagnostics: Equip each controller with standard ports, interface boards and drives to accept maintenance, data logging, fault finding diagnostic, and monitoring computers, keyboards, modems, and programming tools. The system shall be capable of driving remote color CRT monitor(s) that continually scan and display the status of each car and call.

I. Motion Control: AC type with unit valve suitable for operation specified and capable of providing smooth, comfortable car acceleration and retardation. Limit the difference in car speed between full load and no load to not more than ±10% of the contract speed in either direction of travel.

J. Selective Leveling: Provide means to limit elevator car speed when traveling between adjacent floors.

K. Passenger Door Operation: Automatically open doors when car arrives at main floor. At expiration of normal dwell time, close doors. Reopen doors when car is designated for loading. Provide front or rear selective door operation for front and rear applications.

L. Freight Power Door Operation: Open door and gate automatically when car arrives at a floor. Control door and gate closing by using constant-pressure buttons on car or at each floor. Provide passenger sequence operation. Provide reversing safety edge device on car gate. Provide automatic door and gate closing feature with warning buzzer.

M. Standby Lighting and Alarm: Car mounted battery unit with solid-state charger to operate alarm bell and car emergency lighting. Battery to be rechargeable with minimum 5-year life expectancy. Include required transformer. Provide constant pressure test button in service compartment of car operating panel.
N. Battery Standby Power Transfer: Upon loss of normal power, provide controls to automatically lower the car(s) nonstop to the lowest landing. Upon arrival at the lowest landing, the elevator doors shall open automatically and remain open until regular door time has expired. The elevator shall then become deactivated. The standby power source shall be provided via 12-volt D.C. battery units installed in machine room, including solid-state charger and testing means mounted in a common metal container. Battery to be rechargeable lead acid or nickel cadmium with a 10-year life expectancy.

Upon restoration of normal power, the elevator shall automatically resume normal operation.

2.03 MACHINE ROOM EQUIPMENT

A. Arrange equipment in spaces shown on drawings.

B. Pump Unit: Assembled unit consisting of 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. Enclose entire unit with removable sheet steel panels lined with sound-absorbing material. Provide electronic soft start with closed transition. Design unit for 80 upstarts/hour.

C. Landing System: Solid-state, magnetic or optical type.

D. Controller: UL/CSA labeled.
   1. Compartment: Securely mount all assemblies, power supplies, chassis switches, relays, etc., on a substantial, self-supporting steel frame. Completely enclose equipment with covers. Provide means to prevent overheating.
   2. Relay Design: Magnet operated with contacts of design and material to insure maximum conductivity, long life and reliable operation without overheating or excessive wear. Provide wiping action and means to prevent sticking due to fusion. Contacts carrying high inductive currents shall be provided with arc deflectors or suppressors.
   3. Microprocessor-Related Hardware:
      a. Provide built-in noise suppression devices which provide a high level of noise immunity on all solid-state hardware and devices.
      b. Provide power supplies with noise suppression devices.
      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: CSA labeled copper for factory wiring. Neatly route all wiring interconnections and securely attach wiring connections to studs or terminals.
5. Permanently mark components (relays, fuses, PC boards, etc.) with symbols shown on wiring diagrams.
6. Monitoring System Interface: Provide controller with serial data link through RJ45 Ethernet connection and install all devices necessary for monitoring function. Elevator contractor responsible to connect monitoring system interface to machine room monitoring compartment and LAN. Wiring from the LAN to the machine room monitoring compartment by others.
7. Provide controller or machine mounted auxiliary, lockable “open,” disconnect if mainline disconnect is not in sight of controller and/or machine.
8. Provide all diagnostics for testing, adjusting and troubleshooting within controller (including door operation).

E. Muffler: Provide in discharge oil line near pump unit. Design shall dampen and absorb pulsation and noise in the flow of hydraulic fluid.

F. Piping and Oil: Provide piping, connections and oil for the system. Buried piping shall be secondarily contained with watertight Schedule 40 PVC sleeves between elevator machine room and pit. A minimum of two sound isolation couplings shall be provided between the pump unit and oil line and the oil line and jack unit. Provide isolated pipe stands or hangers as required.

G. Noise/Vibration Isolation: All elevator equipment including their supports and fastenings to building, shall be mechanically and electrically isolated from the building structure and main line power feeders to minimize objectionable noise and vibration transmission to car, building structure, or adjacent occupied areas of building.

H. Sound Isolation:
   1. Noise level relating to elevator equipment operation in machine room shall not exceed 80 dBA.
   2. All dBA readings shall be taken three (3) feet off the floor and three (3) feet from equipment using the “A” weighted scale.

2.04 HOISTWAY EQUIPMENT

A. Guide Rails: Planed steel T-sections for car of suitable size and weight for the application, including brackets for attachment to building structure. Provide rail backing to meet Code requirements. No additional structural points of rail attachment, other than those shown on the Contract Documents, will be provided.

B. Buffers: Spring type with blocking and support channels.

C. Hydraulic Jack Assembly:
   1. Cylinder(s): Seamless steel pipe. Design head to receive unit-type packing and provide means to collect oil at cylinder head and return automatically to oil reservoir.
2. Plunger(s): Polished seamless steel tubing or pipe. If plunger length exceeds 24 feet, provide two or more sections not exceeding 16 feet in length, or coordinate installation of longer unit at the jobsite. Join sections by internal threaded couplings. Multiple section jack units shall be factory polished while assembled and marked for proper future reassembly. Isolate plunger from car frame(s).

D. Jack Support and Fluid Shut-Off Valve(s): Provide steel pit channels to support jack assembly and transmit loads to building structure. Provide intermediate stabilizers as required. Provide manual on/off valve(s) in oil line(s) adjacent to pump unit and jack unit(s) in pit adjacent to jack unit(s).

E. Well Hole Casing:
   1. Well hole is to be provided by Elevator Contractor. No additional compensation will be allowed for unforeseen conditions of any kind or spoil removal.
   2. Install steel outer casing minimum 18” diameter. Install watertight sleeve over jack assembly for secondary containment prior to insertion into the outer casing. Extend PVC sleeve through pit floor slab to underside of jack support beams and seal with non-permeable membrane. Seal well opening at the pit floor with hydraulic quick setting cement. Provide PVC vision/access ports.
   3. Provide Union Guard within PVC casing.

F. Terminal Stopping: Provide normal and final devices.

G. Electrical Wiring and Wiring Connections:
   1. Conductors and Connections: Copper throughout with individual wires coded and connections on identified studs or terminal blocks. Use no splices or similar connections in wiring except at terminal blocks, control compartments, or junction boxes. Provide 10% spare conductors throughout. Run spare wires from car connection points to individual elevator controllers in the machine room.
   2. Conduit: Painted or galvanized steel conduit, EMT or duct. Conduit size, 1/2”. Flexible heavy-duty service cord may be used between fixed car wiring and car door switches for door protective devices.
   3. Traveling Cables: Flame and moisture-resistant outer cover. Prevent traveling cable from rubbing or chafing against hoistway or equipment within hoistway.
   4. Auxiliary Wiring: Connect fire alarm initiating devices and emergency two-way communication system in each car controller in machine room.

H. Passenger Doors - Entrance Equipment:
   1. Door Hangers: Two-point hanger roller with neoprene roller surface and suspension with eccentric upthrust roller adjustment.
   2. Door Tracks: Bar or formed, cold-drawn removable steel tracks with smooth roller contact surface.
   3. Door Interlocks: Operable without retiring cam. Paint interlock box flat black.
   4. Door Closers: Spring, spirator or jamb/strut mounted counterweight type. Design and adjust to insure smooth, quiet mechanical close of doors.
5. Hoistway Door Unlocking Device: Provide unlocking device with escutcheon in door panel at all floors, with finish to match adjacent surface.

I. Vertical Freight Bi-Parting Doors - Entrance Equipment:
1. Door Guide Tracks: Continuous steel angles or formed steel tracks fastened to hoistway door jamb.
2. Door Guide Shoes: Machined iron shoes. Four shoes per door panel, with not less than 2-1/2” lateral contact per shoe.
3. Door Interlocks: Operable without retiring cam.
4. Hoistway Door Unlocking Device: Provide unlocking device with pull chain under hinged, lockable cover with stainless steel No. 4 finish at all floors.

J. Floor Numbers: Stencil paint 4” high floor designations in contrasting color on inside face of hoistway doors or hoistway fascia in location visible from top of car.

2.05 HOISTWAY ENTRANCES

A. Complete entrances bearing fire labels from a nationally recognized testing laboratory approved within the governing jurisdiction.

B. Frames: 14 gauge hollow metal at all floors. Bolted and lapped head to jamb assembly at all floors. Provide Arabic floor designation/Braille plates, centered at 60” above finished floor, on both side jambs of all entrances. Provide plates at main egress landing with “Star” designation. For designated emergency car, provide “Star of Life” designation plates at height of 78” - 84” above finished floor on both side jambs at all floors. Braille indications shall be below Arabic floor designation. Provide cast floor designation/Braille plates as manufactured by SCS, Vision Mark orEntrada.

C. Door Panels: 16 gauge steel, sandwich construction without binder angles. Provide leading edges of center-opening doors with rubber astragals. Provide a minimum of two (2) gibs per panel, one at leading and one at trailing edge with gibs in the sill groove entire length of door travel. Construct door panels with interlocking, stiffening ribs.

D. Sight Guards: 14 gauge, same material and finish as hoistway entrance door panels. Construct without sharp edges.

E. Sills: Extruded nickel silver.

F. Sill Supports: Structural or formed steel designed to support door sill based upon car loading classification. Mount to eliminate need for grout under the sill.

G. Fascia, Toe Guards and Hanger Covers: 14 gauge furniture steel with Provider’s standard finish.
H. Struts and Headers: Provide for vertical support of entrances and related material. Provide door open bumpers on entrances equipped with vertical struts.

I. Vertical Bi-Parting Freight Door Panels: 16 gauge metal clad wood core doors within a welded steel angle frame. Provide with safety astragals, vision panels and truckable sills. Provide telescoping upper section or pass-type doors as required.

2.06 CAR EQUIPMENT

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

B. Platform: Isolated type, constructed of steel, or steel and wood which is fireproofed on underside. Design and construct to accommodate load classification requirements.

C. Platform Apron: Minimum 14 gauge steel, reinforced and braced to car platform with Provider’s standard finish.

D. Guide Shoes: Provide as listed in equipment summary.

E. Finish Floor Covering: Provided under other sections.

F. Passenger Sills: One-piece nickel silver extrusion with extruded extension between car entrance columns to face of car front return. Extruded extension to match finish of sill.

G. Freight Sills: Channel, angle or plate steel.

H. Doors: Provide as specified for hoistway entrance doors.

I. Door Hangers: Two-point hanger roller with neoprene roller surface and suspension with eccentric upthrust 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: Prohibit car operation unless car door is closed.

M. Door Clutch: Heavy-duty clutch, linkage arms, drive blocks and pickup rollers or cams to provide positive, smooth, quiet door operation. Design clutch so car doors can be closed, while hoistway doors remain open.

N. Restricted Opening Device: Restrict opening of car door(s) outside unlocking zone.

O. Passenger/Service Door Operator: High speed, heavy-duty door operator capable of opening doors at no less than 2-1/2 f.p.s. Accomplish reversal in no more than 2-1/2” of door
movement. Provide solid-state door control with closed loop circuitry to constantly monitor and automatically adjust door operation based upon velocity, position, and motor current. Maintain consistent, smooth and quiet door operation at all floors, regardless of door weight or varying air pressure.

Acceptable closed-loop door operators:
1. Elevator Components Industries ECI2000
2. G.A.L. MOVFR
3. Motion Control Engineering SmarTraq

P. Passenger/Service Door Control Device:
1. Infrared Reopening Device: 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 7'-0” above finished floor. Device shall prevent doors from closing and reverse doors at normal opening speed if beams are obstructed while doors are closing, except during nudging operation. In event of device failure, provide for automatic shutdown of car at floor level with doors open.
2. Nudging Operation: After beams of door control device are obstructed for a predetermined time interval (minimum 20.0 - 25.0 seconds), warning signal shall sound and doors shall attempt to close with a maximum of 2.5 foot pounds kinetic energy. Activation of the door open button shall override nudging operation and reopen doors.
3. Interrupted Beam Time: When beams are interrupted during initial door opening, hold door open a minimum of 3.0 seconds. When beams are interrupted after the initial 3.0 second hold open time, reduce time doors remain open to an adjustable time of approximately 1.0 - 1.5 seconds after beams are reestablished.
4. Differential Door Time: Provide separately adjustable timers to vary time that doors remain open after stopping in response to calls.
   a. Car Call: Hold open time adjustable between 3.0 and 5.0 seconds.
   b. Hall Call: Hold open time adjustable between 5.0 and 8.0 seconds. Use hall call time when car responds to coincidental calls.

Q. Bi-Parting Freight Door and Gate Operation: Power door and gate. Provide means to open doors and gate from inside of car in the event of power failure.

R. Bi-Parting Freight Car Gate: Power operated, vertical rise, single section minimum 6’-0” high, constructed of 12 gauge welded wire mesh welded into frame angles. Mount car gate lift chains on hoistway side of car gate. Include reversing safety edge device.

S. Infrared Reopening Device: Black, fully enclosed device with full screen infrared matrix or multiple beams extending vertically along edge of each car gate guide track to a minimum height of 7’-0” above finished floor. Include retractable infrared sensor beams positioned at each side of lower edge of gate. Obstruction of beams during gate closing shall cause immediate re-opening.

T. Car Operating Panel:
1. Car operating panel(s) with faceplate(s), consisting of a metal box containing vandal resistant operating fixtures, mounted behind the car stationary front return panel(s).
2. Suitably identify floor buttons, alarm button, door open button, door close button and emergency push-to-call button with SCS, Visionmark or Entrada cast tactile symbols recessed flush rear mounted. Configure plates per local building code accessibility standards including Braille. Locate operating controls no higher than 48” above the car floor; no lower than 35” for emergency push-to-call button and alarm button.
3. Provide minimum 3/4” diameter raised or flush floor pushbuttons which illuminate to indicate call registration.
4. Provide alarm button to ring bell located on car. Illuminate button when actuated.
5. Provide keyed stop switch at bottom of car operating panel faceplate. Mark device to indicate “run” and “stop” positions.
6. Provide “door open” button to stop and reopen doors or hold doors in open position.
7. Provide “door close” button to activate door close cycle. Cycle shall not begin until normal door dwell time for a car or hall call has expired, except firefighters’ operation.
8. Provide firefighters’ Phase II key switch with engraved instructions filled red. Include light jewel, buzzer, and call cancel button.
9. Provide lockable service compartment with recessed flush door. Door material and finish shall match car return panel or car operating panel faceplate.
10. Include the following controls in lockable service cabinet with function and operating positions identified by permanent signage or engraved legend:
    a. Inspection switch.
    b. Light switch.
    c. Three-position exhaust blower switch.
    d. Independent service switch.
    e. Constant pressure test button for battery pack emergency lighting.
    f. 120-volt, AC, GFCI protected electrical convenience outlet.
    g. Stop switch.
11. Provide black paint filled (except as noted), engraved or approved etched signage as follows with approved size and font:
    a. Phase II firefighters’ operating instructions on main operating panel above corresponding keyswitch filled red.
    b. Car number on main car operating panel.
    c. “Certificate of Inspection on File in Campus Office” on main car operating panel.
    d. “No Smoking” on main car operating panel.
    e. Car capacity in pounds on main car operating panel service compartment door.
    f. Freight loading classification and description on car operating panel service compartment door.

U. Car Top Control Station: Mount to provide safe access and utilization while standing in an upright position on car top or run bug from the top of the car.

V. Work Light and Duplex Plug Receptacle: GFCI protected outlet at top of car. Include on/off switch and lamp guard.
W. Communication System:
   1. “Push to Call,” two-way communication instrument in car with automatic dialing, tracking and recall features with shielded wiring to car controller in machine room. Provide dialer with automatic rollover capability with minimum two numbers.
      a. “Push to Call” button or adjacent light jewel shall illuminate and flash when call is acknowledged. Button shall match car operating panel pushbutton design. Provide uppercase “PUSH TO CALL,” “HELP ON THE WAY” engraved signage adjacent to button.
      b. Provide “Push to Call” button tactile symbol, engraved signage, and Braille adjacent to button mounted integral with car front return panel.

2.07 CAR ENCLOSURE

A. Car Enclosure Passenger Elevator: Provide complete as specified herein. Provide the following features.
   1. Shell: Reinforced 16 gauge furniture steel formed panels with baked enamel interior finish as selected. Apply sound-deadening mastic to exterior.
   2. Canopy: Reinforced 14 gauge furniture steel formed panels with lockable, hinged emergency exit. Interior finish white reflective baked enamel.
   3. Return Panels: Reinforced 16 gauge stainless steel satin finish with cutouts for car operating panel(s) and other equipment.
   5. Transom: Reinforced 16 gauge stainless steel satin finish full width of enclosure.
   6. Car Door Panels: Reinforced minimum 16 gauge stainless steel satin finish. Same construction as hoistway door panels. Architectural metal cladding shall wrap around leading and trailing edge of panel and return a minimum of 1/2” on rear side of leading edge of panel.
   8. Interior Wall Finish: Removable panels, faced and edged, with color core plastic laminate. Color and finish as selected.
   9. Ventilation: Two-speed, mounted to car canopy on isolated rubber grommets. Exhaust blower shall meet requirements of Item 2.03, H.
  10. Lighting: Provide fluorescent with wiring and hookup. Coordinate with emergency lighting requirements.
  12. Handrails: Minimum 2” flat stainless steel satin finish grab bar across rear walls (front and rear opening - handrails on side walls).
  13. Finished Floor Covering: Rubber tile 1/8” thick with 1” diameter by 0.025” raised circular pattern.

B. Car Enclosure Service Elevator: Provide complete as specified herein. Provide the following features.
   1. Shell: Reinforced 14 gauge textured stainless steel formed panels as specified in Item 2.02. Apply sound deadening mastic to exterior.
2. Canopy: Reinforced 12 gauge furniture steel formed panels with lockable hinged emergency exit. Interior finish white reflective baked enamel.
3. Return Panels: Reinforced 16 gauge stainless steel, satin finish as specified in Item 2.02.
5. Car Door Panels: Reinforced minimum 16 gauge stainless steel textured finish as specified in Item 2.02. Same construction as hoistway door panels. Architectural metal cladding shall wrap around leading and trailing edge of panel and return a minimum of 1/2” on rear side of leading edge of panels.
6. Ventilation: Two-speed exhaust blower mounted to car canopy on isolating rubber grommets. Provide with a diffusor and grille. Exhaust blower shall meet requirements of Item 2.03, H.
7. Lighting: Fluorescent fixture flush mounted in ceiling with protective diffusor and steel guard over fixtures on car top.
8. Handrails/Guardrails: Handrail line minimum 2” solid stainless steel flatstock bars mounted on all cab walls. Bolt rails through car walls from back and mount on 1-1/2” deep solid round stainless steel standoff spacers no more than 18” O.C. Return handrail/guardrail ends to car walls.
9. Finished Floor Covering: Rubber tile 1/8” thick with 1” diameter by 0.025” raised circular pattern.

C. Freight Elevator: Provide complete as specified herein. Provide the following features.
1. Shell: Reinforced 10 gauge furniture steel formed panels no more than 20” wide with light-proof joints. Baked enamel finish as selected. Reinforce and brace panels to provide rigid structure and securely fasten to car sling and platform. Provide recess in car side wall for recessed mounting of car operating panel.
2. Canopy: Reinforced 12 gauge furniture steel formed panels no more than 20” wide with light-proof joints. Interior finish white reflective baked enamel. Provide hinged emergency exit.
3. Lighting: Recessed 4-tube fluorescent fixtures with on/off switch in car operating panel. Recess mount fixture flush with inside surface of car top. Provide steel guard on car top over fixture.
4. Bumper Rails: Two (2) rows of 2” x 12” oak or maple bumpers mounted on all sides of the car. Locate bottom rail at floor level and top rail at 36” above the car floor. Bolt rails through car walls with bolt and captive nuts on exterior of wall panel sections.

2.08 HALL CONTROL STATIONS

A. Pushbuttons: Provide one riser with flush mounted faceplates. Include pushbuttons for each direction of travel which illuminate to indicate call registration. Include approved engraved message and pictorial representation prohibiting use of elevator during fire or other emergency situation as part of faceplate. Pushbutton design shall match car operating panel pushbuttons. Provide vandal resistant pushbutton and light assemblies.

B. Freight Door Control Buttons: Include vandal resistant “door open,” “door close” and “stop” buttons for control of power operated vertical bi-parting doors at each landing call button
fixture. Provide buttons integral with hall control station. Pushbutton design shall match car operating panel pushbuttons.

2.09 SIGNALS

A. Passenger Cars, Car Riding Lantern: Provide at each entrance to indicate travel direction of arriving car. Illuminate up or down LED lights and sound tone once for up and twice for down direction prior to car arrival at floor. Sound level shall be adjustable from 20 - 80 dBA measured at 5'-0” in front of hall control station and 3'-0” off floor. Illuminate light until the car doors start to close. Provide advanced hall lantern notification to comply with ADA hall call notification time. Car direction lenses shall be arrow shaped with faceplates. Lenses shall be minimum 2-1/2” in their smallest dimension. Provide vandal resistant lantern and light assemblies consisting of series of dots or lines for maximum visibility.

B. Car Position Indicator: Alpha-numeric digital indicator containing floor designations and direction arrows a minimum of 1/2” high to indicate floor served and direction of car travel. Locate fixture in each car operating panel. When a car leaves or passes a floor, illuminate indication representing position of car in hoistway. Illuminate proper direction arrow to indicate direction of travel. Provide multi-numeral vandal resistant indicator and light assemblies.

C. Faceplate Material and Finish: Stainless steel satin finish, all fixtures.

D. 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.

PART 3 EXECUTION

3.01 SITE CONDITION INSPECTION

A. Prior to beginning installation of equipment, examine hoistway and machine room areas. Verify that no irregularities exist which affect execution of work specified.

B. Do not proceed with installation until work in place conforms to project requirements.

3.02 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver material in Provider’s original, unopened protective packaging.

B. Store material in original protective packaging. Prevent soiling, physical damage, or moisture damage.

C. Protect equipment and exposed finishes from damage and stains during transportation, erection, and construction.
3.03 INSTALLATION

A. Install all equipment in accordance with Provider’s instructions, referenced Codes, specification and approved submittals.

B. Install machine 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. Install all equipment for ease of maintenance.

E. Install all equipment to afford maximum accessibility, safety, and continuity of operation.

F. Remove oil, grease, scale, and other foreign matter from the following equipment and apply one coat of field-applied machinery enamel.
   1. All exposed equipment and metal work installed as part of this work which does not have architectural finish.
   3. Neatly touch up damaged factory-painted surfaces with original paint color. Protect machine-finish surfaces against corrosion.

3.04 FIELD QUALITY CONTROL

A. Work at jobsite will be checked during course of installation. Full cooperation with reviewing personnel is mandatory. Accomplish corrective work required prior to performing further installation.

B. Have Code Authority acceptance inspection performed and complete corrective work.

C. The elevator shall not be used temporarily for building construction unless specifically allowed by the Owner.

D. If the contractor is allowed to use the elevator prior to substantial completion of the project, the warranty shall not begin until final acceptance.

3.05 ADJUSTMENTS

A. Install hydraulic jack assembly and guide rails plumb and align vertically with tolerance of 1/16” in 100’-0”. Secure guide rail joints without gaps and file any irregularities to a smooth surface.

B. Static balance car to equalize pressure of guide shoes on guide rails.

C. Lubricate all equipment in accordance with Provider’s instructions.
D. Adjust motors, valves, controllers, leveling switches, limit switches, stopping switches, door operators, interlocks, and safety devices to achieve required performance levels.

3.06 CLEANUP

A. Keep work areas orderly and free from debris during progress of project. Remove packaging materials on a daily basis.

B. Remove all loose materials and filings resulting from work.

C. Clean machine room equipment and floor.

D. Clean hoistways, car, car enclosure, entrances, operating and signal fixtures.

3.07 ACCEPTANCE REVIEW AND TESTS

A. Review procedure shall apply for individual elevators, portions of groups of elevators and completed groups of elevators accepted on an interim basis or elevators and groups of elevators completed, accepted, and placed into operation.

B. Provider shall perform review and evaluation of all aspects of its work prior to requesting Owner’s final review. Work shall be considered ready for Owner’s final contract compliance review when copies of Provider’s test and review sheets are available for Owner’s review and all elements of work or a designated portion thereof are in place and elevator or groups of elevators are deemed ready for service as intended.

C. Furnish labor, materials, and equipment necessary for Owner’s review. Notify Owner a minimum of five (5) working days in advance when ready for final review of elevator or group.

D. Owner’s written list of observed deficiencies of materials, equipment and operating systems will be submitted to Provider for corrective action. Owner’s review may include as a minimum:
   1. Workmanship and equipment compliance with Contract Documents.
   3. Performance of following is satisfactory:
      a. Starting, accelerating, running
      b. Decelerating, stopping accuracy
      c. Door operation and closing force
      d. Equipment noise levels
      e. Signal fixture utility
      f. Overall ride quality
      g. Performance of door control devices
      h. Operations of emergency two-way communication device
      i. Operations of firefighters’ service
   4. Test Results:
a. In all test conditions, obtain specified contract speed, performance times, stopping accuracy without re-leveling, and ride quality to satisfaction of Owner. Tests may be conducted under both no load and full load condition.
b. Temperature rise in motor windings limited to 50° Celsius above ambient. A full-capacity, one (1) hour running test, stopping at each floor for ten (10) seconds in up and down directions, may be required.

E. Performance Guarantee: Should Owner’s review identify defects, poor workmanship, variance or noncompliance with requirements of specified Codes and/or ordinances, or variance or noncompliance with the requirements of Contract Documents, Provider shall complete corrective work in an expedient manner to satisfaction of Owner at no cost as follows;
1. Replace equipment that does not meet Code or Contract Document requirements.
2. Perform work and furnish labor, materials, and equipment necessary to meet specified operation and performance.
3. Perform retesting required by Governing Code Authority, Owner.

F. A follow-up final contract compliance review shall be performed by Owner after notification by Provider that all deficiencies have been corrected. Provide Owner with copies of the initial deficiency report marked to indicate items which Provider considers complete.

3.08 PURCHASER’S INFORMATION

A. Provide four sets of neatly bound written information necessary for proper maintenance and adjustment of equipment within 30 days following final acceptance. Final retention will be withheld until data is received and reviewed by Owner. Include the following as minimums;
1. Straight-line wiring diagrams of “as-installed” elevator circuits, with index of location and function of components. Provide one set reproducible master. Mount one set wiring diagrams on panels, racked, or similarly protected, in elevator machine room. Provide remaining set rolled and in a protective drawing tube. Maintain all drawing sets with addition of all subsequent changes. These diagrams are Purchaser’s property. A legend sheet shall be furnished with each set of drawings to provide the following information;
a. Name and symbol of each relay, switch, or other apparatus.
b. Location on drawings, drawing sheet number and area, and location of all contacts.
c. Location of apparatus, whether on controller or on car.
2. Printed instructions explaining all operating features.
3. Complete software documentation for all installed equipment.
4. Lubrication instructions, including recommended grade of lubricants.
5. Parts catalogs listing all replaceable parts including Provider’s identifying numbers and ordering instructions.
6. Four sets of keys for all switches and control features properly tagged and marked.
7. Diagnostic test devices together with all supporting information necessary for interpretation of test data and troubleshooting of elevator system, and performance of routine safety tests.
8. The elevator installation shall be a design that can be maintained by any licensed elevator maintenance company employing journeymen mechanics, without the need to
purchase or lease additional diagnostic devices, special tools, or instructions from the original equipment Provider.

a. Provide on site capability to diagnose faults to the level of individual circuit boards and individual discreet components for the solid state elevator controller.

b. Provide a separate, detachable device, as required to the Purchaser as part of this installation if the equipment for fault diagnosis is not completely self-contained within the controller. Such device shall be in possession of and become property of the Purchaser.

c. Installed equipment not meeting this requirement shall be removed and replaced with conforming equipment at no cost to the Purchaser.

9. Provide upgrades and/or revisions of software during the progress of the work, warranty period and the term of the ongoing maintenance agreement between the Purchaser and Provider.

END OF SECTION