SECTION 142400
HYDRAULIC ELEVATORS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Hydraulic elevators as follows:
   1. One (1) In-Ground Passenger Elevator, Car 1.

B. Products Installed but Not Furnished Under This Section:
   1. Emergency voice/alarm communication system provisions.
   2. Elevator security devices, control unit, mounting brackets, wiring materials, logic circuits, security system interface terminals, boxes and relays.
   3. Car interior finishes per Architectural.
   4. Car flooring per Architectural.

1.02 ACTION SUBMITTALS

A. Product Data:
   1. Include capacities, sizes, performances, operation, control, signal systems operations, safety features, finishes, and similar information.
   2. Include product data for car enclosures and hoistway entrances.
   3. Include product data for signal fixtures, lights, graphics, Tactile marking plates, and details of mounting.

B. Shop Drawings:
   1. All shop drawings submitted must be signed and sealed by an Engineer licensed in the state where the vertical transportation system is being installed.
   2. Provide scaled shop drawings and construction drawings of the following:
      a. Plan and section layouts of hoistways, pits, overheads, machinery spaces and openings at each landing, to include the following:
         1) Location of all equipment.
         2) Static and dynamic loads imposed on building structure.
         3) Details of equipment isolation.
         4) Required clearances around equipment.
         5) Machine room heat release.
         6) Power Requirements:
            (a) Motor horsepower, code letter, starting current, full load running current, and demand factor.
            (b) Provide engineered power consumption based on 80starts per hour.
            (c) Provide maximum and average power consumption.
         7) Service connections.
         8) Running clearances.
         9) Location of fixtures.
      b. Elevation section of hoistways:
         1) Overhead, pits, clearance, and runby.
         2) Entrance details.
         3) Sill support detail.
      c. Pit Equipment:
         1) Buffers.
         2) Pit reactions.
         3) Service ladder, platform.
         4) Stop switches.
      d. Elevator cabs:
         1) Car shell fabrication.
         2) Ventilation.
         3) Ceiling construction detail.

4) Wall construction detail.
5) Lighting detail.
6) Handrail mounting detail.
7) Transom, front returns.

e. Fixtures:
1) Car operating panel.
2) Hall stations.
3) Hall lanterns.
4) Position indicators.
5) Access key switch.
6) Two-way communication device (all master stations).

3. All submittals shall be clearly marked and identified with project title and appropriate device identification.
4. All submittals are subject to approval.
5. Corrections requested shall be incorporated onto the submittals.
6. All submittals delivered via Portable Document Format (.pdf).

C. Samples for Initial Selection:
1. For finishes involving surface treatment, paint selection per Architectural list:

D. Samples for Verification:
1. For exposed car, hoistway door and frame, and signal equipment finishes.
2. Samples of sheet materials: 3" (75 mm) square.
3. Running trim members: 4" (100 mm) lengths.

1.03 CLOSEOUT SUBMITTALS

A. Record Documents:
1. The following record documents shall be furnished upon completion and before final payment:
a. Shop Drawings:
1) Complete sets of as installed plan and section layouts of hoistways, pits, overheads and equipment spaces, to include the following:
(a) Loads imposed on building structure.
(b) Details of equipment isolation.
(c) Required clearances around equipment.
(d) Machine room heat release/diversity factor.
(e) Power requirements.
2) Elevation Section of Hoistways:
(a) Overhead, pits and entrance details.
3) Elevator cabs.
4) Fixtures:
(a) Car fixtures.
(b) Hall fixtures.
(c) Remote fixtures.
5) Machine room heat release and power requirements.
b. Wiring Diagrams:
1) Complete sets of as installed straight-line wiring diagrams, showing the electrical connections of all altered vertical transportation equipment, shall be furnished upon completion.
2) A legend sheet shall be furnished with each set of drawings containing the following information:
(a) Name and symbol of each relay, switch and other electrical or solid-state apparatus.
(b) Location on drawings, drawing sheets, number and area of switches and relays, etc., and location of all contacts.

(c) Location of apparatus whether on controller, hoistway or elevator cab.

c. Maintenance and Operating 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.
   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.

B. Tools:
   1. The following equipment shall be furnished upon completion and before final payment:
      a. The Elevator Contractor shall provide 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 shall be updated regularly to properly troubleshoot, adjust, synchronize, calibrate, repair, maintain and test the vertical transportation systems. All equipment and/or software shall be of the same version as issued to technicians maintaining the vertical transportation systems.
      c. The Elevator Contractor shall provide a backup copy of any software that resides on the troubleshooting tool.
      d. Upon cancellation of service agreement, the Elevator Contractor shall provide all updates indicated above.

C. Keys:
   1. Four sets of keys to operate all keyed switches and locks shall be furnished upon completion.
   2. Keys shall be properly tagged.
   3. All keying shall be arranged with the Contractor.

1.04 PERMITS, TESTS, AND CERTIFICATES

A. Permits:
   1. The Elevator Contractor shall secure the necessary permits required for work to be performed, including work performed by sub-contractors.
   2. The Elevator Contractor shall obtain and pay for all municipal and state permits necessary for execution of the elevator work, including fees for renewing permits.
   3. The Elevator Contractor shall be responsible for posting all permits as required by the AHJ.
   4. The Elevator Contractor shall be responsible for obtaining final sign-off and approval for each permit filed by them.

B. Tests and Inspections:
   1. The Elevator Contractor shall perform all necessary tests as required by ASME A17.1 and recommended by A17.2.
   2. The Elevator Contractor shall be responsible for scheduling the necessary tests as required by the local authorities.
      a. Any fees associated with a missed appointment, expediting of test or overtime test due to delays caused by the Elevator Contractor shall be the responsibility of the Elevator Contractor.

C. Certificates:
   1. Elevator Contractor is responsible for obtaining and providing Contractor with all temporary and final inspection certificates of the proper governing authorities and shall provide the Contractor with such certificates.

2. The Elevator Contractor shall pay for all fees necessary for obtaining temporary and final inspection certificates.

1.05 QUALITY ASSURANCE

A. Compliance with Regulatory Agencies:
   1. Comply with most stringent provisions of codes, laws, and/or authorities, including revisions and changes in effect:

B. The Elevator Contractor is subject to reviews by the Consultant and/or Contractor at any time throughout the project.

1.06 DELIVERY, STORAGE, AND HOISTING

A. General:
   1. The protection of all equipment and exposed finishes shall be the responsibility of the Elevator Contractor during delivery, handling and installation until completion of project.
   2. The Elevator Contractor shall replace damaged materials with new, at no additional cost for material and labor to Contractor.

B. Delivery and Storage:
   1. It is expected that manufacturers' original packing shall adequately protect materials during delivery.
   2. Deliver materials to the site ready for use in the accepted manufacturer's original and unopened containers and packaging, bearing labels as to type of material, brand name and manufacturer's name. Delivered materials shall be identical to accepted samples.
   3. Store materials under cover in a dry and clean location, off the ground. Remove delivered materials that are damaged or otherwise not suitable for installation from the job site and replace with acceptable materials.
   4. 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:
   1. All required hoisting and movement of equipment shall be the responsibility of the Elevator Contractor.

1.07 COORDINATION

A. General:
   1. Coordinate the following requirements with the other trades.

B. Cast-in-Place Concrete:
   1. Elevator Contractor to provide guide rail bracket inserts and the locations for the General Contractor to install.
   2. Elevator Contractor to provide templates for machine room slab penetrations.
   3. Provide other hoistway and pit requirements, including location of sump pits.

C. Masonry Penetrations:
   1. Provide locations in elevator machine room/hoistway walls where conduit, ropes, oil lines, etc. will penetrate walls and slabs.
   2. Coordinate installation of sleeves, block outs, inserts, and items that are embedded in concrete or masonry for elevator equipment.
   3. Furnish inserts, templates and installation instructions and deliver to Project site in time for installation.

D. Structural Steel:
   1. Including, but not limited to, elevator machine rooms, hoistways and pits, sill supports, rail supports.

E. Miscellaneous Steel:
   1. Pit ladders, working platforms, inspection platforms, guard rails, divider beams.

F. Electric:

1. Electrical service, mainline disconnects, 110 VAC disconnects, outlets, lights, switches in elevator machine rooms and pits.

G. Sprinklers:
   1. Including installation of sprinkler systems in the elevator pits or shafts as per NFPA 13

H. HVAC:
   1. Provide necessary information to General Contractor and coordinate installation of equipment for elevator machine rooms.

I. Finishes:
   1. Cab interiors, hoistway entrances, fixtures.

J. Elevator Cab Flooring:
   1. Material and finish to be specified in other applicable section.
   2. Flooring installation must be coordinated to ensure car saddle is installed level with finished floor.

K. Security Equipment:
   1. Coordinate locations in elevator machine rooms and cabs where cables, conduit, components, etc. for CCTV and/or secure access interface equipment must be installed.

1.08 WARRANTY

A. Manufacturer's Warranty:
   1. Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.

B. Warranty Period: 12 months from date of Substantial Completion.
   1. The Elevator Contractor shall guarantee that the materials and workmanship of the apparatus installed by them and any subcontractor, under this contract, shall be first class in every respect and that he 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 shall relieve the Elevator Contractor of the extent and period provided by law and upon written notice he shall remedy any defects due thereto and pay all expenses for any damage to other work resulting there from.
   4. The warranty as outlined above, for all devices, shall start from the date of final acceptance of each device, by the Consultant and the Owner, of all work specified and intended under these contract documents.

1.09 MAINTENANCE

A. General:
   1. All maintenance shall be performed according to the guidelines stated in manufacturer's Maintenance and Operations manuals.
   2. Maintenance records for each device, including lubrication logs, check charts, shall be provided in each machine 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 shall be performed on a scheduled basis.
   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, shall be the responsibility of the Contractor/Owner.

5. Construction Maintenance Period:
    a. Construction maintenance begins after elevator acceptance for temporary use:
        1) Interim Maintenance: Twelve (12) months.
6. Perform emergency callback service during normal working hours.
7. Include 24-hour-per-day, 7-day-per-week emergency callback service with response time of thirty minutes or less.

C. Warranty Maintenance:
1. Upon final acceptance of each device, after Construction Maintenance period, subsequent to receiving acceptance and sign-off from the governing authorities and final acceptance, each device shall be accepted for full operation.
2. The warranty maintenance period shall begin for each device when all conditions in the above paragraph are met and will continue for the specified period.
    a. Warranty Maintenance Period may begin at different times for each elevator.
3. The warranty maintenance program shall include the following:
    a. Monthly examinations, including adjustments, cleaning and lubrication of equipment.
    b. 24-hour Emergency Call back service shall be provided at no additional cost to Owner.
    c. Replacement of components as required, using only components produced by the original manufacturer.
        1) Each machine room shall be equipped with a lockable storage cabinet to contain the necessary spare parts.

D. Maintenance Agreement: Upon completion of the Warranty Maintenance period, the Elevator Contractor shall turnover the service of the vertical transportation equipment to the owner's maintenance provider who will provide who will provide a full-service agreement.
1. Upon completion of the Warranty Maintenance period, the Elevator Contractor will provide the personnel to service the vertical transportation equipment.
    a. Full-Service Maintenance Agreement shall commence upon the completion of the warranty maintenance period for a term of five (5) years.
        1) If specifications for a comprehensive service agreement have not been provided, then the Contractor shall provide a proposal for a full-service agreement which covers the following:
            (a) All required inspections and tests.
            (b) 24-hour emergency call service at no additional cost to Owner.

PART 2 PRODUCTS

2.01 REFERENCES

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

B. American National Standard Institute (ANSI):
1. A117.1 - Accessible and Usable Buildings and Facilities

C. American Society of Mechanical Engineers:
1. ASME A17.1-2019 - 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

D. International Building Code (IBC)

E. National Fire Protection Association (NFPA):
1. NFPA 13 – Installation of Sprinkler Systems
2. NFPA 70 – National Electric Code
3. NFPA 80 – Fire Doors and Windows
4. NFPA 101 – Life Safety Code

F. Accessibility:
    1. Uniform Federal Accessibility Standards (UFAS)
    2. ADAAG – Americans with Disabilities Act Accessibility Guidelines

2.02 MANUFACTURERS

A. Subject to compliance with project requirements, provide products by one of the following:
    1. Non-Proprietary Controllers:
        a. MCE.
        b. Smartrise
    2. Hoistway Entrances: Existing to remain.
    3. Passenger Elevator Door Equipment (Operators, Tracks, Hangers, and Closers): Existing to remain.
    4. Elevator Car Enclosures:
        a. Manufacturers Standard.
    5. Fixtures Standard, Vandal Resistant.:
        a. EPCO.
        b. Monitor.
        c. Innovation.
        d. National Elevator Cab and Doors.
        e. MAD Fixtures.
    6. Two-Way Communication Device:
        a. Rath.

2.03 FIELD CONDITIONS

A. Seismic:
    1. Elevator system shall withstand the effects of earthquake motions determined according to SEI/ASCE 7 and shall comply 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 and the system will be fully operational after the seismic event.
    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) for Project: 0.227.
    7. Occupancy Category: TBD.
    8. Project Seismic Design Category: D.
    9. Elevator Component Importance Factor (Ip): 1.0.

2.04 PERFORMANCE REQUIREMENTS

A. Car Speed:
    1. ±10% of contract speed in the up direction, +10%/-20% in the down direction, under any loading condition.

B. Car Capacity:
    1. Safely lower, stop and hold 125% of rated load.

C. Car Stopping Zone:
    1. ±1/4" under any loading condition.

D. Door Times:
    1. Seconds from start to fully open or fully closed:
        a. Car 1: Door Open 2.8 seconds, Door Close 3.4 seconds.

E. Car Floor-to-Floor Performance Time:

1. Seconds from start of doors closing until doors are 3/4 open (1/2 open for side opening doors) and car level and stopped at next successive floor under any loading condition or travel direction:
    a. Car 1: 13.5 seconds, floor height 12’-0”, between floors 1 and 2.

F. Pressure:
1. Fluid system components shall be designed for maximum operating pressure of 500 psi.

G. Car Ride Quality:
1. Acceleration and Deceleration:
    a. Smooth constant and not less than 1.5 feet/second² with an initial ramp between 0.5 and 0.75 second.
2. Sustained Jerk:
    a. Not more than 6 feet/second³.
3. Horizontal and vertical acceleration within car during all riding and door operating conditions.
    a. Not more than 15 mg peak to peak (adjacent peaks).
4. Measurement Standards:
    a. Measure and evaluate ride quality consistent with ISO 18738, using low pass cutoff frequency of 10 Hz and A95 peak-to-peak average calculations.

H. Noise and Vibration Control:
1. Airborne Noise:
    a. Measured noise level of elevator equipment and its operation shall 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 machine room relating to elevator equipment and its operation to no more than 80 dBA.
    c. All dBA readings to be taken 3'-0" off the floor and 3'-0" from the equipment using the “A” weighted scale.
2. Vibration Control:
    a. All elevator equipment shall be mechanically isolated from the building structure and other components to minimize objectionable noise and vibrations being transmitted to occupied areas of the building.

2.05 ELEVATORS

A. Elevator System, General:
1. Manufacturer’s standard elevator systems (Non-Proprietary Controller).
2. Unless otherwise indicated, manufacturer’s standard components shall be used, as included in standard elevator systems, and as required for complete system.

B. Passenger Elevator Description:
1. Elevator Identification: Car 1
2. Capacity: 2,000 lbs.
3. Class of Loading: Class A.
4. Contract Speed: 150 fpm.
5. Machine: Hydraulic pump.
6. Machine Location: Remote at top landing.
7. Control System: Operational Control, Collective Microprocessor-Based: Selective collective.
8. Motor Control: Single speed AC with electronic soft start with closed transition.
9. Floors Served, Front: 1-4.
10. Openings: Front 4.
11. Minimum Clear Height to Underside of Canopy: 8’-0” high.
12. Entrance Size: 3'-0" wide x 7'-0" high (Existing to remain).
13. Entrance Type: Single-speed, side-opening (Existing to remain).
14. Hydraulic Type: Direct plunger.

2.06 MATERIALS

A. General:
   1. All materials and finishes are subject to approval by Architect.

B. 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.

C. Stainless-steel:
   1. Type 302, 304, 316 and 400 series complying with ASTM A240, with standard tempers and hardness required for fabrication, strength, and durability.
   2. 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.
      a. No. 4 Satin:
         1) Directional polish finish.
         2) Graining directions as shown or, if not shown, in longest dimension.
      b. Textured:
         1) .050 inches mean pattern depth with bright directional polish (No. 4 satin finish).
         2) 5WL as manufactured by Rigidized Metals.
         3) Windsor pattern 5-SM as manufactured by Rimex Metals.

D. Aluminum:
   1. Extrusions per ASTM B221; sheet and plate per ASTM B209.
   2. Die Cast Aluminum – ASTM B108, Alloy 356.0, T6.
   3. Extruded Aluminum – FS QQ-A 200/8, Alloy 6061, T6.

E. Plastic Laminate:
   1. ASTM E84 Class A and NEMA LD3.1, Fire-Rated Grade (GP-50), Type 7, 0.050" ±.005" thick.
   2. Exposed Surfaces: Color and texture selected by Architect.
   3. Concealed Surfaces: Manufacturer's standard color and finish.

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.
      b. Galvanized metal need not be painted.
   2. Prime Finish:
      a. Apply one coat of rust-resistant primer followed by a filler coat over uneven surfaces.
      b. Sand smooth and apply final coat of primer.
   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, shall be cleaned and painted one field coat of enamel.
   4. All machine room equipment shall be painted upon completion of the installation with the manufacturer's standard machinery enamel.
   5. Elevator designation (number and/or letter) shall be prominently indicated on all machine room and machinery space equipment, top of car crosshead and pit equipment.

G. Baked Enamel Finish:
   1. Prime finish per above.
   2. Unless specified "prime finish" only, apply and bake three additional coats of enamel in the selected solid color.

2.07 OPERATION

A. General:
   1. Cars automatically slow down and stop level at floors in response to car and landing calls with stops made in sequence in the established direction of travel, regardless of order in which buttons are pressed.
   2. Landing calls canceled when answered.
   3. Automatic Leveling:
      a. An automatic two-way leveling device shall be provided, designed to govern the leveling of the car to within 1/8” above or below the landing sill. The leveling operation shall be effective to avoid overtravel, as well as undertravel of the car and maintain the leveling accuracy regardless of the load in the car, direction of travel, rope slippage or stretch.
   4. Door Control:
      a. A car without registered car calls arriving at a floor where both up and down hall calls are registered, responds to the call in the direction of car travel. If no car call is registered for further travel in that direction, lantern immediately indicates changed direction without closing and reopening doors.
      b. Direction lantern to remain illuminated until doors are fully closed.
   5. Independent Service:
      a. Provide controls for operation of each car from its pushbuttons only.
      b. Close doors by constant pressure on desired destination floor button or door close button.
      c. Open doors automatically upon arrival at selected floor.

B. Microprocessor, Selective Collective Operation, Car 1:
   1. General:
      a. Elevators shall operate via car and landing buttons.
   2. Operation:
      a. Momentary pressure of one or more car or landing buttons shall activate the elevator.
      b. Momentary pressure of calls, other than calls for landing at which car is standing, will start car, and cause car to stop at first landing for which a call is registered corresponding to direction in which car is traveling.
      c. Stops made in order in which landings are reached, irrespective of sequence in which calls are registered.
   3. Parked Car (No Demand):
      a. Elevator may remain at landing of last assignment (if no further demand) with doors closed, for a predetermined amount of time (programmable for any amount of time) if feature is enabled.
      b. If this feature is enabled, upon expiration of time, the elevator shall return to the main egress landing with the doors closed.
   4. If this feature is disabled, if no further demand exists, the elevator shall remain at landing of last assignment with the doors closed until a hall call is registered.

C. Car / Hall Lantern Signals:
   1. The lantern shall generate signal upon each stop, regardless of responding to car or hall call.
   2. An option shall be provided to allow lanterns to be active in response to hall calls only.
   3. Lantern shall be provided with signal from controller compliant with ADA requirements.

D. Firefighters’ Service:
   1. Provide equipment and operation in accordance with code requirements.

E. Motion Control:
   1. Microprocessor-based AC variable-voltage, variable frequency with digitally encoded closed-loop velocity feedback suitable for operation specified and capable of providing smooth, comfortable car acceleration, retardation, and dynamic braking.
   2. Limit the difference in car speed between full load and no load to not more than ±10% of the contract speed.

F. Standby Lighting, Communication, and Alarm:
   1. Car mounted battery unit with solid-state charger to operate alarm bell, car emergency lighting, and voice communication system.
   2. Car lighting and communication shall be provided with a minimum of 4 hours of operation on back-up power during a loss of normal power, and a minimum of 1 hour of operation for car-mounted alarm.
   3. Battery to be rechargeable with minimum five-year life expectancy.
   4. Provide constant pressure test button in service compartment of car operating panel.
   5. Provide lighting integral with portion of normal car lighting system.

G. Door Operation:
   1. Automatically open doors when car arrives at a floor.
   2. At expiration of normal dwell time, close doors.
   3. Reopen doors when car is designated for loading.

H. Battery Lowering Operation:
   1. Upon loss of normal power automatically lower car to the nearest landing depending on position at time of power outage.
   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. battery units installed in machine room.
   4. Include solid-state charger and testing means mounted in a common metal container.
   5. Battery to be rechargeable lead acid or nickel cadmium with a ten-year life expectancy.
   6. Upon restoration of normal power, the elevator shall automatically resume normal operation.

2.08 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.
      a. 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. Tank Heater:
      a. Provide an oil tank heater with adjustable thermostat to keep the oil tank temperature within the manufacturer’s recommended operating range.
   4. Submersible pump motor shall be permitted up to 50 HP.

D. Landing System:
   1. 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.
   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:
   a. 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.

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:
   1. Provide oil pressure sensitive switch to automatically close and prevent loss of oil in cylinder upon loss of pressure in oil supply line.

2.09 HOISTWAY EQUIPMENT

A. Guide Rails:
   1. Planed steel T-sections for car of suitable size and weight for the application, including seismic reactions, including brackets for attachment to building structure.
   2. Provide bracketing, at top and bottom of floor beams.
   3. No additional structural points of attachment other than those shown on the Contract Documents will be provided.

B. Terminal Stopping:
   1. 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 machine room.
   2. Conduit:
      a. Galvanized steel conduit, EMT, or duct.
      b. Flexible conduit between isolated equipment, length not to exceed 3’-0”.
      c. Flexible heavy-duty service cord may be used between fixed car wiring and car door switches for door protective devices.
   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 eight pair of spare shielded communication wires in addition to those required to connect specified items.
      d. Tag spares in machine room. Provide cables from controller to car top.
      e. Support traveling cable by suspending from supports by means that automatically tighten around the cable when tension is increased.

4. Auxiliary Wiring:
    a. Provide conduit, wiring and connections for systems.

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:
    a. Operable door locks without retiring cam.
4. Door Closers:
    a. Spring, spirator, or jamb/strut mounted counterweight type.
    b. Design and adjust to ensure a smooth and quiet mechanical close of doors.

E. Floor Numbers:
1. Stencil paint 4" high floor designations in contrasting color on inside face of hoistway doors or hoistway fascia. Must be visible from within car.

2.10 HOISTWAY ENTRANCES

A. Entrance Assemblies: Existing to remain.
1. Complete entrances bearing fire labels from a certified testing laboratory approved by authority having jurisdiction.
2. Provide entrance assemblies bearing 1-1/2-hour UL label.
3. Paint all exposed metal ferrous metal black.

B. Frames: Existing to remain.
1. 14-gauge hollow metal at all floors.
2. Bolted and lapped head to jamb assembly at all floors.
3. Provide Arabic 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 marking indications shall be below Arabic floor designation.
    e. Permanently fastened.
4. Provide car identification label:
    a. Mounted directly below floor designation/Tactile marking plates.
    b. Located on both side jambs at the following levels:
        1) Designated Level.
        2) Alternate Level.
        3) Level where means necessary for tests is provided.
    c. Finish and design to match floor designation/Tactile marking plates.
    d. Permanently fastened.
5. Provide plates at main egress landing with “Star” designation.
6. 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.

C. Door Panels:
1. 16-gauge steel, sandwich construction without binder angles.
2. Provide one leading edge 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. Provide one separate 4” steel reinforcement safety gib mounted between door gibs, where not integrated with door gibs.
5. Construct door panels with interlocking, stiffening ribs.
6. 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 at all floors.

D. Sight Guards:

1. 14-gauge, same material, finish, and height as hoistway entrance door panels.
2. Construct without sharp edges.

E. Sills:
1. Extruded aluminum.

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

G. Fascia, Platform Guards and Hanger Covers:
1. 14-gauge furniture steel with Contractor's standard finish.

H. Struts and Headers:
1. Provide all support of entrances and related material to building structure. No intermediate support provided.
2. Provide door open bumpers on entrances equipped with vertical struts.

I. Finish of Frames and Doors:
1. Satin finish stainless-steel.
2. Provide final painting requirements to General Contractor where factory prime finish is specified.

J. Hoistway Access:
1. Hoistway Door Unlocking Device:
   a. Provide unlocking device with locking escutcheon in door panel at all floors, with finish to match adjacent surface.
2. Hoistway Access Switches:
   a. Mount in entrance frame side jamb at top floor.
3. Provide switch without faceplate.

2.11 PIT EQUIPMENT

A. Buffers:
1. 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.
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.

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. Well Hole and 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.
3. Install Schedule 80 watertight sleeve over jack assembly for secondary containment prior to installing jack assembly 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.
    a. Volume of PVC sleeve shall be capable of containing 110% of system fluid capacity plus jack assembly.

E. Overspeed Valves:
1. Provide a pressure sensitive, mechanically actuated, seismic safety valve.
2. Connect valve directly to jack assembly inlet.

F. Scavenger Pump:
1. Provide electrically operated scavenger pump to collect oil at cylinder head and return directly to oil reservoir in elevator machine room.

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

H. Pit Access:
1. Hoistway Access Key Switch:
    a. Provide key switch at lowest terminal landing.
    b. Mount in entrance frame side jamb.
    c. Provide switch without faceplate.
2. Provide pit stop switch(es).

I. Equipment Access:
1. Provide buffer access ladders and platforms.
2. Provide safety access ladders and platforms.

2.12 CAR EQUIPMENT

A. Frame:
1. Welded or bolted, rolled 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.
2. The car platform shall consist of a steel frame with necessary steel stringers, all securely welded together.
3. Provide platform with two (2) layers of 3/4" marine grade plywood.
4. Cover the underside of the car platform with sheet steel.
5. Isolate the passenger elevator platform.
    a. The support frame shall include rubber pads on which the platform shall rest without any connection to the steel frame.
6. Work Light Fixtures & AC Receptacles:
    a. Provide permanent mounted work light fixtures below platform, complete with proper lamp guards.

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

D. Cartop Guard Rail:
1. 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. Passenger Guides:

1. 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. Emphasis shall be placed on proper tension to car styles allowing minimal lateral movement of the cab.
   3. Steadying plates shall be isolated using rubber or 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. Car 1: Aluminum.

H. Door Panels:
   1. 16-gauge steel, sandwich construction without binder angles.
   2. Provide one leading edge 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.
   5. 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.

I. Door Hangers:
   1. Two-point suspension.
   2. Hanger roller with non-metallic surface and eccentric roller adjustment.

J. Door Track:
   1. Bar or formed, cold-drawn removable steel track with smooth roller contact surface.

K. Door Header:
   1. 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.

N. Restricted Opening Device:
   1. Provide mechanical car-door restrictor to prevent opening of doors when outside unlocking zone.

O. Door Operator:
   1. High speed, heavy-duty door operator capable of opening doors at no less than 1.5 fps
   2. Accomplish reversal within 2½" of door movement.
   3. Provide solid-state door control with closed loop circuitry to constantly monitor and automatically adjust door operation based upon velocity, position, and motor current.
   4. Provide a minimum of four controller-based motion profiles, per floor, per door, to maintain consistent, smooth, and quiet door operation at all floors, regardless of door weight or varying air pressure.

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 7'-0" above finished floor.
b. Provide extension of housing and lens full height of door panels.
c. 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.
d. In event of device failure, provide for automatic shutdown of car at floor level with doors open.

2. Nudging Operation:
a. 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.
b. Activation of the door open button shall override nudging operation and reopen doors.

3. Interrupted Beam Time:
a. When beams are interrupted during initial door opening, hold door open a minimum of 3.0 seconds.
b. 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:
a. Provide separately adjustable timers to vary time that doors remain open after stopping in response to calls.
b. Car Call:
1) Hold open time adjustable between 3.0 and 5.0 seconds.
c. Hall Call:
1) Hold open time adjustable between 5.0 and 8.0 seconds.
2) Use hall call time when car responds to coincidental calls.

Q. Car Operating Panel:
1. Passenger:
a. One car operating panel without faceplates:
1) Consisting of a metal box containing vandal resistant operating fixtures, mounted behind the car stationary front return panel.
b. Suitably identify floor buttons, alarm button, door open button, door close button and emergency push-to-call button with cast flat stainless tactile symbols mounted.
c. Provide “door open” button to stop and reopen doors or hold doors in open position.
d. Provide “door close” button to activate door close cycle.
1) Cycle shall not begin until normal door dwell time for a car or hall call has expired, except firefighters’ operation.
e. Pushbuttons:
1) Provide minimum 3/4" diameter raised pushbuttons which illuminate to indicate call registration.
2) Provide brushed stainless-steel buttons with illuminated LED halo.
3) Include 5/8" high floor designation on face of pushbutton. Elevator contractor to coordinate floor numbers with the Architect.
f. Locate operating controls no higher than 48" above the car floor; no lower than 35" for emergency push-to-call button and alarm button.
g. Locked Firefighters Operation Panel:
1) For fire officer use and independent service only.
2) Openable by the same key which operates the Fire Operation switch.
3) 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.
(h) Fire communication.

4) Arrange manually operated stop switch to sound group control panel distress signal when actuated.

2. Service Compartment:
   a. Provide lockable service compartment with recessed flush door.
   b. Door material and finish shall match car return panel or car operating panel faceplate.
   c. Inside surface of door shall contain an integral flush window for displaying the elevator operating permit.
   d. 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) Independent service switch.
      4) Constant pressure test button for battery pack emergency lighting.
      5) 120-volt, AC, GFCI protected electrical convenience duplex outlet.
      6) Card reader override switch.
      7) Switch to select either floor voice annunciation, floor passing tone, or chime.
      8) Keyed stop switch.
3. 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 inside face of firefighters' compartment door.
   b. Engrave filled red firefighters' operation on outside face of compartment door.
   c. Building identification car number on main car operating panel.
   d. "No Smoking" on main car operating panel.
   e. Car capacity in pounds on main car operating panel.

R. Car Top Control Station:
1. Mount to provide safe access and utilization while standing on car top.
2. Operating device shall contain Up and Down direction buttons, a Run button, an Inspection/Automatic switch and Emergency Stop switch.
3. Operating device shall contain an audible and visible indicator that fire recall has been initiated.
4. This station shall be fixed to the car crosshead or may be portable provided the extension cord and housing is permanently attached to the car crosshead.
5. The car will be operated by constant pressure on the appropriate directional button and the Run button simultaneously.
6. Normal operating devices will be inoperative while this device is in use.

S. Emergency Audible Signaling:
1. Provide on top of each elevator.
2. Activation of Alarm Button or Emergency Stop switch will initiate Emergency Audible Signal.
3. Provide auxiliary power supply to provide 1hr power in the event of normal power loss.

T. Work Light and Duplex Plug Receptacle:
1. GFCI protected outlet at top and bottom of car.
2. Include on/off switch and lamp guard.
3. Provide additional GFCI protected outlet on car top for installation of car CCTV.

2.13 CAR ENCLOSURE

A. Passenger Elevator: Provide complete as specified herein and detailed on architectural drawings.
   1. Shell:
      a. Reinforced 14-gauge furniture steel formed panels with baked enamel interior finish as selected.
      b. Apply sound-deadening mastic to exterior.
      c. Provide concealed ventilation cutouts.
   2. Canopy:
      a. Reinforced 12-gauge furniture steel formed panels with lockable, contacted, hinged emergency exit.
      b. Interior finish white color reflective baked enamel.
   3. Front Swing Return Panel and Integral Entrance Columns:
      a. Reinforced 14-gauge furniture steel clad with minimum 16-gauge satin stainless-steel.
      b. Swing entire unit on substantial pivot points (minimum three) for service access to car operating panels.
      c. Locate pivot points to provide full swing of return panel without interference with side wall finish or handrail.
      d. Secure in closed position with concealed three-point latch.
      e. Provide firefighters' and service compartments with recessed flush cover and cutouts for operating switches, etc.
   4. Front Stationary Return Panel:
      a. Reinforced 14-gauge furniture satin stainless-steel clad with minimum 16-gauge with cutouts for applied car operating panels and other equipment.
   5. Transom:
      a. Reinforced 14-gauge furniture steel clad with minimum 16-gauge satin stainless-steel full width of enclosure.
   6. Base:
      a. Stainless-steel with concealed ventilation cutouts.
   7. Finish Floor Covering:
      a. Accommodate a minimum 3/4" floor thickness.
   8. Interior Wall Finish:
      a. Removable panels faced and edged, with color core plastic laminate, color and finish as selected.
      b. Removable panels faced and edged, with textured finish stainless-steel pattern.
   9. Ventilation:
      a. Forced Ventilation
         1) 3-speed fan or blower mounted to car canopy.
         2) Exhaust blower shall meet noise and vibration criteria.
   10. Lighting:
      a. Provide LED fixtures with wiring and hookup.
      b. Coordinate with emergency lighting requirements.
   11. Suspended Ceiling:
      a. Six-section satin stainless-steel panels with lighting cutouts in each panel.
   12. Handrails:
      a. Minimum 1¼" diameter stainless-steel tubular grab bar with backing plates and captive nuts across rear wall.
      b. Bolt rails through car walls from back and mount on 1½" deep solid round stainless-steel standoff spacers no more than 18" O.C.
      c. Provide at 32 in. above finished floor, as indicated on Architectural drawings.
   13. Pads and Buttons:
      a. Three-piece removable pads.
      b. Two pads covering side walls and adjacent front returns and one covering rear wall.

c. Provide cutouts to access main car operating panel.

2.14 HALL CONTROL STATIONS

A. Pushbuttons:
1. Provide one pushbutton riser.
2. Provide flush mounted faceplates.
3. Stations , at typical floors.
4. Include pushbuttons for each direction of travel that illuminate to indicate call registration.
5. Include approved engraved message and pictorial representation prohibiting use of elevator during fire or other emergency as part of faceplate.
6. Pushbutton design shall match car operating panel pushbuttons.
7. Provide vandal resistant pushbutton and light assemblies.
8. Provide LED illumination.
9. Provide Phase I Fire Service key switch, engraved operating instructions and illuminating jewel.
10. Provide communication check failure indication and silence key switch.
11. Incorporate all items required by Code at the primary egress level into a single hall fixture.

B. Service Operation Pushbutton Riser, Mode II Operation:
1. Provide inconspicuous riser of illuminating pushbuttons, with concealed sign that lights to indicate “Freight Service” when car is in Mode II Operation.
2. Mount in entrance frame side jamb.
3. Include flush mounted faceplates and pushbuttons for each direction of travel that illuminate to indicate call registration.
4. Pushbutton design shall match car operating panel pushbuttons.
5. Provide vandal resistant pushbutton and light assemblies.

2.15 SIGNALS

A. Hall Direction Lantern:
1. Provide at each entrance to indicate travel direction of arriving car.
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. Illuminate light until the car doors start to close.
4. Sound level shall be adjustable from 20-80 dBA measured at 5'-0" in front of hall control station and 3'-0" off floor.
5. Provide advanced hall lantern notification to comply with ADA hall call notification time.
6. Provide adjustable car door dwell time to comply with ADA requirements relative to hall call notification time.
7. Hall direction lenses shall be arrow shaped with faceplates.
8. Lenses shall be minimum 2½" in their smallest dimension.

B. Car Position Indicator:
1. Alpha-numeric LCD screens 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 car operating panel.
3. When a car leaves or passes a floor, illuminate indication representing position of car in hoistway.
4. Illuminate proper direction arrow to indicate direction of travel.
5. Provide multi-numeral vandal resistant indicator and light assemblies.

C. Fixture Faceplate Material and Finish:
1. Satin, all fixtures.
2. Tamper resistant fasteners for all public facing fastenings.

D. Floor Passing Tone:
1. 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.

E. Voice Synthesizer:
   1. Provide electronic device with easily reprogrammable message and female voice to announce car direction, floor, emergency exiting instructions, etc.

2.16 COMMUNICATION

A. Car Communication System:
   1. Hands-Free Phone System:
      a. Two-way communication instrument in car with automatic dialing, tracking, and recall features, with shielded wiring to car controller in machine room.
      b. Provide dialer with automatic rollover capability with minimum two numbers:
         1) Actuate two-way communication via “Help” button.
         2) Button or adjacent light jewel shall illuminate and flash when call is acknowledged.
         3) Button shall match car operating panel pushbutton design.
         4) Provide “Help” button tactile symbol, engraved signage, and Tactile marking adjacent to button mounted integral with car front return panel.
   2. Emergency Personnel Communication:
      a. Communication system shall be provided allowing emergency personnel to establish communications with each elevator individually.
      b. Emergency Personnel Communication shall override any existing connection outside of building.
      c. Adjacent light jewel shall illuminate and flash when call is acknowledged.
      d. Provide operating instructions.
      e. On the same car operating panel as the phone push button, provide capability to communicate with and obtain responses from passengers.
      f. Provide display video capability for entrapment assessment.
   3. Communication for deaf, 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.

PART 3 EXECUTION

3.01 EXAMINATION

A. Prior to beginning installation of equipment examine hoistway and machine room areas.

B. Verify no irregularities exist which 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.

3.02 INSTALLATION

A. Install all equipment in accordance with Contractor’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. Provide any required hoisting/safety beams.

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

G. 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.

2. Machine room equipment, hoistway equipment including guide rails, guide rail brackets, and pit equipment.
3. Neatly touch up damaged factory-painted surfaces with original paint color. Protect machine-finish surfaces against corrosion.

H. Fill hoistway door frames, back boxes for hallway stations and signal devices, and sills.

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

3.03 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.

B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevators.

C. Independent Testing by Owner's Consultant.

3.04 CONSTRUCTION TOLERANCES

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

3.05 ADJUSTING

A. Install hydraulic jack assembly and guide rails plumb and align vertically with tolerance of 1/16" in 100'-0". Secure piston 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 Contractor'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 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 machine room equipment and floor.

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

F. Clean pit equipment and floor.

3.07 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. Check operation of each elevator with Owner's personnel present before date of Substantial Completion and again not more than one month before end of warranty period.

C. Determine that operation systems and devices are functioning properly.

3.08 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. 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. Provide parts and supplies 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. Return items which cannot be refinished in the field to the shop, make required repairs, and refinish entire unit, or provide new units as required.

END OF SECTION