

SECTION 14 24 00 – HYDRAULIC ELEVATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements for one machine roomless, holeless hydraulic elevator.
- B. All engineering, equipment, labor, and permits required to satisfactorily complete elevator installation required by Contract Documents.
- C. Preventive maintenance as described.

1.3 RELATED WORK PROVIDED UNDER OTHER SECTIONS

- A. Hoistway and Pit:
 - 1. Clear, plumb, substantially flush hoistway with variations not to exceed 1" at any point.
 - 2. Bevel cants not less than 75° from the horizontal on any rear or side wall ledges and beams that project or recess 4" or more into the hoistway. Not required on hoistway divider beams.
 - 3. Divider beams between adjacent elevators at each floor, pit, and overhead. Supports at each floor for car and counterweight guide rail fastening. Intermediate car guide rail support when floor heights exceed 14'-0" or as designated on contract drawings. Intermediate counterweight guide rail supports where floor heights exceed 16'-0". Building supports not to deflect in excess of 1/8" under normal conditions, 1/4" under applicable seismic conditions.
 - 4. Installation of guide rail bracket supports in concrete. Inserts or embeds, if used, will be furnished under this Section.
 - 5. Wall blockouts and fire rated closure for control and signal fixture boxes which penetrate walls.
 - 6. Cutting and patching walls and floors.
 - 7. Structural slab, concrete wall pockets and/or structural steel beams for support of hoist machine, rope sheaves, and dead-end hitch beams. Support deflection shall not exceed 1/1666 of span under static load.
 - 8. Erect front hoistway wall after elevator entrances are installed.
 - 9. Grout floor up to hoistway sills and around hoistway entrances.
 - 10. Pit access ladder for each elevator.
 - 11. Structural support at pit floor for buffer impact loads, guide rail loads.
 - 12. Waterproof pit. Indirect waste drain or sump with flush grate and pump.
 - 13. Protect open hoistways and entrances during construction per OSHA Regulations.
 - 14. Protect car enclosure, hoistway entrance assemblies, and special metal finishes from damage.
 - 15. Hoistway venting.
 - 16. Access ladders and platform to governors.
 - 17. Partition between machine room and hoistway where hoist machine is mounted offset from hoistway.

B. Machine Room and Machinery Spaces:

1. Self-closing and locking access door.
2. Ventilation and heating. Maintain minimum temperature of 55° F, maximum 90° F. Maintain maximum 80% relative humidity, non-condensing.
3. Paint walls and ceiling.
4. Class "ABC" fire extinguisher in each elevator machine room.
5. Fire sprinklers where required.
6. Self-closing and locking governor access door and access means.

C. Electrical Service, Conductors and Devices:

1. Lighting and GFCI convenience outlets in pit, machine room, and overhead machinery spaces. Provide one additional non-GFCI convenience outlet in pit for sump pump.
2. Three-phase mainline copper power feeder to terminals of each elevator controller in the machine room with protected, lockable "open," disconnecting means.
3. Single-phase copper power feeder to each elevator controller for car lighting and exhaust blower with individual protected, lockable "open," disconnecting means located in machine room.
4. Emergency telephone line to each individual elevator control panel in elevator machine room.
5. Fire alarm initiating devices in each elevator lobby, for each group of elevators or single elevator and each machine room to initiate firefighters' return feature. Device at top of hoistway if sprinklered. Provide alarm initiating signal wiring from hoistway or machine room connection point to elevator controller terminals. Device in machine room and at top of hoistway to provide signal for general alarm and discrete signal for Phase II firefighters' operation.
6. Temporary power and illumination to install, test, and adjust elevator equipment.
7. Firefighters' telephone jack and announcement speaker in car with connection to individual elevator control panels in elevator machine room and elevator control panel in firefighters' control room.
8. Conduit from the closest hoistway of each elevator group or single elevator to the firefighters' control room and/or main control console. Coordinate size, number, and location of conduits with Elevator Contractor.
9. Means to automatically disconnect power to affected elevator drive unit and controller prior to activation of machine room fire sprinkler system, and/or hoistway fire sprinkler system. Manual shut-off means shall be located outside bounds of machine room.
10. When sprinklers are provided in the hoistway all electrical equipment, located less than 4'-0" above the pit floor shall be identified for use in wet locations. Exception, seismic protection devices.
11. Single-phase power feeders to firefighters' control panel.
12. Single-phase power feeders to machine room rope brake air compressor feeder circuits with single-phase protected, lockable "open" disconnecting means.

D. Standby Power Provision: "Standby Power Operation" is battery back-up powered lowering by elevator provider.

1.4 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.

1.5 QUALITY ASSURANCE

- A. Approved Providers: Alternate Providers must receive approval of Architect and Owner at least 14 calendar days prior to bid date.
 - 1. Geared Elevators: Basis of product design by Otis Elevator or equivalent by ThyssenKrupp, KONE, Schindler as approved by Architect.
- B. Diagnostic Equipment:
 - 1. Provide 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.
 - 2. 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 Owner 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 Owner.
 - c. Installed equipment not meeting this requirement shall be removed and replaced with conforming equipment at no cost to the Owner.
 - d. 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 Owner and Provider.
- C. 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 and State and Local requirements for provisions for the handicapped
 - 6. Local Fire Authority.
 - 7. Requirements of IBC and all other Codes, Ordinances and Laws applicable within the governing jurisdiction.

8. Life Safety Code, NFPA 101,
9. Uniform Federal Accessibility Standard, UFAS.

1.6 DOCUMENT VERIFICATION

- A. 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. Owner will not pay for change to structural, mechanical, electrical, or other systems required to accommodate Provider's equipment.

1.7 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 01. Allow 30 calendar days for response to initial submittal.
 1. Scaled or Fully Dimensioned Layout: Plan of pit, hoistway and machine room indicating equipment arrangement, elevation section of hoistway, details of car enclosures, hoistway entrances, and car/hall signal fixtures.
 2. Design Information: Indicate equipment lists, reactions, and design layout.
 3. Power Confirmation Information: Include motor horsepower, code letter, starting current, full-load running current, and demand factor.
 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.
- C. Operation and Maintenance Data: Provide three 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 by Owner and reviewed by Owner's Consultant. 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 Owner's property.
 2. Lubrication instructions, including recommended grade of lubricants.
 3. Parts catalogs for all replaceable parts including ordering forms and instructions.
 4. Four sets of keys for all switches and control features properly tagged and marked.
 5. Diagnostic equipment complete with access codes, adjusters manuals and set-up manuals for adjustment, diagnosis and troubleshooting of elevator system, diagnostic equipment for monitoring coated steel belts, and performance of routine safety tests.

6. 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 Owner 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 Owner.
 - c. Installed equipment not meeting this requirement shall be removed and replaced with conforming equipment at no cost to the Owner.
7. 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 Owner and Provider.

1.8 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's Consultant, as required in Part 3.

1.9 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.

1.10 WARRANTY

- A. 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 Architect, Purchaser and Owner's Consultant at no additional cost, unless due to ordinary wear and tear, or improper use or care by Owner. Perform maintenance in accordance with terms and conditions indicated in the Preventive Maintenance Agreement.
- B. 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.

- C. Make modifications, requirements, adjustments and improvements to meet performance requirements in Parts 2 and 3.

1.11 MAINTENANCE

A. Interim:

1. When elevator is near completion and ready for service, the Contractor may accept elevator for interim use and place in service prior to substantial completion of project.
2. During this period Contractor may pay a mutually agreed upon monthly amount per elevator for preventive maintenance. Indicate amount per unit per month with quotation.
3. Temporary acceptance form must be acceptable to Contractor and signed prior to use.
4. Contractor must provide or pay for temporary hoistway and car enclosures; protect installed equipment and finishes; pay for and return elevators to elevator subcontractor for all cleaning, repairs, and replacement of materials necessary to restore elevator to "as-new" condition prior to final acceptance.

B. Warranty Maintenance:

1. Provide preventive maintenance and 24-hour emergency callback service for one year commencing on date of final acceptance by Owner. 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 Owner, 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 .25 per unit per month.
4. Owner retains the option to delete cost of warranty maintenance from new equipment contract and remit twelve (12) equal installments directly to Provider during period in which maintenance is being performed.

C. Preventive Maintenance:

1. Quote monthly cost for five year Preventive Maintenance Agreement commencing upon completion of warranty maintenance. Submit quote based upon terms and conditions of the Preventive Maintenance Agreement. Base quotation on present labor and material cost. Price adjustment will be made at Agreement commencement date and thereafter as provided in Agreement.
2. Use competent personnel, acceptable to the Owner, employed and supervised by Provider.

PART 2 - PRODUCTS

2.1 SUMMARY

- A. Holeless Machine Roomless Hydraulic Elevator – Elevator Number 1; One (1) Elevator; Otis "Hydrofit," as basis of product design, and as follows

1. Capacity: 2100 lb
2. Class Loading: Passenger Class A
3. Contract Speed: 100 Fpm
4. Roping: 1:1
5. Machine: One (1) holeless hydraulic elevator, two hydraulic cylinders.
6. Machine Location: Machine room-less, built into hoistway enclosure as shown at lowest level served.
7. Equipment Control: Elevonic
8. Power Characteristics: 480 Volts, 3 Phase, 60 Hertz
9. Stops: Two (2) stops.
10. Openings: Two (2) One front, one rear, as shown on the Drawings
11. Floors Served: Levels 1 – 2, one front opening and one rear opening entrance per floor.
12. Travel: As indicated on the Drawings
13. Clear Inside Platform Size: Minimum 5' - 8-5/16" wide X 4' - 4-1/8" deep
14. Minimum Clear Inside Car Height: 7' – 9"
15. Entrance Size: 3'-0" Wide X 7'-0" High
16. Entrance Type: Single speed, single slide
17. Door Operation: High speed, heavy-duty, door operator, minimum opening speed 2-1/2 fps.
18. Door Protection: Infrared, full screen device, with differential timing, nudging and interrupted beam time
19. Safety: Flexible guide clamp-Type B, Car
20. Guide Rails: Planed Steel Tees
21. Buffers: Oil
22. Car Enclosure: As specified and as detailed on architectural drawings
 - a. Car dropped ceiling designed for easy removal with auxiliary car lighting flush mounted in car canopy, under car crosshead. Include separate light switch in car service compartment.
 - b. Battery powered emergency car lighting. Provide separate constant pressure test button in car service compartment.
 - c. Illuminate portion of normal car lighting
23. Finishes:
 - a. Front Walls: Satin stainless steel with integral car door frames.
 - b. Car Fixtures: Satin stainless steel.
 - c. Side and Wall Panels: Satin Stainless steel.
 - d. Door Faces (Interior): Satin stainless steel.
 - e. Door Sills: Stainless Steel
 - f. Ceiling: Brushed stainless steel.
 - g. Handrails: Satin stainless steel, at side and rear walls.
 - h. Floor: See Division 09 – Resilient Flooring.
 - i. Frames: Satin stainless steel.
 - j. Doors: Satin stainless steel.
 - k. Hall Fixtures: Satin stainless steel.
24. Signal Fixtures: LED Illumination. Provider's standard vandal resistant assembly
 - a. Dual hall pushbutton risers
 - b. Dual car operating panels
 - c. Vandal resistant car and hall pushbuttons
 - d. Car Position Indicators: Single digital with car direction arrows

- e. Security Control Panel
 - f. Hall Lanterns: At all floors with volume adjustable electronic chime or tone, sound twice for down direction
25. Communication System: Self-dialing, vandal resistant, push to call, two-way communication system with recall, tracking and voiceless communication
26. Fixture Submittal: Submit brochure depicting provider's proposed designs with bid.
27. Additional Features:
- a. Car and counterweight roller guides
 - b. Car top inspection station
 - c. Battery pack emergency lowering
 - d. Accessibility signage
 - e. Swing car return panels arranged for integral car operating panels
 - f. Hoistway access switches top and bottom floors
 - g. Hoistway door unlocking device all floors
 - h. Platform isolation
 - i. Independent service feature
 - j. Tamper resistant fasteners for all fastenings exposed to the public
 - k. One year warranty maintenance with 24-hour call-back service
 - l. Signage engraving filled with black paint or approved etching process
 - m. No visible company name or logo
 - n. Wiring diagrams, operating instructions, and parts ordering information
 - o. System diagnostic means and instructions

2.2 MATERIALS

A. Steel:

- 1. Sheet Steel (Furniture Steel for Exposed Work): Stretcher-leveled, cold-rolled, commercial quality carbon steel, complying with ASTM A366, matte finish.
- 2. Sheet Steel (for Unexposed Work): Hot-rolled, commercial quality carbon steel, pickled and oiled, complying with ASTM A568/A568M-03.
- 3. Structural Steel Shapes and Plates: ASTM A36.

B. Stainless Steel: Type 302 or 304, 316 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 (Passenger): Directional polish finish (US 32D). Graining directions as shown or, if not shown, in longest dimension.

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.
- I. Vinyl Tile: Refer to Division 09 Section – Resilient Flooring.

2.3 OPERATION

- A. Single Car Automatic:
 - 1. Otis "Elevonic" (Basis of Design Product), or equivalent approved microprocessor-based, group dispatch, car and motion control systems as follows.
 - a. ThyssenKrupp: TAC 50-04
 - b. KONE: Resolve
 - c. Schindler: Miconic TXR5
 - d. Elevator Controls Corp: G900-XL
 - e. MCE: M3
 - f. Swift: Futura
 - g. Thompson : Microflite Ultra 2000
- B. Other Items:
 - 1. 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.
- C. Firefighters' Service: Provide equipment and operation in accordance with Code requirements.
- D. 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, hoist rope slippage or stretch.

- E. Remote Monitoring and Diagnostics Provisions: Equip each controller and the group dispatch logic controller, with standard ports, interface boards, and drivers 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 monitors that continually scan and display the status of each car and call.
- F. Motion Control: 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. Limit the difference in car speed between full load and no load to not more than $\pm 3\%$ of the contract speed.
- G. 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. Coordinate location of light fixture with Architect. Provide lighting integral with portion of normal car lighting system.
- H. Loss of Power Operation: Manufacturers standard battery pack lowering with solid state recharging circuit.

2.4 MACHINE ROOM EQUIPMENT

- A. Arrange equipment in spaces shown on drawings.
- B. Hoist Machine: Manufacturers standard holeless hydraulic machine roomless drive equipment and controller designed to fit in hoistway enclosure closet as shown.
- C. 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 to monitor. 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.
- D. Emergency Brake: Provide means to prevent ascending car over-speed and unintended car movement per Code.
- E. 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.
- F. 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.

2.5 HOISTWAY EQUIPMENT

- A. Guide Rails: Planed steel T-sections for car and counterweight of suitable size and weight for the application, including seismic reactions, including brackets for attachment to building structure. Provide rail backing and intermediate counterweight tie brackets to meet Code requirements. Provide bracketing, at top and bottom of floor beams. No additional structural points of rail attachment, other than those shown on the Contract Documents, will be provided.
- B. Buffers, Car and Counterweight: Oil type with blocking and support channels.
- C. 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. Provide five pairs of spare shielded communication wires in addition to those required to connect specified items. Tag spares in 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. Provide five (5) pair of shielded wires and two (2) RG-6/U type coaxial cables for card reader. Provide two (2) RG-6/U coaxial CCTV cables within traveling cable from car controller to car top, plus 3'-0" excess loop at both ends. Provide two (2) pair 14 gauge wire for CCTV power.
 4. Auxiliary Wiring: Connect fire alarm initiating devices, emergency two-way communication system, firefighters' phone jack, paging speaker, card reader, intercom, and announcement speaker and/or background music in each car controller in machine room.
- D. 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.
 6. Hoistway Access Switches: Mount in entrance frame side jamb at top and bottom floors. Provide switch without faceplate.
- E. Floor Numbers: Stencil paint 4" high floor designations in contrasting color on inside face of hoistway doors or hoistway fascia in location visible from car.

2.6 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 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 or Entrada.
- 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: 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. Provide 5" x 5" x 1/2" cold-rolled structural steel angle, extending full width of hoistway for Cars 4-7. Fasten to building structure at maximum 18" O.C.
- 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. Finish of Frames and Doors: Stainless steel satin finish at both floors.

2.7 CAR EQUIPMENT

- A. Frame: Welded or bolted, rolled or formed steel channel construction to meet load classification specified.
- B. Safety Device: Type "B," flexible guide clamp.
- C. Platform: Isolated type, constructed of steel, or steel and wood which is fireproofed on underside. Design and construct to accommodate load classification requirements. Provide Class "A" construction for passenger elevators.
- D. Platform Apron: Minimum 14 gauge steel, reinforced and braced to car platform with Provider's standard finish.
- E. Guide Shoes: Roller type with three or more spring dampened, sound-deadening rollers per shoe. Maximum roller rotation speed, 350 r.p.m.
- F. Finish Floor Covering: Provided under other sections.
- G. Sills: One piece extrusion with extruded extension between car entrance columns to face of car front return. Extruded extension to match finish of sill.
 - 1. Building Cars B1001, B1002, and B1003: Aluminum
 - 2. Building Service Car B1004: Aluminum
- 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 doors outside unlocking zone.
- O. Door Operator: High speed, heavy-duty door operator capable of opening doors at no less than 2-1/2 fps. 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. ThyssenKrupp HD91 StarTrac
- 2. KONE AMD 2.0
- 3. Otis i Motion II
- 4. Schindler QKS 15 Heavy Duty
- 5. ThyssenKrupp HD91 StarTrac
- 6. G.A.L. MOVFR

- P. 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
 - a. Acceptable Infrared 3D Reopening Device:
 - (1). Cegard/MAX-154 by CEDES
 - (2). Gatekeeper by Adams
 - (3). Lambda 3D by Otis
 - (4). Microlite 3D by ThyssenKrupp
 - (5). Pana40 Plus 3D by Janus
- 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. Car Operating Panel:

1. Cars: Two car operating panels with faceplates, consisting of a metal box containing vandal resistant operating fixtures, mounted behind the car stationary front return panels. Faceplates shall be hinged and constructed of stainless steel, satin finish.
 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 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 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 in locked car service compartment.
 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.
 10. Provide firefighters' Phase II key switch with engraved instructions filled red. Include light jewel, buzzer, and call cancel button.
 8. Install firefighters' telephone jack with bezel matching adjacent controls.
 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. Card reader override switch.
 - h. Stop switch.
 - i. Switch to select either floor voice annunciation, floor passing tone, or chime.
 11. Provide black paint filled (except as noted), engraved or approved etched signage as follows with approved size and font:
 - a. Car number on main car operating panel.
 - b. "Certificate of Inspection on File in Building Office" on main car operating panel.
 - c. "No Smoking" on auxiliary car operating panel.
 - d. Car capacity in pounds on main car operating panel door.
- R. Car Top Control Station: Mount to provide safe access and utilization while standing in an upright position on car top.
- S. Work Light and Duplex Plug Receptacle: GFCI protected outlet at top and bottom of car. Include on/off switch and lamp guard. Provide additional GFCI protected outlet on car top for future installation of car CCTV.

T. 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. Provide two-way communication between car and machine room if required.

2.8 CAR ENCLOSURE

- A. Car Enclosure - Building Passenger Elevator: Provide complete as specified and detailed on architectural drawings. Provide the following features:
1. Shell: Reinforced 14 gauge furniture steel formed panels with baked enamel interior finish as selected. 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. Front Return Panels and Integral Entrance Columns: Reinforced 14 gauge stainless steel satin finish. Swing entire unit on substantial pivot points (minimum 3) for service access to car operating panels. Locate pivot points to provide full swing of front return panel without interference with side wall finish or handrail. Secure in closed position with concealed three-point latch. Provide service compartment with recessed flush cover and cutouts for operating switches, etc.
 4. Car Door Panels: Reinforced minimum 16 gauge stainless steel satin finish. Same construction as hoistway door panels.
 5. Base: Stainless steel with concealed ventilation cutouts.
 6. Interior Wall Finish: Stainless steel.
 7. Ventilation: Two-speed exhaust blower mounted to car canopy on isolated rubber grommets. Exhaust blower shall meet requirements of Item 2.3, H.
 8. Lighting: Provide fluorescent fixtures with wiring and hookup. Coordinate with emergency lighting requirements. Provide emergency lighting integral with portion of normal car lighting system. Include required transformer. Provide temporary lighting as required.
 9. Suspended Ceiling: Three section, translucent plastic panels mounted in an extruded aluminum angle and T-frame.
 10. Handrails: Minimum 1-1/4" diameter stainless steel tubular grab bar across rear wall, except across both side walls of cars with front and rear entrances.
 11. Pads and Hooks: Three-piece removable pads. Two pads covering side walls and adjacent front returns and one covering rear wall. Provide cutouts to access main car operating panel.

2.9 HALL CONTROL STATIONS

- A. Pushbuttons: Provide two (2) risers with flush mounted faceplates for elevator. 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.

2.10 SIGNALS

- A. Hall Lantern: Provide at each entrance to indicate travel direction of arriving car. Locate as detailed on architectural drawings. 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.
- 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.
- C. Faceplate Material and Finish: Stainless steel satin finish all fixtures.

PART 3 - EXECUTION

3.1 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.

3.2 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.
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.

3.3 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.

3.4 ADJUSTMENTS

- A. Install rails plumb and align vertically with tolerance of 1/16" in 100'-0". Secure 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, power conversion units, brakes, controllers, leveling switches, limit switches, stopping switches, door operators, interlocks, and safety devices to achieve required performance levels.

3.5 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.

3.6 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 Consultant's final review. Work shall be considered ready for Consultant's final contract compliance review when copies of Provider's test and review sheets are available for Consultant'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 Consultant's review. Notify Consultant a minimum of five (5) working days in advance when ready for final review of elevator or group.
- D. Consultant's written list of observed deficiencies of materials, equipment and operating systems will be submitted to Provider for corrective action. Consultant's review shall include as a minimum:
 - 1. Workmanship and equipment compliance with Contract Documents.
 - 2. Contract speed, capacity, floor-to-floor, and door performance comply 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
 - j. Operations of seismic devices
 - k. Operations of special security features and floor lock-off provisions
 - l. Operations of remote monitoring devices
 - m. Operations of elevator car air conditioner/heater
 - n. Operations of emergency brake device
 - 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 and Consultant. Tests shall 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 Consultant'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 and Consultant 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 and Consultant.

- F. A follow-up final contract compliance review shall be performed by Consultant after notification by Provider that all deficiencies have been corrected. Provide Consultant with copies of the initial deficiency report marked to indicate items which Provider consider complete. If additional reviews are required due to Provider's gross non-compliance with initial and follow-up deficiency reports, consultant shall bill Provider at normal billing rates plus expenses, and Provider acknowledges it will pay for additional compliance reviews.

END OF SECTION 14 24 00