SECTION 14240
HYDRAULIC ELEVATORS

PART I - GENERAL

1.01 DESCRIPTION

A. Scope: Work under this Section shall include all materials and installation for Passenger elevators and/or Service elevators and shown and detailed on the Drawings and specified herein:

B. Related Work Specified Elsewhere:

1. Section 02200 – EARTHWORK (Excavation for Plunger/Cylinder Assembly), (**CONSULTANT TO SPECIFY**)

2. Division 5, Section 05120 – STRUCTURAL STEEL

3. Section 05500 – MISCELLANEOUS METAL FABRICATIONS (**CONSULTANT TO SPECIFY**)

4. Section 09651 – RESILIENT TILE FLOORING (for cab floors), (**CONSULTANT TO SPECIFY**)

5. Section 09680 – CARPET (for cab Floors)

6. Section 16725 – SECURITY SYSTEM (Card Key Access System)

7. Division 16 – ELECTRICAL (Service to each elevator including fused disconnect).

1.02 DEFINITIONS

A. It is the intent of the University of California to have a non-proprietary elevator system. The system will require no special interfaces, diagnostic tools, devices or test equipment to maintain or trouble shoot. All components will connect directly to the control system without any unique manufacturer’s protocol or “black box”.

B. Hydraulic elevators are hereby defined to include systems in which cars are hoisted either directly or indirectly by action of a hydraulic plunger and cylinder (jack); with other components of the work including fluid storage tank, pump, piping, valves, car enclosures, hoistway entrances, control systems, signal equipment, guide rails, electrical wiring, roping, buffers, and devices for operating, dispatching, safety, security, leveling, alarm, maintenance, and similar required performances and capabilities.

1.03 SYSTEM PERFORMANCE REQUIREMENTS

A. Elevator schedules indicate required performances, controls, capacities, features, and finishes for each elevator or group of elevators and are included at end of this Section.

1.04 QUALITY ASSURANCE

A. Approved Manufacturers/Installers:
1. Hydraulic Elevators:
   a. Otis
   b. Kone
   c. Shindler
   d. Or equal.

2. Car Enclosures:
   a. Otis
   b. Kone
   c. Shindler
   d. Or equal.

3. Hoistway Entrances:
   a. Otis
   b. Kone
   c. Shindler
   d. Or equal

4. Controls:
   a. Motion Control Engineering or equal.

5. Drive System:
   a. Motion Control Engineering System Flux Vector or equal.

6. Elevator Emergency Communication System:
   a. Allen Tel or equal.

1.05 SUBMITTALS

A. Product Data for each principal component or product of each elevator, including certified test reports on required testing. Indicate capacities, sizes, performance and operating characteristics, features of control system, finishes, and similar information. Indicate any variations from specified requirements.

B. Shop Drawings including dimensioned drawings showing plans, elevations, sections and large-scale details indicating service at each landing, coordination with building structure and relationships with other construction, and details of car enclosures and hoistway entrances. Include elevating diagrams to indicate elevator service to each level and include excavation requirements for jack. Indicate floor that elevators will recall to. Shop
drawings will be reviewed by UCD Fire Department, State Fire Marshal and University's Representative.

C. Wiring diagram detailing wiring for power, signal and control systems differentiating clearly between manufacturer-installed wiring and field-installed wiring. Indicate maximum and average power demands.

D. Maintenance Manuals: Bound manual for each elevator or group of elevators with operating and maintenance instructions, parts listing, recommended parts inventory listing, purchase source listing for major and critical components, emergency instructions, and similar information.

E. Certificates and Permits: Provide University with copies of all inspection/acceptance certificates and operating permits as required by governing authorities to allow normal, unrestricted use of elevators.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Engage the elevator manufacturer or an installer approved by the elevator manufacturer and who has completed elevator installations similar in material, design, and extent to that indicated for Project which have resulted in installations with a record of successful in-service performance.

B. Regulatory Requirements & Permits: Contractor shall be responsible for obtaining, either itself or through its subcontractors, all permits required by Labor Code Section 7301.1. Contractor shall bear all responsibility for, and assumes all risk with regard to, any delay associated with the issuance of such permits. In addition to local governing regulations and requirements of Section 01060, comply with applicable requirements of ASME/ANSI A17.1, Safety Code for Elevators and Escalators (hereafter referred to as the "Code").

1.07 WARRANTY

A. Special Project Warranty: Provide special project warranty, signed by Contractor, Installer, and Manufacturer, agreeing to replace, repair, or restore defective materials and workmanship of elevator work during warranty period. This warranty shall be in addition to, and not a limitation of, other rights the University may have against the Contractor under the Contract Documents.

1. "Defective" is hereby defined to include, but not by way of limitation, operation or control system failures, performances below required minimums, excessive wear, unusual deterioration or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise or vibration, and similar unusual, unexpected, and unsatisfactory conditions.

2. Warranty period is 24-months starting on date of Substantial Completion.

B. Warranties: Provide coincidental product warranties where available for major components of elevator work. Submit with maintenance manuals.

1.08 MAINTENANCE SERVICE

A. Initial Maintenance Service: Provide full maintenance service by skilled, competent employees of the elevator Installer for period of 24-months following Date of Substantial Completion of the project, or the issuance of a final operating permit by the State. Include monthly preventive maintenance, performed without removing cars from service.
during peak traffic periods. A schedule of maintenance activities per month will be included. Include repair or replacement of worn or defective parts or components and lubricating, cleaning, and adjusting as required for proper elevator operation in conformance with specified requirements. Include 24-hours-per-day, 7-days-per-week emergency callback service with response time not to exceed 2-hours. Repair personnel are required to sign in with Plant Operations & Maintenance. If this doesn't occur service will not be recognized. Provide maintenance log and repair history, one (1) per car.

PART II - PRODUCTS

2.01 MANUFACTURERS

A. Otis, Kone, Schindler, or equal.

B. Hydraulic elevators are designed under the specific electrical requirements of a single manufacturer. The Contractor shall coordinate the electrical service shown on the Drawings with the requirements of the units provided to obtain the specified performances. Contractor shall include all costs associated with revised design including, but not by way of limitation; wire sizes, switching, disconnects, conduit sizes, starters, and control panel connections and sizes.

1. Starters: Wye-Delta solid-state starters are required for all elevators, or equal, no known equal.

2.02 MATERIALS AND COMPONENTS

A. General Requirement: Provide manufacturer's standard pre-engineered elevator systems that will comply with or fulfill the requirements of elevator schedule sheets at end of this Section or, at manufacturer's option, provide custom-manufactured elevator systems that will fulfill requirements. Where components are not otherwise indicated, provide standard components published by manufacturer as included in standard pre-engineered elevator systems and as required for a complete system. Products of Otis, Kone or equal are specified in Elevator Schedule at end of this section to establish a standard of quality, appearance, and performance, or equal.

B. Hydraulic Machines and Elevator Equipment: Provide manufacturer's standard single-acting under-the-car hydraulic plunger-cylinder unit for each elevator with electric pump-tank-control system equipment in machine room as indicated. A tank heater and cooler are required.

C. Piping: Provide size, type, and weight piping recommended by manufacturer, and provide isolation couplings to prevent sound/vibration transmissions from power unit.

D. Inserts: Furnish required concrete inserts and similar anchorage devices for the installation of guide rails, machinery, and other components of elevator work.

E. Car Frame and Platform: Manufacturer's standard welded steel units.

2.03 CONTROL SYSTEMS

A. General: Provide Motion Control Engineering control system, or equal, no known equal, specified for each elevator or group of elevators as required to provide automatic or group automatic operation of the type indicated and defined in the Code as "Operations."

C. Multiple-Car Group Elevator Control: Where more than two elevators are scheduled in a group operation, provide solid-state modular microprocessor to control car movements in a zoned operation. Provide automatic dispatching of selected cars in a regulated sequence in response to hall calls with automatic response of system to changes in demand for different traffic conditions including heavy incoming, heavy 2-way, heavy outgoing, and light off-hours as variations of normal 2-way traffic.

D. Auxiliary Operations/Controls: In addition to primary control system features, provide the following controls or operational features for passenger elevators, except where otherwise indicated:

1. Emergency power operation, where scheduled.
2. Automatic 2-way leveling.
3. Car shall accelerate, slow down, stop, and level smoothly without jars or bumps. Full-speed travel shall be free from vibration or sway and door operation shall not cause instability to car.
4. Stopping upon operation of the emergency stop switch shall be rapid, but not violent.
5. Car shall be designed and tested to stop, lower, and hold with one-hundred-twenty-five percent (125%) of rated load capacity.

2.04 CARDKEY ACCESS SYSTEM

A. For each elevator, install necessary cables and devices for Cardkey system to limit access to individual floors. Mount STI card access controller on top of elevator car, provide 120VAC for STI. Work with access control contractor to install reader and pin pad in car. Install traveling cables for data transmission between STI on car and D620. Provide and install 12VDC relays and junction box in or near elevator room to control the operation of floor buttons in car. The access control system will provide 12VDC to close the relays and control the use of the floor button inside the car to send the car to a particular floor.

2.05 SIGNAL EQUIPMENT

A. General: Provide signal equipment for each elevator or group of elevators to comply with requirements indicated below.

1. Provide illuminated hall-call and car-call buttons that light up when activated and remain lighted until call or other functions have been fulfilled; fabricate of acrylic or other permanent translucent plastic. Comply with ADA requirements for tactile and Braille markings.
2. Except for buttons and illuminated signal elements, fabricate signal equipment with exposed surfaces of stainless steel with manufacturer's standard directional polish or satin finish.
3. Car Control Stations: Provide car control stations in each car with flush-mounted metal faceplates containing call button for each landing served and other buttons, switches, and controls required for specified car operation and control. Mount as shown or scheduled at height complying with ASME/ANSI A117.1. If not otherwise indicated, mount in return panel adjacent to car door. Provide operating device symbols as required by Code. Mark other buttons and switches with manufacturer's standard identification for required use or function.

4. Car Position Indicator: For passenger elevator cars, provide either illuminated-signal type or digital-display type, located near top of each car or in car control station. Include direction-of-next-travel signal if not provided in car control station.
   a. In addition to visual indicator, provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served. Elevators must meet all American's with Disabilities Act (ADA) requirements.

5. Hall Push-Button Station: Provide hall push-button station at each landing for each elevator or group of elevators, but not less than one station for each 4 elevators in a group.
   a. For each group of passenger elevators, center between two elevators at center of group or at location shown. Provide unit with flat faceplate designed for flush-mounting on wall with body of unit recessed in wall.
   b. Provide 2-button station where passengers can travel either direction; 1-button station where only one direction of travel is available and indicate which direction that is.

6. Hall Lanterns: Provide units with illuminated "up" and "down" signal arrows, but provide single arrow where only one direction is possible. Provide units projecting from faceplate for ease of angular viewing, except provide flush units where a location in hoistway entrance frame is indicated. Match materials, finishes, and mounting method of hall push-button stations.
   a. In conjunction with each hall lantern device, provide an audible signal to indicate that a car is arriving in response to a hall call and to indicate direction of car travel. Signal shall sound once for up direction of travel and twice for down direction.
      1) At manufacturer's option, audible signal may be placed on each car.

7. Hall Position Indicator: Provide illuminated-signal type or digital-display type, located above each hoistway entrance at ground floor. Match materials, finishes, and mounting method of hall push-button stations.
   a. At manufacturer's option, ground-floor hall lantern signals may be integrated with hall position indicators.

8. Telephone: Provide rough-in for telephone hand set in each car, contained in flush-mounted cabinet and complete with identification and instructions for use. Provide ADA compliant hoop handle on cabinet. Provide a firefighter's telephone cabinet or firefighter telephone jack in main elevator lobby.
9. **Alarm System:*** Provide emergency alarm bell properly located within building and audible outside hoistways, equipped to sound automatically in response to emergency stops and in response to "Alarm" button on each car control station.

10. **Telephone with Auto-Dialer:**
   a. Provide a stainless steel telephone cabinet integral with car control station for speaker telephone set with auto-dialer activated by lifting handset in each elevator, preprogrammed to dial to the University of California Davis Medical Center, Campus Central Plant. The telephone equipment shall be Allentel "Mini-Speaker Phone" #GB31454-ADA, Talk-A-Phone, or equal. Refer to Division-16 for wiring and connection requirements.
   b. Provide recessed unit with back box. Drill four holes in back box and install four vandal-resistant security screws. Trailing cable shall be shielded and interface box shall be located in the elevator machine room. Connect telephone to trail cable. Terminate cable in J-box on side of elevator controller.

**B. Switches:** Where a key switch is required, provide E keyway cylinders to match the University's key system. Cores to be supplied by University. Coordinate with University's Representative. Fire service switches to match University's key system.

---

2.06 **PASSENGER ELEVATOR CAR ENCLOSURES**

**A. General:** Provide manufacturer's standard pre-engineered car enclosures of the selections indicated. Include ventilation, lighting, ceiling finish, wall finish, access doors, doors, power door operators, sill (threshold), trim, accessories, and floor finish, unless indicated as not work of this Section. Provide horizontal sliding doors of manufacturer's standard flush panel type, with operation and number of panels as indicated. Provide manufacturer's standard protective edge trim system for door and wall panels, except as otherwise indicated.

1. **Materials and Fabrication:** Provide selections as indicated for each car enclosure surface; provide manufacturer's standards, but not less than the following:
   a. **Stainless Steel:** AISI Type 302/304 with No. 4 satin finish.
   b. **Aluminum Sills:** Cast or extruded aluminum, with grooved surface, \(\frac{3}{8}\)-inch thickness, mill finish.
   c. **Plastic Laminate:** High-pressure type complying with NEMA LD3, Type GP-50 (0.050" nominal thickness); color, texture, and pattern as indicated in Elevator Schedule at end of this section.
   d. Fabricate car door frame integrally with front wall of car.
   e. Fabricate car with recesses and cutouts for signal equipment.
   f. **Ceiling:** As scheduled.
   g. **Floor Covering:** As scheduled.
2.07 PERSONAL PROTECTIVE DEVICES

A. Handrails: Provide stainless steel handrails on side walls and back wall unless otherwise indicated, either continuous or segmented units.

B. Door Edge Protective Device: Provide retractable edge shoe on leading edges of elevator entrance doors that causes doors to stop and reopen upon contacting an obstruction in entrance.

C. Photo-Eye Detection Device: Provide electronic photo-eye device with timed cutout, projecting dual light beams across car entrance at 5” and 29” heights, that when interrupted will cause closing doors to stop and reopen. Provide keyed switch in car operating panel or toggle switch in service cabinet for disconnecting photo-eye protective device.

2.08 PASSENGER HOISTWAY ENTRANCES

A. General: Provide manufacturer's standard, pre-engineered, hollow metal type, sliding, door-and-frame hoistway entrances complete with track systems, hardware, safeties, sills, and accessories. Match car enclosure doors for size, number of door panels, and door panel movement. Where gypsum-board wall construction is indicated, fabricate frames with reinforced head sections; provide sufficient strength without support from wall lintels.

B. Materials and Fabrication: Provide selections indicated that comply with manufacturer's standards as follows:
   1. Stainless Steel Frames;
   2. Stainless Steel Door Panels;
   3. Aluminum Sills;

2.09 CAR EQUIPMENT

A. Car Frame: Welded or bolted, rolled or formed steel channel construction.

B. Safety Device: Type "B", flexible guide clamp.

C. Platform: Isolated type, constructed of steel, or wood which is fireproofed on the underside.

D. Guide Shoes: Roller type with 3 or more sound-deadening rollers per shoe.

E. Finish Floor Covering: VCT in type and pattern shown on drawings.

F. Car Sills: Extruded nickel silver (with extruded extension between entrance columns to face of cab front return).

G. Toe Guard: Per Code.

H. Car Doors, Hangers and Tracks: Provide as specified for hoistway entrance doors, hangers and tracks.

I. Header: Construct of steel, shape to provide stiffening flanges.
J. Car Door Electrical Contact: Arrange so that elevator cannot operate unless doors are closed within tolerance allowed by Code.

K. Car Door Clutches: Heavy-duty clutches, linkage arms, drive blocks and pickup rollers or cams to provide positive, smooth, quiet door operation. Design clutches so car doors can be closed for maintenance purposes, while hoistway doors remain open.

L. Door Operator and Operation: High-speed, heavy-duty, DC master door operator capable of opening doors at no less than 2-½ f.p.s., and accomplishing reversal in no more than 2-½” of door movement. Open doors automatically when car arrives at a floor to permit egress of passengers. Close doors automatically after a timed interval.

1. Acceptable door operators:
   a. M.O.H. by G.A.L.
   b. OVL-HP or 6970 by Otis Elevator Company.
   c. MAC high-speed, solid-state by Moline Accessories Company.
   d. HD73 by Dover Elevator Company.
   e. Or equal.

M. Infrared Detector Device: Pulsed-screen car door protective device projecting across entire entrance opening. Arrange controls to prevent elevator operation if device is not operative. If detector is obstructed for a predetermined, adjustable interval (10-30 seconds), sound buzzer and attempt to close doors with a maximum of 2-½ foot pounds kinetic energy. Manufacturer: T.L. Jones or equal, no known equal.

N. Differential Door Time: Provide separately adjustable timers to enable varying time that doors remain open after stopping in response to calls.

1. Car Call: Hold open time adjustable between 3 and 4 seconds.

   Landing Call: Hold open time adjustable between 3 and 8 seconds. Use landing call timing when responding to coincide.

PART III - EXECUTION

3.01 EXAMINATION

A. Prior to commencing elevator installation, examine hoistways, hoistway openings, pits, and machine rooms, as constructed; verify all critical dimensions and examine supporting structure and all other conditions under which elevator work is to be installed. If any dimensional discrepancies or other conditions detrimental to the proper installation or performance of elevator work, do not proceed with elevator installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION OF ELEVATOR SYSTEM

A. General: Comply with manufacturer's instructions and recommendations for work required during installation.
B. Excavation for Jack: Drill excavation in each elevator pit to accommodate installation of plunger-cylinder unit; comply with applicable requirements of Division 2 "Earthwork" sections.

1. Install casings with waterproof seals at pit floor and with waterproof, high-pressure seal at bottom of casings.

2. Provide a second (inner) casing with welded waterproof, high-pressure seal at bottom and set inside outer (initial) casing.

C. Install plunger-cylinder units plumb and accurately centered for elevator car position and travel; anchor securely in place, plunger will be single piece.

D. Welded Construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.

E. Coordination: Coordinate elevator work with work of other trades for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels to ensure dimensional coordination of the work.

F. Sound Isolation: Mount rotating and vibrating elevator equipment and components on vibration-absorption mounts, designed to effectively prevent transmission of vibrations to structure and thereby to eliminate sources of structure-borne noise from elevator system.

G. Install piping without routing underground, where possible. Where not possible, cover underground piping with permanent protective wrapping before backfilling.

H. Lubricate operating parts of systems, including ropes, if any, as recommended by manufacturers.

I. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

J. Leveling Tolerance: 1/2", up or down, regardless of load and direction of travel.

K. Set sills flush with finished floor surface at landings. Coordinate with other trades to facilitate and ensure proper grouting of sills.

3.03 FIELD QUALITY CONTROL

A. Acceptance Testing: Upon nominal completion of each elevator installation, and before permitting use of elevator (either temporary or permanent), perform acceptance tests as required and recommended by Code and by governing regulations or agencies.

B. Operating Tests: Load each elevator to its rated capacity and operate continuously for 30-minutes over its full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of pump motor (except submerged pumps) during 30-minute test period. Record failures of elevator to perform as required.
3.04 PROTECTION

A. At time of Substantial Completion of elevator work (or portion thereof), provide suitable protective coverings, barriers, devices, signs, or such other methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

B. Provide similar protective measures for elevator units that will be placed in temporary service, including inspection and maintenance service during period of temporary service.

3.05 DEMONSTRATION

A. Instruct University's staff, designated by University's Representative in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train University's staff in normal procedures to be followed in checking for sources of operational failures or malfunctions. Confer with University's Representative and staff on requirements for a complete elevator maintenance program, see Warranty Section of this Specification.

B. Make a final check of each elevator operation with University's Representative and staff present and just prior to date of Substantial Completion. Determine that control systems and operating devices are functioning properly.

3.06 ELEVATOR SCHEDULE

A. Elevator No.: (**INSERT ELEVATOR NO.***)

1. Manufacturer/Model: Otis, Kone, Schindler, or equal, Passenger Elevator.
2. Capacity: 2,500-pounds.
3. Speed: 150-feet per minute.
4. Travel: 18'-0".
5. Stops/Number of Openings: 2/2.
6. Reverse Openings: None.
7. Inside Cab Size: (Width x Depth) 7'-0" x 5'-0".
8. Door Size/Operation: 3'-6' x 7'-0", right-hand.
10. Wall Panels: Match (**Material,Color, Style**) Nevamar, Wilsonart, or equal.
11. Cab Flooring: Match (**Material,Color, Style**) refer to Division 9.
12. Ceiling: Match (**Material, Color, Style**)
14. Power Supply: 480V, 3-Phase, 3-Wire, 60 Hz.
15. Horsepower Rating: 25 HP.

B. Elevator Nos.: (***INSERT ELEVATOR NO.'S***)
1. Manufacturer/Model: Otis, Kone, Schindler, or equal, Passenger Elevator.
3. Speed: 150-feet per minute.
4. Travel: 48'-0".
6. Reverse Openings: None.
7. Inside Cab Size: (Width x Depth) 7'-0" x 6'-2".
8. Door Size/Operation: 3'-6" x 7'-0", center opening.
10. Wall Panels: Match (**Material, Color, Style**) Nevamar, Wilsonart, or equal.
11. Cab Flooring: Match (**Material, Color, Style**) refer to Division 9.
12. Ceiling: Match (**Material, Color, Style**)
14. Power Supply: 480V, 3-Phase, 3-Wire 60Hz.
15. Horsepower Rating: 40 HP.

END OF SECTION 14240