

**SECTION 14210
ELECTRIC TRACTION ELEVATORS**

PART I - GENERAL

1.01 DESCRIPTION

- A. Scope: Work under this Section shall include all materials and installation for Traction Elevators including Gearless Pedestrian Elevators, Gearless Patient Elevators, and Geared Service Elevators, as shown and detailed on the Drawings and specified herein, including:
- B. Hoistway and Pit complying with the code:
1. Clear plumb elevator hoistway with variations not to exceed 1" at any point.
 2. Bevel cants (15° from vertical) over any rear or side wall ledges and beams that project or recess 2" or more into the hoistway. (Not required on hoistway divider beams).
 3. Divider beams between adjacent elevators at each floor, pit and overhead.
 4. Installation of guide rail bracket supports in concrete. (See Part 2 of this Section for inserts or embeds, if used).
 5. Wall blockouts for control and signal fixtures.
 6. Cutting/patching walls and floors including necessary grouting.
 7. Wall pockets and/or structural beams for support of machines, sheaves, and dead-end beams. Machine hold down means for hoist machine mounted beside hoistway.
 8. Partition between machine room and hoistway when hoist machine is mounted beside hoistway.
 9. Erection of front hoistway wall after elevator entrances are installed.
 10. Grouting around hoistway entrances and sills after installation.
 11. Lockable, self-closing, fire-rated pit door.
 12. Pit ladders and pit screens.
 13. Structural supports for car and counterweight buffer impact loads, and guide rail loads including vertical tube steel.
 14. Waterproof pit.
 15. Protecting open elevator hoistways and entrances during construction per OSHA Regulations.
 16. Protecting cabs, door entrance assemblies and special metal finishes from damage after installation.

17. Venting or other means to prevent accumulation of smoke and gas in case of fire, as required by Local Building Code, up to and including Smoke Socks.
- C. Machine Room complying with the code:
1. Enclosure with access ladders, stairs, etc.
 2. Self-closing and locking access doors.
 3. Cooling and heating.
 4. Painting elevator machine room walls, ceiling and floor.
 5. Sealing or enclosing fireproofing to prevent flaking.
 6. Fire extinguisher.
 7. Self-closing and locking governor access doors and access means.
 8. Sprinklers, shut-off valve outside machine room and means to automatically disconnect mainline power before application of water.
- D. Electrical Service, Conductors and Devices:
1. For general electrical requirements, refer to Division 16.
 2. Lighting and convenience outlets in elevator pit and machine room.
 3. Conduits from the closest elevator hoistway of each elevator group or single elevator to Fire Command Room elevator control console. (Wiring and connections under Part 2 of this Section).
 4. 3-Phase mainline power feeders to terminals of each elevator controller with protected, lockable "off", disconnect switch.
 5. Power feeders to each elevator controller for lighting and exhaust blower. Individual disconnect switch at machine room location shown on Contractor's shop drawings.
 6. Signal fixture power feeders to machine room elevator control panel.
 7. Power feeders to elevator intercom amplifier located in the elevator machine room.
 8. Emergency and firefighters' communication system and announcement speaker system connections to individual elevator control panels in elevator machine room, and elevator control panel in Fire Command Room.
 9. Products-of-combustion sensors (NFPA No. 73E, Chapter 4) in each elevator lobby and machine room to initiate firefighters' return feature.
 10. Temporary power and illumination to install, test and adjust elevator equipment.
 11. Power feeders to Fire Command Control Panel VDU in Room.

12. Intercom system source and interface to corresponding elevator machine room, see Division 16.

E. Standby Power Provisions:

1. Standby power of the same voltage characteristics via normal electrical feeders to run one elevator at a time in each elevator group, and single elevator unit, at full-rated car speed.
2. Conductors to signal power source, from the standby power transfer switch to a single elevator control panel in each elevator bank and/or single elevator unit. (Provide a time delay of approximately 20 seconds for pretransfer signal in either direction).
3. Standby single-phase power to group controller, and each elevator controller for lighting, exhaust blower, emergency call bell, intercom amplifier.
4. Means for absorbing regenerated power during an overhauling load condition.

F. Items Installed, But Furnished under other Sections:

1. Building announcement speakers. Firefighters' Telephone Jack.

G. Items Furnished, But Not Installed:

1. Concrete inserts for attaching guide rail brackets.
2. Security access card readers for cab operating stations on Elevators No. _____ and _____. (**CONSULTANT TO SPECIFY**)

H. Related Work Specified Elsewhere:

(CONSULTANT TO EDIT AS REQUIRED**)**

- I. Section 05120 – STRUCTURAL STEEL
- J. Section 05500 – MISCELLANEOUS METAL FABRICATIONS
- K. Section 09651 – RESILIENT TILE FLOORING (for Cab Floors)
- L. Section 16725 – SECURITY SYSTEM
- M. Division 16 – ELECTRICAL (Electrical Service to each elevator including fused disconnect.

1.02 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.

1.03 DEFINITIONS

- A. Terms used are defined in the latest edition of the Safety Code for Elevators and Escalators, ANSI/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.

1.04 QUALITY ASSURANCE

- A. Approved Manufacturers/Installers:
 - 1. Gearless and Geared Elevators:
 - a. Dover.
 - b. Otis.
 - c. Or equal.
 - 2. Car Enclosures:
 - a. Dover.
 - b. Otis.
 - c. Or equal.
 - 3. Hoistway Entrances:
 - a. Dover.
 - b. Otis.
 - c. Or equal.
 - 4. Controls:
 - a. Motion Control Engineering IMC-AC or equal, no known equal.
 - 5. Drive System:
 - a. Motion Control Engineering System Flux Vector or equal.
 - 6. Elevator Emergency Communication System:
 - a. Allen Tel.
 - b. Talk-A-Phone.
 - c. Or equal.
- B. Compliance with Regulatory Agencies: Comply with most-stringent applicable provisions of following Codes and/or Authorities, including revisions and changes in effect on date of these Specifications:

1. Safety Code for Elevators and Escalators ANSI/ASME A17.1.
2. Inspectors' Manual, ANSI/ASME A17.2.
3. National Electrical Code, No. ASME/NFPA 70.
4. Life Safety Code, ASME/NFPA No. 101-1998, and CCR Title 19.
5. California Code of Regulations Title 8 and Title 24.
6. Requirements of California Uniform Building Code and any other Codes, Ordinances and Laws applicable within the governing jurisdiction.
7. Handicapped Requirements (ADAAG).
8. Office of Statewide Health Planning and Development (OSHPD).

1.05 SUBMITTALS

- A. Within 60 days after award of contract and before beginning equipment fabrication, submit shop drawings and required material for review as outlined in Division I. Allow 30 days for response to submittals.
 1. Scaled and Fully Dimensioned Layouts: Plan of pit, hoistway and machine room indicating equipment arrangement, elevation section of hoistway, details of car enclosures, etc.
 2. Design Information: Indicate equipment lists, reactions and design information on layouts.
 3. Power Confirmation Sheets: Include motor horsepower, code letter, starting current, full-load running current, and demand factor for applicable motors.
 4. Finish Material: Submit samples.
 5. Fixtures: Submit shop drawings.
- B. Deferred Approval Requirements: Installation of elevator guide rails, rail brackets and anchorage of machine room equipment shall not be completed until detail plans, specifications and engineering calculations have been accepted by the University's Representative and approved by OSHPD. Contractor's submittals shall be stamped and signed by a Structural Engineer licensed in the State of California.

1.06 PERMITS, TESTS AND INSPECTIONS

- A. Obtain and pay for permits, licenses and inspection fees necessary to complete the elevator installation.
- B. Perform tests required by University's Representative, Governing Authority and/or the ASME A17.1 Safety Code For Elevators And Escalators, with procedures described in ANSI/ASME A17.2 Inspectors' Manual for Elevators and Escalators, in the presence of authorized Code Authorities and University's Representative.
- C. Supply personnel and equipment for tests and final reviews indicated in Part 3 at no added cost.

1.07 MAINTENANCE

A. Interim:

1. When one or more elevators are near completion and declared ready for service, the University may accept elevators for interim use and place them in service before entire installation of all elevators has been completed and accepted.
2. During this period University may pay a mutually agreed amount per elevator for preventive maintenance.

B. Included with New Equipment Contract (Warranty Period):

1. Preventive maintenance and 24-hour emergency call-back service with 2-hour response time on all equipment described herein for a period of 12 months commencing on date of final acceptance by University's Representative. Systematically examine, adjust, clean and lubricate all equipment. Repair or replace defective electrical and mechanical parts using parts produced by the Manufacturer of installed equipment. Maintain elevator machine rooms, hoistways, and pits in clean condition. Technician must sign in/out with PO&M for service to be acknowledged. Repair log must be kept on site at all times.
2. Use journeyman elevator mechanics supervised and employed by the Elevator Installer.

C. Contract (Ongoing Preventive Maintenance Program): Quote monthly cost for 5-year maintenance agreement commencing on completion of the 12-month period in "B" above. Submit quote based upon terms and conditions of the University's standard preventive maintenance agreement. Base on current costs; price adjustment will be allowed at commencement date and thereafter as provided in agreement.

PART II - PRODUCTS

2.01 SUMMARY

A. Pedestrian Elevators:

1. Number of Units: (**CONSULTANT TO SPECIFY**)
2. Rated Capacity: 4000#.
3. Rated Speed: 700 F.P.M. (Alternate for 500 F.P.M.)
4. Roping: 1:1 Roping.
5. Stops: (**CONSULTANT TO SPECIFY**)
6. Openings: (**CONSULTANT TO SPECIFY**)
7. Floors Served: (**CONSULTANT TO SPECIFY**)
8. Travel: (**CONSULTANT TO SPECIFY**)
9. Platform Size: 8'- 0" wide x 6'- 2" deep

10. Inside Clear Size: 7'- 8" wide x 5'- 6" deep

B. Patient Elevators:

1. Number of Units: (**CONSULTANT TO SPECIFY**)

2. Rated Capacity: Two @ 6500#, One (1) @ 8500#.

3. Rated Speed: 700 F.P.M. (Alternate for 500 F.P.M.)

4. Roping: 2:1 Roping.

5. Stops: (**CONSULTANT TO SPECIFY**)

6. Openings: (**CONSULTANT TO SPECIFY**)

7. Floors Served: (**CONSULTANT TO SPECIFY**)

8. Travel: About 185'- 10-¼".

9. Platform Size: No. 24: 8'- 0" wide x 11'- 0" deep; Nos. 25 & 26: 7'- 0" wide x 10'- 0" deep.

10. Inside Clear Size: No. 24: 7'- 8" wide x 10'- 0" deep; Nos. 25 & 26: 6'- 8" wide x 9'- 2" deep.

C. Service Elevators:

1. Number of Units: (**CONSULTANT TO SPECIFY**)

2. Rated Capacity: 8500#.

3. Rated Speed: 500 fpm (Alternate 350 fpm).

4. Roping: 2:1.

5. Stops: (**CONSULTANT TO SPECIFY**)

6. Openings: (**CONSULTANT TO SPECIFY**)

7. Floors Served: (**CONSULTANT TO SPECIFY**)

8. Travel: (**CONSULTANT TO SPECIFY**)

9. Platform Size: 7'- 0" wide x 12'- 8" deep.

10. Inside Clear Size: 6'- 8" wide x 11'- 2" deep.

D. Helistop Elevator:

1. Number of Units: (**CONSULTANT TO SPECIFY**)

2. Capacity: 8500#.

3. Speed: 350 fpm.
4. Roping: 1:1.
5. Stops: (**CONSULTANT TO SPECIFY**)
6. Openings: (**CONSULTANT TO SPECIFY**)
7. Floors Served: (**CONSULTANT TO SPECIFY**)
8. Travel: (**CONSULTANT TO SPECIFY**)
9. Platform Size: 8'- 0" wide x 11'- 8" deep.
10. Inside Clear Size: 7'- 8" wide x 10'- 0" deep.

2.02 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 A569.
3. Structural Steel Shapes and Plates: ASTM A6, ASTM A36, and ASTM A108.

B. Stainless Steel: Type 302 or 304 complying with ASTM A167, 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 University's Representative's sample. Protect with adhesive-paper covering.

1. No. 4: Bright directional brushed No. 4 (satin) finish. Graining directions in longest dimension.

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

1. Cab Wall Panel Edging: 1-1/2" x 3/4" x 1/8" Stylmark No. 110168 brushed satin with clear finish.

D. Plastic Laminate: ASTM E84 Class A and NEMA LD3, Fire-Rated Grade (FR-50), Type 7, 0.050" +/- .005" thick; color and texture as follows:

1. Exposed Surfaces: Color and texture as specified.
2. Concealed Surfaces: Manufacturer's standard color and finish.

E. Fire-Retardant Treated Particle-Board Panels: Minimum 3/4" thick backup for natural finished wood veneer, and plastic laminate veneer 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. Hardwood Veneer: Select white maple with clear "non-yellowing" finish. Standard thickness, $\frac{1}{40}$ " thoroughly dried conforming to ANSI/HPMA HP-1983, Premium Grade. Place veneer, tapeless spliced with grain running in long direction, belt and polish sanded, bookmatched.
- G. Paint: Clean exposed metal of oil, grease, scale and other foreign matter and factory paint one shop coat of Manufacturer's standard rust-resistant primer. After erection, provide one finish coat of Industrial enamel paint. Galvanized metal need not be painted.
- H. Prime Finish: Clean all surfaces receiving a baked enamel finish of oil, grease, scale, etc. Apply one coat of rust-resistant mineral paint followed by a filler coat over uneven surfaces. Sand smooth and apply final coat of mineral paint.
- I. Baked Enamel: Prime per "H" above. Apply and bake 3 additional coats of enamel in the selected solid color.

2.03 PERFORMANCE

- A. Speed: $\pm 3\%$ of contract speed under any loading condition.
- B. Capacity: Safely lower, stop and hold up to 125% of rated load.
- C. Stopping Accuracy: $\pm \frac{3}{8}$ " under any loading condition.
- D. Door Opening Time: Seconds from start of opening to fully open:
 - 1. Elevators No. (**CONSULTANT TO SPECIFY**) seconds.
 - 2. Elevators No. (**CONSULTANT TO SPECIFY**) seconds.
 - 3. Elevators No. (**CONSULTANT TO SPECIFY**) seconds.
- E. Floor-to-Floor Performance Time: Seconds from start of doors closing until doors are $\frac{3}{4}$ open and car level and stopped at next successive floor under any loading condition or travel direction (14'- 0" typical floor height):
 - 1. Elevators No. (**CONSULTANT TO SPECIFY**) seconds.
 - 2. Elevators No. (**CONSULTANT TO SPECIFY**) seconds.
 - 3. Elevator No. (**CONSULTANT TO SPECIFY**) seconds.
 - 4. Elevators No. (**CONSULTANT TO SPECIFY**) seconds.
 - 5. Elevator No. (**CONSULTANT TO SPECIFY**) seconds, (**CONSULTANT TO SPECIFY**) floor height.

2.04 OPERATION

- A. Simplex Selective Collective: Operate elevator without an attendant from buttons located at each floor and in car. When elevator is idle, automatically start car and dispatch it to floor corresponding to registered car or hall call. Once the car starts, respond to registered calls in direction of travel in the order floors are reached.

1. Do not reverse car direction until all car calls have been answered or until all hall calls, ahead of car and corresponding to direction of car travel, have been answered.
 2. Slow down and stop car automatically at floors corresponding to registered calls, in the order in which they are approached in each direction of travel. As slow down is initiated for a hall call, automatically cancel the call and render the hall button for that direction of travel ineffective until the car leaves floor. Cancel car calls in same manner. Hold car at arrival floor an adjustable time interval to allow transfer.
 3. Answer calls corresponding to direction in which car is traveling unless call in the opposite direction is highest (or lowest) call registered.
 4. Illuminate appropriate button to indicate call registration. Extinguish light when call is answered.
- B. Duplex Selective Collective (Elevators No. ****CONSULTANT TO SPECIFY****): Operate elevators without attendants from buttons in cars and at each landing. When cars are idle, park one car at entry floor ("home" car). Park other car where last used ("free" car).
1. Respond to car calls and hall calls above entry floor using the "free" car. Once a car has started, respond to registered calls in the direction of travel in the order the floors are reached.
 2. Do not reverse car direction until all car calls have been answered, or until all hall calls ahead of the car, and corresponding to the direction of car travel, have been answered. Slow down and stop cars automatically at floors corresponding to registered calls, in the order in which they are approached in each direction of travel. As slow down is initiated for a hall call, automatically cancel that call and render the hall button for that direction of travel ineffective until the elevator leaves floor. Cancel car calls in the same manner. Hold car at arrival floor an adjustable time interval to allow passenger transfer.
 3. Answer calls corresponding to direction in which car is traveling unless call in the opposite direction is the highest (or lowest) call registered. When the free car is clearing calls, start home car to respond to:
 - a. A call registered on home car buttons.
 - b. An up hall call registered below free car while free car is traveling up.
 - c. An up or a down call registered above free car while free car is traveling down.
 - d. A hall call when free car is delayed in its normal operation for a predetermined period.
 4. When both cars are clearing calls, stop only one car in response to any registered hall call. Return the first car to clear its calls to entry floor. Should last service required bring both cars to main floor, the first arriving car becomes the free car. Illuminate the appropriate button to indicate call registration. Extinguish light when call is answered. Answer Ground Floor calls with the "home" car unless free car is parked at floor where the call occurs. If no car is parked at main level, answer basement call using the first down traveling car.

- C. **Group Automatic (Elevators No. (**CONSULTANT TO SPECIFY**)):**
1. Microprocessor-based, group dispatch, car control and motion control systems as follows including, as a minimum, the features described hereafter:
 2. Operate elevators without attendants as a group capable of balancing service and continuing operation with one or more cars removed from the system.
 3. Operate elevators from buttons located at each floor and in each car. Slow down and automatically stop cars at landings corresponding to registered calls. Make stops at successive floors for each direction of travel irrespective of order in which calls are registered except when bypassing hall calls to balance and improve overall service. Stop only one car in response to particular hall call. Assign hall calls to specific elevators and periodically review and modify these assignments to improve service. Simultaneous to initiation of slow down of a car for a hall call, cancel that call. Render hall button ineffective until car doors begin to close after passenger transfer. Cancel car calls in the same manner. Give priority to coincidental car and hall calls in call assignment. Cancel car calls upon direction reversal.
 4. At other than dispatching floors, hold doors open an adjustable interval of 3 to 8 seconds. Cancel initial door open interval when door protective system is actuated, and establish an adjustable door open interval from 1 to 3 seconds following actuation of protective system.
 5. Operate system to meet changing traffic conditions on demand basis. (Dispatch from terminal landings may be used when most traffic is in one direction.) Include provisions for handling traffic which may be heavier in either direction, intermittent or very light. As traffic demands change, automatically and continually modify elevator response to provide the most-effective means to handle traffic conditions. Assign hall calls to individual cars, review assignments; provide means to sense long-wait hall calls and preferentially serve them; and accomplish direction reversal without closing and reopening doors.
 6. Use easily reprogrammable system software. Design basic algorithm to optimize service based on equalizing system's response to registered hall calls at shortest possible level and equalizing trip time at shortest possible level.
 7. Serve floor below dispatch terminal in a manner which logically minimizes delay in passing or stopping at the terminal in both directions of travel. Provide manual means to force a stop at the dispatch terminal when passing to or from level below.
 8. Required Features:
 - a. Dispatch Protection: Backup dispatching in the event primary dispatcher fails.
 - b. Delayed Car Removal: Remove delayed car from group operation.
 - c. Position Sensing: Reset at each floor when stop made.
 - d. Landing Button Failure: Multiple power sources for button risers.

- e. Duplicate Communicator Link: Communication links duplicated by all group and individual car computers.
- 9. Provide group control with on-site and remote monitoring and diagnostic capability. Provide capability for future use of a color VDU monitor for building use which displays status of each elevator, each car and each registered call via phone modem.
 - 10. Include accumulation of hall call registration information as part of monitoring capability. Provide memory capacity for at least the immediate five, 24-hour periods, in hourly blocks of 10 or 15-minute segments, running from hour to hour (i.e., 2:00 p.m. to 3:00 p.m.).
 - a. Accumulate information for the University's Representative to retrieve and use as follows:
 - 1) Summary of hall call registration events by floor, direction, and duration, totaled in minute segments (10 or 15 minutes) and 60-minute blocks with breaks made on the hour using an internal clock.
 - 2) Indication of hall call registration duration averaged for minute and hourly periods.
 - 3) Indication of percentage of calls answered within 30 and 60 seconds in each minute and hourly period.
 - 4) Indication of time periods during which individual elevators are not in group operation (operating separately or out of service).
 - 5) University's Representative has printer and IBM compatible computer which will be used in the machine room to download data and/or produce a hard copy of stored data. Provide means for connection to elevator control using standard connector or clip-on wiring, directions, software, etc., to accomplish information retrieval. (Or provide machine room printer and keyboard, with instructions, to accomplish same purpose.)
 - 11. Future Elevators: Provide controls and hardware to accommodate the future installation of Passenger Elevators No. (**CONSULTANT TO SPECIFY**) and Patient Elevators No. (**CONSULTANT TO SPECIFY**). Controls and group dispatching systems shall be set up to accommodate incremental additions of elevators (i.e., all three additional elevators in each group may not be installed at one time).
- D. Other Items:
- 1. Door Operation: Automatically open door when car arrives at main landing whether car call has been registered or not. When another car is at main landing loading for departure, close arriving car doors. Reopen when car is designated for loading. If no other car is at main landing, leave doors open until car is dispatched or loading interval expires with no demand.
 - 2. Load Weighing: Provide means for weighing passenger load (except on Elevator No. (**CONSULTANT TO SPECIFY**)). Design control system to provide

dispatching in advance of normal intervals and to provide landing call by-pass when the car is filled to adjustable percentage of rated capacity. (Adjustment range: 10% to 100%).

3. Anti-Nuisance Feature: If car loading is not commensurate with registered car calls, cancel car calls.
- E. Automatic Stopping Accuracy: Stop car within ¼" above or below the landing sill. Avoid overtravel, as well as undertravel, and maintain stopping accuracy regardless of load in car, direction of travel, rope slippage or stretch.
- F. Independent Service: Provide controls for operation of each elevator from car buttons only. Close doors by constant pressure on desired destination floor button. Open doors automatically upon arrival at selected floor.
- G. Motion Control: DC, variable-voltage, 12 pulse digital type with closed-loop feedback suitable for operation specified and capable of providing smooth, comfortable acceleration, retardation and dynamic braking. Limit the difference in speed between full load and no load to not more than ±3% of the contract speed.
 1. Design, install and adjust elevator equipment to meet the performance requirements of Paragraph 2.03 within the following parameters:
 2. Horizontal Acceleration within Cars: Not more than 15 mg peak to peak in the 1-10 Hz range during all riding and door operating conditions.
 3. Acceleration and Deceleration: Constant and not more than 4 feet/second/second with an initial ramp between 0.5 and 0.75 second.
 4. Sustained Jerk: Not more than 8 feet/second/second squared.
- H. Firefighters' Service: Per Code, to operate and recall elevators to designated or alternate designated floors in fire or other emergency condition. Provide sensor signal wiring from hoistway or machine room connection point to controller terminals. Provide similar operation and fixtures on all elevators. Operate visual/audible signal until return is complete or automatic operation restored.
- I. Standby Lighting and Alarm: Car-mounted, battery unit with solid-state charger to operate alarm bell and lighting, per Code. Battery to be rechargeable with 5-year minimum-life expectancy. Provide test button in service cabinet of car station which causes illumination of standby lighting bulbs. Locate lights so they are part of normal car lighting system or not exposed to view.
- J. Standby-Power Transfer: If normal power fails, adequate standby power will be supplied through normal power feeders to start and run one elevator at a time in each group at rated speed.
 1. Provide controls to automatically start and run elevators nonstop to designated terminal, one car in each group at a time. Provide controls in the firefighters' panel so that any elevator may be selected to run continuously. (Under either mode of operation, run no more than four (4) elevator(s) simultaneously).
 2. Provide SCR-controlled equipment with filters to stabilize the voltage and ensure that the wave form distortion and harmonic content will not adversely affect

operation of standby generator. Comply with requirements of IEEE Standard 519-1992.

K. Medical Emergency Service: Provide controls to call Elevators No. (**CONSULTANT TO SPECIFY**) directly to any floor and allow attendant operation for medical emergency purposes.

L. Security System Provisions: Provide means to limit access to each building floor on Elevators No. (**CONSULTANT TO SPECIFY**) as follows:

1. Provide necessary controls and "handshake" interface programming and hardware to accommodate installation of proximity or card readers to be located in each car.
2. Provide two pairs of shielded wires from main car station box to machine room car controller on each elevator.
3. Serve both floors on independent service irrespective of switch position.
4. System will be arranged to prevent registration of car calls to either floor when in security mode of operation.
5. Locate all necessary interface control hardware, terminal blocks and relays immediately adjacent to machine rooms.

M. Seismic Protection

1. General: Seismic designs, operations, and equipment installation shall comply with requirements of ASME A17.1, CCR Title 8, and these Specifications.
2. Car and Counterweight Position Restraints (Retainer Plates): Plates shall be bolted to the car and counterweight frames. Welded plates are not acceptable.
3. Seismic Restraints:
 - a. Restraints shall permit adjustment during installation to ensure sufficient clearance between vibration isolated element and rigid restraining device.
 - b. Restraining devices at all base-supported, vibration isolated equipment shall be separate components (sized and installed to meet the general requirements specified above), may be built into the vibration isolator, or may be provided by anchor bolts which do not short-circuit the vibration isolator.
 - c. Installation: Restraints shall not be installed until vibration isolators have been loaded and adjusted to achieve the specific static deflection and clearances.
4. Seismic Protective Devices: Provide both counterweight displacement switches for control of individual elevators and a separate seismic switch for each bank of elevators.

- a. A displacement switch shall activate upon detection of counterweight frame movement from its normal plane of travel or derailment from its guide rails at any point in the hoistway. Displacement switch shall also activate upon detection of displacement of counterweights from their frame, even if frame has not left its guides. Displacement switch shall be of the 'fail-safe' type, connected to a taut stainless steel sensing wire mounted to the top and bottom of each counterweight guide rail. The inside diameter of the steel retainer rings shall be sized to allow not more than 1" of play around the wire.
- b. A seismic switch shall activate upon excitation in either a vertical or horizontal direction of not more than 0.15 times gravity acceleration [32.2 ft/sec² (9.81 m/s²)] with a frequency response of 1.0 to 10 Hz. Seismic switch(es) shall not be of the type requiring batteries to operate or periodic recalibration and shall be mounted on a structural hoistway wall at a nominal height of 3'-0" above pit floor. Provide seismic switch fitted with battery backup unit and integral latch relay, as manufactured by Seismic Switch, Inc., Fairfax, CA, or equal, no known equal.

5. Seismic Operations:

- a. Upon activation of a seismic switch, all elevators which are in motion shall immediately slow to a speed no greater than 150 fpm (0.76 m/s), then proceed to the nearest available floor and shut down.
- b. Upon activation of a counterweight displacement switch, the elevator (if in motion) shall initiate an emergency stop, then proceed away from the counterweight at a speed no greater than 150 fpm (0.76 m/s) to the nearest available floor and shut down.
- c. Elevators with power-operated doors upon reaching a landing shall cause their doors to open and remain open. **EXCEPTION:** Where Emergency/Fire Service in-car operation (Phase II) is in effect, door operation shall conform to the requirements of CCR Title 8.
- d. Elevators equipped with Emergency/Fire Service features shall be operable for both manual recall and in-car operations at a speed no greater than 150 fpm (0.76 m/s), unless a continuous counterweight displacement is detected.
- e. Provide an identified momentary reset button or switch for each elevator, within its respective controller. Post a conspicuous yellow sign adjacent to the reset switch, with ¼" high black letters stating "**WARNING! BEFORE ENERGIZING THE RESET BUTTON, ELEVATOR AND HOISTWAY SHALL BE INSPECTED FOR POSSIBLE DAMAGE.**"

2.05 MACHINE ROOM EQUIPMENT

- A. Arrange equipment in spaces shown in drawings. Provide identifying numbers on machine, power conversion unit, controller, and disconnect switch.
- B. Geared Traction Machine:
 1. Worm gear traction type with DC motor, brake, gear, drive shaft, and gear case mounted in proper alignment on an isolated bedplate.

2. Properly brace and configure Elevator No. (**CONSULTANT TO SPECIFY**) machine mounted beside the hoistway to take up pull reactions. Mount required deflector sheaves to machine bedplate, or provide all supporting steel beams and fastenings to mount deflector sheaves to building structure shown in drawings. Provide removable 16-gauge sheet metal closures around machine between the machine room and hoistway.
 3. Provide analog, closed-loop motor-control signal tach generator on each hoist machine, using belt, direct or friction drive.
- C. Gearless Traction Machine:
1. DC motor, brake and drive sheave mounted in proper alignment on a common, isolated bedplate.
 2. Provide a belt, direct-drive, or friction-driven analog, closed-loop motor control, signal tach generator on each hoist machine.
 3. For hoist machine installations which require blockouts through machine room slab for other than hoist ropes, provide 14-gauge, galvanized sheet metal enclosure over entire blockout on underside of floor slab.
- D. Power Conversion and Regulation Unit:
1. Design solid-state unit to limit current, suppress noise, and prevent transient voltage feedback into building power supply. Isolate unit to minimize noise and vibration transmission. Provide isolation transformers, filter networks, and choke inductors.
 2. Contractor responsible to suppress solid-state converter noises, rapid frequency interference, and eliminate regenerative voltage transients induced into the mainline feeders or the standby power generator. Supply supplemental direct-current power for operation of dispatch logic processors, brake, door operator.
- E. Selector: Relay, solid-state or moving crosshead type electrically or mechanically coupled to elevator car.
- F. Encoder: Solid-state, optical, digital-count type, mechanically coupled to pit-tensioning sheave, or driven from the car governor. Update parity at each floor and restore automatically after power loss. Locate in machine room to monitor car position and provide absolute floor position for stopping.
- G. Controller - Individual Car and Group:
1. Frame: Securely mount all assemblies, power supplies, chassis switches, relays and other items on a substantial, self-supporting steel frame. Completely enclose equipment with covers and ventilate to prevent overheating.
 2. Switch and Relay Design: Direct-current type, magnet operated with contacts of design and material to insure maximum conductivity, long life and reliable operation without overheating or excessive wear, and provide a wiping action to prevent sticking due to fusion. Provide switches carrying highly inductive currents with arc deflectors or suppressers.

3. Microprocessor-Related Hardware:
 - a. Fabricate printed circuit boards with FR4 or G10 glass epoxy material with a minimum equivalent one-ounce copper.
 - b. Coat all printed circuitry with tin lead.
 - c. Include built-in noise suppression devices which provide a high level of noise immunity on double-sided printed circuit boards.
 - d. Include built-in noise-suppression devices which provide a high level of noise immunity on all solid-state hardware and devices.
 - e. Provide power supplies with noise-suppression devices.
 - f. Isolate inputs from external devices (such as pushbuttons) with opto-isolation modules.
 - g. Provide separate regulated power supply for each computer chassis.
 - h. Design control circuits so that one side of power supply is grounded to provide for testing.
 - i. Under no circumstances shall the safety circuits be affected by accidental grounding of any part of the system.
 - j. Design the system so that it will start properly when power is restored in the event of a power failure or interruption.
 - k. Provide system memory so that data is retained in the event of power failure or disturbance.
4. Power Supplies: UL or CSA recognized, with short-circuit protection.
5. Wiring: CSA labeled copper wires for factory wiring. Neatly route all wiring interconnections and securely attach wiring connections to studs or terminals.
6. Permanently mark components (relays, fuses, PC board, etc.) with symbols shown on drawings.
7. Provide extender boards when computing devices are used inside a computer chassis to facilitate access to the printed circuit cards utilized.
8. Use stable capacitor or crystals as the time base for electronic time-delay devices.
- H. Sleeves and Guards: 2" steel angle sleeves around cable or duct slots. Provide rope guards for all sheaves, all exposed cables, and cable slots.
- I. Machine and Equipment Support Beams: Structural steel beams required for direct support of elevator machine, deflector sheaves, overhead sheaves, governor, and dead-end hitches.
 1. Provide bearing plates, anchors, shelf angles blocking, embedments, etc., to support machine beams or equipment.

2. Provide hold down bolts for machines located beside the hoistway. Isolate machine and overhead sheave beams to eliminate noise and vibration transmission to building structure.
 3. Provide ladders and platforms for sheave maintenance.
- J. Governor: Centrifugal-type, car driven, with pull-through jaws and bi-directional electrical shutdown switches. Provide overhead supports required for attachment to building structure.
- K. Hoist Machine Drip Pans: Metal containers to collect lubricant seepage.
- L. Noise and Vibration Control:
1. To minimize noise and vibration in occupied areas, mechanically isolate elevator equipment (including hoist machines, deflector sheaves, power-conversion units and support equipment) from the structure; electrically isolate controllers, machine motors, and power conversion units.
 2. Limit noise level relating to elevator equipment and its operation to no more than 60 dBa in elevator cars under any condition including door operation and exhaust blower on highest speed.

2.06 HOISTWAY EQUIPMENT

- A. Guide Rails: Planed steel T-sections suitable for elevator travel, car weight, counterweight, and seismic reactions, with brackets for attachment to building structure. Provide intermediate counterweight tie brackets to meet Code requirements.
1. Elevator car and counterweight guide rail design to resist a horizontal force of not less than 30% of the operating weights for buildings with an $I = 1.0$ or 1.25 and 50% of operating weight for buildings with an $I = 1.5$. Supporting bracket design to resist a horizontal force of 50% of the operating weights for buildings with an $I = 1.0$ to 1.5 . Structural drawings and engineering calculations of elevator guide rail and supporting bracket which have been accepted and signed by Elevator Installer and their Structural Engineer will be submitted to OSHPD for approval prior to installation as a deferred approval.
- B. Buffers: Oil type with blocking and supports. Provide switch on buffers to limit elevator speed in down direction if buffer is compressed. Provide buffer access ladders and platforms.
- C. Sheaves: Machined grooves with ball or roller bearings. Provide mounting means to machine beams, machine bedplate, car and counterweight structural members, etc. Provide drip pans under deflector sheaves.
- D. Governor and Encoder Pit-Tensioning Sheaves: Mount sheaves and frames on pit support members or guide rails. Provide with guides or pivot points to enable free vertical movement and properly tension cables/tapes.
- E. Compensation: Wire rope with pit-mounted guide sheave assembly. Whisperflex-chain type with pit guide for Elevators No. (****CONSULTANT TO SPECIFY****) only. Pad areas where compensation may strike car or hoistway items.

- F. Counterweight: Steel frame with metal filler weights, guided by roller guide shoes (3 rollers per shoe). Provide dual counterweight derailment detectors.
- G. Counterweight Guard: Metal guard around counterweight in pit per Code.
- H. Hoist and Governor Ropes:
1. 8 x 19 or 8 x 25 Construction, traction steel type.
 2. Governor rope to suit Manufacturer's specification.
 3. Fasten with adjustable shackles.
- I. Normal and Final Terminal Stopping Devices: Per Code.
- J. Electrical Wiring and Wiring Connections: For general requirements refer to Division 16.
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 cabinets, junction boxes, or condulets. Provide 10% spare conductors throughout. Provide 4 pairs of shielded communication wires in addition to those required to connect specified items. Run spare wires from car connection points to individual elevator controllers in the machine room. Tag spares so they can be identified in the machine room.
 2. Conduit, Etc.: Painted or galvanized steel conduit and duct. Conduit size, ½" minimum. Do not use flexible conduit exceeding 36" in length. 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 cables from rubbing or chafing against hoistway or elevator equipment within hoistway.
 4. Life Safety: Connect smoke sensors, emergency communication system, jacks and speakers to designated point in machine room.
- K. Entrance Equipment:
1. Door Hangers: 2-point suspension with upthrust adjustment. Tire rollers so that no metal-to-metal contact exists.
 2. Door Tracks: Bar or formed, cold-drawn steel with smooth hanger contact surface. Provide removable tracks or track surface for replacement.
 3. Interlocks: Provide type operable without retiring cam. Paint interlocks flat black.
 4. Closers: Spring, counterweight or spirator type.
- L. Pit Stop Switch: Per Code. Provide safety interlock switch on pit access door on Elevator No. (**CONSULTANT TO SPECIFY**) per Code.
- M. Floor Numbers: Stencil painted 4" high floor numbers within the hoistway per Code.

2.07 HOISTWAY ENTRANCES

- A. Complete entrances bearing UL fire labels.
 - 1. Elevators No. (**CONSULTANT TO SPECIFY**): 4'- 0" wide x 7'- 0" high single speed, center opening.
 - 2. Elevators No. (**CONSULTANT TO SPECIFY**): 5'- 0" wide x 7'- 0" high two speed, center opening.
 - 3. Elevator No. (**CONSULTANT TO SPECIFY**): 6'- 0" wide x 7'- 0" high two speed, center opening.
- B. Frames: Hollow metal, bolted together fabricated from not less than 14-gauge material to form a one-piece unit. Show 2" jamb and head depth and profiles on approval drawings. Permanently attach handicapped floor designations 2" high, raised 0.030", with lettering, style, and color selected by the University's Representative, 60" above the floor. Stick-on or riveted plates are unacceptable.
- C. Door Panels: 16-gauge steel, sandwich construction without binder angles. Provide leading edges of center-opening doors with rubber astragals to cushion closing impact. Provide a minimum of 2 gibs per door panel, one at leading and one at trailing edge with gibs in the sill groove their entire length of travel.
- D. Sight Guards: 14-gauge material, same material and finish as hoistway entrance door panels.
- E. Sills: Extruded aluminum.
- F. Sill Support Angles: Structural or formed shape designed to support sill without need for grouting.
- G. Fascia, Toe Guards and Hanger Covers: 14-gauge furniture steel with Manufacturer's standard painted finish. Provide fascia for rear entrances. Make hanger covers same width as fascia.
- H. Struts and Headers: Provide for support of entrances and related material. Provide door open bumpers on entrances equipped with vertical struts.
- I. Finishes of Frames and Doors: Stainless steel, satin finish.

2.08 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.
 2. Landing Call: Hold open time adjustable between 3 and 8 seconds. Use landing call timing when responding to coincidental calls.
- O. Elevator Car Stations:
1. Two, opposite-hand elevator control stations without faceplates, consisting of a metal box containing the operating fixtures, mounted behind the car enclosure swing front return panels on Elevators No. (**CONSULTANT TO SPECIFY**). Two opposite-hand control stations flush mounted in side walls adjacent to front returns for Elevators No. (**CONSULTANT TO SPECIFY**). Stations shall

consist of a metal box to contain the operating fixtures mounted on a single piece swing out panel. Locate stations for Elevator No. (**CONSULTANT TO SPECIFY**) one front, one rear in opposite corners.

2. Suitably identify floor buttons, alarm button, door open button and emergency stop switch by tactile symbols per A.D.A. Handicapped Standards, CCR, Title 24 including Braille. Locate operating controls no higher than 54" (front approach) 48" (side approach) above the car floor; 35" for stop switch and alarm button.
3. Provide $\frac{1}{8}$ " raised floor pushbuttons which illuminate to indicate call registration. Include $\frac{3}{4}$ " high designation of the floors served in face of button.
4. Provide alarm button at bottom of station to ring bell located on elevator and activate call request on intercom system.
5. Provide red emergency stop switch or button at bottom of station to interrupt power supply independently of regular operating devices. Maintain registered calls, if emergency feature actuated, and continue normal service after power restored. Arrange switch or button to activate call request on intercom system when actuated. Mark device to indicate "run" and "stop" positions.
6. Provide door open button to stop and reopen closing doors. Make button operable while car is stopped at landing, regardless of special operational features (except firefighters' service).
7. Provide one firefighters' service key switch with engraved instructions per local requirement, light jewel, buzzer and call cancel button.
8. Firefighters' telephone jack.
9. Provide lockable service panel with recessed, flush cover plate matching return panel. Include the following controls with purpose and operating positions identified by engraved letters painted black:
 - a. Inspection switch, conforming to the Code, for disconnecting automatic operation, limiting the car speed and activating hoistway access switch when car is at terminal landing.
 - b. Light switch.
 - c. 3-position exhaust blower switch.
 - d. Independent service switch to permit selection of independent or automatic operation.
 - e. Start button for closing doors and starting elevator when operating on independent service. (Floor pushbuttons may be used for this function.)
 - f. Duplex 120VAC, electrical convenience outlet.
 - g. Cab lighting dimmer switch if incandescent lights provided.
 - h. Card reader override switch (Elevators No. (**CONSULTANT TO SPECIFY**)).

10. Provide black paint filled engraving with size and style approved by the University's Representative as follows:
 - a. "No Smoking" over main car stations.
 - b. Elevator number over main and auxiliary car stations.
 - c. Elevator capacity in pounds over main car station.
 - d. Emergency Communication Cover Plate: Locate on inside face to read:
 - 1) "Should the elevator doors fail to open or if the elevator becomes inoperative: Please do not become alarmed. Please use the button marked "Alarm" or Emergency Communication Cover Plate to summon assistance. Remain in the car until assistance arrives and do not attempt to force doors open."
 11. Optional Medical Emergency Switch (Elevators No. ****CONSULTANT TO SPECIFY****): Keyed switch and blue light jewel in control station. When activated, pressure on desired floor button will allow express travel to that floor. Light jewel will illuminate when elevator is in Medical Emergency mode.
 12. Door Hold Open Button (Elevators No. ****CONSULTANT TO SPECIFY****): Operates to extend door hold open period up to 30 seconds to facilitate patient, equipment and material transfers. Cancel extended time by registration of car call or actuation of door close button.
 13. Install optional security card reader unit in main car operating station of Elevators No. ****CONSULTANT TO SPECIFY**** only. Provide necessary mounting hardware and protective guard to prevent damage to unit from cart movement.
- P. Car Top Control Station: Per Code.
- Q. Emergency Exits: Per Code with electrical shutdown contacts.
- R. Work Light and Duplex Plug Receptacle: Top and bottom of elevator car. Provide lights with on-off switch and bulb guard.
- S. Emergency Communication Systems:
1. Allen Tel Model No. GB31454-ADA, or equal, no known equal, Hands free emergency communication system, engraved instructions, LED light and telephone cabinet in each car with shielded wiring to machine room controller. Engrave inside face of box cover with elevator number and building name. Mount cover recessed and flush, with hairline joints.
 2. Firefighters' telephone jack in each car and firefighters' panel, with 4 shielded source wires extended to machine room junction box for firefighters' 2-way communication system.
 3. At University's option, provide intercom station without faceplate adjacent to telephone cabinet. See Division 16 ****CONSULTANT TO SPECIFY**** for requirements and operational descriptions.

2.09 CAR ENCLOSURES

- A. Pedestrian Elevators No. (**CONSULTANT TO SPECIFY**) Provide the following features.
1. Shell: Reinforced 14-gauge furniture steel with baked enamel interior finish. Apply sound-deadening mastic to exterior. Provide mastic applied plastic laminate frieze from top of wall panels to canopy in color selected by University's Representative.
 2. Top: Reinforced 12-gauge furniture steel with hinged exit openable from car top only. Finish with white, reflective baked enamel.
 3. Front Return Panels and Integral Entrance Columns: 14-gauge stainless steel, satin finish. Swing entire unit on concealed hinges or pivots for access to integral car station wiring and fixtures. Secure in closed position with concealed 3-point latch. Provide cabinets with flush doors for service controls and cab telephone, and cutouts for pushbuttons, etc.
 4. Transom: Stainless steel, satin finish.
 5. Car Door Panels: Same construction as hoistway door panels. Interior finish to be stainless steel, satin finish.
 6. Base: 6" high stainless steel No. 4 finish with concealed ventilation cutouts.
 7. Cab Side and Rear Walls: Plastic laminate wrapped demountable wall panels with aluminum edge trim. See drawings for wall panel design and segmentation. Plastic laminate to be Nevamar #S-2-63T, Wilsonart, or equal, as selected by University's Representative textured APP. Provide bumper at bottom, Type WP-3.
 8. Ventilation: 2-speed exhaust blower mounted on isolated rubber grommets, Morrison Products, Model AA with a diffuser and grille, or equal, no known equal.
 9. Lighting: Indirect fluorescent continuous on sides and rear of ceiling pendant.
 10. Suspended Ceiling: Fabric wrapped panels in "Xorel" by Carnegie, or equal, no known equal. See drawings for ceiling arrangement and fastening requirements.
 11. Handrails: 4" x 3/8" flat stainless steel, brushed satin bars mounted on both sides and rear of the cab interiors. Locate top handrail line at a height of 34" above the cab floor. Bolt through the cab walls from the back to 1-1/2" deep round stainless steel standoff spacers no more than 18" O.C. Handrails shall be removable from inside the cab. Return handrail ends into cab walls.
 12. Pads and Buttons: 3-section removable pads covering walls and front returns. Provide cutouts to access on car station.
 13. Certificate Holder: Stainless steel with heavy plastic protective cover.
- B. Patient Elevators No. (**CONSULTANT TO SPECIFY**): Provide the following features:

1. Shell: Reinforced 14-gauge furniture steel with baked enamel interior finish. Apply sound-deadening mastic to exterior. Provide mastic applied plastic laminate frieze from top of wall panels to canopy in color selected by University's Representative.
 2. Top: Reinforced 12-gauge furniture steel with hinged exit operable from car top only. Finish with white, reflective baked enamel.
 3. Front Return Panels and Integral Entrance Columns: 14-gauge stainless steel, satin finish.
 4. Flush Side Wall Car Stations: Swing entire unit on concealed hinges or pivots for access to integral car station wiring and fixtures. Secure in closed position with concealed 3-point latch. Provide cabinets with flush doors for service controls and cab telephone, and cutouts for pushbuttons, etc.
 5. Transom: Stainless steel, satin finish.
 6. Car Door Panels: Same construction as hoistway door panels. Interior finish to be stainless steel, satin finish.
 7. Base: 6" high stainless steel No. 4 finish with concealed ventilation cutouts.
 8. Cab Side and Rear Walls: Plastic laminate wrapped demountable wall panels with aluminum edge trim and inserts per drawings. Plastic laminate to be Nevamar #S-2-63T color as selected by University's Representative textured APP, Wilsonart, or equal. Provide bumper at bottom, Type WP-3.
 9. Ventilation: 2-speed exhaust blower mounted on isolated rubber grommets, Morrison Products, Model AA with a diffuser and grille, or equal, no known equal.
 10. Lighting: Indirect fluorescent continuous on sides and rear of ceiling pendant. Provide fluorescent fixture with lexan plastic lens in center of ceiling per drawings. Lenses to be approved by University's Representative.
 11. Suspended Ceiling: Fabric wrapped panels in "Xorel" by Carnegie, or equal, no known equal. See drawings for ceiling arrangement and fastening requirements.
 12. Handrails: 4" x 3/8" flat stainless steel, brushed satin bars mounted on both sides and rear of the cab interiors. Locate top handrail line at a height of 34" above the cab floor. Bolt through the cab walls from the back to 1-1/2" deep round stainless steel standoff spacers no more than 18" O.C. Handrails shall be removable from inside the cab. Return handrail ends into cab walls and car operating stations.
 13. Pads and Buttons: 3-section removable pads covering walls and front returns. Provide cutouts to access on car station.
 14. Certificate Holder: Stainless steel with heavy plastic protective cover.
- C. **Service Elevators No. (**CONSULTANT TO SPECIFY**):**
1. Shell: Reinforced 16 gauge rigidized (5WL) stainless steel. Apply sound-deadening mastic to exterior. Provide 10'- 0" clear shell inside.

2. Top: Reinforced 12 gauge furniture steel with hinged exit openable from car top only. Finish with white, reflective baked enamel.
3. Front Return Panels and Integral Entrance Columns: 16 gauge rigidized stainless steel.
4. Flush Side Wall Car Stations: Swing entire unit on concealed hinges or pivots for access to integral car station wiring and fixtures. Secure in closed position with concealed 3-point latch. Provide cabinets with flush doors for service controls and cab telephones, and cutouts for pushbuttons, etc.
5. Transom: 16 gauge rigidized stainless steel with cutouts for car position indicator.
6. Car Door Panels: Same construction as hoistway door panels. Interior face to be rigidized (5WL) stainless steel finish.
7. Base: Rigidized stainless steel with concealed ventilation cutouts.
8. Ventilation: 2-speed exhaust blower mounted on isolated rubber grommets, Morrison Products, Model AA with a diffuser and grille, or equal, no known equal.
9. Lighting: Minimum of four (4) dual tube fluorescent fixtures flush mounted in ceiling canopy with protective lenses.
10. Bumpers: $\frac{5}{4}$ " x 8" solid maple bumpers located at 12" and 48" above the floor. Anchor bumpers at maximum 18" centers with 2 recessed stainless steel bolts. Bumpers shall be finished with a clear sealer and shall be removable from inside the cab.
11. Certificate Holder: Stainless steel with heavy plastic protective cover.

2.10 LANDING CONTROL STATIONS

- A. Pushbuttons: Provide risers flush mounted as shown. Include pushbuttons for each direction of travel which illuminate to indicate call registration. Engrave safety message, "In Case of Fire" as indicated on drawings in pushbutton faceplate and fill black.
- B. Hoistway Access Switches: Mount in entrance frame side jamb at top and bottom terminals. Provide fixture without faceplate. (Alternately, locate in sight guard of terminal floor hoistway doors).
- C. Medical Emergency Stations: Provide one (1) riser mounted above hall pushbutton stations on Elevators No. (**CONSULTANT TO SPECIFY**). Include momentary key switch, engraved blue bezel, blue light jewel and engraved instructions for activating the service.
- D. Emergency Return Switch and Box: Mount in the primary fire return floor lobby call button faceplate and identify purpose with permanent engraving. Provide flush-mounted box with lockable hinged cover below call button to contain keys and instructions for emergency use of elevators. Box faceplate material to be similar to call button faceplate and contain engraved legend "Emergency Only" in $\frac{1}{2}$ " letters. Service keys per Local Fire Authority requirements.

2.11 SIGNALS

- A. Hall Lanterns: Provide at each entrance to indicate travel direction of arriving elevator to waiting passengers. Illuminate indicators with shielded lights, and sound electronic tone mechanism mounted in a metal box fastened in the wall. Illuminate up or down lights and sound tone (twice for down direction travel) at least 4 seconds prior to car arrival at floor. Illuminate light until the elevator doors start to close. Provide arrow lenses with faceplates.
- B. Car Position Indicator: Digital indicator type representing the floor served and the direction of car travel. (Located above each car operating station). When a car leaves or passes a floor, illuminate numeral representing position of car in hoistway. Illuminate proper direction arrow to indicate the direction of travel. Use LED or vacuum-fluorescent type units.
- C. Machine Room Display Unit: Provide VDU monitor and input control in machine room. Include displays and functions to facilitate monitoring for equipment maintenance and adjustment.

2.12 GROUP CONTROL AND INDICATOR PANELS

- A. Provide operating equipment and switches for Elevators, as outlined hereafter in stainless steel cover plate and/or VDU display.
- B. Fire Command Room Panel: Include the following:
 - 1. Key-operated on/off switch and pilot light for each elevator. When placed in "off" position, return elevators nonstop to designated floor and park with doors open. Illuminate pilot light to indicate cars in service. Identify each switch by permanently engraved car number and function.
 - 2. Special operation switches, etc., required by these Specifications, including standby power selection switches, medical emergency, security override, etc. Identify each switch by permanently engraved car number, and function.
 - 3. Car position and direction indicators for each elevator (digital readout or VDU display type). Identify each readout position indicator by permanently engraved car number.
 - 4. Other indicators such as load bypass and seismic operation. Engrave identification, positions, and fill with black paint. Provide wiring to control panel (remote conduit specified elsewhere).
 - 5. Wiring to panel. (Conduit from closest elevator hoistway of each group, specified elsewhere).
 - 6. Firefighters' telephone jack.
- C. Firefighters' Switch and Box: Flush-mounted station and box with lockable hinged cover for firefighters' service per Local Fire Authority requirements.

PART III - EXECUTION

3.01 SITE CONDITION INSPECTION

- A. Prior to beginning installation of equipment, examine hoistway and machine room areas. Verify that no irregularities exist which affect execution of work specified.
- B. Do not proceed with installation until work in place conforms to project requirements.

3.02 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in Manufacturer's original, unopened protective packaging.
- B. Store material in original protective packaging. Prevent soiling, physical damage, and wetting.
- C. Protect equipment and exposed finishes during transportation, erection, and construction against damage and stains.

3.03 INSTALLATION

- A. Install each equipment item in accordance with Manufacturer's direction, all applicable Codes, and Specifications.
- B. Install machine room equipment with clearances in accordance with referenced Codes and Specifications.
- C. Install items so they may be easily removed for maintenance and repair.
- D. Install items so that access for maintenance is safe and readily available.
- E. Install equipment to afford maximum safety and continuity of operation in the event of seismic activity.
- F. Clean the following items of oil, grease, scale, and other foreign matter, 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.
 - 3. Neatly touch up damaged factory-painted surfaces with original paint and color. Protect machine-finish surfaces against corrosion.

3.04 ADJUSTMENTS

- A. Align guide rails vertically with tolerance of $1/16$ " in 100'. Secure joints without gaps and file any irregularities to a smooth surface.
- B. Balance cars to equalize pressure of guide shoe rollers on rails.
- C. Lubricate all equipment in accordance with Manufacturer's instructions.

- D. Adjust motors, generators, brakes, controllers, leveling switches, limit switches, stopping switches, door operators, interlocks and safety devices, etc., to achieve required performance levels.
- E. Fabricate and assemble various parts in shop to minimize field assembly. Assemble parts which require close field fit in the shop and mark for field erection.

3.05 CLEANUP

- A. Keep work areas orderly and free from debris during progress of project. Remove packaging materials on a daily basis as equipment is installed.
- B. Remove all loose materials and filings resulting from work.
- C. Clean machine room equipment and floor of dirt, oil and grease.
- D. Clean hoistways, cars, car enclosures, entrances, operating and signal fixtures, and trim of dirt, oil, grease, and finger marks.

3.06 ACCEPTANCE INSPECTION AND TESTS

- A. General: Furnish labor, materials, and equipment necessary for tests. Notify University's Representative 10 days in advance when ready for final review of each elevator unit or group. (Final acceptance of installation will be made only after all field-quality control reviews have been completed, identified deficiencies have been corrected, all submittals and certificates have been received, and the following items have been completed to satisfaction of University's Representative).
 - 1. Workmanship and equipment comply with Specification.
 - 2. Contract speed, capacity and floor-to-floor performance comply with Specification.
 - 3. Performance of following are 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.
 - 4. Test Results:
 - a. In all test conditions, obtain specified speed, performance times, floor accuracy without releveling, and ride quality to satisfaction of the University's Representative.

- b. Temperature rise in windings limited to 50°C above ambient. Conduct a full-capacity, 1-hour running test, stopping at each floor for 10 seconds in up and down directions, if equipment performance is questionable in University's Representative's opinion.
- B. Performance Guarantee: Should tests reveal defects, poor workmanship, variance or noncompliance with requirements of specified Codes and/or ordinances, or variance or noncompliance with the requirements of specifications, complete corrective work to satisfaction of University's Representative at no cost:
 - 1. Replace equipment that does not meet Code or Specification requirements.
 - 2. Perform work and furnish labor, materials and equipment necessary to meet specified operation and performance.
 - 3. Perform and assume cost for retesting required by Governing Code Authority and University's Representative to verify specified operation and/or performance.

3.07 TRAINING PROGRAM

- A. Provide 1 day (8 hours) of orientation and training to University staff selected by University's Representative on basic features, elevator operation, emergency features, proper reporting of accidents and elevator shutdowns and maintenance of equipment.

3.08 UNIVERSITY'S INFORMATION

- A. Before final acceptance of the installation, Contractor shall submit the following information in conjunction with the requirements of Division 1 concerning the new equipment installed for the University's job file:
 - B. Wiring Diagrams: Four sets of "as installed" straight-line wiring diagrams showing the electrical connections of all equipment and all modifications to control circuits. One set of straight-line wiring diagrams shall be reproducible original. A legend sheet shall be furnished with each set of drawings to provide the following information:
 - 1. Name and symbol of each relay, switch or other apparatus.
 - 2. Location on drawings, drawing sheet number and area, and location of all contacts.
 - 3. Location of apparatus - whether on controller, or on car, etc.
 - 4. Provide one complete set of working straight-line wiring diagrams of "as-installed" elevator circuits, with index of location and function of components. Mount installation wiring diagrams on panels, racked, or similarly protected, in elevator machine room. Maintain with addition of all subsequent changes. These diagrams are University's property.
- C. Shop Drawings: Provide two (2) copies of all "final" corrected equipment fabrication, construction, and installation drawings.
- D. Operation and Maintenance (O&M) Manuals: Provide three (3) neatly bound and indexed sets of O&M manuals containing the following:

1. Sequence of operation and/or flow charts of the motion and supervisory controllers and related operating equipment. Include logic diagrams for all individual and group microprocessors.
2. Operation and maintenance instructions, consisting of detailed application data and instructions for all equipment components, including car, corridor and remote signal/control fixtures.
3. Lubrication program, including recommended procedures and frequency. Provide list giving original manufacturer's grades and part numbers for all cleaners and lubricants to be used.
4. Illustrated parts catalogs for all replaceable parts, including ordering forms and instructions. **NOTE:** If a given component is made up of smaller parts, the smaller parts shall also be clearly identified by number.
5. Summary of contract data for each type of equipment furnished, including quantities and part numbers.
6. Step-by-step installation and adjusting procedures, as used by equipment manufacturer's and Elevator Installer's field personnel, for each type of equipment furnished. This shall include, but not be limited to, complete data and settings for the following:
 - a. Motion controllers: Power conversion and drive unit adjustments, including relay air gaps, current operated relays, overload relays, timed circuits, acceleration and deceleration patterns and all other field-adjustable settings.
 - b. Dispatching controller: Electronic devices, timed circuits, etc., including data and procedure to change field-programmable microprocessor settings.
 - c. Motors: Air gap, compounding, neutral setting and all other necessary adjustments.
 - d. Machine brake: Shoe clearance, core clearance, brake switch, and all other adjustments necessary to give a satisfactory functioning brake.
 - e. Selectors, encoders, tach generators, etc.
 - f. Governor: Over-speed switch and jaw trip settings, rope pull-through adjustment.
 - g. Hoistway switches, inductors, transducers, vanes, cams, etc.
 - h. Terminal landing slow-down device.
 - i. Leveling/re-leveling units.
 - j. Load weighing devices: Settings and load compensation adjustments.
 - k. Safeties: Clearance to rails, releasing carrier pull-out in pounds and adjustment of safety-operated switch.

- l. Guide shoes: Roller guide spring tension and stop settings.
 - m. Door operator: Door operator motor, control switches, cams, rheostats, potentiometers and resistors.
 - n. Car and hoistway doors: Door hangers, closers, inter-locks, clutches, pick-up and drive rollers, and car door restrictors.
 - o. Door protective devices: Focusing, testing, adjusting and maintenance procedures.
 - p. Communications, annunciating, monitoring and security systems.
 - q. Battery-powered, emergency lighting units.
- E. Diagnostic Test Equipment and Instructions, including diagnostic test device together with one set of all supporting information necessary for interpretation of test data and troubleshooting of system. The instruction period for use of the controller diagnostics and interpretation of test results by University's Representative shall not be less than four hours for the work included under this Section.
- F. Two complete replacement sets of all controller circuit boards including program boards as applicable.
- G. The final elevator installation shall be a design that is able to be maintained by any licensed elevator maintenance company without the need to purchase or lease diagnostic devices or special tools from the original equipment manufacturer. As a condition of this installation, the original manufacturer shall guarantee to sell and deliver on a timely basis, within seventy-two hours maximum, equipment to a third party maintenance company or University's Representative any replacement parts as needed at a fair market price. Installed equipment not meeting this requirement shall be removed and replaced with conforming equipment at no cost to the University.

END OF SECTION 14210