

SECTION 14210

TRACTION ELEVATORS

**PART 1 –GENERAL**

1.01 SUMMARY

- A. This section shall apply to both conventional geared machine (CGM) and machine room less (MRL) elevators as applicable.
- B. General
  - 1. All labor, materials, plant appliances, equipment incidental to fabrication, furnishing, delivery and installation of elevator shall be provided.
  - 2. Full maintenance service shall be provided for 12 months following acceptance by Owner.
  - 3. During the full maintenance portion of contract the Elevator Contractor is to submit a monthly report to Stanford University School of Medicine Project Manager.
- C. Requirements of the GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS and Division 1 apply to work of this Section.

1.02 RELATED WORK - SPECIFIED ELSEWHERE

- A. Hoistway shall be provided framed and enclosed, including pit, overhead height, support for rail brackets, and pit ladder. Ventilate hoistway in accordance with applicable code requirements.
- B. Bevel cants not less than 75° from the horizontal on any rear or side wall ledges and beams that project or recess 2" or more into the hoistway. Not required on hoistway divider beams.
- C. Machine or controller room, properly enclosed and ventilated, shall be provided. The Machine Room door is to be keyed to the SOM / Campus keyway.
- D. (MRL) Hoist machine supports including two (2) additional horizontal supports above the top terminal landing on the machine side of the hoistway. Locate as required for selected providers' equipment.
- E. (MRL) Hoist machine ventilation, heating, and/or cooling. Maintain minimum temperature of 55°F, maximum 90°F at the location of the hoist machine or as required by the selected manufacturer.

- F. Sill support angles shall be provided. Door sill and entrance frames shall be grouted.
- G. All cutting and patching of surfaces constituting final finish shall be provided.
- H. Smoke detectors in elevator lobbies, machine or controller rooms, and at the top of the elevator hoistway where sprinkler are installed shall be provided per CCR Title 8.
- I. Division 16 - Electrical: provision of electrical items as follows:
  - 1. Light and a convenience outlet in elevator pit and overhead machine space (MRL).
  - 2. 3-phase power supply to machine room controller.
  - 3. Separate GFCI 20 amp 120 VAC fused disconnect with ground connected to controller.
  - 4. Fire alarm and smoke detector systems.
  - 5. Communications and raceway systems.
  - 6. Feeders, including fused mainline disconnect switch in machine room.
  - 7. Conduits between machine room and hoistway.
  - 8. Outlets in hoistway and at controller for car lights and fan.
  - 9. Telephone circuits to studs on controller.
- J. Adequate support for guide rails.
- K. A sump pit and a protective grating level with the pit floor shall be provided.
- L. Divider beams and pit screens between elevators for multiple car groups.
- M. Conduit runs for remote monitoring systems where required.
- N. A fire extinguisher, ADC rated and tagged, must be permanently mounted in the elevator mechanical room.

### 1.03 REFERENCES

- A. Applicable Codes:
  - 1. American National Standard, Safety Code for Elevators and Escalators (ASME A17.1 - 1996)
- B. California Coded of Regulations (CCR)
  - 1. Title 8
  - 2. Title 24
- C. National Electric Code (NEC)
- D. California Building Code (CBC)

E. Americans with Disabilities Act (ADA)

F. Palo Alto Title 15

G. Arrange and pay for inspections by governing authorities and obtain operating permits.

#### 1.04 SUBMITTALS

##### A. Shop Drawings:

1. Scaled and Fully Dimensioned layouts: Plan of pit, hoistway and machine room indicating equipment arrangement, elevator section of hoistway, details of car enclosures and entrances, etc.
2. Space requirements, general arrangement of elevator equipment, and material being supplied shall be clearly indicated. Connections, attachments, reinforcing, anchorage and location of exposed fastenings, and locations and amount of loads and reaction to be carried on the building structure shall be shown.
3. Power confirmation sheets; Include motor horse power, code letter, starting current, full load running current, and demand factor for applicable motors.
4. Finish material: Submit samples.
5. Fixtures: Submit elevations and detail drawings.
6. All drawings showing structural attachments (rails, clips, fish plates, brackets, machine tie downs, controller tie downs, etc.) shall be stamped by a Certified Engineer and accompanied by a calculation booklet showing how methods of attachment have been achieved.

##### B. Contract Closeout Submittal

1. Operations and Maintenance: After completion of work, three copies of final control wiring diagrams, parts list, description of operating data and other information required for proper maintenance, repairs and adjustment of the equipment installed shall be submitted. At the conclusion of the job, mount a complete set of wiring diagrams including a definition of all nomenclature and symbols on the machine room wall in a suitable frame or laminated in clear plastic. The mounting method must be reviewed by School of Medicine E&M Shop. Submit three copies of all applicable keys for normal operation.

C. Respond to drawing mark-up within 21 days of return; promptly incorporate required changes due to inaccurate data or incomplete definition so that delivery and installation schedules are not affected. Revision response is not justification for delivery or installation delay.

#### 1.05 WARRANTY

A. Provide a special project warranty signed by Contractor, Installer and Manufacturer, agreeing to replace/repair/restore defective materials and workmanship of elevator work that may develop within one (1) year from final date of completion and acceptance of the

entire elevator installation. "Defective" is hereby defined to include, but not by way of limitation, operation of control, system failures, performance 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.

- B. A list of ALL "special tools" is to be provided to Stanford University, School of Medicine Project Manager.

#### 1.06 MAINTENANCE SERVICE

- A. Initial Full Service Maintenance: Provide 12 months of semi-monthly maintenance service during the warranty period, by trained mechanics. Maintenance shall commence upon completion and acceptance of all elevator work and shall include examination, adjustment, greasing, oiling, parts replacement due to normal use. Provide 24 hour call back complete maintenance for all installed equipment.
- B. Provide a monthly report to Stanford University School of Medicine Project Manager showing date and time of semi-monthly service, services done and parts replaced.

### PART 2 – PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURES

- A. Manufacturers and Products: ThyssenKrupp Elevator Corp.; KONE Inc.; Otis Elevator Co.; Schindler Elevator Corp.; Mitsubishi Electric.
- B. Passenger elevator car and/or entrances shall be manufactured by elevator manufacturer or Hauenstein and Burmeister, or the Tyler Elevator Products or approved equal.
- C. The entire elevator installation shall be manufactured, installed and maintained by the acceptable manufactures listed.

#### 2.02 SUMMARY

- A. Passenger Elevator
  - 1. Rated Capacity: 3500 Pounds<sup>1</sup>
  - 2. Rated Speed: 350 FPM
  - 3. Total Travel: Refer to Drawings
  - 4. Floors Served: Refer to Drawings
  - 5. Number of Openings: Refer to Drawings

<sup>1</sup> Palo Alto Title 15 states that all buildings constructed after 1/4/1990 must have at least one elevator that will accommodate a gurney (24" x 82") and two (2) emergency response personal. This is either a custom 2500 lb car or an industry standard 3500 lb car.

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|-------------------------|--|
| 6. Platform Size:       | 7'-0"wide X 6'-2"deep  |
| 7. Inside Clear Size:   | 6'-8"wide X 5'-5"deep <sup>2</sup>   |
| 8. Clear Height of Car: | 8'-0" to underside of canopy   |
| 9. Door Size:           | 3'-6" wide X 7'-0"tall 2   |
| 10. Operation:          | Selective Collective – single car groups<br>Duplex- two car groups<br>Group Automatic – three or more car groups |

B. Operating and Signal Fixtures:

1. Car operating panel, flush telephone device and service cabinet
2. In car direction lanterns - for single car group: mount in each car entrance jamb, total of two per car entrance.
3. Hall position indicator: Provide where in car direction lanterns are provided
4. Hall direction lanterns - for multiple car groups: wall mounted, one per hoistway entrance,
5. Combination hall direction lantern/position indicator at main floor lobby where hall lanterns are provided.
6. One riser of hall buttons per group of elevators per landing
7. Fire key panel at ground floor
8. Digital position indicators inside car and at main floor lobby
9. Independent service in car
10. Emergency Battery Lowering device
11. Keyed Hoistway Access switches at top and bottom landings.

C. Provisions for Handicapped

1. The uppermost button necessary for operation of the elevator shall be located no higher than forty-eight inches (48") from the floor. An emergency stop switch and alarm bell button shall be not less than thirty-five inches (35") from floor. Hall buttons shall be forty-two inches (42") from finished floor to centerline
2. Flush mounted Telephone shall be located below operating buttons, service cabinet above. **For warranty and service needs, phones must be obtained from Stanford Communication Services (non-negotiable). (1) outside telephone line will be provided by Stanford that reports directly to the SHC Security / Dispatch office.**
3. Flush mounted Braille symbols and raised Arabic numerals shall be provided on car stations and door frames.
4. Lanterns shall sound a gong once for up travel and twice for down travel.

D. Earthquake Protection:

1. Rail assemble shall be designed so that it will resist a vertical and horizontal acceleration of 0.5 G.

<sup>2</sup> See Product Design Criteria Sheet for specific size requirements.

2. Steel retainer plates 1/4" minimum thickness shall be provided under roller guides. The retainer shall clear the rail by 3/16" under normal operation.
3. Operation Under Earthquake Conditions: Provide seismic operation in accordance with CCR Title 8. Provide a dual ring and string, continuously monitoring type counterweight displacement device for each counterweight with rings mounted on diagonal corners of frame. Provide a seismic switch device measuring both horizontal and vertical accelerations for each group of elevators located per manufacturer's recommendations.

## 2.03 MATERIALS

### A. Steel:

1. Sheet Steel (furniture steel for Expose work): Stretcher-leveled, cold-rolled commercial quality carbon steel, complying with ASTM A366, matte finish.
2. Sheet Steel (for Unexposed Work): Cold-rolled, commercial quality carbon steel.

### B. Stainless Steel: Type 302 304 or 430 (when SmokeGuards are used) to comply with ASTM A167, with standard tempers and harness required for fabrication, strength and durability. Apply mechanical finish on fabricated work in the locations shown or specified. Texture and reflectivity required to match Architects' sample. Protect with adhesive paper covering.

1. No. 4: Stainless steel directional polish (satin finish) Graining direction is longest dimension.3
2. Patterned: Rigidized Metal's No. 5 WL or accepted equal.

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

### D. 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.

### E. 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 filler coat over uneven surfaces. Sand smooth and apply a final coat of mineral paint.

### F. Baked Enamel: Primer per "E" above. Apply and bake 2 additional coats of enamel in the selected solid color.

## 2.04 PERFORMANCE

### A. Speed: +/- 5% of contract speed under any loading condition.

### B. Capacity: Safely lower, stop and hold up to 125% of rated load.

- C. Stopping Accuracy:  $\pm 1/4$ " under any loading condition.
- D. Door Opening Time: Seconds from start of opening to fully open.
  - 1. Side opening 42": 3.1 seconds
  - 2. Center opening 48": 2.5 seconds
  - 3. Average Speed 2.5 feet per second
- E. Floor-to-Floor performance Time: Seconds from start of doors closing until doors are 3/4 open and car level and stopped at next successive floor under any loading condition or travel direction. (Based upon 12'-0" of travel).
  - 1. Single Slide Doors up to 42" wide: 11.1 seconds
  - 2. Center Opening Doors up to 48" wide: 10.1 seconds
- F. Operating Qualities: Architect and Owner will judge riding quality of cars and enforce the following requirements. Make all necessary adjustments.
  - 1. Transition: Starting and stopping shall be smooth and comfortable. Slowdown, stopping and leveling shall be without jars or bumps.
  - 2. Full Speed: Riding shall be free from vibration and sway.
  - 3. Car Enclosure: Squeaks and rattles are unacceptable. All joints shall be light proof.
  - 4. Airborne Noise: Measured noise level of elevator equipment and its operation shall not exceed 60 dBA inside car under any condition including door operation and car ventilation exhaust blower on its highest speed. Limit noise level in the machine room relating to elevator equipment and its operation to no more than 80 dBA. All dBA readings to be taken 3'-0" off the floor and 3'-0" from the equipment using the "A" weighted scale.

## 2.05 OPERATION

- A. General: Provide a microprocessor based control system including maintenance tools and supporting software documentation required for the complete maintenance of the entire system including diagnostics and adjusting. Maintenance tool may be hand held or built into control system<sup>3</sup> and shall be of the type not requiring recharging or reprogramming nor of the automatic destruct type. The tool and supporting software may be programmed to operate only with this project's identification serial numbering.

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<sup>3</sup>This spec. point will change depending on finish selection. #4 satin stainless steel is standard. #8 polish stainless steel is an option as well as bronze finishes.

B. Approved microprocessor-based, single car or group dispatch, car and motion control systems as follows:

1. Otis: Elevonic
2. Schindler: Miconic
3. ThyssenKrupp: TAC-50
4. KONE: KCM 831
5. MCE: Motion 4000
6. Elevator Controls: V900 AC

C. Selective Collective Operation – Single Car Groups;

1. Pressure upon one or more Car Buttons will send the car to the designated landings in the order in which the landings are reached by the car, irrespective of the sequence in which the buttons are pressed, provided the hoistway door interlock and car door switch circuits are completed. During this operation, the car will also answer calls from the landings, which are in the prevailing direction of travel. Each landing call will be canceled when answered.
2. Pressure upon a Hall Button at a floor above the car location will cause the car to start Up and answer any Up calls as they are reached by the car irrespective of the sequence in which the buttons had been pressed. The car will not stop at floors where Down buttons only had been pressed. If no further Car or Up Hall calls are registered, the car will reverse its direction preference for response to Car Calls or Down Hall calls.
3. The car will start Down to answer calls below the car and will not stop where Up calls only are registered. When traveling Up, the car will reverse at the highest call and proceed to answer calls below it. When traveling Down, the car will reverse at the lowest call and answer calls above it.
4. Should both an Up and a Down call be registered at an intermediate landing, only the call corresponding to the direction in which the car is traveling will be canceled upon the stopping of the car at the landing. Terminal limit switches will be provided in the hoistway designed to automatically stop the car at or near the closest terminal landing.

D. Duplex Selective Collective Operation – Two Car Groups:

1. Operate cars without attendants from pushbuttons in cars and located at each floor. When cars are available, park one car at main floor (“home” car). Park other car where last used (“free” car).
2. Respond to car calls and hall calls above main floor using the “free” car. Once a car has started, respond to registered calls in the direction of travel and in the order the floors are reached.
3. 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.
4. Slow cars and stop automatically at floors corresponding to registered calls in the order in which they are approached in either direction of travel. As slowdown is initiated for a hall call, automatically cancel hall call. Cancel car calls in the same



- manner. Hold car at arrival floor an adjustable time interval to allow passenger transfer.
5. Answer calls corresponding to direction in which car is traveling unless call in the opposite direction is the highest (or lowest) call registered.
  6. When the free car is clearing calls, start home car to respond to:
    - a. A call registered on home car pushbuttons.
    - b. An up hall call registered below free car.
    - 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.
  7. When both cars are clearing calls, stop only one car in response to any registered hall call. Return the first car to clear its calls to main floor. Should last service required bring both cars to main floor, the first arriving car becomes the free car.
  8. Illuminate appropriate pushbutton to indicate call registration. Extinguish light when call is answered.
- E. Group Automatic – Multiple \Car Groups: Operate cars as a group capable of balancing service and providing continuity of group operation with one or more cars removed from the system.
1. Register calls from pushbuttons located at each floor and in each car. Slow cars and stop automatically at floors corresponding to registered calls. Make stops at successive floors for each direction of travel irrespective of order in which calls are registered except when bypassing hall calls to balance and improve overall service; stop only one car in response to a particular hall call. Assign hall calls to specific cars and continually review and modify those assignments to improve service. Simultaneous to initiation of slow down of a car for a hall call, cancel that call. Render hall pushbutton ineffective until car doors begin to close after passenger transfer. Cancel car calls in the same manner. Give priority to coincidental car and hall calls in car assignment.
  2. Operate system to meet changing traffic conditions on a service demand basis. Include provisions for handling traffic which may be heavier in either direction, intermittent or very light. As traffic demands change, automatically and continually modify group and individual car assignment to provide the most-effective means to handle current traffic conditions. Provide means to sense long-wait hall calls and preferentially serve them. Give priority to coincidental car and hall calls in hall call assignment. Accomplish car direction reversal without closing and reopening doors.
  3. Use easily reprogrammable system software. Design basic algorithm to optimize service based on equalizing system response to registered hall calls and equalizing passenger trip time to shortest possible time.
  4. Serve floors below main floor in a manner which logically minimizes delay in passing or stopping at main floor in both directions of travel. Provide manual means to force a stop at the main floor when passing to or from lower levels.
  5. Required Features:

- a. Dispatch Protection: Backup dispatching shall function in the same manner as the primary dispatching.
  - b. Delayed Car Removal: Automatically remove delayed car from group operation.
  - c. Position Sensing: Update car position when passing or stopping at each landing.
  - d. Hall Pushbutton Failure: Provide multiple power sources and separate fusing for pushbutton risers.
6. Communication link: Provide serial or duplicate communication link for all group and individual car computers.

F. Independent Service:

1. A switch will be provided for selecting Independent Service Operation. When this switch is turned to the "ON" position, all previously registered car and hall calls for that car will be canceled and the car will be transferred automatically to Independent Service for operation by an attendant.
2. The car will park with its doors open. Closing of the doors and starting of the car will be subject to constant pressure on a car button until the car starts in motion. After the car is in motion, the button may be released and the car will automatically proceed to and stop at the landing for which the closest car call has been registered. Upon arrival at the floor, all registered car calls will be canceled and the doors will automatically open (assuming power operated doors have been proposed). During this operation, the control system will not accept Hall calls.

G. Multiple Door Timing: Circuitry will be provided to independently adjust the door times when the car is stopping in response to a Car Call versus a Hall Call. Door open times will further be reduced upon interruption of the Electronic Door Protection.

H. Door Obstruction Signal: An audible signal will be furnished which will sound after a predetermined, adjustable time if the door is held open. This audible signal will operate in conjunction with electronic door protection and will sound continually until the obstruction is removed.

I. Reduced Speed Closing: If, after a predetermined and adjustable time, and the car door is held open an audible signal will sound and the door will close at a reduced speed as long as the obstruction is present. If the obstruction is not removed, the door will continue to try and close until the obstruction is either removed or until the expiration of a preset time, at which the door will stop. After the obstruction is removed, the door will either reopen or continue to close after a Car/Hall call button or Door Open/Close button is pressed.

J. Motor Control:

1. Equipment: Capable of operating at plus or minus ten percent of normal feeder voltage and plus or minus three percent of feeder frequency without damage or interruption of elevator service.
  2. Control System: Closed loop feedback control incorporating positional and velocity selector system that is capable of operating continuously at contract speed and load for one hour without exceeding 50 degrees Centigrade from ambient machine room temperature. Design system to not adversely affect stability of voltage and frequency controls of emergency generator set or loads connected to emergency power bus during standby power operation.
  3. Car Load Sensing:
    - a. The control system shall sense the actual load condition of the elevator prior to any movement of the elevators. The start/acceleration pattern shall be adjusted to reflect the carload to achieve a smooth start/acceleration under all load conditions and location in the hoistway.
    - b. Provide load-sensing devices that utilize crosshead deflection or hoist rope pressure. System shall be accurate within 100 pounds and stable over extended periods.
    - c. Systems using pre-torquing of the D.C. motor armature are acceptable; variable voltage control of the brake energization is not acceptable.
- K. Standby Lighting and Alarm: Car-mounted, battery unit with solid-state charger to operate alarm bell and lighting, per Code. Battery to be rechargeable. Provide a test switch in service cabinet of car station which causes illumination of standby lighting bulbs. Design to operate normal car lighting fixtures. Light units mounted in car front returns or operating panels are not acceptable.
- L. Battery Standby Power Transfer – *provide where emergency generator power is not available:*
1. Upon loss of normal power, provide controls to automatically run the car(s) at inspection speed to the nearest landing, up or down, depending upon load in the car. Upon arrival at the nearest landing, the elevator doors shall open automatically and remain open until regular door time has expired. The elevator shall then become deactivated. The standby power source shall be provided via 12-volt D.C. battery units installed in control room, including solid-state charger, inverter, fail safe controls, and testing means mounted in a common metal container. Battery to be rechargeable lead acid or nickel cadmium with a 10-year life expectancy.
- M. Standby Power Source – *provide where emergency generator power is available:*
1. In the event normal power fails, provide controls to automatically lower the car nonstop to the lowest landing using DC battery power source installed in machine room. Include solid-state charger and testing means mounted in a common metal container. Provide rechargeable lead acid or nickel cadmium

battery. Contractor to provide dry contact(s) at disconnect for connection of this unit.

2. Upon failure of normal power, lower elevators to landing, open doors automatically, hold open until regular door time has expired, then close doors and shut elevator down.

N. Operation of Car Under Fire Emergency Conditions:

1. Provide Phase I fire Recall Switch at Main Floor Elevator Lobby. Switch at Main Floor shall be integrated into hall push button station with engraved instructions.
2. Provide Phase II Fire Recall Switch in Main Car Operating Panel. Switch and jewel to be located at the top row of buttons with engraved instructions adjacent.
3. All key locks shall be manufacturer's standard.

O. Automatic shut down of car light and ventilation: Car interior lights and exhaust fans shall be provided with the necessary control to automatically turn these devices off if the elevator has no calls for a predetermined period of time. Lights and fans shall automatically turn on again when a call is registered. Provide a switch located in the service cabinet to allow for automatic or manual control of this feature.

## 2.06 MACHINE OR CONTROL ROOM EQUIPMENT

- A. Motor control: The motor control system on all elevators shall be Variable Voltage Variable Frequency (VVVF/AC) type suitable for the operation specified and capable of providing smooth, comfortable acceleration, retardation and dynamic braking, limiting the difference in speed between full load and no load to not more than five percent (5%) of the contract speed above the full load speed. Provide premium efficiency motors if available.
- B. *(CGM)* Geared Traction Machine: Single worm geared traction type mounted in proper alignment on an isolated bedplate.
- C. Provide analog, closed loop motor-control signal tach generator on each hoist machine.
- D. 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.
- E. *(CGM)* Governor: Centrifugal type, car driven, with pull-through jaws. Electrical shutdown and any required overhead supports which are additional to building structure shall be provided.
- F. Controller:
1. The Controller will control starting, stopping and prevent damage to the motor from an overload or from excess current. It will automatically cut off the power

supply and bring the car to rest in the event of operation of any of the safety devices.

2. The controller will be enclosed in a vented cabinet within the Machine Room.
3. The type of starting furnished will be solid state.
4. Provide externally mounted permanently identified junction boxes on controller cabinets for termination of communication circuits.

## 2.07 WIRING

- A. General: Provide all necessary wiring between car, machine rooms and control stations with 15% spares throughout, minimum of four. Furnish shielded wires in cables for all communication. Included two additional pairs of shielded for each car.
- B. Permanently mark components (relays, fuses, PC board, etc.) with symbols as shown on drawings.
- C. All wiring shall have a flame-retardant, moisture-resistant outer cover and shall be run in metal conduit, flexible metallic tubing or wire ducts.
- D. Terminal blocks in machine rooms, hoistways, and on cars shall be tag coded to identify the circuits.
- E. Alarm Gong: Six-inch size; provide on top of each car to be activated by corresponding alarm button or emergency stop switch.

## 2.08 HOISTWAY EQUIPMENT

- A. *(MRL)* Gearless Traction Hoist Machine:
  1. AC induction or P.M.S.M. VVVF/AC gearless traction type motor with brake, drive sheave, and deflector sheave mounted in proper alignment on a common, isolated machine support frame at the top of the hoistway or mounted on the back of the guide rail at the top landing.
  2. Provide hoist machine mounted direct drive, digital, closed-loop velocity encoder. Provide premium efficiency motors.
- B. *(MRL)* Governor: Centrifugal-type, car driven with pull-through jaws and bi-directional shutdown switches. Provide required bracketing and supports for attachment to guide rail or machine support frame. Governor shall be self or electrically resetting and shall not require additional access.
- C. Guide Rails:
  1. Planed steel T-sections suitable for elevator travel, car weight and seismic reactions, with brackets for attachment to building structure. Minimum weight fifteen pounds (15#) per foot for both car and counterweight.
  2. Designed to span a minimum of 14'-0" and withstand a 0.5 G acceleration.

- D. Roller Guides: Adjustable spring loaded type, mounted at the top and the bottom of the car frame. Each roller guide assembly will consist of wheels arranged to maintain constant contact on dry, non lubricated rail surfaces.
- E. Buffers: Buffers of adequate number and size to fit within shown dimensions.

## 2.09 CAR EQUIPMENT

- A. Platform:
  - 1. All steel welded or steel frame with stringers and double wood floor, with fire proofing as required, minimum 1" exterior grade plywood.
  - 2. Provide extruded nickel silver threshold full width of entrance column.
  - 3. Finished flooring by Stanford.
- B. Car Frame: Welded or bolted, rolled or formed steel channel construction. Isolate platform from car frame by rubber pads and provided with jacking bolts for pad replacement.
- C. Car Sill: Extruded nickel silver (with extruded extension between entrance columns to face of cab front return)
- D. Toe Guard: Per code
- E. Car doors, hangers and tracks: Provide as specified for hoistway entrance doors, hangers and tracks.
- F. Header: Constructed of steel, shape to provide stiffening flanges.
- G. 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.
- H. Door Operator and Operation: A high-speed, heavy-duty DC master door operator capable of opening doors at no less than 2-1/2 f.p.s. and accomplishing reversal in no more than 2-1/2" of door movement. Open doors automatically when car arrives at floor to permit egress of passengers. Close doors automatically after a timed interval.
- I. Infrared Detector Device: Provide an infrared scanning type 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 (20-30 seconds), sound buzzer and attempt to close doors with a maximum of 2-1/2 foot pounds kinetic energy. Proximity type devices not acceptable.
- J. Car Interiors

1. Cab shell and canopy: 14-gage furniture steel, continuous from floor to ceiling.
2. Front return panels and integral entrance columns: 16-gage furniture steel. Swing entire unit on concealed hinges or pivots for access to integral car station wiring and fixtures. #4 stainless steel finish.
3. Car Door panels: Same construction as hoistway door panels. #4 stainless steel finish.
4. Wall Panels: Provide interior panels of 3/4" particle board core. Face and edge panels with patterned stainless steel.
5. Base: 4" high finish with #4 stainless steel.
6. Handrail: Provide handrail on rear wall of enclosure at 32" to top of rail above finish floor. Fabricate from 1-1/4" diameter stainless steel tube with brackets securely attached to walls with concealed fasteners. Design rail supports to withstand a 200 lb. load.
7. Ceiling: Provide manufacturer's standard suspended frame ceiling with flame retardant plastic diffusers. Provide a minimum of two, 2-lamp Stanford standard T-8 fluorescent lighting fixtures with "shatter shield" protection tubes.
8. Two speed fan power ventilation.
9. Car doors shall be #4 stainless steel, mounted on structural header, not on car enclosure. Two guides per panel shall be provided. Sight guards to match.
10. Car shall be sound isolated from car frame.
11. Outside of car shall be painted with 3/16-inch thick sound insulating material
12. Stainless steel pad hooks provided on side and rear walls along with heavy quilted protection pads.

K. Car Operating Panel (see School of Medicine Operating Panel Drawings)

1. One operating panel with applied faceplate containing the operating fixtures, mounted behind the car enclosure fixed front return panel.
2. Suitably identify floor buttons, alarm button, door open button and emergency stop button by engraved and painted letters or symbols per California Administrative Code, Title 24, the Americans with Disabilities Act (ADA) and ANSI A117.1. Locate operating controls no higher than 48" above the car floor and stop switch and alarm button at 35" above car floor.
3. Provide 1/8" raised floor pushbuttons which illuminate to indicate call registration. Call buttons to be 3/4 inch in the smallest dimension (minimum). Buttons to be raised (projected) and shall be of the illuminating type to indicate the registration of a Hall Call. Include designation of the floors served in face of button and on code compliant Braille. Floor designation characters to be a minimum of 2 inch high, raised 1/32 inch, upper case and accompanied by corresponding Braille indications.
4. Provide an alarm button at bottom of station to ring bell located on elevator.
5. Provide an emergency stop key switch at bottom of station to interrupt power supply independently of regular operating devices. Maintain registered calls, if emergency features actuated, and continue normal service after power restored. 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.
  7. Provide a lockable service panel with recessed, flush cover plate matching return panel. Cabinet door shall be provided with a flush glazed window of required size to hold elevator operating permit. Include the following controls:
    - a. Inspection key switch, per Code, for disconnecting automatic operation, limiting the car speed and activating hoistway access switch when car is at terminal landing.
    - b. Light Switch.
    - c. Two position fan switch.
    - d. Independent service switch to permit selection of independent or automatic operation.
    - e. Duplex 120 volt, AC, electrical convenience outlet.
    - f. Emergency light test switch
    - g. Selection switch for automatic or manual fan and light shut down.
    - h. One spare toggles
  8. Digital Position indicator above buttons.
- L. Car direction sign: include directional indications and an audible signal. The appropriate arrow will illuminate corresponding to the direction, which the car is set to travel. The audible signal will alert passengers in the car and at the landing to signal illumination, sounding once for UP and twice for DOWN. Two per elevator are required, one each mounted in the entrance columns.

## 2.10 SIGNALS

- A. Hall Push-button fixtures: Provide 1/8" raised stainless steel vandal resistant pushbuttons.
1. Main lobby landing will have direction of travel buttons, Firemen's Key Switch and Bezel with engraved instructions.
  2. Typical Floors will have direction of travel buttons with "In Case Of Fire..."instructions engraved upon the (Per Title 8 and 24).
  3. There will be only one (1) riser at each elevator landing per group of elevators.
- B. Hall position indicator: Provide digital type position indicator at main floor where in car direction lanterns are provided.
- C. Hall lantern: Provide a combination digital hall position indicator and hall lantern indicating travel direction and location of arriving elevator at the main lobby only and hall lantern only at typical floors. Illuminate indicators and sound an 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 type lens with faceplate.



- D. All signal fixtures are to be attached with vandal resistant screws and have a #4 stainless steel finish.
- E. Provide black paint filled engraving to meet applicable Code as follows:
  - 1. Elevator capacity in pounds on main car station
  - 2. Provide building location on near telephone.
  - 3. Provide instructions for Firemen's key operation on faceplate of service cabinet.
- F. Stanford Elevator number is to be posted at each floor and posted in each elevator. The elevator number is to be provided by the SOM E&M Shop.
- G. Car top control station: Per code.
- H. Emergency Exits: Per code with electrical shutdown contact.
- I. Work Light and a duplex plug receptacle: Top and bottom of elevator car. Provide lights with on-off switch and bulb guard.
- J. Where required for applicable code compliance, provide a Fire Key Control panel with a digital direction indicator, a controller shut off key switch and a fireman's key switch and jewel. Panel to be located as directed by Architect. Conduit and wire to remote location is by others.

## 2.11 HOISTWAY ENTRANCES

- A. Complete side or center opening entrances bearing UL fire labels.
- B. Frames: Hollow metal, fabricated and bolted from not less than 14-gage material to form a one-piece unit. Show jamb and head depth and profiles on approval drawings. Permanently attach handicapped floor destinations per Code. Stick-on or riveted plates are unacceptable.
- C. Door panels: No 16 gage steel, sandwich construction without binder angles. Provide a minimum of 2 gibs per door panel, one at the leading and one at the trailing edge with gibs in sill groove their entire length of travel.
- D. Sight Guards: 14 gage material, same material and finish as hoistway entrances door panels.
- E. Sills: Extruded Aluminum<sup>4</sup>

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<sup>4</sup> Sills could be extruded Nickel Silver as well. The benefit is longer wear, heavier loads however there is a cost associated.

- F. Fascia, Toe Guard and Hanger coves: No. 14 gage furniture steel with Manufacturer's standard paint finish.
- G. Struts and Headers: Provide for support of entrances related material. Provide door open bumpers on entrances equipped with vertical struts.
- H. Locate Access Switches in entrance jambs at terminal landings. Only the bezel of this switch shall be showing.
- I. Finish of Frames and Doors: #4 Stainless Steel.

## PART 3 – EXECUTION STOP

### 3.01 MAINTENANCE

#### A. General

1. Maintenance service shall be provided on entire elevator equipment package described herein for one (1) year after the date of acceptance by Stanford. Maintenance shall include semimonthly, emergency twenty-four (24) hour call-back service, and regular time service calls for examination, adjustment, and lubrication to keep elevator in safe operation and at top performance.
2. Monthly service reports submitted to facilities zone management office, which shows Date and time semi-monthly service was done, what parts/materials were installed, and what services were performed.

#### B. Performance Standards:

1. Maintain the performance standard set forth in this Specification.
2. Maintain smooth starting and stopping, smooth riding qualities and accurate leveling at all times.
3. During the maintenance period the Elevator Contractor shall perform work without removing cars during peak traffic periods.

#### C. Elevator Shutdowns

1. Should any elevator become inoperative, repair within 24 hours of notification of such failure. Breakdown of major components shall be complete and service restored within 72 hours.
2. Failure to comply with above, Owner may order the work done by other contractors at the Contractor's expense.

- D. Maintenance Data: After completion and prior to acceptance, submit three (3) sets of complete and accurate maintenance data specific for each elevator. Final payment will not be made until received.

- E. Final Service and Inspection: Two weeks before expiration of the year's maintenance, the equipment shall be lubricated, fully serviced, adjusted to the standard designated and emergency service operation devices shall be checked. A complete inspection will be made and the elevator units accepted by Stanford University School of Medicine Project Manager, and School of Medicine Engineering & Maintenance Shop, and the Elevator Service Contractor.

### 3.02 FIELD QUALITY CONTROL

- A. Regulatory Agencies Inspection: Upon completion of elevators, Contractor shall provide instruments, weights and personnel to conduct test required by regulatory agencies. The Contractor shall submit a complete report describing the results of the tests.
- B. Examination and Testing: When installation is ready for final acceptance, notify and assist Owner in making a walk-through review of entire installation to assure workmanship and equipment complies with contract documents. Provide equipment to perform the following tests:
  - 1. One hour heat and run test with full load in car. Perform for one car of each duty.
    - a. Stop car at each floor in each direction.
    - b. Provide well-shielded thermometers for motor and verify that temperatures do not exceed 50 degrees Centigrade above ambient.
    - c. Performance and leveling tests shall be made before and after heat and run test.
  - 2. Check and verify operation of all safety features and special operations.
- C. Correction: Make corrections to defects or discrepancies at no cost to Owner. Should discrepancies be such that re-examination and re-testing is required, all costs including those of Owner's representative fees shall be paid for by the Elevator Contractor.
- D. Final Acceptance: Final acceptance of the installation will be made only after all corrections are complete, final submittals and certificates received and the Owner is satisfied and the installation is complete in all respects. Final payment will not be made until the above is completed.

### 3.03 COMMISSIONING OF ELEVATORS

- A. Final Cleaning
  - 1. Elevator hoistways and all equipment therein shall be cleaned and left free of rust, filings, welding slag, rubbish, loose plaster, mortar drippings, extraneous construction materials, dirt, and dust. Include walls, building beams, sill ledges, and hoistway divider beams.
  - 2. Care shall be taken by workers not to mark, soil, or otherwise deface existing or new surfaces. Clean and restore such surfaces to their original condition.
  - 3. Clean down surfaces and areas which require final painting and finishing work. Cleaning includes removal of rubbish, broom cleaning of floors, removal of any

loose plaster or mortar, dust, and other extraneous materials from finish surfaces, and surfaces that will remain visible after the work is complete.

B. Stanford's review requirements

1. Contractor shall perform review and evaluation of all aspects of its work prior to requesting Stanford's final review. Work shall be considered ready for Stanford's final contract compliance review when all Contractor's tests are complete and all elements of work or a designated portion thereof are in place and elevator or group of elevators are deemed ready for service as intended.
2. Furnish labor, materials, and equipment necessary for Stanford's review. Notify Stanford five (5) working days in advance when ready for final review of elevator or group of elevators.
3. Stanford's written list of observed deficiencies of materials, equipment, and operating systems will be submitted to Contractor for corrective action. Stanford's review shall include as a minimum:
  - a. Workmanship and equipment compliance with Contract Documents.
  - b. Contract speed, capacity, floor-to-floor, and door performance comply with Contract Documents.
  - c. Performance of following is satisfactory:
    - 1) Starting, accelerating, running
    - 2) Decelerating and stopping accuracy
    - 3) Door operation and closing force
    - 4) Equipment noise levels
    - 5) Signal fixture utility
    - 6) Overall ride quality
    - 7) Performance of door control devices
    - 8) Operations of emergency two-way communication device
    - 9) Operations of firefighters' service
    - 10) Operations of seismic devices
    - 11) Operations of special security features and floor lock-off provisions
4. Test Results:
  - a. In all test conditions, obtain specified contract speed, performance times, stopping accuracy without re-leveling, and ride quality to satisfaction of Stanford. Tests shall be conducted under both no load and full load condition.
  - b. Temperature rise in motor windings limited to 50° Celsius above ambient. A full capacity one (1) hour running test, stopping at each floor for ten (10) seconds in up and down directions, may be required.

- C. Performance Guarantee: Should Stanford's review identify defects, poor workmanship, variance or noncompliance with requirements of specified codes and/or ordinances, or variance or noncompliance with the requirements of Contract Documents, Contractor

shall complete corrective work in an expedient manner to satisfaction of Stanford at no cost as follows:

1. Replace equipment that does not meet code or Contract Document requirements.
  2. Perform work and furnish labor, materials, and equipment necessary to meet specified operation and performance.
  3. Perform retesting required by Governing Code Authority or Stanford.
- D. A follow-up final contract compliance review shall be performed by Stanford after notification by Contractor that all deficiencies have been corrected. Provide Stanford with copies of the initial deficiency report marked to indicate items which Contractor considers complete. If additional reviews are required due to Contractor's gross non-compliance with initial and follow-up deficiency reports, Stanford shall bill Contractor at normal billing rates plus expenses, and Contractor acknowledges it will pay for additional compliance reviews.

END OF SECTION