

DIVISION 14 – CONVEYING EQUIPMENT

Includes the following sections:

[14 20 00 Elevators](#)

[14 24 23 Hydraulic Passenger Elevator](#)

ELEVATORS	14 20 00
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GENERAL REQUIREMENTS

For buildings over two-stories with substantial equipment located on the rooftop, the Design Professional shall consult the University's Representative to verify requirements for elevator access to the roof for maintenance purposes. If the elevator is to extend to the roof, an exit path to the stair shall be required.

For hydraulic elevators, neither hydraulic pump nor motor shall be submersible.

Elevator machine room shall be located adjacent to the elevator. Provide a hook-up phone line in the machine room.

Remote hydraulic stations are not acceptable. If a remote station is required, obtain written approval from the University's Representative.

Biodegradable oil may be used, but it must be submitted for approval by the University's Representative.

Preferred finish of elevator cab interiors is brushed stainless steel.

Refer to the University's Standard Specification Section 14 24 23 - Hydraulic Passenger Elevator

HYDRAULIC PASSENGER ELEVATOR**14 24 23**

The following standard specification is intended to be edited according to the specifics of the project. Brackets [] and areas shaded in gray [e.g. format] indicate requirements that are optional depending upon the type of system being provided or per instructions associated with the [] and project requirements. Consult with University's Representative and campus stakeholders.

SECTION 14 24 23 Hydraulic Passenger Elevator

PART 1 - GENERAL

1.1. SECTION INCLUDES

- A. [Enter scope of work - Example: Conversion and modernization of an existing Hydraulic Freight Elevator to a Holeless Hydraulic Passenger Elevator, dual jack, front opening] – Scope of work to be defined herein. Description of Elevator to be modernized is as follows:
1. [Elevator Location] Freight Elevator – ID#072 – In ground Hydraulic
- B. General Description of Work
1. Elevator design and construction shall be considered design/build per UCSC standards and performance requirements outlined below.
 2. [Upgrade (if upgrading elevator)] elevator controls, doors, frame, platform and safety system to passenger classification
 3. Present general characteristics of the elevator, including duty, speed, capacity, travel, stops and openings, shall be upgraded or retained.
 4. Contractor shall complete all work according to all applicable codes, laws and guidelines as modified by any federal, state or local jurisdictional authority.
 5. Contractor shall complete all work according to the terms of the Americans with Disabilities Act (ADA), as modified by state or local authority. Wherever there is a conflict between federal ADA and state or local ADA modifications, the more stringent rule shall apply.
 6. Contractor shall complete all work according to accepted industry standard practices at all times.
 7. Wherever Contractor, University, jurisdictional authority, or any other party discovers that work has been completed which does not comply with any of the above, Contractor shall correct the work at no charge to University, whether or not final payment has been made under the Agreement.
- C. Not Included in this section is the following work by other trades, requiring coordination by the elevator contractor:
1. HVAC: Contractor shall supply heat output information for new equipment to be installed for the purposes of performing the following work:
 - a. Temperature: The elevator machine room shall maintain an ambient temperature between 50 and 90 degrees Fahrenheit with relative humidity not to exceed 85% based on scheduled heat generation.
 2. Security:

- a. In-Car Card Reader: University shall supply a security card reader which allows operation of the elevator. The security termination will be in the elevator machine room. Contractor shall install wiring from the termination in the machine room to the elevator cabin adjacent to the control panel. The card reader will be provided and installed by the security contractor.

3. Communication:

- a. In-Car Communication: University shall supply one dedicated phone service per elevator to be terminated in the elevator machine room. Contractor shall install wiring from the unit to the phone jack in the machine room. This phone line shall not be used for any Elevator Remote Monitoring Capability offered by Contractor.

Reference specification section 27 32 23 - ELEVATOR TELEPHONE for further information.

4. General:

- a. University shall allow access to elevator, elevator machine room, and hoistway as needed during the project according to the project schedule and agreed-upon building operational requirements.
- b. Machine/Secondary Room Door(s): The elevator machine room and any secondary room doors must be self-closing and locking and shall be fire rated per applicable code. The elevator machine room door should be appropriately labeled (Example: ELEVATOR MACHINE ROOM – Authorized Personnel Only). The machine room door will be both self-closing and locked.
- c. Fire Extinguisher: Provide a code-approved ABC Type fire extinguisher in the machine room. Current extinguishers are acceptable as long as they are kept current.
- d. Recesses and Setbacks: The Safety Code for Elevators and Escalators does not permit hoistway recesses or setbacks more than 4 inches on sides not used for loading and unloading unless they are necessary for the installation of elevator equipment. Any existing hoistway recesses or setbacks greater than 4 inches may require the projection to be beveled at an angle not less than 75 degrees with the horizontal. In this case, no recesses or setbacks were observed and no work will be required.
- e. Cutting and Patching: Contractor shall be responsible for all cutting, coring, rough patching and finish patching required during the project. Refer also to Architectural drawings and specifications.
- f. Pit Drainage: No alteration to pit drainage will be required as a result of this project.

1.2. RELATED SECTIONS SPECIFIED ELSEWHERE

- A. Division 26 Electrical
- B. Fire and Life Safety
- C. Section 01 81 13 for LEED requirements
- D. Division 01 for submittal and other procedural requirements.
- E. Section 27 23 32 - Elevator Telephones

1.3. REFERENCES

- A. ICC/ANSI A117.1 Accessible and Usable Buildings and Facilities
- B. ADAAG - Accessibility Guidelines for Buildings and Facilities
- C. ANSI/NFPA 70, National Electrical Code
- D. CEC California Electrical Code, Current Edition
- E. CBC California Building Code, Current Edition
- F. ANSI/NFPA 80, Standard for Fire Doors and Fire Windows
- G. ASME/ANSI A17.1, Current adopted edition. Safety Code for Elevators and Escalators.
- H. California Code of Regulations – Title 8 – Elevator Safety Orders

1.4. DEFINITIONS

- A. University: University of California at Santa Cruz
- B. Contractor: The General Contractor and his/her Subcontractors (which includes the Elevator Contractor) awarded the project and contracted to perform the work.

1.5. ACCEPTABLE ELEVATOR INSTALLERS

- A. Elevator Service Co.
- B. Schindler Elevator Co.
- C. Otis Elevator Co
- D. Thyssen/Krupp
- E. Ascent Elevator
- F. Kone, Inc.

1.6. PERFORMANCE/OPERATIONAL REQUIREMENTS

- A. Contractor shall be solely responsible for design and installation, to ensure the elevator is installed so that they operate at all times according to all applicable codes, laws and guidelines, including ADA, as modified by any Authority Having Jurisdiction.
- B. All upgrades and equipment installations as required to upgrade the elevator to a passenger elevator.
- C. Arrange elevator components in the machine room so equipment can be removed for repairs or replaced without dismantling or removing other equipment components.
- D. Provide complete design and installation services for the elevator and all its components for a complete and operational assembly.
- E. Contractor shall insure that the elevator is installed so that it operates according to all aspects of this specification. Any special operations shall be demonstrated to the University Representative as soon as they are installed. In the event that the operation does not work according to the specification, the Contractor shall make corrections at no charge to University.

F. Elevator Description:

1. Elevator Equipment: Holeless Hydraulic Passenger Elevator.
2. Type: Holeless, besides the-car. Telescoping dual cylinder
3. Service: Passenger Service elevator – Class C3 loading
4. Quantity of Elevators: [Enter quantity]
5. Landings: [Enter landings]
6. Openings: [enter #] Front Openings, [enter #] Back Openings
7. Travel: [enter travel height]
8. Rated Capacity: [enter capacity] lbs
9. Rated Speed: [enter speed] fpm
10. Clear Inside Dimensions (W x D): [enter dimensions] (Maximize based on existing hoistway)
11. Cab Height: As required due to ceiling clearance requirement.
12. Clear height under suspended elevator ceiling: [enter height]
13. Entrance Width & Type: [enter width] (Maximize), [enter type]
14. Entrance Height: [enter height]
15. Main Power Supply: [enter power supply] Volts, three-phase
16. Operation: Microprocessor Single Car Automatic Operation with Onboard Diagnostic Capabilities
17. Machine Room: [enter location] Adjacent to Hoistway
18. Control Space Location: [enter location] Adjacent Machine Room
19. Elevator Equipment shall conform to the requirements of seismic zone: Site specific seismic requirements S_s =[enter #] g, S_1 =[enter #] g
20. Security Feature: Card-reader operation
21. Maintenance Service Period: 12 Months min.

1.7. SUBMITTALS

A. Submittals

1. Provide submittals in accordance with the requirements specified in Division 1 Submittals

2. Following project engineering, Contractor shall immediately commence engineering the project and producing approval drawings and/or submittals for the project.
 - a. In all cases, the Contractor shall submit layout drawings for all fixtures to be installed, to include car stations, hall stations, car or hall lanterns, fire control panel, Braille plates, key switches, equipment locations, cab and door dimensions etc.
3. Product Data of all materials being used. Product Data: Submit manufacturer's product literature for each proposed system.
 - a. Cab design, dimensions and layout.
 - b. Layout, finishes, and accessories and available options.
 - c. Controls, signal, operating system and emergency phone.
 - d. Color selection charts for cab and entrances
4. Shop Drawings:
 - a. Clearances and travel of car.
 - b. Clear inside hoistway and pit dimensions.
 - c. Large scale layout of car-control station
 - d. Location and layout of equipment and signals.
 - e. Car, guide rails, buffers and other components in the hoistway.
 - f. Maximum rail bracket spacing.
 - g. Maximum loads imposed on building structure.
 - h. Hoist beam requirements.
 - i. Location and sizes of access doors.
 - j. Location and details of hoistway door and frames.
 - k. Electrical characteristics and connection requirements.
5. Project Material Cost Data
6. Project Data for Regional Materials
7. Project Data for Recycled Content
8. Written certification of installer's experience. Submit as outlined in the submittal requirements
9. Vibration and Seismic Controls
10. Electrical Wiring Diagram

1.8. QUALITY ASSURANCE

- A. Submit qualifications as a submittal in accordance with Division 1 submittal requirements.
- B. Manufacturer Qualifications: Minimum 10 years' experience in installing elevator equipment of the types specified. At least one full-time mechanic service route with units solely within 30 miles of the subject property. At least 1,000 elevators serviced by the office to be responsible for the project and subsequent service.
- C. Regulatory Requirements:
 1. Elevator design, clearances, construction, quality of work, materials, and installation, unless specified otherwise, shall be in accordance with California Code of Regulations – Title 8 – Elevator Safety Orders according to authority listed in 1.3, and according to

all applicable codes, laws and guidelines.

1.9. DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product.
- B. Examine materials delivered to the site for concealed damage or defects in shipping. Defects shall be noted and reported in writing.
- C. Store elevator materials in a protected environment in accordance with manufacturer recommendations. Do not store products in location with conditions outside manufacturer's absolute limits.

1.9. PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by the manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10. WARRANTY

- A. For any work performed under the Agreement, Contractor warrants the work to be free from defect for a period defined in Division 1, including both material and labor. Should any repair or other work exhibit problems, whether the work was performed under the Agreement or under separate proposal, Contractor shall endeavor to make immediate correction of the failure or problem at no additional charge to University.

1.11. MAINTENANCE SERVICE

- A. Contractor shall provide warranty maintenance for a period of one (1) year from the turnover of the elevator for beneficial use to the University. The cost for this maintenance shall be included in the Contractor's modernization price.
- B. Maintenance service shall be performed according to the terms, conditions, and scope of work of the University's existing elevator maintenance contract.
- C. The maintenance service on the subject elevator shall terminate on the one year anniversary of the turnover of the elevator, and shall not extend past that date in any way.

PART 2 - PRODUCTS

- A. **[Add if Elevator is being upgraded] - EQUIPMENT TO BE MODERNIZED AND OR CONVERTED: The following products shall be installed, replaced, modified, repaired or refurbished, upgraded as noted herein.**
- B. Contractor shall be fully responsible for a complete turnkey project in relation to the items contained below. All subcontractors shall be approved by University and shall meet all requirements, including requirements for insurance, indemnity and other contract requirements which are required of Contractor in this specification and the resulting contract documents.
 - 1. Electrical – Contractor shall supply electrical requirements for new equipment to be installed for the purposes of performing the following work:

- a. Main Line Disconnect(s): Contractor shall provide all power to the elevator systems, according to the requirements of the new equipment. This shall include a mainline disconnect switch for each elevator equipment which shall be fused and lockable in the open position, including fuses as applicable. A ground wire shall be provided and distributed within the machine room to each elevator controller. Contractor shall review the power requirements for the new elevator system to verify the existing building electrical system shall be sufficient to operate the new elevator system. Existing branch and feeder wiring in the machine room shall be reviewed by Contractor and upgraded as needed per code and equipment requirements. If needed, Contractor shall adjust the position of any drop locations as needed to accommodate a new machine room equipment layout. In this case, it is expected that a new disconnect will be required.
- b. Car Lighting: Provide 120V single phase fused and lockable disconnect switch per elevator with feeder wiring to each controller to control elevator car lights and fans. These are not currently in existence and will be required.
- c. Machine Room Lighting: Illumination of elevator machine rooms shall not be less than 19 foot-candles at the floor level. The light fixture(s) shall be LED and externally guarded to prevent contact and accidental breakage. The lighting control switch shall be located within easy reach of the access point to the elevator machine room. Where the elevator machine room is directly accessed by a door, the light switch shall be located on the strike side of the door. The existing lighting does appear to be sufficient and properly guarded.
- d. Machine Room GFCI Outlets: Provide 120V 15 or 20 ampere duplex GFCI protected outlets to each machine room (no GFCI outlets currently exist).
- e. Pit Lighting: Illumination of elevator pits shall not be less than 10 foot-candles. The light fixture(s) shall be LED and externally guarded to prevent contact and accidental breakage. The pit lighting fixture shall be weatherproof (NEMA 4) if located less than 48 inches above the pit floor and the wiring shall be identified for use in wet locations. The current pit lighting does appear to be sufficient.
- f. Pit Light Switch: An illuminating pit light switch shall be so located as to be easily accessed from the elevator opening at the bottom landing. Where sprinklers are located in the elevator hoistway, the pit light switch fixture shall be weatherproof (NEMA 4) if located less than 48 inches above the pit floor and the wiring shall be identified for use in wet locations. In this case, new illuminating pit light switches shall be supplied.
- g. GFCI Outlet - Pit: Provide a 120V 15 or 20 ampere duplex GFCI protected outlet in each hoistway pit. Where sprinklers are located in the elevator hoistway, the pit GFCI outlet fixture shall be weatherproof (NEMA 4) if located less than 48 inches above the pit floor and the wiring shall be identified for use in wet locations. Contractor to verify that the outlet in the elevator pit is operational and meets code.
- h. Battery Raising/Lowering Signal: Provide an auxiliary contact on the mainline disconnect switch to signal the controller in the event of loss of power to the mainline switch. This can sometimes be added to an existing disconnect switch but often requires installation of a new switch.

2. Fire and Life Safety

- a. Smoke Detectors: The Safety Code for Elevators and Escalators requires

automatic elevator recall operation upon activation of a smoke detector in an elevator machine room, elevator hoistway and/or any elevator lobby. The elevator lobby main recall floor smoke detector must provide an independent signal to the elevator control system to recall affected elevators to an alternate recall floor. Smoke detectors located in elevator machine rooms and hoistways require a special signal to the elevator control system that initiates flashing of the in-car fire hat indicator in addition to elevator recall operation. In the event that the elevator machine room is located on the same floor as the main recall floor, a signal from the fire system is required to initiate flashing of the in-car fire hat indicator as well as alternate floor recall operation. Smoke detectors in elevator hoistways are required when sprinklers are located in the hoistway higher than 24 inches above the elevator pit floor. Where elevators have a hoistway smoke detector at or below the bottom floor, a signal from the fire system is required to initiate flashing of the in-car fire hat indicator as well as alternate floor recall operation. When elevators do not share a common hoistway, where applicable, a smoke detector is required in each hoistway. When elevators do not share a common machine room, a smoke detector is required in each elevator machine room.

- b. Elevator Machine Room and Hoistway Sprinklers: In some jurisdictions, sprinklers in elevator machine rooms and/or elevator hoistways located higher than 24 inches above the pit floor must be accompanied by heat detectors to automatically disconnect main line power prior to the application of water. This is commonly referred to as “shunt trip operation”. The Electrical Code requires that no provision shall be made to open or close the disconnecting means from any other location than the elevator equipment room and that following shunt trip operation power shall only be restored by manual means. Shunt trip operation will be required on this project.
- c. Pit Sprinklers: Wherever possible, pit sprinklers should be located within 24” of the pit floor.
- d. At this property, the current layout of fire and life safety systems is as follows:
 - i. Elevator Machine Room(s): [enter if sprinklers and smoke detectors are required]
 - ii. Hoistways: [enter if sprinklers and smoke detectors are required]
 - iii. Pits: [enter if sprinklers and smoke detectors are required]
 - iv. Lobbies: [enter if sprinklers and smoke detectors are required]
- e. Based on the above, the following Fire and Life Safety work will be required:
 - i. Elevator Machine Room(s): [enter specific requirements]
 - ii. Hoistways: [enter specific requirements]
 - iii. Pits: [enter specific requirements]
 - iv. Lobbies: [enter specific requirements]
- f. Fire Control Panel: The elevator project will require an elevator fire recall operation (return to egress floor automatically when fire alarm is activated, and when power is lost,) and may require the installation of additional smoke detectors and/or heat detectors, modifications. Elevator contractor shall coordinate all new requirements with the new fire control panel installation.

- g. Inside car emergency light if machine fails
 - h. Emergency Return System: Reynolds and Reynolds UV2 Powervato, factory installed and wired on the elevator controller
- C. General:
- 1. Pit Ladder: Elevator pits that extend more than 35 inches below the sill of the pit access door require a fixed vertical ladder of noncombustible material located within reach of the pit access door. The ladder shall extend not less than 48 inches above the sill of the access door. The steps shall be a minimum of 16 inches wide and shall be spaced 12 inches on center. The pit ladder must have a clear distance of not less than 7 inches from the centerline of the steps to the nearest object behind the ladder. Contractor shall ensure the elevator pit ladder meets all of these requirements.
- D. Cab Interiors
- 1. Cab interiors (floors, walls and ceiling) **[shall be replaced with new]**. The University shall select new materials from elevator supplier's standard selection unless materials are noted otherwise:
 - 2. Steel Cab
 - a. Cab Style: **[enter cab style. Example: Steel Cab Series]**
 - b. Car Wall Finish: **[enter wall finish. Example: Brushed stainless steel]**
 - c. Car Front Finish: **[enter front finish. Example: Brushed stainless steel]**
 - d. Car Door Finish: **[enter door finish. Example: Brushed stainless steel]**
 - e. Ceiling: **[enter ceiling finish. Example: Satin Finished Stainless Steel six panel suspended ceiling with LED lights]**
 - f. Handrail: **[enter handrail finish; Example: Stainless steel]**
 - g. Custom Flat – **[enter information. Example: satin stainless steel - 3 in. wide. Rails to be located on Back Wall and Side Walls of car enclosure.]**
 - h. Flooring: **[Enter floor finish. Example: VCT. (Not to exceed 5/16" finished depth.)]**
 - i. Threshold: **[enter finish. Example: Aluminum]**
 - j. Protective pad hooks and quilted fire retardant protective pads, color as selected:
- E. Car Station
- 1. Contractor shall provide and install a new applied car station, of material and finish chosen by the University.
 - 2. Contractor shall assume vandal-resistant type fixtures.
 - 3. Contractor shall include in the car station the following:
 - a. Car Call Buttons of style chosen by University, however, Contractor shall not allow University to choose buttons which do not comply with the following;
 - i. Buttons shall be at least $\frac{3}{4}$ " in their smallest dimension;
 - ii. Buttons shall be arranged in ascending order – where two or more

columns are used, buttons shall read from left to right;

- iii. Buttons shall be raised or flush;
 - iv. Buttons shall be square-shouldered;
 - v. Buttons shall be activated by a mechanical motion that is detectable;
 - vi. Buttons shall be equipped with visual indicators which shall light when the button is pressed and which shall extinguish when the call is answered.
 - vii. Buttons shall be no higher than 48" above the finished floor
 - viii. Coordinate car station controls with the in cab car reader functions/controls.
- b. The following emergency controls shall be provided at a height of 35" above the finished floor:
- i. An Alarm Button of style to match the car call buttons. This button when pressed shall actuate the alarm bell on top of the car.
 - ii. A manual emergency stop switch, with red operating handles or buttons, which shall be marked "STOP" and shall have two clearly marked positions, "STOP" and "RUN". When in the "STOP" position, power shall be removed from the elevator driving-machine, motor and brake. The alarm bell on top of the car and in the lobby hoistway shall also be actuated when the switch is in the "STOP" position.
- c. Door open and close buttons of style to match the car call buttons, located such that they are evenly spaced above the emergency controls and below the car call buttons.
- d. Two-way communication shall be provided in the car station, as follows:
- i. Communication controls shall be located below the emergency controls, or otherwise as directed by University Representative, but in no case lower than 15" above the finished floor or higher than 48" above the finished floor.
 - ii. Communication shall consist of a button labeled "HELP." Button shall be red.
 - iii. Adjacent to the button shall be a call acknowledgement light with instructions for operation. The acknowledgement light shall be lit when communication is established, and shall be extinguished when communication is terminated.
 - iv. When the button is pressed a call shall be placed to a location outside the hoistway.
 - 1. The call shall be to the University Dispatch.
 - v. Two-way communication shall be established immediately between the elevator and University Dispatch. Such communication may only be disconnected when authorized personnel outside the car terminate the call.
 - vi. The emergency communication system shall be powered by the

University provided telephone line.

- vii. Contractor shall be responsible for all wiring of this unit up to the phone line provided by the University in the machine room. Coordination between University and low-voltage contractor shall be required.
 - viii. Emergency phone shall:
 - 1. be analog; Dial phones are prohibited.
 - 2. be vandal-resistant
 - 3. be ring-down circuit capable
 - 4. not provide any recorded messages or DTMF tone signaling.
 - 5. be required to have valid FCC part 68 certification.
 - ix. Speaker grills for emergency communication shall be vandal-resistant and located in the car station according to University's wishes.
- e. All controls listed above shall be accompanied by tactile symbols and Braille located immediately to the left of each control button or switch.
- i. Car buttons shall be accompanied by tactile symbols identifying the floor number.
 - ii. The main egress/entry floor shall also be designated by a raised, five pointed star to the left of the floor designation for that floor.
 - iii. Other controls shall be accompanied by tactile symbols as identified by code requirements.
 - iv. Immediately below the tactile symbol shall be Braille to match the symbol per code requirements.
 - v. Raised and Braille characters shall be of a non-glare finish.
 - vi. Raised and Braille characters shall be white on a black background.
 - vii. Shape and style of Raised and Braille plates shall be chosen by the University.
- f. A lockable service panel shall be provided conforming to the following:
- i. Independent Service Key switch;
 - ii. Inspection Key switch;
 - iii. Car Lighting Switch;
 - iv. Emergency Light Test Switch;
 - v. Car Fan Switch;
 - vi. GFCI Outlet (duplex);
- g. A lockable fire service panel shall be provided conforming to the following:
- i. The panel shall be engraved on the outside with "Firefighters' Operation". Such engraving shall comply with code requirements;
 - ii. On the inside door of the panel shall be firefighters' instructions as

required by code;

- iii. Fire service, both Phase 1 and Phase II operation
- iv. Car shall return to the egress floor, automatically, when power is lost.
- v. Contained on the inside of the panel shall be the following:
 - 1. Fire operation key switch: Key switch to match other keys in the University (FE0 K1 barrel key);
 - 2. Door open and door close buttons;
 - 3. Call Cancel Button;
 - 4. Fire Hat Jewel;
 - 5. Stop Switch.
- h. An additional Fire Hat Jewel;
- i. Emergency lighting, which shall be a lens unit located near the top of the panel (integral with panel);
- j. An elevator inspection certificate frame (often located on the service panel);
- k. Engraving per applicable code to include the following:
 - i. Elevator Number;
 - ii. Capacity;
 - iii. No Smoking (include code reference as applicable);
- l. An in-car position indicator, conforming to the following:
 - i. The indicator shall be integral to the car station (not surface mounted);
 - ii. The indicator shall be located near the top of the car station;
 - iii. The indicator shall be LED type with characters at least 2" high;
 - iv. The indicator shall include up and down arrow indicators and sufficient characters to indicate all floors served;
 - v. As the elevator passes floors, the numerals shall change to indicate that floor number and an audible signal no less than 20 decibels and with a frequency no higher than 1500 Hz shall sound.
- m. Contractor's logo or name shall NOT appear anywhere in the car station.

F. Control:

1. Controller:

- a. The elevator controller shall utilize a microprocessor based logic system and shall comply with (ANSI/ASME 17.1, current edition) safety code for elevators. The system shall provide comprehensive means to access the computer memory for elevator diagnostic purposes without need for any external devices, and shall have permanent indicators to indicate important elevator status as an integral part of the controller. Systems that require hookup of external devices for troubleshooting are not acceptable. The elevator control equipment shall be provided such that at least three (3) elevator service companies can maintain the equipment. Immediate availability of replacement

parts shall be guaranteed and no special proprietary diagnostic devices will be utilized. An O.E.M. control, serviceable only by the O.E.M. will not be accepted. Controller shall be provided with the capability of in-the-field changes for certain variables such as door time. These changes should be stored permanently using non-volatile memory. Thus, if the power to the unit is disconnected, the system will maintain the programmed variables. The Car Diagnostic Display shall have the capability of selecting either the operational or programming modes and/or displaying the status of all inputs and outputs and capability of remote diagnostics to be interfaced with UCSC's elevator shop IBM compatible computer system.

- b. Failure of any single magnetically operated switch, conductors, or relay to release in the intended manner; or the occurrence of a single accidental ground or short circuit shall not permit the car to start or run if any hoistway door or gate interlock is UNLOCKED or if any hoistway door or car door or gate contact is not in the made position. Furthermore, while on car top inspection or hoistway access operation, failure of any single magnetically operated switch, conductors or relay to release in the intended manner; or the occurrence of a single accidental ground shall not permit the car to move even with the hoistway door locks and car door contacts in the closed or made position.
- c. Dedicated permanent status indicators shall be provided on the controller to indicate when the safety string is open, when the door locks are open, when the elevator is running at high speed, when the elevator is on independent service, when the elevator is on fireman's service, when the elevator out of service timer has elapsed or when the motor limit timer or valve limit timer has elapsed. Provide a switch, in case of the duplex, to select which of the two cars' statuses is to be displayed on the indicators, in addition, provide means of displaying other special or error conditions that are detected by the microprocessor.
- d. The elevator shall not require the functioning or presence of the microprocessor to operate normally during car top inspection operation or hoistway access operation in order to provide a reliable means to move the car if the microprocessor fails.
- e. A Motor limit timer function shall be provided which, in the event of the pump motor being energized longer than a predetermined time, shall cause the car to descend to the lowest landing, open the doors automatically and then re-close them and the elevator shall then be rendered unresponsive to any automatic operation. Operation may be restored by cycling the power disconnect switch or putting the car on access for inspection operation.
- f. A valve limit timer function shall be provided which, in the event of the pump motor being energized longer than a predetermined time, shall cause the car to descend to the lowest landing, open the doors automatically and then re-close them and the elevator shall then be rendered unresponsive to any automatic operation. Operation may be restored by cycling power to the disconnect switch or putting the car on access or inspection operation.
- g. Low Oil Control:
 - i. A low oil control feature shall protect the hydraulic components if the elevator fails to complete its upward travel in the normal time.
 - ii. Actuation of the low oil control circuit shall stop the pump and lower the car to the lowest landing. Power-operated doors shall open to permit

passengers to depart and shall then close. The car shall remain parked at that landing completely removed from demands for service.

- iii. To return the car to normal service, the malfunction shall be corrected and the elevator controls reset in the machine room.
- h. An out of service timer (T.O.S.) shall be provided which will automatically take the car out of service if the car is delayed in leaving the landing while there are calls existing in the building. The car shall not respond to hall calls while in this mode of operation.
- i. Door protection timers shall be provided for both the open and close directions which will help protect the door motor and which will help prevent the car from getting stuck at a landing. The door open protection timer shall cease attempting to open the door after a predetermined time in the event that the door is prevented from reaching the open position. The door close protection timer will reopen the doors for a short time in the event that the door-closing attempt fails to close the door locks after predetermined time.
- j. A minimum of three different door standing open times shall be provided. A car call time value shall predominate when a car call only is canceled. A hall call time value shall predominate whenever a hall call is canceled. In the event of a door reopen from the safety edge, photo eye, a separate short door time value shall predominate.
- k. Door Timing – Separate adjustable timing means shall be provided to establish independent minimum passenger transfer time for car stops, hall stops, main lobby stops, and door reversal operations (short door time.)
- l. Hall call or car call registration and lamp acknowledgment shall be by means of a single wire per call besides the power busses. Systems that register the call with one wire and light the call acknowledgement lamp with a separate wire are not acceptable. Phase I emergency recall operation, and Phase II emergency in-car operation shall be provided within the controller according to applicable local codes.
- m. Independent service operation shall be provided such that actuation of a key switch in the car-operating panel will cancel any existing car calls, and hold the doors open at the landing. The car will then respond only to car calls and will ignore hall calls. Car and hoistway doors will only close by constant pressure on car call buttons or a door close button until the car starts to move. While arrival lanterns and gongs shall be inoperative.
- n. The car shall be equipped with two-way leveling to automatically bring the car within plus or minus $\frac{1}{4}$ inch of exact level at any landing regardless of load up to maximum capacity.
- o. A selector switch shall be provided on the controller to select high or low speed during access or inspection operation as long as speed does not exceed 150 feet per minute.
- p. A test switch shall be provided. In the “test” position, this switch shall allow independent operation of the elevator without any door open functioning for purposes of adjustment or testing the elevator. The elevator shall not respond to hall calls and shall not interfere with the other car in a duplex installation.
- q. A timer shall be provided to limit the amount of time a car is held at a floor due to a defective hall call or car call including stuck pushbuttons. Call demand at

another floor shall cause the car to eventually ignore the defective call and continue to provide service in the building.

- r. Simplex selective collective automatic operation shall be provided for the single car installations. Operation of one or more car call or hall call buttons shall cause the car to start and run automatically provided the hoistway door interlocks and car door contacts are closed. The car shall stop at the first car call or hall call set for the direction of travel of the car. Stops shall be made in the order in which the car calls or hall calls set for the direction of operation of the elevator are reached, irrespective of the order in which they were registered. If only hall calls set for the opposite direction of travel of the elevator exist ahead of the car, the car shall proceed to the most distant hall call, reverse direction, and start collecting calls. Emergency return unit shall return car to elevator base when power is lost.
- s. Simplex home landing operation shall be provided and, if no calls are registered, shall cause the car to travel to a predetermined home landing floor and stop without providing a door operation. The ability to change home landing feature shall be provided.
- t. If the car is enroute to the home landing and a call appears from the direction opposite to which the car is traveling, the car shall slow down, stop, and then accelerate in the opposite direction, toward the call. The home landing function shall cease instantly upon the appearance of a normal call and the car shall proceed non stop in response to any normal call. Provide LED lighting at front and back inside the controller cabinet.
- u. Controller shall include factory installed and wired Reynolds and Reynolds UV2 Powervator as emergency power battery system.
- v. Manufacturer:
 - i. Elevator controller shall be as manufactured by Elevator Control or Motion Control Engineering (MCE), or SMARTRISE to include all features noted above including soft start features to limit inrush current Remote diagnostics shall be included.
 - ii. Model number of controller shall be reviewed with the campus elevator engineer prior to including it in the specifications.
- w. Collective Operation:
 - i. Operation shall be automatic by means of the car and landing buttons. Stops registered by the momentary actuation of the car or landing buttons shall be made in the order in which the landings are reached in each direction of travel after the buttons have been actuated. All stops shall be subject to the respective car or landing button being actuated sufficiently in advance of the arrival of the car at that landing to enable the stop to be made.
 - ii. If all calls in the system have been answered, the car shall park at the last landing served or the predetermined home landing.

G. Cab Ventilation

1. Contractor shall provide new, fully functional cab ventilation, consisting of a fan on the top of the elevator and vents inside the cab as required by code.
2. Contractor shall ensure that cab fans operate such that noise level requirements in this

specification are met at all times.

3. Fan shall be provided with an energy saver option that turns the fan off after one hour of elevator inactivity.
- H. Door Jamb Braille
1. Contractor shall provide all new door jamb floor indicator plates, which shall be installed in both jambs of every elevator at every floor.
 2. The plates shall have raised characters at least 2" high indicating the floor number.
 3. Braille shall be located below the raised character, also indicating the floor number.
 4. On grade level, a raised, five-pointed star shall be placed to the left of the raised character.
 5. The characters shall have a non-glare finish.
 6. The characters shall be white on a black background.
 7. The top of the characters shall be 60" above the finished floor.
 8. The shape and style of the plates shall be chosen by University.
- I. Car Riding Lanterns
1. Contractor shall provide a new car riding lantern for each elevator installed in the car return such that it is visible from the hall button station which calls the elevator.
 2. The visual elements (up and down indicators) shall be at least 2.5" in the smallest direction.
 3. When the elevator is answering an "UP" call, the upper visual indicator shall light and an audible signal shall sound once or a verbal announcement shall say "UP".
 4. When the elevator is answering a "DOWN" call, the lower visual indicator shall light and an audible signal shall sound twice or a verbal announcement shall say "DOWN".
 5. An LED-type indicator is acceptable, assuming that the display clearly indicates an "UP" or "DOWN" direction.
 6. The fixture shall be mounted so that its centerline shall be at least 72" above the finished floor.
 7. The style and finish of the car lantern fixture shall be chosen by University.
- J. Hall Buttons
1. Contractor shall provide a new hall button station at every floor in place of existing hall button stations.
 2. Hall button plates shall be of material and finish as chosen by University.
 3. Hall Buttons shall be of style chosen by University, however, Contractor shall not allow University to choose buttons which do not comply with the following;
 - a. Buttons shall be at least $\frac{3}{4}$ " in their smallest dimension;
 - b. Buttons shall be raised or flush;
 - c. Buttons shall be square-shouldered;

- d. Buttons shall be activated by a mechanical motion that is detectable;
 - e. Buttons shall be equipped with visual indicators which shall light when the button is pressed and which shall extinguish when the call is answered.
 - f. The “UP” button shall be located above the “DOWN” button.
 - g. Buttons shall be centered at 42” above the finished floor.
4. Hall button plates shall be standard-sized and shall be flush mounted. Wherever possible, plates shall be sized and located to minimize cutting and patching required by University.
 5. The hall button station in the main lobby shall additionally contain the following:
 - a. Fire Service Key switch – Key switch shall match the key used to open the fire service panel inside the elevator cab and shall be of type and manufacture specified by the University.
 - b. Fire Service Indicator
 - c. Fire Service Instructions
 6. Contractor shall include in each hall station at every floor fire service evacuation signage. Such signage shall comply with current elevator and fire codes as modified by local jurisdictional authority.
- K. Hoistway Access Switches
1. Contractor shall provide new hoistway access switches at the top and bottom landings for each elevator.
 2. New access switches shall be located in place of existing switches.
 3. The access key switch plates shall be of material and finish chosen by University.
 4. The key switch shall be continuous-pressure, spring-return type with the key removable only in the “OFF” position.
 5. The key switch shall be operated by cylinder-type lock having not less than a five-pin or five-disk combination. The electrical contacts in the switch shall be positively opened mechanically, and shall not solely be dependent on springs.
- L. Elevator Controls
1. Contractor shall provide a new automatic push button, microprocessor-based controller which is software oriented. The controller shall meet all applicable codes as modified by local authority.
 2. All relays, capacitors, fuses, fuse holders, circuits, contacts, and any circuit board, software chip, software program, or any other device, assembly or software shall be properly labeled and designed to meet all applicable codes, as modified by local authority.
 3. Control wiring shall comply with all applicable codes. Wiring shall be copper and shall be neatly organized, terminated and marked. No loose wires shall be allowed without proper termination. Temporary or permanent jumpers shall not be allowed at any time, and shall not be stored in the control cabinet or machine room.
 4. The controller shall provide safe and automatic operation of the elevator, including logic, power, and motion control.

5. The control shall be designed to protect against damage due to overload, reverse-phase, low-voltage, or single-phase conditions.
6. Contractor shall provide a selector/leveling system compatible with the new control system. The system shall be capable of automatic self-leveling and shall correct for over travel and under travel. The system shall provide constant, accurate feedback of the position of the elevator in the hoistway. Such a system shall be adjusted to insure accurate leveling at all floors within 1/8" in all cases.
7. The control shall control the motion of the elevator smoothly at all times with stepless acceleration and deceleration, and with speeds regulated within 5% of the elevator's rated speed.
8. Dispatching shall be of standard selective collective (non-destination) type. Dispatching algorithms shall be the most modern available by the manufacturer for the product approved.
 - a. Elevators shall answer calls in the direction of travel, in the order in which the elevator arrives at the call, regardless of the order in which calls were placed. Elevators shall not stop for calls placed in the direction opposite of travel until all calls in the direction of travel have been answered.
 - b. The elevator will not accept car calls opposite of the direction of travel.
 - c. Elevators shall have a completely adjustable parking pattern, allowing elevators to be parked at any combination of designated floors, with different combinations utilized at different times of the day (morning, mid-day, afternoon, evening, etc.).
9. If software or hardware upgrades become available during the project which substantially improve the quality of dispatching or the operation of the elevators, such upgrades shall be installed at no charge to the University. At the end of the project, the Contractor shall ensure that all controls and all group dispatchers have identical operating software versions.
10. Contractor shall provide a computer, CRT interface, or LCD-type panel in the controller which shall be able to interface with the elevator controls and allow for the following:
 - a. Programming/adjustment;
 - b. Troubleshooting;
 - c. Car Status;
 - d. Placing calls;
 - e. Any other function needed to operate the elevator systems efficiently.
11. Any passwords or passcodes of any kind used in any part of the elevator system shall be recorded and provided to University when they are originally set and any time they are changed for any reason.
12. Elevator control shall be equipped with a battery lowering device, which shall operate the elevator in the event of power loss according to this specification and all applicable code requirements.
13. Elevator control shall contain a solid-state type motor starter.
14. Provide low-oil sensing operation which shall, when activated, return the elevator to the

lowest landing, open the doors, and shut down the elevator until the oil reservoir is properly filled.

15. Rubber floor mats shall be provided in front of each controller. A properly grounded wrist strap shall also be provided and maintained in the controller at all times.

16. Approved control systems are as follows:

- a. Motion Control Engineering (MCE);
- b. Elevator Controls;
- c. Smartrise;

M. Special Operations

1. The elevator shall be designed to perform the following special operations according to all applicable code requirements. Descriptions of operation listed below are intended only as a brief summary and are not intended to fully detail the full requirements as clearly specified in applicable codes.

2. Fire Service Operation:

a. General:

- i. Elevators shall be fully equipped with fire service Phase I and Phase II operations which shall fully comply with all applicable codes.
- ii. Phase I operation shall be actuated by key switch or smoke detector, and shall lower all elevators in the applicable bank to the recall landing.
- iii. The elevators shall also be equipped with alternate floor recall, so that the elevator will recall to an alternate floor when smoke is detected at the main recall floor.
- iv. The elevators shall be equipped with flashing fire hat indicators in each cab to indicate smoke detected in hoistways or the machine room, and otherwise as indicated in applicable code.
- v. Phase II operation shall allow for use of the elevator by authorized personnel through use of the fire service controls located behind locked panels in each elevator.

b. Operation by the use of firemen and other authorized personnel:

- i. A three position (on, off, and by-pass) key-operated switch shall be provided at the main floor for each single elevator or each group of elevators. The key shall be removable only in the "on" and "off" positions. When the switch is in the "on" position, all elevators controlled by this switch and which are on automatic service shall return non-stop to the main floor, and the doors shall open and remain open.
- ii. An elevator traveling away from the main floor shall reverse at the next available floor without opening its doors.
- iii. Elevators equipped with automatic power-operated doors and standing at a floor other than the main floor, with doors open, shall close the doors without delay and proceed to the main floor.

- iv. Door reopening devices for power-operated doors, which are sensitive to smoke, heat or flame shall be rendered inoperative. All car and corridor call buttons shall be rendered inoperative and all call registered lights and direction lanterns shall be extinguished and remain inoperative.
 - v. A car stopped at a landing shall have its “Emergency Stop Switch” rendered inoperative as soon as the doors are closed and it starts toward the main floor.
 - vi. A moving car, traveling to or away from the main floor, shall have its “Emergency Stop Switch” rendered inoperative immediately.
 - vii. A sensor in each elevator lobby, which when activated prevents cars from stopping at that floor, shall not be substituted for the above requirements.
- c. Sensing Devices: In addition to the key-operated switch required in “i” above, heat and smoke or products of combustion sensing devices shall be furnished and installed at each floor. (Note – Egress floor is 1st floor.) The activation of a sensing device shall cause all cars to return non-stop to the main floor. The key operated switch when moved to the “by-pass” position, shall restore normal service independent of the sensing devices. Smoke detectors shall be photoelectric type, 120 vac. entex Corp. Model 8100. Submit drawings showing locations of smoke heads and exposed conduit for owner’s approval prior to installation.
- d. A three position (off-hold-on) key-operated switch shall be provided in each car and shall be effective only when the main floor key-operated switch is in the “one” position or a sensor has been activated and the car has returned to the main floor or other approved level. The key shall be removable in all positions, and shall not change the operation until the car is at a floor with doors fully opened.
- e. The operation of elevators on Fire service shall be as follows:
- i. An elevator shall be operable only by a person in the car.
 - ii. Elevators shall not respond to elevator corridor calls.
 - iii. The opening of power-operated doors shall be controlled only by continuous pressure “open” buttons or switches. If the switch or button is released prior to the door reaching the fully open position, the doors shall automatically recluse. Open doors shall be closed by continuous pressure on “Door Close” switch or button.
 - iv. Means shall be provided to cancel registered car calls.
 - v. When the switch is in the ‘hold’ position, the car shall remain at the floor with its doors open.
 - vi. Elevators can be removed from individual car fire service by moving the key operated switch to the “off” position and the car is at the main floor or other approved level.
- f. The switches required above shall be operated by the same key but are not a part of a building master key system. There shall be a key for the main floor switch and for each elevator in the group and these keys shall be kept on the

premises by the person responsible for maintenance and operation of the elevators, in a location readily accessible to authorized persons, but not where they are available to the public. TURN OVER ALL KEYS TO University Representative. University Representative shall deliver key to elevator foreman. These keys shall be the Fire Service Keying System.

- g. Instructions of operation shall be provided as required by code.
3. Inspection Operation: Elevator shall have inspection operation enabled through switches on the car top, in the machine room and/or in the elevator. Inspection operation shall allow for the operation of the car at inspection speed and shall be solely under the control of the operator of the inspection controls. Inspection operation shall occur according to applicable code guidelines. Access switches shall be controlled through the in-car inspection switch. Access switches shall only be enabled when the in-car inspection switch is placed in the "ACC ENABLE" position.
 4. Independent Service: Elevator shall be placed on independent service through a key switch in the car station. When placed on independent service, all existing calls will be canceled. The elevator will then be operable through the car call buttons, and will travel directly to any floor chosen therefrom. Doors shall remain open at any landing until the door close button is utilized to close the doors.
 5. When the elevator is on either inspection or independent service and the elevator receives a signal to recall under fire service phase I, the fire hat indicator shall illuminate and a buzzer shall sound to alert the operator of the fire recall signal, according to applicable codes.
 6. Battery Lowering: When normal power is lost, an auxiliary contact mounted on the mainline switch shall alert the controller to the loss of normal power. In this case, the elevator shall lower to the main egress landing, open its doors, and shut down.
- N. Isolation
1. Contractor shall provide isolation pads at any point where equipment is attached to building structure or to other equipment so as to minimize audible noise which may be detectable in the elevator or in any portion of the subject property. Such isolation shall be provided at support points of equipment including, but not limited to controllers, motors, power units, etc.
- O. Code Data Plate
1. Contractor shall install in each machine room a plate indicating the code in place at the time of the modernization.
 2. The plate shall be permanently etched so that it shall not wear off or deteriorate over time.
 3. The plate shall be conspicuously displayed on the mainline switch or on the controller.
- P. Hydraulic Power Unit
1. Contractor shall provide a new submersible hydraulic power unit, which shall include a tank, submersible motor, positive displacement pump, 4-coil control valve, and muffler.
 2. Also included shall be oil strainers, an oil gauge, and a drip pan.
 3. Motor shall be sized for continuous operation at full speed and at rated capacity.
 4. Integral control valve shall consist of up, down, up leveling and down leveling controls, designed for smooth and gradual opening and closing.

5. Muffler shall be installed in the oil line to dampen noise and pulsation resulting from flow of hydraulic oil.
 6. Unit shall be firmly affixed to the building structure in a safe and firm manner with isolation pads included as indicated previously in this specification.
 7. Unit shall include a viscosity control assembly with heating element.
 8. Contractor shall remove all oil from the existing unit. Contractor is responsible for all handling of oil and costs associated with its safe and code-compliant disposal.
 9. Contractor shall provide a new supply of oil according to the manufacturer's requirements. Sufficient oil shall be provided to reach the required limit as shown in the tank unit.
 10. Sufficient specially prepared hydraulic oil with greater than 400 degrees F. flashpoint and proper viscosity and lubricating qualities shall be provided. Indicate type of oil used and its viscosity value.
 11. Oil shall be of the biodegradable type, listed as green product in the USGBC directory.
- Q. Control Valves
1. Contractor shall provide all new control valves in the machine room and pit as needed to comply with applicable code requirements.
 2. Valves provided shall include relief valves, check valves, manual lowering valves, and pit rupture valves.
- R. Shut off Valves
1. Manually operated valves shall be provided and installed in the oil supply line to isolate the cylinder and plunger unit from the hydraulic machine. Provide two valves-one in the pit near the jack assembly and another one in the machine room near the machine. Valves shall be rated twice the operating pressure and shall be the same size as the pipe.
- S. Oil Strainer:
1. A self-cleaning strainer shall be provided and installed in the oil line between the hydraulic machine and the cylinder plunger unit to protect the oil control valves during downward travel of the elevator. The strainer shall have a 40-mesh 316 stainless steel screen for removal of solid particles and a magnetic drain plug for removal of ferrous materials. The strainer assembly shall be designed for at least 600 psi working pressure.
- T. Isolation Coupling (s):
1. One isolation coupling(s) shall be provided to abate the transmission of noise produced by the vibration of the pumping unit. Proper location of the isolation coupling(s), in the oil delivery line, shall be determined by the elevator subcontractor.
 2. Pressure rating for the isolation couplings shall be in accordance with ANSI A17.1 .
- U. Cylinder and Plunger Unit:
1. The cylinder shall be all above ground and fabricated of steel pipe. The cylinder head shall have a bronze, babbitt or phenolic-lined bearing and an integral drip ring. Packing shall be of the self-adjusting type not requiring external adjustment and shall allow operation of the plunger with minimum friction. The packing gland shall be arranged to return automatically to the reservoir any oil, which may escape the packing ring. Structural steel shapes shall be provided to support the cylinder and to transmit vertical loads to the pit floor.

2. The plunger shall be constructed of seamless steel pipe or tubing turned true and smooth and polished to a fine finish. A stop plate to prevent the plunger from leaving the cylinder shall be welded to the bottom of the plunger.
3. Grey cast iron or other brittle materials shall not be used and the cylinder and plunger unit shall be factory tested at not less than 600 psi, or as per ASME A17.1 and State of California Elevator Code. For strength and freedom from leakage. Units of multiple section construction shall be securely joined by couplings. Cylinder couplings shall have all joints welded before installation to prevent leakage.
4. Provide a stainless steel drip pan (at pit floor) or drip ring around cylinder with scavenger pump. Oil piping between pump and oil storage tank and all related power wiring.

V. Wiring

1. Contractor shall provide all new wiring, terminal blocks and electrical connections for the entire elevator system, including new traveling cables.
2. Wiring and traveling cables shall be installed in all cases according to all applicable codes, including, but not limited to, electrical and elevator codes.
3. Wiring and traveling cables shall be insulated, with a flame retardant and moisture proof outer covering.
4. Wiring may be run in existing conduit, flexible tubing or raceways. Contractor shall insure that all such enclosures are in good condition and in compliance with applicable code requirements. New wire enclosures may be installed as needed, also in conjunction with applicable codes. Contractor shall insure at the end of the project that all wire runs are very neatly organized within conduit or raceway, and that covers are on. Flexible tubing shall be affixed at each end to prevent exposure and tension on wires contained therein.
5. Junction boxes shall be supplied and distributed according to applicable code requirements. Separate junction boxes shall be supplied for signal, communication and power wiring to minimize interference.
6. Wiring shall be shielded according to control manufacturer's recommendations in order to eliminate interference between power wiring and signal wiring. Contractor shall take all necessary steps to minimize signal interference and to preserve the continuity of operation of all signals and other aspects of the elevator system.
7. All wiring and terminal blocks shall be properly tagged to identify signals and purpose for each wires and to agree with submitted elevator drawings.
8. A minimum of three twisted, shielded wire pairs shall be supplied in each traveling cable, one of which shall be specifically reserved for a closed circuit TV system should one be installed in the future.
9. A minimum of one coaxial cable shall be supplied in each traveling cable. The cable shall be terminated on the car top and in the machine room.
10. Traveling cables shall be sufficiently flexible to bend in a circle with an inside diameter of one foot without cracking or inordinate strain on the outer covering or the wires contained therein.
11. Traveling cables shall be suspended in a manner which does not place strain on any individual connectors.

12. The open loop of the traveling cable shall show no tendency to twist, curl, or otherwise hang in any manner other than in an open loop. The open loop shall be no less than 2 feet in diameter.
13. The path of the traveling cable during operation shall be such that the traveler does not come in contact with any portion of the hoistway or any equipment located therein. Cable shall not be allowed to rub or otherwise contact any structure or piece of equipment in a way that would either create audible noise or create wear on the cable itself.

W. Door Equipment

1. Contractor shall provide a complete new door operator, located in the machine room, by Peele, Courion, or approved equal. Operator shall be designed to work with the new elevator controller. Contractor is solely responsible to ensure the door operator and controller work seamlessly in their operation.
2. Contractor shall provide new, low-profile door motors to control both hall and car door panels.
3. Contractor shall provide a new reversing edge on the car gate to initiate reopening if it is struck from any direction.
4. Contractor shall provide new car and hall door panels.
5. Contractor shall provide all new gate contacts, limits, and interlocks.
6. Contractor shall provide new Door tracks and guides. Contractor shall thoroughly clean and lubricate tracks and guides to allow for smooth and quiet operation.
7. Doors shall operate automatically and in accordance with all code requirements.
8. The system shall be manually operable in case of an emergency without disconnecting the power equipment.
9. The operator shall be designed that, in case of obstruction, the system will not reach electrical overload as the doors continue to attempt to close in spite of the obstruction. Once the obstruction is removed, the doors shall return to service immediately without requiring reset.
10. The doors shall be opened at rated speed (2 ft/sec.) and the closing speed shall be per Code. Door closing force shall be as allowed by code.
11. An electric contact for the car doors shall be provided which shall prevent elevator movement away from the floor unless the door is in the closed position as defined by Code.
12. Each hoistway door shall be equipped with an auxiliary door closing device and a positive electro-mechanical interlock to prevent the operation of the elevator until the interlock circuit is established and the doors are locked and closed.
13. Selective, synchronous door operation shall be provided so that doors at slightly different levels are not to open at the same time. Therefore, each door is to have its own synchronous opening.
14. Manufacturer:
 - a. Gal, MOH operator.
15. Landing Door Hangers

- a. Each hoistway door shall be suspended by two (2) sheave type hangers running on a hanger track provided integral with the hoistway entrance. Each hanger shall consist of a polyurethane tread on a metal hub equipped with precision ball bearings mounted onto a steel bracket. The hanger sheaves shall not be less than 3-1/4 inches in diameter. The track shall be so shaped as to permit free movement of sheaves without regard to vertical adjustment of the sheave brackets. An up-thrust roller shall be provided beneath the track and each sheave wheel, capable of withstanding a vertical thrust equal to the carrying capacity of the upper sheave. The up-thrust roller shall be adjustable for fine vertical adjustment and the face of the roller shall be so shaped as to conform to the bottom face of the hanger track.
- b. Manufacturer: GAL, with MOM operator.

16. Adaptive Door Timing:

- a. Door open times will be varied subject to the call situation causing the stop:
- b. Shortest timing, when car call only causes stop.
- c. Longer timing, when hall call only causes stop.
- d. Longest timing, when coincident hall and car calls exist.
- e. All timing shall meet ADA guidelines as a minimum.

17. Door Protection and Reopening Device

- a. Adams Gatekeeper 2000 or Innovation Smart Edge, Model 2002 with additional Dual Eye Ray Unit or Janus 3D, or Tri-Tronics

X. Buffers

1. Buffers shall be installed in the pit to meet ANSI A17.1 requirements. These buffers shall be fastened to steel channels furnished and installed by the Elevator Contractor.

Y. TERMINAL STOPPING DEVICES

1. Slow-down, normal and emergency stopping devices shall be furnished and installed for the car. The devices shall be so arranged that as the car approaches either terminal landing, a roller with noiseless tread, mounted on a moveable car, shall come into contact with cams located in the hoistway, and through the operation of the stopping device, bring the car automatically to a smooth stop at the terminal landing. The full width of the roller tread shall engage the cam surface. The emergency car stopping system shall comply with the A17.1 requirements.

Z. LANDING SYSTEM

1. This landing system shall provide high speed stepping signals, one-floor-run stepping signals, leveling, and door zone signals. Each output signal shall be electrically isolated and shall be capable of reliably operating at 120VAC.
2. The system shall consist of a steel tape with mounting hardware to accommodate the complete travel of the elevator, a car top assembly with tape guides and sensors, and magnetic strips for stepping and leveling.
3. The leveling and stopping accuracy of the system shall be within 1/4 inch of the floor level and shall correct for over travel or under travel to within the same accuracy, regardless of load variations or direction of travel.
4. Landing control system shall be as manufactured by Interface Projects, Co., Model IP 8300 (including any required modifications to accept elevator control systems or

approved equal.

AA. Machine Finish and Painting

1. All exposed surfaces of machines and motors, controllers, etc., shall be repainted after field installation and before acceptance by Owner with rust-resistant gloss enamel paint.

BB. Top of Car Inspection Station

1. Contractor shall provide a new top of car inspection station compatible with all code requirements.
2. The station shall contain the following:
 - a. In inspection switch;
 - b. Up and down run switches;
 - c. A stop switch.
3. Contractor shall also provide lighting on the car top, which shall be properly guarded and grounded.
4. Operation of the inspection station shall be according to all applicable code guidelines.

CC. Alarm Bells

1. Contractor shall provide an alarm bell no less than 6" in diameter on top of the elevator.
2. Alarm bells shall sound upon application of the in-car stop switch or alarm button.

DD. Top Emergency Exit

1. A top emergency exit shall be provided of size, style, and operation according to all applicable codes.
2. An electrical contact shall be provided such that, when the escape hatch is open, the elevator shall move at no more than 150 fpm.

EE. Guide Rails

1. Existing guide rails can be retained provided they work with the new elevator car. Replace guide rails with new units if required due to new elevator configuration. Rails shall be thoroughly cleaned of all grease, oil, dust, dirt, debris and other accumulated material.
2. All connection points shall be tightened and rail joints shall be adjusted as needed such that no noise or movement of any kind is detectable from within the car as the elevator or counterweight passes over the rail joints.
3. Rails shall be aligned as needed to comply with ride quality requirements found in this specification.
4. Guide Rails Requirement
 - a. Planned steel tee guide rails shall be furnished and installed to meet ANSI A17.1- 2004 requirements, including suitable brackets and clamps for attachment to the building structure. The guide rails and car frame shall be so located that the car is in balance with the guides. The machined tongue and groove joints shall be fitted with machined fishplates fastened to each rail with at least 4 through bolts. Rails are to be cleaned of any shipping or protective coatings at time of installation.

- b. All joints shall be located free of interference with supporting clamps and brackets. Shims used to obtain rail alignment shall be designed to remain in position, even though the fastening bolts may be loosened. The guide rails shall be installed and aligned with their machined faces plumb within one-eighth of an inch from top to bottom of the hoistway.
- c. Minimum Rail Size – 16 pounds/ft. upgrade rails based on application.

FF. Car Guides

- 1. Existing guide shoes shall be replaced based on new car frame and platform requirements. Shoes shall be adjusted, cleaned and lubricated to move freely on the guide rails in a smooth and quiet manner.
- 2. Each roller guide shall consist of three wheels (minimum roller diameter – 6”) tired with a durable resilient material; each rotating on ball bearings having sealed-in lubrication; all assembled on a substantial metal base and so mounted as to provide continuous contact of all wheels with the corresponding rail surface under all conditions of loading and operations. The wheels shall run on three finished rail surfaces. The roller guides shall be properly secured at top and bottom on each side of car frame. Provide roller guides at top and bottom of car.
- 3. The roller guides shall run on dry guide rails.
- 4. Manufacture: ELSCO Type A.

GG. Hoistway Limits

- 1. All new normal and final limits shall be provided and shall operate per applicable code guidelines.
- 2. Cam and roller limits are acceptable as are electronic limits such as the Adams KE device.
- 3. Contractor may choose their acceptable device, and shall indicate such in their submittal.
- 4. Regardless of the device chosen, the contractor shall ensure that operation of the limits cannot be heard from within the elevator. In all cases, the elevator shall meet the audible noise requirements found in this specification. Inability of Contractor to make the limits operate within the noise requirements will result in Contractor having to make any necessary modifications, including purchasing, at Contractor’s expense, new limits or a different type of limits.

HH. Car Frame and Platform

- 1. Existing car frame and platform shall be replaced. Contractor shall thoroughly tighten all members and adjust cab steadying plates so that no squeaks, groans or any other noise shall be audible from within the cab while the elevator is at rest or during travel, and so that the elevator complies with all ride quality guidelines found herein.
- 2. Elevator shall be properly aligned so that the gap between the car and hall sills when the car is level with any floor shall not exceed 1.25” per ADA requirements.

II. Toe Guard

- 1. A toe guard shall be provided to extend below the opening to provide safety at landings.

JJ. Jack Unit and Exposed Piping

- 1. Existing Hydraulic jack unit and piping shall be removed and capped.

2. Contractor shall inspect all exposed portions of the jack and cylinder and notify the University if any leaks are determined.
 3. Contractor shall replace all valves, fittings and connections with new materials.
 4. All Hydraulic Supply Piping:
 - a. Shall be Schedule 80 black steel pipe. Welded pipe only. No grooved fittings are allowed. The system must be free from seepage at all joints.
 - b. All piping shall be run above ground, exposed for maintenance.
 - c. Maximum total equivalent length of piping is 30 ft.
 - d. Acoustically insulate pipes and fittings to reduce noise.
- KK. Pit Springs
1. Existing pit springs can be retained and refurbished, unless it conflicts with the new platform installation. Provide a new pit spring if required due to new installation requirements.
 2. Operation of springs shall be checked for compliance with all code guidelines.
- LL. Pit Switches
1. Contractor shall provide a new pit stop switch within reach of the egress point to the pit. The switch shall operate according to all code requirements.
- MM. Painting
1. Contractor shall stencil 4" floor identification numbering on the hoistway side of all doors or on walls adjacent to hoistway doors.
 2. Contractor shall stencil unit numbers no less than 2" in height on elevator controls, disconnects, and top of car. Stop switches and auxiliary disconnects shall be identified by number, but numbering may be smaller than 2" due to space constraints.
 3. All newly installed equipment shall be painted before shipment with paint of the best quality and suitable for use in elevator application. Such equipment shall have paint touched up as needed at the completion of the project to insure no exposed metal surfaces remain which may have become chipped or damaged during installation.
 4. [Existing equipment shall be thoroughly cleaned and painted. All matching equipment for each elevator shall be painted the same color]
 5. At the completion of the project, Contractor shall ensure that all metal surfaces are adequately touched-up or otherwise painted and protected against rust and corrosion. Overall machine room appearance shall be professional in every way.
 6. Contractor shall thoroughly clean and paint the pit floor and walls up to the level of the first landing.
 7. Contractor shall thoroughly clean and paint the machine room floor and walls with a color approved by the University.
 8. University shall reserve the right to require additional painting as needed upon final inspection.

PART 3 - EXECUTION

3.1. EXAMINATION

- A. Contractor shall be responsible for complete examination of existing conditions, including field measurements and all other details related to the project.
 - 1. Contractor's project engineering process shall include a thorough site inspection according to the following guidelines:
 - a. Contractor shall thoroughly inspect the site conditions, verifying all measurements, conditions, surfaces, access paths, etc. to ensure that Contractor is fully versed on the details of the jobsite and thus of the project.
 - b. Contractor shall reassess all bid documents previously submitted, in particular whether any changes are required to work by University or Contractor's project plan.
 - c. Contractor must report to University Representative within 7 calendar days of this project visit any of the following items:
 - i. Contractor shall detail additional work by University not listed in this specification or in Contractor's previous bid submittal.
 - ii. Contractor shall report on any items listed in this specification, which may affect University's cost, project time, or any other major details of the project.
 - iii. Note that this also includes identification of any hazardous materials and/or conditions observed at the jobsite which would require attention by the University prior to Contractor's mobilization.
 - iv. If Contractor notes any ambiguities, discrepancies, or any other items within this specification or the modernization Agreement, Contractor must alert University Representative to these items so that a course of action may be chosen and Amendments/Change Orders produced accordingly.
 - v. If Contractor does not report to University Representative within 7 days of this initial visit any of the above items or any other discrepancy of any kind between the specification and Agreement and the actual conditions of the property and thus Contractor's project plan, it shall be assumed that Contractor shall proceed according to the Agreement without the need for Amendment or Change Order due to conditions found at the property. Further, it shall be assumed that Contractor did not identify any additional work to be performed by University or others. Any additional costs identified after this date due to project conditions which were present during this job site visit shall be borne by the Contractor.
 - d. Contractor shall engineer and order equipment solely based on their survey and not on any information contained in the specification. By ordering equipment for the project, the Contractor agrees that they have been given ample opportunity to survey the site and takes full responsibility for the suitability of the equipment ordered for the particular project. In no case shall the University be responsible for any rework or purchase of any additional equipment due to the equipment being unsuited for the project, even if such equipment is specified herein.

3.2. PREPARATION – COORDINATION

- A. Contractor shall submit electrical and heat emission details to the University Representative to allow University to validate the size of electrical and/or HVAC work for the project.

3.3. INSTALLATION

- A. Contractor shall conform to all of the requirements during installation of the equipment/performance of the work.
- B. Contractor's personnel

1. Contractor agrees to assign a single lead mechanic to the project. In the case where multiple crews are used, it shall be made clear which mechanic is to be the lead mechanic. The cell phone number for the lead mechanic will be made available to University for communication during the project for immediate on-site concerns.
2. Any mechanic or other personnel working on the project shall be qualified to perform the work of the project, and shall be properly licensed to perform such work. Contractor is solely responsible to insure the qualifications and suitability of Contractor's personnel to perform the work under the Agreement.
3. Contractor shall assign a member of supervisory staff to the project. The cell phone number of this supervisor shall be made available to building management, and the supervisor shall be on call 24 hours per day, 7 days per week.
4. Contractor's supervisor shall visit the property no less than once every other week, with the first visit occurring on the first day of mobilization.
5. Contractor's supervisor shall respond within four business hours to any call from University Representatives regarding the project. When the supervisor is to be on vacation or otherwise unavailable such that he/she cannot respond within four business hours, an alternate contact shall be provided to the University Representative.
6. Contractor shall assign an account manager or similar support personnel to manage the project with respect to all administrative issues. The cell phone number of this person will be made available to University, and the person will be on call 24 hours per day, 7 days per week.
7. Contractor personnel shall wear uniforms at all times and carry photographic identification demonstrating that they do work for Contractor.
8. Contractor personnel shall conduct themselves in a professional and polite manner at all times. At no time shall Contractor personnel make any comment to any building tenant regarding the elevator service, or give any details as to work being performed or required at the property. All questions regarding the elevators must be referred to building management.

C. Methods and Procedures

1. Contractor shall complete all work delineated in the Agreement according to the specification and Agreement documents, and according to all applicable codes, laws and guidelines as regulated by any authority having jurisdiction, and according to all industry standard practices.
2. Contractor shall perform all work necessary to provide a complete elevator modernization project, whether or not all required work is specifically detailed in this specification or the Agreement.
3. Contractor shall at all times coordinate work with University and with other trades to ensure that work schedules are adhered to and all trades work cooperatively and in harmony with each other.
4. Contractor and Contractor's employees shall at all times operate with safety as the highest priority.
5. If any accident should occur during the project, whether involving Contractor's personnel or others, Contractor shall immediately report all details of the accident to University. Contractor shall keep the University informed at all times regarding details and subsequent actions and activities regarding the accident.
6. If at any time Contractor identifies any issue which endangers the safety of any person, including, but not limited to, elevator passengers, people passing by any elevator opening or in any elevator lobby, or Contractor's personnel or any other person present in an elevator machine space or accessing any elevator machine space (by adjacent corridors, stairs, or any other means), Contractor must notify the University's Representative verbally before leaving the property, and in writing within 24 hours.
 - a. If the issue is one which is covered under Contractor's Maintenance or Modernization Agreement, Contractor shall correct the item before leaving the property.
 - b. If the issue cannot be corrected immediately (for example, if parts must be

- ordered), the Contractor shall make all necessary precautions to secure the elevator, including leaving the elevator out of service. If the issue is in an elevator-related space, the Contractor shall work with University to secure the area and make all necessary precautions to prevent injury to any person. Contractor shall then expedite the repair of the noted item, including paying, at Contractor's expense, any fees relating to expedited shipping and delivery.
- c. If the issue is one that is not covered under Contractor's Modernization or Maintenance Agreement but can be corrected by Contractor, Contractor shall submit a proposal to University within 24 hours of discovering the condition. Contractor shall again work with University to secure the area, to leave the elevator out of service, or to otherwise prevent injury to any person while University processes the proposal. Once approval is given, the Contractor will immediately proceed with correction of the noted item.
7. Contractor agrees to comply with all rules and regulations specific to the subject property. University reserves the right to set or change rules at any time, which Contractor shall comply with as soon as Contractor receives notification.
 8. Regular working hours: Refer to University's General Conditions, Division I.
 9. No work may be done outside of normal working hours without written approval from the University. Such approval may be given in "blanket" terms at University's discretion.
 10. When any single elevator is out of service for modernization, the elevator shall be identified as out of service with University-approved signage posted at every floor in view of the hall buttons controlling that elevator.
 11. Contractor shall ensure that all entries to any machine space are kept closed and locked at all times, whether Contractor's personnel are on property or not.
 12. Contractor shall carefully control access to areas where Contractor is allowed to store equipment. Where locks are provided, the Contractor shall be solely responsible for keeping the area properly locked. Any loss or damage to stored equipment due to failure of Contractor to properly secure the area shall be Contractor's responsibility. Contractor shall keep such areas organized and of clean appearance. Trash or rubbish shall at no time be stored in designated storage space or elsewhere on University's property. No flammable or hazardous materials may be stored therein without specific permission from the University. If such permission is given, the Contractor must comply with safety guidelines as found in the Agreement.
 13. Contractor shall not allow trash or rubbish to accumulate at any time. Contractor shall remove trash and rubbish from the property on a regular basis, but no less than weekly, and any time upon the request of the University. Contractor is responsible for the safe and code-compliant disposal of any material, trash or rubbish generated during the project.
 14. Contractor shall at all times keep all machine spaces as clean and organized as possible, although it is acknowledged that the nature of the project does allow for some disorder due to the ongoing work. However, the Contractor shall endeavor to keep the disorder to a minimum. At no time shall walkways or exit pathways be blocked by trash, rubbish, or new or removed material or equipment.
 15. Contractor is fully responsible for the safe and code-compliant removal of all equipment which is not to be retained. Contractor may keep any equipment which is not specifically designated as the property of the University. Any equipment which is not to be kept by the Contractor shall be disposed of at no additional cost to University. Contractor is responsible for the safe and code-compliant removal, storage and/or disposal of all equipment and materials which are not to remain on-site after the completion of the project. Any equipment designated to remain on site until completion of the project (perhaps as spare parts for elevators not yet modernized) shall be stored in designated areas in a safe and orderly manner.
 16. Contractor shall provide standard barricades around any elevator opening when work is being done at that opening, whether the elevator doors are open or not.
 17. Contractor shall take all necessary steps to protect University's property during the work. Flooring shall be protected in front of elevators and along any access pathways

while work is occurring, or when equipment or materials are being moved in and out. Walls will likewise be protected against damage during the project. Contractor shall repair any/all damage caused by Contractor's personnel during the project or resulting from Contractor's work during the project. This includes any noticeable wear or soiling of carpet or other surfaces which may occur due to repeated traffic across such surfaces by Contractor's employees.

18. Contractor shall supply safety mesh/screening in shared hoistways to protect adjacent elevators during the work. Such screening shall cover the entire length and width of the hoistway between the elevator being modernized and any other adjacent elevator(s).

D. Materials and Equipment

1. Unless otherwise specified, all materials shall be new and from the manufacturers specified in Contractor's bid and as approved by University Representative.
2. All material shall be installed according to industry standard, manufacturer's recommendations, and all applicable codes, laws and guidelines by any authority having jurisdiction.
3. Materials shall be properly lubricated as they are installed and as needed thereafter to insure protection against wear and to allow for smooth and quiet operation at all times.
4. Equipment placement shall be according to all applicable codes and shall allow for adequate access for future maintenance.
5. Where equipment is designated to be retained and/or refurbished, the equipment shall be thoroughly cleaned, repaired and tested so as to insure like-new operation for a time period which will match the newly installed equipment. Should the Contractor feel that they are not able to match the performance of newly installed equipment with the retained/refurbished equipment, Contractor should note this as an exception in their bid package. If Contractor has not made such an exception at the time of bidding, no allowance shall be made for refurbished/retained equipment in Contractor's ability to meet any performance criteria contained in the specification or Agreement.

E. University Pre-Completion Punch List

1. Upon Completion of the elevator, in addition to testing and inspection requirements defined elsewhere in this specification, Contractor shall perform the following:
 - a. Contractor shall accompany the University Representative for the specification punch out for each elevator.
 - i. It is understood that some identified items may be delayed until the end of the project.
 - ii. Contractor shall endeavor to correct noted items which can be corrected, specifically items noted as a priority on the punch list.
 - iii. Contractor may return the elevator to service while working on the punch list items, unless otherwise directed by the University Representative.
 - b. Contractor is solely responsible for keeping elevators running reliably at all times. University shall not have to determine whether it is the modernization or maintenance team's responsibility to make the elevator work properly. University shall follow Contractor's maintenance procedures as needed to report shutdowns or callbacks, but shall be entitled to call the elevator contractor to resolve any issues of concern. Contractor warrants that it will take care of all items of concern during the modernization with the university's representative and will not require University to interface with several entities within Contractor's organization.

3.4. ADJUSTMENT

A. Upon completion of any elevator, the elevator system shall be adjusted as follows:

1. Contractor shall adjust the elevators to operate in the smoothest and most efficient manner possible, and according to the direction and wishes of the University

- Representative up to the capability of the equipment.
2. Contractor shall adjust the elevator to operate according to the following characteristics:
 - a. Ride Quality: The ride quality of each elevator shall meet the following requirements, as measured by a standard ride-quality analyzer approved by University and/or University's consultant, using the A95 scale with ISO filter on:
 - i. Maximum horizontal peak-to-peak vibration: 20.0 mili-g in any direction;
 - ii. Maximum vertical peak-to-peak vibration: 15.0 mili-g in either direction;
 - iii. Ride quality shall be measured by Contractor before beginning elevator work to establish a baseline, and then upon completion of the project. Should adjustment be required to meet the stated values, the Contractor shall measure the ride quality again until the ride meets the stated requirements.
 - b. Noise: The audible noise produced by the elevator as measured inside the elevator, or in any building space adjacent to the elevators or any elevator machine space, shall not exceed the following levels. Note that noise readings apply over ambient noise:
 - i. Car at rest with doors closed and fan running: 50 dba;
 - ii. Car running at high speed with fan running: 60 dba;
 - iii. Doors in operation: 60 dba.

3.5. TESTING AND INSPECTION

- A. Upon completion of any elevator, Contractor shall perform all of the following functions:
 1. Contractor shall perform any safety tests or any other tests required by code or any Authority Having Jurisdiction (AHJ) upon completion of any elevator and properly tag the elevator equipment upon successful completion of the test.
 2. Contractor shall schedule inspection by the AHJ upon completion of each elevator.
 - a. The Contractor shall schedule the inspection at least six weeks in advance of completion of any elevator so that the inspection does not delay the project in the event of a backlog at the AHJ.
 - b. Contractor shall pay any/all fees related to the inspection, and any re-inspections if required.
 - c. Should the inspecting authority note any deficiencies requiring correction, Contractor shall make correction of such items the highest priority, and shall make every attempt to have the inspection authority return as quickly as possible for re-inspection.
 - d. Contractor shall bear the cost of any number of re-inspections which are required due to items which are Contractor's responsibility. When re-inspections are required due to work by University, University shall reimburse Contractor for the re-inspection fees via Change Order, but shall not be liable for any time spent by Contractor during the re-inspection.

3.6. PROJECT COMPLETION

- A. Upon completion of the project, Contractor shall complete all of the following:
 1. Contractor shall complete all items noted in Section 3.4 for the final elevator(s) being modernized.
 2. Contractor shall accompany the University Representative for the final punch list for all elevators.
 - a. Contractor shall be fully responsible for correcting all noted items, which shall be judged according to specification, code, and industry standard.
 - b. Contractor shall demonstrate any/all operations as required by the University Representative, as well as the proper functioning of each elevator and of the entire elevator system.
 - c. Contractor shall endeavor to complete all noted items within 30 days of receiving

- the list from the University Representative.
- d. University shall hold final retention payment until University Representative determines that all noted punch list items have been corrected.
 3. Contractor shall completely clean all machine spaces of any trash, debris, parts, or other materials related to the project. All material shall be removed and disposed of by University in a code-compliant manner at Contractor's expense.
 4. Contractor shall further clean dust and other construction debris from all equipment, machine spaces and surfaces of any kind to insure a completely clean property in all areas
 5. Contractor shall ensure that all elevator systems and machine spaces are in a completely organized manner that will demonstrate to the maintenance group how the equipment and spaces should continue to be maintained on an ongoing basis.
 6. Any areas previously painted shall be touched up as needed to insure a professional appearance.
 7. Contractor shall provide complete instruction to University's personnel on the operation and testing of the elevator systems. This includes the safe and proper operation of any switches or operations such as fire service, independent service, swing operation, etc., or the operation of emergency phones/intercoms, EMS systems, or any other portion of the elevator which is accessible and operable by University. Contractor shall also review with the University any/all responsibilities of the University related to the newly modernized elevators or related equipment.
 8. Contractor shall provide three (3) sets of keys for ALL key switches (with no exceptions) in or related to the elevators.
 9. Contractor shall supply complete sets of as-built prints for all aspects of the elevator system. These prints shall be updated for any changes made in the field during installation. The prints shall be newly printed, clean, and neatly bound. One set of prints shall be maintained in the elevator machine room, while the other set shall be given to University for storage as they desire. Reference Division 1 for additional requirements.
 10. Contractor shall demonstrate to the University that spare parts for the recently modernized elevators are kept in stock as follows. Parts on-site shall be demonstrated visually. Parts off-site shall be provided in a listing to University Representative which details all parts and their locations:
 - a. In the machine room: All electronic sub-components and other consumable parts such as relays, contacts, transformers, leads, switches, etc. Contractor shall maintain in the machine room a list of all spare parts to be kept on-site. Contractor shall demonstrate to the University upon request that all parts are indeed in stock.
 - b. In the Contractor's local warehouse (within 20 miles of the subject property): All circuit boards of any kind installed in any elevator or escalator, door operator motors and other mid-level parts which may need to be replaced.
 - c. Available within 48 hours from Contractor's national stock or from OEM or other sources: All motors, armatures, field coils, and any other major item which can be replaced on-site. Where parts cannot be guaranteed to be available to arrive on site within 48 hours due to limited availability in the industry, such as certain parts which may no longer be manufactured, Contractor shall purchase and maintain a spare in the machine room or in their local warehouse earmarked specifically for this property.

3.7. MAINTENANCE

- A. After completion of the installation, maintenance and 24-hour callback service for the equipment furnished under this specification shall be provided for a period of twelve (12) months as part of this Contract. This service shall also include regular examination (biweekly); advise UCSC elevator maintenance at 831-459-1360 each time after completion of service and supply written record of service to the University and logged in machine room, this should include an oil log of

the installation during regular working hours by trained employees of this Contractor, and shall include all necessary adjustments, greasing, oiling, cleaning supplies and parts to keep the equipment in proper operation, except parts made necessary by misuse, accidents or neglect caused by others.

- B. All maintenance service must be performed by the installers and not by any other services agency. Also, the installer must have an established maintenance and service organization available for performance in the County of Santa Cruz that can provide regular and emergency service, 24 hours a day, every day of the year.
- C. Note: It is the responsibility of UCSC Elevator Maintenance to respond to any emergency regarding elevators. In the event that someone is trapped in an elevator that is under contracted maintenance, during regular work hours Monday through Friday, the University Elevator Maintenance will respond to free the passengers as soon as possible to minimize the inconvenience to users.
- D. A detailed record of work performed by University Elevator Mechanics is maintained in the Elevator Shop. Contractors should contact Elevator Maintenance to review work performed by University Elevator Mechanics. The elevator contractor shall be responsible to service record and maintain all elevator emergency circuits (including the fire service circuit, related equipment and sensors) as part of the regular elevator maintenance contract.

3.8. COMMISSIONING CHECKLIST

Reference Elevator Commissioning Sequence Progress Check Sheet at end of section.

ELEVATOR COMMISSIONING SEQUENCE PROGRESS CHECK SHEET

Specification Section: _____ Elevator Type & No. _____

Acknowledgements

Owner	Contractor	
_____	_____	Shop Drawings Submitted (To A/E)
_____	_____	Print Review Completed (by UCSC Elevator Dept.)
_____	_____	Shop Drawings Approved
_____	_____	Elevator(s) – Contract UCSC Elevator Dept.
_____	_____	Telephone Order Placed (1 or 2 lines per elevator)
_____	_____	O&M Manual (Draft) Submitted and approved
_____	_____	Field Review Completed (by UCSC Elevator Dept. prior to installation)
_____	_____	Major Components Delivered
_____	_____	Jack Inspection Completed (for Hydraulic type) by UCSC Elevator Dept.
_____	_____	Electrical Complete
_____	_____	Adjusting Performed
_____	_____	Issues from Adjusting Resolved
_____	_____	Installation Complete
_____	_____	Final Adjusting Completed (UCSC Elevator Dept. attends)
_____	_____	Code Inspection Complete (State of California Elevator Inspector), Report Submitted to Owner
_____	_____	Mfgr's Performance Testing Completed (Running Speed Test with Full Design Load) PLUS testing of the emergency power battery system
_____	_____	Elevator Accepted by UCSC Elevator Dept.
_____	_____	O&M Manual (Final Submitted)
_____	_____	All Punch-List Items Completed
_____	_____	Operator Training/Instruction Scheduled and completed
_____	_____	System Accepted by Owner

End of Section 14 24 23 00

