

SECTION 14 21 00
TRACTION ELEVATORS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Provide ___ passenger and ___ service traction elevators.
2. Due to maintenance area concerns, MRL elevators will be considered on a case by case basis.
3. Coordinate the work of this Section with work of other Sections as required to properly execute the work as necessary to maintain satisfactory progress of the work of other Sections.

B. Related Sections:

1. Elevator pit, including sump with pump, block-outs in machine room floor slabs and other similar concrete work in division 3.
2. Structural steel work, including intermediate floor framing where floor height exceeds 14 feet in Division 5.
3. Elevator pit and buffer ladders, railings, wire mesh partitions, machine room floor grates in Division 5.
4. Hoistway and enclosures, including cutouts for elevator equipment and components penetrating enclosures in Division 4.
5. Machine room and hoistway ventilation and sprinklering in Division 23
6. Machine room and pit lighting, light switches, GFCI convenience outlets, 480 volt 3 phase, 60 hertz electrical power distribution to elevator machine rooms, including products of combustion detection systems in Division 26.

1.02 SUBMITTALS

A. Shop Drawings, Descriptive Data: It should be noted that it is not the intent of the submittal process to relieve the contractor or manufacturer of contract responsibility.

B. Samples: All exposed materials with finish and all custom fixture fabrications.

1. Complete hall call buttons and hall lantern assembly.
2. Omit all logos from exposed finishes or components.
3. All cab finishes.

C. Maintenance Data: Provide written information necessary for proper maintenance and adjustment of the equipment prior to final acceptance as follows:

1. Straight line wiring diagrams of as-installed elevator circuits with index of location and function of all components. Leave one set in machine rooms. Provide 2 corrected sets for Owner's file 90 days after acceptance.
2. Lubricating instructions and recommended lubricant grade.
3. Parts catalogs and maintenance manuals. Spare parts lists should include price and availability for a period of three (3) years from end of warranty period.
4. Include any special tool, pass word or manuals that are required for maintenance, trouble shooting, adjustments or performing safety tests of the elevators for the Owner's use.
5. All special tools, passwords and manuals will become the property of the Owner at the completion of the project.

1.03 REFERENCES

- A. Comply with applicable building codes and elevator codes at the project site, including but not limited to the following:
 - 1. ASME A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code.
 - 2. NFPA 70 National Electrical Code.
 - 3. NFPA 80 Fire Doors and Windows.
 - 4. Americans with Disabilities Act – Accessibility Guidelines (ADAAG).
 - 5. ASME A17.1, Buildings and Facilities, Providing Accessibility and Usability for Physically Handicapped People.
 - 6. ASME UL 10B and ASTM E152, Fire tests of door assemblies.
 - 7. Model building codes.
 - 8. All other local applicable codes.
- B. Make application for, secure and pay for all necessary permits and certificates of inspection for all equipment included herein, as required by the various departments of the Local and State Authorities. Furnish the Owner certificates and approval as required by the local governing authorities having jurisdiction.
- C. In addition to the permits, inspections and test specified and the governing codes, the elevator contractor will be required to have performed speed and load carrying capacity and heat tests at his own expense.
- D. Any damage of any kind to the car or the adjoining structure which may develop through performance of any tests shall be repaired at no additional costs to the Owner.

1.04 CONTRACTORS RESPONSIBILITY

- A. The electrical and mechanical design is based on the following power characteristics and heat releases. The Contractor shall submit with bid any power characteristics or heat releases of this equipment that exceeds these listed below. Any additions or modifications requested at a later date will be at the expense of the Contractor.

Elevator #	Capacity	Speed	H.P.	Accel.	Amps	Running Amps	Heat Release
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Heat Release is based on BTU's per hour per elevator.
All amperages based on 460-volt, 3 phase, 60-hertz system.
Maintain 50 to 90 degrees F temperature with 90% non-condensing humidity.

- B. Store materials in a dry protected area. Protect and handle materials in accordance with manufacturer's recommendations to prevent damage, soiling, or deterioration.

1.05 WARRANTY

- A. Provide warranty to replace, repair, or restore parts or components that fail or do not operate properly due to poor field or factory workmanship, engineering or design for a period 12 months [\[confirm warranty period with UH Elevator shop\]](#) from the date of signed final acceptance.

1.06 MAINTENANCE

- A. Furnish regular maintenance for the elevators for a period of twelve (12) [\[confirm number with UH Elevator shop\]](#) months after the equipment is accepted by the Owner. The maintenance service shall comprise regular examinations of the installation by competent and trained mechanics on a weekly basis, and shall include all necessary adjustments, greasing, oiling, cleaning, and supply of parts and accessories necessary to keep the equipment in good

operating condition, except such replacement of parts made necessary by misuse, accidents not attributable to failure of equipment or workmanship, and negligence of the Owner.

- B. Repair work during the twelve month warranty period **[confirm warranty period with UH Elevator shop]** shall be carried out only by the Elevator Contractor's personnel, using only standard parts furnished by the Elevator Contractor and shall not be assigned or transferred to any agent.

1.07 FULL MAINTENANCE BID

- A. Elevator Contractor shall provide a full maintenance proposal for five years starting from completion of the 12 months maintenance period included in base elevator bid. Proposal shall include 24-hour emergency callback service. This bid is to be submitted with equipment bid for review.

1.08 QUALITY ASSURANCE

- A. The specific product or material manufactured by any of the following listed manufacturers is "acceptable" only if the specific product or material can evidence exact compliance with the contract documents and governing codes.
 - 1. ThyssenKrupp Elevator Company
 - 2. Fujitec America Company
 - 3. KONE Elevator Company
 - 4. Otis Elevator Company
 - 5. Schindler Elevator Company
- B. Elevator Contractor must be able to demonstrate that he has installed and maintained similar elevators to those specified and which have given satisfactory service; has been in successful operation for at least ten (10) years; maintains locally an adequate stock of parts for replacement or emergency purposes; has available qualified persons to do the work.
- C. The controls shall not have any software embedded that would require service by only the original control manufacturer.

1.09 PARTS AND PRINTED CIRCUIT BOARDS

- A. Contractor guarantees they will sell parts and printed circuit boards to the Owner or the Owner's Agent. The same shall not be dependent on an exchange component.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. The following manufacturers and dispatching are acceptable:
 - 1. For all elevators:

ThyssenKrupp Elevator	Virginia Controls or Motion Control
Fujitec America Elevator	Virginia Controls or Motion Control
KONE Elevator	Virginia Controls or Motion Control
Otis Elevator	Virginia Controls or Motion Control
Schindler Elevator	Virginia Controls or Motion Control
 - 2. For cabs and entrances:

ThyssenKrupp Elevator
Fujitec America Elevator
H & B
KONE Elevator

Otis Elevator
 Schindler Elevator
 Tyler

2.02 TYPE AND GENERAL CHARACTERISTICS

A. Passenger Elevators

1.	Quantity:	
2.	Capacity:	Capable of holding EMS stretcher; generally between 2500 and 3500 lbs.
3.	Speed:	2 through 3 floors of travel = 150 fpm 4 and above of travel = 350 fpm
4.	Floors Served:	As required
5.	Stops and Openings:	As required
6.	Operation and Control:	Microprocessor by Virginia Controls or Motion Control Engineering
7.	Machine Location:	Overhead above hoistway but at lower level may be an option
8.	Cabs:	Stainless steel front car door, stainless steel base, plastic laminate sides and rear, luminous ceiling with UL approved manufacturer's standard concealed lighting, exhaust fan, stainless steel handrails on three sides.
9.	Doors:	3-6" minimum width x 7'0" high. 16 gauge material.
10	Ceiling height:	8-0" to canopy. 7'6" to luminous ceiling.
11	Cab Inside:	To meet ADA code inside dimensions

B. Freight Elevators

1.	Quantity:	
2.	Capacity:	Minimum of 4000 lbs., sized to meet specific product and product weight.
3.	Speed:	Up to 2 floors of travel = 50 fpm Above 2 floors of travel = 100 fpm
4.	Floors Served:	As required
5.	Stops and Openings:	As required
6.	Operation and Control:	Microprocessor by Virginia Controls or Motion Control Engineering
7.	Machine Location:	Overhead above hoistway but at lower level may be an option.
8.	Cabs:	Standard freight cab (steel wainscoting) 8'0" x 8'0". Provide complete set of wall pads.
9.	Doors:	Bi-parting type. Manual or Power doors as required.
10	Ceiling height:	8'0" to canopy
11	Cab Inside:	Sized to meet specific product and product weight.

2.03 PERFORMANCE

- A. Speed: +/- 3% under any loading condition.
- B. Capacity: Safely lower, stop and hold up to 125% rated load.
- C. Leveling: +/- 1/8" under any loading condition.
- D. Door Closing time, Thrust and Kinetic Energy shall comply with ASME Code and ADA.

Floor to Floor Performance Time: Floor to floor performance time of 10.0 seconds for passenger elevators and 11.5 seconds for service elevators (from time door starts closing at one floor to fully opened and level on next successive typical floor, regardless of loading conditions or direction of travel).

2.04 MACHINE ROOM EQUIPMENT

- A. Identification: Provide identifying numbers on drive, machine, governor, controller and disconnect switch.
- B. Geared Machine: These machines shall be of the geared traction type as required in the elevator schedule. A continuous bed plate shall be provided and set on steel beams or a structural concrete slab.
- C. Motors: The motor shall be alternating current, reversible type designed for elevator service with high starting torque and low starting current. Motor armature shall be dynamically balanced and supported by appropriate ball or roller bearings.
- D. Brake: The brake shall be spring applied and electrically released and designed to provide smooth stops under variable loads.
- E. Sound Isolation: Provide resilient isolators beneath the machine bed plates and drive units to reduce vibration and noise transmission to the building structure.
- F. Governor: the car safety shall be operated by a centrifugal speed governor located at the top of the hoistway in the machine room. The governor shall actuate a switch when excessive descending speeds occur, disconnecting power to the motor and applying the brake application of the safety.
- G. Drive System:
 - 1. A variable voltage variable frequency AC drive system shall be provided. Power for the system will be taken from the building 3 phase power supply. The AC voltage will be changed to DC, and a power transistor inverter circuit will change the DC voltage to AC to power the elevator motor. Motor speed and torque will be controlled by varying the frequency and amplitude of the AC. A digital velocity encoder shall be provided on the motor giving feedback to the controller on motor speed and position. Provide line filters, noise spike or notching suppressors to insure other computer-operated equipment in the building will not be affected.
 - 2. The system shall meet or exceed all requirements of IEEE 519 1981 standard for general systems. The position selector shall be part of the microprocessor system. The car position in the hoistway shall be digitized through a primary position encoder. The microprocessor control system shall store the floor position and slowdown points in memory.
 - 3. The drive control system shall be a dual-loop feedback system based primarily on car position. The velocity profile shall be calculated by the microprocessor control system producing extremely smooth and accurate stops. The velocity encoder shall permit accurate position/velocity feedback shall permit a fast and accurate control of acceleration

- and deceleration. The vertical acceleration rate shall be not less than 3.3 ft./sec.² for speeds through 700 fpm, and 4 ft./sec.² for speeds over 700 fpm.
4. Provide regenerative drives for speeds of 350 fpm or greater.

2.05 AUTOMATIC TWO WAY LEVELING.

- A. Each elevator will have two way leveling to automatically bring the car to a stop approximately level with any floor for which a stop has been initiated, regardless of load, rope stretch of direction of travel.
- B. Automatic leveling control shall permit the synchronization of door opening with the stopping of the car at a floor.

2.06 ELEVATOR SUCCESSIVE STARTING

- A. After all variable frequency drives in a group have been shut down due to lack of normal power, only a single drive shall be allowed to start up at one time.

2.07 NORMAL STOPPING DEVICES

- A. Provide slow-down and normal stopping devices on top of each car.

2.08 GUARDS

- A. In addition to guards for sheaves and other similar items hereinafter specified, attention is directed to the requirements relative to guarding of exposed gears, sprockets, tape or rope sheaves, or devices of selectors, floor controllers, or signal machines, and the ropes, chains, or tapes for driving same in machine rooms and secondary spaces. Kick angles shall be included around all unprotected openings in the machine room floor.

2.09 MOTION CONTROL OR VIRGINIA CONTROLS

- A. Furnish and install microprocessor motion controllers for each elevator as manufactured by either of the above companies.
- B. The motion control system shall perform all of the functions of safe elevator motion and elevator door control. This shall include all of the hardware and software required to connect, transfer and interrupt power, and protect the equipment against overloads. The motion controller shall interface with the microprocessor control system.

2.10 OPERATION AND CONTROL SYSTEMS

- A. Provide "Group Automatic" operation and control systems for each group of elevators.

2.11 OPERATION

- A. General Operation and Control: A microprocessor based control system shall be provided to perform all of the functions of safe elevator motion and elevator door control. This shall include all of the hardware required to connect, transfer and interrupt power, and protect the motor against overloading. The system shall also perform car operational and group supervisory control. Each controller cabinet containing memory equipment shall be properly shielded from line pollution. Micro-computer system shall be designed to accept reprogramming with minimum system down time.
- B. Anticipated in Rush Device: To maintain sufficient lobby elevator capacity to handle anticipated heavy in rush traffic the system shall include a device to call all of the cars in the group to the

lobby without waiting for a lobby call. The device shall only operate predetermined heavy rush periods. During these periods, cars shall be automatically dispatched from the lobby when they become loaded nearly to capacity or, if not loaded to capacity, on a variable time interval calculated on the basis of the number of cars at the lobby and other data representative of traffic in the system. The cars shall continue to operate in this manner until the end of the predetermined period.

- C. **Off Peak Geographical Spacing:** When the cars are at rest, they shall be assigned throughout the building to pre-determined zones. The first car entering a zone shall become assigned to that zone. A car may run through an occupied, assigned zone in search of an occupied zone in which to park. While there are no calls registered the cars shall remain in a zone parked with door closed. The lowest zone shall consist of the main floor and adjacent floor, above or below, as required to suit design requirements. The remaining floors shall be divided into equal zones with one car randomly assigned to each zone. Optimized response to hall calls shall be below, as required to suit design requirements. The remaining floors shall be divided into equal zones with one car randomly assigned to each zone. Optimized response to hall calls shall be achieved by computing a relative system response (RSR) time for each registered hall call. The computation of each car's (RSR) time to a hall call shall be based on, but not limited to, such relevant factors as distance, service to previously assigned car, and hall calls, car load, direction, door and car motion status, and coincidence of car and hall calls. The car with the least RSR shall have this car assigned to it. RSR computation for each hall call is repeated several times a second and the hall call assignment might be changed if a more suitable car is found.
- D. **Moderate Up and Moderate Down Traffic programs:** When incoming traffic at the lobby floor increases as indicated by two cars leaving the lobby in the up direction, filled to capacity with a re-determined adjustable time period, cars assigned to upper zones shall be called to the lobby without waiting for a lobby call. Calls shall be automatically dispatched from the lobby when they become loaded nearly to capacity or, if not loaded to capacity, on a variable time interval calculated on the basis of the number of cars at the lobby and other data representative of traffic in the system. The cars shall continue to operate in this manner until the lobby traffic has been reduced to a predetermined level. When down calls above the lobby increases to a predetermined level, assignment of a car to the lobby ceases and the lobby car shall travel up to assist the other cars. Cars arriving at the lobby, after discharging passenger shall be dispatched upward. The cars shall continue to operate in this manner until the down traffic has been reduced to a pre-determined level.
- E. **Anticipated Exit Device:** To prepare the system for heavy outgoing traffic, operation shall be such that upon arrival at the lobby of any car, loaded more than a pre-determined capacity during a regularly anticipated exit period, assignment of a car to the lobby ceases and the lobby car shall travel up to assist the other cars. Cars arriving at the lobby, after discharging passengers, shall be dispatched upward. The cars shall continue to operate in this manner until the end of the regularly anticipated exit period.
- F. **Car to Lobby Operation:** Provide a key operated switch for each elevator in the Life Safety Panel which, when actuated, shall cause the corresponding elevator to make a trip to the lobby as soon as the car is available for response to the special call.
- G. **Load Weighing Dispatching:** A load weighing device shall be provided which shall dispatch the cars away from the main lobby floor when the load in the car reaches a pre-determined capacity. The load dispatch weight shall be adjustable.
- H. **Load Weighing Bypass:** A load weighing device shall be provided which shall be set to operate at a pre-determined percentage of the load in the car. The car shall bypass hall calls when this device is actuated. The bypass load weight shall be adjustable and separate from the load weighing dispatch weight.

- I. Anti-nuisance: A system shall be provided so that when the number of car calls is greatly disproportionate with the weight of the car all car calls shall be canceled without making any stops. The ratio of calls to weight shall be adjustable.
- J. Car Button Independent Service all Elevators: A Switch shall be provided in the car operating station which, when actuated, shall disconnect the elevator from the hall buttons, and permit operation from the car buttons only.
- K. Car Reversal Operation: A car without registered car call arriving at a floor where both up and down hall calls are registered shall initially respond to the hall call in the direction that the car was traveling. If no car call or hall call is registered for further travel in that direction, the car shall close its doors and immediately reopen them in response to the hall call in the opposite direction.
- L. Car Delay Operation: If, for any reason, the doors are prevented from closing and the car is unable to respond to a call, the calls shall be transferred to another car.

2.12 GENERAL OPERATIONS AND CONTROL

- A. Control of the elevator shall be automatic in operation by means of pushbuttons in the car numbered to correspond to floors served, for registering car stops and by up/down push buttons at each intermediate landing and call pushbuttons at terminal landings.
- B. The momentary pressing of one or more buttons shall dispatch the car to designated landings in the order in which the landings are reached by the car, irrespective of the sequence in which buttons are pressed.
- C. Each landing call shall be canceled when answered.
- D. When the car is traveling in the up direction, it shall stop at all floors for which car buttons or up hall buttons have been pressed. It shall not stop at floors where down buttons only have been pressed unless the stop for the floor has been registered by a car button, or unless the down call is at the highest floor for which any buttons have been pressed.
- E. The pressing of an up button when the car is traveling in the down direction shall not interrupt the travel unless the stop for that floor has been registered by a car button, or unless the up call is the lowest for which any button has been pressed.
- F. When the car has responded to high or lowest stop, and stops are registered for the opposite direction, its travel shall reverse automatically and it shall then clear the calls registered for that direction.
- G. Should both up and down call be registered at an intermediate floor, only the call corresponding to the direction in which the car is traveling shall be canceled upon the stopping of the car at the landing.
- H. An adjustable time delay shall be provided so that after the car has stopped in response to a hall button, the entering passenger may register his car button before the car will reverse to answer calls in opposite direction.
- I. Car station shall contain a key operated toggle switch for the car light, a fan switch and a door open button for stopping the closing motion of the doors and causing them to return automatically to their position.

- J. The buttons in the car and hall stations shall be of the light-up type and shall indicate that a call has been registered for that landing.
- K. Elevators shall have car button independent service. When a key operated switch in the car panel is activated the car shall be disconnected from the hall buttons and shall only respond to car buttons. Car doors shall be closed by pressing the door close button.

2.13 AUXILIARY OPERATION AND CONTROLS

- A. General: In addition to primary control system features, provide the following controls or operational features for the passenger and service elevators, except where otherwise indicated.
- B. Special Emergency Service – Phase I: The activation of a key switch in a lobby level hall station shall return all cars in the group express to the designated floor and by-pass all car and hall calls. The cars shall park at the designated floor with the doors open and will not respond to car or hall calls unless the SES-II switch in the car is activated. This system shall be in conformance with the current ASME code, Section 211.3.
- C. Special Emergency Service – Phase II: In-car control of each elevator during the emergency operation, by means of a key switch in each car shall be provided. Operation shall be per ASME Code, Rule 211.3.
- D. Emergency Lighting and alarm Bell (Power to Car): Remote emergency alarm bell, located where directed, so it can be heard outside the hoistway to be arranged to sound automatically in response to activation of alarm button.
- E. Emergency lighting and Alarm Bell (No Electrical Power to Car): Car mounted 12 volt battery unit including solid state charger and testing means enclosed in common metal container rechargeable lead acid or nickel cadmium battery with 10 year minimum life expectancy. When normal power to the car fails the system shall automatically provide power to the car emergency light and to the alarm bell circuit.
- F. Emergency Exhaust Fan: Any glass elevators located where direct sunlight can reach the cab must be equipped with a battery back up exhaust fan.

2.14 GUIDE RAILS

- A. Car and counterweight guide rails, brackets and bracket spacing shall conform to ASME A17.1 Code requirements. Design brackets to accommodate offsets or variations in hoistway walls. Include ladder brackets where necessary.

2.15 PIT SWITCH

- A. Provide an additional pit switch where pit depth exceeds 66 inches.

2.16 ROPES

- A. Suspension ropes and their connections shall conform to ASME A17.1, Section 2.12.

2.17 ELEVATOR COUNTERWEIGHTS

- A. A counterweight shall be provided for each elevator equal in weight to approximately the weight of the car plus a minimum of 40 percent of the rated load.

2.18 CAR AND COUNTERWEIGHT BUFFERS

- A. Suitable oil buffers with necessary blocking and extensions shall be provided under the elevator car and counterweight.

2.19 OVERHEAD SWITCHES

- A. One emergency stop switch shall be located beside top access door of elevators without overhead machine location.

2.20 HOISTWAY DOOR INTERLOCK

- A. Each elevator hoistway door shall be equipped with a hoistway unit system hoistway door interlock. The interlock shall prevent the operation of the elevator driving machine by the normal operating device unless the hoistway is locked in the closed position. The interlock shall also prevent the opening of the hoistway door from the landing side unless the car is either stopped or being stopped. Provide door restrictors.

2.21 HOISTWAY DOOR UNLOCKING DEVICES

- A. Unlocking devices shall be provided at all floors. Escutcheons shall be provided in all openings; finish of escutcheons shall be metal and match door finish.

2.22 ELEVATOR COMPENSATION

- A. Compensation, when required, shall be provided for the weight of hoisting ropes and unbalanced portion of traveling cables. Such compensation shall consist of iron or steel wire ropes attached to the underside of the car and counterweight. Where ropes are provided, pit sheaves shall be included. (Provide alternate quotation for whisper-flex where applicable).

2.23 ELECTRICAL WIRING

- A. Electrical wiring shall comply with the ASME and National Electrical Codes and all applicable local codes. Wiring shall be included for all devices installed.
 1. Furnish and install complete insulated wiring to connect all parts of the equipment. Properly ground all components as required by National Electric Code.
 2. Insulated wiring shall have a flame retarding and moisture resisting outer cover and shall be run in a metal conduit, metallic tubing, or wire ducts.
 3. Provide 6 percent spare wires between each controller, leveling device, hoistway junction box, and control panel, also, provide 6 percent spare conductors in each trail cable; all spares shall be properly tagged or otherwise identified with clear and indelible markings.
 4. Tag code all field wiring at junction points; control wiring in traveling cables at their terminals in the machine room: elevator car junction box and connections within the car. Test entire wiring system for insulation to ground.
 5. Provide total of six (6) shielded pairs for security use in the traveling cables for the elevator. The shielded pairs shall be located in a cable which is not used to carry alternating current circuits. The shielded wiring shall extend to junction box in the elevator machine room.

2.24 TOP OF CAR OPERATING DEVICE

- A. Each elevator shall be provided with an operation device mounted from or on the car crosshead which will permit slow (150 fpm or less) operation for purposes of adjustment, inspection, maintenance, and repair. A transfer switch shall be provided in the top of the car operating device fixture which will permit the disconnection of hoistway switch or switches and render the top of car operating device operative. The operating device shall be mounted in a metal box and shall be rigidly secured in a position conveniently accessible to workmen on top of the car..

2.25 LUBRICATION

- A. Suitable means shall be provided for lubrication with oil or grease for all bearing surfaces in connection with the elevator installation. Grease gun fittings, if used, shall be suitable for high pressure guns. Grease cups, if used, shall be automatic compression type.

2.26 CAR TOP LIGHTS

- A. Electric light with wire guard and GFI convenience outlet fixture on car top which shall meet the requirements of ASME A17.1, Rule 204.7a(4).

2.27 DOOR OPERATOR

- A. A heavy duty, DC master door operator capable of opening door at not less than 1½” fps and accomplishing reversal in 2½” maximum door movement. Doors shall open automatically when car arrives at floor to permit transfer of passengers; after timed interval door shall automatically close. Arrange operator so doors can be opened by hand from inside car in case of power failure, if car is within leveling zone.
- B. Door operation shall be closed loop system which gives constant feedback of the position and velocity of the elevator doors. System shall automatically overcome door resistance by increasing the power supply to the motor and increasing the torque required to maintain velocity. If a service tool is needed to make digital adjustments, provide the Owner with the service tool and all required manuals.

2.28 DOOR OPENING AND DOOR CONTROL DEVICE

- A. Provide proximity type door protection for all elevators.
- B. Door open timing feature.
 - 1. Operate in conjunction with proximity devices to provide adjustable, reduced, hold open time once beams are broken and re-established.
 - 2. When doors are held open beyond an adjustable time, buzzer sounds and doors shall close at reduced speed.
 - 3. There shall be a difference in door hold open times between car and hall calls. Door speed, thrust and kinetic energy shall comply with the ASME Code. Door hold open times shall comply with “Handicapped Requirements”.

2.29 FINAL LIMIT SWITCHES

- A. In addition to the normal limit switches, a hoistway final limit switch shall be installed at the top and at the bottom of each hoistway.
- B. Final limit switches shall be so located that they open at or about the time the buffer is engaged by the time the buffer is engaged by the car or counterweight.

2.30 CARFRAME AND SAFETY

- A. Car frame shall be fabricated from formed or structural steel members and shall have adequate bracing to support the platform and car enclosure. The car safety shall be an integral part of the car frame with safety blocks located in the bottom members of the car frame. The safety shall be flexible guide clamp type.

2.31 PLATFORM

- A. The car platform shall be constructed of steel with ¾” plywood sub-floor and fire proofing on the underside. The platform shall rest on rubber pads designed to form an isolating cushion between the car and car frame.

- B. The finished flooring for the elevators shall be furnished by others.

2.32 ROLLER GUIDES

- A. Rubber tired roller guides shall be mounted on the top and bottom of the car and counterweight to engage the guide rails.

2.33 CAR DOOR HANGERS AND TRACKS

- A. Hang doors on sheave type hangers with polyurethane that roll on a polished steel track and guided at the bottom by non metallic shoes sliding in a smooth threshold groove.

2.34 CAR DOOR ELECTRICAL CONTACT

- A. Shall operate in conjunction with car door so elevator cannot operate unless doors are closed or within the tolerance allowed by Code.

2.35 HOISTWAY ENTRANCES

- A. Entrances shall be complete with frames, doors, sight guards, sills, fascia plates, toe guards, headers, struts, hanger covers, tracks, hangers, miscellaneous hardware and related parts. Entrances shall carry UL label for Class "B" 1 ½ hour fire rating. Sill support angles shall be included. Entrance profiles, finishes and details as shown on the drawings.
- B. Frames: Frame finish for all entrances shall be Baked Enamel The Architect shall select the color for the baked enamel entrances. Floor designations/ Braille plates on hoistway door frames shall be permanently attached to frames.
- C. Doors and Sight Guards: Provide horizontal sliding doors of flush construction and sound deadened. Doors shall be fabricated from a minimum of #16 gauge painted baked enamel steel for the all openings. The Architect shall select the color of the baked enamel entrances.
- D. Sills: Extruded aluminum at all floors. Sills shall be level with finished floor.
- E. Sill Support Angles: Any support angles required shall be furnished and installed by the elevator contractor.
- F. Hanger Supports: Hanger supports or headers shall be formed sections securely bolted to the strut angles.
- G. Fascia Plates: Concealed fascia plates shall be #14 gauge steel, reinforced to insure a flat even surface throughout, and shall be securely fastened to hanger housings and sill above. Fascia plates shall be finish painted with one coat of rust inhibitive prime paint.
- H. Struts and Closers: Structural steel angles and other similar methods shall be furnished of sufficient size to accommodate the door closers. Angles shall be continuous and be securely bolted to the sills and building beams above.
- I. Header: 3/16" thick steel formed to provide stiffening flanges.
- J. Door Hangers and Tracks: Hangers for each hoistway entrance shall be of the sheave type arranged for two point suspension of the doors, and shall have brackets integral with door, or applied. Sheave and rollers shall be of steel with sealed ball bearings and there shall be adjustable ball bearings rollers to take up thrust of doors. Tracks shall be cold drawn or cold rolled steel of smooth surface and working section and shall be oiled with wick type lubrication.

- K. Hanger Cover Plates: Shall be made of #14 gauge steel and shall be removable type. Cover plates shall be arranged to assure hanger accessibility from within the car. Cover plates shall be finish painted with one coat of rust-inhibitive prime paint.
- L. Floor Numbers: Provide floor numbers within the hoistway in compliance with ASME 17.1 Code. Provide cast plates on each elevator entrance on each elevator entrance jamb in compliance with requirements for A.D.A. Stick-on plates are not acceptable. Submit sample for approval. Also provide car numbers on each 1st floor jamb per code.

2.36 CAR ENCLOSURE

- A. Passenger cars as detailed herein. Car top railing to be provided as required by code.

2.37 CAR DOORS

- A. Car doors shall be 1 inch thick, of flush design metal construction, with interior reinforcing and sound deadening insulation. They shall be adequately reinforced to withstand operational stresses and as required to accept hangers, interlocks and other accessories. The finish of the car doors shall be satin stainless steel.
- B. The car return panels and car operating panels shall have a satin stainless steel finish.
- C. The car door system shall be designed so that the car doors may not be opened more than 4" from the inside of the car if the car is outside the unlocking zone of a landing.

2.38 EMERGENCY EXITS

- A. All cars shall have ceiling emergency exits.

2.39 HALL BUTTON FIXTURES

- A. Passenger elevators and service elevators shall have one (1) riser(s) of hall buttons per bank. The buttons shall be vandal proof similar to EPCO. Face plates shall have a satin stainless steel finish.
- B. Include rated boxes and wiring as required.
- C. Include integral fireman's phone jacks at each lobby. Include all wiring and conduit to Life Safety Panel.
- D. 1st floor fixture shall contain fireman's phase I keyed switch, emergency power jewel, and phase I engraved instructions. Stick on markings is not acceptable.

2.40 HALL LANTERN FIXTURES

- A. Provide a hall lantern with an audible signal at each landing entrance for each elevator. The lanterns, when illuminated, shall indicate the elevator car which shall stop at the landing and in what direction the car is set to travel. When the car reaches a predetermined distance from the floor where it is going to stop, the corresponding hall lantern shall illuminate and the gongs sound once for up and twice for down. The hall lantern shall remain illuminated until the car doors close in preparation for leaving the floor.
 - 1. Faceplates shall have a satin stainless steel finish.
 - 2. Provide vandal resistant arrow indications.

2.41 CAR POSITION INDICATOR

- A. The elevators shall have one digital readout fixture per car above car operating panel.
- B. Fixtures shall be LED type and include floor sounding single adjustable tone of no less than 20 Decibels at not more than 1500 hertz, shall sound as the car is passing or stopping at a floor.

2.42 CAR OPERATING PANELS

- A. The elevators shall have one (1) car operating panel per car as shown on the Architect's drawing and shall include the following:
 - 1. Self-illuminating floor registration vandal proof EPCO buttons without markings on buttons.
 - 2. Alarm, door control buttons.
 - 3. Firefighter's key switch, pilot light, call cancel and buzzer.
 - 4. Jack for Firefighter's headset. Include wiring to fire control panel.
 - 5. All buttons shall be designated by raised markings with Braille, applied with concealed fasteners to meet ADA requirements. Stick on markings are not acceptable.
 - 6. Engraved elevator number, Phase II fireman's instructions, no smoking signs and elevator capacity on faceplate or return panel.
 - 7. Lockable service cabinet containing controls for car stop switch fan switch, car light switch, light rheostat, independent service, inspection service, and 110 volt convenience outlet.
 - 8. Swing return panels shall have a satin stainless steel finish.
 - 9. Locate to meet ADA requirements.
 - 10. ADA hands free phone shall be flush mounted in the swing front return.
 - 11. Logos or manufacturer's name are not permitted on exposed surfaces.

2.43 COMMUNICATIONS SYSTEMS

- A. The emergency communication system Model TALK-A-PHONE ETP-100EB shall be mounted behind the main car operating panel and be designed to provide two-way communication between the elevator and a point outside the hoistway. Audio and visual two-way communication is required. System shall automatically dial a programmable number to a point outside hoistway.
- B. Visual messages shall be provided to indicate the status of an emergency call. The visual message will illuminate and shall read: "Message Received" when the emergency call button is pressed.
- C. Raised letter and Braille shall be integrated and permanently marked on the faceplate identifying the device as a speech independent emergency telephone. Surface painted or applied graphics shall not be acceptable.
- D. Emergency communication system must be able to provide receiving agent with information identifying building and elevator number whenever an emergency call is placed.
- E. Emergency communication system shall comply with Federal Communication Commission (FCC) regulations and Americans with Disabilities Act (ADA).
- F. When the party called by someone in the cab hangs up, the telephone shall disconnect immediately without giving a busy signal in the cab.
- G. Integrated network board for central IT communication with elevator in the controller.
- H. One Rolm telephone adapter required per car.
- I. One analog telephone pair terminated in an RJ – 11 jack and located near the elevator traveling cable at the telephone is required.

- J. One telephone pair in the elevator traveling cable and one assigned elevator telephone number from UH telecommunications from 48 volt analog board are required.

2.44 SMOKE SENSOR TIE-IN

- A. System to interface with smoke sensors, including alternate level refuge. (Others will run wiring from the smoke sensors to the elevator machine room interface where the elevator contractor connects to their controls).

2.45 LIFESAFETY PANEL

- A. Elevator bid price shall include the cost of all wiring and conduit from various elevator banks to the fire command panel. Faceplate shall be No. 4 finish stainless steel. Life safety panel shall include all elevators.
 1. Position indicators for all elevators.
 2. One fireman's SES switch (on/off) per elevator bank.
 3. Jack for Firefighters headset.
 4. One car to lobby switch for all elevators.
 5. One power switch and pilot for each elevator.

2.46 Security interface for elevators with card [If card readers not required, delete entire section].

- A. Elevator contractor shall provide cut-out in faceplate with a tinted non-scratch flush mounted window and space behind within each elevator that requires a security cardholder. Refer to the security. The security contractor shall furnish the card reader to the elevator contractor for mounting. The elevator contractor shall provide all required mounting accessories and shall mount the card reader within the elevator cab. Brackets to hold the card reader in place shall be durable and non-metallic.
- B. The security contractor shall terminate the traveling cable provided by the elevator contractor within the elevator cab to the mounted card reader. The elevator contractor shall provide and mount glass panel to cover the mounted card reader. Mount the card reader so the window panel is flush to the front of the swing front return.
- C. The security contractor shall terminate the traveling cable provided by the elevator contractor within the elevator machine room to the security remote field panel.
- D. The security contractor shall provide an interface panel within the elevator machine room. This panel shall contain two terminal strips. The security contractor shall label the terminal strips with the required connections from the elevator controller. The elevator contractor shall wire from the elevator controller to these terminal strips. Coordinate with the security contractor to provide all required connections and compatible low voltage contact closures from the elevator controller to this terminal strip to allow the following operation:
 1. Signal from the security system to initiate elevator control by the card reader.
 3. On card reader mode: The security system shall indicate to the elevator controller which floors are selectable by the cardholder within that elevator. The elevator controller shall enable those floor selection buttons only. When a floor is selected, the elevator controller should disable all other floors from being selected and signal the security system that a selection has been made.
 4. Signal from the security system to remove the elevator from under card reader control to normal operation.

PART 3 – EXECUTION

3.01 SCOPE

- A. Installation shall meet all of the standard requirements of paragraph 1.03 for installation and inspection, tolerances, and qualifications. All work required for completion of a first-class installation is the responsibility of the Contractor, even if not included in this specification.
- B. Performance of the elevator shall meet requirements of Paragraph 2.03.

3.02 HOISTWAYS

- A. Entire front of hoistway will be left open until the hoistway entrances have been installed. After the guide rails have been erected and aligned, install frames in alignment with the guide rails, after which the wall may be completed. Coordinate this phase of the work to provide minimum delay in completion.

3.03 PAINTING

- A. All elevator equipment not painted, wire duct, miscellaneous iron and steel work located within the machine room or hoistway, shall be given a finish coat of paint. Material that has factory finish paint, shall have all scratches or mars painted after installation.
- B. Finish coat shall have hard, tough semi-gloss surface.

3.04 CLEAN UP

- A. Remove daily trash from hoistways, pits, and machine rooms including all packing material and debris resulting from this work. Leave all elevator spaces broom clean.

3.05 ACCEPTANCE TESTING

- A. Tests shall be performed by the Elevator Contractor at his expense in the presence of the Owner's representative. The elevators shall be subjected to the following acceptance inspection and tests:
 - 1. Inspection and tests required by applicable portions of Requirements, 1.03.
 - 2. Inspection and tests required by Federal, State, and Local codes and ordinances.
 - 3. Test safety circuit, loop circuit, and the drive circuits at 500 volts. Minimum resistance to ground shall be one megohm.
 - 4. General riding quality, leveling accuracy, and quietness of operation shall be acceptable to the Owner's representative.

3.06 USE OF ELEVATORS

- A. The elevators shall not be used for construction purposes, or during the period prior to turning over the project to the Owner. Should the elevators be authorized for temporary use, the following conditions shall apply:
 - 1. The Elevator Contractor shall provide a temporary acceptance form for the user to sign
 - 2. Neither the new installation period, nor the guarantee, shall start at this time unless specifically approved in writing by the Owner.
 - 3. The user shall provide, if job conditions require, all temporary enclosures, guards or other projection of the hoistway openings, power, signal devices, car lights, protection of any elevator entrances, cars, fixtures, and any other equipment that is installed.
 - 4. The user shall return the elevators in the same condition they were in when placed on temporary service and shall pay the Elevator Contractor for repairs or clean up.
 - 5. The user shall allow the Elevator Contractor to perform routine maintenance or repairs.

6. The cost of temporary service shall be worked out between the Elevator Contractor and the user.
- B. As elevators are completed, the Owner shall have the prerogative of accepting and using them, shutting them down, or accepting them under an Interim Service Agreement described below:
1. The Owner shall have the prerogative of continuing the Interim Service Agreement until all elevators in the group (or building) are completed.
 2. The guarantee period and new installation service will start at the termination of the interim service period.
 3. The cost of interim service shall not exceed the prorated cost of the monthly maintenance bid required by these specifications.

3.07 ACCEPTANCE

- A. Final acceptance of the installation shall be made only after all field inspections and tests are complete, punch list items are complete, all Owner's information items listed in 1.02.C have been furnished, and the Owner's representative is satisfied that the installation has been satisfactorily completed.

END OF SECTION 14210

SECTION 14 24 00
HYDRAULIC ELEVATORS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Provide _____ passenger and _____ service holeless hydraulic elevators.
 - 2. Coordinate the work of this Section with work of other Sections as required to properly execute the work as necessary to maintain satisfactory progress of the work of other Sections.

- B. Related Sections:
 - 1. Elevator pit, including sump with pump, block-outs in machine room floor slabs and other similar concrete work in division 3.
 - 2. Structural steel work, including intermediate floor framing where floor height exceeds 14 feet in Division 5.
 - 3. Elevator pit and buffer ladders, railings, wire mesh partitions, machine room floor grates in Division 5.
 - 4. Hoistway and enclosures, including cutouts for elevator equipment and components penetrating enclosures in Division 4.
 - 5. Machine room and hoistway ventilation and sprinklering in Division 23.
 - 6. Machine room and pit lighting and convenience outlets, 480 volt 3 phase, 60 hertz electrical power distribution to elevator machine rooms including emergency power distribution and products of combustion detection systems in Division 26.

1.02 SUBMITTAL

- A. Shop Drawings, Descriptive Data: It should be noted that it is not the intent of the submittal process to relieve the contractor or manufacturer of contract responsibility.

- B. Samples: All exposed materials with finish and all custom fixture fabrications.
 - 1. Complete hall call buttons and hall lantern assembly.
 - 2. Omit all logos from exposed finishes or components.
 - 3. All cab finishes.

- C. Maintenance Data: Provide written information necessary for proper maintenance and adjustment of the equipment prior to final acceptance as follows:
 - 1. Straight line wiring diagrams of as-installed elevator circuits with index of location and function of all components. Leave one set in machine rooms. Provide 2 corrected sets for Owner's file 90 days after acceptance.
 - 2. Lubricating instructions and recommended lubricant grade.
 - 3. Parts catalogs and maintenance manuals. Spare parts lists should include price and availability for a period of three (3) years from end of warranty period.
 - 4. Include any special tools, pass word or manuals that are required for maintenance, trouble shooting, adjustments or performing safety tests of the elevators for the Owner's use.
 - 5. All special tools, passwords and manuals will become the property of the Owner at the completion of the project.

1.03 REFERENCES

- A. Comply with applicable building codes and elevator codes at the project site, including but not limited to the following:

1. ASME A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code.
 2. ASME/NFPA 70 National Electrical Code.
 3. ASME/NFPA 80 Fire Doors and Windows.
 4. Americans with Disabilities Act – Accessibility Guidelines (ADAAG).
 5. AMSE/A17.1, Buildings and Facilities, Providing Accessibility and Usability for Physically Handicapped People.
 6. ASME/UL 10B and ASTM E152, Fire tests of door assemblies.
 7. Model building codes.
 8. All other local applicable codes.
- B. Make application for, secure and pay for all necessary permits and certificates of inspection for all equipment included herein, as required by the various departments of the Local and State Authorities. Furnish the Owner certificates and approval as required by the local governing authorities having jurisdiction.
- C. In addition to the permits, inspections and test specified and the governing codes, the elevator contractor will be required to have performed speed and load carrying capacity and heat tests at his own expense.
- D. Any damage of any kind to the car or the adjoining structure which may develop through performance of any tests shall be repaired at no additional costs to the Owner.

1.04 CONTRACTORS RESPONSIBILITY

- A. The electrical and mechanical design is based on the following power characteristics and heat releases. The Contractor shall submit with bid any power characteristics or heat releases of this equipment that exceeds these listed below. Any additions or modifications requested at a later date will be at the expense of the Contractor.

Elevator #	Capacity	Speed	H.P.	Starting Amps	Running Amps	Heat Release
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All amperages based on 460 volt system.
Maintain 50 to 90 degree F temperature with 90% non condensing humidity.

- B. Store materials in a dry protected area. Protect and handle materials in accordance with manufacturer's recommendations to prevent damage, soiling, or deterioration.

1.05 WARRANTY

- A. Provide warranty to replace, repair, or restore parts or components that fail or do not operate properly due to poor field or factory workmanship, engineering or design for a period 12 months period **[confirm warranty period with UH Elevator shop]** from the date of signed final acceptance.

1.06 MAINTENANCE

- A. Furnish regular maintenance for the elevators for a period of twelve (12) **[confirm number with UH Elevator shop]** months after the equipment is accepted by the Owner. The maintenance service shall comprise regular examinations of the installation by competent and trained mechanics on a weekly basis, and shall include all necessary adjustments, greasing, oiling, cleaning, and supply of parts and accessories necessary to keep the equipment in good operating condition, except such replacement

of parts made necessary by misuse, accidents not attributable to failure of equipment or workmanship, and negligence of the Owner.

- B. Repair work during the twelve month warranty period **[confirm warranty period with UH Elevator shop]** shall be carried out only by the Elevator Contractor's personnel, using only standard parts furnished by the Elevator Contractor and shall not be assigned or transferred to any agent.

1.07 FULL MAINTENANCE BID

- A. Elevator Contractor shall provide a full maintenance proposal for five years starting from completion of the ___ month's maintenance period included in base elevator bid. Proposal shall include 24 hour emergency callback service. This bid is to be submitted with equipment bid for review.

1.08 QUALITY ASSURANCE

- A. The specific product or material manufactured by any of the following listed manufacturers is "acceptable" only if the specific product or material can evidence exact compliance with the contract documents and governing codes.
 - 1. ThyssenKrupp Elevator Company
 - 2. Fujitec Elevator Company
 - 3. KONE Elevator Company
 - 4. Otis elevator Company
 - 5. Schindler Elevator Company
- B. Elevator Contractor must be able to demonstrate that he has installed and maintained similar elevators to those specified and which have given satisfactory service; has been in successful operation for at least ten (10) years; maintains locally an adequate stock of parts for replacement or emergency purposes; has available qualified persons to do the work.
- C. The controls shall not have any software embedded that shuts the elevator down if the equipment is not malfunctioning, and forces the Owner to call the Manufacturer for service.

1.09 PARTS AND PRINTED CIRCUIT BOARDS

- A. Contractor guarantees they will sell parts and printed circuit boards to the Owner or the Owner's Agent. The sale shall not be dependent on an exchange component.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. The following manufacturers and dispatching are acceptable:
 - 1. For all elevators:

ThyssenKrupp Elevator	Motion Control or Virginia Controls
Fujitec Elevator	Motion Control or Virginia Controls
KONE Elevator	Motion Control or Virginia Controls
Otis Elevator	Motion Control or Virginia Controls
Schindler Elevator	Motion Control or Virginia Controls
 - 2. For cabs and entrances:

ThyssenKrupp Elevator
Eklunds

Fujitec Elevator
H & B
KONE Elevator
Otis Elevator
Schindler Elevator
Tyler

2.02 TYPE AND GENERAL CHARACTERISTICS

A. Passenger Elevators.

1. Quantity:
2. Type: Holeless Hydraulic
3. Capacity: Capable of holding EMS stretcher; generally between 2500 and 3500 lbs.
3. Speed: 150 fpm
4. Floors Served: As Required
5. Stops and Openings: As Required
6. Operation and Control: Microprocessor by Virginia Controls or Motion Control Engineering
7. Power unit location: First floor or below; adjacent to hoistway.
8. Cabs: Stainless steel front car door, stainless steel base, plastic laminate sides and rear, luminous ceiling with UL approved manufacturer's standard concealed lighting, exhaust fan, stainless steel handrails on three sides,
9. Doors: 3-6" minimum width x 7'0" high. 16 gauge material.
10. Ceiling height: 8'0" to canopy; 7'6" to luminous ceiling
11. Cab size; To meet ADA code inside dimensions

B. Freight Elevator

1. Quantity: .
2. Type: Holeless Hydraulic
3. Capacity: Minimum of 4000 lbs., sized to meet specific product and product weight.
4. Speed: Up to 2 floors of travel = 50 fpm
Above 2 floors of travel = 100 fpm
4. Floors Served: As Required
5. Stops and Openings: As Required
6. Operation and Control: Microprocessor by Virginia Controls or Motion Control Engineering
7. Power unit location: First floor or below; adjacent to hoistway
8. Cabs: Standard freight cab (steel wainscoting) 8'0" x 8'0". Provide complete set of wall pads
9. Doors: Bi-parting type. Manual or Power doors as required.
10. Ceiling height: 8'0" to canopy
11. Cab size; 11. Cab Inside: Sized to meet specific product and product weight.

2.03 PERFORMANCE

- A. Speed: +/- 5% under any loading condition.
- B. Capacity: Safely lower, stop and hold up to 125% rated load.

- C. Leveling: +/- 1/4" under any loading condition.
- D. Door Closing time, Thrust and Kinetic Energy shall comply with ASME Code and ADA.
- E. Floor to Floor Performance Time: Floor to floor performance time (from time door starts closing at one floor to fully opened and level on next successive typical floor, regardless of loading conditions or direction of travel). Hydraulic passenger – 16 seconds. Hydraulic service – 17.5 seconds.

2.04 POWER UNIT

- A. The power unit (oil pumping and control mechanism) shall be compactly and neatly designed, with all of the components listed below combined in a self-contained unit.
- B. Pump shall be especially designed and manufactured for oil hydraulic elevator service.
- C. Motors shall be high starting torque, single speed, of standard manufacturer and of duty rating to comply with herein specified speed and loads. Drive shall be direct coupled submersible or belt driven if required on larger units. Dry-type hydraulic elevator motors are preferred.
- D. Valve: The control valve shall control flow for up and down directions hydraulically and shall include an integral check valve. A control section including control solenoids shall direct the main valve and control up and down starting, acceleration, transition from full speed, up and down stops, pressure relief and manual lowering. All of these functions shall be fully adjustable for maximum smoothness and to meet contract conditions. System to be provided with a low-pressure switch and shut-off valve. All valves must be located as to make them readily accessible for servicing. Provisions shall be incorporated to securely lock all adjustments.
- E. Tank: Provide storage tanks constructed of steel in conformance with ASME A17.1, Section 304. A tank heater, thermostatically controlled, shall be provided in the storage tank to maintain proper oil temperature.
- F. Power Controller: a power controller shall contain necessary electrical silver contactors, electro-mechanical switches and thermal overload relays. Components shall be mounted in NEMA 1 enclosure. Logic control system shall be microprocessor based, integrated solid state circuitry. System shall be protected from environment and vibrations.
- G. Piping: All necessary pipe and fittings to connect power unit to jack unit, and a complete charge of oil of the proper grade shall be furnished to each unit. A main line strainer and shut-off assembly of the self cleaning type with a 60 mesh element, and a magnetic drain plug shall be furnished and installed in the oil line. The unit shall be designed for 400 psi working pressure, shall be compact in design with easy access for cleaning. Sound isolating couplings, a minimum of two, shall be installed in the oil line in machine room between pump and jack. Each Coupling shall consist of two machined flanges separated by a neoprene seal to absorb vibration and to positively prevent metal to metal contact in the oil line. Couplings shall be designed and manufactured in such manner that they will be absolutely blowout proof. Oil-hydraulic silencer (muffler device) shall be installed in the oil line near power unit.
- H. With non-submersible pumps, sound insulating panels manufactured of reinforced 14 gauge steel panels with a 1" thick 1.5 pound core of fiberglass affixed to interior shall be

mounted on all four open sides of the power unit frame to isolate air borne noise from motor-pump assembly.

- I. Vibration pads shall be mounted under the power unit assembly to isolate the unit from the building structure.
- J. Provide identifying numbers on power unit, controller and disconnect switch.

2.05 ELECTRICAL CIRCUIT FAILURE PROTECTION

- A. The electrical control circuit shall be designed so that if a malfunction should occur, due to motor starter failure, oil becoming low in the system, or the car failing to reach a landing in the up direction within a pre-determined time, the elevator car will automatically descend to the lowest terminal landing. Power operated doors will automatically open when the car reaches that landing to allow passengers to depart. The doors will then automatically close and all control buttons, except the door open button in the car station, shall be made inoperative. The malfunction shall then be corrected and the elevator placed back in service through the mainline disconnect switch.

2.06 ELEVATOR LEVELING

- A. System shall be designed for automatic flush leveling of the car in both directions, controlled by a sensing system which once set, requires no periodic adjustment. System shall be two way leveling.

2.07 MOTION CONTROL OR VIRGINIA CONTROLS

- A. Furnish and install microprocessor motion controllers for each elevator.
- B. The motion control system shall perform all of the functions of safe elevator motion and elevator door control. This shall include all of the hardware and software required to connect, transfer and interrupt power, and protect the equipment against overloads. The motion control shall interface with the microprocessor control system.

2.08 OPERATION

- A. General Operation and control: A microprocessor based control system shall be provided to perform all of the functions of safe elevator motion and elevator door control. This shall include all of the hardware required to connect, transfer and interrupt power, and protect the motor against overloading. Each controller cabinet containing memory equipment shall be properly shielded from line pollution. Microprocessor system shall be designed to accept reprogramming with minimum system down time.
- B. Car Button Independent Service All Elevators: A switch shall be provided in the car operating station which, when actuated, shall disconnect the elevator from the hall buttons, and permit operation from the car buttons only.
- C. Car Reversal Operation: A car without registered car calls arriving at a floor where both up and down hall calls are registered shall initially respond to the hall call in the direction that the car was traveling. If no car call or hall call is registered for further travel in that direction, the car shall close its doors and immediately re-open them in response to the hall call in the opposite direction. The direction lanterns shall indicate the change direction when the doors re-open.

2.09 GENERAL OPERATION AND CONTROL

- A. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops and by Up/Down push buttons at all landings.
- B. Momentary pressing of one or more buttons shall dispatch the car to designated landings in the order in which the landings are reached by the car, irrespective of the sequence in which buttons are pressed.
- C. Each landing call shall be canceled when answered.
- D. When the car is traveling in the up direction, it shall stop at all floors for which car buttons or Up hall buttons have been pressed; it shall not stop at floors where Down buttons only have been pressed, unless the stop for that floor has been registered by a car button, or unless the down call is at the highest floor for which any buttons have been pressed.
- E. The pressing of an Up button when the car is traveling in the down direction shall not interrupt the travel unless the stop for that floor has been registered by a car button, or unless the up call is the lowest for which any button has been pressed.
- F. When the car has responded to its highest or lowest stop, and stops are registered for the opposite direction, its travel shall reverse automatically and it shall then clear the calls registered for that direction.
- G. Should both up and down calls be registered at an intermediate floor, only the call corresponding to the direction in which the car is traveling shall be canceled upon the stopping of the car at the landing.
- H. An adjustable time delay shall be provided so that after the car has stopped in response to hall button, the entering passenger may register his car button before the car will reverse to answer calls in opposite direction.

2.10 AUXILIARY OPERATION AND CONTROLS

- A. General: In addition to primary control system features, provide the following controls or operational features for the passenger and service elevators, except where otherwise indicated.
- B. Special Emergency Service – Phase I: The activation of a key switch in a lobby level hall station shall return all cars in the group express to the designated floor, by-passing all car and hall calls. The cars shall park at the designated floor with their doors open and will not respond to car or hall calls unless the SES-II switch in the car is activated. This system shall be in conformance with the current ASME Code, Section 211.3. Heat and smoke or products of combustion sensing devices are to be furnished by others but the elevator contractor shall furnish contacts on the elevator controller to receive signals from the sensing device. If an elevator is on Independent Service, when the elevators are recalled, a buzzer shall sound in the car and a jewel shall be illuminated as required.
- C. Special Emergency Service – Phase II: In-car control of each elevator during the emergency operation, by means of a key switch in each car shall be provided. Operation shall be per ASME Code, Rule 211.3.
- D. Emergency Power Operation: Provide battery powered emergency lowering for each car. Car shall lower and park with the doors closed after a door time out period. The door open button shall remain activated.

- E. Alarm Bell System (With Electrical Power to Car): Remote emergency alarm bell, located where directed, so it can be heard outside the hoistway to be arranged to sound automatically in response to activation of alarm button in car control system.
- F. Emergency Lighting and Alarm Bell (No Electrical Power to Car): Car mounted 12 volt battery unit including solid state charger and testing means enclosed in common metal container rechargeable lead acid or nickel cadmium battery with 10 year minimum life expectancy. When normal power to the car fails, the system shall automatically provide power to the car emergency light and to the alarm bell circuit.
- G. Emergency Exhaust Fan: Glass elevators located where direct sunlight can reach them must be equipped with a battery back up exhaust fan.

2.11 ELECTRICAL WIRING

- A. Electrical wiring shall comply with the ASME and National Electrical Code and all local codes. Wiring shall be included for all devices installed.
 - 1. Furnish and install complete insulated wiring to connect all parts of the equipment. Properly ground all components as required by the National Electric Code.
 - 2. Insulated wiring shall have a flame retarding and moisture resisting outer cover and shall be run in a metal conduit, metallic tubing, or wire ducts.
 - 3. Provide 6 percent spare wires between each controller, hoistway junction box and control panes, also 6 percent spare conductors in each trail cable; all spares shall be properly tagged or otherwise identified with clear and indelible markings.
 - 4. Tag code all field wiring at junction points; control wiring in traveling cables at their terminals in the machine room; elevator car junction box and connections within the car. Test entire wiring system for insulation to ground,
 - 5. Provide total of 4 shielded pairs for security use in the traveling cables for the elevator. The shielded pairs shall be located in a cable which is not used to carry alternating current circuits. The shielded wiring shall extend to junction box in the elevator machine room.

2.12 PLUNGER, CYLINDER AND CASING

- A. The dual plunger and cylinder for holeless elevators shall be designed to lift the gross weight of the fully loaded elevator at full acceleration. Design and fabrication of components shall conform to the requirements of ASME A17.1 Code.
- B. The plungers shall be constructed of seamless steel tubing, turned smooth and true and finished to a fine polished surface, with a stop plate welded to the plunger bottom.
- C. When the use of holeless elevators cannot be provided, wrap cylinder with an approved coating to protect it from electrolytic and chemical corrosion. Provide schedule 80 PVC sealed and capped casing with electrolytic back fill for the holed units.
- D. Provide sheave, cables and required safety devices to provide 2 to 1 ratio of car speed to plunger speed for the roped hydraulic units when holeless elevators cannot be used.

2.13 GUIDES AND BUFFERS

- A. Guides for each elevator car shall be planed or formed steel elevator guide rails, properly fastened to the building structure with steel brackets, all provided as part of the work of this section.

- B. Substantial spring buffers under car shall be furnished and installed in elevator pit. They shall be mounted on continuous channels fastened to the elevator guide rail or securely anchored to the pit floor and substantial extension shall be provided, as required.

2.14 PIT SWITCH

- A. An emergency stop switch shall be located in the pit accessible from the pit access door. Provide an additional stop switch where pit depth exceeds 66 inches.

2.15 HOISTWAY DOOR INTERLOCK

- A. Each elevator hoistway door shall be equipped with a hoistway unit system hoistway door interlock. The interlock shall prevent the operation of the elevator driving machine by the normal operating device unless the hoistway door is locked in the closed position. The interlocks shall also prevent the opening of a hoistway door from the landing side unless the car is either stopped or being stopped.

2.16 HOISTWAY DOOR UNLOCKING DEVICES

- A. Unlocking devices shall be provided at all floors with metal escutcheons to match the door finish.

2.17 TOP OR CAR OPERATING DEVICE

- A. Each elevator shall be provided with an operating device mounted from or on the car crosshead which will permit slow speed (150 fpm or less) operation for purposes of adjustment, inspection, maintenance, and repair. A transfer switch shall be provided in the top of the car operating device fixture which will permit the disconnecting of hoistway access switch or switches and render top of car operating device operative. The operating device shall be mounted in a metal box and shall be rigidly secured in a position conveniently accessible to workmen on top of the car.

2.18 LUBRICATION

- A. Suitable means shall be provided for lubrication with oil or grease, all bearing surfaces in connection with the elevator installation. Grease gun fittings, if used, shall be suitable for high pressure guns. Grease cups, if used, shall be automatic feed compression type.

2.19 CAR TOP LIGHTS

- A. Electric light with wire guard and GFI convenience outlet fixture on car top which shall meet the requirements of ASME A17.1, Rule 204.7a(4).

2.20 DOOR OPERATOR

- A. Heavy duty, DC master door operator capable of opening doors at not less than 1 ½ fps and accomplishing reversal in 2 ½ inch maximum of door movement. Doors shall open automatically when car arrives at floor to permit transfer of passengers; after timed interval, doors shall automatically close. Arrange operator so doors can be opened by hand from inside car in case of power failure, if cars are within leveling zone.

2.21 DOOR RE-OPENING AND CONTROL DEVICE

- A. Provide proximity type electronic door protection.

- B. Door Open timing Feature:
 - 1. Operate in conjunction with detectors to provide adjustable, reduced, hold open time once rays are broken and re-established.
 - 2. When the doors are held open beyond the adjustable time, buzzer sounds and doors shall close at reduced speed.
 - 3. There shall be a difference in door hold open times between car and hall calls. Door speed, thrust, kinetic energy shall comply with the ASME Code. Door hold open times shall comply with "Handicap Requirements" ADA.

2.22 AUTOMATIC TERMINAL LIMIT SWITCHES

- A. Electric limit switches shall be placed in the hatchway near the terminal landings and be designed to cut off the electric current and stop the car should it run beyond either terminal landing.

2.23 CAR FRAME

- A. Car frame shall be fabricated from formed or structural steel members and shall have adequate bracing to support the platform and car enclosure.

2.24 PLATFORM

- A. The car platform shall be constructed of steel with a plywood subflooring and fire proofing on the underside. The platform shall be isolated from the piston. Typical sills shall be extruded aluminum.

2.25 ROLLER GUIDES

- A. Rubber tired roller guides shall be mounted on the top and bottom of the car and engage the guide rails.

2.26 CAR DOOR HANGERS AND TRACKS

- A. Hang doors on sheave type hangers with polyurethane that roll on a polished steel track and guided at the bottom by non metallic shoes sliding in a smooth threshold groove

2.27 CAR DOOR ELECTRICAL CONTACT

- A. Shall operate in conjunction with car doors so elevator cannot operate unless doors are closed or within the tolerance allowed by Code.

2.28 HOISTWAY ENTRANCES

- A. Entrances shall be complete with frames, doors, sight guards, sills, fascia plates, toe guards, headers, struts, hanger covers, tracks, hangers, miscellaneous hardware and related parts. Entrances shall carry UL label for class "B" 1 1/2 hour fire rating.. Entrance profiles, finishes and details as shown on the drawings
- B. Frames: Frame finish for the front entrances at _____ shall be _____. Front entrances for the typical floors shall be _____. The Architect shall select the color for the baked enamel entrances. Floor designations on hoistway door frames shall be permanently attached to frames. Adhesive application is not acceptable.

- C. Doors and Sight Guards: Provide horizontal sliding doors of flush construction and sound deadened. Doors shall be fabricated from a minimum of #16 gauge _____ for the front openings at _____ and baked enamel for the typical openings. The Architect shall select the color of the baked enamel entrances.
- D. Sills: Extruded aluminum at all floors except the openings at _____ for elevators _____ which shall be _____. Sills shall be level with finished floor.
- E. Sill Support Angles: Any support angles required shall be furnished and installed by the elevator contractor.
- F. Hanger Supports: Hanger supports or headers shall be formed sections securely bolted to the strut angles.
- G. Fascia Plates: Concealed fascia plates shall be #14 gauge steel, reinforced to insure a flat even surface throughout, and shall be securely fastened to hanger housings and sill above. Fascia plates shall be finish painted with one coat of rust-inhibitive prime paint.
- H. Struts and Closers: Structural steel angles and other similar methods shall be furnished of sufficient size to accommodate the door closers. Angles shall be continuous and be securely bolted to the sills and building beams above.
- I. Header: 3/16" thick steel formed to provide stiffening flanges.
- J. Door Hangers and Tracks: Hangers for each hoistway entrance shall be of the sheave type arranged for two point suspension of the doors, and shall have brackets integral with door, or applied. Sheave and rollers shall be of steel with sealed ball bearings and there shall be adjustable ball bearings rollers to take up thrust of doors. Tracks shall be cold drawn or cold rolled steel of smooth surface and working section and shall be oiled with wick type lubrication.
- K. Hanger Cover Plates: Shall be made of #14 gauge steel and shall be removable type. Cover plates shall be arranged to assure hanger accessibility from within the car. Cover plates shall be finish painted with one coat of rust-inhibitive prime paint.
- L. Provide car number inside the entrance jamb at the ground floor only.

2.29 CAR ENCLOSURE

- A. Passenger cars and service cars as detailed herein.

2.30 CAR DOORS

- A. Car doors shall be 1 inch thick, of flush design metal construction, with interior reinforcing and sound deadening insulation. They shall be adequately reinforced to withstand operational stresses and as required to accept hangers, interlocks and other accessories. The finish of the car doors shall be _____.
- B. The car return panels and car operating panels shall have a _____ finish.
- C. The car door system shall be designed so that the car doors may not be opened more than 4" from the inside of the car if the car is outside the unlocking zone of a landing.

2.31 EMERGENCY EXITS

- A. All cars shall have ceiling emergency exits.

2.32 HALL BUTTON FIXTURES

- A. Passenger elevators _____ shall have _____ riser(s) of hall buttons. The circular EPCO buttons shall be milk white. Face plates shall have a _____ finish.
- B. Include rated boxes and wiring as required.
- C. Include integral fireman's phone jacks at each lobby. Include all wiring and conduit to Life Safety Panel.

2.33 HALL LANTERN FIXTURES

- A. Provide a hall lantern with an audible signal at each landing entrance for each elevator. The lanterns, when illuminated, shall indicate the elevator car which shall stop at the landing and in what direction the car is set to travel. When the car reaches a predetermined distance from the floor where it is going to stop, the corresponding hall lantern shall illuminate and the gongs sound once for up and twice for down. The hall lantern shall remain illuminated until the car doors close in preparation for leaving the floor.
 - 1. Faceplates shall have a _____ finish.
 - 2. Provide round milk white lens.

2.34 CAR POSITION INDICATOR

- A. The elevators shall have one digital readout fixture above each car operating panel.
- B. Fixtures shall be LED type and include floor sounding single adjustable tone of no less than 20 Decibels at not more than 1500 hertz, shall sound as the car is passing or stopping at a floor.

2.35 CAR OPERATING PANELS

- A. The elevators shall have ___ car operating **panel(s)** per car as shown on the Architect's drawing and shall include the following:
 - 1. Self-illuminating floor registration without markings on EPCO buttons.
 - 2. Alarm, door control buttons. Include wiring and conduit to Life Safety Panel.
 - 3. Firefighters key switch, pilot light, call cancel and buzzer.
 - 4. Jack for Firefighter's headset including wiring and conduit..
 - 5. All buttons shall be designated by raised markings with Braille, applied with concealed fasteners to meet ADA requirements. Stick on markings are not acceptable.
 - 6. Engraved elevator number and elevator capacity on faceplate or front return.
 - 7. Lockable service cabinet containing controls for car stop switch, fan switch, car light switch, light rheostat, independent service, inspection service, and 110 volt GFCI convenience outlet.
 - 8. Faceplates and return panels shall have a _____ finish.
 - 9. Locate to meet ADA requirements.
 - 10. Logo or manufacturers name not permitted on exposed surfaces.

2.36 COMMUNICATIONS SYSTEM

- A. The emergency communication system Model TALK-A-PHONE ETP-100EB shall be mounted behind the main car operating panel and be designed to provide two-way communication between the elevator and a point outside the hoistway. Audio and

visual two-way communication is required. System shall automatically dial a programmable number to a point outside hoistway.

- B. Visual messages shall be provided to indicate the status of an emergency call. The visual message will illuminate and shall read: "Message Received" when the emergency call button is pressed.
- C. Raised letter and Braille shall be integrated and permanently marked on the faceplate identifying the device as a speech independent emergency telephone. Surface painted or applied graphics shall not be acceptable.
- D. Emergency communication system must be able to provide receiving agent with information identifying building and elevator number whenever an emergency call is placed.
- E. Emergency communication system shall comply with Federal Communication Commission (FCC) regulations and Americans with Disabilities Act (ADA).
- F. When the party called by someone in the cab hangs up, the telephone shall disconnect immediately without giving a busy signal in the cab.
- G. Integrated network board for central IT communication with elevator in the controller.
- H. One Rolm telephone adapter required per car.
- I. One analog telephone pair terminated in an RJ – 11 jack and located near the elevator traveling cable at the telephone is required.
- J. One telephone pair in the elevator traveling cable and one assigned elevator telephone number from UH telecommunications from 48 volt analog board are required.

2.37 LIFE SAFETY PANEL

- A. Elevator bid price shall include the cost of all wiring and conduit from various elevator banks to the fire command panel. Faceplate shall be No. 4 finish stainless steel. Life safety panel shall include all elevators.
 - 1. Position indicators for all elevators.
 - 2. One fireman's SES switch (on/off) per elevator bank.
 - 3. Jack for Firefighters headset.
 - 4. One car to lobby switch for all elevators.
 - 5. One power switch and pilot for each elevator.
 - 6. Emergency power pilot light and interlocking push button switches for fireman's override of automatic selection system, buttons to be behind lockable door.

2.38 SMOKE SENSOR TIE-IN

- A. System to interface with smoke sensors, including alternate level refuge. (Others will run wiring from the smoke sensors to the elevator machine room interface where the elevator contractor connects to their controls).

2.39 SECURITY INTERFACE FOR ELEVATORS WITH CARD READERS

- A. Elevator contractor shall provide cut-out in the faceplate with a tinted non-scratch flush mounted window and space behind within each elevator that requires a security cardholder. Refer to the security. The security contractor shall furnish the card reader to

the elevator contractor for mounting. The elevator contractor shall provide all required mounting accessories and shall mount the card reader within the elevator cab. Brackets to hold the card reader in place shall be durable and non-metallic.

- A. The security contractor shall terminate the traveling cable provided by the elevator contractor within the elevator cab to the mounted card reader. The elevator contractor shall provide and mount glass panel to cover the mounted card reader. Mount the card reader so the window panel is flush to the front of the swing front return.
- B. The security contractor shall terminate the traveling cable provided by the elevator contractor within the elevator machine room to the security remote field panel.
- C. The security contractor shall provide an interface panel within the elevator machine room. This panel shall contain two terminal strips. The security contractor shall label the terminal strips with the required connections from the elevator controller. The elevator contractor shall wire from the elevator controller to these terminal strips. Coordinate with the security contractor to provide all required connections and compatible low voltage contact closures from the elevator controller to this terminal strip to allow the following operation:
 - 1. Signal from the security system to initiate elevator control by the card reader.
 - 1. On card reader mode: The security system shall indicate to the elevator controller which floors are selectable by the cardholder within that elevator. The elevator controller shall enable those floor selection buttons only. When a floor is selected, the elevator controller should disable all other floors from being selected and signal the security system that a selection has been made.
 - 2. Signal from the security system to remove the elevator from under card reader control to normal operation.

PART 3 – EXECUTE

3.01 SCOPE

- A. Installation shall meet all of the standard requirements of paragraph 1.03 for installation and inspection, tolerances, and qualifications. All work required for completion of a first-class installation is the responsibility of the contractor, even if not included in this specification.
- B. Performance of the elevator shall meet requirements of Paragraph 2.03.

3.02 HOISTWAYS

- A. Entire front of hoistway will be left open until the hoistway entrances have been installed. After the guide rails have been erected and aligned, install frames in alignment with the guide rails, after which the wall may be completed. Coordinate this phase of the work to provide minimum delay in completion.

3.03 PAINTING

- A. All elevator equipment not painted, wire duct, miscellaneous iron and steel work located within the machine room or hoistway, shall be given a finish coat of paint. Material that has factory finish paint, shall have all scratches or mars painted after installation.
- B. Finish coat shall have hard, tough semi-gloss surface.

3.04 CLEAN UP

- A. Remove daily trash from hoistways, pits, and machine rooms including all packing material and debris resulting from this work. Leave all elevator spaces broom clean.

3.05 ACCEPTANCE TESTING

- A. Tests shall be performed by the Elevator Contractor at his expense in the presence of the Owner's representative. The elevators shall be subjected to the following acceptance inspection and tests:
 - 1. Inspection and tests required by applicable portions of Requirements, 1.03.
 - 2. Inspection and tests required by Federal, State, and Local codes and ordinances.
 - 3. Test safety circuit, loop circuit, and the drive circuits at 500 volts. Minimum resistance to ground shall be one meg ohm.
 - 4. General riding quality, leveling accuracy, and quietness of operation shall be acceptable to the Owner's representative.

3.06 USE OF ELEVATORS

- A. The elevators shall not be used for construction purposes, or during the period prior to turning over the project to the Owner. Should the elevators be authorized for temporary use, the following conditions shall apply:
 - 1. The Elevator Contractor shall provide a temporary acceptance form for the user to sign.
 - 2. Neither the new installation period, the guarantee, shall start at this time unless specifically approved in writing by the Owner.
 - 3. The user shall provide, if job conditions require, all temporary enclosures, guards or other projection of the hoistway openings, power, signal devices, car lights, protection of any elevator entrances, cars, fixtures, and any other equipment that is installed.
 - 4. The user shall return the elevators in the same condition they were in when placed on temporary service and shall pay the Elevator Contractor for repairs or clean up.
 - 5. The user shall allow the Elevator Contractor to perform routine maintenance or repairs.
 - 6. The cost of temporary service shall be worked out between the Elevator Contractor and the user.
- B. As elevators are completed, the Owner shall have the prerogative of accepting and using them, shutting them down, or accepting them under an Interim Service Agreement described below:
 - 1. The Owner shall have the prerogative of continuing the Interim Service Agreement until all elevators in the group (or building) are completed.
 - 2. The guarantee period and new installation service will start at the termination of the interim service period.
 - 3. The cost of interim service shall not exceed the prorated cost of the monthly maintenance bid required by these specifications.

3.07 ACCEPTANCE

- A. Final acceptance of the installation shall be made only after all field inspections and tests are complete, punch list items are complete, all Owner's information items listed in 1.02.C have been furnished, and the Owner's representative is satisfied that the installation has been satisfactorily completed.

END OF SECTION 14 24 10