

PART I - GENERAL

[Note to AE: The elevator consultant is expected to add any wording or offer suggestions to make changes to this specification in order to make it a thorough product that properly protects and provides the U of I with quality hydraulic elevators and project practices. In no way should the elevator consultant consider this “what must and only be utilized” for specifying elevators at the U of I. This document is required to be used, but the expertise of the elevator consultant is valued and expected to improve this document where improvement is needed in the opinion of the consultant.]

There are paragraphs within this document where the AE is required to provide the appropriate project-specific information. Italic font in brackets has been used to call attention to these items specific to a project.]

1.1 SCOPE OF WORK

- A. The extent of hydraulic elevator work is shown on drawings and in the schedule, and is hereby defined to include, but not by ways of limitation, the hydraulic pumping unit(s), direct acting jack assembly, cars, hoistway entrances, guide rails, signals, controls, electric wiring, buffers; devices for operating, dispatching, safety, security, leveling and alarm. Electrical service to the elevator system is not included as elevator work, and construction of the basic elevator hoistway, pits and machinery rooms complete with access, services and utilities is not included as elevator work.
- B. Design, furnish and install hydraulic elevator(s) in a first-class manner.
- C. *[Note to AE: For elevator replacement and modernization project, include a list of specific components to be retained and re-used. Edit this specification to delete paragraphs that do not apply to the project.]*

1.2 ELEVATOR CONTRACTOR

- A. Furnish all elevator engineering, materials, labor, tools, equipment, transportation, supervision, testing for the complete “TURNKEY” installation of the specified elevator(s).
 - 1. *[Note to AE: Insert building name, address, U of I building location number here (for each building if more than one)]*
 - a. *[Note to AE: Install number and type of elevator(s) to be provided]*
- B. *[Note to AE: For elevator replacement / modernization projects, the services of a structural engineer may be required to meet current code requirements for the various aspects of the project. Where necessary, the Structural Engineer would need to verify machine room flooring loading, hoistway re-certification, pit floor load compliance, as well as verifying and approving equipment loading techniques and procedures.]*
- C. In all cases where a device or part of the equipment is herein referred to in the singular number, it is intended that such reference shall apply to as many such devices as are required to complete the installation.
- D. Any items not specified in detail by the Specification, but which are incidental to or necessary for the complete installation and proper operation of the work described herein or reasonably implied, shall be furnished as if called for in detail by the Specification.
- E. Related Sections: The following sections contain requirements that relate to this section and are performed by other trades. *[Note to AE: Specific section numbers listed below are directly from the U of I Facilities Standards. Add to this list as needed for a complete list of references specific to the project.]*

1. *Section 01 35 00 – Special Procedures*
2. *Section 01 76 00 – Protecting Installed Construction*
3. *Section 08 11 13 – Hollow Metal Doors and Frames*
4. *Section 09 65 80 - Elevator Flooring Requirements*
5. *Section 21 10 00 – Water-Based Fire Suppression Systems*
6. *Section 22 13 29 – Sewerage Pumps*
7. *Section 26 80 00 – Elevator Electrical Requirements*
8. *Section 27 00 00 – Communications*
9. *Section 28 30 00 – Fire and Smoke Detection System*
10. *Drawing 14 20 00-01, Elevator Pit Plan View*
11. *Drawing 14 20 00-02, Elevator Pit Sectional View*
12. *Drawing 14 20 00-03, Elevator Pit Ladder Detail*
13. *Exhibit 14 24 00-01, Hydraulic Elevator Modernization Checklist [Note to AE: This is for elevator replacement or modernization projects only.]*
14. *Division 04 – Masonry*

1.3 STANDARDS AND REGULATIONS

- A. Code Compliance: All material, design, clearances, construction, workmanship, operation and tests shall be in accordance with the requirements of the regulations listed below. In the event of any potential conflict between the code standards, the most stringent requirement shall apply:
- B. Current Codes: All codes in effect under the Illinois Elevator Safety and Regulation Act, and current codes identified in the U of I Facilities Standards shall be used.
 1. ASME A17.1 “Safety Code For Elevators and Escalators”
 2. International Building Code
 3. NFPA 70 National Electrical Code
 4. NFPA 101 Life Safety Code
 5. The Illinois Accessibility Code
 6. International Mechanical Code
 7. All parts and components shall be U. L. Listed as applicable with ASME A17.1

1.4 PERMITS

- A. The elevator contractor must obtain a permit for installation from the Office of the State Fire Marshal, Elevator Safety Division. The contractor shall be responsible for the permit application fee and the preparation and submission of all required plans, specifications and application forms related to the elevator installation permit.
- B. A copy of the elevator permit for installation shall be provided to the University of Illinois Elevator Shop and the Project Manager.

1.5 SUBMITTALS

- A. See *Section 01 33 23 - Shop Drawings, Product Data, and Samples [Note to AE: Include appropriate Section reference]*
 1. Product Data: Submit Shop drawing(s) and catalog cut submission for each system proposed for use. Shop drawing(s) and catalog cut submission shall include, but not be

limited to, the following: *[Note to AE: Edit this list accordingly for elevator replacement and modernization projects to include only those items that are applicable.]*

2. Signal and operating fixtures, operating panels and indicators.
 3. Hydraulic pumping unit
 4. Hydraulic jack unit
 5. Sling and platform
 6. Controller, type and model
 7. Selector
 8. Roller guides, model
 9. Car door operator, model
 10. Door detector, type and model
 11. Door operator
- B. Shop Drawings: Submit approval layout drawings. Include the following.
1. Job specific shop drawings and technical coordination information shall be submitted for review prior to commencing with fabrication of the equipment. The first shop drawing submittal shall be complete. Partial shop drawings will not be reviewed until they have been completed. Delay in the project as a result of partial submittals shall be the responsibility of the Elevator Contractor. Show arrangement of equipment in machine room so pumping unit(s), motors, rotating elements, and other equipment can be disassembled and removed for repairs or replaced without disturbing other components. Arrange equipment for clear passage through access door.
 2. Show floors served, travel distances, maximum dynamic and static loads imposed on the building structure at points of support and all similar considerations of the elevator work.
 3. Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information. *[Note to AE: Edit this list accordingly for elevator replacement and modernization projects to include only those items that are applicable.]*
 - a. Provide hydraulic jack data and installation instructions and welding requirements.
 - b. Car and Hall Signal Operating Fixtures
 - c. Car and Hoistway Doors
 - d. Door tracks and rollers
 - e. Cab Interior
 - f. Cab design, dimensions and layout
 - g. Car frame components.
 - h. Car platform components.
 - i. Inspection station.
 - j. Buffers.
 - k. Hoistway Switches.
 - l. Hoistway-door and frame details.
 - m. Electrical characteristics and connection requirements.
 - n. Expected heat dissipation of elevator equipment in machine room (BTU).
 - o. Maximum rail bracket spacing.

- p. Maximum loads imposed on guide rails requiring load transfer to building structure.
- q. Loads on hoisting beams.
- r. Clearances and travel of car.
- s. Clear inside hoistway and pit dimensions.
- t. Location, materials and sizes of access doors, hoistway entrances and frames.
- u. Provide hall sill installation and loading design requirements including sill-mounting angle, sill support brackets, attachments, sill grouting details, and the loads and use that the hoistway sills are designed for.
- v. Provide wiring diagrams for the entire system of power distribution, lighting, control, signals, communication, etc. Indicate electrical power requirements and branch circuit protection device recommendations.
- w. Samples: Submit samples of each required finish, not including those intended for painting after installation.
- x. Certificates and Test Reports for components as required by Code: Submit written, certified reports for required tests on specific components such as cab fire ratings and elevator door / frame requirements, UL listings. As Required by Code. Where required, submit additional copies directly to governing authorities.
- y. The Elevator Contractor shall be required to submit all hoistway and machine room plan and section drawings, as well as all permit application forms, to the Owner/Agent and the Elevator Consultant within four (4) weeks from the receipt of a "Notice to Proceed".
- z. The Elevator Contractor shall be required to provide copies of all correspondence to/from the Authority Having Jurisdiction (AHJ) regarding the permit application request for the project to the Owner/Agent and the Elevator Consultant.

1.6 JOB END CLOSE OUT SUBMITTALS

- A. "Job End Submittals" sets shall be provided at the time when the elevator contractor's "Final Acceptance Document" is signed and shall be provided to the U of I Elevator Shop or University of Illinois Project Manager and shall include the following items.
 - 1. Signature Document: A document with all job end submittal items listed on it shall be provided by the owner and shall be signed for, as complete and provided within the submittal packages, by the elevator contractor and shall be signed by the AE, the Elevator Consultant, U of I Elevator Shop representative as received in full. (separate attached document)
 - 2. Clearly legible: All copies and sheets within the submittal sets shall be legible and poor quality copies will not be accepted.
 - 3. As Built: All submittals shall be "as built" and shall represent the finished product and equipment of the actual equipment and wiring installed.
- B. Number / Sets of Project Manuals to be provided:
 - 1. Simplex / single elevator installation: 3 sets total
 - 2. Multiple identical elevators located in the same machine room: 3 sets total
 - 3. Multiple identical elevators located in the same building installed at the same time: *[Note to AE: 1 set for each elevator machine room plus one set for the U of I Elevator Shop records and one set for F&S Records Management.]*
 - 4. Multiple different elevator equipment installed at the same time: 3 sets per unique elevator.

- C. Project Manual - One "set" of submittal items equals one project manual: Upon completion, the Contractor shall prepare and submit for the Owner's use and full ownership, three copies / "sets" Project Manuals. Each manual / set shall contain.
1. Provide a CD containing all OEM information as well as the below items.
 2. Adjuster's Test Report: An adjuster's test report shall contain all variable controller settings, adjustable parameter settings and adjustments, and all data from safety tests performed. Settings, loads, forces, speeds and adjustments shall be noted.
 - a. 3 Adjuster's test reports are required for each elevator and shall be clearly marked as to the applicable elevator the reports represent.
 3. Parts Catalog: A comprehensive parts catalog / cut sheets containing all components including mechanical / electrical systems of the complete elevator system with corresponding part numbers to the pictured / listed parts. A current list of available vendors shall be provided for all the parts. This shall include but is not limited to all mechanical, control, and fixture parts.
 4. Three (3) sets of Owners' Manual consisting of the installation instructions, all diagnostic information and descriptions, all pertinent codes and any special kind of tools (highest version) necessary for the proper maintenance and adjusting of the units. **If this is a Housing related project, four (4) copies are required.** If any adjusting tool(s) is to be provided, then the unit shall be considered the Property of the Owner and shall be provided at no additional cost to the Owner. The unit provided shall not be of the self-destructing, self-resetting type.
 - a. Required Periodic test Procedures: A clear description and defined process for performing all code required periodic tests shall be provided with submittals.
 - b. Noted on Signature Document: Any special tools shall be noted as required and accounted for on the signature sheet or stated none required on the Signature Document.
 5. One (1) set(s) of instructions that explain operating features of the control equipment, including adjusting and troubleshooting procedures.
- D. Electrical Schematics: Three (3) complete sets of "as built", current and actual finished representation of the complete elevator control and electrical systems including but not limited to all controller(s), motor(s), signal operating fixture(s), door operator(s) shall be provided. Provide the interconnecting wiring list to the processor interface boards. Insure and maintain any circuit changes made during the course of installation on each set of the wiring diagrams is represented. These diagrams will be the property of the University of Illinois.
1. One (1) of the 3 shall be factory-laminated with a metal grommet hole at the upper-left portion of each laminate section; include a metal chain through the grommet hole that shall attach all of the diagrams / schematics and shall be mounted in the machine room.
 2. 2 of the 3 sets shall be identical sets non laminated paper copies, minimum 11 X 17 , standard font sizing.
- E. Operation and Maintenance Manuals: Manuals describing recommended service requirements and procedures for optimal life and operation of equipment shall be provided.
- F. Keys: Contractor shall provide Three (3) sets of keys to operate all key-operated functions (for each elevator) all properly marked and identified.
- G. Diagnostic and Special Test Equipment: Special equipment or tools necessary for the repair, adjusting, or troubleshooting of the operation of the elevator and any component such as a door operator, selector, or controller of the elevator shall be included in the project and furnished at no additional cost. If any adjusting tool(s) is to be provided, then the unit shall be considered the Property of the Owner and shall be provided at no

additional cost to the Owner. The unit provided shall not be of the self-destructing, self-resetting type.

1. Items Shall Include: All required hardware, firmware, software, cables and associated apparatus for complete function, and training manuals specific to the equipment installed which are available to the vendor shall be included.
- H. Updates or Future Publications: Access to all manufacturer's websites and technical support for the life of the equipment as well as any and all information, printed material, and or publications pertaining to the provided elevator equipment that updates or recommends any changes to, or operational problems of the equipment shall be provided to the Owner for the life of the equipment. This shall include any and all information that is provided to the vendor's branch offices, service representatives and mechanics, or factories Re-Programming:
- I. There shall be no cost to Owner for re-programming or re-charging of the service tool at any time.

1.7 QUALITY ASSURANCE

- A. Contractor Requirements: The Contractor for all work covered under this Section shall have proven experience regularly engaged in the business of installing and servicing elevator related equipment of the type and character required by the specifications. The Contractor shall install the equipment with competent and experienced workmen and in compliance with all governing laws.
- B. Branch Office: In order to ensure proper and qualified maintenance service and ability for the bidding contractor to respond within a Maximum of 2 hours time from being notified of an elevator shut-down, all bidders must operate a branch office within a 100-mile radius of the project site under the name of the bidder.
- C. Previous Installations: Vendors must be able to show 5 satisfactory installations that have been in operation for a period of at least 1 year. This equipment must be of the same control and operation as outlined in the bid specification.

1.8 WARRANTY

- A. Submit copies of written warranty, signed by the Contractor agreeing to repair or replace defective materials and workmanship of the elevator work during a one (1) year guarantee period, which starts on the date of Substantial Completion for the Project. Defective materials and workmanship is hereby defined to include operational failures, performance below required minimums, excessive deterioration or aging, evidence that the system will not be reasonably maintainable for the life of the building, abnormal wear considering intensity of use, unsafe conditions, excessive noise or vibration, and similar unusual, unexpected and unsatisfactory conditions; but does not include defects caused by alterations, abusive use, vandalism, failure of the supporting structure or power supply, improper maintenance and similar causes beyond the control of the Contractor.

1.9 MAINTENANCE SERVICE

- A. Service Time and Frequency: The Contractor shall provide maintenance service for new installations for a period of 6 months from the date of Substantial Completion. Service shall occur once a month or approximately every thirty days and shall consist of the following items.
- B. Service Examinations: Service examinations shall consist of the inspection of all mechanical and operational aspects of the elevator equipment. Work shall include the repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Use parts and supplies as used in the manufacture and installation of original equipment.
- C. Missed service visits: If a monthly service visit is missed or a period in excess of 32 days passes without the elevator being serviced as per this document, the elevator service time

and warranty shall be extended for an additional 32 days. This extended service and warranty period shall be subject to the same requirements as this Section, including service visits and warranty and service extension for missed visits.

- D. Elevator Mechanic: A qualified elevator mechanic directly in the employ of the Contractor shall perform Service.
- E. Cleaning and Service: Elevator shall be left in a clean condition after each examination. Cleaning shall include car top, pit area, hoistway, and machine room area. Any oil or lubrication leaks shall be wiped clean and the cause of the leak shall be corrected.
- F. Written Reports: Signed, dated, written reports of the service work performed shall be provided to the U of I Elevator Shop immediately or within a reasonable time after the service work is performed. These reports shall be legible. Poor quality carbon copies will not be acceptable. The mechanic who performed the work and the U of I Elevator Shop foreman shall sign reports. Another representative of the U of I Elevator Shop may sign the reports if the foreman is unavailable.
- G. Notification: The U of I Elevator Shop shall be notified of what specific piece of equipment will be serviced and when it will be performed prior to performing service on the elevator equipment at this number, 217-333-2539. If there is no answer a message may be left on the voice mail system.
- H. Repairs and Notification: If it becomes necessary to remove the elevator from service for an extended period of time beyond normal industry standard service requirements, arrangements shall be made to coordinate this work with the U of I Elevator Shop and appropriate departments. The U of I Elevator Shop shall be contacted at 217-333-2539 to coordinate the elevator outage.
- I. Call Backs: Contractor is responsible for providing labor and shall respond to all call backs for warranted items 24 hours per day, 7 days a week, including all Holidays, within 2 hours time of being notified of the call, at no additional cost to the Owner during the 12 month warranty period.
- J. Written Report: A written report, stating the nature of the call back, any parts that were used, and the action taken to correct the problem which resulted in the call will be provided to the U of I Elevator Shop and General Contractor. This report shall be signed by the U of I Elevator Shop foreman, or, if unavailable, by another representative of the U of I Elevator Shop. This report shall be clear, legible, signed and dated by the mechanic that performed the work.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS AND EQUIPMENT

- A. Manufacturer / Contractor may provide their standard equipment except where otherwise specified in these Contract Documents. *[Note to AE: Any deviation from these Standards requires an approved project variance prior to issuance for bid. AE shall edit accordingly for replacement/modernization and/or note items which are existing to remain.]*

2.2 SYSTEM DESCRIPTION

- A. Elevator Designations: *[Note to AE: Provide listing of all elevators with individual designations (E1-E2 etc) with North, South, East, West and/or building reference designations throughout submittals and elevator data provided by contractor for any differences in elevators.]*
 - 1. *[Example: 1248-E1, North Hydraulic (Building Number – Elevator Number, Elevator Description)]*
 - 2. *[Example: 1248-E2, South Hydraulic]*

3. [Example: 1248-E3, West Duplex Hydraulic]
 4. [Example: 1248-E4, East Duplex Hydraulic]
- B. Elevator Characteristics: [Note to AE: Fill in all characteristics below. If two or more elevators vary in characteristics, repeat the following criteria for each differing elevator system]
1. Rated Capacity: [lbs]
 2. Type: [In ground hydraulic – Holeless hydraulic]
 3. Type of loading elevator to be designed for: [Note to AE: Select one]
 - a. C3 Single Unit loading --- [AE – must define the maximum load the elevator is to be designed for with load being on a 24" X 24" four wheeled dolly – this information is necessary for the manufacturer to design the platform properly]
 - b. Class A General Freight and Passenger Loading (This design is for light duty standard elevators – maximum single piece load for Class A designed elevators – “as per elevator Code” – is a maximum weight of 25% of the elevator’s rated capacity)
 4. Speed: [Insert rated speed in feet per minute; i.e. 150 fpm] + or - 5% of contract speed under any loading condition or direction of travel.
 5. Machine Room location: [basement – other floor – overhead]
 6. Door openings: [how many front] and [how many rear]
 7. Number of Stops: [Enter total number of floor levels elevator stops at]
 8. Floor number designation: [what are the floor number designations for each stop]
 9. Rise / Travel: approximate; to be verified by drawings: [Enter appropriate number in feet]
 10. Inside Cab dimensions from surface of wall to wall: [provide inside car dimensions]
 11. Handrail: distance from face of handrail to face of handrail and from face of car door to face of back wall handrail: [inches][this needs to be considered in order to accommodate the largest package / equipment that is desired to be “fit” inside the elevator cab]
 12. Inside Cab Height from finished floor to car top: [provide dimension] Height to cab Ceiling:
 13. Inside Cab Height from finished floor to drop ceiling: Height from floor to drop ceiling. [provide dimension in inches]
 14. Entrance Width: [provide width and height of clear car door opening]
 15. Door Type: [single door side opening – 2 speed side – single speed center opening – 2 speed center – etc]

2.3 CAR OPERATING FEATURES

- A. All cars shall have listed features unless noted otherwise.
- B. Stopping Accuracy: $\pm 1/4"$ (6.4 mm) under any loading condition or direction of travel.
- C. Main Power Supply: [Note to AE: Provide correct voltage: 208, 240, 440, 480 & 600] Volts + or - 5% of normal, 3 Phase, with a separate equipment grounding conductor.
- D. Lighting Power Supply: 120 Volts, 1 Phase, 15 Amp, 60 Hz.
- E. Full Collective Selective Operation.
 1. Single pushbutton automatic [Note to AE: If specifying a Freight elevator with manual doors – Delete Collective selective]

- F. Anti-nuisance car button cancellation function that can be programmed on or off.
- G. Independent Service. Car door shall close when car call button is pressed.
- H. Car Secure Access. Feature that allows car calls to be made inoperative until car button sequence is entered by car pushbuttons to allow actuation of secured floor calls.
- I. Firefighters' Service Phase I and Phase II as per elevator code
 - 1. Main landing *[Note to AE: Enter designated landing as per governing Life Safety code]*
 - 2. Alternate Landing *[Note to AE: Enter alternate landing]*
- J. Top of Car Inspection:
- K. Automatic Standby Power Operation with Manual Override: *[Note to AE: This is optional – delete if elevator not on or provided with emergency power]*
 - 1. This operation shall return each car automatically to a designated landing when the system is initially switched to standby power. System shall be provided so that one car is returned at a time and all code requirements for emergency power operation are provided. Provide all code required items as per elevator operating including but not limited to an illuminated signal at primary landing as per code for emergency standby power.
- L. Non-Standard Options *[Note to AE: to be determined by owner – these are non-typical options]*
 - 1. Provision for Card Reader in Car (Card Reader provided and Installed by others).
 - 2. Security video in car: (video equipment provided by others).
 - 3. Speaker in car: (Speakers to be provided by others).

2.4 CONTROLLER CHARACTERISTICS

- A. Simplex Control System *[Note to AE: this is for (1) single car operations]*.
 - 1. A simplex selective collective control system shall be provided to meet the traffic conditions of the building.
 - a. A car traveling “UP” shall answer its car calls and any “UP” hall calls assigned to it. “DOWN” hall calls shall be answered by the car on the return trip.
 - b. The elevator shall park at the floor where the last call was answered.
 - 2. The controller shall include an Anti-Nuisance feature. In the event car loading or operation is not commensurate with the number of calls registered, all car calls shall be canceled.
- B. Duplex Control System *[Note to AE: this to be used for 2 car group (duplex) operations]*
 - 1. The duplex control system shall operate to meet the changing traffic conditions on the basis of demand.
 - 2. Power provisions shall be incorporated into the elevator control dispatch system to prevent loss of control memory, sequence of operation and/or other control functions due to fractional power interruptions, spikes or other interferences.
 - 3. A car traveling “UP” shall reverse and return to the dispatch floor after it has answered its car calls and any “UP” hall calls assigned to it. “DOWN” hall calls shall be answered by any car on the return trip.
 - 4. When the incoming traffic diminishes, the control shall reallocate cars from the dispatch floor and permit cars to park with their doors closed at the last floor served, with a car parked in the lobby or main floor level at all times.

5. The control shall give priority in assignment of a hall call to a car with a corresponding car call. If this coincident hall call cannot be answered within the adjustable priority time, the car with the best potential arrival time shall be assigned to the hall call.
 6. The controls shall incorporate a Fail Safe Dispatching Operation system. Should the car selection or dispatching system fail, so that cars are not dispatched within the predetermined interval and in accordance with the conditions of the operating pattern in effect, the cars shall leave the dispatching terminals without regard to sequence of regular intervals and proceed to answer registered calls in the normal sequence and manner, unless fire return features have been activated, until dispatching malfunctions are corrected and normal service is restored.
- C. Three (3) Car Group Control System [*Note to AE: This paragraph can be applied for 3 or more elevators in a common bank.*]
1. Programmable parking: Elevator shall be provided with a programmable feature to enable parking of the elevators as desired by owner.
 2. The three (3) car group control system shall operate to meet the changing traffic conditions on the basis of demand.
 3. Power provisions shall be incorporated into the elevator control dispatch system to prevent loss of control memory, sequence of operation and/or other control functions due to fractional power interruptions, spikes or other interferences.
 4. A car traveling "UP" shall reverse and return to the dispatch floor after it has answered its car calls and any "UP" hall calls assigned to it. "DOWN" hall calls shall be answered by any car on the return trip.
 5. When the incoming traffic diminishes, the control shall reallocate cars from the dispatch floor and permit cars to park with their doors closed at the last floor served, with a car parked in the lobby or main floor level at all times.
 6. The control shall give priority in assignment of a hall call to a car with a corresponding car call. If this coincident hall call cannot be answered within the adjustable priority time, the car with the best potential arrival time shall be assigned to the hall call.
 7. The controls shall incorporate a Fail Safe Dispatching Operation system. Should the car selection or dispatching system fail, so that cars are not dispatched within the predetermined interval and in accordance with the conditions of the operating pattern in effect, the cars shall leave the dispatching terminals without regard to sequence of regular intervals and proceed to answer registered calls in the normal sequence and manner, unless fire return features have been activated, until dispatching malfunctions are corrected and normal service is restored.

2.5 EQUIPMENT: MACHINE ROOM COMPONENTS

- A. Controller: Provide a microprocessor based control system for AC drive motors to perform all of the functions of safe elevator operation. Controller shall utilize a position velocity feedback system utilizing an encoder to maintain car speed within 5% regardless of load or direction. The system shall also perform car and group operational control.
1. Absolute Positioning: All collective selective elevator systems shall provide absolute positioning features within the elevator control system.
 2. Controller shall be separated into two distinct halves; Motor Drive side and Control side. High voltage motor power conductors shall be routed so as to be physically segregated from the rest of the controller.
 3. Field conductor terminations points shall be segregated; high voltage (>30 volts DC and 110 VAC,) and low voltage (< 30 volts DC)

4. EMC Testing: Controllers shall be designed and tested for Electromagnetic Interference (EMI) immunity according to the EN 12016 (May 1998): "EMC Product Family Standards for lifts, escalators, and passenger conveyors Part 2 – immunity"
5. Controller shall be provided with: Provide the highest possible level (all levels) of microprocessor control testing device, tool or maintenance terminal suitable for all, but not limited to, troubleshooting, system adjustment/modification, emergency or special code required adjustment and maintenance procedures, etc. relating to the particular type of installed controls. This device shall be the sole property of the owner and shall be of the non self-destructible and/or of the non self-changeable type. The unit(s) will not be leased, borrowed or returned to the manufacturer. Any need to re-calibrate, replace with a newer version of the unit, adjust and/or modify the unit in any way; shall be provided to the U OF I by the Elevator Contractor at no additional cost. Any replacement or newer unit will be delivered to the U OF I within three (3) working (business) days of a written notice from the U OF I. The unit must come with complete instructions and operating techniques required to operate all functions of the device. At no time, and for the life of the equipment, will the manufacturer be allowed to install and/or modify the control system to be of the self-destructible and/or self-changeable type.
6. Provide all levels of codes and/or passwords to gain access to the elevator system for the complete adjusting, diagnosing (to recall faults), troubleshooting, etc. of each unit.
7. Code Data Plate: "A data plate shall be provided by the elevator contractor that indicates the A17.1 Code to be used for inspections and tests. The data plate shall be of such material and construction that the letters and figures stamped, etched, cast, or otherwise applied to the face shall remain permanently and readily legible. The data plate shall be in plain view, securely attached on the main line disconnect or on the controller. The height of the letters and figures shall be provided as per code.
8. Technical Support: All manufacturer's technical and engineering support personnel must be immediately (within 1 hour) available to the Owner for direct assistance at any time during regular and normal hours of the elevator trade. This assistance must be available for at least a ten (10) year period from the acceptance of the last elevator.
9. Future Changes: The manufacturer and/or installer of the controller must agree to make any type of changes to the program as requested by the Owner, such as in the case of government agency, building code or A.D.A. requirement, etc., and will be made at reasonable costs at industry accepted rates, for the life of the equipment or for at least a ten (10) year period. In addition, any discretionary building feature (change) will be handled in the same aforementioned manner. All changes will be made in a timely manner and will not exceed fifteen (15) working days to complete.
10. The control system will NOT be allowed to have a built-in modem for remote monitoring unless specifically requested by the Owner.
11. Controllers allowed at U of I without written approval:
 - a. GAL Manufacturing Corp: GALaxy hydraulic elevator controller.
 - b. MCE
 - c. Vertitron hydraulic controller, Vertitron Midwest Inc
- B. Motor Starter: Solid state soft start motor starters such as Siemens brand shall be used on all hydraulic elevators. Comparable motor starters by other manufacturers may be used.
- C. AC Motor: The AC motor shall be designed and insulated this application and shall be designed and constructed for compatibility with the pumping unit and controller.
- D. Battery Powered Lowering (optional): *[Note to AE: Provide If Desired by Owner]*
 1. Emergency Lowering Main Line Disconnect Contact: *[Note to AE: This contact must be provided by the Electrical Contractor inside the main line disconnect – noted here due*

to it frequently being overlooked – requirement should be noted in electrical contractor section] If a battery powered emergency lowering unit or similar device is used, there shall be an auxiliary contact associated with the main line disconnect that prevents the elevator from lowering when the main line disconnect is manually opened. This shall be in compliance with 1999 NEC 620-91(c). *[Note to AE: Contact requirement must be written into Division 26 of bid document for electrician to provide.]*

2.6 EQUIPMENT ACCESS

- A. All Equipment requiring maintenance and periodic inspections shall be accessible, and shall be able to be disassembled, maintained and inspected “in place”.

2.7 HYDRAULIC ELEVATOR COMPONENTS

- A. Oil Collection System: A container to collect oil from the jack head shall be provided by Contractor. This shall consist of a container with a minimum 5-gallon capacity with a sealed top to prevent any contaminants from being introduced into the collected oil.
 - 1. Overhead Machine Room: *[Note to AE: Delete if not used]* If the elevator machine room is installed above the elevator lowest landing level, an automatic electric return pump shall be provided in the pit. This pump shall be designed to pump the collected oil 100 feet vertically.
- B. 1000 PSI rated Shutoff Valves: 1000 psi, and properly sized shut-off valves shall be installed in the oil line in the machine room and in the elevator pit area.
- C. Hydraulic Pumping Unit: The power unit shall be specially designed and manufactured for oil-hydraulic service with all components combined in a self-contained unit and with all adjustment features accessible. It shall be rotary, positive displacement type inherently designed for steady discharge with minimum pulsations to give a smooth and quiet operation. The motor shall be of standard manufacture, specially designed for oil-hydraulic service and shall be provided with motor(s) rated at 120 starts per hour (sph).
 - 1. Hydraulic Elevators Traveling 4 Stories or More: *[Note to AE: Delete if not applicable]* Projects with hydraulic elevators traveling 4 stories or more shall specify “dry” pumping units with the motor and hydraulic pump located outside of the oil reservoir and the motor(s) shall be designed for 120 starts per hour.
 - 2. High Use Low Rise Hydraulic Elevators: *[Note to AE: Incorporate if applicable or delete]* If the anticipated usage of a hydraulic elevator that is 3 stories or less is expected to be high, a dry pumping unit with a motor rated of 120 starts per hour shall be specified for the installation.
- D. Hydraulic Control Valve: Only the following manufacturers and styles may be used without written permission from the U of I Elevator Shop.
 - 1. EECO Valves
 - 2. Maxton (UC series)
 - 3. ThyssenKrupp (Standard)
- E. Valve Features: Oil control unit shall have the following components and features.
 - 1. Quick Couplings: Control valve shall have quick coupling connector(s) which enable monitoring of the working pressure between the jack unit and control valve, and for the adjustment and monitoring of the pressure relief setting.
 - 2. Adjustments: Control valve shall be located so that the valve adjustments are easily accessible.

2.8 HYDRAULIC JACK ASSEMBLY

- A. Jack Assembly: Any reference to “Jack” shall be in reference to the complete unit of the cylinder, piston, and head. Jack Unit shall be of sufficient size to lift the gross load the height specified. Unit shall be factory tested to ensure adequate strength and freedom

from leakage. Jack shall consist of a plunger of heavy steel tubing accurately turned and polished to prevent any undue wear of packing gland. Jack assembly shall meet or exceed all ASME Code requirements.

1. Jack Assembly Installation: Jack shall be installed and compliant as per referenced A17.1 code.
2. Location and Plumb: The Jack shall be set perfectly plumb and within half of the diameter of the cylinder to the location of the Jack on the installation drawings. The piston shall travel within the cylinder without touching the cylinder walls.
3. Jack Manufacturers: Allowable Jack manufacturers without an approved project variance are as follows:
 - a. Vertical Express
 - b. CEMCO
 - c. EECO
 - d. ThyssenKrupp
4. Packing Seal: Packing seal for the Jack unit shall be a pressure balance design of a standard attainable size. Packing seal shall provide positive sealing with low friction and shall provide internal spring action for positive sealing from zero to normal operating pressure.
5. Jack Packing Required Replacement: All hydraulic elevators shall have the pistons checked for defects and left smooth including any joints, and shall have their jack packing(s) replaced at the beginning of the elevator's warranty period.
6. Replace Packing during Warranty period: If the packing leaks in excess of 1 gallon of oil in a 1 month period of time, the packing shall be replaced by the Contractor before the end of the warranty period, and the cause of the leak shall be corrected.
7. Drip Ring: There shall be a drip-ring and drain hole present at the cylinder head with a means of collecting accumulated oil into a drip bucket.
8. Piston: Piston shall extend a minimum of 1/2 inch through the top of the packing and above the head when the piston is landed in the bottom of the cylinder.
9. Piston Joints: shall be made perfectly smooth and shall be undetectable as they pass through the packing gland.
10. Cylinder Welding: If manufacturer requires the cylinder to be welded, a certified welder shall perform the welding. Welding shall be completed following the manufacturer's recommended welding and installation procedures. These specifications and procedures shall be provided with the pre-manufacturing submittals within the Project submittal package prior to the Contractor performing any welding.
11. Cylinder Protection: Hydraulic cylinder shall be primed, taped, and placed inside of a watertight PVC casing. This PVC casing shall be placed inside of a steel jack hole casing.
12. Tape and Primer: The entire cylinder, including joints, shall be treated with a corrosion resistant compound, painted with a taping primer, and then completely covered and wrapped with a commercial grade protective tape such as Scotchwrap Tapecoat or equal. Tape and Primer shall be specifically designed for this application. Tape shall overlap each previous wrap by a minimum of 1/2 per circumference rap, and the bottom of the jack shall be double wrapped minimum.

2.9 JACK HOLE CASING

- A. Steel Jack Hole Casings: A protective casing made from standard-weight steel pipe with continuous welded watertight connections shall be used to line the jack hole.
- B. 18 Inch Casing: A minimum size of 18 inches shall be used for all jack hole casings and shall have all joints welded watertight.
- C. Steel Casing for Jack Holes Deeper than 15 Feet: Any jack hole deeper than 15 feet shall use a jack hole steel casing with a minimum diameter of 20 inches, or 10 inches larger than the largest point of the PVC used, whichever is greater. The 10-inch dimension includes being 10 inches larger than the PVC joints and end caps.
- D. Casing Depth: Jack hole casing shall extend a minimum of 3 feet below the bottom of the installed cylinder.
- E. Alternate Methods: *[Note to AE: A written variance request must be submitted in order to consider alternate methods of installing jack units in writing.]*
- F. Dirt / diggings Removal: All diggings that are collected through the excavation process shall be removed from the premises and disposed of in a legal manner by the Elevator Contractor.
- G. Finishing Jack Hole: *[Note to AE: Ensure this gets specified in proper sections]* (finishing the jack hole with concrete shall not to be done by elevator contractor:)
 - 1. General Contractor finishing the jack hole with concrete: Once the jack installation is complete, the jack hole shall be finished and covered with concrete to the thickness of the pit floor. Jack hole shall be finished smooth and flush with the pit floor.
 - 2. Water tight seal: Special attention and provisions shall be provided to ensure a watertight seal around the PVC jack casing. Water seepage in pit area is not acceptable. *[Note to AE: This item should be provided in the waterproofing and concrete section of bid document].*

2.10 OIL LINE

- A. Oil line Requirements: The oil line shall meet or exceed all requirements of ASME A17.1, and the following requirements.
- B. Intent of Requirements: The intent of the below specification is to try to eliminate the possibility of a leak point outside of the hoistway and machine room and in an overhead area such as a drop ceiling space. It is also to minimize any support loads on Victaulic style fittings and to reduce vibration and noise being transmitted through the building by the oil line attachments. The elevator contractor shall provide substantial support for the oil line and limit any attachments to the building structure to limit oil line vibration being transmitted to the building structure.
- C. Welding of Oil Lines: Only qualified welders shall perform welding on hydraulic elevator oil lines. Due to the pressures associated with hydraulic elevator operations, welders must be familiar and certified with pressure system and pipe welding. Welding materials and procedures for all oil line piping shall conform to ANSI B31.1, ANSI/AWS D1.1 and ANSI/AWS D1.3 and applicable state and local regulations.
- D. Proof of Competency: Contractors may be required to furnish proof of the competency of each welder and shall at the request of the AE or governing authority, have all or any of the welders pass a standard qualification test such as ASME, AWS or Hartford Insurance Company procedure and tests. It is the responsibility of the Contractor to provide proper welds by qualified personnel.
- E. Schedule 80 oil line: Only schedule 80 oil line and equivalent oil line fittings shall be used where un-welded oil line is used.
- F. Machine Room to Hoistway: Only welded or continuous oil line with no unions, threaded fittings or Victaulic style couplings shall be used for oil line runs outside of the machine room and hoistway enclosures.

- G. Vertical oil line Runs: Projects with machine rooms located above the hoistway or where the oil line enters the hoistway more than ten feet above the pit shall utilize continuous or welded oil line from the pit to the inside of the machine room with no victaulic fittings, couplings, threaded unions or threaded connections connecting the vertical pipe. The vertical oil line run shall be supported from the top of the run and the bottom of the run only. All attachments to the building on the vertical run of the pipe shall be used to maintain location of the pipe only, and shall not be used to support the weight of the oil line. These attachments shall utilize a sound isolation material between the oil line and the attaching bracket. This material shall be specifically designed for the purpose of preventing vibration to the building structure. Tape wrap or hard materials is not acceptable.
- H. Isolation Couplings: Two hydraulic elevator oil line sound and vibration isolation couplings shall be installed in the oil lines.
- I. Grooved-End Fittings will support no load: Grooved-end fittings such as, but not limited to Victaulic style fittings, shall have minimal or no load on them caused by the supporting of the oil line.
- J. Oil Line Below Hoistway Doors: Oil lines shall not be routed so that they are directly below any hoistway door opening.
- K. Supports: Oil lines shall be supported so that they are able to support a minimum of 300 pounds without deflection at any point on the oil line pipe.
- L. Wall Penetrations Fire Rating: All wall penetrations made by an oil line installation shall be sealed with an appropriate material to maintain the fire rating of the room or hoistway and to prevent vibration from being transmitted to the building structure.
- M. Isolation Material: Oil lines shall utilize a sound and vibration isolation material to isolate the oil line from direct contact with any penetrated wall.
- N. Fittings: No oil line fitting, threaded or grooved, or parts there of, shall be encased, mudded, mortared, or located within any wall or building penetration.
- O. Pressurized Hoses and Fittings: No pressurized hoses or fittings shall be installed on any equipment covered by ASME A17.1.

2.11 EQUIPMENT: HOISTWAY COMPONENTS

- A. Hoistway Operating Devices: (provide as required by code)
- B. Buffers: As required by code
- C. Railing Systems: Only "T" type guide rails shall be used.
- D. Guide Rail Inserts: Elevator contractor shall provide guide rail insert brackets to General Contractor for installation.
- E. Fascia: Galvanized 14 gauge sheet steel fascia shall be provided at the front <and rear> of the hoistway as required by code and shall be properly supported to prevent excessive deflection so to meet code requirements "Clearance Between Loading Side of Car Platforms and Hoistway Enclosures". *[Note to AE: Designate if Painted or Stainless Steel fascia is desired]*
- F. Plunger / Piston Stabilizer or Follower: Any form of mechanical, cabled, or other assemblies used for plunger stabilization is not allowed.

2.12 HOISTWAY ENTRANCES

- A. Frames: Entrance frames shall be of bolted construction for complete one-piece unit assembly. All frames shall be securely fastened to fixing angles mounted in the hoistway so that there is no movement or deflection possible and as per code and shall be of 14-gauge (2 mm) sheet steel minimum.

1. Entrance Finish: *[Note to AE: This paragraph may be written as needed to indicate specific entrance finishes by the opening. Clearly indicate landing/opening designations for each finish. For example: "Lobby - satin finish stainless steel, floors 2 through 8 - with white baked enamel". Frame & Door finish can be independent.]* *[Select finish: satin stainless steel> or <satin bronze> or <mirror stainless steel> or <mirror bronze> or < white prime> or <powder coated finish, etc.>]*
- B. Entrance Markings: Braille entrance designations as per the IL accessibility Code shall contain an adhesive back and be provided with holes in each of the corners of the plate and shall be mounted with drive rivets so that a solid, tight, attachment is provided. Markings shall be provided on both sides of the entrance as per applicable codes.
- C. Sills: shall be *[Note to AE: Provide material and color Sill are to be provided in – stainless – cast iron – aluminum – Bronze, [nickel – or – brass – color – or ?] etc.].*
- D. Sill supports: *[Note to AE: Provide sill support detail [provided by GC or elevator contractor as how hoistway sill will be attached to the building when heavy loading other than Class A loading is specified for elevator]* shall be provided as required for specific loading design as per C3 elevator design.
- E. Hall Sills for heavy loading: Hall sills for heavy "single unit loading" designed elevators shall be bronze alloy unless specified otherwise.
 1. Sill Load Requirements: For single unit loading C3 designed elevators *[Note to AE: provide following information or delete all if C3 elevator not specified]*
 - a. Max Unit load = *[Provide weight in pounds of heaviest single piece load that elevator will be used for (this is frequently the capacity of elevator)]*
 - b. Max Wheel load = *[Provide wheel load information for the elevator contractor to design the platform here: Max Unit Load (as defined above) on a 24" X 24" four wheeled dolly should be provided in this space for the elevator contractor design needs.*
 - c. Max Axle load = *[Provide Axle load]*
 2. C3 Elevator Sill Grouting: Hall sills designed for heavy loading shall be fully grouted with a Pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing minimum compressive strength of 4000 psi at 28 days. Grouting, anchorage and sill support requirements shall be provided by elevator contractor with the submittals. Grouting of elevator sills shall be responsibility of other trades than elevator contractor. Other methods of heavy C3 designed elevator sill installations must be submitted and approved.
- F. Door Operators: Provide high-speed Heavy duty Door operator. Provide related door hardware and equipment of one of the following manufacturers and models:
 1. Thyssen-Krupp HD-LM closed loop "non proprietary" closed loop door operator.
 2. "MAC" / Kone Spares heavy duty Closed loop door operator.
 3. GAL Manufacturer Model MOVFR heavy duty operator
- G. Door Operation:
 1. Force Limiting Operation: Provide fully adjustable means to limit the door pressure while closing to a maximum of 30 pounds and a maximum of 7.5 foot-pounds kinetic energy.
 2. Nudging Operation: Nudging functions shall be provided but Doors shall be able to be adjusted to remain fully open if door screen continues to be obstructed and a door nudging buzzer shall sound rather than the door going into actual nudging. Doors shall fully reopen if door screen becomes obstructed during closing.

- a. Door Buzzer: Provide adjustable means to sound audible electronic tone when doors are held open for an adjustable period of time.
- 3. Door Timing and Operation: Provide separate adjustable timers to vary the time the doors are held open or before they close for answering car calls, answering hall calls, for door open time, and nudging operation.
 - a. The dwell time for a car call stop at a typical floor shall be adjustable between one (1) and eight (8) seconds and the dwell time for a hall call stop shall be adjustable between one (1) and eight (8) seconds.
- 4. The hall call timing shall predominate in the event of a coincidental car and hall call stop.
- 5. Door Stall Operation: Provide means to reopen doors in the event that the doors do not close fully within 30 seconds of closing operation. Provide means to remove the elevator from service after the third unsuccessful attempt.
- 6. Door time for main landing: Door dwell times shall be field adjustable with resolution to 0.1 seconds. The dwell time at the main dispatch floor shall be adjustable between three (3) and fifteen (15) seconds.
- 7. Interrupted Door Screen: Upon interruption of the car door electric eye beam or door detector unit, the door open time shall be able to be reduced to an adjustable time of 0.5 to three (3) seconds.
 - a. Hall and car stop times for door screen: The photo beam or door detector control door dwell time shall be separately adjustable for car and hall calls.
- H. Door Protection System: Provide 40 beam, infrared, double diode transmit system, which shall initiate door reopening operation.
- I. Door Hangers and Tracks: For each hoistway sliding door, provide sheave type two point suspension hangers and tracks complete. Sheaves shall be 3/4" diameter and have polyurethane tires with ball bearings properly sealed to retain grease. Hangers shall be provided with an adjustable slide to take the up-thrust of the doors. Tracks shall be, smooth surface and shaped to conform to the hanger sheaves.
 - 1. Acceptable Manufacturers:
 - a. GAL Manufacturing Corp
 - b. Kone Spares
 - c. Thyssen-Krupp
 - d. Vertical Express

2.13 HOISTWAY DOORS:

- A. Entrance doors shall be a minimum of 16-gauge furniture steel reinforced hoistway doors construction with vertical internal channel reinforcements.
- B. Doors: Doors shall be *[Note to AE: Provide material, finish, gauge and any specific requirements of hoistway doors]*
 - 1. Fire Rating: Entrance and doors shall be UL fire rated for 1-1/2 hour or as required by local code.
 - 2. Sight Guards: Color and material matched sight guards will be furnished with all doors.
 - 3. Key Hole: Each hoistway door panel shall contain an emergency release hole, with a stainless steel tube and collar.
 - 4. Door Safety Gibs: All horizontally sliding hoistway and car doors shall have a minimum of three gibs at the bottoms of the doors. One of the three gibs shall be solid metal so that fire cannot cause the gib to come out of the doorsill grooves.

2.14 EQUIPMENT: CAR COMPONENTS

- A. Car Balance & weight frame: Provide adequate weights and weight frame to static balance the elevator cab and car frame. Static balance is the front to back and side-to-side balance of the hydraulic elevator car alone. Balance shall be within plus or minus 50 lbs in order to limit force on roller guides.
- B. Cab Components: Provide Cab design details including, color, thickness and composition of materials, removable panels, car top, etc.
1. *[Note to AE: Provide appropriate cab type and details]*
 2. Car Door Finish: *[Note to AE: Provide car door finish, material, construction]*
 3. Ceiling Type: *[Note to AE: Provide Ceiling / drop Ceiling Type, description, material, finish]*
 4. Cab Lighting: *[Note to AE: Provide Cab lighting details] Lighting is to be electronic ballast, double tube T8 fluorescent fixtures. Because of the increased cost of relamping, increased energy usage, and increased probability of vandalism and theft, any ceiling/lighting design utilizing incandescent, compact fluorescent, halogen, LED, or other lamp is not permitted.]*
 5. Emergency Car Lighting: Car lighting shall be connected to a building emergency power source and an emergency power unit on elevator employing a sealed rechargeable battery and totally static circuits shall be provided to illuminate the elevator car and provide current to the alarm bell in the event of building power failure.
 6. Emergency Pulsating Siren or alarm bell: Siren/alarm bell mounted on top of the car that is activated when the Alarm button in the car operating panel is engaged. Siren/alarm bell shall have a rated sound pressure level of 80 dba at a distance of 3.0 m from the device. Siren/alarm bell shall respond with a delay of not more than 1 second after the switch or push button has been pressed. The bell shall contain a separate battery charging unit including a solid-state charger and a means for testing the device and the button shall light when pressed.
 7. Exhaust Fan: A key operated exhaust fan shall be mounted on the car top.
 8. Car top 120-Volt Receptacles and Lights: The car-top shall be equipped with GFI outlet, light switches, and light receptacle located and accessible from the top the car. The light switch(s) shall be within convenient reach from the access doorways.
 - a. Front and Rear Openings: If the elevator has front and rear openings, there shall be a light switch easily accessible on the car top from both the front and rear access doors. The light switches shall be wired so that either switch will operate all the lighting.
 9. Car Top Stop Switch: Car top stop switch/s shall be located so that it is easily accessible from the hallway from both front and rear openings without getting onto the car.
 10. Top of Car Safety Railing: a Standard Railing conforming to the requirements of the code as per "Railing and Equipment on Top of Cars". Safety "standard Railing shall be installed to withstand 200 lbs of force in any direction as per code.
 - a. Safety Railing / Car Top: The car top safety railing shall be installed so that the top rail is 2" (two inches) – INSIDE THE PERIMETER OF THE CAR TOP. This is to help prevent accidental contact with hoistway equipment if personnel have their hands on the top rail of the Safety Railing.
 11. Handrails: Flat bar style Handrails shall be provided on all sides of the cab that do not have doors. Handrails shall be removable from inside the cab and attached with a minimum bolt size of 5/16 inch.
 - a. *[Note to AE: Provide Handrail Type, style, material and description]*

12. Car Threshold / Sill: *[Note to AE: Provide material used: < aluminum> or <bronze> or <nickel alloy>Cast Iron - other.]* Provide as required for class of loading. Aluminum sills may be used for Class A loading and bronze Alloy sills shall be used for C3 designed or heavy loading designed elevators unless specified otherwise. Car Sill and Hall sills shall be provided in the same material.
13. Protective pads and hanging buttons: Provide code compliant quilted fire retardant protective pads and cab mounting buttons in all elevators. Pads shall have hemmed cutouts for all car fixtures, including the emergency communication device and as required by code.
 - a. Hanging Buttons: Hanging buttons for protective pads shall be through bolted and double nutted on the back side of the cab so as to prevent the removal or unscrewing of the hanging buttons from inside the car. The screw rod shall use a "loctite" type product on the male and female threads of the button, or some means to prevent unscrewing the button from the threaded rod.
- C. Car Guide Assemblies: Provide heavy-duty "ELSCO" roller-type guides that are applicable to the size and capacity of the installation. Roller guides shall allow front-to-back and side-to-side adjustment of each guide. Each arm shall be spring mounted with adjustable stops. Guide assemblies shall be designed to maintain guidance with the loss of the roller.
 1. Provide a new protective roller guide plate over the car top roller guide assemblies to prevent accidental contact with the rotating wheels.

2.15 MONITOR WITH KEYBOARD INTERFACE

- A. Each elevator group shall have a built in monitor of not less than 7" diagonal measurement, with keyboard interface, that can display the following information:
 1. Group Display - shows car position, door status, registered car and hall calls, the hall call assignment and the hall call ETA time. The keyboard interface shall allow car calls for each car in the group and hall calls to be entered.
 2. Individual Car Diagnostics Display – shows the status of individual inputs and output. This display also shows the car service status, current fault, demand velocity, encoder velocity, velocity difference between demand and encoder, car position, position indicator, floor count (learned on setup), pulse count locations, run command, encoder direction and the direction preference.
 3. Hall Call Display - the up and down hall call inputs from the serial hall call boards.
 4. Elevator Traffic Statistics Screen - displays the number of car and hall calls, the number of hall calls less than 15, 30, 45, and 60 seconds, and the number of hall calls greater than 60 seconds. The display also shows the percentage of calls answered for each category.
 5. Fault Log (for each car) - Car Fault Display shows car faults in the order that the faults occurred. The fault buffer on the car shall hold at least 50 of the last faults in a circular buffer. The fault display shows the fault, the time it occurred, the date, the car position and the number of consecutive occurrences. A Detailed Car Fault Display must show the standard car fault information plus additional control information that is stored at the instant the fault is recorded.

2.16 FIXTURES

- A. General: Provide all new flush mounted car and hall fixtures including car station, hall push buttons, car position indicator, and car riding direction arrows. LED lighting shall be provided with all fixtures. Allowable manufacturers without written approval:
 1. CE Electronics
 2. EPCO
 3. Innovation Industries

4. ThyssenKrupp impulse and traditional style fixtures
 5. The Fixture Company
 6. Janus Monitor Controls fixtures
- B. Fixture Finish: *[Note to AE: Provide fixture cover material and finish > brushed stainless > mirrored brass > etc.]*
1. Car Fixture Finish: *Provide fixture cover material and finish. Stainless, brushed bronze... mirrored etc*
 2. Hall Fixture Finish: *Provide fixture cover material and finish*
- C. Hall Position indicators: Only Digital Style hall and car Position indicators or units that require no bulbs or maintenance shall be provided.
1. Hall Position Indicator: Only the main landing floor shall be provided with a Hall Position indicator located above and centered with the door frame. *[Note to AE: Designate what landings hall position indicators will be used on (main landing only, normally)]*
- D. Fire Service Lobby Fixture: incorporated into the main landing hall pushbutton fixture Provide a Phase I emergency fire service key switch which meets current code requirements. Engrave the Firefighter's Instruction's above the Phase I fire service switch.
- E. Hoistway Access Key: Hoistway Access Key shall be a "Fort Lock" Chicago style barrel 515 Key.
- F. Car Control Stations: Provide flush-mounted metal panel containing call button for each landing served and containing other buttons, switches, and controls required for specified car operation and control. Mount at height complying with Illinois Accessibility Code. Provide operating device symbols required by Illinois Accessibility Code. Mark other buttons and switches with manufacturer's standard identification for required use or function. Car Control Stations shall contain but not limited to, LED illuminated pushbuttons marked to correspond to the landings served. A "door open" and "door close" button, a key operated car light and fan switch a key operated independent service switch. Key switches for Firefighter's Service Phase I and Phase 2 shall be provided as required by code.
1. Car Position Indicator: The car operating panel shall contain and incorporate a two (2") inch L.E.D. digital position indicator with directional arrows so arranged that as the car travels through the hoistway, its position shall be indicated by illumination of a numeral corresponding to the landing at which the car is stopped or passing. The digital position indicator shall be integral with the main car operating panel and shall have a hard plastic lens cover for protection.
- G. Elevator Designation Plate: Provide at the top of the Car Station a removable plate with the elevator designation engraved into it. The Elevator Designation Engraving must contain the UI building number a hyphen and then an E, and then the elevator designation number as per the project. EXAMPLE: 8283-E1 at the Oak Street Chiller plant elevator designation.
- H. Capacity Plate: The elevator capacity plate shall be located at the top of the car station.
- I. Utility Outlet: A 125V 15 amperes utility outlet with ground-fault circuit-interrupter protection shall be furnished in the cab.
- J. Operating Permit Frame: Owner shall provide and install.
- K. Emergency Phone Cutout in Car Station: The car station shall be provided with a cutout and box without a door to accommodate the U OF I Standard Ram-tech emergency telephone. The cutout shall be 7" wide by 10" high with a securely mounted box provided behind that is a minimum of 3½" deep and shall be located at the bottom of the car station.

1. U of I Shall Provide Emergency Telephone: An emergency phone will be provided by the Owner on all projects and be included with any new project. The CITES, Customer Service Section, shall be contacted at (217) 333-1161. See *U of I Facilities Standards Section 27 00 00 – Communications Systems*.
- L. Hall Fixture Finish: LED LIGHTED [Note to AE: Provide fixture cover material and finish > brushed stainless > mirrored brass > etc.]
- M. Hall Lanterns floor arrival tones: Provide fixtures on car that sounds in the car as it reaches the appropriate floor with LED illuminated "up" and "down" signal arrows. Provide units to match materials, finishes, and mounting method with car push-button stations.
 1. Provide Hall Mounted Direction indicators: [Note to AE: Provide ONLY with installations with more than one elevator in group]

2.17 ELECTRICAL REQUIREMENTS

- A. Traveling Cables and Electric Wiring
 1. All wiring provided shall be new insulated copper wiring and shall have a flame retarding and moisture resisting outer cover which shall be run in metal conduit, metal piping or metal duct work. All wires shall bear Underwriters Laboratory (UL) approval and shall adhere with all NEC code requirements.
 2. Provide new electric wiring and traveling cables that shall be properly secured and shall meet all code requirements.
 3. Traveling Cable Spares:
 - a. Spare Wires: The traveling cable for the elevator shall have no fewer than 8 spare conductors or 10 percent spare conductors, whichever is greater. the spares shall be properly marked and tagged.
 - b. Communication Wire: One pair of shielded communication wires shall be provided for an emergency phone and 1 spare pair of shielded communication wires shall be provided in the traveling cable to the car.
 - c. Shielded twisted pair: Two (2) shielded twisted pair conductors shall be provided in the traveling cable.
 4. Car Station Spares: A minimum of 8 spare conductors shall be supplied to the car station from the machine room.
 - a. Other Equipment Spare Wires: The number of spare wires shall be maintained and allowed for regardless of other equipment installed inside the elevator car at time of installation, such as security card reader, camera, intercom, etc. the additional spares shall be properly marked and tagged.
 5. Hoistway Wire Spares: There shall be no fewer than 8 spare conductors from the elevator controller to a hoistway pull box at the bottom of the hoistway or hoistway junction box. The additional spares shall be properly marked and tagged in the pull-box / junction box and controller.
- B. Compression Fittings: Only compression style electrical conduit fittings shall be used.
- C. Electrical Piping: All electrical piping runs to the elevator equipment shall be run overhead or in a manner which will not restrict access to and around any control or machine equipment.
- D. Splices: Conductors shall be continuous from outlet to outlet and no splices shall be made except where absolutely necessary and then only made inside a junction or pull box.
- E. Environment: Elevator controls and equipment shall be capable of operating properly while the temperature is maintained between 50 and 110 degrees Fahrenheit and the humidity is maintained below 75 percent non-condensing in all equipment areas.

- F. Motor Wiring to Controller: All motor and control wiring outside of an enclosure such as a motor pull box, governor, etc shall be run in appropriately sized conduit to the controller.
- G. Grounding of Equipment: A properly sized grounding wire shall be provided from the elevator machine room's mainline disconnect to a motor control center panel. A separate properly sized ground wire shall be provided from the main line disconnect to the elevator controller. All elevator equipment including but not limited to motor drives, and encoders, shall be properly grounded to this system.
- H. NEC Electrical Clearances: Maintain all clearances around all equipment in conformance with the NEC.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Should the Elevator Contractor proceed with any additional work without the prior written consent of the AE, Elevator Consultant and/or Owner/Agent, then the Elevator Contractor shall absorb all of the costs associated with the work that was performed.
- B. The Elevator Contractor shall INCLUDE and perform the following as part of the execution of the work detailed in the specification:
 - 1. Confirm that the Specification and contract documents are complete with regard to the work required to provide for a complete, legal and Code compliant installation.
 - 2. Confirm that the elevator equipment to be provided will fit within the space available as specified.
- C. General: Comply with Manufacturer's instructions and recommendations and to applicable Codes & Standards to provide a quiet, smoothly operating installation, free from sides-way, oscillation, or vibration.
- D. Vendor Shall Supply All Equipment and Supervision Required: The manufacturer/contractor shall provide all items, articles, and operations listed, mentioned, and herein specified, including all tools, scaffolding, safety devices, supervision, and incidentals necessary and required for the elevator completion. The contractor shall supply all safety equipment necessary to accomplish this project including, but not limited to, ladders, safety harnesses, safety barriers, warning signs, and scaffolds. All of the equipment will be of new or first-rate condition.
- E. Rail Bracket Embeds: The elevator manufacturer shall furnish and deliver, to the general contractor, embeds to be placed into the Cast In Place or CMU elevator hoistway and cast in place elevator pits to accommodate the installation of the guide rail brackets and supports, counter weight brackets and supports and all other elevator components as required for the complete installation of the traction units as specified herein.
- F. Coordination: Coordinate elevator work with work of other trades for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by Contractor, to ensure dimensional coordination of Work.
 - 1. Fire Alarm Interface: Elevator Contractor shall coordinate with Electrical Contractor to make final connections of existing fire alarm wiring to new control panel.
- G. Alignment: Verify guiderails are installed plumb and square to opposing rail and aligned with hoistway entrances.
- H. Hoistway Clearances: There shall be a minimum clearance from anything located on the car or cab to anything attached to or in the hoistway of ¾" unless closer running clearances are required and necessary for the proper operation of the elevator system. Items requiring ¾" running clearances include but are not limited to electrical conduit,

raceways, junction boxes, rail brackets, pit ladders, light fixtures, sump discharge lines, etc. Other running clearances shall comply with Elevator Code as applicable.

- I. Floor Accuracy/Leveling Tolerance: The elevator shall stop within ¼" of floor regardless of load or direction of travel and re-level to within ¼" during loading/unloading.

3.2 DEMOLITION *[Note to AE: Include this paragraph for elevator replacement / modernization projects only.]*

- A. Retaining Existing Equipment: Owner reserves the right to retain any of the existing equipment. Contractor shall contact the Owner prior to beginning work to establish what materials and equipment shall be retained by the Owner.
- B. Disposal of Equipment: Contractor shall be responsible for the legal removal from the premises and disposal of all equipment not retained by the Owner.

3.3 JOB SITE CONDITION AND CLEANUP *[Note to AE: Include this paragraph for elevator replacement or modernization projects only.]*

- A. Daily Work Area Cleanup: Work areas will be kept orderly and free from debris during installation on a daily basis.
- B. Cleanup and Protection of existing Surfaces: The manufacturer/contractor shall be responsible for the protection of the existing surfaces including walls floors, etc, and the removal of packing materials, and general cleanup of the construction area. Job site shall be left in a pre-job condition at the completion of the project.
- C. Patching and Repairing: Contractor shall be responsible for patching and repairing any holes or penetrations that are made by the contractor.
- D. Cutting and Welding: See Section 01 35 00 – Special Procedures for Owner's required notification process prior to performing any welding or other fire hazardous work.
- E. Dust: Any cutting of concrete, masonry, or any other material that generates dust shall utilize some means to minimize, control, reduce or eliminate the effects of the dust.
- F. Notification: Because of the nature of the occupied buildings that this work will take place in, the contractor shall notify the Owner of any cutting that will cause a dust condition. Notification shall be a minimum of three working days before work is to begin.

3.4 FINAL TESTING AND ACCEPTANCE

- A. The elevator contractor shall conduct preliminary functional testing to ensure that the elevator installation is complete and ready for acceptance testing. The elevator contractor shall then schedule an acceptance inspection of the installation with the third-party elevator inspector selected by the project and the University of Illinois Elevator Shop. Advance notice of the planned date of inspection shall be sent to the inspector and the Elevator Shop at least five (5) working days prior to the date requested.
- B. The elevator contractor will be required to complete the contractor's portion of the State of Illinois Conveyance Registration Form once the elevator equipment has arrived at the job site and the equipment serial numbers are available. The elevator contractor shall forward the form with the required information included, to the Project Manager for filing with the Elevator Safety Division of the Office of the State Fire Marshal. The registration of the new equipment will be handled by the University of Illinois.
- C. The elevator contractor and the other project contractors associated with the elevator installation shall provide assistance as required to demonstrate to the Elevator Inspector and the University of Illinois Elevator Shop that the elevator installation is in compliance with all of the requirements of the State of Illinois Elevator Safety and Regulation Act and the standards referenced herein. Upon completion of the inspection and a finding of no outstanding compliance issues, the elevator contractor shall provide the required statement of testing to the Project Manager for filing. The application for the Certificate of Operation will be processed and filed by the University of Illinois.

1. The elevator contractor shall be responsible for any re-inspection fees required on the project that is caused by their omissions or errors.
 2. The elevator contractor is required to notify the Project Manager of any impingements upon the elevator installation by other contracting trades.
- D. Testing: Elevator contractor shall provide testing of load, speed, endurance, and operation in accordance with ASME A17.1 and II State elevator safety code requirements.
- E. Inspection and Acceptance: The U of I Elevator Shop shall witness final acceptance tests.

3.5 TRAINING

- A. Formal Training: Formal classroom training from the manufacturer shall be provided if U of I Elevator Shop personnel have not previously received formal training on a proposed piece of equipment.
- B. Training: Elevator manufacturer shall provide training personnel to the University of Illinois Campus for the purpose of teaching and instructing an adjuster level training program to the U of I Elevator Shop personnel. At the Owner's option, 3 U of I Elevator Shop personnel may travel to the Contractor's / controller manufacturer's Training Center. Contractor / controller manufacturer shall be responsible for the cost of the program. Owner shall be responsible for travel expenses. All training shall be made available prior to the end of the warranty period with reasonable and adequate notice of a minimum of 90 days so that accommodations and scheduling can be accomplished.
- C. On-Site Training: Contractor shall provide one 8-hour session of training at new installation locations on the complete operation, adjusting, and troubleshooting of the elevator system. Training shall include complete instruction on the use of any service or adjusting tools.

3.6 PAINTING & CLEANING

- A. Machine Finish, Cleaning and Painting of Equipment: All equipment shall be "touch up" painted and left in a clean condition and meet the following requirements.
1. "Touch Up" Paint: All factory painted surfaces of machine, motors, governors, car slings, controllers, etc. that have been scratched, welded on, rusted, etc, shall be "touched up" with manufacturer's standard color paint. Spray paint is not acceptable for touch up painting.
 2. Paint (no spray paint): All accessories such as unfinished machinery iron work, metal fittings, welded areas, guide rails, (except items such as conduit and wire ropes) that are exposed in the hoistways, pits, and machine rooms, shall be cleaned and painted with one coat of the manufacturer's standard color enamel acceptable to the Owner. Gloss black paint may be used instead of manufacturer's standard color on items such as guide rails, and pit channels at manufacturer's discretion. Factory painted surfaces of guide rails, shall be considered an unfinished surface, and shall require cleaning and painting.
- B. Cleaning: At time of final acceptance all debris, dirt, mud, protective materials and dust from all surfaces inside hoistway, machine room, controller, elevator car frame, sill and all other related equipment shall be removed and elevator equipment shall be left in a like-new clean condition.

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This section of the *U of I Facilities Standards* establishes minimum requirements only. It should not be used as a complete specification.