

## DIVISION 14 - CONVEYING SYSTEMS

(LINK TO UNIVERSAL DESIGN IN PROGRAM INFO/GENERAL REQ. SECTION)

### 14200 — ELEVATORS

1. **Intent:** The intent of this standards section is threefold: 1. Hiring of a Vertical Transportation(VT) Sub Consultant early in the design process, 2. provide guidelines in developing drawings and specifications for vertical transportation systems that are intended for standalone and multiple building sites, 3. Retain the VT Sub Consultant for an 11 month warranty audit of new or modernized equipment prior to the transfer from the 1 year warranty period to the regular VT maintenance contract. Guidelines in developing drawings and specifications include the following:
  - 1.1 Provide acceptable levels of elevator service. Traffic analysis should be performed to confirm acceptable levels of elevator service for vertical circulation of building occupants and programming.
  - 1.2 Provide safe, reliable, and convenient transport of passengers and material.
  - 1.3 Provide systems that meet all current applicable code and accessibility requirements.
  - 1.4 Provide reliability and achieve desired lifecycle service and cost. Equipment replacement parts shall be available for a minimum of 10 years from installation.
  - 1.5 Prohibit installation of control equipment that requires adjustment or troubleshooting with proprietary diagnostic instruments.
  - 1.6 To ensure that elevators comply with specifications and installation procedures in the standards, the A/E shall retain the services of an elevator consulting firm to provide design, specification and construction/inspection services. The A/E shall include a Pre- Design report prepared by the consultant as part of the Pre-Design deliverables. The elevator consulting firm shall have an office in Minnesota with a minimum of five years of experience as an elevator consultant.
    - 1.6.1 The Consultant's Pre-Design report shall include recommendations for elevator quantities, types, speeds, capacities and platform sizes based on the anticipated building population and specific usage. Traffic analysis should be performed as stated in Section 1.1. to confirm acceptable levels of elevator service. This report is optional at the Owner's discretion for the following:
      - 1.6.1.1 Modernization projects in existing buildings provided the building's population or occupancy type is unchanged.
      - 1.6.1.2 Projects that require an elevator solely for compliance with building or accessibility code requirements.
      - 1.6.1.3 Request and utilize information from available Pre-Design Studies of Probable Cost of Modernization for existing equipment where appropriate for building renovations or elevator modernizations. Likewise for documentation related to deferred maintenance for U of M buildings.

- 1.7 During the Design Development phase, the Consultant shall provide the Architect with a list related to building work, outside the scope of Division 14, required to comply with prevailing elevator code requirements. The Architect shall distribute this list to their design

**team** and verify that the necessary work is included in the Construction Documents.

- 1.8 Projects with SD, DD, and CD should include a vertical transportation consultant throughout all phases of project, as well as Warranty Review of the equipment prior to the expiration of the warranty at end of project.
- 1.9 When an existing elevator or escalator system is to be removed, Consultant should provide requirements of the removal/demolition within the specification and reference the Division 1, General Requirements.
- 1.10 Consultant to reference all applicable related sections with the specification document, such as the following divisions.
  - 1.10.1 Division 21 Fire Suppression – integration of fire alarm systems and fire suppression systems with the elevator systems.
  - 1.10.2 Division 22 Plumbing – pit floor drains and sump pumps.
  - 1.10.3 Division 23 HVAC – providing the required heating and cooling of equipment spaces.
  - 1.10.4 Division 26 Electrical – electrical systems for main line power supply, standby power supply, lighting levels for equipment spaces and lobbies, GFCI outlets and emergency power integration.
  - 1.10.5 Division 27 Communications – phone system and connectivity devices.
  - 1.10.6 Division 28 Electronic Safety and Security – system provision and integration.
  - 1.10.7 Division 28.2 Security Systems Standards– system provision and integration.
- 1.11 It shall be the intent of projects to consider incorporation two-way Phone/Video emergency communication requirements as required by ASME A17.1 2019, section 2.27.1.1 **or future code adoptions**. This requirement initially shall be implemented for modernization projects, to incorporate these requirements as part of the scope of the elevator modernization. Until the newer code is adopted in the local jurisdiction this requirement will not be implemented on new design projects until the code is adopted and enforced.
- 1.12 Consultant shall provide relevant guidance and information related to high rise elevators where implementation of Occupant Evacuation Elevators and Occupant Evacuation Operation will be incorporated with in the design as per the requirements of Section 3008 of the IBC and ASME A17.1 Section 2.27.11.
- 1.13 Consultant shall provide relevant guidance and information related to high rise elevators where implementation of Fire Service Access Elevators will be incorporated with in the design as per the requirements of IBC and ASME A17.1.

## 2. Design Criteria

- 2.1 Install elevators in buildings that are two stories and higher. The design shall provide direct service to all floors in the building, including floors where mechanical rooms are located. Escalators may be considered in buildings that have a concentrated flow of traffic such as sport facilities, auditoriums and bookstores.

- 2.2 For an elevator remodeling project, the university shall retain the rights to salvage existing elevator components.
- 2.3 The U of M may require performing elevator vendor or 3<sup>rd</sup> party testing of MRL roped traction systems where the elevator(s) is/are deemed critical to the support of the building programming or function. It is recommended to use technology tools to test and report rope balance, load testing and tension **for final acceptance**. The U of M reserves the right to hire and pay a 3<sup>rd</sup> party to provide the service and perform the testing.
- 2.4 Service Elevator
- 2.4.1 Include a service elevator in all buildings that are two stories or higher. Locate the service elevator adjacent to the service entrance or loading dock if applicable. In smaller buildings the service elevator may also serve as a passenger elevator.
- 2.4.2 The service elevator shall provide direct service to all floors in the building, including floors dedicated to mechanical and electrical equipment.
- 2.4.3 Service elevator cab interiors shall be a minimum of 5'-8" wide, 8'-9" deep, and 10'-0" high. 5,000 lbs. minimum capacity.
- 2.4.4 Service elevator entrances shall be a minimum of 4'-6" wide by 7'-6" high.
- 2.4.5 A door hold feature activated by a momentary pushbutton in the car operating panel shall be provided. Door hold feature timer parameter shall be adjustable up to 120 seconds.
- 2.4.6 Service elevators that open directly into mechanical rooms or building service areas shall be equipped with means to restrict access from inside the elevator to authorized personnel through the means of a key switch or card reader device.
- 2.5 Hydraulic Elevators
- 2.5.1 **PROHIBITED:** Hydraulic elevators in parking ramps.
- 2.5.2 Hydraulic passenger elevators may be used for light-duty applications. They shall be limited to a maximum travel of 24 feet or three stops, hydraulic jack assemblies shall be conventional in ground type, twin post holeless type or twin post telescoping type
- 2.5.3 Hydraulic freight elevators shall be limited to a maximum travel of 60 feet. The hydraulic jack assembly shall be conventional, in ground type.
- 2.5.4 Roped hydraulic jack assemblies shall require approval by the U of M prior to installation. Roped hydraulic elevators are prohibited in residence halls.
- 2.6 Traction Elevators
- 2.6.1 Traction elevators shall be used for all applications that exceed 24 feet of travel or three stops.

- 2.6.2 Traction elevators shall be used in parking ramps regardless of travel or number of stops. Elevators in parking ramps must include hall floor indicators on every level.
- 2.6.3 New parking garage elevators shall be designed with required code compliant glazing.
- 2.6.4 Parking garage elevators will be incorporated with a minimum of NEMA 1 rated enclosures in the elevator equipment room and hoistway with no penetrations for conduits in the top of the enclosures.
- 2.6.5 MRL traction equipment is restricted in single elevator applications without review and approval.
- 2.6.6 Car safeties shall be replaced upon the second modernization of the elevator equipment. With this scope consideration there should be a case by case assessment of the cost of the replacement along with a general discussion and review.

### 3. Materials

#### 3.1 Steel

- 3.2 U Services, CPM has developed standards for building finishes that elevator finish colors for panels, flooring or metal finishes **for existing buildings which cab modernizations** should align with.

#### 3.3 Steel

- 3.3.1 Commercial-quality carbon steel that is stretcher-leveled and cold-rolled shall be used for exposed work. Such steel must comply with ASTM 366, matte finish.
- 3.3.2 Commercial-quality carbon steel that is hot-rolled shall be used for concealed work. Such steel must comply with ASTM A568/A568M-03.

- 3.4 Stainless steel: Type 302 or Type 304 that complies with ASTM A240 shall be chosen as follows:

##### 3.4.1 No. 4 finish: Satin finish

- 3.4.1.1 Directional polish finish.

- 3.4.1.2 Graining direction in the longest or vertical dimension.

##### 3.4.2 No. 8 finish: Mirror finish

- 3.4.3 Textured: Patterned type with .050-inch mean pattern depth with satin finish. Other patterned finishes shall be considered and approved.

- 3.5 Bronze materials shall be constructed of stretcher-leveled sheets with 60 percent copper and 40 percent zinc that are similar to Muntz Metal, Alloy Group #2. After cleaning, spray with one coat of clear lacquer.

- 3.5.1 No. 4 finish: Satin finish
  - 3.5.1.1 Directional polish finish.
  - 3.5.1.2 Graining direction in the longest or vertical dimension.
- 3.6 Aluminum extrusions shall comply with ASTM B221 requirements. Sheet and plate shall comply with ASTM B209 requirements.
- 3.7 Plastic laminate shall comply with ASTM E 84 Class A and NEMA LD3.1, fire-rated grade (GP-50), type 7, 0.050" +/- .005" thick, and as follows
  - 3.7.1 The Owner's representative shall select the appropriate color for exposed surfaces.
  - 3.7.2 Use the manufacturer's standard for plastic laminate on non-exposed surfaces.
- 3.8 Fire-rated particleboard panels shall have a minimum of 1/2-inch-thick backup for natural veneer or plastic laminated panels provided with suitable anti-warp backing, meet ASTM E84 Class "I" rating with a flame-spread rating of 25 or less.
- 3.9 Paint: Clean exposed metal parts and assemblies of oil, grease, scale, and other foreign matter and factory paint one shop coat of standard rust-resistant primer. After erection, provide one finish coat of industrial enamel paint. Galvanized metal need not be painted.
- 3.10 Prime Finish: Clean all metal surfaces receiving a baked enamel paint finish of oil, grease, and scale. Apply one coat of rust-resistant primer followed by a filler coat over uneven surfaces. Sand smooth and apply final coat of primer.
- 3.11 Baked Enamel Finish: Prime finish per above. Unless specified "prime finish" only, apply and bake three additional coats of enamel in the selected solid color.
- 3.12 Laminated safety glass shall comply with ANSI Z.97.1 and CPSC 16 CFR, part 1201.

#### **4. Elevator Performance**

- 4.1 Elevators that are of the same make and model shall perform the same way. Each elevator shall be adjusted for optimum performance and shall be specified to meet requirements based on the Schematic Design report in regard to the following:

- 4.1.1 Overall car floor to floor performance time—measured from when the doors begin to close, the elevator travels to the next floor and the doors are three-quarters (center opening doors) or one-half (side opening doors) of the way open.
  - 4.1.2 Floor stopping accuracy— $\pm 1/4$ " of level regardless of load up to rated capacity.
  - 4.1.3 Running speed—maintained within 3 percent of specified speed under all load conditions for traction elevators and within 10 percent of specified speed for hydraulic elevators.
  - 4.1.4 The noise level shall not exceed 60 Dba inside of the car under any condition, including with the fan running and when the door is operating.
  - 4.1.5 Ride quality for new installations shall be such that there are no excessive horizontal or vertical vibrations. The maximum peak-to-peak vibration shall not exceed 20 milli-g's within the band specified in ISO 8041 for whole body X, Y and Z. These measurements shall be taken with an accelerometer sensing unit that is placed in the center of the platform. There shall be no sound or vibration absorption material between the unit and the platform. All elevators that have readings in excess of the allowable limit shall be readjusted or realigned to an acceptable vibration level.
- 4.2 Door opening time—measured from when the doors begin to open until the doors are fully open.
  - 4.3 Door closing time—measured from when the doors begin to close until the doors are fully closed.

## 5. Approved Equipment and Contractor Qualifications

- 5.1 Elevator systems and individual components shall be designed to allow for routine maintenance, troubleshooting, and code-required testing to be completed by any qualified elevator maintenance provider without the need for any external diagnostic devices or software.
- 5.2 All products must include all UL/CSA labels required by the State of Minnesota and be acceptable for use by the Minnesota Department of Labor & Industry (MDLI) Elevator Code Division.
- 5.3 The installation contractor shall have an office in Minnesota and have a minimum of five-years of experience installing elevator equipment.
- 5.4 See list of approved manufacturers and equipment.

## 6. Control and Operation

- 6.1 Motor Drives and Motor Control

- 6.1.1 Provide solid state AC motor drives on all new traction installations and modernizations.
  - 6.1.1.1 Provide regenerative motor drives when possible. Verify requirements and limitations with the Owner or Electrical Engineer.
- 6.1.2 Provide solid state reduced voltage motor starters on all hydraulic applications.
- 6.1.3 Provide any interface cards required for equipment maintenance, code mandated testing, and troubleshooting.
- 6.1.4 Provide diagnostic equipment complete with access codes, adjusters' manuals, and set-up manuals for adjustment, diagnosis, and troubleshooting of elevator system, and performance of routine safety tests.
- 6.1.5 Provide remote maintenance IOT (Internet of Things) capabilities. Enable component performance data capture of information provided through non-proprietary elevator monitoring systems. System shall not allow remote maintenance or the ability to login remotely and affect changes to the operability of the elevator system.

## 6.2 Elevator Controls

- 6.2.1 Provide Selective Collective Simplex operation for single elevators.
- 6.2.2 Provide Selective Collective Duplex or Group Automatic Operation for two-car ~~groups~~
- 6.2.3 Provide Group Automatic Operation using a current ETA algorithm for groups of three or more elevators.
- 6.2.4 Provide all elevator control features required by prevailing code requirements and the requirements of the Owner. Optional features that should reviewed with the Owner and Design Team during the design process include:
  - 6.2.4.1 Card reader security
  - 6.2.4.2 In car security cameras
  - 6.2.4.3 Key activated security
  - 6.2.4.4 Swing car operation
  - 6.2.4.5 Priority service operation
  - 6.2.4.6 Standby power (emergency power or battery lowering)
  - 6.2.4.7 Restricted lobby access
  - 6.2.4.8 Car to lobby
  - 6.2.4.9 Attendant operation
  - 6.2.4.10 Digital video displays

- 6.2.4.11 Intercom systems
- 6.2.4.12 Announcement speakers
- 6.2.4.13 Special wiring requirements

6.2.5 Coordination with applicable other specification sections and performing subcontractors including but not limited to the following divisions.

- 6.2.5.1 Division 1 General Requirements – Construction Use
- 6.2.5.2 Division 21 Fire Suppression – Fire Alarm
- 6.2.5.3 Division 22 Plumbing – Elevator pit drains, sumps & capacity
- 6.2.5.4 Division 23 HVAC - Cooling and Heating for elevator control/machine rooms & hoistways where MRLs are being installed or modernized
- 6.2.5.5 Division 25 Building Automation and Control – Temperature control for Div. 23
- 6.2.5.6 Division 26 Electrical Section – Hoistway, lobby and equip. space lighting & NEC 620
- 6.2.5.7 Division 27 Communications – Elevator emergency phones and cables
- 6.2.5.8 Division 28 Electronic Safety and Security – Cameras, card readers & LED monitors

Division 28.2 Security Systems Standards.

## **7. Equipment in Hoistways, Controller Spaces, Control Rooms, Equipment Spaces, and Equipment Rooms.**

### 7.1 General

- 7.1.1 Equipment shall be designed and installed so it is easily removed for maintenance and repair. Consultant shall notify the A/E at any point in the design process if the building design appears to prohibit future replacement of any elevator equipment.
- 7.1.2 Minimum machine room door width shall be specified.
- 7.1.3 Hoist beam requirements shall be specified. Specifically related to MRL traction elevators, intent shall be to leave the hoist beam in place.

### 7.2 Traction Elevators

- 7.2.1 Traction hoist machines in new buildings shall be geared or gearless with motor, brake, drive sheave and deflector sheave mounted on a common structural frame. The machines shall be located in the equipment room, hoistway or equipment space.

- 7.2.2 Provide new gearless traction machines when replacing existing geared traction machines where feasible and cost effective. Any modernization design shall require replacement of geared traction machines that have existing DC hoist motors or that have been in operation more than 20 years. If geared machine is less than 20 years old, specify the refurbishment of gears, bearings, brake and seals, as well as the provision of new AC induction hoist motor.
- 7.2.3 New gearless machines shall be PMAC (P.M.S.M. ACVVVF) Gearless type machines.
- 7.2.4 Selectors shall be solid-state or steel hoist way tape that uses magnets mounted on the tape for car position, slowdown and leveling. Provide digital closed loop selector systems for all elevators with speeds of 300 fpm or higher.
- 7.2.5 Mechanically and electrically isolate elevator equipment from the building structure. Isolate unit to minimize noise and vibration transmission. Provide isolation transformers, filter networks and choke inductors.

### 7.3 Hydraulic Elevators

- 7.3.1 **PROHIBITED:** Submersible pump units in applications with a pump motor greater than 30 horsepower.
- 7.3.2 Equip pump units with guards and sound isolation panels. To maintain a constant oil temperature, provide thermal and/or external cooling units in the oil reservoir as necessary.
- 7.3.3 Provide a muffler on hydraulic elevators.
- 7.3.4 Provide a gate or shutoff valves in hydraulic piping for all pump units. One valve shall be in the machine room and one valve shall be in the pit area, near the hydraulic jack.
- 7.3.5 Locate the hydraulic control valve in the oil reservoir above the level of oil when the car is at the lowest landing.
- 7.3.6 Run hydraulic piping above ground/overhead. Buried oil lines or couplings are prohibited. Provide labeling on any hydraulic piping which runs outside of hoistways or elevator equipment rooms.
- 7.3.7 To return oil back to the hydraulic pump unit reservoir, provide a Wagner or University-approved equal scavenger pump in each pit where the distance between the elevator jack/jacks and hydraulic power system fall within allowable distances
- 7.3.8 Provide at least one isolation coupling in the oil line to reduce vibration and noise.

## 8. Hoistway Equipment

- 8.1 Guide rails shall be planed steel t-sections of suitable size and weight for the application. Fasten the rails to the building structure with brackets at intervals that do not exceed the span required

- by code.
- 8.2 Sheaves shall be machined grooves with sealed bearings.
  - 8.3 Counterweight shall be steel frame with metal filler weights.
  - 8.4 Governor pit tension sheave mounted to enable free vertical movement and proper tension of governor rope.
  - 8.5 Suspension means being traction steel type rope of 8 x 19 or 8 x 25 Seale construction. Also, consideration and approval required for MRL traction equipment and the use of coated, flat belt with imbedded steel cables.
  - 8.6 Hydraulic jack assembly cylinder shall be seamless steel pipe with head designed to receive unit-type packing, along with a provided means of collecting oil at head. Provide secondary containment/cylinder protection.
  - 8.7 Hydraulic jack assembly plunger shall be polished, seamless steel tubing or pipe. Join sections by internal threaded couplings with multiple section jack units factory polished while assembled. Jack plunger shall be isolated from the car frame. Dual jack holeless applications are acceptable.
  - 8.8 Hydraulic cylinder hole: Drill cylinder hole for hydraulic elevators per Minnesota statecode.

- 8.9 All electrical wiring shall be run in labeled duct, conduit or flexible conduit. Provide 10 percent of spare wires on hoistway wiring. Label spares in the controller. Provide all required conductors in the traveling cable for security and other Owner control and signal fixture requirements. Coordinate with requirement with the design team for any campus specific wiring requirements.

## 9. Entrance Equipment

- 9.1 Frames shall be of hollow metal, bolted construction with a permanently attached and raised cast Braille plate. Frames to be minimum of 14-gauge steel.
- 9.2 Braille and car ID plate design criteria shall be black lettering on satin finish stainless steel background.
- 9.3 Door panels shall be made of 16-gauge steel with two gibs per door panel.
- 9.4 Sight guards shall be made of 14-gauge steel with the same finish as door panels.
- 9.5 Sills
- 9.5.1 Passenger elevators shall have extruded aluminum or nickel silver sills.
- 9.5.2 All service elevators and elevators that have a capacity of 5000 pounds or greater shall have extruded nickel-silver sills.
- 9.5.3 All elevator cabs should have sill extensions.
- 9.6 Sill support angles shall be constructed of steel and designed to support elevator sills fastened to a building structure at a maximum of 18 inches on center.
- 9.7 The Owner's representative shall select the finish for doors and frames. Review should align with previous section. See 3. Materials 3.2 p.5? regarding the review process.

## 10. Car Equipment

- 10.1 Car frame shall be welded or bolted formed steel channel construction to meet load classification requirements.
- 10.2 Car and/or counterweight safeties shall be of instantaneous type for car speeds of 150 fpm or slower. Safeties shall be Type B with flexible guide clamp for car speeds faster than 150 fpm.
- 10.3 Roller guides shall be provided on all Class A passenger and service elevators. Elevators with Class C loading may use slide guides with replaceable inserts.
- 10.4 Platform design and construction to accommodate load classification requirements depending on type of use for passenger or freight use. Car platform shall consist of a steel frame with necessary steel stringers, all securely welded together. For platforms, provide appropriate layers of 3/4" marine grade plywood based on stringer spacing. Cover the underside of the car platform with sheet steel or fire resistive paint. Isolate the elevator platform.

10.5 Cartop guard rail railing system provided on the outside perimeter of the car top on all sides where the horizontal distance between the edges of the car top and the adjacent hoistway enclosure exceeds 12 in.

10.6 The Owner shall determine whether passenger elevators shall have tile or carpet flooring. Service elevators may require 1/4-inch aluminum checker plate flooring. Freight elevators shall have 1/4-inch steel checker plate flooring. **Review and specify based on building programming and use.**

10.7 Car sills shall be made of extruded aluminum or extruded nickel silver (to match hoistway sills).

Include a set of cab protection pads with hooks and/or buttons with each passenger and service elevator. Preferred manufacturer of cab protection pads is Palmer Pads, along with their “stud strip” style of components for hanging the cab pads.

## **11. Pit Equipment**

- 11.1 Buffers oil or spring type with blocking and support channels.
- 11.2 Provide safe pit access.
- 11.3 Counterweight guarding in front of counterweight assembly, when applicable.
- 11.4 Compensation shall provide encapsulated chain with pit guide assembly or wire rope type compensation with guide sheave assembly, when applicable.

## **12. Car Enclosure**

- 12.1 The design concept of passenger elevator cabs shall be provided by the Architect or Owner. The Consultant shall review to verify selected finishes comply with code requirements and provide opinions of additional cost if finish material weights require the elevator equipment to be of increased capacity and/or equipment size.
- 12.2 The interior of the service elevators shall be constructed of rigid stainless-steel walls and stainless-steel cab fronts and doors.
- 12.3 Freight enclosure shell shall be constructed of reinforced 10-gauge furniture steel formed panels of no more than 20" wide with no light proof joints. The shell shall also be constructed with reinforced brace panels to provide rigid structure and securely fasten to car sling and platform.
- 12.4 The interior of freight elevators shall have painted steel walls with two rows of 2-inch by 12-inch oak bumpers on the side and rear walls. LED fixtures shall be recessed in the car canopy for lighting and provide a minimum of 20 foot-candles of illumination at the car floor.

## **13. Door Equipment**

- 13.1 Passenger door panels shall be 16-gauge steel, sandwich construction without binder angles.
- 13.2 Passenger door operator shall be high speed, heavy duty capable of opening doors at no less than 1.5 fps.
- 13.3 Freight doors shall be power-operated and vertical bi-parting.
- 13.4 Freight gate shall be 12-gauge welded wire mesh, welded into frame angels.
- 13.5 Freight infrared reopening device shall be provided.
- 13.6 Freight door panels shall be 12-gauge formed steel plates welded into frame angels, with safety astragals, vision panels, unlocking device and truckable sills.

## **14. Fixtures**

- 14.1 Provide two car operating panels in elevators with center opening doors and elevators with front

and rear (side) openings.

- 14.2 Hall fixtures to be flush mounted for all new elevators. Surface mounted are only allowed as part of modernization of existing elevators where flush mounted fixtures are constrained and will not work.
- 14.3 Hall and car fixtures shall be vandal-resistant and illuminated with machined positive button stops. The Owner may allow non-vandal resistant fixtures in specific installations. Install at least one hall position indicator panel at the firefighters' designated landing.
- 14.4 Provide fire command panels when required by code. Include all wiring, conduit, cutting and patching required.
- 14.5 For multi-car installations, provide hall lanterns on each floor. For single-car installations, car direction lanterns on both car door jambs may be provided.
- 14.6 Position indicators can be alpha-numeric, digital type or LCD screens containing a minimum of floor designations and direction arrows indicating the floor served and direction of car travel.
- 14.7 Car digital displays design and type shall be reviewed and approved prior to incorporating as part of an installation.
- 14.8 Incorporate engraved ASME A17.1 "In Case of Fire" pictograph on each hall push button station faceplate. A separate pictograph is acceptable for modernization projects if necessary to avoid damaging or altering existing wall finishes.
- 14.9 Illuminate signal fixtures with LED lamps. Specify tamper-proof fasteners.
- 14.10 All key switches in car and hall fixtures shall be supplied by Adams or Innovation with the exception of specific keying required by code.
- 14.11 Emergency Communication
- 14.11.1 Provide an emergency telephone in or adjacent to the car operating panel in each elevator. The telephone shall be a vandal-resistant, ADA-compliant, hands-free, two-way communication system with audible components. It shall not require an individual access door. See 1. Intent: 1.11 p.3 regarding options for future codes.
- 14.11.2 The connection from the telephone device to the demarcation point on the elevator car shall be via shielded telephone cable with connection plugs as required by the telephone manufacturer. See U of M Standards for cabling requirements to the elevator equipment.
- 14.11.3 A twisted shielded pair of wires in the traveling cable shall connect the telephone systems from the demarcation location on the elevator car to a demarcation location mounted on or adjacent to the elevator controller in the machine room or controller space.
- 14.11.4 The contractor shall program the telephone to ring at PSECC.

14.11.5 Incorporate a reference to the applicable related sections with the specification document that related to Emergency Communication requirements including Division 27 Communications, Division 28 Electronic Safety and Security and Division 28.2 Security Systems Standards.

14.11.6 Incorporate the two-way phone emergency communication requirements as per current code. Consider ASME A17.1 2019, section 2.27.1.1. or future adopted codes on a case by case basis. If included, these requirements shall be implemented for modernization projects only. Until the newer code is adopted in the local jurisdiction, this requirement will not be implemented on new design projects until it has been adopted and enforced by the AHJ.

## 15. Warranty Maintenance

15.1 The A/E shall engage the elevator consultant to develop and provide a warranty maintenance service specification in accordance with the following:

15.1.1 The installer shall furnish preventive maintenance and 24-hour callback service on all new elevators and escalators for one year from the date of Substantial Completion. Service shall include systematic examination, adjustment, cleaning, lubrication, repair, and parts replacement.

15.1.2 Response time for callbacks shall be within two hours.

15.1.3 The installer shall repair and replace electrical and mechanical parts using standard parts produced by the manufacturer of installed equipment. The installer shall maintain an adequate stock of parts in the equipment room for repair and replacement. Submit an inventory list of stocked parts for the Owner's approval.

15.1.4 The installer shall hire and supervise competent personnel to work under the maintenance service contract.

15.1.5 In the event of an accident or injury, the installer shall conduct an inspection and submit a report to the University Elevator program within one working day. The Elevator Program shall then submit the report to the state elevator authority, as required per Minnesota Rule 1307.0040. All parts shall be retained for the inspector to examine.

15.1.6 The maintenance service contract shall specify that the installer is to test and repair all elevator emergency systems, including firefighters' emergency recall, emergency telephones and standby power as part of regularly scheduled testing at the university.

15.1.7 Maintenance and testing shall be conducted in accordance with the ASME A17.1 Elevator Safety Code. CAT1 testing falling within the 1 year warranty period shall be completed by the warranty vendor prior to transfer to the regular maintenance program.

15.2 Frequency:

15.2.1 The minimum frequency of service shall be determined by the current Maintenance Control Program, but in no cases shall be less than one (1) one hour visit per month. MCP shall be provided as part of submittal package for review and approval, as well as part of close out documents.

15.3 Reporting:

15.3.1 Copies of all service, repair, and callback tickets shall be delivered via email or hard copy to the University Elevator Program.

15.4 Inspection:

15.4.1 At least 45 days prior to expiration of the warranty maintenance service contract, the installer shall schedule a final inspection with the University Elevator Program and the designated project representative as part of the warranty maintenance contract obligation. All deficiencies shall be corrected prior to expiration of the contract.

15.5 Assignment of Warranty and Maintenance:

15.5.1 The A/E shall provide a line item on the bid form for the Contractor to provide a monthly dollar amount for the completion of the 12 months of warranty maintenance by the elevator contractor.

15.5.2 All warranty related claims and actions that occur after substantial completion of the project will be managed by the University Elevator Program directly with the elevator contractor.

15.5.3 A/E shall specify that the 12 months of warranty and warranty maintenance shall commence upon substantial completion of the project. The use of any elevator prior to substantial completion of the project shall not alter this requirement.

15.6 Construction Use (Temporary Use) Construction use (temporary use) is permitted only with approval of the CPM Project Manager and Elevator Program Manager for new facilities, major or minor renovations and remodels of floors or sections of buildings:

15.6.1 Division 1 General Requirements shall be referenced.

## 16. Owner's Information

16.1 General: Within 30 days after Substantial Completion of the elevator, provide all wiring diagrams, written information, supplemental data and diagnostic tools necessary for proper maintenance and adjustment of the equipment, including the following to the elevator consultant:

- 16.1.1 Wiring Diagrams: Provide three copies of all wiring diagrams. One hard copy shall be provided in each machine room on the job site. Other copies shall be in an appropriate electronic format.
- 16.1.2 Operation and Maintenance Manuals: Provide three neatly bound and indexed set of O and M manuals (hard copy for the machine room and electronic) that contain the following:

- 16.1.2.1 Straight-line wiring diagrams of “as-installed” elevator circuits with index of location and function of components. Provide one set reproducible master. Mount one set wiring diagrams on panels, racked, or similarly protected, in elevator machine room. Provide remaining set rolled and in a protective drawing tube. Maintain all drawing sets with addition of all subsequent changes. These diagrams are Purchaser’s property.
- 16.1.2.2 Written Maintenance Control Program (MCP) specifically designed for the equipment included under this contract. Include any unique or product specific procedures or methods required to inspect or test the equipment. In addition, identify weekly, bi-weekly, monthly, quarterly, and annual maintenance procedures, including statutory and other required equipment tests.
- 16.1.2.3 Provide any necessary interface cards required for equipment maintenance, code mandated testing, and troubleshooting.
- 16.1.2.4 Lubrication instructions including recommended grade of lubricants.
- 16.1.2.5 Parts catalogs for all replaceable parts including ordering forms and instructions.
- 16.1.2.6 Four sets of keys for all switches and control features properly tagged and marked.
- 16.1.2.7 Neatly bound instructions explaining all operating features including all apparatus in the car and lobby control panels.
- 16.1.2.8 Neatly bound maintenance and adjustment instructions explaining areas to be addressed, methods and procedures to be used, and specified tolerances to be maintained for all equipment.
- 16.1.2.9 One (1) electronic copy of all documents to be provided on flash drive.
- 16.1.2.10 Diagnostic equipment complete with access codes, adjusters’ manuals and set-up manuals for adjustment, diagnosis and troubleshooting of elevator system, and performance of routine safety tests.

16.2 See Item 5 above “Approved Equipment and Contractor Qualifications”.

- 17. Escalators, Dumbwaiters Vertical Platform Lifts and LULA Elevators:** The design of escalators and dumbwaiters shall be handled on a case-by-case basis. Only the manufacturer shall design and install these systems, which the university shall review and approve. The A/E shall coordinate the design of the systems with other building systems. The university shall furnish a list of approved manufacturers, and the A/E shall have the Elevator Consultant prepare specifications based on these manufacturers.

**18. Approved Product Listing: Where specific products are not referenced below, the Elevator Consultant shall verify through the submittal process that the elevator component manufacturers have referenced the correct parameters included in the Division 14 drawings and specifications (speed, capacity, loading, travel, stops, openings, etc.).**

18.1 Gearless Traction Elevator Machines:

- Imperial Electric
- Hollister-Whitney
- Torin

18.2 Geared Traction Machines:

- Imperial Electric
- Hollister-Whitney
- Torin

18.3 Hydraulic Power Units:

- Minnesota Elevator
- EECO
- Schumacher
- Canton
- Quality

18.4 Elevator Controls, Motor Drives, and Landing Systems:

18.4.1 Traction Elevators

- Car speed of 350 fpm or greater and/or three (3) or more elevators in a group:
  - Motion Control Engineering – iControl
  - GAL - Galaxy
  - Smartrise C4 Traction
- Car speed of less than 350 fpm and/or one (1) or two (2) elevators in a group:
  - Motion Control Engineering – iControl, Motion 4000
  - G.A.L – Galaxy
  - Elevator Controls Corporation – Pixel Traction
  - Smartrise C4 Traction

18.4.2 Hydraulic Elevators

- Motion Control Engineering – Motion 2000 w/LS-QUTE
- G.A.L – Galaxy

- Elevator Controls Corporation – Pixel Hydraulic
- Smartrise Evolved
- Vertitron Midwest - VHC102 (Simplex Only)

#### 18.4.3 Hydraulic Jack Assemblies

EECO

DL Martin Co.

ITI Hydraulik

Lift Solutions

#### 18.5 Door Operators and Related Door Equipment:

- GAL – MOVFR II
- GAL – MOVFE (linear)
- Wittur

18.6 Elevator Cabs and Interior Finishes:

- Hauenstein and Burmeister
- Minnesota Elevator
- Schumacher
- G & R
- Tyler

18.7 Car and Counterweight Roller Guides:

- ELSCO
- Hollister Whitney
- Wittur

18.8 Car and Hall Signal Fixtures:

- Innovation Industries
- MAD

18.9 Emergency Telephones

- Rath Microtech Smartphone

19.0 Freight Vertical Bi-Parting Door Equipment and Enclosures:

Courion.  
EMS.  
Peelle.

**End of Division 14**