DIVISION 14 – Conveying Equipment

Preface

The Texas Tech University System's '*Design and Construction Standards'*, as administrated by Facilities Planning and Construction, are intended to serve as guidelines to the Design Professional and Construction Management teams for design development and construction administration of Texas Tech University System (TTUS) Capital Projects. They communicate the minimum expectations and requirements relative to specific building systems, design provisions, general specification requirements, and administrative procedures for new facilities being constructed on Texas Tech University System (ASU, MSU, TTU, TTUHSC, and TTUHSC El Paso) campuses. Several, but not all requirements for each component Institution or Agency within the TTU System are covered. Design Professionals, Construction Managers at Risk and/or Design-Build Firms shall also refer to provisions covered in their service Agreements, as well as within the project's Basis of Design (BOD) document.

In addition, the 'Design and Construction Standards' shall also be utilized in conjunction with the approved project specific Program and Schematic Design development. In the event of conflict between this document and specific project requirements, Design Professionals, Construction Managers at Risk and/or Design-Build Firms shall contact Facilities Planning & Construction for clarification.

The guidelines within the '*Design and Construction Standards'* are not intended to prohibit the use of alternative design solutions, methods, systems, products or devices not covered in this document. Offered alternatives deviating from or not covered in these standards shall be documented by the Design Professional and/or Construction Management teams and submitted to Facilities Planning & Construction for approval prior to implementation.

Throughout the '*Design and Construction Standards'* there are references to manufacturer

specific products. These are to be considered the 'Basis of Design' to establish the expected minimum quality requirements. Design Professionals are encouraged to identify and include equivalent products and/or manufacturers offering comparable products to facilitate open bidding environments.

General Requirements for Elevators and Lifts

Vertical conveyance systems shall be specified non-proprietary based on this standard. ***Proprietary, packaged elevator systems are not preferred and will not be considered***.

The most appropriate elevator system shall be selected by TTUS Facilities Planning and Construction and the component Institution, based on recommendations from the Design Professional, as subject to the project's programmatic requirements and most cost-effective solution. As a rule of thumb, hole less hydraulic elevator systems are more cost effective than traction elevator systems for projects with three stops or less. Traction systems shall be design and specified for projects with three stops or more, or as the project and construction budgets permits.

Machine-Room-Less (MRL) elevators shall not be specified unless existing conditions and circumstances dictate an MRL solution as the most cost-effective option.

CODES AND REGULATIONS

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

1. ASME A17.1 Safety Code for Elevators & Escalators (current edition) as adopted by TDLR.
2. ASME A18.1 Safety Standards for Platform Lifts and Stairway Chair Lifts (current edition) as adopted by TDLR.
3. NFPA 70 National Electrical Code (NEC), current adopted edition.
4. NFPA 80 Fire Doors and Windows.
5. 2012 Texas Accessibility Standards (TAS)
6. ASME UL 10B and ASTM E152, Fire tests of door assemblies.

7. IBC – current adopted edition of municipality in which project is being constructed.
8. Texas Department of Licensing and Regulation, Elevator Division.
9. NFPA – National Fire Protection Association (edition adopted by State Fire Marshal). Owner will provide Qualified Elevator Inspector (QEI) for final inspection.

Elevator performance criteria shall meet or exceed ASME A17.1.

Platform and Stairway Chair Lift performance criteria shall meet or exceed ASME A18.1.

The elevator installer shall be responsible for submitting plans to the Texas Department of Licensing and Regulation (TDLR) and paying the review fees for all new installations and alterations. Elevator installers inspectors will not be allowed to perform inspections on any new installation or alteration without a copy of the approved plans and drawings being available on site for the inspector's use during the inspection. Elevator installers QEI will conduct periodic site visits and inspections.

QUALITY ASSURANCE

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

In general, Elevators shall not be used for construction purposes unless authorized by TTUS FP&C. Damage of any kind to the cab or the adjoining structures which may develop through performance of the Work or in conjunction with testing shall be repaired at no additional costs to the Owner.

Should the elevators be authorized for temporary construction use, the following conditions shall apply:

1. The Elevator Contractor shall provide a temporary acceptance form for the user to sign.
2. Neither the new installation period, nor the guarantee, shall start at this time unless specifically approved in writing by the Owner.
3. The user shall provide, if job conditions require, all temporary enclosures, guards or other projection of the hoist way openings, power, signal devices, car lights,

protection of any elevator entrances, cars, fixtures, and any other equipment that is installed.

4. The user shall return the elevators in the same condition they were in when placed on temporary service and shall pay the Elevator Contractor for repairs or clean up.
5. The user shall allow the Elevator Contractor to perform routine maintenance or repairs.
6. The cost of temporary service shall be negotiated between the Elevator Contractor and the user. Submit shop drawings and descriptive data for all equipment that will be installed.

Advise Facilities Planning and Construction, QEI, and Authorities Having Jurisdiction at least 7-days in advance of dates and times that preliminary tests are to be performed on elevators.

Texas Tech will provide third-party QEI inspection and certification services for final acceptance. Provide one (1) week notice to Facilities Planning and Construction for final QEI inspection scheduling.

Before the final QEI inspection can be performed:

1. Permanent phones must be installed with dial tone verified and call out functional.
2. Fire service/alarm must be complete to test Fire Service recall.
3. Elevator installation must be 100% complete.

Make a final check of each elevator’s operation with Owner's personnel present and before date of Substantial Completion. Determine that operation systems and devices are functioning properly.

Before the elevator contractor can begin installation, the Construction Manager shall provide:

1. Comprehensive, approved Product Data and Shop Drawings
2. The electrical disconnect switch.
3. Clear and completed hoist way(s).
4. Permanent machine room door(s).

CLOSE-OUT DOCUMENTATION and RECOGNITION OF SUBSTANTIAL COMPLETION

Final Acceptance Testing: On completion of elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required by the Authority Having Jurisdiction, Texas Department of Licensing and Regulation, Texas Tech, and by governing Regulations and Agencies.

Conduct on-site Owner's personnel training covering proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of operational failure and other building emergencies. Train Owner's personnel in procedures to follow in identifying sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program.

Submit written information necessary for proper maintenance and adjustment of the equipment prior to final acceptance.

This includes but is not limited to:

1. Straight line wiring diagrams of as-installed elevator circuits with index of location and function of all components. Leave one laminated drawing set in machine room. Provide two (2) corrected sets for Owner’s file 90 days after acceptance.

2. Lubricating instructions and recommended lubricant grade. Suitable means shall be provided for lubrication with oil or grease for all bearing surfaces in connection with the elevator installation. Grease gun fittings, if used, shall be suitable for high pressure guns. Grease cups, if used, shall be automatic compression type.

3. Parts catalogs and maintenance manuals. Include four (4) sets per elevator.

4. Include any special tools, passwords, software package or manuals that are required for maintenance, trouble shooting, adjustments or performing safety tests of the elevators for the Owner’s and Owner’s elevator maintenance providers’ use.

5. Include training classes for use of maintenance tools and operating procedures.

6. Deliver six (6) sets of all keys for all keyed features of the elevator system to the

component Institution's Lock Shop.

7. Logbooks as required by ASME A17.1 including a written maintenance control program, maintenance record book, firefighter's service operation log, record of oil usage, and a written emergency evacuation procedure (Guide for Emergency Personnel).

8. Provide warranty to replace, repair, or restore parts or components that fail or do not operate properly due to poor field or factory workmanship, engineering or design for a period of twelve (12) months from the date of signed final acceptance.

9. Provide monthly preventive maintenance in accordance with ASME 17.1 for the elevator(s) for a period of 12 months after the equipment is accepted by the Owner. The maintenance service shall comprise regular examinations of the installation by competent and trained mechanics and shall include all necessary adjustments, greasing, oiling, cleaning, and supply of parts and accessories necessary to keep the equipment in good operating condition, except such replacement of parts made necessary by misuse, accidents not attributable to failure of equipment or workmanship, and negligence of the Owner. Include 24 hour-hour-per-day, 7 days per week emergency call back service, with a guaranteed response time of 1 hour or less.

10. Schedule all preventive maintenance visits with the component Institution's Building Maintenance Elevator Supervisor and furnish all maintenance reports to Facilities Planning and Construction at the completion of each preventive maintenance inspection.

11. All elevator related work shall be performed by the Elevator Contractor's personnel only, using only standard parts furnished by the Elevator Contractor and shall not be assigned or transferred to any agent. Elevator Contractor must be able to demonstrate experience in installation and maintenance of similar elevators to those specified and which have given satisfactory service; maintains locally an adequate stock of parts for replacement or emergency purposes; has available qualified persons to do the work. Installation shall be by mechanics directly employed by elevator contractor.

14 21 00 Electric Traction Elevators | 14 24 00 Hydraulic Elevators (Hole-less)

The following design guidelines apply to both electric traction and hydraulic elevator systems.

Elevator size and capacity requirements must meet or exceed ASME A17.1.

Elevator speed shall be approved by Facilities Planning and Construction and the component Institution. At a minimum, design and specify 125 fpm elevator car speed, unless size and application of use restrict.

Design Professionals are encouraged to contact and consult with Alliance Elevator Solutions for scoping non-proprietary elevator systems.

Submit samples of all exposed materials with finish and all custom fixture fabrications.

Elevator required signage shall be furnished and installed by elevator contractor. All signage to be metal and engraved.

ELEVATOR CONTROLS and MACHINARY Design Requirements

The elevator controllers shall be manufactured by **Motion Control Engineering**, **Elevator Controls**, **SmartRise**, or other comparable manufacturer, equal in all respects, with no exceptions. Texas Tech will determine acceptance.

The controllers must not contain embedded proprietary software that shuts the elevator down if the equipment is not malfunctioning and forces the Owner to call the Manufacturer for service.

The elevator door controller must be manufactured by **G.A.L**. or others, but equal in all respects, with no exceptions. Texas Tech will determine acceptance. The door operator must be sized and programed for each application.

Drive machines and safety equipment must be manufactured by **Hollister-Whitney** or others, but equal in all respects, with no exceptions. Texas Tech will determine acceptance.

Dry or submersible type power units must by manufactured by **Hollister-Whitney** and supplied

with unitized valves manufactured by **Maxton Manufacturing Company** or others, but equal in all respects, with no exceptions. Texas Tech will determine acceptance.

Guides for the elevator cabs and counterweights shall be manufactured by **Hollister Whitney** or **Elsco** or others, but equal in all respects, with no exceptions. Texas Tech will determine acceptance. The guides must be sized for each application.

Door re-opening devices shall be manufactured by **Janus** and type **Janus 200** or others, but equal in all respects, with no exceptions. Texas Tech will determine acceptance.

Contractor and elevator equipment provider guarantees they will sell parts and printed circuit boards to the Owner and the Owner's Elevator Service provider. The same shall not be dependent on an exchanged component.

ELEVATOR MACHINE ROOM Design Requirements

The elevator machine rooms should have the following standard features, but not be limited to:

1. A self-closing, self-locking, properly rated machine room door is required. The component Institution's Lock Shop will key the door for restricted access.
2. The elevator machine room shall be properly ventilated, heated and cooled. Machine room temperature should be maintained between 55F and 90F.
3. Provide a 120-volt, 20A, circuit for car lights, fan and alarm circuit. This circuit must be provided with a lockable disconnect per NEC 620-53.
4. Provide adequate 120-volt receptacles in each elevator equipment room. Each outlet shall be GFCI.
5. All disconnects located in the elevator equipment room for elevator support equipment shall be fused type and lockable. Disconnect switch to be provided by electrical contractor.
6. Provide a 10-pound ABC fire extinguisher in each machine room.

7. Only such equipment directly required in the function or support of the elevator system is allowed in the machine room or hoist way. No other equipment, piping drains, etc., is permitted in this space.

8. No floor drains are allowed.

9. Provide 40-foot candles of lighting at on the machine room floor. This exceeds ASME requirements. Light fixtures will be equipped with bulb/tube protection.

10. Provide at least one smoke detector for activation of Fire Fighter service. Upon activation, the elevators will go into recall mode. Activation of the smoke detector will recall all elevators to the designated floor.

11. Sprinklers shall be installed in elevator machine rooms in accordance with NFPA 13.

12. A heat detector must be installed within 24 inches of each sprinkler head located in the elevator machine room. The fire alarm system must function such that when the heat detector's temperature rating is reached, the fire alarm system shunt trips the main breaker prior to sprinkler activation in the elevator equipment room in accordance with ASME A17.1.

13. If elevators are powered from emergency power, interlock wiring (conduit and wire) must be provided between the transfer switch and each elevator equipment room and between each elevator equipment room.

14. One telephone line per elevator shall be installed in each elevator room. Coordinate with TTU Communication Services (806-742-2000).

15. Provide proper clearances per applicable codes around electrical and mechanical equipment.

16. Flexible metallic tubing will not be allowed in the machine room.

17. A minimum machine room clearance shall be 7'-0".

ELEVATOR CAB FEATURES Design Requirements

Elevator cabs should have the following standard features, but not be limited to:

1. Specify telecommunications emergency phone device in each elevator per ASME A17.1. Use of this device shall not require the opening of a door. Specify an IP addressable type telephone. If there is a need for protection as directed by Owner, provide phone with steel surface mounted enclosure.

2. Key Switch Feature (Fire Fighter Service, FFS): Car and hall push buttons are activated and deactivated by security key switches. Key is removable only in deactivated position. Per ASME 17.1, any key to an existing elevator shall be changed to match the key to any newly installed elevator in the same building.

3. The fire fighter service key switch required for all elevators in a building shall be operable by the same key. There shall be a key for each switch provided. These keys shall be kept on the premises in a location readily accessible to firefighters and emergency personnel, but not where they are available to the public. This key shall be of a tubular, 7 pin, style 137 construction and shall have a bitting code of 6143521. The key shall be coded FEO-K1. The possession of the “FEO-K1” KEY SHALL BE LIMITED TO THE ELEVATOR PERSONNEL, EMERGENCY PERSONNEL AND ELEVATOR EQUIPMENT MANUFACTURES.

4. Cab lighting shall be LED down lighting, automatic off/on.

5. Light fixtures shall be metal and vandal resistant. All fixtures shall be approved by submittals. Fixtures shall be manufactured by MAD, INNOVATION, or PTL or others, but equal in all respects, with no exceptions. Texas Tech will make that determination.

6. All switches and pushbuttons shall be vandal resistant.

7. All pushbutton lamps shall be Raider Red.

8. All signage shall be engraved metal, no plastic will be permitted.

ELEVATOR PIT Design Requirements

The elevator pit should have the following standard features, but not be limited to:

1. Pits shall be required for every elevator.
2. Ladder shall extend a minimum of 48” above lowest landing access opening.
3. A minimum clearance of 4 ½” from the center of the ladder rung to the wall or nearest obstruction must be maintained.
4. Start the first rung of the pit ladder 12” AFF and maintain 12” between rungs. Rungs are to be “non-slip”.
5. Leading edge of the pit ladder shall be a maximum of 18” from access opening. Coordinate electrical and switch locations with other trades.
6. Provide a minimum of 20-foot candles of lighting on the elevator pit floor. Install a minimum of two lights. This exceeds ASME requirements. Light fixtures will be equipped with bulb/tube protection.
7. Pit light switch shall be located adjacent to the access opening within reach directly above the ladder.
8. All receptacles installed in the pit shall be GFCI type. The receptacle for the sump pump shall be a dedicated receptacle separate from the general use receptacles.
9. Elevator “Emergency Stop” switch shall be located approximately 18” above pit opening within reach range. If the pit depth is greater than 67”, an additional stop switch shall be installed and located approximately 47” above the pit floor.
10. Provide sump pumps in pits for any elevator that has Firemen’s Service. The sump pump shall be designed to discharge at a rate of 50 gpm.
11. Sumps in pits shall be covered with metal grating. The cover shall be level with the pit floor and secure.
12. Pipe sump pump discharge to the exterior of the building. The sump pump discharge

piping will be 1¼" copper or black steel pipe. The discharge line check valve will be located above the pit cover for ease of repair. The Design Professional in conjunction with the component Institution's Environmental Health and Safety Department will provide a design for the possibility of discharging hydraulic oil on hydraulically operated systems. Removal of water from the pit shall fall under the plumbing code. The piping shall terminate outside the building with a type of connection and at a height as directed by the Design Professional.

13. Do not provide a sump pump on/off switch in the elevator pit. System must be fully automatic. The sump pump is required to be provided with a set of contact points to monitor pump run status. Pumps shall have a dedicated circuit for operation. Oil detection type sump pumps will not be allowed.

14. All electrical shall be installed in liquid tight flex conduit. Wires shall be rated for "wet" locations. Flexible metallic tubing will not be allowed in the pit.

15. Sprinklers will be installed in the elevator pit in accordance with NFPA 13.

ELEVATOR LIFE / SAFETY Design Requirements

- Per NFPA 13 (8.15.5), Sidewall spray sprinklers shall be installed at the bottom of each elevator hoist way not more than 2 ft. above the floor of the pit.
- Per NFPA 13 (8.15.5.2), The sprinkler required at the bottom of the elevator hoist way by 8.15.5 shall not be required for enclosed, non-combustible elevator shafts that do not contain combustible hydraulic fluids.
- Per NFPA 13 (8.15.3), Automatic sprinklers in elevator machine rooms or at the tops of hoist ways shall be of ordinary or intermediate temperature ratings.
- Per NFPA 13 (8.15.5.4), upright, pendent, or sidewall spray sprinklers shall be installed at the top of elevator hoist ways.
- Per NFPA 13 (8.15.5.5), the sprinkler required at the top of the elevator hoist way by 8.15.5.4 shall not be required where the hoist way for passenger elevators is noncombustible and the car enclosure materials meet the requirements of ASME A17.1,

Safety Code for Elevators and Escalators.

- Smoke detectors must be installed in each elevator machine room and at every elevator landing. They must be so arranged that if activated, the elevators will go into fire fighter recall mode. Activation of the smoke detector will recall all elevators to the designated floor per the component Institution's AHJ/Fire Marshall's direction. Install a heat detector in the elevator equipment room to provide a shunt trip.

- Install a smoke detector in the elevator pit. If the sprinkler head is installed above 2 ft. of the finished pit floor, a heat detector shall also be installed to provide an elevator shunt trip.

- Heat detectors installed for shunt trip will be located within 2 ft. of the sprinkler head. Smoke and heat detectors will be monitored by the fire alarm system.

- Provide floor numbers within the hoist way in compliance with ASME 17.1 Code. All cars shall have ceiling emergency exits sized and located per ASME A17.1

- Electrical wiring shall comply with the ASME A17.1 and National Electrical Codes and all applicable local codes. Wiring shall be included for all devices installed.

Specify a final check of each elevator is required to demonstrate successful functional operation to Texas Tech, Facilities Planning and Construction and the component Institution's Elevator Maintenance personnel. This must be scheduled and performed before date of Substantial Completion to verify operation systems and devices are functioning properly.

14 42 00 Wheelchair Lifts

Comply with applicable provisions of 2012 Texas Accessibility Standards.

Comply with ASME A18.1, Safety Standard for Platform Lifts and Stairway Chairlifts, and manufacturer's written instructions for installation of lift, unless otherwise indicated.

Comply with NFPA 80 for fire-rated lifts listed and labeled by a qualified testing agency, for fire-

protection ratings, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10B.

Secure lifts to building construction; for concrete and solid masonry anchorage, use post-installed anchors; for hollow masonry anchorage, use toggle bolts; for metal stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with Rough Carpentry Work to locate backing members.

Wiring Method: Conceal conductors and cables within housings of units or building construction. Do not install conduit exposed to view in finished spaces. Bundle, lace, and route conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.

Provide pre-engineered vertical platform lift systems as follows:

- Door Operation and Clear Opening Width: Low-energy, power-operated doors that remain open for 20 seconds minimum.
- Power Supplies: Electric
- Emergency Operation: Provide manual operation and battery power system or connection to indicated standby (emergency) power to raise or lower unit to a landing in case of malfunction or power loss.
- Attendant Operation: Provide attendant call device at each landing.
- Self-Supporting Unit: Support vertical loads of unit only at base, with lateral support only at landing levels.
- Platform Enclosure and Door: Rectangular steel-tube frame with fiberglass panels, flush galvanized or aluminum floor plate; nonskid surface texture.
- Ramp: Fixed ramp matching platform to provide transition from floor to lift platform at bottom landing.
- Fold-down seat with seatbelt.
- Lighting system within lift enclosures from manufacturer's available products.
- Support to Structure: Provide framing and brackets to support vertical loads from floor or stair treads and only lateral loads from walls. Fabricate framing and brackets from steel rectangular tubing, plates, shapes, and bars.
- Verify that installed lift will have a minimum headroom of 80 inches above any point on

platform floor at any point of travel.

Quality Assurance:

- Acceptance Testing: On completion of lift installation and before permitting use of lifts, perform acceptance tests as required and recommended by ASME A18.1 and Authorities Having Jurisdiction.
- Operating Test: In addition to acceptance testing, load lifts to rated capacity and operate continuously for 30 minutes between lowest and highest landings served. Readjust stops, signal equipment, and other devices for accurate stopping and operation of system.
- Advise Owner, Architect, and Authorities Having Jurisdiction in advance of dates and times tests are to be performed on lifts.
- Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of lift Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper lift operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
- Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lifts. Include a review of emergency systems and emergency procedures to be followed at time of operational failure and other building emergencies.
- Check operation of lifts with Owner's personnel present and before date of Substantial Completion. Determine operating systems and devices are functioning properly.
- Check operation of lifts with Owner's personnel present not more than one month before end of warranty period. Determine operating systems and devices are functioning properly.