

## SECTION 14 20 00 - ELEVATORS

### PART 1 - GENERAL

- 1.1 The following guidelines establish standards for the University of Colorado Denver | Anschutz Campus elevator designs. These are to be used as guidelines as to the selection of number, type and speed of elevators. Final design should be based upon calculations that support the performance criteria within this section.
- 1.2 DESIGN REQUIREMENTS
  - A. Elevator Cab Numbering: Refer to Part 1.6, C
- 1.3 PERFORMANCE CRITERIA
  - A. Elevator calculations will be completed based upon a traditional two button dispatching system over a peak five minute two-way traffic calculation. At a minimum the system design performance will meet the following criteria:
    1. Average Interval: 35 seconds
    2. Handling Capacity: 14% of building population
    3. Maximum 80% platform utilization
- 1.4 CIRCULATION PLANNING
  - A. Coordinate elevator performance analysis with the following circulation requirements:
    1. Public elevators will be located in direct walking path that is visible from public entries to the building. Elevators will be located near or adjacent public circulation stairs. Elevator lobbies will be designed to meet fire protection standards.
    2. Service elevators will be located to facilitate building function. Projects with more than four floors, dedicated laboratory spaces and/or kitchen facilities will have a separate service elevator(s).
- 1.5 SYSTEM MINIMUM REQUIREMENTS
  - A. Elevator Type, Quantity and Configuration:
    1. Design Requirements
      - a. Provide a hydraulic elevator for up to four landings, minimum speed of 125 fpm, maximum speed of 150 fpm. Speed will not vary by more than 10%.
      - b. Provide machine room less or geared elevators for up to fifteen landings, minimum speed of 200 fpm, maximum speed of 450 fpm. Speed will not vary by more than 3%.
      - c. Provide gearless elevators above fifteen landings, minimum speed of 500 fpm. Speed will not vary by more than 3%.
      - d. Final selection will be based upon compliance to the performance criteria, as well as maintainability and service for the life of the building.
      - e. Machine-room-less elevators can only be used if diagnostic equipment stipulated below will be provided to the University.
      - f. Provide a second elevator where feasible to be used in cases of maintenance and unscheduled service outages.
    2. Performance times below will be utilized for analysis and specifications.
      - a. Hydraulic
      - b. Floor to Floor performance times: (based on 12'-0" floor height)

Speed (fpm)	Center Opening* 3'-6" wide x 7'-0" tall	Side Opening* 3'-6" wide x 7'-0" tall
125	13.0 sec	15.5 sec
150	12.5 sec	14.5 sec
*adjust .5 seconds for each 6" of door width, height and 1'-0" of travel		

c. Traction

1) Floor to Floor performance time: (based on 12'-0" floor height)

Speed (fpm)	Center Opening* 3'-6" wide x 7'-0" tall	Side Opening* 3'-6" wide x 7'-0" tall
350	9.1 sec	11.1 sec
500 (and up)	8.0 sec	10.0 sec
*adjust .5 seconds for each 6" of door width, height and 1'-0" of travel		

3. Door Times

- a. Door times will be based upon high speed, heavy duty door closed loop operation. Pre-opening will not be used in the analysis or specification.

4. Quantity

- a. Provide a minimum of one passenger elevator for every four floors.
- b. Provide a minimum of one service elevator if more than four floors. Service elevator may be grouped with passenger elevator unless there are dedicated laboratory spaces and/or kitchen facilities.

5. Passenger Elevators

- a. Minimum capacity of 2,500 lbs.
- b. Minimum platform size of 7'-0" wide by 5'-0" deep with a cab interior of 6'-8" wide x 4'-3" deep.
- c. Minimum door size of 3'-6" wide by 7'-0" high

6. Service Elevators

- a. Minimum capacity of 4,000 lbs.
- b. Minimum platform size of 6'-0" wide by 8'-4" deep with a cab interior of 5'-8" wide by 7'-5" deep (front opening only).
- c. Minimum door size of 4'-0" wide by 7'-0" high, two speed side opening entrance.

B. Control Systems:

1. Provide simplex operation for one car, duplex operation for two cars and group operation for more than two car systems.
2. Include swing car operation when service elevator is included in duplex or group operation.

C. Codes:

1. Elevators will comply with the prevailing ASME A17.1 code as well as the Americans with Disability Act.
2. At least one elevator will comply with building code stretcher accessibility requirements.

1.6 SUBMITTALS

A. Product Approval

1. Include machine room, hoistway, cab and fixture layouts engineered specifically for the project.

B. Product Documentation:

1. Include project specific Operating and Maintenance Manuals as well as Wiring Diagrams submitted in both hard copy and on USB drive.
2. Include recommended inspection, preventative maintenance, lubrication and adjustment schedules and instructions, identification of and sources for any special or unusual tools or materials, a list and specifications for each recommended lubricant and where, when and how each is to be used

and any other information appropriate for operation, inspection, service and maintenance for optimum performance.

C. Minimum Turnover Documents

1. Records: All Product Documentation, completed punch list, inspection and correction records, manufacturer's or Installer's standard operation and maintenance manual, according to ASME A17.1/CSA B4 including diagnostic and repair information available to manufacturer's and Installer's maintenance personnel. Acceptance inspection will be by an inspector Certified as meeting the requirements of ASME QEI-1 as required by ANSI/ASME A17.1.
2. Necessary maintenance documentation, including as-built wiring diagrams, shall be properly stored and posted in location identified by University. Prior to final acceptance the University shall receive the following:
  - a. Four (4) each Operating, Maintenance Manuals, Repair Manuals and Adjusters Manuals
  - b. Four (4) sets of as-built wiring diagrams
  - c. Four (4) sets of parts catalogs
  - d. A thumb drive containing all of the necessary turnover documents
  - e. Ten (10) sets of service keys
  - f. Diagnostic Test Equipment with Instructions: Necessary diagnostic test devices full capability adjuster's tool with complete documentation and supporting information for effective use of and interpretation of data, troubleshooting, adjustment and repair of the systems.

1.7 WARRANTY AND MAINTENANCE

- A. Warranty: Warrant equipment material and workmanship for one year from date of acceptance of substantial completion.
- B. Specifications shall include a preventative maintenance schedule consistent with the warranty period.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Control System

1. Maintainable control with common features such as Independent Service, Fire Fighters Service, and Emergency Power Operation.
2. Provide a Smartrise Inc. microprocessor-based controller installation that is able to be maintained by any licensed elevator maintenance company without the need to purchase or lease diagnostic devices or special tools or software from the original equipment manufacturer.
  - a. Controller shall include diagnostic capability to monitor, store and recall elevator malfunctions. Controller or provided diagnostic tool shall have the ability to complete all code mandated tests. Controller shall have on-board, or provided diagnostic tool, shall enable field programmable features such as adjustable door times and other industry standard and appropriate features and adjustments. Controller or provided diagnostic tool shall retain system errors and trouble codes for use in diagnosing trouble calls.
  - b. Manufacturers of elevator control systems may provide their own controllers as long as they include full diagnostic tools over the lifetime of the building without restrictions, recalibrations, or lease agreements.
3. Provide security interface with building security system. Access shall be dictated by building security access; elevator contractor shall provide necessary interfaces for access and tracking of floor(s) selected. Interface shall be provided via serial interface link.

B. Cab Design

1. Cabs will be constructed of a steel shell with removable interior panels with a finish selected by the architects.
2. Cab fronts and doors will be, at a minimum, brushed stainless steel.

3. Cab ceiling will be, at a minimum, a drop ceiling finished in brushed stainless steel with LED lamps.
  4. Cab lights and fan will shut off after demand extends beyond five minutes.
- C. Fixtures
1. Provide vandal-resistant buttons, indicators and panels. Provide LED indicator lights with a long life and ease of maintenance design.
  2. Include one car operation panel adjacent each opening and one hall push button station per floor for every two passenger elevators.
  3. Provide hall lanterns on all passenger elevators.
  4. Provide car direction signs for all single service elevators, hall lanterns for groups of service elevators.
  5. Car operating fixture shall include a field programmable, hands free, two-way communication device. Device shall be isolated from high voltage to eliminate noise on the line. Call out initiation shall be by push button only. Device shall not activate cab alarm bell.
  6. All fixture key switches shall meet the campus standards.
    - a. Provide small format (7pin) interchangeable cores.
    - b. Key all elevators alike. Coordinate with the University Facility Operations requirements.
  7. Provide one riser of hall push button stations per two elevators. Stations shall be flush mounted faceplates, with illuminating pushbuttons for each direction of travel which illuminate to indicate call registration. Include approved engraved message and pictorial representation prohibiting use of elevator during fire or other emergency situation as part of faceplate. Pushbutton design shall match car operating panel pushbuttons.
- D. Door Operators:
1. Design Requirements
    - a. Closed-loop, high speed, heavy-duty master door operator type with a minimum of ½ horsepower motor. Operator will include on-board diagnostics and be capable of adjustable door times.
- E. Car Guides
1. Provide slide guides for speeds less than 150 fpm or for heavy duty freight applications. Otherwise provide roller guides.
- F. Car and Hoistway Entrance Finishes
1. Minimum of baked enamel or brushed stainless steel as selected by the architect. Car and hoistway doors shall match.
- G. Hydraulic Elevator:
1. Machine Room and Equipment
    - a. Locate machine room at the lowest hoistway level directly adjacent to or as near as possible to the hoistway.
    - b. Pump unit shall be a submersible pump with an electronic hydraulic valve.
    - c. All associated piping and components shall be isolated to minimize transfer of noise to the building.
    - d. Any hydraulic cylinder holes shall be cased with steel as required to maintain the hole. The cylinder will be protected with a PVC casing filled with Union-Gard.
- H. Traction Elevator:
1. Machine Room and Equipment
    - a. Locate machine within the hoistway, room directly above the top of the hoistway or adjacent at the bottom of the hoistway.
    - b. The machine either be a permanent motor permanent magnet machine or a worm gear traction machine with an AC VVVF motor control.
- I. Hoistway and Pit Equipment:

- a. Necessary mechanical equipment for operation of the elevator. The equipment will be installed according to manufacturer's recommendations and properly field painted before acceptance.
- J. Emergency Operation
  - 1. Provide battery lowering for hydraulic elevators or single car operation on the emergency generator for traction elevators. Coordinate the necessity of a pre-transfer signal from the emergency generator to indicate power supply is changing from normal to emergency power, and back again. Signal shall provide a 20 second delay before the power source is changed.
- K. Pit moisture/water sensor located approximately one foot above the pit floor to be provided. Once activated, elevator will perform "flooded pit operation," which will run the car up to the designated floor, cycle the doors, and shut down and trip the circuit breaker shunt to remove three-phase power from all equipment, including pit equipment.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Installation Requirements
  - 1. Installation shall be completely coordinated between contractors without The University's representatives' involvement.
  - 2. Installation shall be completed via manufacturer's installation procedures.
  - 3. Elevator machine room, hoistway and pit shall be painted prior to turnover to the University.
  - 4. All equipment shall be properly cleaned after temporary construction use.

#### 3.2 FIELD QUALITY CONTROL

- A. Provide complete installation, testing and appropriate inspections and reports by trained and experienced professionals.
- B. Repair or replace parts and/or materials that fail as a result of any testing.
- C. Necessary maintenance documentation, including as-built wiring diagrams, shall be properly stored and posted in the machine room. Prior to final acceptance the University will receive the following:
  - 1. Four Operating and Maintenance Manuals
  - 2. Four sets of as-built wiring diagrams
  - 3. Four sets of parts catalogs
  - 4. A USB drive containing all of the necessary turnover documents
  - 5. Ten sets of keys
- D. Provide coordination with and guarantee timetable and completion and acceptance dates to the University, with penalties as provided in the contract.

#### 3.3 TEMPORARY USE

- A. Temporary use of the elevator(s) will be permitted as an arrangement between contractor(s). The University shall receive a final installation that is fully warranted, free of defects and in compliance with the specifications.

**END OF SECTION 14 20 00**