

102.115 – ELEVATOR DESIGN GUIDELINE

PART 1 - INTRODUCTION

1.01 OVERVIEW

- A. The guideline shall be used in conjunction with the requirements for the standards by building type when designing and specifying elevator systems and components BJC HealthCare projects.
 - 1. Hospital Standard: Chapter 2, Document 203.401
 - 2. Ambulatory Care Standard: Chapter 3, Document 303.401
 - 3. Medical Office Standard: Chapter 4, Document 403.401
 - 4. Office Standard: Chapter 5, Document 503.401
 - 5. Parking Structure Standard: Chapter 6, Document 603.401
- B. Elevators shall be provided in every building with more than one occupied floor level. No fewer than 2 elevator cabs shall be provided.

1.02 ELEVATOR CATEGORIES BY USE

- A. There are four categories of elevators that are included in this guideline and referenced in the standards.
 - 1. PASSENGER, GENERAL/PUBLIC USE. Passenger type elevators that are non-restricted use. These elevators are intended for public use and are generally not restricted, however access to some floor levels may need to be controlled. These elevators should be located in high visibility locations near the entrance lobby and at main corridor intersections. Elevators should be located within a 200 foot walk in any direction on every floor within the building. Consider locating a stair near general/public use elevator core.
 - 2. PASSENGER, STAFF/CLINICAL USE. Intended for use exclusively by clinical staff and for patient transport. Restricted use of elevators by authorized personnel. These are intended for the movement of patients and medical equipment by clinical staff and as such must be readily available and must be able to accommodate the size and weight of items being transported. Location of these elevators shall support the clinical operations.
 - 3. SERVICE, SUPPLY. Service/Supply types include elevators for transporting clean equipment and supplies to floors for use and for transporting dirty equipment and soiled materials for processing. Items are typically transported on carts. Service/Supply elevators are restricted access and a minimum of 2 elevators shall be provided, dedicated clean and dirty use.

4. **SERVICE, FREIGHT.** Intended for use by staff only to move large equipment, materials and supplies. Some hospitals may employ a dedicated clean and dedicated dirty freight elevator system, coordinate with Facility Engineering.

Table. Requirements for specific use elevators by building type.

	Hospital	Ambulatory Care	Medical Office	Office	Parking Structure
Passenger, General/Public Use	required	required	required	required	required
Passenger, Staff/Clinical Use	required	Typically not required, coordinate requirements with building function and layout.	not required	not required	not required
Service, Supply	required	Typically not required, coordinate requirements with building function and layout	not required	not required	not required
Service, Freight	required	Typically not required, coordinate requirements with building function and layout. Requirements for a freight elevator depend on the building layout, project requirements, and location of shipping and receiving relative to the destination of materials. When required, Service Freight elevator may serve as a Passenger General/Public Use elevator, unless otherwise directed.			not required

1.03 TYPES OF ELEVATORS

- A. Two basic types of elevators are Hydraulic and Traction types. Each type should be considered relative to the project requirements.
- B. Hydraulic Elevators. Hydraulic elevators operate on the principle of fluid-driven pistons within a cylinder to raise and lower an elevator cab. These hydraulic types operate at slower speeds than traction types, typically around 150 feet per minute (fpm). Capacity of passenger elevators range from 2,000 to 4,000 pounds and freight elevators range from 4,500 to 5,000 pounds. Because the cylinder length directly relates to the height of travel, the hydraulic types are best suited for low to mid rise applications. The three basic types of hydraulic elevators are holeless, holed, and roped.
 1. Holeless Hydraulic. Cylinder is above ground (no drilling/coring) and there are different types of holeless hydraulic elevators.
 - a. Single Stage cylinder type. Limited to two stops (one story travel), uses one or more single-stage cylinders to lift the car from the top. Cylinder placement shall be beside and not beneath the elevator cab.

Table. Comparison of hydraulic and traction elevator types.

	Overall Advantages	Overall Disadvantages	Specific Types		Approximate Travel Distance			
					height	low rise	mid rise	high rise
Hydraulic	1. Initial cost 2. Hoistway size 3. Lifting capacity	1. Operating cost/regular maintenance 2. Speed (up to 150 fpm) 3. Ride quality	Holeless	Single stage	5'-15'	X		
				2-Stage (telescoping)	5'-30'	X		
				3-Stage (telescoping)	5'-45'	X	X	
			Holed		15'-60'	X	X	
			Rope		15'-60'	X	X	
Electric Traction	1. Speed (up to 450 fpm) 2. Ride quality 3. Operating cost	1. Initial cost 2. Machine Room (except MRL) 3. Hoistway size	Machine Room-Less Traction		5'-250'	X	X	X
			Geared Traction		55'-300'		X	X
			Gearless Traction		100'-500'+			X

PART 2 - GUIDELINE

2.01 GENERAL

- A. Unless otherwise directed, BJC HealthCare will retain elevator consulting services to assist with the development of elevator scope of work for all projects. This includes renovations to elevator cab finishes, elevator control upgrades, and complete elevator systems for new buildings. Architect and Engineer shall coordinate project requirements and overall design with elevator requirements.
- B. Development of elevator design shall include Owner bidding and procurement to establish elevator basis-of-design requirements in a competitive manner. The Architect and Engineer shall participate in this effort and coordinate design.
 - 1. Dimensions and tolerances among elevator manufacturers vary. Early determination of the elevator basis-of-design (manufacturer and model) will provide the architects and engineers with the information needed to accommodate the specific elevator requirements.
- C. The following table identifies the permitted and conditionally permitted elevator types with respect to the specific elevator function within a building. BJC Director of Design, Director of Construction, Corporate Architect and Corporate Engineer shall review and approve proposed elevator type for every project. For purposes of this guideline, the following travel distances are defined as follows:
 - 1. Low rise elevator length of travel: up to 35'-0”.

2. Mid rise elevator length of travel: 35'-0" to 100'-0"
3. High rise elevator length of travel: 100'-0" and up

Table. General elevator type by building, height, and use.

			Hydraulic Type				Electric Traction Type			
			Holeless			Holed	Rope	Machine Room-Less Traction	Geared	Gearless
			Single Stage	2 Stage	3 Stage					
Hospital	Passenger - General/Public Use	low rise	CP	P	P	CP	CP	CP	NP	NP
		mid rise	NP	CP	CP	CP	CP	P	CP	NP
		high rise	NP	NP	NP	NP	NP	P	CP	NP
	Passenger - Staff/Clinical Use	low rise	CP	CP	CP	CP	CP	P	NP	NP
		mid rise	NP	CP	CP	CP	CP	P	P	NP
		high rise	NP	NP	NP	NP	NP	P	P	NP
	Service/Freight	low rise	CP	P	P	CP	CP	P	NP	NP
		mid rise	NP	P	P	CP	CP	P	CP	NP
		high rise	NP	NP	NP	NP	NP	P	CP	NP
Ambulatory Care	Passenger - General/Public Use	low rise	CP	P	CP	CP	CP	CP	NP	NP
		mid rise	NP	CP	P	CP	CP	P	CP	NP
		high rise	NP	NP	NP	NP	NP	P	CP	NP
Medical Office	Passenger - General/Public Use	low rise	P	P	CP	CP	CP	CP	NP	NP
		mid rise	NP	CP	P	CP	CP	P	CP	NP
		high rise	NP	NP	NP	NP	NP	P	CP	NP
Office	Passenger - General/Public Use	low rise	P	P	CP	CP	CP	CP	NP	NP
		mid rise	NP	CP	P	CP	CP	P	CP	NP
		high rise	NP	NP	NP	NP	NP	P	CP	NP
Parking Structure	Passenger - General/Public Use	low rise	P	P	CP	CP	CP	CP	NP	NP
		mid rise	NP	CP	P	CP	CP	P	CP	NP
		high rise	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

- D. Coordinate elevators with entity specific standards, existing conditions, service and maintenance agreements, and project requirements.

PART 3 - DOCUMENTATION

3.01 GENERAL

- A. Elevator Report. Unless otherwise directed, Owner will engage an elevator consultant to assist in the development of a report to support the basis-of-design requirements for the elevator components of the project. This report shall be prepared for all projects where elevator work will be required. This includes

projects with new elevator systems and renovations or upgrades to existing elevator systems and components. The Architect and Engineer shall participate in the discussions for the development of the elevator requirements and shall coordinate their work with the basis-of-design elevator requirements.

1. For new elevator systems, the elevator report shall include rationale for selection of the elevator type (hydraulic/traction) based on project requirements. A traffic study shall also be included in the report. Consideration shall be given for the number of stops, vertical rise, quantity, speed, operating controls, finishes, location/grouping, capacity, initial cost, life cycle costs, and other critical factors as necessary. Owner shall provide projected passenger volumes, passenger physical limitations, equipment information (sizes/weight), material handling requirements, and other information as necessary for the determination of the requirements.
 2. For renovations, upgrades and additions to existing elevator systems, elevator consultant shall field verify the existing systems, examine as-built documents and other available information, analyze performance and maintenance history, and review of any existing code deficiencies. All areas associated with the existing elevator system shall be reviewed, including but not limited to the hoistway, elevator pit, machine room (if applicable), and associated areas. Review shall also include structural analysis, capacity of existing utilities, and utility routing and connection. This information shall be included in the elevator report.
- B. Interior Cab Finishes. Provide finish samples for elevator cab flooring, walls, and ceilings for initial selection and samples for final approval to BJC Design Project Manager and Director of Design.
- C. Maintenance and Instruction Materials.
1. BJC must receive 3 (three) complete sets of all electrical schematics, including printed circuit boards, mechanical drawings, service manuals, and diagnostic/service tools that are available to elevator manufacturer's installers and service personnel. These shall include all control wiring, shall show all solid-state circuits, and shall identify all electric and electronic components as originally installed including all field adjuster notes. The name of the manufacturer and the manufacturer's catalog number shall be provided for all components not manufactured by the elevator installer.
 2. A complete parts list, recommended lubricants and a recommended spare parts list shall also be provided to the Owner.
 3. All required drawings, manuals and parts lists shall be provided to BJC before final payment is made to the Contractor.
 4. Furnish one (1) complete set of all diagnostic tools, equipment, and documentation required for the complete maintenance of all aspects of the control and dispatch, including a "mechanic's" service tool. Any diagnostic system shall be an integral part of the controller and provide user-friendly

interaction between the serviceman and the controls. The Documentation shall include a description of component function, a hard copy of all as-built schematics, a hard copy set of source codes utilized in developing any control software, and an electronic copy of all source codes utilized. Any and all such systems shall be free from secret codes and decaying circuits that must be periodically reprogrammed by the manufacturer.

5. Drawings are to be laminated both sides for protection. Prints to be hole punched and bound with metal two metal rings in flip chart fashion. Provide a metal cabinet to store the as built drawings in the elevator machine room.

PART 4 - SUPPORTING INFORMATION

4.01 GENERAL

- A. For information on elevator traffic analysis, see the *Architect's Handbook of Formulas, Tables, & Mathematical Calculations*, by David Ballast, or *The Vertical Transportation Handbook*, edited by George R. Strakosch.
- B. Standards for Physically Disabled: Except as otherwise indicated, comply with NEII "Suggested Minimum Passenger Elevator Requirements for the Handicapped", and The American with Disabilities Act, "Accessibility Guidelines".
- C. Coordinate with entity specific standards regarding acceptable systems and manufacturers. Subject to compliance with requirements, provide elevators by one of the following manufacturers.
 1. Kone Inc.
 2. Otis Elevator Company
 3. Schindler Elevator Corporation
 4. ThyssenKrupp Elevator

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