

CHAPTER 7

CONVEYING SYSTEMS



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I. DESIGN INTENT

I.A PURPOSE

Provision of mechanical conveying systems ensures accessibility to TRI-RAIL facilities for passengers with special needs, and enhances convenience for all customers.

The purpose of this Chapter is to delineate guidelines for the design and use of elevator and escalator systems at stations.

I.B GENERAL CONSIDERATIONS

Elevators, in conjunction with overpasses, provide a safe, convenient, fully-accessible route between platforms located on opposite sides of the tracks. Therefore, at least one elevator shall be provided at each platform connected by a pedestrian overpass.

Escalators provide an efficient means for rapid movement of large numbers of people between various levels of facilities, such as platforms and overpasses. However, current ridership levels and projections for future growth do not justify installation of escalators at TRI-RAIL stations, except in certain cases.

Regardless of the type(s) of conveying system selected, the following criteria should be considered during design.

I.B.1 Location

Elevators or escalators should be located in a manner which optimizes their use while minimizing impacts to pedestrian traffic; generally, immediately adjacent to, but not encroaching upon, normal pedestrian circulation paths; and in reasonably close proximity to station entrances, walkways to/from parking areas, and TVM enclosures,

as well as station buildings, rest rooms, and concession areas, where such amenities are provided.

I.B.2 Compliance

Elevators and escalators shall be fully ADA-compliant, of robust design and construction. Structural, mechanical and electrical features shall meet or exceed the requirements of applicable codes, standards, and regulations.

I.B.3 Aesthetics

Elevators and escalators should contribute to the architectural enhancement of stations and other facilities. Where used in conjunction with overpasses, elevators and escalators shall be integral to the design of the overpass.

I.B.4 Support Facilities

Machinery rooms, pits, and other service spaces shall be designed with security and vandal resistance in mind, and shall be located in such a manner that access to such spaces is positively separated from normal pedestrian traffic.

II. ELEVATORS

II.A GENERAL

All elevator construction, including shafts, pits, cabs, doorways, and vestibules, shall be in accordance with applicable codes, regulations, and standards.

Elevator cabs, doorways, vestibules, fixtures, and controls shall be ADA compliant.

II.A.1 Location and Clearances

Elevator shafts shall be located no closer than 8'- 0" from the edge of any platform. Shafts shall be oriented so that elevator doors do not face the platform edge.

A minimum clearance of 5'- 0" shall be provided at any side of an elevator shaft where pedestrian circulation is allowed.

II.A.2 Construction

Elevator cabs and shafts shall be provided with glazed panes of sufficient size to preclude use of the cab as a "hiding place". Shaft enclosures shall be architecturally compatible with the station architecture; where used in conjunction with an overpass, the shaft design shall be integral with the overpass structure.

II.A.3 Ancillary Spaces

The design of pits, machine rooms, and similar spaces shall accommodate all required machinery and control equipment, and facilitate access for inspection and maintenance. No equipment unrelated to the elevator system shall be located within such spaces.

II.B EQUIPMENT, MATERIALS AND PERFORMANCE

II.B.1 General

Elevators shall be designed for heavy-duty commercial use, with equipment selected to accommodate "crush load" crowding.

Elevator operation shall be fully automatic, available 24 hours per day, unless manually controlled by key switch during non-operating hours.

Elevators shall have three glass wall panels: one on each of the three walls other than the entry wall. Elevator size and configuration shall accommodate a rolling emergency stretcher.

II.B.2 Hydraulic Equipment

Elevators that are a hydraulic piston-driven shall be designed as follows:

- i. Compound acting hydraulic cylinders shall be utilized to minimize necessary cylinder casing depth. The use of "holeless" cylinders may be considered.
- ii. Drive system equipment shall utilize non-combustible hydraulic fluid.
- iii. Hydraulic fluid reservoirs shall be equipped with electric strip heaters, with enough capacity to prevent congealing of fluid in cold weather.
- iv. Machine rooms shall be equipped with thermostatically-controlled exhaust fans. Fans shall automatically shut down upon activation of smoke detectors.

II.B.3 Machine Room Less (MRL)

Elevators that are MRL's shall be designed as follows:

- i. All controllers shall be non-proprietary
- ii. Gearless, machine room less traction elevators with stops in all elevators at all levels.

- iii. Elevator passenger cabs and controller closets shall be air-conditioned spaces.
- iv. Use stainless steel frames and doors at all lobbies to minimize vandalism. Interior finishes shall include stainless steel walls, hard ceiling with recessed vandal-resistant lighting, and rubber flooring.
- v. The use of wire strand systems, for elevator support is permitted; belts containing wire or Kevlar rope systems shall not be allowed.
- vi. Trailing cables must have capabilities of telephone, security, audio, and CCTV.
- vii. Coordinate call buttons with floor identification.

II.B.4 Materials

Durable, readily available, fire and vandal resistant, as follows:

- i. **Structural members:** Galvanized steel, epoxy prime-coated; finish-painted with polyurethane top coat if not concealed by other construction.
- ii. **Door & window frames, hoistway doors:** Stainless steel, Type 304 or higher, with brushed satin finish.
- iii. **Hoistway thresholds:** Bronze or nickel silver, with rough-cast finish on walking surfaces.

II.B.5 Performance

- i. **Design Payload:** 3000 lb., minimum
- ii. **Ascending Speed:** 3 ft./sec., minimum with design payload; with adjustable control.

II.C ELEVATOR CABS

II.C.1 Materials

Structural steel framing, with stainless steel finish surfaces (Type 304 or higher).

II.C.2 Layout

Elevator cabs shall be designed to accommodate stretchers, wheelchairs, baby strollers, and the like without having to turn 360°.

The cab interior dimensions shall be sized to accommodate the 360° turning of a wheelchair with helper.

II.C.3 Flooring

Resilient, fire and chemical resistant finish floor over marine plywood subfloor.

II.C.4 Lighting

Compact fluorescent or HID, minimum 4 fixtures per cab, recess-mounted, with vandal-resistant lens. Fixtures shall have integral, battery-powered emergency lighting provisions. Minimum general lighting level shall be 20 footcandles at the floor.

II.C.5 Control Panel

Seamless, touch-sensor operated audio-visual control panel, with labels and instructions in English and in Braille. Panel mounting height shall be suitable for use by wheelchair users. Key-operated firefighter override controls shall be included.



FIGURE 7.1
TYPICAL MRL
ELEVATOR

II.D ELEVATOR CONTROLS

Elevators shall be fitted with tactile Braille call buttons, raised and audible as well as visible annunciation systems to indicate the direction and floor position of the elevator car. All user

controlled lift functions shall be accessible and readily available to those in need.

II.E EXTERIOR FIXTURES AND ACCESSORIES

II.E.1 General

Fixtures and accessories shall be heavy duty, vandal-resistant, fabricated from stainless steel, polycarbonate, and similar materials. Fasteners shall be concealed where possible, and vandal-resistant where exposed.

II.E.2 Call buttons

Seamless, touch-sensor type having no moving parts; wall-mounted, with center of button 42" above finish floor.

Emergency telephone components, including speaker and microphone, shall be concealed behind a stainless steel panel. The only visible component of the device shall be the "PTT" (push-to-talk) button used to initiate the emergency communication

Instructions for operating the emergency telephone shall be posted in both English and Braille.

II.F.2 Recall System

Each elevator shall be equipped with a recall system, which will return the cab to platform and open the doors upon activation of an "elevator equipment emergency" circuit. Doors shall remain open until the cause of

TABLE 7.1 General Planning Dimensions	
Elements	Dimensions
Car Internal Dimensions (W x D x H)	5'- 0" x 8'- 0" x 7'- 0" (minimum)
Landing Width at Car Door	4'- 8" (minimum)
Elevator Well: W x D	7'- 0" x 11'- 0" (approx. minimum)
Elevator Well Headroom from Car	14'- 0" (minimum)
Pit Depth	6'- 0" (minimum)
Machine Room Clearances (L x W x H)	8'- 0" x 10'- 0" x 7'- 0"
Handrail Diameter	2"
Handrail Height above Floor	34"
Handrail Length along Car Side Walls	To within 6" of Car Corners
Elevator Capacity	Based on Required Area

II.E.3 Hall/Car Lanterns

Audible/visible type; wall-mounted, with centerline min. 72" above finish floor.

II.F COMMUNICATION AND SAFETY SYSTEMS

II.F.1 Telephone

Each elevator cab shall be provided with an emergency telephone for communication as per TRI-RAIL’s maintenance contractor.

the emergency is diagnosed and corrected.

II.F.3 Local Alarm

Audio-visual, consisting of a horn and strobe light, located to facilitate recognition by station personnel and local emergency service providers.

II.F.4 Critical Passenger Elevator Dimensions

Please refer to **Table 7.1** for dimensions for planning purposes. All dimensions shall be

adjusted to suit the actual sizes of equipment selected.

II.G MONITORING SYSTEM

Submit operation and maintenance manuals for each type of elevator. Include full maintenance and operating instructions, parts lists, recommended spare parts and emergency parts inventory, sources of purchase, and similar information. Manuals must also include functions of signals, door devices, and emergency operations.

III. ESCALATORS

III.A DESIGN GUIDELINES

Escalator construction and installation shall be in accordance with applicable codes, regulations, and standards.

Escalator equipment and controls shall be ADA-compliant.

III.A.1 Location and Clearances

Escalator equipment shall be located no closer than 8'-0" from the edge of any platform. Escalators serving platforms shall be oriented parallel to tracks, so that passengers alighting on escalator landings do not face the platform edge.

Minimum clearance of 9'-0" shall be provided at escalator landings, measured from the tip of the balustrade to the nearest obstruction. Please refer to **Figure 7.2** for Escalator Location and Clearances.

FIGURE 7.2 ESCALATOR LOCATION AND CLEARANCES



(NEED DIMENSIONS)

III.A.2 Construction

- i. Escalators shall be provided with canopies and glazed fenestration for passenger protection from surrounding elements. Such treatments shall be architecturally compatible with the station architecture; where used in conjunction with an overpass, the escalator design shall be integral with the overpass structure.
- ii. **Incline Angle:** 30° from horizontal.
- iii. **Ancillary Spaces:** The design of pits, machine rooms, and similar spaces shall accommodate all required machinery and control equipment, as well as facilitate access for inspection and maintenance. No equipment unrelated to the escalator system shall be located within such spaces.

III.B EQUIPMENT, MATERIALS AND PERFORMANCE

III.B.1 General

Escalators shall be designed for heavy-duty commercial use, with equipment selected to accommodate "crush" loading.

Escalator operation shall be fully automatic, reversible, and available 24 hours per day.

III.B.2 Equipment

Escalators shall be of electric gear-driven design, as follows:

- i. Drive lubrication system shall utilize non-combustible synthetic lubricants.
- ii. Lubricant reservoirs shall be equipped with thermostatically-controlled electric strip heaters, with capacity able to maintain lubricant temperature at 70°F±.
- iii. Machine spaces shall be equipped with thermostatically-controlled exhaust fans.

Fans shall automatically shut down upon activation of smoke detectors.

III.B.3 Materials

Durable, readily available, fire and vandal resistant, as follows:

- i. **Structural members:** Galvanized steel, epoxy prime-coated.
- ii. **Balustrades & Undersides:** Stainless steel, Type 304 or higher, with brushed satin finish. Porcelain enamel finish panels may be used on external surfaces not exposed to pedestrian traffic.
- iii. **Thresholds:** Stainless steel or nickel silver, with rough-cast finish on walking surfaces.
- iv. **Combplates:** Yellow, colorfast composite material, conforming to the requirements of Rule 802.6b of ANSI A17.1.

III.B.4 Performance

Escalators shall be designed for an operating speed range of 90-120 ft/minute, adjustable, under load conditions equivalent to 120 lbs. placed on the center of each exposed step.

III.B.5 Controls

- i. Key-operated switches to stop and start each escalator shall be provided at top and bottom of balustrades, and at the central control panel.
- ii. Pushbutton emergency stop switches shall be provided at top and bottom of balustrades.
- iii. Each escalator controller shall include provision for "maintenance" operation at a speed of 10 ft/minute in either direction; such control provision shall be accessible from both top and bottom landings.

IV. NON-PROPRIETARY EQUIPMENT

SFRTA encourages the use of non-proprietary equipment to improve service and maintenance of systemwide equipment. Where feasible the service and maintenance guidelines described below shall be followed.

IV.A DIAGNOSTIC TOOLS AND PARTS

All diagnostics shall be provided onboard.

IV.A.1 Service Tool

No service tool shall be required for equipment installation, adjustment, maintenance or troubleshooting.

IV.A.2 Parts

Spare or replacement parts shall be available at published prices to anyone without restriction.

IV.B TECHNICAL SUPPORT

IV.B.1 Training

Regularly scheduled technical training classes shall be available at reasonable cost to anyone without restriction.

IV.B.2 Telephone Support

Telephone hotline support shall be available from trained, experienced technicians.

IV.B.3 Field Support

Field engineering support shall be available at the customer's location by prior arrangement at reasonable cost.

IV.B.4 Documentation

All installation, adjustment, maintenance and troubleshooting manuals and documents required for proper equipment

operation shall be provided with equipment at time of delivery.

IV.C PROPRIETARY EQUIPMENT

In cases where equipment provided is proprietary, the following is required at a minimum:

- a. access to purchase parts after construction
- b. wiring diagrams/drawings, and
- c. source software

A statement that guarantees no service tools is needed, or that tools and software for a laptop are to be provided by the manufacturer, with guaranteed updates for life of equipment is preferred.

V. GREEN DESIGN

The following LEED prerequisites and credits apply to this Chapter. These criteria shall be implemented on each project as applicable, and as far as the budget allows. Criteria to meet each prerequisite and credit shall be in accordance to the latest version of LEED New Construction and Major Renovations.

V.A SUSTAINABLE SITES (SS)

V.A.1 SS Credit 8: Light Pollution Reduction

The intent of this credit is to minimize light trespass from the building and site.

V.B INDOOR ENVIRONMENTAL QUALITY (IEQ)

VII.B.1 IEQ Credit 6.1: Controllability of Systems - Lighting

The intent of this credit is to provide a high level of lighting, which can be individually controlled to promote comfort and well being.

V.C ENERGY & ATMOSPHERE (EA)

V.C.1 EA Credit 1: Optimize Energy Performance

The intent of this credit is to increase energy efficiency performance.

V.C.2 EA Credit 2: On-site Renewable Energy

The intent of this credit is to encourage use of renewable sources of energy for consumption of the stations and ancillary structures.

V.C.3 EA Credit 2: On-site Renewable Energy

The intent of this credit is to encourage use of renewable sources of energy for consumption of the stations and ancillary structures.

V.C.4 EA Credit 6: Green Power

The intent of this credit is to encourage the development and use a grid-source, renewable energy technology to provide a minimum of 35% of the station and ancillary structures' energy demand for a minimum of 2 years.

V.D MATERIALS & RESOURCES (MR)

V.D.1 MR Credit 4: Recycled Content

The intent of this credit is to incorporate the requirement to use recycled materials, or the recycled material content in the design and specifications.

V.D.2 MR Credit 5: Regional Materials

The intent of this credit is to encourage and increase the use of local materials by reducing impacts due to transportation.

V.D.3 MR Credit 6: Rapidly Renewable Materials

The intent of this credit is to encourage the use of rapidly renewable materials, such as bamboo, cotton, linoleum, and cork.

V.D.4 MR Credit 7: Certified Wood

The intent of this credit is to encourage environmentally responsible forest management, by utilizing certified wood.

END OF CHAPTER