



◀ Elevators increase accessibility to underground stations.

### 2.2.2.3 PROVISIONS FOR DISABLED USERS

People with disabilities, those 65 years old and older, the temporarily disabled and patrons with transitory conditions – the parent with a stroller, the expectant mother, the shopper carrying parcels, the traveller with baggage – must be carefully considered in station design. The specific issues that must be considered in facility design are orientation, horizontal travel, vertical travel, use of fare collection equipment, transfer from the platform to the transit vehicle and egress under emergency conditions (see Fig. 4). In most instances, provisions for the mobility disadvantaged fall within normal practice or existing code requirements. The majority of requirements can be incorporated through design at little or no additional cost.

#### ► GUIDELINES

- Ensure elevators comply with all applicable codes and standards.
- Clearly identify mobility-disadvantaged accessible entrances and other system elements, such as parking spaces, rest rooms and vehicle doors.
- Make all primary entrances to transit facilities accessible to the mobility-disadvantaged.
- Design circulation spaces that permit the unassisted movement of the mobility-disadvantaged through the facility, yet still integrate with general patron flow.
- Position and mount all equipment to which the public has access in such a way that wheelchair occupants can use the controls without assistance.
- Identify essential public facilities within transit facilities in a method appropriate for the blind and partially sighted.

- Ensure elevators, where employed, are accessible to the mobility-disadvantaged on the level that they use to enter the building, and at all levels normally used by the general public.
- Avoid potential hazards, due to abrupt changes in floor level, ground and floor surfaces and gratings.
- Identify platform edges by using a band of pavement at least 2' wide with a clearly contrasting texture and color. Tactile warning strips should be used to identify this potential dangerous area for the blind.

### 2.2.2.4 SECURITY & VANDALISM

Security and safety concerns the ability to protect the public from site hazards, prevent dangerous situations and guard against destruction of property.

#### ► GUIDELINES

- Assign proper lighting to all areas of the site open to the public.
- Avoid designs with obstructions or 'hiding spots'.
- Identify and equip high security areas with appropriate security measures (fences, cameras, security personnel, etc.)
- Select design materials with reduced susceptibility to vandalism as well as those easy to clean, replace or repair.



◀ Ramps are encouraged at all minor grade changes.

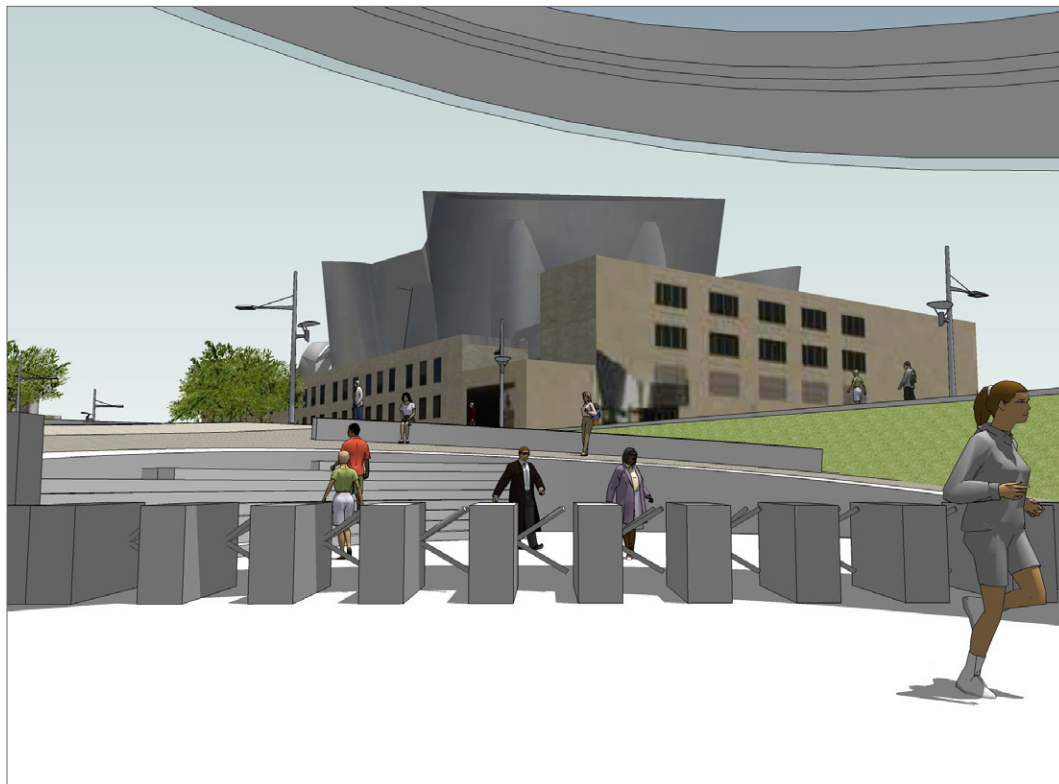
#### TECHNICAL CONSIDERATIONS

##### ► AREAS OF CONSIDERATION FOR THE DISABLED

- Parking
- Entrances
- Signage
- Grade Changes
- Protrusions
- Warning Systems, Both Audio and Visual
- Vertical Circulation
- Surfaces
- Guardrails
- Hardware
- Restrooms
- Control Buttons – Height
- Drinking Fountains
- Landscape / Pedestrian Zone Relationships



FIG. 4



◀ Passenger circulation is easily understood and unobstructed.



◀ Adequate space surrounding vending and ticketing areas is necessary for efficient circulation.

## 2.2.2.5 HORIZONTAL STATION CIRCULATION

Passenger traffic is composed of two distinct groups: regular patrons and infrequent users. Once passenger flows have been established and the majority of patrons become familiar with the process, many directional problems will be eliminated. The initial goals should be to provide easily understood patron orientation, unobstructed access to and from station platforms and sufficient space to accommodate projected growth.

### ► GUIDELINES

- Ensure pedestrian circulation is safe, easily understood and non-conflicting.
- Create station circulation systems that provide safe passage to and from the station platform and, in the case of a subterranean station, the mezzanine.
- Clearly label station entries.
- Encourage right-hand circulation patterns and the separation of passenger flows moving in opposite directions.
- Avoid cross-flow circulation and dead-end conditions.
- Ensure compliance with the National Fire Protection Association (NFPA) Standard 130 at exits.
- Provide a minimum of 7' - 6' clear at all platform edges.
- Include adequate space surrounding vending / ticketing areas as not to obstruct circulation.
- Provide a minimum queuing distance at high-traffic areas (see Fig. 5 for details).

### TECHNICAL CONSIDERATIONS

#### ► QUEUING DISTANCES

Provide the following minimum queuing distance at the following areas:

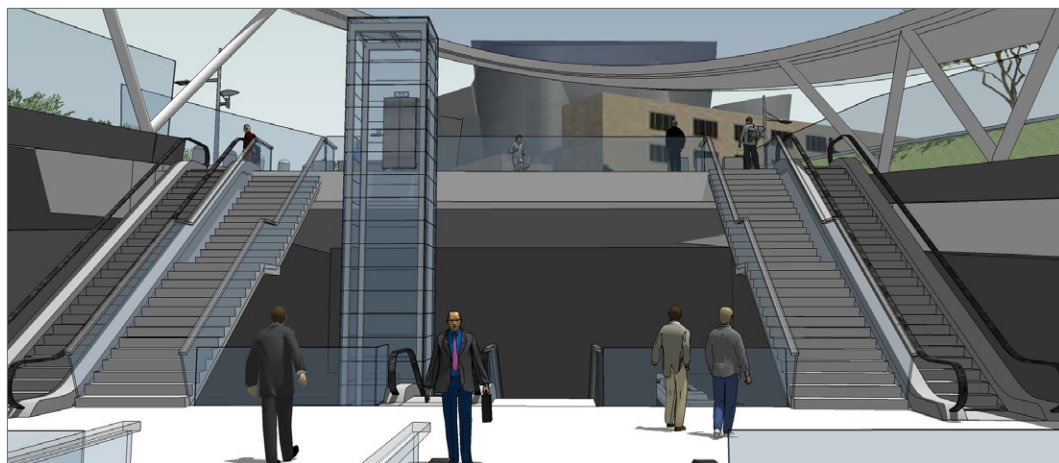
- Ticketing / Fare Vending = 8' - 0'
- Escalator = 20' - 0'
- Elevator = 12' - 0'
- Stair = 15' - 0'



FIG. 5



◀ Safe and efficient vertical station circulation.



◀ Weather protected outdoor escalators.

### 2.2.2.6 VERTICAL STATION CIRCULATION

Vertical access to station platforms will typically be by stairs and ramps and, in the case of underground stations, by escalators and elevators as well. The priorities in designing a station's vertical components should be safety, convenience, accessibility for the disabled, security and ease of maintenance.

#### ► STAIR GUIDELINES

- Construct stairs of non-combustible materials.
- Use non-slip surfaces on treads, risers and landings.
- Include a trough to one or both sides of stairs to facilitate cleaning.
- Provide a ramp where a change in elevation is less than 18".
- Keep stair width to a minimum of 6' to accommodate:
  - » Opposite (up-down) flow of pedestrian traffic and a passing lane;
  - » Convenience for persons carrying packages and / or children; and
  - » Different anthropometric sizes.
- Conform stair elements to the guidelines outlined in Fig. 6.

#### ► RAMP GUIDELINES

- Construct ramps of non-combustible materials with a non-slip surface.
- Keep the ramp slope within the parameters of 1' in 20' (5%), with a maximum slope of 1' in 12' (8%).
- Ensure that the distance between landings does not exceed 30'. Requirement for railings, handrails and headroom are as noted for stairs in Fig. 6.
- Ensure a width minimum of 6' - 0" and a landing length of 5' - 0".

#### ► ELEVATOR GUIDELINES

- Employ only fully automatic, hydraulically operated models.
- Size interiors to accommodate wheelchairs, stretchers for emergencies and maintenance equipment.
- Ensure a rated minimum capacity of 3,500 lbs.
- Ensure controls that accommodate wheelchair-bound as well as sight and hearing impaired patrons.
- Locate elevators near parking for people with disabilities in stations with parking facilities.

#### ► ESCALATOR GUIDELINES

- Weather-protect any escalators that may be used outdoors.
- Provide escalators that are two speeds and reversible. They must be equipped with an emergency stop connected to the fire alarm system to enable an emergency exit route when stopped.
- Adhere to the following escalator dimensions:
  - » Width = nominal 48" minimum measured between balustrades and 27" above nosing of step treads.
  - » Slope = 30°
  - » Headroom = same as stairs (refer to Fig. 6 for details).

FIG. 6

#### TECHNICAL CONSIDERATIONS

##### ► STAIR FEATURES

###### TREADS & RISERS: GENERAL

- When parallel to adjoining escalator, tread to riser relationship should be a component of 30°.
- Ratio of riser to treads:  $2R + T = 24$  to 25 (where R = Riser, T = Tread).
- Tread and riser dimensions should be uniform in any one stair.

##### RISERS

- Maximum = 7".
- Recommended = 6 - 1/2".
- Limit number of risers in a single run to 18 at public stairs.

##### TREADS

- Minimum size = 11".
- Treads exposed to weather should have a 1% slope downward toward nosing.

##### ► LANDINGS

- Straight run stair minimum length = 4'.
- Return stair minimum length = width of stairs.
- Avoid concealed reverse landings.
- Ramp landing length = 5".

##### ► HANDRAILS

- Diameter = 1-1/4" minimum to 2" maximum.
- Distance from wall = 1-1/2".
- Height from top of tread at nosing to top of handrail:
  - » Adult = 30" minimum to 34" maximum; and
  - » Child = 24".
- Continuous from top to bottom of stairs including landings. Locate on both sides of stairs. Extend 12"

beyond the top riser and 22" beyond the bottom riser.

- Intermediate handrail required when width of stairway is over 88".
- Return ends to wall or turn down 90°.
- Grip surface to be uninterrupted by handrail supports.
- Handrails may extend a maximum of 3 1/2" into width of stairs.

##### ► GUARDRAILS

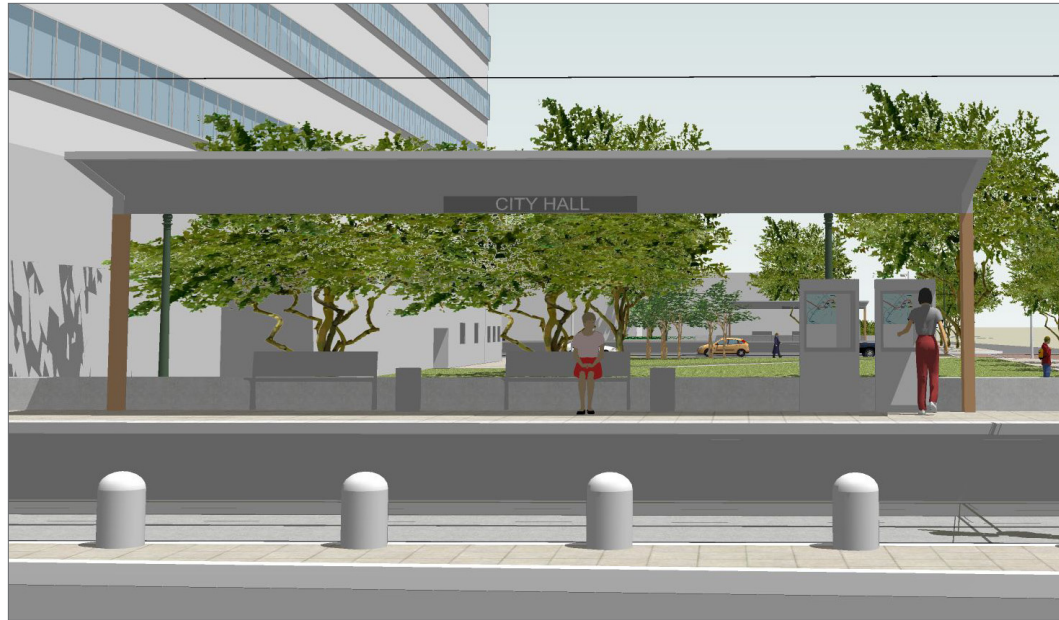
If guardrails are not solid, any opening should be sized to allow a maximum of a 4" sphere to pass through.

##### ► HEADROOM

- Measured from perpendicular to the tread nosing.
- Public stairs = minimum of 7'-6".
- Service stairs = minimum of 9'-0".
- 9'-0" for maintenance (to avoid finger prints).
- Continuous soffits = 10'-0".

##### ► TACTILE WARNINGS

Locate before top and bottom risers. Start at a minimum of 24" from the stair nosing.



◀ Canopies shelter passengers from the sun and rain.



◀ Transparent enclosures increase visibility and security.



◀ Solar paneled canopies protect from the sun while harnessing its energy to power the platform.

## 2.2.2.7 WEATHER PROTECTION

Protecting the patron from exposure to extreme summer heat and winter rain and wind is a major factor in the architectural design of the station as well as in maintenance and security issues. Each station type has its own particular weather protective situations. The at-grade stations are more exposed and may need more extensive provisions for the patrons as well as for mechanical equipment. Underground stations will require protection at patron entries and for vertical circulation equipment such as elevators and escalators.

### ► GUIDELINES

- Incorporate canopies into the station design as effective shelter from the sun and rain. They should slope to a drain or gutter and, as an additional sustainability feature, can be made to empty into a bioswale or water feature. Canopy design should fit with the surrounding architecture.
- Design enclosures to be transparent or semitransparent for visibility and security. The bottoms of enclosure partitions should be open for drainage and to prevent the collection of wind-blown debris.
- Situate station amenities on the leeward side of buildings for protection against wind.
- Use existing vegetation on site, such as trees, as buffers against adverse weather. Architectural and landscaping elements can also be used to reduce glare from low horizontal sun angles.
- Protect against building up-draft and the Venturi effect on wind caused by large buildings.
- Ensure that protective devices do not obscure visibility, inhibit security or interfere with patron circulation.