

Elderly and Handicapped Accessibility

The California Ways

ROBERT E. KERSHAW AND JOHN A. BODA

Making light rail transit accessible to the disabled is done in ways as varied as the number of systems in existence. The interpretation and implementation of "full accessibility" is just as varied. Full accessibility must include provisions not only for the wheelchair-bound, but also for the deaf, hard of hearing, blind, partially sighted, elderly, and developmentally handicapped. These provisions include wheelchair ramps or lifts, wheelchair spaces in the vehicles with tie-downs,

safety tile, Braille, audio devices, station space planning, and signage of proper size and contrast. Early planning and design decisions must include input from disabled groups and adequate funds in the project budget. Prerevenue service training for disabled access should also be considered as part of the project. This is usually a shared effort with the various disabled groups and the system operator. It has proven to be a good public relations tool, also.

PLANNERS AND DESIGNERS OF light rail transit systems must provide full accessibility to the system for the general public. This includes meeting the unique needs of the disabled community. The interpretation and implementation of "full accessibility" and the provisions for disabled access to light rail transit (LRT) are as varied as the number of systems in existence.

Full accessibility must include provisions not only for the wheelchair-bound, but also for the deaf, hard of hearing, blind, partially sighted, elderly, and developmentally handicapped. These provisions include wheelchair

R. E. Kershaw, Boyle Engineering Corp., 100 Howe Avenue, Suite 250 North, Sacramento, Calif. 95825. J. A. Boda, California Department of Transportation, 1120 N. Street, Sacramento, Calif. 95814.

ramps or lifts, wheelchair spaces in the vehicles with tie-downs, safety tile, Braille, audio devices, station space planning, and signage of proper size and contrast.

Early planning and design decisions must include input from the disabled groups. The impact of accessibility alternatives must be weighed against their associated costs and these costs included in the development of the project budget. Once the accessibility choices are approved, preoperational training must then be considered. This training process should be a shared effort by the various disabled groups and the system operator. It has proven to be a good public relations tool, also.

How new California LRT systems have chosen to provide accessibility gives insight into the planning and design process and into the results yielded by operational experience. It is not the intent to pass judgment on the selected methods of disabled accessibility that were deemed appropriate for each unique system. The purpose is to provide accessibility choices to any agency considering a transit system and to encourage them to select and agree to these choices early to reduce conflict, budget repercussions, and possible construction delays.

The following systems will be reviewed for early planning and accessibility criteria, methods for dealing with the special interest groups, and the various techniques implemented to meet the full accessibility requirements for transit projects:

- San Diego (Trolley),
- San Jose (Guadalupe Corridor),
- Los Angeles/Long Beach (Willowbrook Line), and
- Sacramento (RT Metro).

SAN DIEGO

San Diego's 16-mi LRT starter line was completed in 1981 without federal funds. This was the first of the new LRT systems to be constructed on the West Coast and was the model for others soon to follow. A 5-mi extension was recently opened for revenue service and another extension is under construction. The Metropolitan Transit Development Board (MTDB) has a very aggressive extension plan under development.

Planning for elderly and handicapped (E&H) accessibility was not an afterthought on this project. MTDB, as the agency responsible for the planning and design of the LRT project, worked closely with the Ad Hoc Committee for Elderly and Handicapped Access. This committee issued a 1978 draft E&H accessibility study that was ultimately adopted by MTDB in

1984 after countless meetings and compromises over detail and the objective meaning of "full accessibility."

The adopted "Elderly and Handicapped Access: Design Handbook for Stations" condenses current California regulation (State Building Code - Part 2, Title 24, C.A.C.) and incorporates additional recommended standards and design criteria as defined by the MTDB's E&H ad hoc committee. The final system design incorporated the criteria, leaving very little to chance or to change on the sensitive issue of disabled accessibility.

The handbook primarily addresses three major categories of disability that will be affected by environmental factors. These are visual impairment or blindness, mobility impairment, and hearing impairment or deafness.

Visual Impairment

Station Access

Drop-off areas are conveniently located immediately adjacent to the loading area. Walkways are delineated and are wide and free from potential hazards to the visually impaired.

Safety Stripe

An 18-in. safety stripe runs along the entire length of the station. Initially it was contrasting brick pavers but was later modified to a slightly raised yellow surface of epoxy and sand grit. The yellow is for the partially sighted and the tactile surface for the blind cane user. Also, contrasting mats are placed opposite the doors to allow for ease in locating the doors.

Signage and Identification

MTDB complied with all adopted standards and requirements for signage, opting for large light-colored lettering with contrasting dark background. No signs are backlit; consequently glare is precluded. Signage is uniform throughout the system in location, quantity, and quality.

International symbols are used wherever possible. The use of Braille was considered but has not been implemented to date.

Station Platform

Platform design provides orientation and uniformity in the location of fare vending machines, telephones, benches, signage, and other elements of potential hazard for the blind and partially sighted. Textured and contrasting

paving colors assist the patron from the bus to the trolley boarding area in a relatively straight and unimpaired path. The stations are all well lighted for safety and security. High-pressure sodium lighting is used because it reduces glare for the partially sighted.

Vehicle

The button to operate the trolley door is raised, located on the side of the car, and outlined with contrasting color. Grab bars and stanchions are provided for the safety of those standing. The operator calls out station stops and emergency or important announcements.

Mobility Impairment

Station Access

Drop-off areas and parking for the disabled are conveniently located immediately adjacent to the loading area. Size, detail, and number of spaces comply with local standards and the E&H handbook.

Ramps and Walkways

Ramps and curb cuts are provided at convenient locations and comply with all rules and regulations as far as slope and width are concerned. Walkways are wide and free of obstacles to the mobility impaired.

Fare Vending Machines

Fare vending machines and phones are all located for convenient access. The height of the machine mechanisms is located for wheelchair-bound patron use.

Vehicle

E&H access to the light rail vehicle (LRV) is available only at the front right door of a lift-equipped train consist. The lift is an electromechanical device placed in a dedicated doorway. Because each train loads on the right side, only one doorway is blocked from general use. There are no tie-downs in the vehicle but steel clips serve as wheel stops for a maximum of two wheelchair users.

The mainline train consists are all E&H lift-equipped, but the Euclid extension has accessibility only between 30- and 60-min intervals because of

the single-car consist. The train schedule is marked to indicate which trains are accessible. A rubber mat is placed at the head of each station platform and is marked with an international wheelchair symbol. The wheelchair lift controls are in the operator's cab with a clear line of sight to the lift. The average cycle time per user is approximately 2 min. This delay has not caused a significant problem in the scheduled operations.

After several experiments with other lifts, the Ricon lift was chosen for its reliability and adaptability within the vehicle. This system has drawbacks. There are no hand rails for the user; instead curbs on the lift keep wheels from rolling off. Mechanical systems are labor-intensive and subject to breakdown. The 2-min cycle could disrupt schedules and upset rush hour passengers. And the lift user has to rely on the vehicle operator, which reduces the user's independence. Also, a two-car train is needed to provide accessibility in both directions. This requirement could cause operational problems in changing vehicle consists from one- to three-car trains, hence increasing operation costs.

Hearing Impairment

No provisions for the hearing impaired were made on the platform or within the vehicle other than some preoperational training. Because hearing-impaired people require visual warnings for any emergency alarm, a visual display of any audio message provided to the public and telephones with amplification are minimal conveniences available to accommodate their disabilities. The E&H handbook states that telephones must generate a magnetic field to allow hearing-aid devices to pick up the voice signal. In addition, at least one telephone must be equipped with a volume control, according to the handbook. These improvements have yet to be implemented.

SAN JOSE

The recently operational San Jose Light Rail System involved the disabled community from the beginning in planning, design, and construction processes. A technical memorandum, "Access for Elderly and Handicapped Patrons," was developed by a consultant suggesting alternatives and recommendations for use during preliminary engineering. Later, two committees were established.

An ad hoc committee, made up of several active proponents of E&H accessibility, works on accessibility problems related to the county areas. The second committee, called the Disabled Advisory Committee, works on accessibility problems in the City of San Jose. Both committees meet once a

month to resolve problems, make recommendations, or vote on staff proposals. Presently, they are working with the LRT marketing group to educate and train disabled patrons. In addition, the San Jose system benefited from having the LRVs manufactured before the final guideway design. Hence, the designers had more flexibility in providing E&H access to the vehicles.

Visual Impairment

Station Access

Drop-off areas are conveniently located adjacent to the loading areas. Walkways are wide, well lighted and defined, with obstacles located to the sides.

Safety Stripe

Safety tile 18 in. wide is located along the entire edge of the station boarding area. The tile is a contrasting beige color with longitudinal grooves for detection. Stairways leading to the platform have a contrasting color band at the edge of each stair tread. In the pedestrian mall area, a safety stripe 11 in. wide runs the full length of the 4-in. curb parallel to the tracks. The safety stripe is also continuous along the nonplatform side of the tracks.

Signage and Identification

Suburban station signs have gray aluminum backgrounds with black, Helvetica-style letters. All other station signage is white lettering on tile. Station signage is distributed throughout the platform. At the park-and-ride walkways to the station platforms, the signs are grouped in central locations. Downtown signage is done on the stainless steel shelters and on bus stop signage poles.

International symbols are used wherever possible. Signs are not illuminated, but area lighting is placed to highlight all station signage. Braille operating instructions and system information are proposed for the fare vending machines. The Braille should be in place prior to complete system operation.

Station Platform

Major access to the platforms is from one or both ends where fare vending machines and telephones are located.

Uniformity of other elements, such as shelters, benches, light poles and planters, was a consideration in design for safety and security. Illuminated handrails are placed on the suburban station access stairways.

Vehicle

The button to open the LRV door protrudes from the side of the car next to the doors and is lighted in the center with a contrasting color. A public address system allows the operator to call out the station stops. Grab bars and stanchions are provided for those standing. The stairwells have a contrasting color band at the edge of each stair tread.

Mobility Impairment

Station Access

Drop-off areas and parking for the disabled are conveniently located adjacent to the loading area. Size, detail, and number of spaces comply with local standards. Curb cuts, ramps, walkways, and elevators, where needed, are provided for the elderly and wheelchair-bound in compliance with local requirements.

Station Platforms

Platform design includes lighted and unobstructed space for wheelchair access and waiting. Fare vending machines and phones are located for convenient access. The height of the mechanisms is located to accommodate the wheelchair-bound patron.

Vehicle

Access to the LRV is through the front right door of each train. Two wheelchairs are permitted per train in an area near the operator at the front of the vehicle where the chairs can be secured. The wheelchair spaces are equipped with tie-downs. An intercom is placed within reach of the disabled so they can contact the driver for information or emergencies. The electro-mechanical lift is located at the head of each station. After general loading, the operator pulls forward to the lift, gets out of the cab and operates the lift, placing the disabled person into the vehicle. It takes approximately 3 min to load or unload the disabled patron.

After two unsuccessful attempts to obtain bids on the Portland-type way-side lift and a feasibility study of wheelchair ramps, a platform-mounted lift, similar to the concept of the San Diego MTDB on-board lift, was chosen. Platforms and ramps were judged aesthetically unacceptable in downtown areas, and vehicle-mounted lifts were considered less reliable than platform-mounted lifts. If a platform lift breaks down, train operations will not be

affected. Drawbacks to this lift include the 6-min loading/unloading cycle, which will disrupt peak hour travel; the possibility that vandalism could occur on platform lifts; the E&H patron's reliance on the vehicle operator for access; and the high maintenance and operational costs that will continue throughout the life of the system.

Hearing Impairment

Phones with volume adjustment are not presently in place. Signage and maps are located so they can be seen from the vehicle and the platform. The vehicles operate with their lights on and are equipped with a bell for intercity warnings and a loud horn for suburban area warnings. Beyond that, little else has been provided for the hearing impaired other than preoperational training, printed schedules, maps, and a TDD (telecommunications device for the deaf) machine to call for other assistance.

LOS ANGELES/LONG BEACH

The 20-mi Los Angeles/Long Beach system is in final design stages and construction is well on the way for summer 1990 operation. An E&H Committee was set up about 3 years ago at the beginning of preliminary engineering to develop accessibility design criteria for the project. Because these criteria are specific, it is anticipated that few problems will develop. The committee continues to meet to review and approve all station designs for compliance with the approved design criteria. The system is funded by local sales tax monies; no federal dollars are presently involved.

Visual Impairment

Station Access

Well-lighted drop-off areas free from obstacles are conveniently located for the disabled. A portion of this line is in the subway and interfaces with the L.A. Metro Rail. It also interfaces with the Century Freeway Transitway. Both of these lines have high platforms. This was the major factor in the decision to use a high platform on the Los Angeles/Long Beach line, along with the fact that high platforms reduce boarding times. Because the station platforms are all high (at car, not track, level), access is by walkways with a 1:20 slope. This design enhances accessibility for all users. All stairs have a contrasting edge strip and slip-resistant surface.

Safety Stripe

An 18-in. safety stripe of light colored, contrasting, textured material will be placed on all high-level boarding areas. All pavement and ramped walkways have a textured, non-slip surface. The 18-in. width is required because the platform height is 39 in. above the track—adequate warning is very important given the severe consequences of falling.

Signage and Identification

A consultant will be selected to develop the scope and details of system signage and identification. The consultant will have a general set of guidelines to follow and will submit the design for approval. Braille is being considered for the fare vending machines and certain phone instruments. Since the blind are not charged a fee to ride, the Braille will be used for informational purposes. Braille will be placed at all elevator locations according to state requirements in Title 24.

Station Platforms

Platforms are raised to the height of the LRV floor, so all doors of all cars will be accessible for all patrons. All platforms will be lighted for safety and security. Emergency phones will be located on the platform. Because all platforms are elevated, warning curbs, guard rails, and handrails will be used at all nonboarding edges. A public address (PA) system and closed-circuit TV system will be installed at each station. The PA system will be used to assist patrons with schedules or problems as they arise. The platforms will have minimal obstacles and those that exist will be set back from the platform edge.

Vehicle

The operator will control opening and closing of all doors. An emergency switch will be available to open doors if necessary. The LRV is equipped with an audible whistle and bells that can be heard from 500 ft. Floor coverings at all door openings will be marked by a 2-in. strip of contrasting color and differing texture.

Mobility Impairment

Station Access

Curb cuts, sloped ramps, and elevators will be provided for platform access. Parking for the disabled will be provided immediately adjacent to the platform area and will comply with local codes for size, identification, and number of spaces required.

Signage and Identification

The consultant will propose all signage and will maximize use of international symbols for the handicapped.

Station Platform

The raised platform will have curbs and handrailings for safety. Wide walkways and loading areas will allow for ease in wheelchair use. The platforms will be well lighted for safety and security. A raised safety stripe at the boarding edge will warn wheelchair-bound patrons. All telephones and vending machines will be accessible to wheelchair-bound patrons.

Vehicle

The continuous raised platform will provide wheelchair-bound patrons easy access to doors at the end of the vehicles. This allows for more wheelchairs per train and also provides quicker access and egress. The trade-off for the raised platform is considerably higher capital cost and a physical barrier that could be a conflict for circulation.

The maximum gap between the platform and vehicle will be 3 in. horizontally and 1/2 in. vertically. The vehicle has air shocks to adjust the car floor to the platform level. However, the gap may present a hazard, especially to small wheelchair wheels. The door opening is 32 in. wide, which allows passage for a single wheelchair. A priority area next to the door is set aside at each end of the vehicle for wheelchair tie-downs. The criteria indicate 1 percent of seating space must be available for wheelchair-bound patrons.

Hearing Impairment

Visual warnings have been proposed for all emergency alarms. Telephones will have volume controls. Vehicle flashing lights will have a minimum

oscillation of 60 flashes/min. Training and other assistance for the hearing impaired will be considered during final design and before scheduled opening.

SACRAMENTO

The Sacramento Regional Transit (RT Metro) design criteria established only general guidelines for providing full accessibility. The following excerpt is from the design criteria:

1. Accessibility to Vehicles

Access shall be provided by a short high platform ramp meeting grade, width, and other criteria noted elsewhere. The ramp shall be located to access the front door of the first car of a maximum length train at all station sites practical. Details for access will be determined by the end of preliminary design. Some sites may be physically constrained to preclude the E&H ramp; however, all efforts will be made to remedy this situation. Final decision on elimination will be made by RT.

2. Platform Accessibility

Platforms shall be designed to meet accessibility requirements for the E&H.

3. Parking

E&H parking shall be located as close to the platform as possible. Parking space number and size shall comply with Caltrans standards and the California Vehicle Code.

This excerpt exemplifies the very general and unspecific criteria for disabled access to RT Metro. The design criteria were prepared before the environmental document or preliminary engineering was completed and before the total scope or cost of the project was known in detail. The requirements for full accessibility are all well known and have been published in many documents.

How these requirements are to be satisfied, however, is not specified. Early in the planning phase of this project the various disabled groups showed little interest. However, after the preliminary engineering and the environmental work were completed and approved and funding was ensured, disabled access became a very critical issue in the final design phase.

After many attempts by the numerous disabled groups to become the spokesperson for all, it became apparent that no one group could speak in the best interest of all. After numerous meetings with the disabled groups and concerned individuals, an agreement was reached to work with the Sacramento County Advisory Committee for the Handicapped. This committee served as the forum for all meetings with staff and ultimately proposed recommendations for the RT Board's final implementation.

Visual Impairment

Station Access

Convenient drop-off areas and access for disabled patrons were provided contiguous to the platform to preclude vehicle/pedestrian conflict.

Safety Stripe

The issue of the safety stripe on the RT Metro project was a classic example of misunderstanding and miscommunication. The safety stripe ceramic tile material was described by staff and conditionally approved by the committee for the handicapped pending receipt of an actual tile. Similar tiles were provided to the disabled community for review. After the tile had been delivered and installation begun, actual samples were provided for further review and were rejected by the committee because they lacked detectability and contrasting color. After numerous meetings, discussions, debates, delayed contracts, and board action, the decision was made to reject the ceramic tile and replace it with rubberized safety tile. This occurred just prior to start-up and drew much negative attention to the project. It also required an additional construction contract to remove the portions of ceramic tile in place and install the rubberized safety tile at a cost of approximately \$500,000.

A slight depression and a painted yellow line were placed as a temporary solution prior to contracting for the rubberized safety tile. Several other related safety stripe issues surfaced, such as limits of tile, width of tile, definition of a platform, and the need for additional safety tiles to direct disabled patrons to fare vending machines and vehicle doors, and to provide detection for raised or recessed elements that could be dangerous to the blind. These issues were all resolved with few, if any, additional changes. The rubberized safety tile is now in place and is meeting with approval from the disabled. But a concern remains about the durability of the material in a changing external environment. The additional placement of directional tile is being considered.

Signage and Identification

As RT Metro had no specific guidelines for signage, the disabled community became actively involved in review of colors, lettering types, size, and configuration. The basic color scheme was accepted with modifications and the contrast and lettering size and type were agreed upon. Full-size, color prototype signs were presented to the committee for approval prior to final

fabrication. The basic colors were beige, accented with either dark burgundy or dark green for contrast.

Few additional issues on signage or identification surfaced after this approval. However, the use of Braille became an issue. The staff's position was that no other operating system uses Braille, no funds were budgeted for Braille, and Braille was not required as a specific element for full accessibility. This issue came to the board with a staff recommendation that the use of Braille be rejected. After much arguing, debate, and "good old-fashioned politicking," it was decided by a 3-to-2 vote that Braille would be placed throughout the system. This decision was made even after a national group, representing a faction of the blind community, stated that Braille was not desired by their members because fewer and fewer blind individuals read Braille. The group suggested that training and audio devices could serve the same purpose at much less cost.

Braille now in place on the fare vending machines includes station name and all operating instructions. The disabled ticket selection button on the machines was raised to allow for ease in location. The change machines also have limited instructions in Braille. The use of additional Braille is under consideration.

Station Platform

The design staff made a concerted effort to design each platform with uniformity and common elements. Open and clear paths are provided to the shelter area. Phones are located at one end of the shelter, fare vending and change machines at the other end. The station platform is well lighted for safety and security. The light poles double as support for the signage. This reduces the number of potential hazards for the blind.

Vehicle

Raised buttons with a yellow background are located on either side of the vehicle doors. Homing devices were proposed to make it easy for the blind to locate the buttons. No proven technology was found for this, and the fact that all blind patrons would have to carry the devices precluded their use. It was decided that the safety stripe and directional tile on the platform at the door location would provide sufficient identity.

In- and out-of-vehicle public address systems are provided in each vehicle so that station names can be called out and emergency messages announced. There are no intercom systems on the trains. There is no striping or other means of warning blind riders of their proximity to the stairwells. Many

visually impaired users with canes and dogs prefer the handicap ramps for boarding.

Mobility Impairment

Station Access

Drop-off areas and parking for the disabled are conveniently located immediately adjacent to the loading area. Size, detail, and number of spaces comply with local standards.

Station Platform

Ramps and curb cuts are provided at convenient locations at most stations and comply with local rules and regulations regarding slope, width, and texture. The platform loading area is wide and uncluttered and allows for ease of wheelchair movement. The platforms and walkways are well lighted for safety and security. The fare vending machines and phones are all located for convenient access with the height of the mechanism located for wheelchair-bound patron use.

Vehicle

Vehicle access was one of the very few accessibility elements determined early on. Staff had viewed the on-vehicle lifts in San Diego and the wayside lifts in Portland and were concerned with safety, reliability, operational time, and maintenance cost of the lifts. Early meetings with the wheelchair-bound community indicated their acceptance of a staff-proposed short ramp to access the vehicles through the front doors. A mockup was built to show how it would function. A demonstration ramp built on the San Francisco Muni system that would provide similar access was also examined.

The short E&H ramps were provided at 22 of the 27 stations where space was adequate. Four locations where it was physically impossible to provide the ramp required lifts to a wayside platform for vehicle access. After an in-depth review of this deviation, the E&H committee approved the patron-operated lifts. The lifts were initially designed with no gate between the lift floor and the elevated platform and without a safety device to prevent operating the lift with the lower gate open. It was later decided that an upper gate should be included and that both gates should be equipped with an interlock switch to prevent operation of the lift if either gate were left open. One on-street station could not be made fully accessible because of a shared lane with vehicular traffic. This was acceptable to the E&H committee because the next station is only three blocks away.

Because the Sacramento system is not fully double-tracked and the train can load from either side depending on the station, lifts on the vehicle were precluded. A lift on the platform was also precluded because of the 20-sec station dwell times necessary to maintain schedule. A 2- to 3-min delay cannot be made up on a single-track system schedule. Sacramento did not consider high-platform stations because of the high cost and the narrow sidewalks downtown. The ramp concept was the better solution for this system configuration. But there are drawbacks.

At some downtown stations, a ramp would partially block building doorways, so the lift/platform was used. The sidewalk width also was reduced in the area of the ramps and the ramps are visible at each station.

The space between the edge of the vehicle floor and the ramp is approximately 13 in. wide due to the out-folding doors and clearance requirements. Consequently, the vehicle specification required the car manufacturer to provide a mechanical, nonelectrical or nonhydraulic folding plate that would cover the stairwell and bridge the gap between the vehicle and the platform. Final review and approval came after many proposal iterations, shop plan submittals, and review by staff and the E&H committee. The folding plate is placed in the down position on both front doors when an inbound run begins and remains down until the end of the run. When a wheelchair-bound patron desires access, the door opens automatically and the operator moves out of the cab to press a handle that places the bridge plate across to the ramp platform. It takes approximately 30 sec to load or unload a wheelchair patron; patrons with walkers take slightly longer.

Space for up to two wheelchairs is available in the covered stairwell areas near the operator's cab. Plans are being implemented to retrofit the cars to provide jump seats in lieu of two fixed seats near the front doors. This would provide convenient space for an additional wheelchair. Chair tie-downs were deferred because no one type or model was acceptable to the majority. Tests and evaluations are being conducted by others that may lead to acceptance of one specific type suitable for all users. Grab bars and vertical stanchions are provided for additional stability.

Before revenue service began, training sessions were provided to the disabled community to familiarize them with the system and to acquaint operators with the concerns and needs of the disabled.

Hearing Impairment

To accommodate hearing impaired people, one telephone at most—but not all—stations is equipped with a volume control. Vehicle lights are on during operation.

CONCLUSION

As can be seen, there are numerous ways to meet elderly and handicapped accessibility requirements dictated by state and federal laws. What is most interesting, however, is the dissimilarity in a few critical methods used to provide accessibility, such as lifts, ramps, Braille, safety stripes, and signage. In choosing methods, reliability, maintenance and operation costs, aesthetics, and, most of all, local preference of both the operator and users must be considered. Other considerations must include physical constraints, such as shared right-of-way, narrow streets and sidewalks, urban and suburban station differences, availability of right-of-way, and utilities.

Once these options and considerations are understood, quantified, and approved, staff assumes the responsibility for developing these further so a total understanding by management, the governing board, and the disabled community is reached. Early involvement of an E&H advisory committee (preferably at the beginning of preliminary engineering) is a must in order to make accessibility choices and mitigate the accessibility problems inherent with these types of transit projects. It should be noted that the California Administration Code (C.A.C.) Title 24 and its interpretation are more specific and restrictive than the federal regulations governing handicapped accessibility to transportation systems. However, this may not be true in other states.

The four systems discussed are representative of the problems and varied solutions that will most probably be encountered with any LRT system considered in North America.