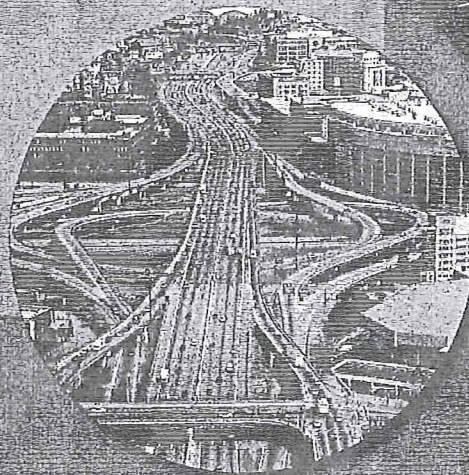
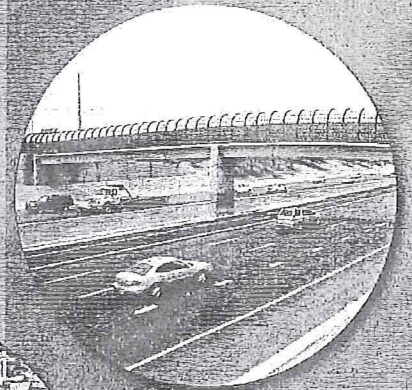


A Policy on Geometric Design of Highways and Streets

LAND-USE COMMISSION
STATE OF HAWAII
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4.17 PEDESTRIAN FACILITIES

4.17.1 Sidewalks

Sidewalks are an integral part of city streets but are rarely provided in rural areas. However, the potential for collisions with pedestrians is higher in many rural areas due to the higher speeds and general absence of lighting. The limited data available suggest that sidewalks in rural areas are effective in reducing pedestrian collisions.

Sidewalks near or along the highway in rural and suburban areas are more often justified at points of development that generate pedestrian concentrations, such as residential areas, schools, businesses, and industrial plants. When suburban residential areas are developed, initial roadway facilities are needed for the community to function, but the construction of sidewalks is sometimes deferred. However, if pedestrian activity is anticipated, sidewalks should be included as part of the initial construction. Shoulders may obviate the need for sidewalks if they are of a type that encourages pedestrian use in all weather conditions. If sidewalks are utilized, they should be separated from the shoulder. If the sidewalk is raised above the level of the shoulder, the cross section typically approaches that of an urban highway.

In suburban and urban locations, a border area generally separates the roadway from a community's homes and businesses. The main function of the border is to provide space for sidewalks. Other functions are to provide space for streetlights, fire hydrants, street hardware, and aesthetic vegetation and to serve as a buffer strip. Border width varies considerably, but 2.4 m [8 ft] is considered an appropriate minimum width. Swale ditches may be located in these borders to provide an economical alternative to curb and gutter sections.

Sidewalk widths in residential areas may vary from 1.2 to 2.4 m [4 to 8 ft]. Sidewalks less than 1.5 m [5 ft] in width require the addition of a passing section every 60 m [200 ft] for accessibility. The width of a planted strip between the sidewalk and traveled-way curb, if provided, should be a minimum of 0.6 m [2 ft] to allow for maintenance activities. Sidewalks covering the full border width are generally justified and often appropriate in situations such as commercial areas, through adjoining multiple-residential complexes, near schools and other pedestrian generators, and where border width is restricted.

Where sidewalks are placed adjacent to the curb, the widths should be approximately 0.6 m [2 ft] wider than the minimum required width. This additional width provides space for roadside hardware and snow storage outside the width needed by pedestrians. It also allows for the proximity of moving traffic, the opening of doors of parked cars, and bumper overhang on angled parking.

Justification for the construction of sidewalks depends upon the potential for vehicle-pedestrian conflicts. Traffic volume-pedestrian warrants for sidewalks along highways have not been established. In general, wherever roadside and land development conditions affect regular pedestrian movement along a highway, a sidewalk or path area, as suitable to the conditions, should be furnished.

As a general practice, sidewalks should be constructed along any street or highway not provided with shoulders, even though pedestrian traffic may be light. Where sidewalks are built along a high-speed highway, buffer areas should be established so as to separate them from the traveled way.

Sidewalks should have all-weather surfaces to serve their intended use. Without them, pedestrians often choose to use the traveled way. Pedestrian crosswalks are regularly marked in urban areas but are rarely

marked on rural highways. However, where there are pedestrian concentrations, appropriate traffic-control devices should be used, together with appropriate walkways constructed within the right-of-way.

When two urban communities are in proximity to one another, consideration should be given to connecting the two communities with sidewalks, even though pedestrian traffic may be light. This may avoid driver-pedestrian conflicts along the roadway between these communities.

Pedestrian facilities such as sidewalks must be designed to accommodate persons with disabilities. The cross slope on sidewalks is not permitted to exceed 2 percent. For more information, refer to the *Public Rights-of-Way Accessibility Guidelines* (43) and the AASHTO *Guide for the Planning, Design, and Operation of Pedestrian Facilities* (5), Section 4.17.2 on “Grade-Separated Pedestrian Crossings,” and Section 4.17.3 on “Curb Ramps.”

Generally, the guidelines set forth in this section for the accommodation of pedestrians along roadways are also applicable to bridges. However, because of the high cost of bridges and the operational features that may be unique to bridge sites, pedestrian-way details on a bridge will often differ from those on its approaches. For example, where a planted strip between a sidewalk and the traveled way approaches a bridge, continuation of the offset, affected by the planted strip, will seldom be justified.

Where flush shoulders approach a bridge and light pedestrian traffic is anticipated on the shoulders, the shoulder width should be continued across the bridge, and possibly increased, to account for the restriction to pedestrian escape imposed by the bridge rail. A flush roadway shoulder should not be interrupted by a raised walkway on a bridge. Where such installations already exist, and removal is not economically justified, the ends of the walkway should be ramped into the shoulder at a rate of approximately 1:20 with the shoulder grade.

Provisions for pedestrians are often appropriate on street overcrossings and on longer bridge crossings. On lower-speed streets, a vertical curb at the edge of the sidewalk is usually sufficient to separate pedestrians from vehicular traffic. Continuity of curb height should be maintained on the approaches to and over structures. For higher speed roadways on structures, a barrier-type rail of adequate height may be used to separate the walkway and the traveled way. A pedestrian-type rail or screen should be used at the outer edge of the walkway. On long bridges (greater than 60 m [200 ft]), a single walkway may be provided. However, care should be taken so that approach walkways provide safe and relatively direct access to the bridge walkway. Fences may need to be erected to channelize pedestrians and prevent or control conflicts between pedestrians and vehicular traffic.

For a discussion of the potential problems associated with the introduction of a traffic barrier between a roadway and a walkway, see Section 4.10.3 on “Bridge Railings.” For a discussion on providing access between the street and the sidewalk to accommodate persons with disabilities, see Section 4.17.3 on “Curb Ramps.” Further guidance on sidewalk and pedestrian crossing design is presented in the current *Public Rights-of-Way Accessibility Guidelines* (43) and in the AASHTO *Guide for the Planning, Design, and Operation of Pedestrian Facilities* (5).

4.17.2 Grade-Separated Pedestrian Crossings

A grade-separated pedestrian facility allows pedestrians and motor vehicles to cross at different levels, either over or under a roadway. It provides pedestrians with a safe refuge for crossing the roadway without

vehicle interference. Pedestrian separations should be provided where pedestrian volume, traffic volume, intersection capacity, and other conditions favor their use, although their specific location and design need individual study. They may be warranted to accommodate heavy peak pedestrian movements, such as at central business districts, factories, schools, or athletic fields, in combination with moderate to heavy vehicular traffic or where unusual risk or inconvenience to pedestrians may result. Pedestrian separations, usually overpasses, may be needed at freeways or expressways where cross streets are terminated. On many freeways, highway overpasses for cross streets may be limited to three- to five-block intervals. Because this situation imposes an extreme inconvenience on pedestrians who desire to cross the freeway at the terminated streets, pedestrian separations may be provided. Local, state, and federal laws and codes should be consulted for possible additional criteria concerning the need for such pedestrian separations, as well as additional design guidance.

Where there are frontage roads adjacent to the arterial highway, the pedestrian crossing may be designed to span the entire facility or only the through roadway. Separations of both through roadways and frontage roads may not be justified if the frontage roads carry light and relatively slow-moving traffic; however, in some cases the separation should span the frontage roads as well. Fences may be needed to prevent pedestrians from crossing the arterial at locations where a separation is not provided.

Pedestrian crossings or overcrossing structures at arterial streets are not likely to be used unless it is obvious to the pedestrian that it is easier to use such a facility than to cross the traveled way. Pedestrians tend to weigh the perceived safety of using the grade-separated facility against the extra effort and time needed to cross the roadway (5). If the grade-separated route adds substantially to the travel time, usage may be limited. For more information, refer to the *AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities* (5).

Generally, pedestrians are more reluctant to use undercrossings than overcrossings. This reluctance may be minimized by locating the undercrossing on line with the approach sidewalk and ramping the sidewalk gently to permit continuous vision through the undercrossing from the sidewalk. Good sight lines and lighting are needed to enhance a sense of security. Ventilation may be needed for very long undercrossings.

Pedestrian ramps should be provided at all pedestrian separation structures. Where warranted and practical, a stairway can be provided in addition to the ramp. Elevators should be considered where the length of ramp would result in a difficult path of travel for a person with or without a disability.

Walkways for pedestrian separations should have a minimum width of 2.4 m [8 ft]. Greater widths may be needed through tunnels, where overpass screenings create a tunnel effect, and where there are exceptionally high volumes of pedestrian traffic, such as in the downtown areas of large cities and around sports stadiums or arenas.

A serious problem associated with both pedestrian overcrossings and highway overpasses with sidewalks is vandals dropping objects into the path of traffic moving under the structure. The consequences of objects being thrown from bridges can be very serious. In fact, there are frequent reports of fatalities and major injuries caused by this type of vandalism. There is no practical device or method yet devised that can be universally applied to prevent a determined individual from dropping an object from an overpass. For example, small objects can be dropped through mesh screens. A more effective deterrent is a solid plastic enclosure. However, these are expensive and may be insufferably hot in the summer. They also obscure and darken the pedestrian traveled way, which may be conducive to other forms of criminal activ-

ity. Any completely enclosed pedestrian overpass has an added problem that children may walk or play on top of the enclosure. In areas subject to snow and icing conditions, the possibility that melting snow and ice may drop from the roof of a covered overpass and fall onto the roadway below should be considered.

At present it is not practical to establish absolute warrants as to when or where barriers should be installed to discourage the throwing of objects from structures. The general need for economy in design and the desire to preserve the clear lines of a structure unencumbered by screens should be carefully balanced against the need to limit the potential for injury to pedestrians and damage to vehicles.

Overpass locations where screens definitely should be considered at the time of construction include:

- Near a school, a playground, or elsewhere where it would be expected that the overpass would be frequently used by children unaccompanied by adults;
- In large urban areas on overpasses used exclusively by pedestrians and not easily kept under surveillance by police; or
- Where the history of incidents on nearby structures indicates a need for screens.

Screens should also be installed on existing structures where there have been prior incidents of objects being dropped from the overpass and where no deterrence of future incidents is expected from increased surveillance, warning signs, or apprehension of a few individuals involved.

More complete information on the use of protective screens on pedestrian overpasses is available in the *AASHTO Roadside Design Guide (13)*.

Figure 4-18 illustrates two typical pedestrian overcrossings of major highways.