H11 Urban and Restricted Environment Considerations

H11.1 Introduction

This section identifies urban and restricted environment that the designer should consider when providing roadside safety treatment in these environments.

Restricted environments are segments of roadway where conditions are different from adjacent sections of the roadway. These areas are not limited only to urban environments, and may be found in rural or rural-urban transition, or suburban, areas.

For urban or restricted environments, the number of accesses and intersections becomes more frequent, and bicycle and pedestrian activities increase. Consequently, roadside safety for non-motorist traffic becomes more of a consideration.

In addition, the various appurtenances, such as benches, trash barrels, and bicycle racks to accommodate pedestrians and cyclists may also be located within areas that may be struck by an errant vehicle. Ideally, these appurtenances should be located where they will be less likely to be struck by a vehicle. However, this may not always be feasible. Appurtenances with yielding features should be used to reduce the potential injuries of the motorist.

H11.2 Urban and Restricted Areas

H11.2.1 Barrier and Warrants

The warrants for barrier systems in urban and restricted areas are essentially the same as those for rural environments. However, the presence of pedestrians requires additional consideration.

It may be necessary to provide a barrier system to shield pedestrians from potential errant vehicles in urban or restricted area environments where pedestrians may travel in close proximity to the roadway. The designer should review and confirm whether a barrier system, if feasible, is necessary to protect pedestrians.

Aesthetics can also be a contributing factor when selecting a longitudinal traffic barrier system, particularly in environmentally or socially sensitive locations, such as recreational areas, parks, or other urban or suburban environments. In these instances, a natural-looking barrier system that blends in with the surroundings is often more appropriate.

In addition, the location of the system may also be influenced by other factors in urban or restricted environments. Pedestrian and bicycle activities are not typically considered in rural environments. Consider providing a uniform clearance and consistent barrier design in these environments.

H11.2.2 Protecting Adjacent Land Uses

In urban and suburban areas, some consideration should be given to protecting pedestrians who are using adjoining properties from potential road-related risks. It may be prudent to shield schools, playgrounds, and parks located on the outside of sharp curves or across from T-intersections with longitudinal traffic barrier systems. This reduces the potential of personal injury to people using these facilities in the event of a crash on the highway. The probability of a vehicle leaving the roadway and striking a person is greater than normal in these particular areas of the roadway. Since no specific warrants or guidelines are available for these situations, the designer needs to rely on judgement to determine if a barrier system is required.

Barrier systems intended to shield adjacent land uses need to prevent errant vehicles from entering a specific area. A barrier that is not structurally adequate may be less desirable than

having no barrier at all. Flying debris resulting from the impact of a vehicle into an inadequate barrier may injure people in the area.

Consider installing a guardrail system to shield businesses and residences that are very close to the right-of-way, particularly at locations having a history of run-off-the-road incidents.

H11.2.3 Protecting Pedestrians and Bicycles

Pedestrians and bicyclists must also be considered by designers.

The most desirable solution is to separate the pedestrian and bicycle traffic from vehicular traffic. Since this solution is not always practical, an alternative method of protection is sometimes necessary. Currently there is no warrant or criteria available to determine when pedestrian or bicyclist protection is required.

On low-speed streets, curbs will likely be sufficient to delineate (separate) pedestrians and cyclists from vehicular traffic. When speeds are over 40 km/h, a vehicle can mount the curb at relatively flat impact angles. Consequently, when sidewalks or bicycle paths are adjacent to the driving lane of high-speed facilities, protection other than curbs may need to be considered for the safety of pedestrians and bicyclists.

Additional information related to bicycle facilities is provided in *AASHTO's Guide for the Development of Bicycle Facilities*.

H11.3 Curbs

Curbs are generally restricted to roadways with design speeds of 70 km/h or less in urban or highly developed areas.

At higher speeds on suburban or urban facilities, consider providing a shoulder and offsetting the curb further away from the edge of the driving lane. This will reduce the likelihood of an errant vehicle impacting the curb line.

For low speed environments with design speeds less than or equal to 40 km/h, curbs may be considered as an effective barrier to deflect errant vehicles away from the hazards. However, the hazard should be 0.5 m beyond the curb line, as a minimum, and be as far away from the curb line as feasible.

For design speeds over 40 km/h, a vehicle can mount the curb at relatively flat impact angles and strike the hazard. In this scenario, a barrier system should be installed in front of the hazard to shield it from errant vehicles.

The installation of curbs with barrier systems presents additional challenges because the vehicle may not effectively interact with the barrier system after hitting the curb. For information on the appropriate curb and barrier system combination, refer to **Section H4.3**.

H11.4 Zone of Intrusion

Rigid barriers are frequently used in urban and/or restricted environments. Consideration should be given to providing a clearance behind the barrier system, whenever practical, to accommodate the Zone of Intrusion.

For information on the Zone of Intrusion clearance, refer to **Section H5.4.4**.

H11.5 References

The following documents were used during the development of this section:

American Association of State Highway and Transportation Officials,
Guide for the Development of Bicycle Facilities, Washington, DC, 1999.

American Association of State Highway and Transportation Officials,

Roadside Design Guide 2002,
Washington, DC, 2002.

THIS PAGE LEFT BLANK INTENTIONALLY