

Delaware Department of Transportation
Clear Zone, Lateral Offset & Horizontal Clearances Discussion

The discussion points mentioned below are intended to make designers aware of the two roadside design concepts that should be considered when preparing designs for the Delaware Department of Transportation. This discussion is not intended to replace the responsibility of the designer to read and fully understand the concepts of clear zones and lateral offsets as defined in the various American Association of State Highways and Transportation Officials (AASHTO) manuals and guides.

Clear Zone Concept

As per the “2011 AASHTO Roadside Design Guide (AASHTO RDG)”, the clear zone concept was first discussed in the early 1960s. This discussion was brought about as the nature and characteristics of typical rural highway crashes began to change. Instead of head-on crashes with other vehicles, many drivers were running off the freeways and colliding with man-made objects such as bridge piers, sign supports, culverts, ditches and other design features of the roadside.

In 1974, AASHTO published the second edition of the “*Highway Design and Operational Practices Related to Highway Safety*”, which became known as the “Yellow Book”. In this publication it was stated that for “adequate safety”, it is desirable to provide an unencumbered roadside recovery area that is as wide as practical on a specific highway section. Studies have indicated that on high-speed highways, a width of 30-feet or more from the edge of traveled way permits about 80 percent of the errant vehicles leaving the roadway to recover”.

Subsequently most highway agencies began to try to provide a 30-foot clear zone, particularly on high-volume, high-speed, rural roadways. **A clear zone is the unobstructed, traversable area provided beyond the edge of the through traveled way for the recovery of errant vehicles. The clear zone includes shoulders, bike lanes and auxiliary lanes, except those auxiliary lanes that function like through lanes.** Many obstacles located within this clear zone distance were removed, relocated, redesigned, or shielded by traffic barriers or crash cushions.

It soon became apparent, however that in some limited situations in which embankments sloped significantly downward, a vehicle could encroach farther from the through traveled way and a 30-foot clear zone might not be adequate. Conversely, on most low-volume, urban, or low-speed facilities, a 30-foot clear zone distance was considered excessive and seldom could be justified for engineering, environmental or economic reasons.

In 1977, AASHTO published the “*Guide for Selecting, Locating, and Designing Traffic Barriers*” which modified the earlier clear zone concept by introducing variable clear zone distances based on traffic volumes, speeds and roadside geometry. Since 1977, the clear zone concept has undergone a few revisions and refinements, most recently in the 2011 AASHTO RDG.

As discussed in the 2011 AASHTO RDG, Table 3-1 can be used to determine the suggested clear zone distance for selected traffic volumes and speeds, but provides only a general approximation of the needed clear zone distance. The designer should keep in mind the site-specific conditions, design speeds, rural versus urban locations, and practicality. **The distances obtained from Table 3-1 should suggest only the approximate center of the range to be considered and not a precise distance to be held as absolute.** For roadways with low traffic volumes, it may not be practical to apply even the minimum values found in Table 3-1. Refer to Chapter 12 in the 2011 AASHTO RDG for additional

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considerations for low-volume roadways and Chapter 10 in the 2011 AASHTO RDG for additional guidance for urban applications.

DeIDOT Application and Display of Clear Zone

The Delaware Department of Transportation's Project Development Section has adopted the practice of displaying the clear zone on the Construction Plan sheets at the distances obtained in Table 3-1 of the 2011 AASHTO RDG. The DeIDOT Project Development Section will consider deviations from the ranges established in Table 3-1, but this will be on a case-by-case basis, with the final determination being made by the Assistant Director (and/or as part of an approved Design Criteria Form, found in Figure 3-6 of DeIDOT's RDM, for new construction or reconstruction projects). Deviations from the ranges established in Table 3-1 are not considered a formal design exception; however, the justification shall be well documented in the project file.

Lateral Offset Concept

Generally the principles and guidelines for roadside design discussed prior to Chapter 10 of the 2011 AASHTO RDG deal with roadside safety considerations for rural highways, Interstates, and freeways where speeds are generally higher (approaching or exceeding 50 mph) and vehicles are operating under free-flow conditions.

For arterials and other non-controlled access facilities in an urban environment, however, rights-of-way often are extremely limited and, in many cases, establishing a clear zone using guidance in Chapter 3 is not practical. These urban environments are characterized by sidewalks beginning at the back of curb, enclosed drainage, numerous fixed objects (ex: signs, utility poles, fire hydrants, etc.) and frequent traffic stops. These environments typically have lower operating speeds and, in many instances, on-street parking. **In these environments, a lateral offset to vertical obstructions, including breakaway devices, is needed to accommodate motorists operating on the highway.** This lateral offset to obstructions helps to:

- Avoid adverse impacts on vehicle lane position and encroachments into opposing or adjacent lanes.
- Improve driveway and horizontal sight distances.
- Reduce the travel lane encroachments from occasional parked and disabled vehicles.
- Improve travel lane capacity
- Minimize contact from vehicle-mounted intrusions, such as large mirrors, car doors, and the overhang of turning trucks.

A few general guidelines have been provided below for lateral offsets, but, chapter 10 of the 2011 AASHTO RDG discusses in detail the various applications for lateral offsets. Please consult this chapter to determine the appropriate lateral offset(s) for your site-specific location.

- Where curb is used, the lateral offset is measured from the face of the curb.

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- The lateral offset value of 1.5 ft. has been considered a minimum lateral distance for placing the edge of objects from the face of curb. The minimum lateral offset was never intended to represent an acceptable safety design criteria, though sometimes it has been misinterpreted as such. In a constrained urban environment, there is still a need to position rigid objects as far away from the active traveled way as possible.
- An enhanced lateral offset of 4 ft. to 6 ft. to obstructions is a more appropriate guide for these (urban or restricted) environments, and is recommended along roadway tangents and insides of curves. Note: Along the inside of curves, a lateral offset should be provided that keeps the driver's line of sight clear, to provide the required stopping distance.
- An enhanced lateral offset of 6 ft. is recommended at intersections and along outsides of curves.
- Where curb is NOT present, lateral offsets of 8 ft. are recommended along roadway tangents and insides of curves when clear zone widths cannot be achieved.
- Where curb is NOT present, lateral offsets of 12 ft. are recommended along outsides of curves when clear zone widths cannot be achieved.
- At lane merge points, an enhanced lateral offset of 12 ft. is recommended in the immediate vicinity of the taper point from the lane merge curb face. (See figure 10-2 of the RDG for a detailed explanation of this enhanced lateral offset.
- At driveways a lateral offset of 10 - 15 ft. beyond the edge of the driveway should be considered.

DelDOT Application and Display of Lateral Offsets

The Delaware Department of Transportation's Project Development Section has adopted the practice of displaying the lateral offsets on the Construction Plan sheets at the distances obtained in Chapter 10 of the 2011 AASHTO RDG. The DelDOT Project Development Section will consider deviations from the values provided in chapter 10 (not lower than the 1.5 foot minimum), but this will be on a case-by-case basis, with the final determination being made by the Assistant Director as part of an approved Design Criteria Form, found in Figure 3-6 of the RDM.

Horizontal Clearances –vs. - Lateral Offsets

In prior editions of the AASHTO's "A Policy on Geometric Design of Highways and Streets", also known as the "Green Book", the terms horizontal clearance and lateral offsets were used interchangeable throughout the text. In the current edition of the Green Book (2011 – 6th Edition), the references to horizontal clearance have been omitted in favor of lateral offset. Therefore, DelDOT has opted to drop this concept and only make reference to lateral offsets on the Construction Plan sheets.