

# Guardrail

## Standard

Guardrail shall be provided and installed by the developer where necessary for the safety of the traveling public, whether on public roads or private property, as well as protection for adjacent properties. The need for guardrail should be determined at the early stages of design to ensure that road sections are designed with enough width to facilitate the guardrail installation and that drainage pipes have sufficient cover for the installation of posts and are extended to accommodate the necessary adjustments in the embankments and slopes. Right-of-way adjustments or guardrail easements may be necessary to accommodate the installation and maintenance of guardrail. The need for guardrail on private roads or parking lots should be determined at the early stages of design.

## Warrants

A traversable recovery area for vehicles should be provided beyond the traveled way (edge of pavement) whenever possible. Ideally, this recovery area or “clear zone” should be free of obstacles such as non-traversable drainage structures, steep slopes, and unyielding fixed objects that can cause accidents and result in injuries to motorists. In locations where it is not feasible to remove these obstacles from the clear zone, guardrail may be required in order to adequately protect motorists.

The following minimum guidelines for guardrail installation are based on AASHTO Roadside Design Guide and VDOT Road Design Manual. However, it should be noted that guardrail may be required in some locations that do not necessarily meet these criteria based on the judgment of the Traffic Engineer. Such factors as traffic volumes, speed of traffic, accident history, road curvature, slopes of recovery area, presence of curb and gutter, location of trees, utility poles, etc. must all be taken into consideration when determining if guardrail is warranted in a particular location.

Guardrail is typically required on sections of roadway when any of the following conditions exist within the clear zone:

- A roadside parallel embankment (fill slope) of 3:1 or steeper and a depth of 4 feet or more.
- A water hazard with a depth of 2 feet or more (as measured from the near edge of pavement).
- A ditch section with a depth of 3 feet or more (as measured from the near edge of pavement).
- A fixed object (such as a culvert, pipe, headwall, retaining wall, bridge pier, or abutment).
- Other hazards as determined by the Traffic Engineer.

The clear zone is measured from either the face of curb or the near edge of pavement (on a road with shoulders). For public roads with a design speed of 30 miles per hour or less, private roads, or parking lots, the minimum clear zone is 7.5 feet. When there is a water hazard with a depth of 2 feet or more (as measured from the near edge of pavement), the minimum clear zone is increased to 10.0 feet. The width of the clear zone increases as the design speed of the road increases and can be found in the following table.

DESIGN SPEED OF ROADWAY (MPH)	30 or less	35 - 40	45 - 50	55
CLEAR ZONE WIDTH (FEET)	7.5	14	20	24

These dimensions are based on the clear zone having an average slope of 6:1 or flatter. If the average slope is steeper than 6:1 or a water hazard is present, the Traffic Engineer will determine the adequate clear zone requirement.

The Traffic Engineer shall make the final determination as to whether guardrail is warranted along a section of roadway based on a review of the plans, a field inspection after rough grading has been completed and/or prior to final acceptance. To avoid untimely adjustments to roadway features to facilitate guardrail, it shall be the responsibility of the developer to notify the Traffic Engineer of potential guardrail needs at the earliest possible stage of construction and prior to the installation of guardrail to ensure that the limits of the potential hazards are adequately protected.

### Acceptable Types

Except as noted herein, all guardrail materials, types and installation requirements shall be in accordance with the latest edition of the VDOT Road and Bridge Specifications and Standards. Non-standard guardrail will not be permitted in the County right-of-way.

Guardrail shall be the galvanized strong post system, standard GR-2. Guardrail terminal treatments are required on both the run-on and run-off ends of guardrail, except on roadways with raised or inverted median strips that physically divide opposing lanes of traffic. At locations where raised or inverted medians exist, guardrail terminal treatment will only be required on the run-on end of the guardrail installation. The preferred treatment should be the standard GR-6 with the end buried into a cut slope, even if the guardrail must be extended a short distance to tie into a cut slope. If this installation is not practical, the standard GR-7 or GR-9 Terminal Treatment must be used.

The minimum offsets from the edge of pavement or face of curb to the face of the guardrail are shown in the following table.

### Guardrail Offsets

Road Classification		Minimum Offset (In Feet) from Edge of Pavement or Face of Curb to Face of Rail
Class I – IV	Shoulders	6.0
	Curb & Gutter without Sidewalk	6.5
	Curb & Gutter with Sidewalk	6.5
Class V – IX	Shoulders	8.0
	Curb & Gutter without Sidewalk	6.5
	Curb & Gutter with Sidewalk	6.5

In order to obtain the above offsets and the 4-foot splays required for standard GR-7, it may be necessary to widen road sections and other engineering features. In addition, it may be necessary to dedicate additional right-of-way or dedicate permanent guardrail easements to encompass all the guardrail installation, if sufficient right-of-way does not exist for the placement and maintenance of the facility.

#### Applicability of the Standard

This standard applies to all types of development, including residential subdivisions, PODs, and CIPs.