



## **GDOT Road Safety and Horizontal Clearance**

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## 5. ROADSIDE SAFETY AND HORIZONTAL CLEARANCE

### 5.1. General Considerations

It is the goal of the Georgia Department of Transportation (GDOT) to provide and maintain a high quality statewide multimodal transportation system. Addressing roadside safety is key to achieving this goal. Promoting effective relationships with stakeholders is also a GDOT goal. Often, input from stakeholders regarding roadside amenities and design requires a proactive and ongoing coordination effort with stakeholders to achieve success. While these two goals may at times seem to be in competition with one another, it is important to recognize that each goal contributes to GDOT's ability to achieve its mission of providing a safe transportation system that is sensitive to the needs of its citizens and environment.

Features and elements generally encountered in roadside design for new construction or reconstruction projects are identified in respective sections of this chapter. Therefore, this chapter addresses the area outside of the actual roadway and it is an important component of highway design. Under certain circumstances, the policies described in this chapter may not be applicable to permitting existing facilities, relocation for reconstruction, or temporary conditions.

The recommended minimum horizontal clearances or offsets are also listed in this chapter. However, the reader is cautioned that the offsets alone do not present a complete solution to allow features or objects on the shoulder or roadside.

*GDOT strongly discourages arbitrary reduction of design speed  
in order to reduce offset requirements.*

To retain a roadway design element that does not comply with minimum Horizontal Clearance, the designer must request a design exception of the appropriate authority. Refer to the current GDOT *Plan Development Process (PDP)*<sup>1</sup> for information on the design exception process.

Sound engineering judgment and reasonable environmental flexibility should be exercised in selecting and specifying roadside features at each location. "Roadside" is defined in the American Association of State Highway and Transportation Officials (AASHTO) *Roadside Design Guide* as the area between the outside shoulder edge and the right-of-way limits. In curb and gutter sections, the roadside includes the urban shoulder, which is part of an urban roadway that begins at the edge of traveled way and extends to the right-of-way limit or to the breakpoint of the fore slope or back slope that ties to the natural terrain (2006).

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<sup>1</sup> GDOT. *Plan Development Process (PDP)*. 2006

The current version of this document is available on the GDOT Repository for Online Access to Documentation and Standards (R-O-A-D-S) web page at: <http://www.dot.state.ga.us/dot/preconstruction/r-o-a-d-s/Other%20Resources/index.shtml>

The following elements should, at a minimum, be considered by the designer, even when compliance with established offsets is proposed:

- current traffic volumes
- design year traffic volumes (for projects under design)
- truck percentages
- current detailed crash history
- posted speed limit
- design speed (if available)
- operating speed (85<sup>th</sup> percentile, off peak)
- functional classification of the roadway
- roadway setting/context (urban environment, rural, residential, commercial, historic district, etc.) and if the proposed project fits in with the roadway setting/context
- existing operations (e.g. sight distance or vehicular operations), and the proposed project's affect on those operations
- maintenance
- existing roadside elements (e.g. permitted utilities or lighting) impacted/affected by the proposed project
- proposed roadside elements and their consistency with the needs of the corridor (e.g. safety, utility, and aesthetic needs for pedestrian, bicycle, transit, vehicular traffic; consistency needs in terms of conformity with local, regional, and state roadside amenity values)
- mitigation measures that should be considered (including the removal or relocation of fixed objects, the reduction of impact severity by implementing breakaway or traversable features, and the shielding of fixed objects with traffic barriers such as guard rail)

## 5.2. Rural Shoulder Horizontal Clearance

Horizontal clearance is the lateral distance measured either from the traveled way or the face of curb, to the face of a roadside object or feature. The rural shoulder is the part of the roadway beyond the edge of traveled way that is graded or paved flush with the edge of traveled way to allow for emergency usage (AASHTO 2006).

Horizontal clearance for rural type shoulders, including graded or paved surfaces, is based on the concept of clear zone that is established by the AASHTO *Roadside Design Guide*. By definition, clear zone is the area beyond the roadway edge of traveled way which provides an environment free of fixed objects, with stable, flattened slopes which enhance the opportunity for reducing crash severity (AASHTO, 2006). Fixed objects include trees, large shrubs, bodies of water, and elements of the roadway facility such as road signs, structure piers, utility poles or light standards, and

electrical or controller cabinets, or other non-moveable objects that can pose a safety hazard to a vehicle and its occupants if the vehicle leaves the roadway.

In determining the acceptable clear zone for a particular roadway and prevailing condition, refer to the current *AASHTO Roadside Design Guide* in its entirety, and not just to the tables provided in Chapter 3 of the Guide. Principles of clear zone safe drainage treatments, ditch designs, curve correction factors, and many other features of the clear zone concept are key elements to an overall safe and aesthetically pleasing roadside design. It is not the intent of this Manual to reproduce the clear zone values that are provided in the *AASHTO Roadside Design Guide*.

It is desirable to provide the maximum clear zone that is commensurate and practical for the prevailing conditions. The maximum clear zone values, based on the traffic volume, slope, geometry and speeds identified in the current *AASHTO Roadside Design Guide* should be utilized when providing full reconstruction of the roadway. If not practical to provide the recommended upper value due to overall highway design considerations, the minimum values should be observed, for the respective conditions. For retro-fit types of projects, achieving the minimum clear zone values are acceptable.

The minimum horizontal clearance for the lowest type of rural roadways (local and collectors) is 10-ft., regardless of traffic volumes.

Features or objects located within the accepted clear zone for a roadside should comply with the guidelines provided in the *AASHTO Roadside Design Guide*. If features or fixed objects cannot be removed or modified to become clear zone compliant, they should be shielded in a cost effective manner that is consistent with current practice and standards. It is GDOT's policy that fixed objects in median areas of 64-ft. or less that can not be eliminated shall be treated with cost-effective shielding devices, such as guardrail, impact attenuators, or earth-mound redirection design.

In cases where road median widths are greater than 64-ft., but less than 84-ft., specific engineering judgment should be made by the designer. For medians wider than 84-ft., it is not necessary to protect fixed objects that are located near the center of the median and outside the required clear zone. For roadsides, it is GDOT's policy to shield objects that are within the defined clear zone. The intent of the designer should be to reduce the seriousness of the consequences of a vehicle leaving the roadway.

### 5.3. Urban Shoulder Horizontal Clearance

Horizontal clearance on urban roadways is not based entirely on the clear zone concept due to various pre-existing conditions and urban roadway shoulder constraints, although clear zone considerations may apply under certain conditions, such as run-off-road (ROR) crash history, excessive volumes, geometric conditions, excessive operating speeds, new location construction, etc. Urban roadways are generally confined on the roadside and are posted at speeds of 45 mph or less. According to the *AASHTO Roadside Design Guide*, the presence of curb and gutter within the roadside, even barrier-faced, does not generally redirect a vehicle, especially at speeds above 25 mph. Horizontal clearance for urban roadways is based on the specific feature or element being considered, and generally is related to a combination of environmental, operational and safety characteristics, both for pedestrians and vehicular traffic.

According to the *AASHTO Roadside Design Guide*, Chapter 10, Roadside Safety in Urban or Restricted Environments, uniform horizontal clearance between traffic and roadside features is desirable (2006). It is GDOT's intent to facilitate this principle as much as practical, using this guide and ongoing education and collaboration with GDOT staff and participating stakeholders.

The GDOT *Pedestrian and Streetscape Guide*<sup>2</sup>, written and maintained by the GDOT Office of Planning, has direct application on urban shoulder usage. The GDOT *Pedestrian and Streetscape Guide* provides guidance for design professionals, developers, municipalities and others regarding the design, construction, and maintenance of pedestrian facilities.

The GDOT Office of Utilities employs the GDOT *Utility Accommodation Policy and Standards Manual*<sup>3</sup> to guide decisions for utility facility placement on public right of ways. Both rural and urban conditions are addressed in this document.

From an operational perspective, the horizontal offset of 1-ft., 6 in. from face of curb to fixed object stated in the AASHTO *Green Book* (2004) shall be an absolute minimum horizontal clearance for urban roadways. If this controlling AASHTO criterion is violated, a design exception will be required.

## 5.4. Horizontal Clearances for Signs

### 5.4.1. Sign Placement

Placement of traffic control, informational, or any other types of signs that are allowed on the road right of way shall be in accordance with the most current edition of the Federal Highway Administration (FHWA) *Manual of Uniform Traffic Control Devices, (MUTCD)*<sup>4</sup>, and with practices and policies of the GDOT Office of Traffic Safety and Design.

Obstruction of sidewalks should be avoided in reconstruction projects. However, encroachments of sign placements in sidewalks, if necessary as a retrofit, shall ensure that an unobstructed, ADA-compliant sidewalk is provided.

### 5.4.2. Sign Supports

Sign supports, except for overhead sign supports, shall be frangible or breakaway in rural or urban shoulder environments. If the support is located outside the accepted clear zone for the roadway, frangible or breakaway design is not required.

If overhead sign supports are required within the accepted clear zone for the prevailing rural condition, the support should be shielded with barrier or guardrail.

Overhead sign supports in urban roadways should observe the same horizontal clearance requirements as utility installations in urban roadways. However, if this is not practical, the minimum horizontal clearance from the face of curb to the face of the support is 8-ft.

<sup>2</sup> GDOT/Otak. *Pedestrian and Streetscape Guide*. 2003

The 2003 version of this publication is available online at: [http://www.dot.state.ga.us/dot/plan-prog/planning/projects/bicycle/ped\\_streetscape\\_guide/index.shtml](http://www.dot.state.ga.us/dot/plan-prog/planning/projects/bicycle/ped_streetscape_guide/index.shtml)

<sup>3</sup> GDOT. *Utility Accommodation Policy and Standards Manual*. 1988

The three-part document and addenda to this publication are available online at: <http://www.dot.state.ga.us/dot/operations/utilities/88manual.shtml>

<sup>4</sup> FHWA. *Manual on Uniform Traffic Control Devices (MUTCD)*. 2003

The 2003 version of this publication is available online at: <http://mutcd.fhwa.dot.gov/kno-2003r1.htm>

## 5.5. Horizontal Clearance for Light Standards

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### 5.5.1. High Mast Roadway Lighting

High mast lighting should be positioned outside the clear zone. If this is impractical, cost-effective shielding shall be provided in accordance with current standards for roadside barrier.

### 5.5.2. Roadway Lighting

Roadway lighting shall be placed on or along the outside shoulders as described below. Median lighting is only acceptable if integrated with concrete median barrier installations.

The size of the base must be considered when measuring horizontal clearance. Breakaway or frangible bases are generally wider than the pole.

Light standards should be mounted outside the clear zone. Any light standards that are not located outside of the clear zone shall be mounted on an AASHTO compliant breakaway mounting.

#### Rural Shoulders

The horizontal distance from the edge of traveled way or the edge of the auxiliary lane to the base of the light standard should be no less than 20-ft.

#### Urban Roadways

In urban roadway conditions, light standards should be positioned in accordance with rural shoulder guidelines or as close to the right of way line as possible.

If it is not feasible to comply with the above statement, light standards shall be placed directly outside of the sidewalk and at least 7-ft. from the face of curb. Coordination of street light placement with sidewalks and other roadside features shall ensure that at least 4-ft. of usable sidewalk remains, and that the lights do not conflict with other permitted features or elements on the urban shoulder.

### 5.5.3. Pedestrian lighting (non roadway)

All pedestrian light standards shall be located at the back of the sidewalk. If sidewalk is not present, the light standards shall be placed a minimum of 7-ft. from the face of curb.

## 5.6. Horizontal Clearances for Utility Installations

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### 5.6.1. General Guidance

Utility installations are governed by the *GDOT Utility Accommodation Policy and Standards Manual (UAPSM)*. Designers should read and understand the referenced policy, in conjunction with the policies and guidelines set forth in this Manual.

### 5.6.2. Rural Shoulders

Refer to **Table 5.1.** for GDOT policies related to horizontal clearances for utility installations on roadways with rural shoulders.

**Table 5.1 Horizontal Clearances for Utility Installations: Rural Shoulders**

| Posted Speeds | Slope Condition                           | GDOT Policy  |
|---------------|---|--|
| < 60 mph      | fill section with slopes 4:1 or flatter   | Utility obstacles shall be located at least 30-ft. from the edge of traveled way to the face of the obstacle   |
| < 60 mph      | fill section with slopes steeper than 4:1 | The horizontal distance in which slopes steeper than 4:1 are encountered is not to be considered as 'traversable and recoverable'. Consult the AASHTO <i>Roadside Design Guide</i> and the UAPSM for full understanding. |
| ≥ 60 mph      | all slope conditions                      | Utility obstacle shall be located outside the accepted clear zone for the prevailing conditions, or 30-ft., whichever is greater.  |

**5.6.3. Urban Shoulders**

Utility obstacles shall be positioned as near as possible to the right of way or utility easement.

Utility obstacles should be placed in keeping with the nature and extent of roadside development.

Horizontal clearance for utility obstacles is measured from the face of curb to the face of pole or obstacle.

No utility obstacle shall encroach on current sidewalk clearances required by ADA.

For utility relocation on urban highway projects, it is desirable for the utility offset to be governed by design speed, ADT, etc.

The designer shall conform to the minimum horizontal clearances listed in **Table 5.2**.

**Table 5.2 Horizontal Clearances for Utility Installations: Urban Shoulders**

| Posted Speeds         | Minimum Horizontal Clearance |
|-----------------------|------------------------------|
| < 35 mph              | 6-ft.                        |
| ≥ 35 mph and < 45 mph | 8-ft.                        |
| = 45 mph              | 12-ft.                       |

**5.7. Horizontal Clearances for Signal Poles and Controller Cabinets for Signals**

Horizontal clearances for signal poles and controller cabinets for signals are designated by the GDOT Office of Traffic Safety and Design Traffic Signal Design Guidelines<sup>5</sup>.

**5.7.1. Rural Shoulders**

On roadways with rural shoulders, signal poles and controller cabinets for signals shall be located outside the clear zone.

<sup>5</sup> Design Aids are available on the GDOT Office of Traffic Safety and Design's web page at: <http://www.dot.state.ga.us/dot/operations/traffic-safety-design/designaids.shtml>

### 5.7.2. Urban Shoulders

The horizontal clearance for signal poles and controller cabinets for signals shall be located a minimum of 6-ft. from face of curb or behind sidewalk, whichever is greater.

## 5.8. Horizontal Clearances to Trees and Shrubs

Guidance on horizontal clearances with regard to trees and shrubs is provided from the GDOT Office of Maintenance, which also includes approvals through the Office of Traffic Safety and Design. Additional guidance is provided by the Office of Planning through the GDOT *Pedestrian and Streetscape Guide*.

Utilities and intersection sight distance requirements may affect the location and diameter size of proposed trees in the horizontal clearances and clear zone. Clear zone requirements can be found in the current AASHTO *Roadside Design Guide* or in Chapter 4 of the current GDOT *Regulations for Driveway and Encroachment Control* <sup>6</sup>.

The design speed shall be used to determine horizontal clearance criteria.

### 5.8.1. Rural Shoulders

On roadways with rural shoulders, trees and shrubs shall be located outside the clear zone.

### 5.8.2. Urban Shoulders

On roadways with urban shoulders with a posted design speed of greater than 45 mph, trees and shrubs shall be located outside of the clear zone.

On roadways with urban shoulders with a posted design speed of 45 mph or less, refer to **Table 5.3.** for minimum horizontal clearances for trees and shrubs.

The designer should note that AASHTO *Roadside Design Guide* measurement of trees differs from that of landscape architects. The recommended point to measure a tree is 6 inches above the base of the tree.

**Table 5.3 Horizontal Clearances to Trees and Shrubs: Urban Shoulders**

| Posted / Design Speeds   | Minimum Horizontal Clearance <sup>(1)</sup> |
|--|---|
| <b>Tree Size<sup>(2)</sup> ≤ 4 inches</b>  |   |
| ≤ 35 mph   | 4-ft.                                       |
| 40 to 45 mph   | 8-ft.                                       |
| <b>Tree Size<sup>(2)</sup> &gt; 4 inches</b>   |   |
| ≤ 35 mph   | 8-ft.                                       |
| ≤ 35 mph<br>(Commercial Area <sup>(3)</sup> )  | 4-ft.<br>8-ft. in median                    |
| 40 mph   | 10-ft.<br>16-ft. in median                  |
| 45 mph   | 14-ft.<br>22-ft. in median                  |
| <sup>(1)</sup> From center of tree to face of curb   |   |
| <sup>(2)</sup> Tree size is diameter of the tree at maturity, measured at 6-inches above the base of the tree.                       |   |
| <sup>(3)</sup> In a Central Business District and/or where commercial businesses are typically directly adjacent to the right-of-way |   |

<sup>6</sup> GDOT. *Regulations for Driveway and Encroachment Control*. 2006

The 2006 version of this publication is available online at: <http://www.dot.state.ga.us/dot/preconstruction/r-o-a-d-s/DesignPolicies/index.shtml> Note: It is named "GDOT Driveway and Encroachment Control Manual" in the R-O-A-D-S Index.

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