

Sight Distance

Background

According to the [American Association of State Highway and Transportation Officials \(AASHTO\)](#), the ability of a driver to see ahead on the roadway is of paramount importance for the safe and efficient operation of a vehicle. In general, sight distance refers to the driver's line of sight. Insufficient sight distance is a significant factor in roadway crashes and many other near collisions.

Sight distance can be categorized into various types: (1) *stopping sight distance (SSD)*, (2) *decision sight distance (DSD)*, (3) *passing sight distance (PSD)*, and (4) *intersection sight distance (ISD)*. Each of these sight distances considers the reaction time of the driver and the subsequent time to complete the associated task (e.g., stopping, slowing, or maneuvering). Although summaries of these sight distance values are provided in this fact sheet, the actual formulas and figures used to determine these values should be obtained from AASHTO's *A Policy on Geometric Design of Highways and Streets* (AASHTO Green Book).

Stopping Sight Distance

Stopping sight distance is calculated as the sum of (1) the distance a vehicle travels from the instant a driver sees an object necessitating a stop until the instant the brakes are applied, and (2) the distance required to actually stop the vehicle once the brakes are applied. In roadway design, the SSD is used to determine if drivers will have sufficient time to stop. Specifically, SSD is affected by both horizontal and vertical curves in a roadway's alignment.



Source : Iowa State University Center for Transportation Research and Education
- *Handbook of Simplified Practice for Traffic Studies*

It is important to understand the SSD available along roadways to determine if motorists are being afforded sufficient time to stop their vehicle. In the event that appropriate SSD is not available there are various countermeasures that can be considered. For example, one countermeasure that could improve conditions immediately is the trimming of brush that obstructs sight lines. Longer-term solutions may include geometric changes in horizontal and vertical curves.

Did You Know?

The Federal Highway Administration reports that crash rates tend to increase as the available sight distance decreases.



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Decision Sight Distance

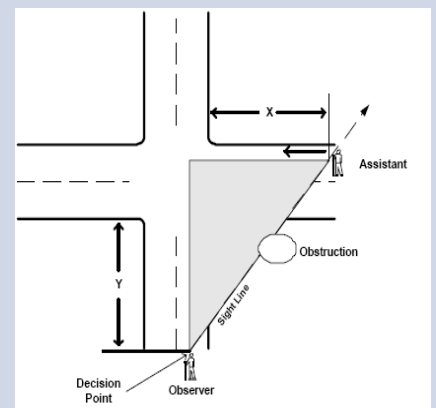
Decision sight distance (DSD) refers to the sight distance needed for a driver to (1) detect an unexpected or difficult-to-perceive condition in a roadway environment, (2) recognize the threat condition, (3) select an appropriate speed and path, and (4) initiate and complete the maneuver safely and efficiently. Some common examples of DSD on the roadway include the distance required to slow down for a turn, a merge, a lane drop, or an exit. It is important to consider DSD at locations where drivers may require additional time or distance due to complex driving situations. Because DSD is a greater distance than SSD, advance warning signs of an upcoming maneuver or required action may be warranted.

Passing Sight Distance

Passing sight distance (PSD) is the length of roadway needed to complete a normal passing maneuver. PSD is the distance required to make a decision, react, pass, and rejoin the traffic stream. A calculation of PSD helps to determine if sufficient distance is available to allow for a passing zone to be installed or to determine if a current passing zone actually affords motorists sufficient distance and time to complete a passing maneuver.

Intersection Sight Distance

Intersection sight distance (ISD) refers to the line of sight between a driver on a roadway and a vehicle attempting to enter from a side street or driveway. This value is critical in determining where driveways or other access points should be located, or what traffic control devices are necessary, to ensure that adequate ISD is provided. ISD is easily measured in the field, and information on this procedure can be found in the AASHTO Green Book.



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PSD should be periodically re-evaluated to determine if adequate sight distance is provided per the AASHTO Green Book. Passing zones should be removed or adjusted when adequate PSD can not be provided

Countermeasures for Improving or Mitigating Sight Distance

A simple and relatively low cost and quick solution can be trimming trees, bushes, and plants within the right of way. Without disturbing private property or historic sites, one possible approach is to take annual visits around town and trim overhanging branches or trim bushes that affect the driver's line of sight. On private property, a respectful conversation with residents or property owners can often result in permission to trim on private property.

Utilizing traffic signs can also be an effective strategy. Signage can be added to alert drivers of an upcoming situation that is out of sight distance range. For example, adding a turn ahead or railroad grade crossing sign can help mitigate limitations in available sight distance. Also consider that some signs may inhibit sight distance so removing unnecessary signs that interfere with sight distance can also be effective.



Turn Ahead
Warning Sign
(Source MUTCD)

Another option that may help mitigate sight distance would be the establishment of an advisory speed. Although an advisory speed plaque does not guarantee that a driver will slow down, it may alert the driver that this section of roadway could be hazardous. Please note that these speeds are not enforceable, and advisory speed plaques should be mounted with the warning sign it is intended to supplement.



Sample Advisory
Speed Plaque
(W13-1)
(Source MUTCD)

Altering the roadway or intersection itself may be a long-term, higher-cost countermeasure that may improve sight distance.

Resources

A Policy on Geometric Design of Highways and Streets

The AASHTO Policy, also known as the AASHTO "Green Book", is based upon established design practices, and is intended to provide guidance in roadway design. This document is available for purchase through AASHTO at <https://bookstore.transportation.org/>

Massachusetts Traffic Safety Toolbox Series

This series of fact sheets provides information on safety improvements that can be implemented at the local level. Information on problem areas, possible countermeasures, and implementation considerations is included in each fact sheet which can be found at www.mass.gov/mhd/safetytoolbox/



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