TRAFFIC AND SAFETY MANUAL

Chapter 7 – Traffic Engineering Studies
7G – Sight Distance Studies

Intersection Sight Distance

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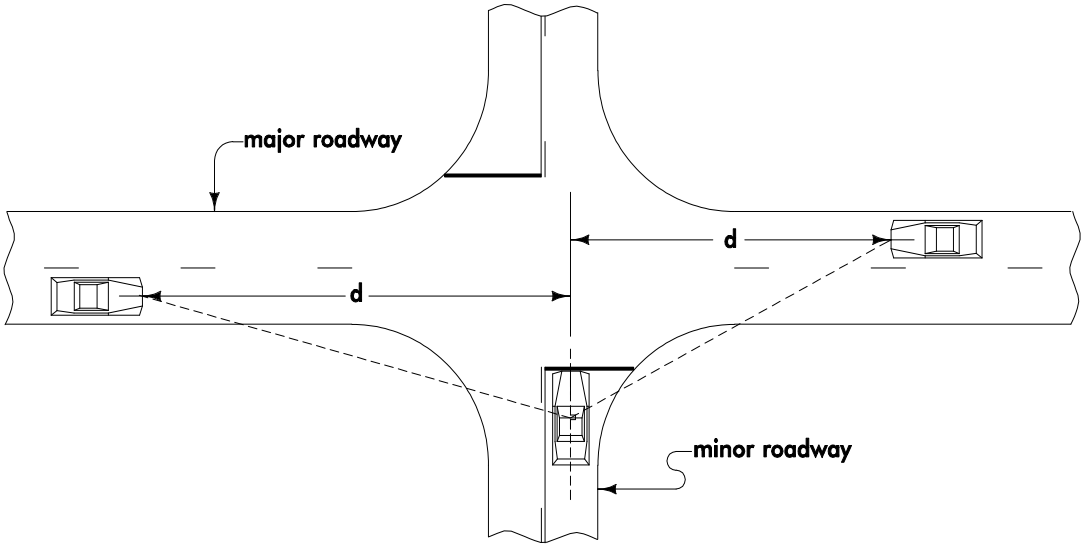
General

An intersection sight distance study is performed to determine if adequate sight distance, from a design perspective, exists for a driver negotiating an existing intersection. If the study results in a finding that the existing sight distance is less than adequate for design purposes, it is appropriate to install an Intersection or Side Road warning sign.

As shown in Figure 1, horizontal sight distance (d) is the leg of the sight triangle that is along the major roadway. The sight triangle is the right triangle designated by the stopped driver's eye, the middle of the intersection, and the approaching vehicle. An adequate sight distance is achieved when no part of the sight triangle is obstructed from the view of the stopped driver.



HORIZONTAL SIGHT DISTANCE

Figure 1

Sight distance for at grade intersections is based on a stop condition on the minor road. The sight triangle is based on the assumed location of the stopped driver's eye, the time required for the stopped vehicle to enter the road (left turn movement) or to clear through traffic lanes (straight-across movement), and the speed of the approaching vehicle.

Criteria

Established criteria must be used in the study of available sight distance at existing intersections. These criteria are based on information found in Section 6D-1 of the Iowa Department of Transportation Design Manual with minor modifications as listed below.

- The passenger design vehicle is normally used to determine the minimum sight distance. A single unit truck (bus) or combination truck may be used if warranted by conditions present at the intersection under study.
- The location of the stopped driver's eye is 14.5 feet behind the near edge of the traveled way of the major road if there is no stop line on the minor road. If there is a stop line on the minor road, the location of the driver's eye is 18 feet from the traveled way. This distance may be reduced if the stop line is closer than 10 feet from the major road.
- The height of eye of the driver of the stopped vehicle is 3.5 feet.
- The lateral location of the driver of the stopped vehicle is the left wheel path.
- The height of the object on the major road is 3.5 feet.
- The lateral location of the object on the major road is the center of the near lane for each direction of travel.
- The straight across movement is used at four-way intersections and the left-turn movement is used at "T" or ramp intersections.
- It is appropriate to use a speed of 60 MPH for a location with a posted speed limit of 55 MPH or 70 MPH for a location with a posted speed limit of 65 MPH. If the location is in a speed zone of less than 55 MPH, the actual posted speed limit is used.

Calculations

The needed sight distance at the intersection under study is calculated as shown in Section 6D-1 of the Iowa Department of Transportation Design Manual. Table 1 provides time gaps for left-turn and straight-across movements for various design vehicles. The listed time gaps are for a stopped vehicle at an intersection with a two-lane highway with no medians and grades of 3% or less. Adjustments for multi-lane highways are required as noted in the table and the needed sight distance must be calculated using the formula provided. Also, if the single unit truck (bus) or combination truck is used because of unique conditions at the site, the needed sight distance must be calculated using the formula provided.

If no adjustments are needed for type of vehicle, number of lanes or width of median the minimum sight distance along the thru highway may be taken from Table 2, adjusted by the factors in Tables 3 and 4, and applied as shown in Figures 2 through 7 to determine the minimum sight distance at the location under study.

Due to operational rather than design considerations, as well as signing standards currently in use, median widths of less than 30 feet should be used in determining the number of lanes to be crossed at divided highway intersections. For example, a 24-foot median should be considered as two additional lanes. At divided highway intersections with a median width of 30 feet or more, sight distance to the left is used for the first stop and sight distance to the right is used for the stopped position in the median.

Determination of Signing Need

The available sight distance needs to be compared with the needed sight distance to determine if signing is needed. If the available sight distance is less than the calculated sight distance, Cross Road or Side Road warning signing should be considered.

Documentation

For many studies, the findings, conclusions and recommendations must be clearly conveyed to those who are responsible for acting on the results. This is done through the use of a memo, letter or more formal report. Some study presentations include the use of forms, tables or graphs depicting the data collected. The documentation for an intersection sight distance study should include when, where and by whom the study was conducted, and that it was done in conformance with established guidelines. The calculation of needed sight distance should be shown and compared to the measured available sight distance to show why signing is or is not being recommended.

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