Subdivision - Intersection Sight Distance Examples

(Examples reference AASHTO "Green Book", 2011 (6th Edition), Chapter 9)

Departure sight triangles for intersections with stop control on the minor road should be considered for two situations as depicted in Figure 9-15:

Case B1 – Left turns from the minor road; and

Case B2 – Right turns from the minor road

Include the following note on all Record Plans: Shrubbery, plantings, signs and/or other visual barriers that could obstruct the sight distance of a driver preparing to enter the roadway are prohibited within the defined departure sight distance triangle area established on this plan. If the established sight distance triangle area is outside the right-of-way or projects onto an adjacent property owner's land, a sight easement shall be established and recorded with all affected property owners to maintain the required sight distance.

Example 1

2 lane highway
Highway Grade = 2.7%
Minor Road Approach Grade = 0.7%
Posted Speed = 40 MPH
Find left turn (case B1) and right turn (case B2) departure sight distances for a passenger car. Prepare a profile along driver's line of sight to verify no obstructions to the driver's view.

D.S. or V_{major} = 45 MPH

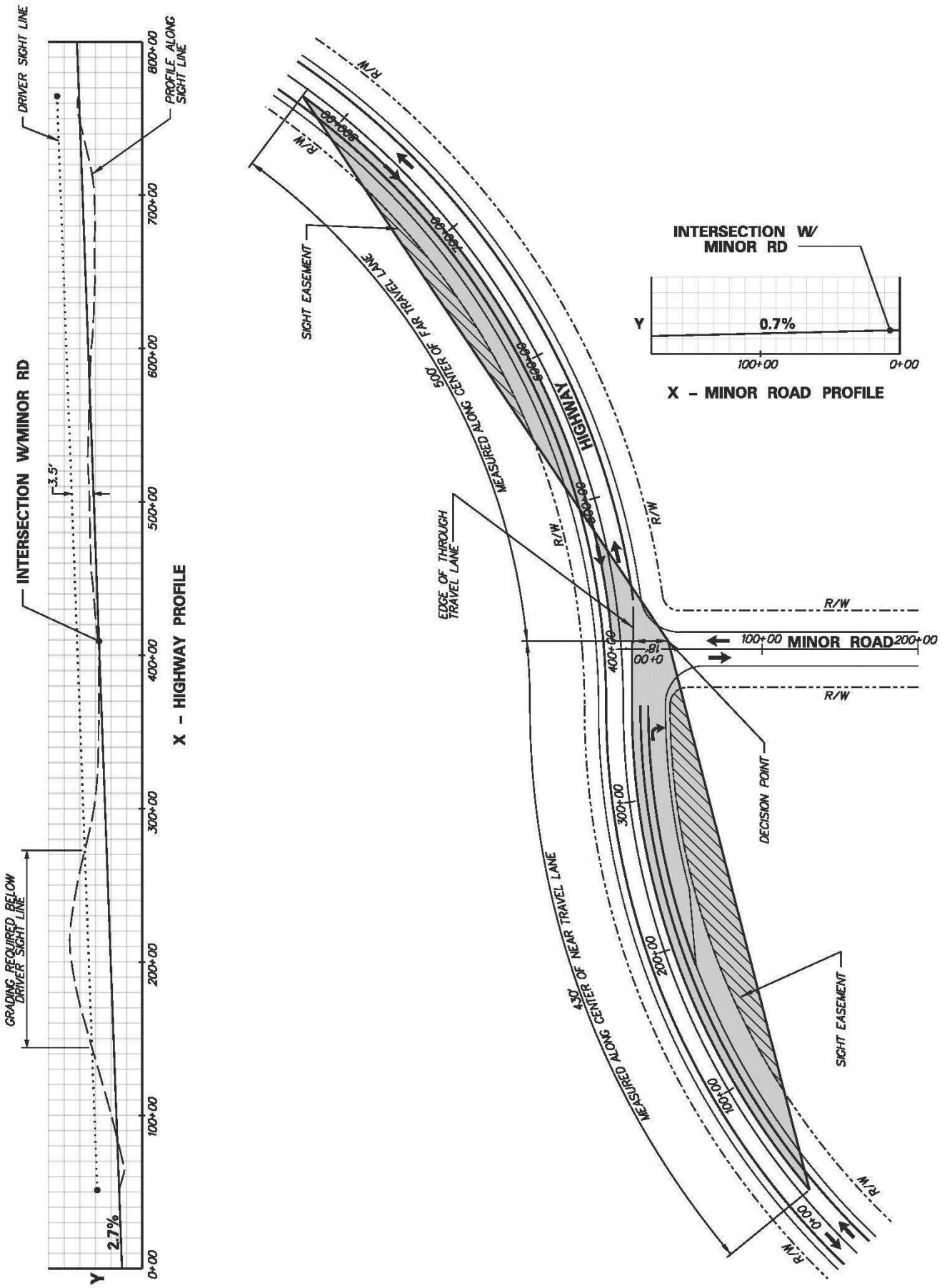
Using Table 9-5, t_g =7.5 sec for a passenger car

There is no adjustment needed for crossing the right turn lane, since the decision point is measured from the edge of the through lane and is not affected by the right turn lane.

For left turn (B1), using Table 9-6, ISD = 500 feet
For right turn (B2), using Table 9-8, ISD = 430 feet

The calculated sight distance will follow the center of the approach lane, which is a curve in this example (dimension "b" in Figure 9-15).

Locate the Decision Point (dimension "a" in Figure 9-15) 18' from the edge of the through travel lane of the major road. Dimension the 500' for the left turn (B1) along the middle of the approaching far lane and then draw the hypotenuse from that point to the decision point. Dimension the 430' for the right turn (B1) along the middle of the approaching near lane and then draw the hypotenuse from that point to the decision point. A sight easement will be required for any portions of the sight triangle that falls outside of the right-of-way on either side of the highway as shown on the cross hatched areas. In addition, the terrain must be graded below the driver's sight line from station 150+00 to 275+00 to provide an unobstructed line of sight.


INTERSECTION W/MINOR RD
DRIVER SIGHT LINE
PROFILE ALONG SIGHT LINE
3.5'
GRADING REQUIRED BELOW DRIVER SIGHT LINE
2.7%
Y
0+00
100+00
200+00
300+00
400+00
500+00
600+00
700+00
800+00
X - HIGHWAY PROFILE
INTERSECTION W/ MINOR RD
0.7%
X - MINOR ROAD PROFILE
R/W
SIGHT EASEMENT
500' OF FAR TRAVEL LANE MEASURED ALONG CENTER
HIGHWAY
EDGE OF THROUGH TRAVEL LANE
MINOR ROAD
DECISION POINT
430' OF NEAR TRAVEL LANE MEASURED ALONG CENTER

EXAMPLE 1

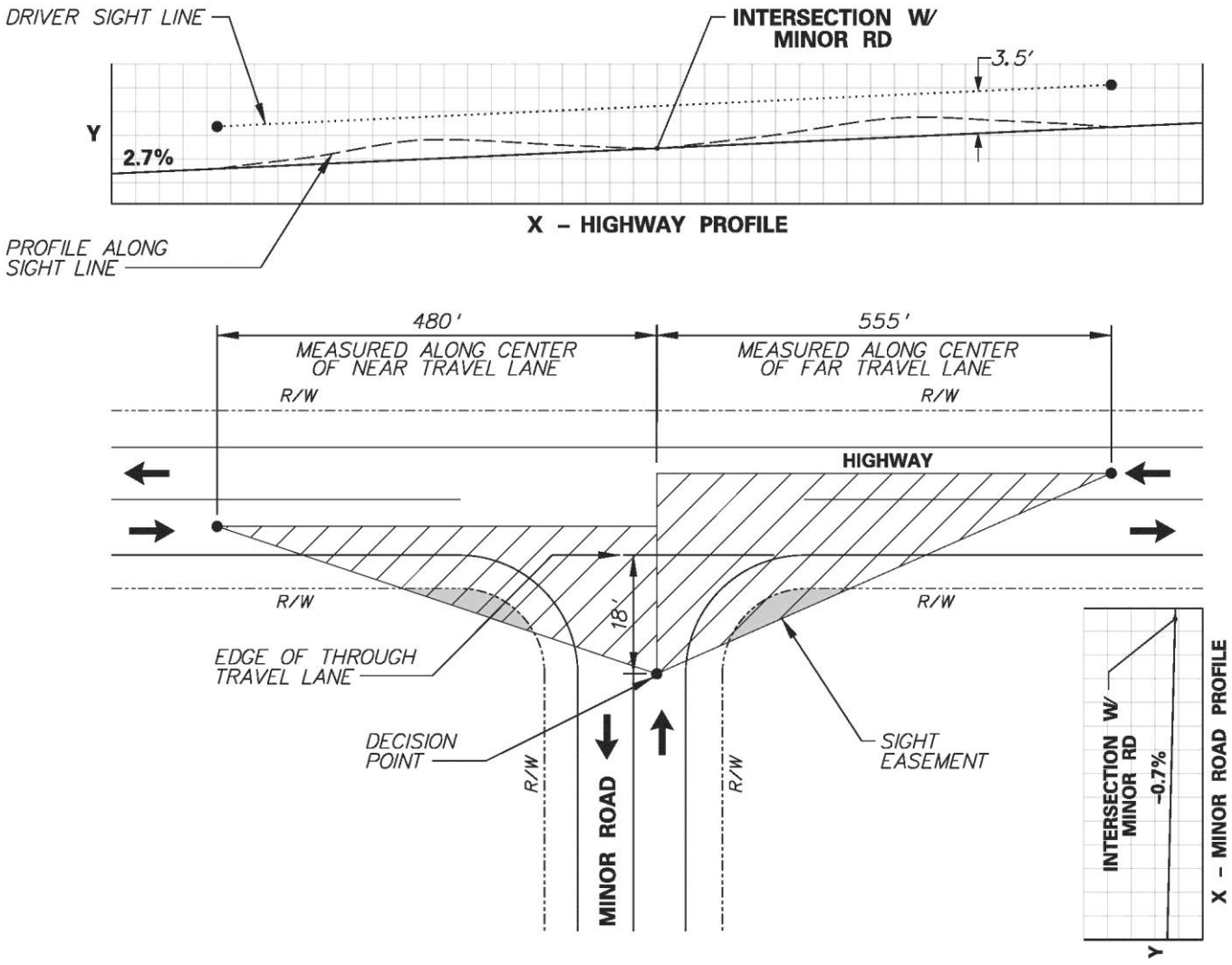
Example 2

2 lane highway
Highway Grade = 2.7%
Minor Road Approach Grade = 0.7%
Posted Speed = 45 MPH
Find left turn (case B1) and right turn (case B2) departure sight distances for a passenger car. Prepare a profile along driver's line of sight to verify no obstructions to the driver's view.

D.S. or V_{major} = 50 MPH

Using Table 9-5, t_g =7.5 sec for a passenger car

For left turn (B1), using Table 9-6, ISD = 555 feet
For right turn (B2), using Table 9-8, ISD = 480 feet
The terrain must be graded below the driver's sight line as indicated on the profile to provide an unobstructed line of sight.



Example 3

4 lane divided highway w/ 22' wide median
Highway Grade = 4.3%
Minor Road Approach Grade = -0.9%
Posted Speed = 50 MPH
Find left turn (case B1) and right turn (case B2) departure sight distances for a passenger car. Prepare a profile along driver's line of sight to verify no obstructions to the driver's view.

D.S. or V_{major} = 55 MPH

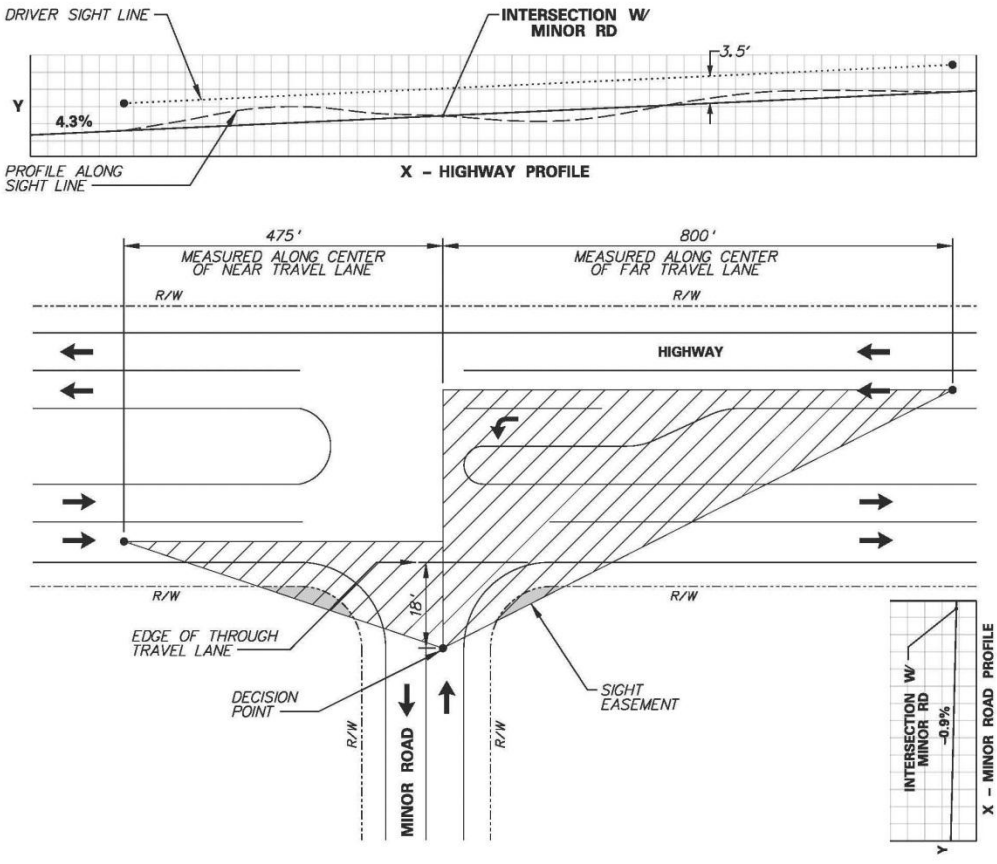
For left turn (B1), using Table 9-5, t_g =7.5 sec for a passenger car but additional time is needed to cross the additional travel lane and the median. Add 0.5 second to cross the additional near lane and 1.0 second to cross the median, which will be considered two additional lanes.

Therefore, t_g = 7.5 + 0.5 + 1.0 = 9.0 seconds

Using ISD = 1.47 * V_{major} * t_g Per Table 9-4, use 1.1 adjustment factor for approach highway grade
ISD = (1.47 * 55 * 9.0) * 1.1
ISD = 727.65 * 1.1 = 800.4 feet or <u>800 feet</u>

For Right Turn (B2), using Table 9-7, t_g =6.5 sec for a passenger car.

Using ISD = 1.47 * V_{major} * t_g Per Table 9-4, use 0.9 adjustment factor for approach highway grade
ISD = (1.47 * 55 * 6.5) * 0.9
ISD = 525.5 * 0.9 = 472.9 feet or <u>475 feet</u>
No obstructions exist to the driver's view on the profile.



Example 4

2 lane highway

Highway Grade = -6%

Minor Road Approach Grade = -1.5%

Posted Speed = 50 MPH

Find left turn (case B1) and right turn (case B2) departure sight distances for a passenger car. Prepare a profile along driver's line of sight to verify no obstructions to the driver's view.

D.S. or V_{major} = 55 MPH

Using Table 9-5, t_g =7.5 sec for a passenger car

For left turn (B1), using Table 9-6, ISD = 610 feet

Per Table 9-4, use 0.9 adjustment factor

ISD = 610 * 0.9

ISD = 549 feet or <u>550 feet</u>

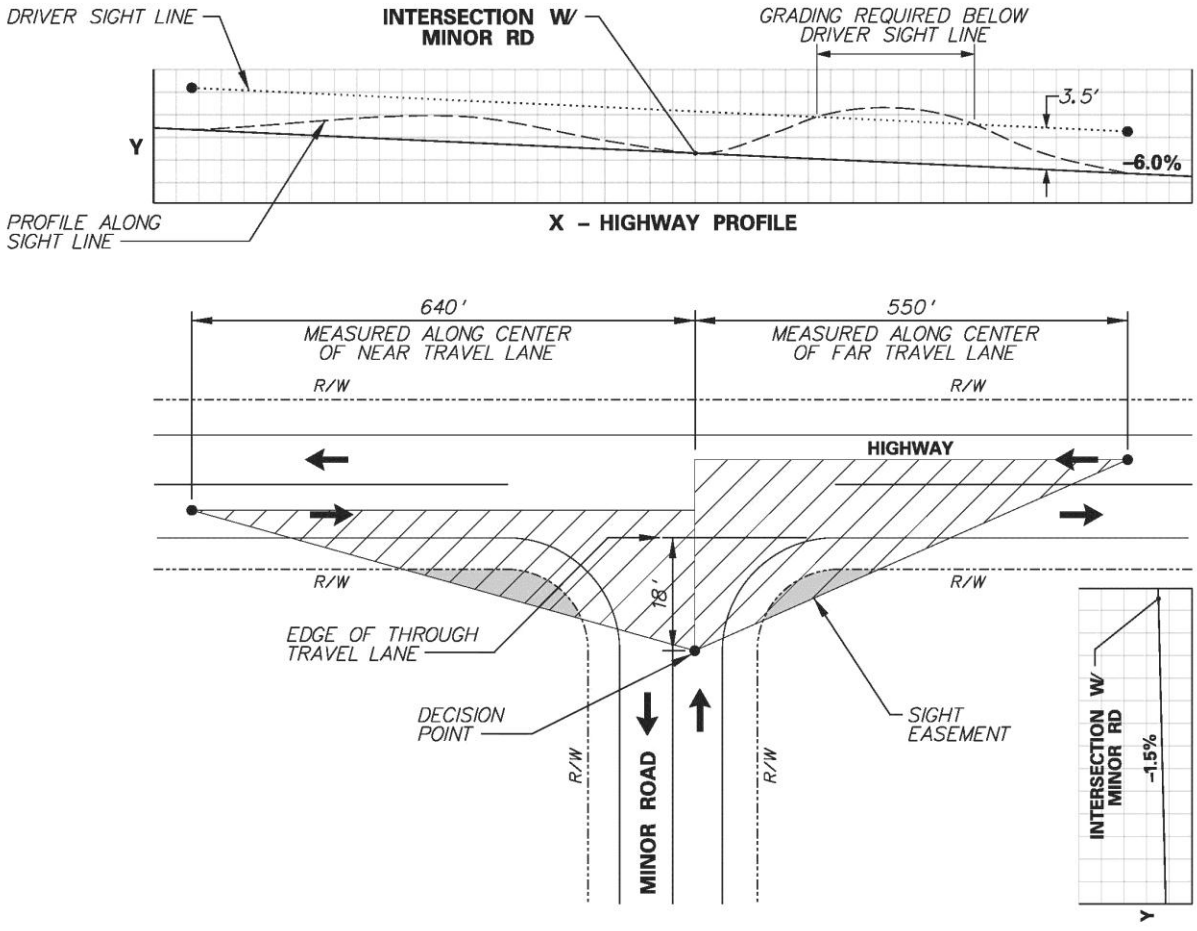
For right turn (B2), using Table 9-8, ISD = 530 feet

Per Table 9-4, use 1.2 adjustment factor

ISD = 530 * 1.2

ISD = 636 feet or <u>640 feet</u>

No obstructions exist to the driver's view on the profile.



Example 5

4 lane divided highway with center left turn lane
Highway Grade = -1.5%
Minor Road Approach Grade = 3.5%
Posted Speed = 40 MPH
Find left turn (case B1) and right turn (case B2) departure sight distances for a passenger car. Prepare a profile along driver's line of sight to verify no obstructions to the driver's view.

D.S. or V_{major} = 45 MPH

For left turn (B1), using Table 9-5, t_g =7.5 sec for a passenger car but additional time is needed for the additional near lane, turn lane and the minor road approach grade which is greater than 3%.

Therefore, t_g = 7.5 + 0.5 + 0.5 + (3.5*0.2) = 9.2 seconds
Using ISD = 1.47 * V_{major} * t_g
ISD = 1.47 * 45 * 9.2
ISD = 608.6 feet or <u>610 feet</u>

For right turn (B2), using Table 9-7, t_g =6.5 sec for a passenger car but additional time is needed for minor road approach grade which is greater than 3%.

Therefore, t_g = 6.5 + (3.5*0.1) = 6.85 seconds
Using ISD = 1.47 * V_{major} * t_g
ISD = 1.47 * 45 * 6.85
ISD = 453.1 feet or <u>455 feet</u>
No obstructions exist to the driver's view on the profile.