

Example Problem 6D-1_2: Intersection with a Two-lane Highway

Determine if the bridge barrier rail restricts intersection sight distance for a left turn maneuver.

Given:

Local Road intersecting a 2-lane state highway

Design speed of the 2-lane highway = 60 mph

Bridge barrier height = 34 inches

Design vehicle – passenger car

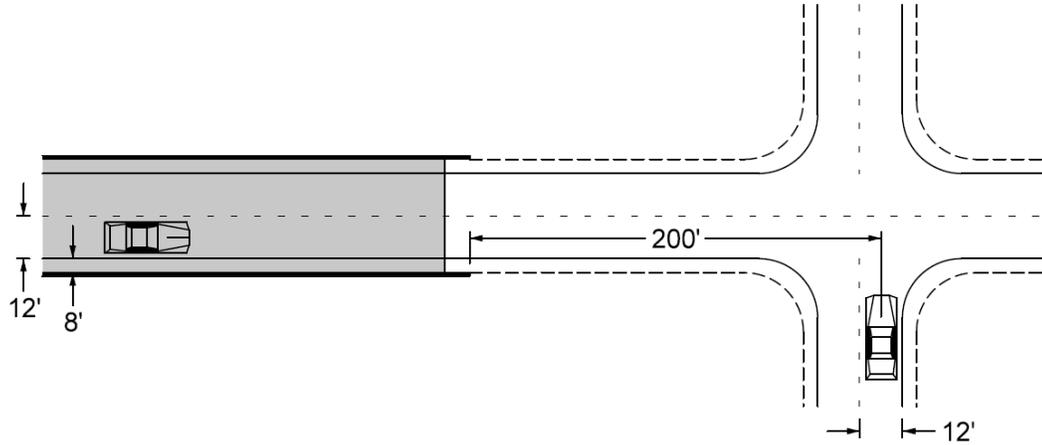


Figure 1: Intersection with possible sight distance restriction.

Solution:

- Using a time gap acceptance value from Table 3 and Equation 6D-1_4, determine the required intersection sight distance:

$$L = 1.47 \times 60 \times 8.0 = 705.6 \text{ ft} \approx 710 \text{ ft}$$

- Construct departure sight triangle:

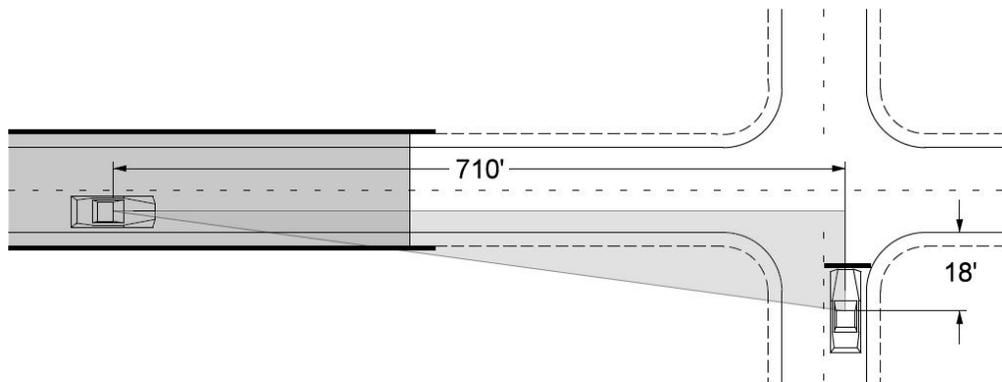


Figure 2: Intersection sight triangle.

The barrier rail falls within the sight triangle.

- Calculate the elevations of the drivers and obstruction:

Elevation of the driver on the local road (minor road):

$$\text{Elev}_{h1} = 899.28 + 3.5 = 902.78 \text{ ft}$$

Elevation of the driver on the two-lane highway (major road):

$$\text{Elev}_{h2} = 919.83 + 3.5 = 923.33 \text{ ft}$$

Elevation of the top of barrier varies from 910.85 to 908.55 feet.

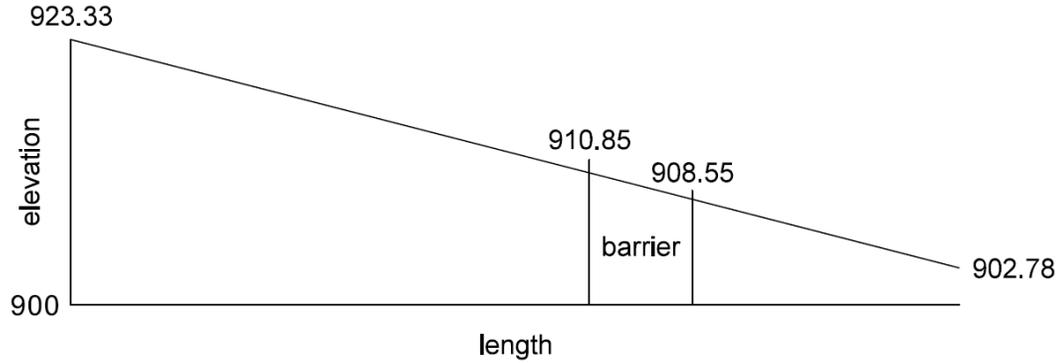


Figure 3: Vertical sight line.

Note: Pavement surface elevations can be determined from survey .tin files, design files, or construction plans.

The height of the barrier is a sight obstruction.

4. Calculate the available intersection sight distance:

Since the barrier is the sight obstruction, the available intersection sight distance can be determined from similar triangles.

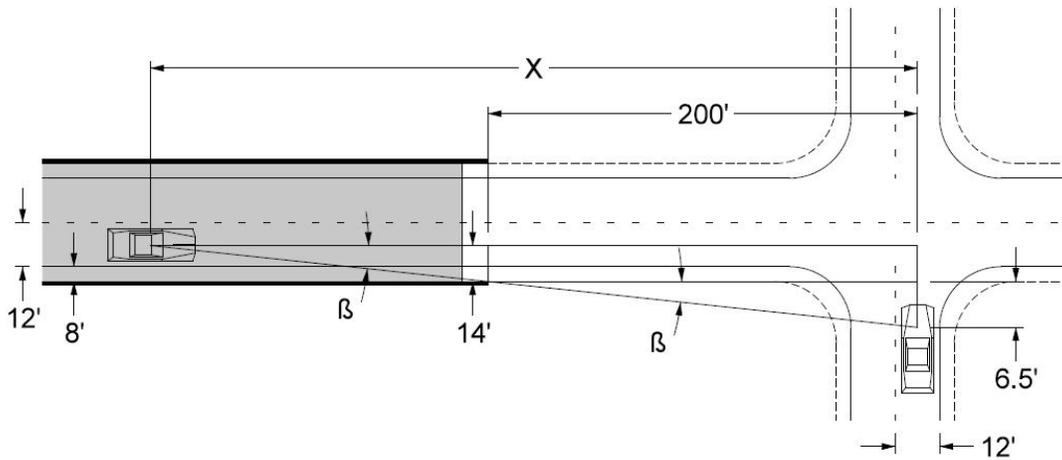


Figure 4: Modified intersection sight triangle.

$$\beta = \tan^{-1} \frac{6.5}{200} = 1.861^\circ$$

$$X = \frac{20.5}{\tan 1.861^\circ} = 631 \text{ ft}$$

$$V_{\text{major}} = 631 / (1.47 * 7.5) = 57.2 \text{ mph or } 55 \text{ mph}$$

Discussion:

When determining available intersection sight distance, the designer should use minimum values from Table 3 and assume the stopped driver is 14.5 feet from the edge of the through roadway.

Possible solutions are:

- Reduce the design speed of the state highway to 55 mph.
- Widen the bridge.
- Relocated the local road away from the bridge.