

Example Problem 4C-2_1, Determining Intake Bridge End Drain Location

Determine the intake bridge end drain location for the following situation.

Given:

- Two 12 foot lanes
- Shoulder widths are 6' and 10'
- Skew angle is 30°
- Determine the inlet location.

Solution:

Intake location is a function of various bridge characteristics, the bridge approach section, and the placement of the guardrail. The best way to place the intake is to draw the bridge situation plan, locate the joints in the approach section, and determine the position of guardrail and guardrail posts.

Standard Road Plan [SW-538](#) shows the point from which DI1 and DI2 are measured when using [BA-202](#). Standard Road Plan [BA-250](#) shows the location station to be used for a guardrail installation at a bridge end when using [BA-202](#).

- Determine the proper reinforced bridge approach section dimensions, see Section [7D-1](#). This case will be a Case 2 situation (see Example 2 in Section [7D-1](#)).
- Determine d_1 and d_2 for the bridge approach. Of the two, d_1 is always the shoulder width on the shorter side of the reinforced bridge approach section, and on the side of panels B and C. For this example $d_1 = 6'$ and $d_2 = 10'$.

Shoulder panel size is assumed to be 20 feet in length.

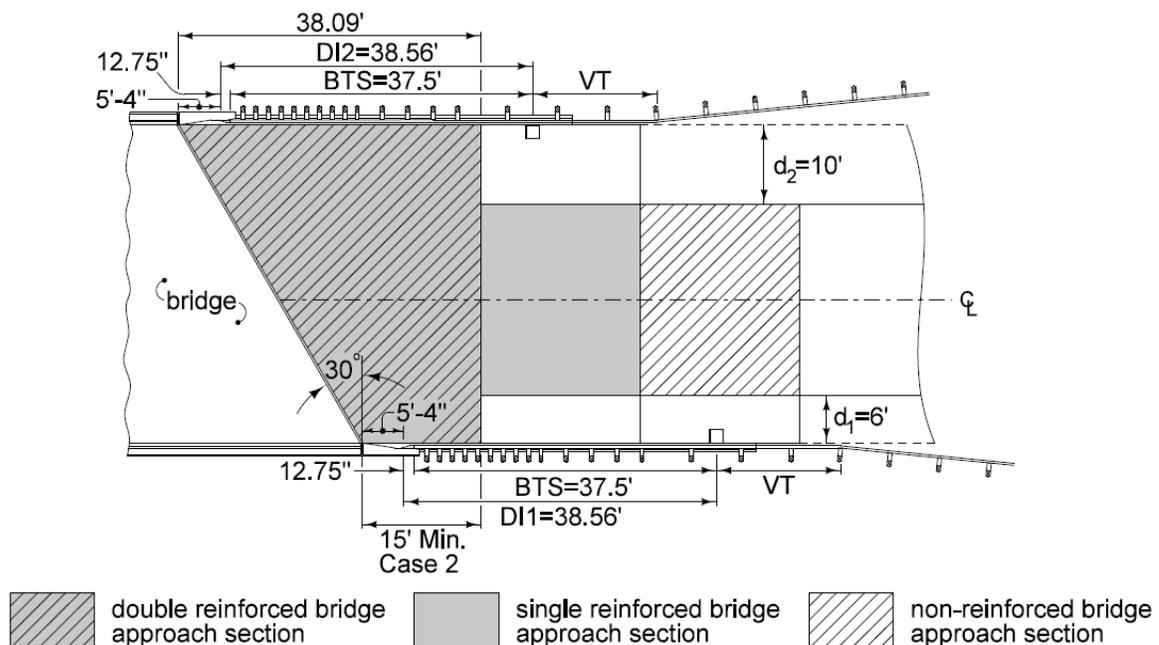


Figure 1: Location of the intakes.

In Figure 1 on the d_1 side, the first joint is located at $15'-0" - 5'-4" = 9'-8"$ from the bolt hole location shown in [BA-202](#). The next two joints are located at $29'-8"$ and $49'-8"$ respectively.

$D11 = 12\frac{3}{4} \text{ in.} + 25 \text{ ft} + 12.50 \text{ ft} = 38.56 \text{ ft}$ from the bolt hole location, which places the center more than 6 ft. from the nearest joint and between two guardrail posts, see Figure 1. Additionally, the curb drop will occur beyond the BTS.

In Figure 1 on the d_2 side, the first joint is located at $38.09' - 5'-4" = 32.76 \text{ ft}$ from the bolt hole location. The next two joints are located at 52.76 ft and 72.76 ft respectively.

$D12 = 12\frac{3}{4} \text{ in.} + 25 \text{ ft} + 12.50 \text{ ft} = 38.56 \text{ ft}$ from the bolt hole location, which places the center more than 6 ft from the nearest joint and between two guardrail posts, see Figure 1. Additionally, the curb drop will occur beyond the BTS.

Discussion:

This example gives a minimum requirement for intake location. Intakes can be moved a greater distance from the location station, if desired, but the designer should then verify that:

1. The intake is located approximately in the middle of two guardrail posts.
2. The center of the intake is at a 6 foot minimum distance from the nearest joint and beyond the reinforced bridge approach section, and the curb drop occurs beyond the BTS.

If condition 1 or 2 is not met, the designer should extend the guardrail by 12.5 foot increments in the variable tangent section of the guardrail layout, then check the location of the intake at 6.25 foot increments until it meets the requirements.