IOWADOT

Design Bureau

Concrete Barrier Rail

**Design Manual
Chapter 8
Roadside Safety**
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Concrete barrier rail consists of two types: permanent (BA-100s) and temporary (BA-401). Permanent concrete barrier rail is most commonly cast in place, while temporary concrete barrier rail is precast in short sections to allow it to be moved from location to location.

Permanent Concrete Barrier Rail

Permanent concrete barrier rail is a rigid barrier system consisting of reinforced concrete shaped to withstand a vehicular impact, see Figure 1. It is the only type of barrier that can be designed to withstand an impact from a semi-truck. It can be tied to an underlying pavement with reinforcing bars, attached to pavement with dowels, or mounted on a footing. Permanent concrete barrier rail should not be installed on slopes steeper than 10:1. Additionally, it generally should not be placed more than 15 feet from the edge of a roadway because of the danger of high angle impacts. Permanent concrete barrier should not be used when another type of barrier will suffice.

Figure 1: Permanent concrete barrier rail example.

> **Note:** Although concrete bridge rails may share the same shape and basic design as permanent concrete barrier rails, their function is different, so they will not be discussed in this manual. For more information on bridge rails, refer to Section 5.8.1 of the Bridges and Structures Bureau's Design Manual.

The type of end section (BA-107 or BA-108) to use depends on expected posted speed. Due to the risk of vehicles tipping, BA-108 should be used only where posted speed is expected to be 30 mph or less, see Section 8A-4.

Considerations for permanent concrete barrier rail include:

- Zone of intrusion (ZOI), see Section 8A-6.

- Maximum longitudinal gap between two pieces of barrier rail, e.g. at a pavement joint, without using a cover plate is 4 inches.

- Vertical taper rate for transitioning the height of barrier rail, e.g. transitioning from 34 inches to 44 inches, is 10:1.

- Sign posts and light poles on top of concrete barrier must be breakaway.

Below are guidelines for choosing a barrier height:

- Use a 44 inch barrier with reinforcing into the shoulder if the barrier is located more than 10 feet from a bridge pier not designed to take a 600 kip load, see Chapter 5 of the Roadside Design Guide and Bridges and Structures Bureau's Design Manual 3.7.4.

- Use a 54 inch barrier with reinforcing into the shoulder if the barrier is located 10 feet or less from a bridge pier not designed to take a 600 kip load, see Chapter 5 of the Roadside Design Guide and Bridges and Structures Bureau's Design Manual 3.7.4.

- Use 44 inch barrier with reinforcing into shoulder when protecting a sign truss that is within 10' of the edge of traveled way.

- Use 44 inch barrier with dowels beyond the first 60' of barrier in the median.

- Use 34 inch barrier with dowels beyond the first 60' of barrier on the shoulder.

- Use 34inch or 44 inch barrier with reinforcing into shoulder within the first 60' of a run of barrier (likely adjacent to a crash cushion).

- Use 34 inch barrier with reinforcing into shoulder when protecting a steep drop off or retaining wall on the shoulder.

- Use 34 inch barrier with dowels for all remaining cases.

Temporary Concrete Barrier Rail

Temporary concrete barrier (often referred to as TBR) is a semi-rigid barrier system consisting of precast reinforced concrete sections shaped to withstand a vehicular impact, see Figure 2.

Figure 2: Temporary concrete barrier rail example.

The most common use for TBR is in work zones. Refer to Section 9B-9 for more information regarding TBR.

Chronology of Changes to Design Manual Section:

008C-001 Concrete Barrier Rail

3/4/2021   Revised
Added in information regarding zone of intrusion.

2/18/2020   NEW
New.

11/30/2011   VOID
Void. This is no longer a current design practice.

9/23/1997
New material.