

(Old) Type 1 Beam Guardrail Design Information

Previously, WSDOT standard practice was to install W-beam guardrail at a rail height of 27 to 28 inches, referred to as “Type 1” guardrail. WSDOT is phasing out the use of Type 1 guardrail. A primary reason for phasing out Type 1 guardrail is that not all configurations are [MASH-compliant](#), whereas Type 31 guardrail is MASH compliant.

The [Standard Plans](#) still include plans for Type 1 guardrail installations, as there is still the occasional need to extend or repair Type 1 guardrail. **Do not use Type 1 guardrail for new installations.**

(Old) Type 1 Beam Guardrail Placement Cases

In the 2017 Design Manual Update, the placement cases listed below were removed from Chapter 1610

- **Case 1** is used where there is one-way traffic. It uses a crash-tested terminal on the approach end and a Type 4 anchor on the trailing end.
- **Case 2** is used where there is two-way traffic. A crash-tested terminal is used on both ends. When flared terminals are used on both ends, use a minimum of 25 feet of guardrail between the terminal limits when feasible.
- **Case 3** is used at railroad signal supports on one-way or two-way roadways. A terminal is used on the approach end, but usually cannot be used on the trailing end because of its proximity to the railroad tracks. If there is a history of crossover collisions, consider additional protection such as an impact attenuator.
- **Case 4** is used where guardrail on the approach to a bridge is to be shifted laterally to connect with the bridge rail. A terminal is used on the approach end and a transition is needed at the bridge end. A curve in the guardrail is shown to shift it to the bridge rail. However, the length of the curve is not critical. The criterion is to provide a smooth curve that is not more abrupt than the allowable flare rate (see Chapter 1610 for the flare rate).
- **Case 5** is a typical bridge approach where a terminal and a transition are needed.
- **Case 6** is used on bridge approaches where opposing traffic is separated by a median that is 36 feet or wider. This case is designed so that the end of the guardrail will be outside the Design Clear Zone for the opposing traffic.
- **Cases 7 and 8** are used with beam guardrail median barrier when median fixed features such as bridge piers are encountered. A transition is needed on the approach end for each direction, and the flare rate is not to be more abrupt than the allowable flare rate (see Chapter 1610 for the flare rate).

- **Case 9 (A, B, and C)** is used on bridge approaches where opposing traffic is separated by a median less than 36 feet wide. This design, called a “Bullnose Terminal,” treats both bridge ends and the opening between the bridges. The “nose” is designed to collapse when struck head on, and the ribbon strength of the rail brings the vehicle to a controlled stop. Type 7 anchors are installed on each side of the nose to develop the ribbon strength. Since an impacting vehicle might penetrate into the system, it is critical that no fixed feature be located within the first 65 feet of the system.
- **Case 10 (A, B, and C)** is used at roadside fixed features (such as bridge piers) when 3 or more feet are available from the face of the guardrail to the object. The approach end is the same for one-way or two-way traffic. Case 10A is used with two-way traffic; therefore, a terminal is needed on the trailing end. Case 10B is used for one-way traffic when there is no need to extend guardrail past the bridge pier and a Type 4 anchor is used to end the guardrail. Case 10C is used for one-way traffic when the guardrail will extend for a distance past the bridge pier.
- **Case 11 (A, B, and C)** is used at roadside fixed features (such as bridge piers) when the guardrail is to be placed within 3 feet of the object. Since there is no room for deflection, the rail in front of the feature is to be considered a rigid system and a transition is needed. The trailing end cases are the same as described for Case 10.
- **Cases 12 and 13** are called “Weak Post Intersection Designs.” They are used where an intersection design needs a gap in the guardrail or there is not adequate space for a bridge approach installation that includes a transition, a terminal, or both. These placements are designed to collapse when hit at the nose, and the ribbon strength of the rail brings the vehicle to a stop. A Type 7 anchor is used to develop the ribbon strength. These designs include a Type 5 transition for connection with bridge rail and a Type 5 anchor at the other end of the rail. The Type 5 anchor is not a breakaway anchor and therefore can typically be used only in situations where a crash-tested terminal is not needed; for example, where slow-moving vehicles are anticipated, such as some side roads and driveways.

Since an impacting vehicle might penetrate into the system, it is critical that no fixed feature be located within the clear area shown in the *Standard Plans*. The 25 feet of barrier length beyond the PC along the side road are critical for the operation of this system.

These designs were developed for intersections that are approximately perpendicular. Evaluate installation on skewed intersections on a case-by-case basis. Use the Case 22 placement if it is not feasible to install this design according to the *Standard Plans*.

- **Case 14** shows the approach rail layout for a Service Level 1 bridge rail system. Type 20 guardrail is used on the approach and no transition is needed between the Type 20 guardrail and the Service Level 1 bridge rail since they are both weak post systems. A Type 6 transition is used when connecting the Type 20 to a strong post guardrail or a terminal.
- **Case 15** is used to carry guardrail across a box culvert where there is insufficient depth to install standard posts for more than 17 feet 8 inches. This design uses steel posts anchored to the box culvert to support the rail. Newer designs—Cases 19, 20, and 21—have replaced this design for shorter spans.

- **Cases 16 and 17** are similar to Cases 1 and 2, except that they flare the rail and terminal as far from the road as possible and reduce the length of need.
- **Case 18** is used on the trailing end of bridge rail on a one-way roadway. No transition is needed.
- **Case 19 (A and B)** is used where it is not possible to install a post at the 6-foot 3-inch spacing. This design omits one post (resulting in a span of 11 feet 6 inches, which is consistent with a post spacing of 12 feet 6 inches) and uses nested W-beam to stiffen the rail. The cases differ by the location of the splice. No cutting of the rail or offsetting of the splices is needed or desirable.
- **Case 20** is similar to Cases 19A and 19B, except that it allows for two posts to be omitted, which results in a span consistent with post spacing of 18 feet 9 inches.
- **Case 21** has a similar intent as Cases 19A, 19B, and 20 in that it allows for the omission of posts to span an obstruction. This design uses CRT posts with additional post blocks for three posts before and after the omitted posts. The design allows for three posts to be omitted, which results in a span consistent with a post spacing of 25 feet.
- **Case 22** is the “Strong Post Intersection Design” that provides a stiff barrier. This design is to be used as a last resort at crossroads or road approaches where a barrier is needed and there isn’t a clear area behind the nose or minimum distances for a “Weak Post Intersection Design” (see Cases 12 and 13).