

Section 83 Railings and Barriers

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4-8301 General

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Railings and barriers are used to reduce the severity of run-off-road accidents, to prevent out-of-control vehicles from crossing the median, and to decelerate errant vehicles. Construction personnel involved in the installation of railings, barriers, and other traffic safety systems should be familiar with Chapter 7, “Traffic Safety Systems,” of the *Traffic Manual*. Chapter 7 discusses concepts and design considerations for traffic safety systems, including railings and barriers.

The following paragraphs discuss some of the details considered during design. The discussion centers on metal beam guard railing but can be applied to other types of railings and barriers.

The design for guardrail with end anchors contains many subtle details, the basis for which may not be readily apparent. Pay special attention to all connection details.

Impact tests and automobile configurations show that the specified height of 660 mm to 685 mm is necessary to prevent errant vehicles from climbing over the guardrail. Spacing posts 1905 mm apart provides resistance to guardrail deflection on impact and also lessens the tendency of the guardrail to form a pocket during impact.

A block spaces the guardrail out from the post. As a result, the contact area is moved away from the post so that little possibility exists of a vehicle snagging on the post. Also, the block allows the guardrail to rise slightly on initial impact, reducing a vehicle’s potential for rolling.

When timber shrinks, it introduces enough slack in the mounting bolts to allow the timber blocks to rotate. Toenailing the blocks prevents this rotation.

When timber posts are used, the specified washers prevent bolts from pulling through when a vehicle strikes the guardrail. Also, during installation, the square hole in the plate washer will keep the carriage bolt from rotating.

For anchoring guardrail, anchor cables should be drawn up tautly. Cable clips must be installed correctly with the “U” on the short end of the cable and the saddle on the working end. Chapter 7 of the *Traffic Manual* discusses guardrail anchorage.

The metal box spacer used at the “structure” end of an approach guardrail allows the guardrail to approach the structure on a straight line and minimizes the possibility of vehicles snagging on the end of the bridge railing.

Frequently, when lateral clearances are limited, a proprietary end terminal system will be specified. When the plans and special provisions require end terminal systems, ensure the systems are installed according to the manufacturers’ instructions.

- Ensure that the backfilling of postholes conforms to specifications. Posts should be set to the full depth shown on the plans. When spread footings or other underground obstructions interfere with placing at full depth, refer to the *Standard Plans* for alternatives.
- Periodically measure the spacing of posts.
- Ensure that blocks for metal beam guard railing are toenailed to timber posts.
- Ensure that rail elements are lapped so that the exposed ends will not face approaching traffic. Check bolts for tightness and threaded rods for proper trimming.
- Measure the height of the guardrail and barrier above the ground to ensure that the height conforms to the plans.
- Ensure that connections to bridge railings, retaining walls, abutments, or other flat surfaces comply with specifications. When high-strength bolts are required, check the markings on the bolts to ensure they also match specifications. When necessary, consult with district laboratory personnel about the proper markings.
- Ensure that anchor assemblies are constructed as specified. Cable clips should be installed in the proper direction and tightened to the required torque. The METS inspector will normally have obtained, when required for testing, a sample cable with swaged fitting. Therefore, if cable is properly identified as previously inspected, project personnel do not need to obtain a sample.
- When posts are installed in loose soil or near embankment edges, it may be necessary to use longer posts or some design modifications to ensure a barrier with adequate strength. Refer to Sheet A77FA in the *Standard Plans*.
- Immediately before placing concrete, ensure that holes for concrete anchors and footings are excavated to the dimensions shown on the plans.
- Ensure that anchor cables are tight enough to prevent any obvious slack in the cable once the footing concrete has cured for the required period.
- Direct the disposal of surplus material from excavation. When traffic is using an adjacent lane, prohibit spoil piles or windrows of material to remain in front of guardrail or median barriers. Such material alters the effective height of the railings and barriers.
- Ensure that asphalt concrete dikes are positioned under the guardrail as shown on the plans.
- Bolts or threaded rods must be long enough so that the nuts are threaded completely onto the bolt. Ensure that no more than 13 mm of thread is exposed on the traffic side of the guardrail as shown on the plans.
- Ensure the construction of flares conforms to the plans.
- Keep adequate records and make sufficient measurements to support both partial and final payment.

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Measure railings, barriers, and terminal systems as specified and, where appropriate, to the limits shown on the plans. Also, by counting, determine the number of cable anchor assemblies and connections to be paid for.

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