

end of the terminal. This will preclude designs of short runs of the system; however, designers still may desire this system on longer runs. Refer to HDM 10.2.5.2 for further discussion including TL2 (70 km/h) termination.

Existing anchorages constructed to details in Standard Sheet M606-6 Corrugated Beam Guide Railing that are at or near the limits of the established clear zone are considered acceptable for use on the NHS and may remain in place. To transition such an existing terminal or approach to Modified G2 Weak-Post, Corrugated Beam Guide Railing, the following will be necessary:

- A half-length corrugated beam section (2.225 m) will need to be added to extend the typical approach (or terminal) section beyond the previously established point of need.
- A full-length corrugated beam section (4.130 m) will need to be spliced to the half section and connected to a post at midspan at the full rail height (815 mm) required of the Modified G2 Weak-Post, Corrugated Beam Guide Railing.

These sections of corrugated beam are included in the run of guide rail and no pay item is needed for the retained anchorages. The full rail height of the system would generally be required to be fully established at the point of need; however, considering the cost involved to relocate anchorages and reset posts to achieve the full rail height at that point, an exception is allowed when retrofitting existing anchorages to be used with the Modified G2 Weak-Post, Corrugated Beam Guide Railing system. The Department considers this exception justified because the 4 m section just beyond the point of need where the height transitions from 760 mm to 815 mm will perform nearly the same as a section with the rail height fully established at 815 mm.

The dynamic deflection in test 3-11 was 2.12 m. Considering this test result and the similarity of the structural elements with the Weak-Post, Corrugated Beam system, the design deflection values for both systems will be considered to be identical. Hence, the Design Deflections for the Modified G2 Weak-Post, Corrugated Beam Guide Railing are 2.4 m, 1.8 m, and 1.5 m corresponding to post spacings of 3.81 m, 1.905 m and 1.27 m, respectively.

New Construction Projects Policy. Department policy will be modified to allow the Modified G2 Weak-Post, Corrugated Beam Guide Rail in new construction contracts on or off the NHS when design speeds are higher than 70 km/h (45 mph). The existing Weak-Post, Corrugated Beam Median Barrier system recently passed crash test 3-11 at TL-3 and received FHWA approval for use on the NHS (Refer to EI 03-020).

Reconstruction Projects Policy. The intent of a reconstruction project is to bring the facility up to current standard practice. Thus, new installations of guide rail and median barrier should conform to the policy for new construction. In addition, runs of existing roadside weak-post, corrugated guide rail that cannot be eliminated should be replaced if the design speeds are in excess of 70 km/h (45 mph). The Modified G2 Weak-Post, Corrugated Beam Guide Rail should be considered as an option for replacement of such guide rail.

Interstate and Freeway 3R Projects Policy. The roadside design of these projects should be treated in the same manner as reconstruction projects. Thus, new installations of weak-post, corrugated barriers should conform to the new construction policy. With respect to replacement of existing runs of weak-post, corrugated beam guide rail on the mainlines of such projects, consideration should first be given to eliminating the need for the runs by regrading the slopes, removing or modifying fixed objects, extending culverts, or otherwise addressing the conditions that led to the installation of the weak-post, corrugated barrier in the first place. If those actions are not practical, replace the run. The Modified G2 system may be considered as a replacement.

Nonfreeway 3R Projects Policy. New installations of barrier should conform to the policy for new construction. With respect to replacement of existing runs of weak-post, corrugated beam guide rail, the Regional Design groups should exercise their discretion and may not need to replace such unless any of the

following conditions exist:

- The speed is over 80 km/h.
- The rate of reportable accident impacts on the weak-post, W-beam guide rail exceeds 0.2 crashes/year/km.
- The percentage of impacting vehicles that penetrate through, over, or under the weak-post guide rail exceeds approximately 10%.

While replacement may not be necessary, it is encouraged, if convenient, or when significant work on a given run is part of the project. The Modified G2 system may be considered as a replacement system.

2R Projects Policy. By definition, 2R projects are simple 3R projects. The policy relating to 3R projects applies to the 2R projects.

Safety and Guide Rail Projects Policy. Under these projects, existing runs of weak-post, corrugated guide rail should be replaced on the mainlines of Interstate facilities and other high-speed freeways and along their high-speed ramps with design speeds higher than 70 km/h or 45 mph. On any nonfreeway facilities with design speeds in excess of 70 km/h (45 mph), existing runs of weak-post, corrugated barrier should also be replaced if the number of accidents exceeds 0.2 crashes/year/km and the percentage of impacting vehicles that penetrate through, over, or under the weak-post guide rail exceeds approximately 10%. The Modified G2 system may be considered as a replacement.

100% State Repair and Maintenance Contracts. Weak-post, corrugated guide rail and median barrier may be repaired and maintained without replacement under these contracts on facilities of all types.

Federal Aid for Repair and Maintenance of Guide Rail and Median Barrier. The repair and maintenance contracts are not federal-aid eligible unless they meet Department requirements for element-specific work. These requirements state, "On-call guide rail repair contracts must be designed to assure guide rail warrants are considered and the guide rail installed meets current standards." Accordingly, a run of weak-post, corrugated guide rail or median barrier can be repaired as "element-specific work" under a federal-aid, element-specific project only when the conditions exist that would permit a designer to retain the run of barrier if encountered in a 3R project under design.

1R Projects Policy. The Department Roadside Design policy related to 1R projects on existing facilities is discussed in Section 10.3 of the Highway Design Manual. The Regions should consider the aforementioned information in their determination of the work to be addressed by the 1R project.

Actions. Designers now have the option of specifying a weak-post system in TL3 applications. Designers should use the new 606.18 pay items for all designs for weak-post, corrugated beam guide railing unless they can demonstrate that 606.16 pay items are better suited in certain applications with design speeds requiring a TL2 or lesser treatment. It is due to the expectancy that there may be such instances that the 606.16 family will remain active. If the usage of the 606.16 family on projects becomes greatly reduced, the family will be disapproved at a later date.

DQAB will incorporate the guidance in the next update of Chapter 10 of the Highway Design Manual. DQAB will also update the Guide Rail Quick Reference Sheet.

Costs. The Modified G2 system will cost slightly more than the previous Department standard weak-post system due to the back up plates required at the post, the additional 50 mm post length, and additional

connection hardware. Still the weak-post system should be significantly less expensive than heavy-post, blocked-out corrugated beam, box beam, or concrete barrier.

Changes. The policy relating to roadside barrier has not changed except that a new weak-post, corrugated beam guide rail system, that is acceptable for installation in TL3 applications, replaces the previous weak-post corrugated beam guide rail system as the Department standard weak-post system. The replaced system was not acceptable for new installations in TL3 applications.

The Modified G2 Weak-Post, Corrugated Beam system detailed on Standard Sheets M606-50 and M606-51 (see EB 04-012) differs from the previous standard Weak-Post, Corrugated Beam Guide Rail system, detailed on Standard Sheet M606-6, in that the Modified G2 system includes the following changes:

- (1) Posts are 50 mm longer.
- (2) Rail mounting height is 55 mm higher.
- (3) The splices are located at midspan between the posts.
- (4) 300 mm long backup plates are used at the posts.
- (5) The rail-to-post connection has been revised to include:
 - Two square washers instead of a single square washer.
 - A round washer under the nut located on the post flange.

The details for the all anchorage units, including driveways, walkways, and other openings, have not been modified and are identical to the previous standard Weak-Post, Corrugated Beam system.

The new posts will be acceptable for use with the 606.16 Weak-Post system; however, the old posts are unacceptable for use with the Modified G2 606.18 Weak-Post system. Maintenance personnel will need to replace damaged posts in the Modified G2 system and may also replace damaged posts in the replaced Weak-Post system with the 1650 mm modified G2 posts driven 50 mm deeper to achieve proper post alignment for the required rail height. It will no longer be necessary to stock the 1600 mm posts.

TRANSMITTED MATERIALS: Nothing is transmitted with this instruction.

BACKGROUND: The FHWA, pursuant to the Intermodal Surface Transportation and Efficiency Act, (ISTEA) (§1073, Public Law 102-240, 12/18/91), issued notice of a final rule on July 16, 1993, which required all new installations of traffic barrier to meet NCHRP 350 requirements. EI 97-014 issued revised design policy to be in compliance with the federal rule and provided design policy for similar work not explicitly affected by the rule. The weak-post system did not meet NCHRP 350 requirements at TL3 at the time that the guidance was issued; consequently, its use was not allowed for most TL3 applications.

In November 2000, a modified weak-post system was approved by the FHWA for use on the NHS in TL3 applications. The weak-post guide rail is considered historically successful and cost-effective when compared to the other systems approved for TL3 applications.

EI 03-020 announced the availability of the Department's Weak-Post, Corrugated Beam Median Barrier system for TL-3 applications and provided revised guidance for its use.

REFERENCES: EB 03-057 (Guide Rail Quick Reference Sheet), EI 03-020 (Weak-Post Median Barrier) and the Highway Design Manual, highway barrier sections 10.2.3.2 Weak-Post and 10.2.5.6 Transitions.

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