

**TPF-5(114)  
Roadside Safety  
Research Program  
Pooled Fund Study**

**Roadside Safety  
Pooled Fund**

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**NCHRP Report 350 TL-2 Compliant  
T-Intersection Guardrail System**

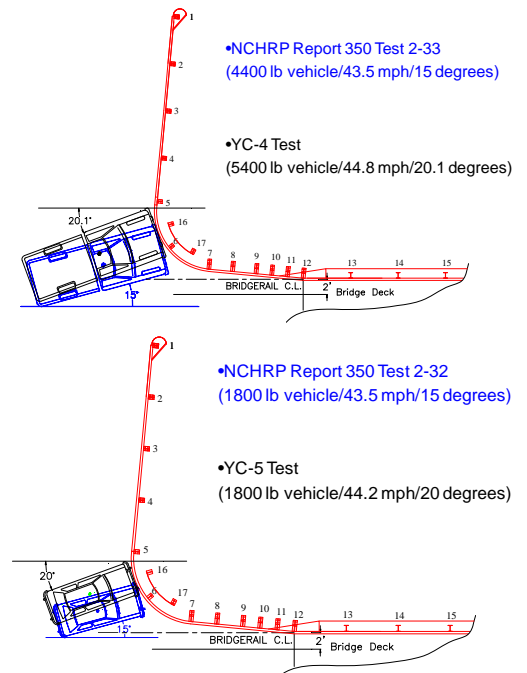
**INTRODUCTION**

When a road or driveway intersects a highway with certain restrictive features (bridge rail, culvert ...etc), it is difficult to fit the proper guardrail length (transition, length-of-need guardrail, and end treatment) along the primary roadway. Site constraints such as private driveways, state roads, and parish or county roads may intersect the primary road and not allow the placement of a properly designed guardrail length of need.

In these cases, alternatives are to shorten the designed guardrail length, provide a curved or T-intersection guardrail design, or relocate the constraint blocking placement of the guardrail. This curved guardrail system is usually known as a short radius guardrail.

**RESEARCH METHODOLOGY**

This study is undertaken to investigate the performance of previously tested T-intersection guardrail systems to determine if some of these previously tested T-intersection guardrail systems would meet *NCHRP Report 350 TL-2* criteria. The evaluations performed in this study indicate that the Yuma County T-intersection guardrail design meets *NCHRP Report 350 TL-2* criteria. The study approach consists of (a) determination of an appropriate *NCHRP Report 350 TL-2* test matrix for short radius guardrail, (b) a review of the crash tests performed on a T-intersection guardrail treatment developed for Yuma County, Arizona, (c) a comparison of Yuma County tests with the *NCHRP Report 350* tests, and (d) an investigation of the energy dissipation contribution of the free standing CRT post that were part of the original design. As a result of this



**Clusters of Yuma County Tests and  
*NCHRP Report 350* Crash Test**

research, the following conclusions are made: Yuma County tests have either similar or higher impact severity in terms of velocity and vehicular weight than corresponding *NCHRP Report 350 TL-2* tests. Therefore, conditions of *NCHRP Report 350 TL-2* tests were attained or exceeded by the Yuma County tests. The dissipated energy associated with fracturing the two free standing CRT posts is not significant enough to affect the performance of the system. Hence, the recommended T-intersection system does not incorporate the two free standing CRT posts behind the curved section.

**Minimum T-Intersection Details**

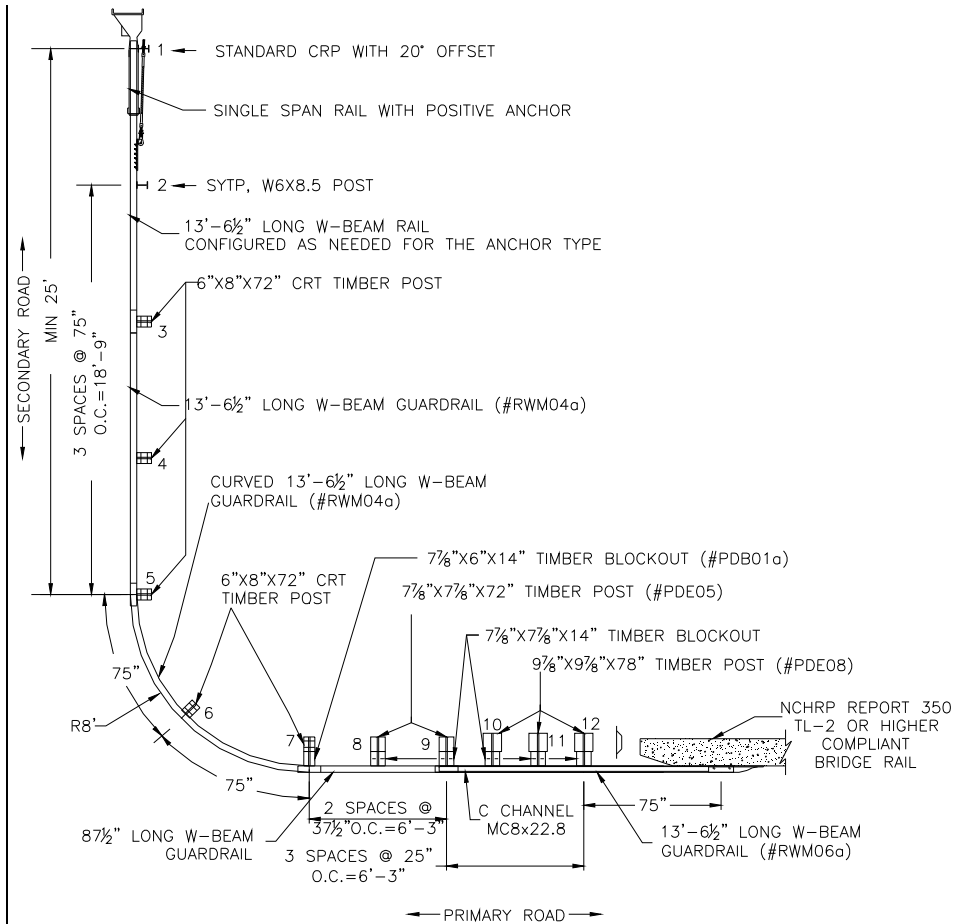
A recommended *NCHRP Report 350 TL-2* T-intersection system (see next page) is a 27 inch high W-beam rail

system. The nose section of this T-intersection system consists of a 12½ ft curved W-beam segment having an 8 ft radius. The curved section is attached to a straight W-beam section on the secondary road using common W-beam splicing details. The secondary road W-beam should have a 25 ft minimum length and should be terminated with a positive anchor. Five CRT posts, spaced at 6.25 ft, are placed along the curved section and secondary road section. On the primary road direction, the curved section is as attached to a transition to the bridge rail. The transition in stiffness is achieved by using a reduced post spacing, increasing post size, and using a MC 8 x 22.8 structural steel channel behind a the W-beam adjacent to the bridge rail.

### Acceptable System Changes

Design changes to the aforementioned system can be made provided the impact performance is not affected. The researchers conclude the following modifications are acceptable:

- 1- The T-Intersection guardrail system can be terminated on the secondary roadway using any *NCHRP Report 350* TL-2 or higher compliant terminal if the secondary roadway design requires such end termination. However, a minimum rail length of 25 ft with a positive anchor is required even if a crashworthy terminal is not needed.
- 2- The transition section on the primary road can be replaced with any *NCHRP Report 350* TL-2 or higher compliant transition.
- 3- The bridge barrier section can be any *NCHRP Report 350* TL-2 or higher compliant bridge rail that is compatible with the transition being used.
- 4- Additional W-beam guardrail sections with a 6.25 ft standard post spacing may be added between the tangent point of the curved section and the beginning of the transition section as needed to provide the length of need for a given site.
- 5- Blockouts can be replaced with other blockouts of similar size but



### Recommended T-Intersection Details

made of different materials provided that they have been used in a successful crash test under *NCHRP Report 350* or have received FHWA acceptance.

- 6- 7 inch diameter round wood posts can be used lieu of the 6x8 inch rectangular wood posts. The round breakaway posts (posts 3 through 7 in figure above) should have 3.5-inch diameter weakening holes similar to the CRT post.
- 7- A standard 7-7/8 x 5-7/8 x 14-inch blockout can be used in the curved section. This is not expected to change the performance of the system since the weakened (CRT) posts will break prior to any significant change of height to the system.

FHWA issued an acceptance letter (HSSI/B-209) on November 10, 2010 for this T-Intersection guardrail system.

### FOR MORE INFORMATION:

Report on web site: [Evaluation of Existing T-Intersection Guardrail Systems for Equivalency with NCHRP Report 350 TL-2 Test Conditions](#)

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