

Side Mounted Bridge Rail

Background

Caltrans is constantly faced with Right-of-Way issues and other limitations that eliminate the option of mounting a standard bridge rail on top of a bridge deck. The Caltrans Division of Engineering Services and the Highway Safety Features New Products Committee (HSFNPC) recognized the need for a crashworthy side-mounted bridge rail usable in areas where the posted speed limit exceeds 70 km/hr (45 mph). Crash testing will be performed according to current crash test guidelines, Manual for Assessing Safety Hardware 2009 (MASH) Test Level 4 for longitudinal barriers.

Development of the Side Mounted Bridge Rail

The California ST-70 Side Mounted Bridge Rail was constructed two stages. A typical cross-section of each stage is shown in Figure 1 and 2.

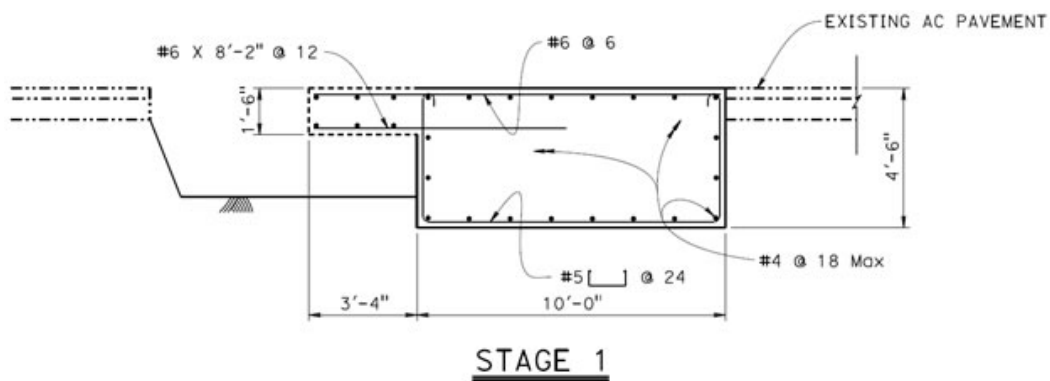


Figure 1. Cross Section of Stage 1

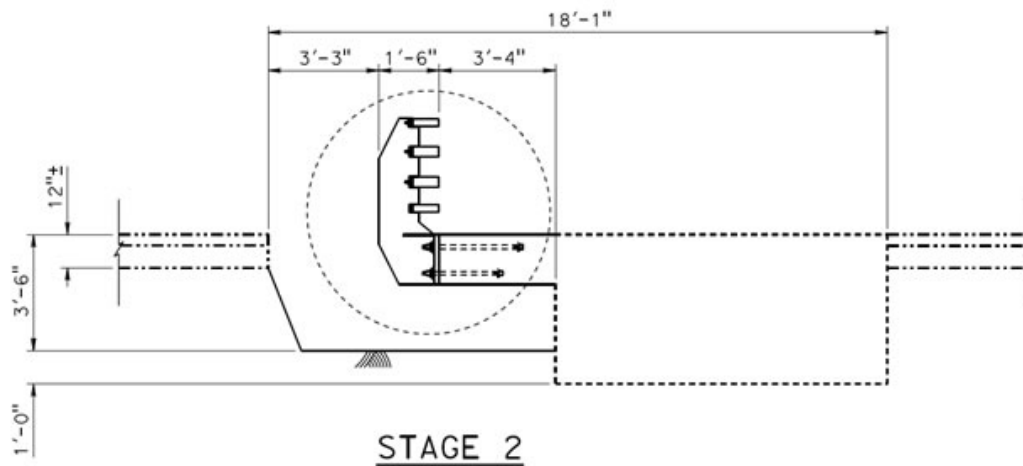


Figure 2. Cross Section of Stage 2

A 76 ft. test section of the bridge rail with 8 posts was constructed at the Caltrans Dynamic Test Facility. The barrier was constructed in two separate concrete pours with rebar for anchoring. The 6 inner posts were held in place with 5 anchor bolts per post. Two stacked disc springs were installed on each anchor bolt, on the outside of the barrier post. The discs were retained with a flat washer and nut torqued to provide 10,000 lbs. of preload. The discs allow the barrier to have some controlled deflection, reducing the peak load on the rail and providing some energy dampening during impact. The reduced peak load provides a lower maximum stress on the top anchor bolts and a slightly lower peak deceleration of the impacting vehicle.



Construction



Post Close-up



Spring Close-up



Completed Barrier



MASH 2009 Test No. 3-11



MASH 2009 Test No. 3-10



MASH 2009 Test No. 4-12

Impact Conditions (Preliminary)

Test 110MASH3P15-01 (MASH 2009 Test Level 3, 4)
Vehicle: 2005 Dodge RAM 1500 Quad Cab Pickup

Impact Speed: 98.9 km/h
Impact Angle: 25.0°

Test 110MASH4C15-02 (MASH 2009 Test Level 3, 4)

Vehicle: 2008 Kia Rio
Impact Speed: 104.1 km/h
Impact Angle: 25.0°

Test 110MASH4S16-03 (MASH 2009 Test Level 3, 4)

Vehicle: 2004 Freightliner M2
Impact Speed: 90.6 km/h
Impact Angle: 15.8°

High Speed Crash Test Video

Test 110MASH3P15-01	Test 110MASH4C15-02	Test 110MASH4S16-03
Across	Across	Across
Upstream	Upstream	Upstream
Downstream	Downstream	Downstream
OH Downstream	OH Downstream	OH Downstream
OH Upstream	OH Upstream	OH Upstream
Post 4 Connection	Post 4 Connection	Post 3 Connection

Quicktime is recommended to view the Crash Test Videos. Quicktime is available [here](#).

Related Documents

[Compliance Crash Testing of Side Mounted Bridge Rail. Preliminary Investigation](#)

Contact Information

Vue Her
Vue.Her@dot.ca.gov
Project Engineer

John Jewell
John.Jewell@dot.ca.gov
Senior Engineer

Bob Meline
Bob.Meline@dot.ca.gov
Senior Engineer

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