

## Third Quarter 2003 Progress Report

Midwest Roadside Safety Facility  
Mid-States Regional Pooled Fund  
September 30, 2003

### YEAR 11

#### **Steel H-Beam Temporary Barrier Rail and Connections**

Polivka, K.A., Bielenberg, R.W., Faller, R.K., Sicking, D.L., Rohde, J.R., Reid, J.D., and Holloway, J.C., *Development of a Steel H-Section Temporary Barrier for Use in Limited Deflection Applications*, Final Report to the Midwest State's Regional Pooled Fund Program, Transportation Research Report No. TRP-03-120-03, Project No. SPR-3(017)-Year 11, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, May 30, 2003.

#### **Development of a Guardrail Treatment at Intersecting Roadways**

Continued testing of the system will utilize funding under Year 13 of the pooled fund program.

#### **Triple-Cable Barrier End Terminal and Anchorage Assemblies**

The retest of the cable anchor release system will utilize funding under Year 14 of the pooled fund program.

#### **Transition from Standard W-Beam Guardrail to Stiffened Bridge Transition**

A full-scale crash test of this system was performed on June 16, 2003. As shown in the photos below, the vehicle was not redirected in a stable manner. Upon analysis of the current design, there were two viable options for rectifying this situation. Either the length of the thrie-section following the W-beam to thrie-beam transition could be further lengthened, or we could utilize the Midwest Guardrail System (MGS) with a 31" rail height. Lengthening the thrie-beam section would allow for a more gradual stiffness transition, reducing the propensity for roll. The MGS would improve the stability of the vehicle by putting redirective forces higher up on the vehicle. This reduced roll has been demonstrated on the previous full-scale tests of the MGS. After discussions with many states, we have decided to utilize the MGS rail and to keep the length of the transition the same. This system will utilize an asymmetrical W-beam to thrie-beam connection. We currently have funding for an 820C test for this system, but the retest of this system with a 2000P vehicle will need to be completed first. Based on many States prioritization of this project, there is enclosed a budget for the retest. It is suggested that contingency funds from Year 11 and a portion of Year 12 be utilized for this retest. If you would like to comment on this plan please contact John Rohde ([jrohde@unl.edu](mailto:jrohde@unl.edu)) in the next few weeks with questions or concerns.



## **YEAR 12**

### **Non-Proprietary Steel Beam Guardrail System – Year 2**

Results of this project will be reported in conjunction with Year 13 results.

### **Development of a Guardrail Treatment at Intersecting Roadways-Year 3**

The system is currently being constructed at the test site. The system, augmented by an anchor placed near the center of the radiused section, will utilize a release mechanism similar to the cable terminal currently being tested under Year 14. This anchor will significantly reduce system deflection during impacts on either side of the radiused section and should still allow the system to capture a vehicle impacting on the “nose”.

### **Portable Aluminum Work Zone Signs**

The bogie testing for this project has been completed. A submission to FHWA seeking approval has been sent. Polivka, K.A., Faller, R.K., Holloway, J.C., and Rohde, J.R., *Safety Performance Evaluation of Minnesota's Aluminum WorkZone Signs*, Final Report to the Midwest State's Regional Pooled Fund Program, Transportation Research Report No. TRP-03-107-01, Project No. SPR-3(017)-Year 11, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, January 29, 2002.

Currently, MwRSF researchers are coordinating with the MnDOT to conduct additional bogie and/or crash tests on other work-zone devices.

### **Single-Faced Concrete Barrier**

Several steel reinforcement options were developed for the 42" and 51" heights for the ½-section safety shape parapet. Design of the barrier to foundation attachment details as well as the reporting will be completed in the 4<sup>th</sup> quarter of 2003.

### **W-Beam to Thrie-Beam Transition Additional 820C Test**

This test will be performed in conjunction with the Year 11 study, the test will utilize a asymmetrical W-beam to thrie beam transition. This test will be performed based on the successful completion of the test funded in Year 11.

## Year 13

### **Generic W-Beam Guardrail with Curb**

This system utilized a 6" type "B" curb, located 6" ahead of the face of the non-proprietary guardrail system. A full-scale test was performed on September 5, 2002. The pickup was safely redirected and all salient criteria were acceptable. The maximum dynamic deflection of the system was about 40". A report for this test is anticipated late in the 4<sup>th</sup> quarter of 2003.

### **Open Railing Mounted on New Jersey Concrete Barrier (2'8")**

The design for this system is shown on the following pages. The system is comprised of breakaway uprights, with three longitudinal tubing rail sections. Expansion joints are incorporated. The transitions for the system are designed to release in a reverse direction impact. Comments and questions regarding this design should be directed to John Rohde (jrohde@unl.edu).

### **Evaluation of Rigid Hazards in Zone of Intrusion**

A full-scale TL-3 crash test was performed on July 25, 2003 of a luminaire pole mounted on top of a single-slope concrete barrier. The vehicle was smoothly redirected with modest contact with the pole. The pole remained upright with minimal cosmetic damage. All salient safety criteria were met. Based on this test and the previous TL-4 test, similarly-designed luminaire poles rigidly mounted on top of safety shape barriers appear to be acceptable. Consideration of the debris is important. The pole in the initial TL-4 test was detached, landing adjacent to the backside of the barrier. For applications where the dislodged pole could present a safety hazard, this design would not be acceptable. An additional TL-4 test of a luminaire pole mounted on the deck behind the barrier is planned for the 4<sup>th</sup> quarter of 2003 using a pole position utilized in the State of Texas.

### **Three-Cable Guardrail**

In light of the results of the median barrier test performed this quarter, options for this project are currently being considered.

### **Non-proprietary Guardrail System – Additional Test**

The retest of the new guardrail system (NPG-4) was performed on June 14, 2002. This system utilized a 31" installation height, 12" blockouts (located off the splices), and 6' soil tubes. The system performed very well, smoothly redirecting the vehicle and all salient criteria were met. A report for this test is anticipated late in the 4<sup>th</sup> quarter of 2003.

### **Kansas Temporary Barrier Redesign and Test**

Polivka, K.A., Faller, R.K., Rohde, J.R., Holloway, J.C., Bielenberg, B.W., and Sicking, D.L., *Development and Evaluation of a Tie-Down System for the Redesigned F-shape Concrete Temporary Barrier*, Final Report to the Midwest States Regional Pooled Fund Program, Transportation Report No. TRP-03-134-03, Project No. SPR-03(017)-Year 13, Sponsoring Agency Code RPRP-03-06, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Lincoln, NE, August 22, 2003.

### **System for Stiffening New Guardrail System**

The ¼-post space system was tested on October 18<sup>th</sup>, 2002. The system performed well, meeting all salient criteria. Maximum permanent set was approximately 18". A draft report for this project is anticipated in the 4<sup>th</sup> quarter of 2003. In addition, Barrier VII computer simulation modeling is underway in order to validate the model with the full- (NPG-4) and ¼-post (NPG-6) spacing systems. A report for this test is anticipated late in the 4<sup>th</sup> quarter of 2003.

## **YEAR 14**

### **Development of a Four-Strand High-Performance Cable Barrier**

Follows work under Year 11.

### **Evaluation of Transverse Culvert Safety Grate**

Bogie testing of various configurations is planned for the 4<sup>th</sup> quarter. This testing will form the basis of the simulation study.

### **Flare Rates for W-Beam Guardrail**

A literature review is in progress.

### **Approach Slopes for W-Beam Guardrails Systems**

No Progress

### **Concept Development of a Bridge Pier Protection System for Longitudinal Barrier**

No Progress

### **Retest of Cable End Terminal**

This system is currently under construction, with testing anticipated early in the 4<sup>th</sup> quarter.