

RESEARCH AND TECHNOLOGY

REVIEW

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SPOTLIGHT ON RESEARCH PROJECTS IN PROGRESS

NATIONAL POOLED-FUND STUDIES

- SAFE WORK ZONES
- AN EDUCATED DRIVING PUBLIC
- EQUITABLE HIGHWAY USER FEES

A SMALL PORTION OF THE NDOT WISH LIST

As it should be, the Nevada Department of Transportation's RD&T effort reads like a "wish list" of goals for correcting or improving a multitude of transportation concerns. Safe work zones, an educated driving public, and equitable highway user fees are but a small part of the department's current wish list, but the implications of these research projects are tremendous.

Last summer, we informed you of the

department's participation in three new National Pooled-Fund Studies: "Use Of Lane Striping And Delineators To Control Vehicle Speeds In Work Zones", "Public Outreach Campaign Material For Safer Work Zones", and "Collection Of Data To Relate Vehicle Operating Weights To Registered Weights For Highway Cost Allocation And Highway User Fee Analysis". Adding to our anticipation over the potential benefits of these research projects, we find particular satisfaction in the fact that the project costs are shared with a number of other states; pooled-fund projects are especially attractive during times of constrained budgets.

Following, is a brief description of these three projects including the expected benefits:

USE OF LANE STRIPING AND DELINEATORS TO CONTROL VEHICLE SPEEDS IN WORK ZONES

The purpose of this study is to determine if the use of alternative striping and lane delineation techniques can decrease vehicular speeds in work zones, without sacrificing driver safety or reducing lane widths and clearances. The theory is that certain striping and

delineation schemes can be constructed that will present the illusion of either a narrower road or a higher rate of speed by the motorist. If successful, the resulting motorist action is expected to be a voluntary reduction in speed. Done correctly, neither the physical width of the roadway, nor the work zone clearances, will be affected.

Speed studies will be conducted to compare standard work zones with work zones using these alternative striping and delineation schemes. Preferably, the study will be conducted on an Interstate reconstruction project where opposing traffic is shifted to one set of lanes. This would allow the set-up of standard striping and delineation on one lane as a control, and the alternative techniques to be used on the other lane for testing. Since the same work zone would be used for both the test lane and the control lane, environmental effects of two different locations can be ignored. Speed data would be collected by a means other than radar to prevent potential errors resulting from a motorist's reaction to radar detection devices.

The primary anticipated benefit of this project would be the reduction

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Product Evaluation Committee
PEC RECAP
 MARCH 11, 1997



**BEEBE
 SADDLEMARKER**

**"Riding the Rails
 with Saddlemarker"**

The Saddlemarker "drum" is designed to provide a highly-visible workzone, barrier rail marker for areas requiring additional delineation. Its unique one-piece hollow design is manufactured from resilient plastic, and is available in several body color and reflective stripe combinations.

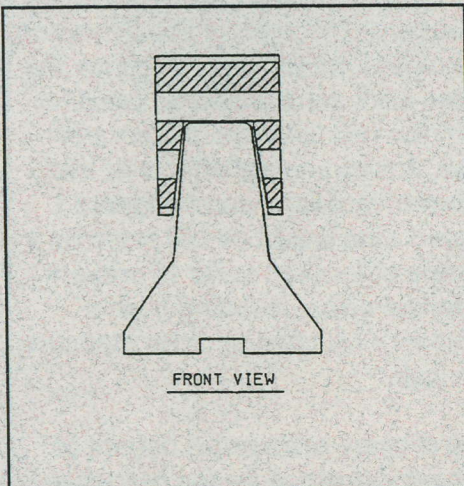


Fig.1 Saddlemarker, shown on top of a concrete barrier rail.

This barrier rail delineator uses sand as an internal ballast, with proven stability in winds up to 97 m.p.h. The Saddlemarker's design is intended specifically to enhance the safety of motorists through work zone areas, particularly where there are changes in barrier rail alignment. It reflectorizes both the top and the sides of the barrier rail with a great deal more visibility than that which is typically found with barrier rail reflectors. Its overall lightweight construction provides a product that if hit, flattens out and does not become a projectile.

Based on a presentation by the device's inventor, Mr. Russ Beebe, the PEC approved the Saddlemarker for use on a case-by-case basis at the discretion of the Traffic Engineering Section. The Saddlemarkers approved for use by NDOT will be striped with three bands of white reflective sheeting for nighttime visibility. The fluorescent orange body color will provide daytime visibility.



**BRUGG CABLE CO.
 GEOBRUGG
 ROCKFALL
 PROTECTION**

Mr. Erik Rorem from the Brugg Cable Company, provided a Caltrans video showing detailed performance

testing of the GeoBrugg rockfall mitigation systems. This video presented a very good demonstration of the type of boulders that can be restrained with a properly designed system. The two systems introduced to Nevada by Brugg Cable included a rockfall barrier and the more common slope protection netting.

While Brugg Cable generally custom designs each installation, their basic wire rope rockfall

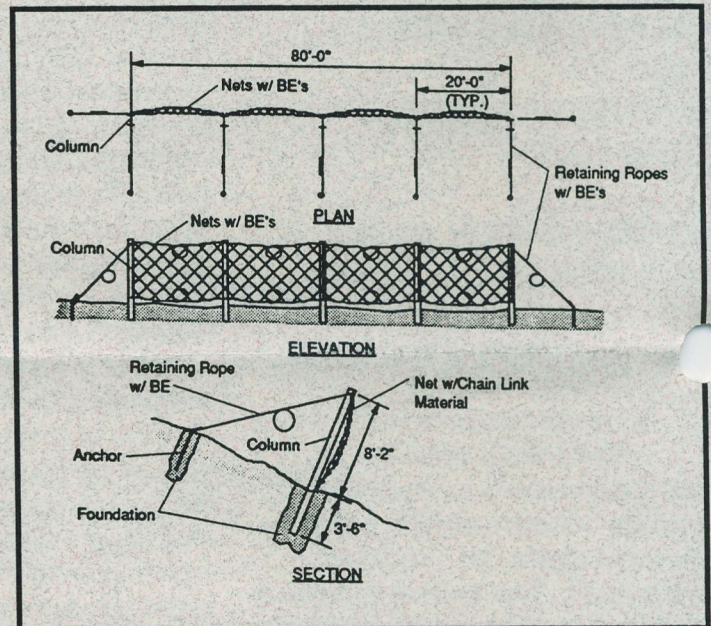


Fig. 2 Rockfall Barrier Installation Details

barriers are designed to absorb impact loads of 30 ft-tons of kinetic energy. These rigid protective barriers are constructed from heavy steel, timber, or concrete posts which support a flexible wire safety net. (see figure 2) The netting is equipped with damping devices that control the rockfall forces under extreme load conditions. These damping devices are composed of a friction brake and a wire rope

(please see Brugg next page)

Brugg
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loop that is activated only when the friction force reaches a pre-set level during heavier-than-normal rockfall conditions. Smaller rocks are stopped without the braking element being activated.

The Brugg slope protection netting system uses a steel, wire-rope safety net that is draped over unstable rock faces to divert and control rock slides. While very similar to the slope protection systems using chain-link mesh, the GeoBrugg mesh netting controls larger amounts of debris.

The Brugg Cable company has designed and fabricated these systems for nearly 50 years, with over 2,000 systems installed worldwide. In addition to many installations that were installed for private use, a number of the more recent installations have undergone testing in controlled and measured settings by Brugg, Caltrans, and FHWA.

Based on Mr. Rorem's presentation and a recommendation from Parvis Noori, NDOT's Geotechnical Engineer, the PEC voted to develop a new Standard Specification for rockfall mitigation systems. Our new specification will be based upon Caltrans and Oregon DOT specifications which allow the two systems presented by the Brugg Cable Co. ☺

Wish List

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of work zone fatalities and accidents as a result of the lower speeds and increased driver

attention. Other benefits would be fewer lawsuits related to work zone accidents, and a safer environment for both drivers and highway workers.

PUBLIC OUTREACH CAMPAIGN MATERIAL FOR SAFER WORK ZONES

A great deal of work has been done in recent years, concerning improving the safety of work zones.

To date, the bulk of improvement has been in the form of engineering improvements such as new safety products and procedures implemented by those in the transportation community. However, the FHWA has

recognized a need to improve driver performance while approaching and traversing work zones. As a result, they have initiated this research project to develop appropriate campaign material to be used by state and local governments to educate the motoring public through public outreach programs. The resulting material is intended to provide the states with material having a common nationwide theme and message content, while achieving the economy of developing this campaign material only once.

Material will be developed that will focus on sensitizing drivers to the greater risks involved in traveling within work zones, both for the

traveling public and for the construction and maintenance workers. Also, the material will serve to educate drivers about the traffic control and safety devices used in work zones in order to gain support and achieve better compliance with these devices. The material will be applicable to various modes of communications and be reproducible for adaption and use by state and local governments as well as other

safety organizations. The contractor for this project will work with the FHWA and participate in a technical panel of state highway agency representatives used to evaluate candidate campaign

theme and messages, content for public service announcements (30 second TV and radio spots), and printed material (pamphlets, posters, bumper slogans, etc.).

COLLECTION OF DATA TO RELATE VEHICLE OPERATING WEIGHTS TO REGISTERED WEIGHTS FOR HIGHWAY COST ALLOCATION AND HIGHWAY USER FEE ANALYSIS

As a system that relies solely on user fees, the nation's highway system depends on equitable methods for assessing these fees.

(please see Wish List next page)

The case to be made for elevating RD&T as a high priority requiring adequate funding is based not on an assertion that RD&T is more important than other parts of the agency's mission but on the belief that RD&T is essential to the mission.

Robert J. Reilly

Wish List

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While most user fees are collected in relatively straightforward ways, such as with fuel taxes, registration fees for commercial vehicles have proven difficult to assess in an equitable manner.

Because the cost of building and maintaining highways is directly related to vehicle weights and axle configurations, many states, including Nevada, collect registration fees on commercial vehicles based on their declared gross weights and the vehicle's classification. Because every vehicle causes varying degrees of roadway damage based on its weight and the distribution of this weight over the roadway's surface, commercial registration fees are used as an equitable means to

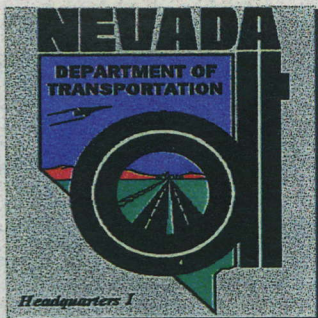
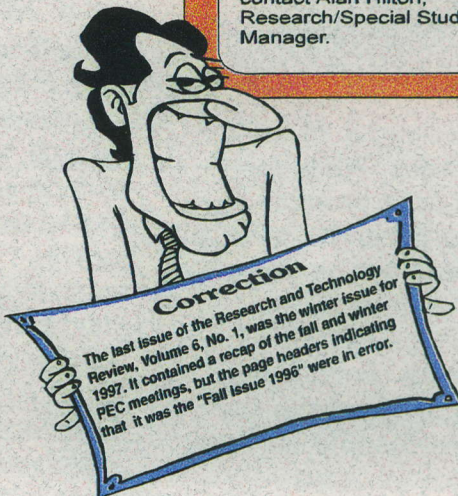
determine the representative costs associated with this weight-induced damage. However, this method relies on our ability to accurately determine actual weights versus the declared weights that we use to assess this fee. Using the results expected from this study and the software being developed by FHWA, we can expect an improvement in the accuracy of future highway cost allocation studies. The end result will be an improved assessment of user fees that more accurately reflect's a commercial vehicle's "use" of our nation's highways. ☺

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If you have comments, questions, or need additional information regarding any of the topics discussed in this issue, please contact Alan Hilton, Research/Special Studies Manager.



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