



REVIEW

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Research Bulletin

Evaluating the Effectiveness of Continuous Shoulder Rumble Strips in Reducing “Ran-Off-Roadway” Single-vehicle Crashes

The Nevada Department of Transportation (NDOT) is sponsoring a research project titled “Evaluating the Effectiveness of Continuous Shoulder Rumble Strips (CSRS) in Reducing “Ran-Off-Roadway” Single-Vehicle



Milled Rumble Strips

Crashes” (ROR-SV) with Dr. Shashi Nambisan, University of Nevada, Las Vegas, as the principal investigator. The panel members involved in the project are Kelly Anrig, NDOT Headquarters Safety; Scott Thorson, NDOT Headquarters Traffic; Melanie Mucha, FHWA; and Dr. Reed Gibby, NDOT Research.

The project evaluated safety records on roadways in Nevada on which CSRS had been installed. Specifically, crash records involving ROR-SV crashes were used to evaluate the effectiveness of the CSRS treatment. The roadways studied include Interstate freeways, US

Routes, and State Routes: 306 individual segments corresponding to a total of 1,303 centerline miles of roadways. Data for the period from 1995 to 2003 were used for the analyses. Key data considered in the analyses include the locations and dates of installation of CSRS on roadway segments, crash data, posted speed limits,

and average daily traffic volumes. The number and rates of ROR-SV crashes were determined for periods before and after the installation of the CSRS.

An analysis of the data to-date indicates overall the CSRS treatment is effective in reducing ROR-SV crashes and the corresponding crash rates. About 68 percent of the roadway segments showed improvements based on crashes per million vehicle miles of travel, and these segments accounted for about 83 percent of the centerline miles of the roadways. Likewise 11 percent of the segments (about 4 percent of centerline miles) showed no change in crash rates, and 21 percent of the segments (14 percent of the centerline miles) showed worse crash rates. The results based on crashes per mile are similar:

about 66 percent of the segments (81 percent of centerline miles) showed improvement, 12 percent of the segments (4 percent of centerline miles)



Rolled Rumble Strips

showed no change, and 23 percent of the segments (15 percent of centerline miles) experienced higher rates after the installation of the CSRS. Statistical analyses of the data affirm these findings. A statistical analysis based on a method developed by researcher and author, Ezra Hauer, for evaluation of safety indicates that the installation of CSRS resulted in a significant reduction in the expected number of crashes on a vast majority of the roadways studied. Application of regression modeling indicated that the installation of CSRS typically result in a reduction in the number of crashes (or crashes per million

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vehicle miles of travel, or crashes per mile) on a segment. Roadways with posted speed limits greater than 65 mph showed significant improvements after the installation of CSRS (based on crashes per million vehicle miles of travel or crashes per mile). As the posted speed limit increases, the crash rates decrease. No significant relationships between shoulder widths or average daily traffic on ROR-SV crashes were discernible from the analyses.

In summary, the installation of CSRS on roadways in Nevada has resulted in improved safety by reducing the number of ROR-SV crashes and their rates, crash per million vehicle miles of travel and crashes per mile.



Raised Rumble Strips

Research, Development & Technology Transfer (RD&T) Program

Applying innovation, technology and process improvement has been identified as a key element in achieving the department's strategic goals. Thus, there is increasing demand for research and technology implementation. The department's RD&T program is formulated to help meet these goals.

Every year, the Research Division works with the various NDOT divisions/districts to identify needs and priorities in specific functional areas; the division gathers ideas of research and develops research problem statements. The Research Advisory Committee (RAC), comprised of 13 NDOT division heads, reviews research statements and prioritizes them according to strategic directions and department needs. Based on the prioritization results, requests for proposals are issued to Nevada universities for development of proposals. Once the proposals are received and prioritized by the RAC, the Research Management Committee, comprised of NDOT Deputy and Assistant Directors, evaluates the proposals and selects the projects to be funded. In the current RD&T program, there are 33 active research projects representing the primary functional areas that include Construction, Materials, Maintenance, Traffic/Safety, Planning, Roadway Design and Structures. Both state and federal funds are directed towards the conduct of research. The total funding for the program has been increased from \$1.3 million in FY 2004 to approximately \$2 million in FY 2006.

In addition to sponsoring the department's research projects, NDOT actively participates in national and regional research activities. These include national and regional pooled-fund studies, the National Cooperative Highway Research Program, and other research activities associated with the Transportation Research Board and American

Association of State Highway and Transportation Officials.

Just as important as research projects is the program's ability to infuse innovation by directly involving end-users in the evaluation and development of new products and practices. These come in many forms and include new materials, equipment standards, design guides, analytical methods, testing procedures, specifications, and operating practices.

The department's RD&T program also encompasses library and information services. The library distributes national and state research reports, provides reference and database search services, and borrows publications from other libraries through inter-library loans to meet NDOT employee information needs.

The department's RD&T program will continue to be a source of pride as it effectively supports the department's strategic goals by implementing research results and innovative technologies, by evaluating and developing new products and practices, and by providing library resources.



The NDOT Research Team: Heidi Wood, Jason Van Havel, Roma Clewell, Reed Gibby, and Tie He

— Product Evaluation Committee (PEC) Meeting Recap —

June 6, 2006 PEC Meeting

The June Product Evaluation Committee (PEC) meeting was dominated by information regarding the Federal Highway Administration's (FHWA) initiative to review each state's product evaluation process. Sole sourcing and proprietary products are targets of their Process Review; the Qualified Product List (QPL) is an important aspect of the review.

The PEC started by examining each QPL-of-one. Their intent was to limit the use of QPLs-of-one. Before the meeting, the Research Division reviewed each QPL-of-one with the affected division. The QPL-of-one categories were determined to be either required or not. The ones that were not required were recommended for deletion to the PEC. Required categories were left and new searches were initiated to find more products for those categories.

The PEC agreed on a deletion list of 213.02.18 (Filtration Systems Type C) and 623.02.16 (Conduit Duct Sealing Compound). Furthermore, 625.02.02a (Barrier Marker Drums on Concrete Barrier Rails) was deleted, as it is no longer manufactured. The products can still be used by following procedures relevant for products not on the QPL.

At the suggestion of the FHWA, the Research Division developed three surveys focused on the QPL. The three types were targeted to vendors, contractors, and NDOT employees who are associated with the QPL. The surveys covered areas such as effectiveness, ease of use, and educational topics about the QPL and the process.

A point of findings arising from the surveys was how well the process of sole source policies was understood and whether there are ways to improve the process. The response was that NDOT internal recipients felt they understand the process; however, the challenge was justifying the products usage. The PEC discussed tracking product usage, but there is no formal process for tracking this information.

Another finding is that in the current application process, vendors are asked to provide information from other states and/or federal testing processes. These product findings are a consideration of the decision making process for placement on the QPL.

Sunset clauses were discussed to ensure products are reviewed periodically. The PEC decided not to use Sunset clauses because affected divisions ensure products are appropriately reviewed and listed on the QPL.

Other Process Review issues were covered at the PEC meeting. One of the issues was verification of product and contact data, which was conducted on vendors whose products appear on the QPL. Well over 85 percent of the listings had changes. Most of these changes were minor. Another issue from the Process Review looked at the product evaluation process. Approximately 11 percent of all products were rejected by the divisions as not meeting acceptance criteria for QPL listing. There were approximately 154 products pending, but that number has recently been reduced by more than half through the date review process. While normal practice is to allow two months turn around on product evaluations, there are still too many evaluations that extend past the two-month deadline. Field test challenges or contracts associated with field tests are a major reason that products remain on the pending list for longer lengths of time.

Research Corner

There are many online sources for transportation research and some helpful sources are highlighted.

<http://ntl.bts.gov/databases.html>

For more information on the new changes to the TRIS/NTL database, you can read the following information sent to transportation libraries from a librarian at the National Transportation Library. The new changes have really been a great improvement!

“TRIS Online is a public domain, web-based version of the Transportation Research Information Services (TRIS) bibliographic database. TRB continues to produce and maintain the TRIS Database with funding by sponsors of TRB, primarily the state departments of transportation and selected federal transportation agencies. TRIS Online is the largest resource of published transportation research containing over 530,000 records of technical reports, journal articles, conference papers and monographs related to modes and disciplines of transportation. Over 24,000 of the records in TRIS Online now provide links to the full text documents. The NTL publishes TRIS Online on its website. NTL’s Digital Archive includes technical reports from the University Transportation Centers, State Departments of Transportation and other resources.”

TRIS/NTL Integrated Search

The National Transportation Library, part of the Bureau of Transportation Statistics (BTS) <http://www.bts.gov/>.

Research and Innovative Technology Administration, (U.S. Department of Transportation) and the Transportation Research Board <http://www.trb.org>.

Part of the National Academies <http://www.nationalacademies.org/>, announced the release of an improved web search capability for TRIS Online and the NTL Catalog.

The NTL Integrated Search allows the user to use one interface, one set of functional rules, to search not only the TRIS Online Database, but also the NTL Digital and Portal Collections. The database is available from the NTL’s website at <http://ntl.bts.gov> and <http://ntl.bts.gov/tris>.

If you can use any help finding information, or have a specific request, please let Heidi know! Thank you!

Heidi at the NDOT Research Library, 888-7895, open Mon.-Fri., located in the Main NDOT Headquarters, Rm. 115.

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The Research Division administers the Department’s research, development and technology transfer program and serves as the “clearing-house” for product evaluations.

Research and Technology Review

Is published quarterly by the NDOT Research Division. Its purpose is to provide the latest information on the NDOT research activities including product evaluation and other pertinent research topics.

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If you have comments or need additional information regarding any of the topics discussed in this issue please contact the Research Division at (775) 888-7223.

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