



REVIEW

Published by the Nevada Department of Transportation, Research Division

Research Bulletin

NDOT CONDUCTS RESEARCH PEER EXCHANGE

The Nevada Department of Transportation (NDOT) Research Division hosted a Research Management Peer Exchange November 7 and 8, 2006, with Transportation Departments from the states of Oklahoma, Oregon, and Washington. It was conducted to comply with federal regulatory requirements for Research, Development and Technology (RD&T) programs and to exchange information among members of the peer exchange team. The exchange focus was to improve three program areas: 1) identify and address research needs, 2) provide incentives for research champions, and 3) improve internal and external customer satisfaction for our research program.

During the exchange, the team reviewed NDOT's research program mission, objectives, processes, and scope. The team members from the other state DOTs also presented an overview of their processes and experiences in the three focus areas. In addition, the team interviewed representatives of our Research Advisory Committee (RAC), the University of Nevada at Reno (UNR) and Las Vegas (UNLV) research faculties, and the Research Project Panels. The team received feedback from them on our research program and processes for research development, research management and research implementation. The findings and recommendations were reported to NDOT Deputy Director/Chief Engineer, (now director) Susan Martinovich, and Assistant Director for Planning, Kent Cooper.



NDOT Research Peer Exchange Team (from left to right): Reed Gibby (NDOT), Tie He (NDOT), Leni Oman (Washington State DOT), Bernie Jones (Oregon State DOT), Siv Sundaram (Oklahoma DOT), and Mike Herron (FHWA).

Overall, feedback from the various representatives indicated that the evolving NDOT research program processes were excellent, staff members were qualified and responsive, communication is improving, and most of the research projects are in-line with departmental strategic goals and are useful to the divisions. Several of the team's suggestions for enhancing the research program included:

- 1) developing a two-stage research problem statement process;
- 2) increasing communication and marketing through

Continued on next page

**In This
Issue**

Pg. 1 - Research Peer Exchange Pg. 2-3 Left-Turn Controls at Signalized Intersections

Pg. 4 - Product Evaluation Committee Meeting Recap

Pg. 5 - Approved FY 2007 Research Projects

Pg. 6 - Library Corner

Continued from previous page

newsletter circulation, website, publications, staff outreach, and a Research Day; 3) developing better recognition of research champions and panel members; 4) providing opportunities for champions and panel members to travel and network nationally; 5) synchronizing the research process with the university recruitment schedules; and 6) improving customer communication through customer service surveys.

The team wishes to thank the following individuals for their participations in the peer exchange:

Russ Law, Frank Csigá, Fred Drees, Dean Weitzel, Mike Lawson, Mark Elicegui, James Souba, Kent Mayer, Todd Stefanowicz, Darin Tedford, Anita Bush, Scott Thorson, Tracy Larkin-Thomason, Chuck Reider, Jason Van Havel, Roma Clewell, Heidi Wood, Dave Olsen, Mike Stair and Bill Hoffman from NDOT; Dr. Nader Ghafoori and Dr. Harry Teng from UNLV; and Dr. Tian Zong, Dr. Kwang Kim, Dr. Bob Nowak, Dr. Raj Siddharthan, Dr. Yanyao Jiang, and Dr. Cahit Evrensel from UNR.

LEFT-TURN CONTROLS AT SIGNALIZED INTERSECTIONS

An important subject in traffic engineering studies is determining the appropriate left-turn control types at signalized intersections. The State of Nevada is facing many issues related to determining the policies and operations of left-turn controls. To address such a need, the University of Nevada Reno (UNR), with funding from the Nevada Department of Transportation (NDOT), initiated a research project in January 2006, titled "Evaluation of Safety and Efficiency of Protected/Permissive Left-turn Controls". Dr. Zong Tian, Assistant Professor of Civil and Environmental Engineering at UNR, has been leading a team to conduct the research. The research team includes Mr. Kent Kacir, Senior

Transportation Engineer with Siemens ITS, and two graduate students, Ozlem Ozmen and Xuan Wang. A panel has been selected to provide technical advice and direction on the project. The panel members include several NDOT employees: Kent Sears, District I; Mike Fuess, District II; Jeff Lerud, Headquarters Traffic; Scott Thorson, Headquarters Traffic; and Reed Gibby, Research. Members from outside organizations are Tom Kruse, City of Las Vegas; Dave Crisler, Las Vegas FAST; Jim Poston, Washoe RTC (Chair); Jon Ericson, City of Sparks; and Melanie Muchas, FHWA.

The primary research objectives are developing guidelines for determining left-turn control types in the State of Nevada and evaluating the safety performance for a unique protected/permitted left-turn control application in the Las Vegas area.

The unique protected/permitted left-turn application in Las Vegas involves switching between protected/permitted (where the left-turn traffic receives a protected green arrow and a permissive green ball) and protected-only operation on a time-of-day basis (where the left-turn control provides a separate signal phase for the left-turn traffic using a green arrow). This operation will address safety concerns by using protected-only operations during the peak periods and, to achieve efficiency, using protected/permitted operations during the off-peak hours. Using protected-only left-turn controls will also help traffic progression during



Figure 1: Shows the typical permissive left turn display with a red arrow. The green ball means that the driver turning left must yield to on-coming traffic.

Continued on next page

Continued from previous page

the peak hours. Figures 1 and 2 illustrate the typical signal displays while Figure 3 shows the unique Las Vegas display.

The initial phase of the project includes a literature review, agency survey, and a synthesis of left-turn control guidelines of other organizations. The agency survey form was posted on the Internet in March, which included a total of 15 questions, covering a broad range of issues that could provide useful information for the project.

A total of 36 responses were received by May 30, 2006. Among the responses, nine were state DOTs, including Arizona, Maryland, Michigan, Louisiana, New Jersey, Missouri, Washington, Utah, and Oregon. The remaining responses were from local public agencies and private transportation organizations.

Through the comprehensive literature review and agency survey, several key factors were identified which have major influences in selecting left-turn control types. Among these factors, traffic safety is placed as the highest priority, followed by capacity and delay, size of intersection, vehicular speed, and traffic progression.



Figure 3: Illustrates the special time-of-day protected/permitted left-turn operation in Las Vegas. The left-turn signal head with the protected/permitted design operates protected-only during the peak periods by turning off the lights for the permissive green ball and yellow ball that allow the permitted left turn movements during the off-peak periods. The yellow arrow display, during a peak period, indicates that the protected left turn movement is about to terminate.



Figure 2: Shows the typical protected left turn display with a red arrow. With a green arrow, a driver has the right-of-way to make a left turn.

In addition, survey responses also indicated that traffic volume, sight distance, intersection geometry, pedestrian and bicycle volume, cycle length, driver expectations, and median width are also important factors to consider.

Based on the literature review and agency survey, a synthesis of left-turn controls was developed. This synthesis will be continuously refined based on the Panel, local engineers' feedback, and new research results that surface. The literature review, agency survey, and synthesis have been documented in a working paper.

The research team is currently working on the next phase of the project, which involves evaluation of the safety performance of the time-of-day protected/permitted operation currently being implemented at several intersections in the Las Vegas area. The research team has been working with NDOT and local agencies to gather necessary data for conducting the analysis. Once the data is collected, advanced statistical procedures will be applied to assess the safety measures related to the unique Las Vegas left-turn operation. The project will be completed by the end of 2007.

— Product Evaluation Committee (PEC) Meeting Recap —

Federal Process Review Continues

Survey

Surveys were sent to vendors, contractors, and within NDOT addressing questions about the product evaluation process. The results were generally favorable, such as comments like, “We’ve dealt with all 50 states product evaluation processes and NDOT is the best to deal with”. Another vendor’s comment was that “the process was easy, but if we could speed the process up it would be better.” Internal comments included suggestions for changing or updating our processes to make it easier to use, and listing manufacturers rather than distributors on the QPL. Contractors suggested that we include more QPL products and also list distributors rather than manufacturers on the QPL. Overall, the feedback from the survey was useful.

Draft Process Review Report

The Federal Highway Administration provided a rough draft of the report titled “Joint Process Review, September 2006, The Qualified Product List & Use of Proprietary and Patented Products”. Results from the review found that the Sole Source Process needed clarification. Three reasons for Sole Sourcing were determined: for emergency, for cost effectiveness, and for experimental features. Sunset clauses were recommended. The sunset clauses would vary in duration on a case-by-case basis depending upon anticipated changes within the product and/or market. The findings will be implemented in 2007.

The Report also indicated that more education on the use of the QPL would be helpful. Fact sheets or product brochures could be developed addressing: How do I use the QPL; How do I submit products on the QPL; and Whom do I contact? These fact sheets can be tailored to those using the information such as Designers, Resident Engineers, Contractors, Vendors, etc. Further training could be provided on the process at the Resident Engineer’s Conference and Academy. A quick Fact Sheet could also be attached to the front of the QPL on the web site.

QPL Products Meeting Specifications but not Listed on QPL

Four or five times a week, Contractors request product approval for products not on the QPL but meet all specification requirements for the product category. Research took some time to clarify the following:

1. If a contractor, through the Resident Engineer, requests a new product that is not on the established QPL, the Resident Engineer can first contact the Materials Division to conduct an initial review of the request. If the product is related to Materials, the Materials Division can approve the product, provided that it meets contract specification requirements and the QPL requirements established for the particular product. After the product is reviewed, a copy of the approval or denial memo along with the original product information should be sent to the Product Evaluation Coordinator in the Research Division.
2. If the product is not related to Materials or requires more than one division to evaluate, the Materials Division will contact the Product Evaluation Coordinator in Research to determine which Division needs to review the product. Materials will then forward the product information to the correct division. Once the division has made its determination, the division will inform Materials and copy Research. Materials will then communicate the determination to the Resident Engineer.
3. If the product is approved, the Research Division will add the product to the QPL for future use.

Continued on next page

4. All vendor requests for product reviews should be forwarded to the Product Evaluation Coordinator in the Research Division for evaluation through the Product Evaluation Process.

A distinction was made between quality control and substituted products. Products that are substituted or used in place of products on the QPL list must go through the above procedure; however, quality control is determined by the specifications established by the Divisions.

Approved FY 2007 Research Projects with Principal Investigators and Technical Panel Members

Project Title	Principal Investigator	Technical Panel Members
Evaluation of Graffiti Countermeasures	Dr. Harry Teng (UNLV)	Mohamed Rouas (NDOT District I), Jeff Dodge (NDOT Maintenance & Operations), Dave Severns (NDOT Bridge Maintenance Inspection), Lucy Joyce-Mendive (NDOT Landscape), Larry Haugsness (City of Las Vegas), Rick Parrino (City of Reno), Dr. Harry Teng (UNLV), Reed Gibby, (NDOT Research), and Jason Van Havel (NDOT Research)
Methodology to Improve Project Cost Estimates for Transportation Planning Activities	Dr. Kambiz Raffiee (UNR)	Frank Csigas (NDOT Roadway Design), Russ Law (NDOT Operations Analysis), John Koster (NDOT Roadway Design), Coy Peacock (NDOT Program Development), Amir Soltani (NDOT Hydraulics), Dr. Kambiz Raffiee, and Reed Gibby (NDOT Research)
Development of Surrogates for Crashes	Dr. Tian Zong (UNR)	Kelly Anrig (NDOT Safety), Chuck Abbott (NDPS Office of Traffic Safety), Russ Law (NDOT Operations Analysis), Kirsten Kehe (NDOT Road Design), David Leegard (NDOT Traffic Information), Dr. Zong Tian, and Reed Gibby (NDOT Research)
Safety Analyst Implementation Demonstration	Dr. Tian Zong (UNR)	Chuck Reider (NDOT Safety), Lawrie Black (NDOT Safety), Theresa Pacheco (NDOT Safety), Steve Jackson (NDOT Roadway Systems), Dr. Zong Tian, and Reed Gibby (NDOT Research)
Reflective Cracking of Flexible Pavements: Literature Review, Analysis Models and Test Methods Demonstration	Dr. Peter Sebaaly (UNR)	Jim Souba (NDOT Maintenance), Kent Mayer (NDOT Maintenance & Operations), Sohila Bemanian (NDOT Materials), Joe Martinez (NDOT District I), Tracy Larkin-Thomason (NDOT District II), Kevin Lee (NDOT District III), Dr. Peter Sebaaly (UNR), Tie He (NDOT Research), and Reed Gibby (NDOT Research)
Performance Evaluation of NDOT Pavement Maintenance Activities		
Evaluating the Effectiveness of Traffic Safety Education Programs	Dr. Shashi Nambisan (UNLV)	Chuck Reider (NDOT Safety), Chuck Abbott (NV Department of Public Safety - Office of Traffic Safety), Bill Young (Las Vegas Metro Police), Russ Law (NDOT Operations Analysis), Meg Mincolla (NDOT Public Information), Reed Gibby (NDOT Research), Dr. Shashi Nambisan (UNLV), and Roma Clewell (NDOT Research)

Library Corner

NDOT Research Library is located in Room 115 of the NDOT Headquarters Building, and is open 8-5, Mon-Fri.

The library has many resources for you to enjoy. The latest copies of Civil Engineering, Landscape Architecture, and ENR, are just a few of the magazines we subscribe to. We also have all the NCHRP Reports, and NCHRP Synthesis, TRR's, and most publications from US DOT, FHWA and AASHTO. You will also find research reports from many of the United States, States, along with Federal Registers, Highway Statistics, and a section of computer software books for using Excel, Access, and WordPerfect.

Remember, I send any book, anywhere in Nevada! Requests are also taken! If there is a book you would like to see purchased, let me know!

If you have any transportation research question(s), I'm here to help. I'd be happy to gather information, and literature for you using many different transportation databases. Call me, Heidi, at X.7895, or email me at: hwood@dot.state.nv.us

An easy-to-use source I would like to share with you comes from Northwestern University. They are very advanced in their transportation library, and I'd like you to see the resources they have to offer: <http://www.library.northwestern.edu/transportation/>

(A good page to start with in this link is found under, II. About the Transportation Library Collection, then, C. TRANSPORTATION e-resources, then click on-General Transportation.)

This list they have compiled is a great place to return to, time and time again!

Hope to see you in the library soon, come in and look around!

Nevada Department of Transportation
1263 S. Stewart Street
Carson City, NV 89712

First-Class
U.S. Postage
PAID
Carson City, NV
Permit No. 15



Volume 15

Number 3

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.

*The Nevada Department of Transportation
1263 S. Stewart Street
Carson City, Nevada 89712*

Jim Gibbons, Governor
Susan Martinovich, P.E., Director

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.

Editor: Roma Clewell

