

RESEARCH AND TECHNOLOGY

REVIEW

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RESEARCH BULLETIN

Prioritization of Research Proposals for FY 2001 R, D & T Program

On July 14, 2000, the NDOT annual Research Advisory Committee (RAC) meeting was held to prioritize research proposals submitted for the FY 2001 research, development and technology transfer (R,D&T) work program. A total of fourteen proposals were evaluated and five proposals were recommended to the department's Research Management Committee for final approval.

Prioritizing this year's proposals was a difficult task for the RAC, because of a record number of quality proposals and limited

funding. Unlike in the past, this year's proposals covered a broad range of research subjects including traffic, design, materials/pavements, maintenance, structures, environment, and hydraulics. Also, proposals were submitted from both Nevada universities, as well as in-house personnel. Many of the proposals may benefit the department in terms of addressing operational problems.✪

NDOT Research: Traffic Control in a Roundabout Way

Alleviating traffic congestion in a small city is a challenge for traffic-engineering professionals, especially in terms of intersection control. Signalized intersections in small cities/towns are

generally uncoordinated and isolated with a typical peak-hour congestion problem. During off-peaks, these signalized intersections tend to stop a large percentage of all entering vehicles as a function of their performance. The benefit derived from these types of signalized intersections may be marginal when compared to the initial signal-installation costs and the ongoing maintenance/operational costs.

In Carson City, The Nevada Department of Transportation along with the local Regional Transportation Commission (RTC)



Roundabout on Edmonds Dr. and Fifth St.

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were faced with the problem of providing effective traffic control at an isolated intersection east of the central business district. The intersection of Edmonds Drive at Fifth Street has experienced an increase in traffic during the last 10 to 15 years due to residential development and a school located off of Fifth Street; Edmonds Drive now serves as a quasi ring road pending the construction of the Carson City bypass. On an annual average daily basis, 15,250 vehicles use this intersection.

The specific problem encountered at the intersection was the failure of the existing 4-way stop. During peak-hour conditions, there was up to a 25 minute standing que. While the intersection meets warrants for signalization, the roadway geometrics at the intersection are prohibitive unless the intersection is widened to provide auxiliary lanes for an approximate cost of \$50,000. The total cost for signalization would range from \$180,000 to \$230,000 plus approximately \$5,000 in annual maintenance costs. However, even with the three distinct peak-hour periods (7:30 am, 2:30 pm, and 5:00 pm) a signal would be overkill at the intersection with vehicles stopped needlessly during off-peak conditions.

NDOT proposed a research project to study the feasibility of using a modern roundabout to control traffic at the intersection of Edmonds Drive at Fifth Street. After NDOT conducted public opinion surveys and an outreach campaign, the Carson City RTC agreed to install a temporary

roundabout. The public, along with the RTC, were convinced that a roundabout would reduce delay during peak-hours and unlike the existing 4-way stop, there would be no delay during off-peak conditions. The local newspaper served as a means to educate drivers as to the counter clockwise flow of traffic in roundabouts. Also, traffic engineers constructed a model of the roundabout to show a scale replicate of exactly what the intersection would look like after the roundabout was installed. Using NDOT maintenance forces, a temporary roundabout was installed for about \$15,000.

Initial analysis indicated that delay at the intersection was reduced from a peak-hour 25-minute standing que to a maximum delay of 25 seconds after the roundabout was installed, with an average delay of about 10 seconds.

Based on the results of this project, the Carson City RTC voted in June of 1999 to install a permanent roundabout at the studied intersection during the summer of 2000 for an estimated cost of \$170,000 to \$200,000.

The use of modern roundabouts has application at isolated intersections in small cities where traffic volumes during peak-hour conditions are too high for a 4-way stop and where a traffic signal would cause unnecessary delay during off-peak conditions. In addition to the permanent installation at Edmonds Drive and Fifth Street in Carson City, NDOT plans a new construction application of a modern roundabout at an interchange along the Carson City U.S. 395 bypass. Also, there are plans to retrofit three intersections in the Las Vegas area with roundabouts as a means to reduce approach speeds, thereby reducing the number and severity of

crashes.

Roundabout operation is efficient: during peak traffic periods, delays are less than for signalized intersections and off-peak periods have virtually no delay associated with the intersection traffic. Since all vehicles slow to nearly the same slower speed, there may be some safety benefit as well. At slower speeds, motorists make better decisions with reaction time and distance reduced. These factors lead to less crashes as well as a dramatic reduction of crash severity.

At the Carson City intersection, monetary savings realized in the installation of a permanent roundabout as opposed to a signal, could be as high as \$60,000, not to mention the elimination of annual maintenance costs.

Approved Asphalt Release Agents

In an effort to enhance worker safety and the quality of products used on NDOT projects, the PEC approved a qualified product list for asphalt release agents. Since NDOT does not have comprehensive specifications or resources to test these products, the Texas DOT specifications for asphalt release agents have been adopted. Based on input from the Materials Division, these specifications will be converted into NDOT's format.

To date, the Construction Division has used an extensive list of asphalt release agents that were approved

Product Evaluation Committee (PEC) Meeting Recap

for use on NDOT projects based solely on their not being solvent. As Construction proposed, four of the currently approved asphalt release agents that meet the newly adopted spec are listed in the initial QPL. Vendors of products approved under the old specification will be notified and provided an opportunity to submit test data to certify compliance with the new specifications. Once a product is determined to be in compliance, it will be added to the QPL.

Field Test

Test Deck for Epoxy Bridge Overlay Systems Underway

The PEC approved a test deck for epoxy-based overlay systems to develop alternatives to polyester styrene systems that are currently used by NDOT. The committee's decision was based on the potential for reducing worker exposure to harmful materials, reducing construction time involved in bridge rehabilitation, and implementation of new technologies.

Launching a test deck will enable NDOT to effectively gauge performance of several epoxy-based overlay systems in a controlled setting. As such, adequate data will be available if a need for a specification revision arises. If successful, the test may result in having alternative products that are suitable for various applications.

As a representative product of epoxy-based thin overlays, the T-48

system from Transpo Industries, Inc. was introduced to the committee for consideration. This product, together with the Mark 163 Flexigrid system from Poly-Carb, will be placed on the test deck. Currently, the T-48 and Flexigrid systems are used by several state

DOT's as alternatives to the polyester styrene system. Both systems are claimed to improve skid resistance and provide an impervious membrane to prevent the treated surface from being penetrated by moisture and chlorides.★

Product Removal

Davidson Products Removal from QPL

Due to product failures, District I requested that Davidson Plastics flexible guideposts series 400 and 500 be removed from the existing QPL pending re-evaluation. It is the contention of district personnel that the failures were due to the material composition of guideposts which resulted in poor wind resistance (the posts sheared-off at the base during high winds).

Given that similar product failures were also documented in another district, the PEC decided to remove the series 400 and 500 guideposts from the QPL. The committee will consider any request for re-evaluation based on the existing process for product evaluation, i.e., the committee will act on any specification-



June 6, 2000 Meeting: Left to right; Alan Hilton, Research; Masha Wilson, Research; Tie He, Research; Todd Jorgensen, FHWA; Garth Oksol, FHWA; Thor Dyson, District II; Dave Lindermann, District III; Dale Lindsey, Operations Analysis; Bill Hoffman, Bridge; Tom Locke, Maintenance; Jeff Hale, Construction; Wes Clyde, Materials; Dean Weitzel, Materials; Fred Droes, Traffic/Safety; Gene Weight, District I; Kevin Baxter, Specifications.

revision request or a request to establish a test deck to determine the actual cause of product failure.

Because of its complexity, the issue regarding the use of ground mounted flexible guideposts in general and existing acceptance criteria, will be discussed at the next PEC meeting.★

Specification Revision

Breakaway Luminaire Base Coupling

Transpo Industries, Inc. requested a revision to NDOT specifications to allow use of their product - Omni-Directional Breakaway Luminaire Base Coupling series 4000 - as an alternative to the current generic design detail shown in the NDOT Standard Plans, section T-30.1.9. Because of the potential for retrofit application, the PEC approved a field test of the product in September 1998.

However, during the retrofit process, the district maintenance

crew experienced several problems in fitting the product with the luminaire. Considering that the ease of installation is an important criteria in any field test and further application, the committee concluded that this product does not appear to be viable for use by NDOT in a retrofit situation. Therefore, the PEC decided against revising the current Standard Plans detail to allow the series 4000 as an alternate for maintenance applications.☺

**On-Going Field Test
CONCRETE PROTECTIVE
COATINGS**

When traveling on the off-ramp of U.S. 395 at the



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

North McCarran Boulevard interchange, you may notice some concrete barrier rail sections with different colors. This is the NDOT test site for concrete protective coatings. The different colors reflect the experimental use of five different products installed on April 5, 2000.

As reported in our previous issue of the newsletter, the test is designed to evaluate how a particular coating performs over a two-year period of time. Interim inspections of the products are scheduled to assess the ability of individual material to withstand weathering effects. On July 10, 2000, the first inspection was conducted. In all the test sections, no flaking, blistering, or cracking was observed. However, all the products are experiencing some color degradation and dirt retention. The two

products from Textured Coatings of America are performing better than other products in terms of color degradation and visibility.☺

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 **Alan Hilton**, Research Division Chief, at (775) 888-7803. ahilton@dot.state.nv.us

