RESEARCH AND TECHNOLOGY

REVIEW

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RESEARCH BULLETIN

WASHTO-X IS UNDERWAY

The Nevada Department of Transportation (NDOT) is participating in a pooled-fund project involving a video conferencing network among states within the Western Association of State Highway and Transportation Officials (WASHTO). The primary intent of the project is to test the feasibility of extending the Tel-8 video conferencing network to states outside the original core group of Utah, Wyoming, Montana, South Dakota, and North Dakota. In addition to the original five states from Tel-8, other states participating in WASHTO-X are California, Oregon, Washington, Arizona, Oklahoma, and Nevada. Utah DOT in conjunction with their T^2 Center at Utah State University is coordinating the project.

WASHTO-X is aimed at providing a cost-effective means for regional transportation professionals, from both federal and state agencies, to communicate with their colleagues in other states regarding various transportation topics without incurring travel costs. Each video conference consists of a short presentation by a host state or states on a predetermined topic followed by a roundtable discussion between other participating states.

In addition to the program assessment video conferences held on May 30, 2002 and July 23, 2002, there have been two actual events to date - "Noise Abatement" and "Bridge-Deck Rehabilitation." Both of the actual events were well attended by NDOT staff. The next scheduled event will take place on August 13, 2002 for the selected topic- "Pavement Marking Materials." On September 10, 2002 the event topic will be "Project Delivery." While additional topics have yet to be decided, events are tentatively scheduled for the second and fourth Tuesdays of each month after September. Each event will be held from 8:00 AM to 10:00 AM in the small third floor conference room in the NDOT headquarters building. For a list of suggested topics for future events and more information regarding this program, visit the web at WASHTO-X.org. Any questions or future topic suggestions regarding WASHTO-X should be directed to NDOT's site coordinator, Alan Hilton - Research Division Chief.**?**

In This Issue

NDOT RESEARCH PROGRESS REPORT

Performance and Selection of Asphalt Crack Sealant

In May, 2002, we observed the performance of the different crack sealants installed last year on SR 278 near Eureka, Nevada. Total installation length, debonding (defined as separations or cracks at the interface between the sealant and pavement or cracks in the sealant), pull-out (absence of sealant) length and crack size of each treatment were measured.

Figure 1. Measuring crack length.

The percentage of failure (the sum of debonding length and pull-out length) over the total length was calculated as an indicator of performance for each product. The average results of the three randomly-located replicates of each treatment for each installation method are presented in table 1.

From the table, it can be seen that among the nine products used, Crafco 231 and Crafco Polyflex stand out with only 4% failure while all other products had a failure rate of over 60% after a year. In general, the five hot-applied products performed better than the four cold-applied materials with the same installation method. Between the two installation methods, the "rout and recess" method significantly improved the product performance, particularly in the case of Elastoflex 60.

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Figure 2. Measuring crack size with a micrometer with precision of 0.001 inches.

Table 1. Performance of Selected Crack Sealants After One Year's Installation

Products	Installation Methods	Product Types	Installation Length (feet)	Debonding Length (feet)	Pull-out Length (feet)	% of Failure
Elastoflex 60	Simple band-aid	Hot applied	387	259	30	75
Elastoflex 60	Rout and recess	Hot applied	410	42	2.5	11
Safe Seal 3405	Simple band-aid	Cold applied	395	379	0	96
Safe-Seal 3405	Rout and recess	Cold applied	421	326	0	77
Crafco 231	Simple band-aid	Hot applied	394	17	0	4
Crafco 231	Rout and recess	Hot applied	394	0	0	0
Kold-Flo	Simple band-aid	Cold applied	402	402	0	100
Kold-Flo	Rout and recess	Cold applied	378	273	5	74
Crafco Polyflex	Simple band-aid	Hot applied	393	15	0	4
Elastoflex 65	Simple band-aid	Hot applied	383	198	57	67
Elastoflex 500	Simple band-aid	Hot applied	437	294	17	71
Percol Elastic Cement AC	Simple band-aid	Cold applied	359	359	0	100
Soft Seal	Simple band-aid	Cold applied	364	354	0	97

Product Evaluation Committee (PEC) Meeting Recap

RE-EVALUATION

Flexible Guide Posts Re-Evaluation

At its June 11th meeting, the PEC decided to not reinstate flexible guideposts from Carsonite International and Bunzl-Extrusion on the QPL at this time, but to re-evaluate these products based on a current research project's findings. The project's intent is to tighten the specifications so that they are a better predictor of actual performance; there will be a particular emphasis on developing wind-load criteria.

As we already reported, the Drivable Survivor from Carsonite International and FG400/500 from Bunzl-Extrusion flexible guideposts were removed from the QPL based on requests from NDOT staff. The major identified problem with the Drivable Survivor was attributed to fast degradation of the sheeting backing used to affix reflective sheeting to the post resulting in the failure of this delineator. Davidson's Flexi-Guide 400/500 post was removed from the QPL because it had a high rate of failure on two construction projects. The product is suspected of having inadequate resistance to wind loads during cold temperatures. According to the vendors, corrective steps have been taken to ensure that these problems do not occur again. At its meeting, the PEC considered various options regarding the vendor's requests for re-evaluations. These options included: (1) re-evaluation of these posts as part of the research project, or (2) acceptance and reinstatement on the QPL FG400/500 based on the statements provided by the vendors regarding corrective actions that have been taken. **?**

FIELD TEST RESULTS

Reflexite Endurance Work Zone Signs

Based on the results of a field test, the PEC did not approve the addition of the Endurance work zone sign system to the QPL. The committee acted upon conclusions and recommendations provided by a field evaluation report describing the six month performance of Reflexite's Endurance work zone sign systems.

The field test of Reflexite's Endurance work zone sign, a rigid high-strength sign panel system (a combination of thermoplastic sign substrate and reflective sheeting) was approved by the PEC at its December 2000 meeting. At that time it was determined that if Reflexite's Endurance system performs well, the test findings would be implemented in the form of a new specification for reflective sheeting material used for rigid sign

Figure 3. Test section with Endurance Signs.

panel and a thermoplastic rigid substrate for portable sign stands.

The endurance system was tested on the frontage road in Washoe Valley. The purpose of this test was to determine the system's performance and durability as an alternative to roll-up signs. The study's findings indicated that the Endurance signs have higher initial reflectivity than roll-up signs, however, their reflectivity tends to decrease more rapidly. As stated in the report, "Endurance signs on portable sign stands are not better in terms of durability, wind resistance, and color retention than roll-up signs tested under the same conditions." **?**

Asphalt Crack Sealant continued from page 2

We will continue to monitor the performance of these products for another year. The final results will be reported at the end of the research.

For more information, contact Tie He, NDOT Research Coordinator at (775) 888-7220 or via e-mail at the@dot.state.nv.us **?**

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*

NDOT LIBRARY RECENT ACQUISITIONS

(Received April 1 through June 30, 2002)

CONSTRUCTION

O-15 Corridor Reconstruction Project (UT-01-08), Utah DOT; **3838**

HYDRAULICS/ENVIRONMENT

A Comparative Review of Wetland Mitigation Practices: Evaluation, Monitoring, Maintenance, Inventory, Staff and Funding (UT-01.10), Utah DOT; **3837**

Evaluation of the Effects of Development on Peak Flow Hydrographs for Collyer Brook, Main (ME 99-6), Main DOT; **5998**

Long Term Vegetation and Faunal Succession in an Artificial Northern California Vernal Pool System (FHWA/CA/TL/2001-36), Caltrans; **6206**

Roadway Applications of Vegetation and Riprap for Streamband Protection Synthesis Report (FHWA-OR-RD-02-08), Oregon DOT; **6208**

What is the Best Way to Address Environmental Justice Issues? (FHWA-AZ-02-506), Arizona DOT; **6398**

A Synthesis of the Application and Performance of Three-Sided Precast Box Culverts (UT-02.05), Utah DOT; **6609**

Evaluation of Crown Vetch (Coronilla varis) as a Sustainable Vegetation for Roadsides (ME 96-3) Maine DOT; **6846**

Compaction and Settlement of Existing Embankments (KTRAN: KU-00-8), Kansas DOT; **6996**

Landscape and Aesthetics Master Plan for Nevada State Highway System - Final Review Draft, Nevada DOT; **7177**

Environmental Impact of Construction and Repair Materials on Surface and Ground Waters (NCHRP 25-9), National Cooperative Highway Research Program; **CD-7429**

Dust Control on Low Volume Roads: A Review of Techniques and Chemicals Used (FHWA-LT-01-002), Washington DOT; **7371**

MAINTENANCE

Evaluation of BLASTOX, Lead Reducing Shot for Paint Removal on Bridges (FHWA-PA-2001-016-97-4(1)),

Pennsylvania DOT; **6019**

A Comparison Between the Use of UDOT's and Contractor's Equipment for Crack Sealing (UT-02.04), Utah DOT; **6527 & 6528**

Evaluation of Selected Deicers Based on a Review of the Literature (CDOT-DTD-R-2001-15), Colorado DOT; **6999**

Comparison of "Saw & Seal" Procedure and Performance Grade Binder to Minimize Thermal Cracking (1st Interim Report 00-19), Maine DOT; **7439**

MATERIALS/PAVEMENTS

Construction and Comparison of Louisiana's Conventional and Alternative Base Courses Under Accelerated Loading (FHWA/AL-00/347), Louisiana DOT; **6782**

Crumb Rubber Modified Asphalt Concrete in Oregon (FHWA-OR-RD-02-13) Oregon DOT; **6822**

TILT: The Treasure Island Liquefaction Test (SSRP 2001/17), California DOT; **7069**

Development of Maintenance Practices for Oregon F-Mix (FHWA-OR-RD-02-09), Oregon DOT; **7252**

Three Year Laboratory Evaluation of Rapid Set Patching Concrete (NTPEP 225), CD from Transportation Research Board; **7264**

A Process for Selecting Strategies for Rehabilitation of Rigid Pavements - Final Report (10-50A), Texas Transportation Institute for NCHRP; **7325**

The Use of Micro-Surfacing for Pavement Preservation (TR 02-3), Maine DOT; **7328**

Evaluation of Steel Paving Mesh (FHWA-PA-2002-001+2000-058), Pennsylvania DOT; **7370**

Materials-Related Forensic Analysis and Special Testing, "Determination of Soil Strength & Consolidation Parameters" (FHWA-PA-2002-011+98-32(09)), Pennsylvania DOT; **7438**

Pavement Evaluation Using Integrated Data from High-Speed Sensors (Final Report)(CD) U.C. Beckley; **980**

Evaluation of the Fundamental Engineering Properties of Bituminous Mixtures Containing Hydrated Lime (FHWA/LA-02/306), Louisiana DOT; **7443**

Vision-Based Low Cost Field Demonstrable Paint Restriping Guidance System (UCD-ARR-01-09-14-02), California DOT; **CD-7441**

PLANNING/PROGRAM DEVELOPMENT

Non-Pricing Methods to Optimize High Occupancy Vehicle Lane Usage (FHWA/CA/OR-2001/21) Caltrans; **413**

Research on Best Security Practices (FHWA/CA/OR-2001-29), Caltrans; **6207**

Survey Methods for Assessing Freight Opinions (FHWA-OR-RD-02-14), Oregon DOT; **6796**

Weight Enforcement and Evasion: Oregon Case Study (FHWA-OR-DF-02-12), Oregon DOT; **6824**

National Transportation Security Summit (FHWA/CA/IR-2002/01 - MTI #S-01-02), Caltrans; **6825**

Evaluation of LADOTD Load Data for Determination of Traffic Load Equivalency Factory (98-1P), Louisiana DOT; **6879**

Evaluating and Improving Pedestrian Safety in Utah (UT-02.10) Utah DOT; **6972**

Impact of Kansas Grain Transportation on Kansas Highway Damage Costs (KTRAN: KSU-01-5), Kansas DOT; **6995**

I-99 Information Exchange, Work Order 90 (FHWA-PA-2002-009-97-04(90), Pennsylvania DOT; **7368**

Summer Transportation Institute 2001 Final Report (FHWA-PA-2001-029-97-04(105-2), Pennsylvania DOT; **7366**

Road Lifecycle Innovative Financing Evaluation (Road Life) Year 2001 Annual Report (NM00ADM-01.1) New Mexico DOT; **7372**

STRUCTURES

Revising the AASHTO Guidelines for Design and Construction of GRS Walls (CDOT-DTD-R-2001-16), Colorado DOT; **6155**

Performance of Zinc Anodes for Cathodic Protection of Reinforced Concrete Bridges (FHWA-OR-RD-02-10), Oregon DOT; **6891**

4th South Street Viaduct Five Year Condition Inspection and Evaluation (UT-02.07), Utah DOT; **6973**

A Fitness-For-Purpose Evaluation of Electro-slag Flange Butt Welds, Final Report (OR-RD=02-15), Oregon DOT; **7067**

Construction and Monitoring of Post-Tensioned Masonry Sound Walls (CDOT-DTD-R-2002-2), Colorado DOT; **7068**

Strain Monitoring for Horsetail Falls and Sylvan Bridges (FHWA-OR-DF-02-17), Oregon DOT; **7263**

Composites in Bridges (FHWA-PA-2002-008-97-04(89)), Pennsylvania DOT; **7326**

Field Testing and Evaluation of Laurel Hill Creek Bridge (FHWA-PA-2002-006-97-04(11), Pennsylvania DOT **7367**

Evaluation of Erection Procedures of the Horizontally Curved Steel I-Girder Ford City Veteran's Bridge (FHWA-PA-2002-003-97-04(74), Pennsylvania DOT; **7369**

Strong Motion Instrumentation of I-15 Bridge C-846 (UT-01-12), Utah DOT; **7365**

TRAFFIC/SAFETY

Evaluation of Microwave Traffic Detector at Chemawa Rd/I-5 Interchange; Final Report (FHWA-or-DF-02-05) Oregon DOT; **6823**

Evaluation of LADOTD Load Data for Determination of Traffic Load Equivalency Factors (FHWA-LA-01-340 Louisiana DOT; **6879**

Traffic Control Devices for Passive Railroad-Highway Grade Crossings (AASHTO), National Research Counci **7315**

Motor Vehicle Traffic Accident Summary - 2001 South Dakota, South Dakota DOT; **7327**

Improved Use of the Inspection Selection System (ISS) for Motor Carrier Safety: Development of an Intrastate ISS for Wisconsin Using the SafetStat Methodology (SPR-0092-00-02), Wisconsin DOT; **7389**

Empirical Study of Ramp Metering and Capacity (FHWA/CA/TO-2002/08), California DOT; **7440**

Mature Drivers: Safety and Mobility Issues (FHWA-NJ-2002-013 - 995922), New Jersey DOT; **7478**

Dancing Diamonds in Highway Work Zones: An Evaluation of Arrow-Panel Caution Displays (UT-02.13), Utah DOT; **7482**

REFERENCE BOOKS

CFR's New Edition **2002**

Roadside Design Guide 2002 AASHTO; **227**

Transportation Research Board, Includes 1996-2000 Index of Transportation Research Board Publications (Volumes 1741-1780); **CD-7431**