RESEARCH AND TECHNOLOGY

REVIEW

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RESEARCH BULLETIN

DOT Conducts Research Peer Exchange

The NDOT Research Division hosted a research management peer exchange April 24 - 27, 2001. The purpose of a peer exchange is to give research managers from state departments of transportation and the federal government a means to improve the quality and effectiveness of their research processes, both for the host department and the visiting research managers. In addition to NDOT, research managers from Oregon, Montana and Colorado along with FHWA officials from Nevada and Oregon served as the peer exchange team.

2001 NDOT Peer Exchange Team: (from left) Sue Sillick, Montana DOT; Richard Griffin, Colorado DOT; Barnie Jones, Oregon DOT; Alan Hilton, NDOT; Randy Bellard, FHWA-Nevada; Tie He, NDOT (Bob Raths FHWA-Oregon, not shown).

During the exchange, the team discussed NDOT's research-management procedures and those used in other team members' respective agencies and organizations. The team also interviewed more than 30 people including NDOT research-program customers and researchers from the University of Nevada System.

Team members identified certain opportunities for improving their respective programs. The opportunities identified by NDOT centered on the following topics:

- Research Program Development;
- Program/Project Management;
- Implementation; and
- Research Program Outreach

For a full copy of the peer exchange final report please contact the Research Division.

In This Issue

Peer Exchange 1
Crack Sealants.....1
NDOT Research.....2
Approved Products.....3
Sign Systems.....4

NDOT Research

Evaluation of Asphalt Crack Sealant under Nevada conditions

An in-house research project is underway to evaluate the

Crack sealant test site on S.R. 278 near Eureka, Nevada.

performance of the most commonly used asphalt crack sealants under Nevada conditions. The objective of this research is to tackle the three major problems with the NDOT crack sealing program: material ineffectiveness (sealant debonding and pull-out); safety concerns with hot-applied sealant, and sealant-caused bumps in overlays.

Two test sections were selected based on the NDOT pavement management system, pavement conditions and number of suitable transverse cracks. One section, located between mileposts 35 to 36 on U.S. 50 near Eureka, is used as a test site to evaluate the long-term performance of different crack sealants. The other section, located between mileposts 21 and 22.5 on S.R. 278 also near Eureka, is used to investigate sealant-caused bumps in overlays. This section is scheduled to be overlaid in July, 2001.

At the test site on U.S. 50, three cold-applied and two hot-applied products were installed with and without routing on May 1, 2001. The three cold-applied products are Safe-Seal 3405 from R.W. Meadows, Kold Flo from Unique Paving Materials, and Percol Elastic Cement Asphalt Welder SB from Construction Sealants and Supply. The two hot-applied products are Elastoflex 60 from Maxwell Products, Inc. and Roadsaver 231 from Crafco. Each product was installed in three assigned test sections that were arranged in random order. Within each test section, there are 10 suitable transverse cracks. Bump formation including size, shape and location will be recorded during the overlay. Reflective cracking will be observed immediately and at intervals of six months, one year and two years after the overlay.

At the test site on S.R. 278, nine products including four cold-applied and five hot-applied products were installed May 1 and 2. The four cold-applied products are Safe-Seal 3405 and Soft-Seal from W.R. Meadows, Kold Flo from Unique Paving Materials, and Percol Elastic Cement Asphalt Welder SB from Construction Sealants and Supply. The five hot-applied products are Elastoflex 60, 65, and 500 from Maxwell Products, Inc. and Roadsaver 231 and Polyflex from Crafco. All the products were installed in three replicates that were arranged in random order. Debonding and pull-out lengths will be measured at intervals of six, 12, 18 and 24months after installation.

Routing for crack sealant installation.

Failures in crack sealing can cause a significant increase in pavement maintenance costs through a loss of pavement life and result in a drain on maintenance personnel resources.

The research will provide NDOT with a list of effective products including some new ones, thus improving overall treatment effectiveness with a reduction in maintenance costs.

The research is being conducted by the Research Coordinator, Tie He and directed by a research panel consisting of District III Engineer Mike Glock; Assistant District III Engineer Joe Martinez; Chief Maintenance Engineer Frank Taylor; Research Division Chief Alan Hilton; Assistant District II Engineer Thor Dyson; Materials Research Engineer; Michael Dunn; and Maintenance Coordinator Thomas Locke. In addition, District III Maintenance Supervisor Ross Sanborn, and the Eureka and Austin maintenance crews participated in the installation of materials for the project.**?**

Product Evaluation Committee (PEC) Meeting Recap

Mechanically Stabilized Earth Walls B Large Panel

The PEC approved a revision to the NDOT Standard Plans and accompanying QPL for Mechanically Stabilized Earth (MSE) Retaining Walls with large rectangular shaped panels (1.5 meters tall by 3.0 meters wide).

A larger wall panel has been proposed for the I-580 extension project to reduce costs and to incorporate a specific aesthetic theme. The area of wall panel is restricted to a certain size for aesthetics and to accommodate differential settlement. NDOT maintains a list of pre-approved vendors supplying retaining wall panels and soil reinforcement systems. That list includes vendors with systems that have been pre-approved for only their smaller precast concrete panels (generally 1.5 meters by 1.5 meters or slightly larger, in square, hexagonal and cruciform shapes). Currently, a revised panel design and other associated issues are being evaluated for each potential supplier of a MSE retaining wall with large panels.

This approval for large panels may extend to other projects once a QPL for the I-580 extension project is established. **?**

Stormwater Runoff Treatment Systems

The PEC approved specifications and the establishment of a general QPL for stormwater runoff treatment systems used to remove and retain sediment and floating contaminants (oil, debris, and other pollutants) washed into storm drains.

Recently, manufacturers of various stormwater treatment systems have requested that NDOT evaluate their systems for use on NDOT projects. In the past, hydraulics engineers used these systems on a case-by-case basis based on available information and the specific requirements of the particular projects. In response to vendor's requests, Hydraulics explored baseline characteristics of various stormwater treatment units to develop acceptance criteria, including performance requirements and an initial general QPL. Currently, this initial general QPL consists of four products that represent innovative stormwater best management practices (BMPs). Each product targets a different set of primary pollutants and uses a different operating mechanism to effectively manage surface water runoff. BMPs could be simple, such as re-vegetating a bare slope; or very complex, such as stormwater treatment systems. Whether simple or complex, BMPs are site-specific. The units listed in the general QPL will be selected by the designer for use on a particular project based on specific removal criteria, maintenance considerations, constructability, and flow rates. Companies seeking to place their stormwater treatment systems on a general QPL will be directed to submit proposals for acceptance under the established specifications. **?**

3M Canoga Vehicle Detection System

The PEC approved a trial installation of the 3M Canoga vehicle detection system as an alternative to typical saw-in-place loop detectors and video detection. This trial installation will help to determine the 3M system constructability and acceptance by local entities.

The 3M Canoga non-invasive microloop vehicle detection system consists of the following components: model 702 non-invasive microloop probes and carries, installation kit, Canoga vehicle detectors, and home-run cables required to install the non-invasive microloop. This system is a new approach to vehicle sensing. Instead of saw cutting pavements for loops, or putting up poles to mount above-ground sensors, a plastic conduit is placed below the road surface. The trial installation was approved based on favorable results of a questionnaire circulated to those states listed by the vendor as having some experience with the 3M detection system. States that have used this system are: Washington,

Indiana, Minnesota, California and Michigan. ?

Water-Borne Traffic Paint Formulation

In an effort to improve striping quality and reduce failures of pavement marking materials, the PEC approved a specification revision and the establishment of a QPL for rapid-dry water-borne traffic striping paint based on the recommendation of a task force headed by the Materials Division. The QPL will be composed of those paints whose formulations meet the new specs as determined by the Materials Division. In the past, NDOT has used solvent-based traffic paint as the primary maintenance applied painting material. However, because of Environmental Protection Agency requirements to reduce volatile organic compound emissions from coating products, water-borne paint is being substituted for existing solvent-based paints.

Manufacturers/suppliers will be required to supply water-borne paint using the new formulations under established acceptance criteria. ?

Qualified Product List Available on Intranet

Those who are interested in viewing the qualified product list (QPL) can find it on the department's Intranet using the following path - \\Datsrv1\QPL. The QPL is compiled by the Research Division and is updated on a continuing basis as new products are approved for use. The NDOT product evaluation policy and flow charts showing the product evaluation procedure are also posted in this file folder. For questions regarding this matter, please contact Product Evaluation Coordinator Masha Wilson at 888-7894 or by e-mail at mwilson@dot.state.nv.us ?

Testing Reflexite Endurance Sign Systems for Use in Work Zones

Reflexite Endurance Signs are designed for use in road construction work zones and maintenance operations. They are the first rigid-panel sign system (rigid panel with a portable stand) that passed NCHRP 350. To evaluate field performance with regard to durability, wind resistance, reflectivity and color retention, a field trial is being conducted on a frontage road in Washoe Valley.

Reflexite Sign Systems being tested in Washoe Valley, Nevada

In the test, there are four types of installations: a Reflexite Endurance sign mounted on a MDI portable sign stand; a Reflexite Endurance sign mounted on a telespar post; a Reflexite roll-up sign mounted on a MDI portable sign stand; and an aluminum sign mounted on a telespar post. To increase test reliability, the four installations were repeated, resulting in a total of eight signs on the road.

The reflectivity of these signs will be measured every two months during a six-month period. The color, resistance to wind, permanent creasing, and delaminations/cracks will be observed and recorded. After the test period, a report, along with a recommendation on specifications, will be presented to the NDOT Product Evaluation Committee for action. ?

NDOT LIBRARY RECENT ACQUISITIONS

(Received January 1 through March 31, 2001)

BICYCLE/PEDESTRIAN

Making Crosswalks Safer for Pedestrians (BC-010), University of Southern Florida, 7/00; **A01-011**

CONSTRUCTION

Implementation of Highway Advisory Radio (HAR) for Construction Zones in Louisiana (FHWA/LA.00/339) by LA State University, 5/99; **1207**

HYDRAULICS/ENVIRONMENT

Using Wetlands for Stormwater Management, by OH DOT; **A01-008**

Estimation of Impervious Curve Numbers (BB-908) by Florida Tech, 6/00; **A01-010**

Performance Evaluation of Existing High-Density Polyethylene Pipe (FHWA-SC-00-08), by University of South Carolina, 12/00; **A01-014**

Lag Times and Peak Coefficients for Rural Watersheds in Kansas (K-Tran: KU-98-1) by KA DOT; **1199**

MATERIALS/PAVEMENTS

Continued Investigation of Strand Slippage in Prestressed Concrete Piles, Vol. I (FHWA-SC-00-07) by University of S. Carolina, 12/00**; A01-005**

Continued Investigation of Strand Slippage in Prestressed Concrete Piles, Vol. II (FHWA-SC-00-07) by University of S. Carolina, 12/00; **A01-006**

Evaluation of Superpave Mix Design for Rice Density Effects (WPI# 0510801), by University of Florida, 9/00**; A01-012**

Use of Stabilizer Agents in Mixer Drum Wash Water (BB-889), by University of Florida, 10/00; **A01-013**

Construction Report – US Highway 36, Superpave Overlay of Sand Anti-Fracture Layer Over AC/PCC Pavement (RDT-00-001B), MO DOT, 2/13/01; **A01-019**

Application of Non-Contacting Proximity Sensors for Measuring Soil Resilient Characteristics (WPI# 0510815) by FL DOT, 2/27/01; **A01-023**

Field and Laboratory Evaluation of Resilient Modulus Measurements on Florida Pavement Soils (WPI#0510636) by FL DOT, 2/27/01; **A01-024**

Identification of Dispersive Soils in Oklahoma by Physiochemical and Clay Mineral Properties, Part I – Final Report Text, Part II – Final Report Database, by OK DOT, 5/00**; 951**

Assessing Pavement Layer Condition Using Deflection Data by National Cooperative Highway Research Program, 01/00**; 952**

Appendices Assessing Pavement Layer Condition Using Deflection Dataa (NCHRP 10-48) by National Cooperative Highway Research Program, 01/00; **953**

A Study of Open Graded Base Course Performance – Draft Report by US Army Corps of Engineers, 12/00; **1195**

Evaluation of Ground Granulated Blast Furnace Slag in Concrete (Grade 120) (FHWA/LA-99/336) by Louisiana Transportation Research Center, 10/99; **1196**

Evaluation of a Chemical Humectant Applied to an Existing Metallized Zinc Cathodic Protection System by CA DOT; **1198**

Accelerated Testing for Studying Pavement Design and Performance (FY 99) (FHWA-KS-99-7) by KA DOT, 7/00; **1202**

Evaluation of Cold In-Place Recycled Mixtures on US-283 (KS-99-4) by KA DOT, 8/00; **1203**

Evaluation of Cement Treated Base Courses (00-1TA) by LTRC, 12/00; **1205**

Quality Assurance Specification Review for Hot Mix Asphalt and Structural Concrete (ME 99-4) by Fugro-BRE, Inc., 5/00; **1209**

PLANNING/PROGRAM DEVELOPMENT

Highway Improvements and Rural Growth: An Annotated Bibliography (FHWA/MT-00-001/8117-13 by Dept. of Sociology University of MO, 1/01; **1201**

STRUCTURES

Seal Slab/Pile Interface Bond (BB-305) by University of S. Florida, 6/00; **A01-002**

Repair of Corrosion-Damaged Columns using FRP Wraps (RC-1386) by University of Michigan, 12/21/00; **A01-007**

Instrumentation and Monitoring of Tieback Wall on Sum82 at Btecksville (FHWA/OH-2000/015) by OH DOT; **A01-015**

Instrumented Elastomeric Bridge Bearings (FHWA/OH 2000/010) by OH DOT;
A01-016

Experimental Testing and Modeling of a FRP Bridge (RDT-00-016) by MO DOT, 2/13/01; **A01-020**

Non-Metallic Reinforcement of Concrete Bridge Decks (RC-1392) by MI State University, 2/22/01; **A01-023**

NCHRP Report 350 Test 3-11 on the Modified PennDOT Type 2 Guide Rail – Test 3 by PA DOT 6/00; **1194**

NCHRP Report 350 Test 3-10 on the Modified PennDOT Type 2 Guide Rail – Test 4 by PA DOT, 7/00; **1192**

Innovative HPS-70W Ford City Bridge Demonstration Project: Improved Weldability Using Optimized Weld Metal Strength (ATLSS Report No. 00-08) by PA DOT, 10/00; **1193**

Assessment of Mitigating Embankment Settlement with Pile-Supported Approach Slabs (LA99/333) by LTRC, 12/99; **1197**

Prefabricated Wall Drain System for Structures [FHWA-PA-2000-028+96-31(3)] by PennDot Research 6/00; **1204**

Development of New Driven Pile Technology (FHWA/OH-99/008) by Ohio DOT, 01/99; **1464**

TRAFFIC/SAFETY

Investigation of Fender Systems for Vessel Impact (WPI# 0510846) by FAMU-FSU College of Engineering, 7/00; **A01-003**

Evaluation of Deer Guards for Key Deer, Big Pine Key, Florida (BB-851) by Texas A & M University, 6/00; A01-004

Evaluation of the Buckeye Crossbuck at Public, Passive Railroad/Highway Grade Crossings in Ohio (FHWA/OH-2000/021) by Ohio University**; A01-009**

Design and Development of an Automated NEMA Traffic Signal Controller Tester (FHWA/OH-2000/013) by OH DOT, 2/5/01; **A01-017**

Effects of Ground Mounted Diagramatic Entrance Ramp Approach Signs (FHWA/OH-2000/018) by OH Research Institute, 2/22/01; **A01-021**

Analysis of Rural Intersection Accidents Caused by Stop Sign Violation and Failure to Yield the Right-of-Way (K-Tran: KSU-98-6) by K-TRAN, 9/00; **1200**

Improvements to Mobility Performance Measure Calculations (CDOT-DTD-R-2000-14) by BRW, Inc., 9/00**; 1206**

Evaluation of Modified Work Zone Traffic Control Devices at Business Accesses (FHWA-OR-RD-01-10) by 1/01; **1208**

A Portable Real-Time Traffic Control System for Freeway Work Zones (FHWA/OH-2000-011) by University of Cincinnati, 7/00; **1210**

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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