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RESEARCH AND TECHNOLOGY REVIEW

New NDOT Research Projects Selected

The Research Management Committee, at its annual meeting on August 28, 2008, approved six new research projects to be included for the department's FY 2009 Research, Development and Technology Transfer (RDT) program. They are as follows:

Winter Maintenance Improvements (phase III): This project is proposed to continue to find ways to improve the visibility of snow plow drivers and to investigate data transmission techniques for use in a Maintenance Decision Support System. The Principal Investigator (PI) is Dr. Cahit Evrensel at the University of Nevada, Reno (UNR).

Applicability of Adaptive Traffic Signal Control Systems in Nevada's Urban Areas: The project is to develop guidelines on assessing and implementing adaptive signal control systems in Nevada's urban areas. It will be a cooperative project with the Regional Transportation Commission of Southern Nevada (RTCSN). The PI is Dr. Zong Tian at UNR.

Feasibility of Using Video Cameras for Automated Enforcement on Red-light Running and Managed Lanes: This research is proposed to conduct a public acceptance survey, to perform benefit/cost analysis, and to address technical issues such as accuracy and reliability of using video cameras for automated enforcement on red-light-running and managed lanes. The PI is Dr. Zong Tian at UNR.

Analysis, Modeling and Design for Traffic Incident Management Systems: This research is to develop mathematical models, perform analysis, develop simulations, and then apply those to assist decision support system for incident management in the Las Vegas area. The PIs are Dr. Pushkin Kachroo and Dr. Vinod Vasudevan at the University of Nevada, Las Vegas (UNLV).

A Pilot Study on the Implementation of VMT-based Fuel Tax in Nevada: The objective of the project is to devise a pilot program for implementing vehicle-mile-traveled (VMT) based fuel tax system in Nevada. It will study potential tax revenues using the VMT-based system in comparison with the current gallon-based fuel tax system. It will also address some issues (e.g. privacy, technology and structure issues) associated with the implementation of the VMT-based system. Dr. Reed Gibby, at NDOT Operations Analysis Division, is asked to develop a scope of work with universities, RTCs and other interested parties.

Assessment of Alternative Power Applications at the Nevada Department of Transportation (NDOT): The objective of this research is to identify potential applications of alternative energies at NDOT including its facilities, parking lots, and fleets as well as its roadway systems. An implementation plan will be developed for each application identified in consideration with the existing incentive programs offered by Nevada power companies. The Research Division will work with NDOT experts, university electrical engineering departments, Nevada power companies, and other interested parties to develop a scope of work. This project will serve as an integral part of NDOT's "going-green" effort.

Contents:

Corrosion Evaluation of Mechanically Stabilized Earth Walls

by Kenneth L. Fishman

During the excavation of a soundwall footing at the I-515/Flamingo Road interchange, NDOT officials uncovered significantly corroded barmats of a mechanically stabilized earth (MSE) wall (fig. 1). Those ungalvanized steel barmats have corroded beyond anticipated levels for the 20 yr- old wall. An investigation was performed to analyze the three individual walls at this intersection in order to understand the mechanism of corrosion and depleted service life (fig. 2, next page). Based on an estimated design life of 50 years, the loss of steel was estimated to have occurred at 2.5 times the anticipated corrosion rate of the design. One of the walls was retrofitted with a cast-in-place tie-back wall in order to bring the level of serviceability of the wall to acceptable levels.

Figure 1. Typical MSE wall – I-515/Flamingo Road, Las Vegas, NV

Testing on the wall backfill materials showed that the soil was aggressive and very corrosive (low resistivity and high soluble salt content). The corrosive nature of the backfill coupled with a soil saturation of approximately 25 to 40% created an environment in which higher than anticipated rates of corrosion occurred. Recently, Dr. Raj Siddharthan of University of Nevada, Reno and Dr. Barbara Luke of University of Nevada, Las Vegas initiated an NDOT-funded study to develop a catalog of similar MSE walls controlled by NDOT and to determine which of the walls need further investigation.

During the course of this research it was found that the specifications and limiting requirements have changed regarding backfill materials used in MSE wall construction. Prior to the 1986, NDOT Standard Specifications for Road and Bridge Construction (Silver Book), stated the allowable minimum resistivity, maximum soluble sulfates, and maximum chlorides were 1,000 ohm.cm, 2,000 ppm, and 500 ppm, respectively. There were 15 walls at seven locations that were constructed during this time period. The 1986 Silver Book revised these values, due to a better understanding of soil corrosion behavior, to 3,000 ohm.cm, 1,000 ppm, and 200 ppm, respectively.

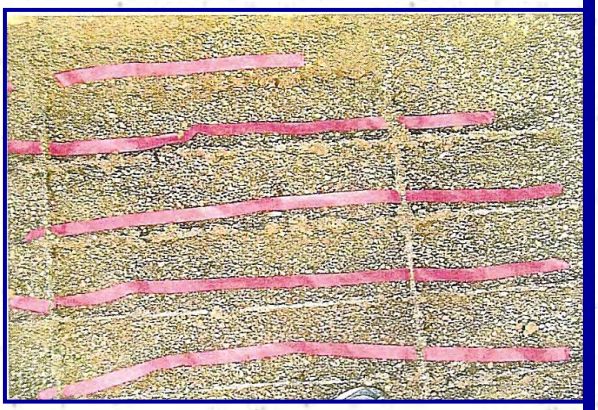

Figure 2. Corrosion of soil reinforcing barmat – I-515/Flamingo Road, Las Vegas, Nevada (Fishman 2005)

At least 11 walls at five locations were constructed using these guidelines. The current practice within AASHTO and NDOT requires a minimum resistivity of 3,000 ohm.cm, while soluble sulfates and chlorides have been limited to a maximum of 200 and 100 ppm, respectively. As evidenced from the data above, there have been a large number of walls in Nevada that have been constructed that may have backfill soils which would be considered as aggressive soils under today's standards. With the identification of potentially aggressive backfills, the continuing research into MSE wall reinforcement corrosion will prove to be invaluable in the understanding of the breadth of this issue in Nevada.

PRODUCT EVALUATION COMMITTEE (PEC)
SEPTEMBER 2008 MEETING RECAP
by Roma Clewell

QPL Category Deletions: The Product Evaluation Committee has deleted three (3) categories from the Qualified Products List (QPL). Reflective Markers, specification 502.02.01 was deleted because the products resided in duplicate specification 625.02.02. Also deleted were the Aluminum Poles, specification 623.02.11, and Protective Overlay Film, specification 627.02.01, because the category is used minimally and can be specified through the bid process when needed.

Southwest Bridge Preservation and Maintenance Working Group: The Southwest Bridge Preservation and Maintenance Working Group was formed after the Federal Highway Administration approached Rob Potter, District II Bridge Maintenance Supervisor, about developing a committee to share information and test data leading to better repair and maintenance decisions on bridge infrastructure. Six states are participating: Arizona, California, Colorado, New Mexico, Utah, and Nevada.

The first conference is scheduled for October 29, 2008, at the Atlantis Hotel and Spa in Reno, Nevada.

Highlight of Research Division's New Research Coordinator

By Heidi Wood

The Research Division is happy to introduce Ken Chambers as our new Research Coordinator! Ken was born in Elko, Nevada, was raised in Mountain City; and graduated from Elko High in 1984.

Ken enjoyed working in mining and construction before returning to school at University of Nevada, Reno, where he graduated in 1995 with a bachelor's degree in mechanical engineering. Ken worked in Carson City during the last year of school, fell in love with the area, and worked in manufacturing for nearly five years. Ken originally started to work for the State of Nevada in 2000, at the Department of Conservation and Natural Resources, in Water Resources. Mr. Chambers came on board with NDOT in 2002, transferring in to Operations Analysis, where he enjoyed working with Russ Law and Dale Lindsey.

Ken is currently busy raising a darling sixteen-year-old daughter, enjoys cooking, many outdoor activities (especially competitive shooting), and hiking C-hill with his friends at lunch time.

Photo by Carol Tate, NDOT

Please help us welcome Ken into his new position!!

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LIBRARY CORNER
by Heidi Wood

The NDOT Research Library holds a large selection of magazines, journals, study materials, along with publications from FHWA, TRB, TRR, and US DOT.

The Research Library is located in room 115, in the main NDOT Headquarters building. Stop by whenever you can, and I'll be happy to show you around. For those of you in other areas, remember; I send any book (or requested publication) anywhere in Nevada! So just send me a request of what you may need, and I'll put it in the mail to you!

Also, look at our webpage on the NDOT Homepage under, "Reports and Publications", for our research publications.

www.nevadadot.com

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About NDOT's R&T Review

The NDOT 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 information and other pertinent research topics.

If you have comments or need additional information regarding any of the topics discussed in this issue, please contact the Research Division.

Edited by

Heidi Wood

Library Assistant III