

RESEARCH AND TECHNOLOGY

REVIEW

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SPOTLIGHT ON RESEARCH PROJECTS IN PROGRESS

IMPROVED PAVEMENT PERFORMANCE WITH PRE-COMPACTION

Sponsored by FHWA, Through the Priority Technologies Program

Premature failure of longitudinal joints between asphalt mats is a major source of pavement failure in Nevada and across the country. A lack of sufficient asphalt material and compaction in the joint section is indicated as the main reason for these joint failures.

TransTech Systems, Inc., of Albany, New York, manufactures attachments to asphalt pavers which address this issue. The Joint Maker System automates proper longitudinal joint construction processes and allegedly delivers pavements where average densities in the longitudinal joint sections are nearly equal to average densities in the full mat area.

Currently, this technology is underutilized because most state departments of transportation, including NDOT, do not require compaction testing in the joint sections. In fact, NDOT currently requires compaction tests to be taken a minimum of one foot from the longitudinal joint to insure that test results represent the average mat compaction. In the typically low-bid contracting environment that currently exists throughout much of the industry, contracting firms naturally respond directly to the contract requirements placed upon them by their customers, with little or no incentive for voluntarily going beyond those requirements. Another reason for the underutilization of improved joint construction technology may include the general perception by

many pavement owners that paving contractors do not have an available and cost-effective method for providing higher quality longitudinal joint construction.

It is the industry's underutilization of available and innovative technology, such as TransTech's Joint Maker System, that led to the establishment of the Priority Technologies Program and to NDOT's current participation with FHWA in testing the Joint Maker System to determine its effectiveness in improving our longitudinal joint construction techniques.

ISTEA, Section 6005, established "an applied research and technology program

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DEMONSTRATION PROJECT NO. 87

"Video Inspection of Highway Edgedrains"

NDOT personnel were recently the fortunate recipients of the FHWA-sponsored Demonstration Project No. 87, "Video Inspection of Highway Edgedrains". This video technology was demonstrated in Las Vegas on September 17th and later presented, from a design standpoint, in Carson City. It was evident by the responses of those involved that there is a lot to be learned about the inspection and maintenance of highway edgedrains.

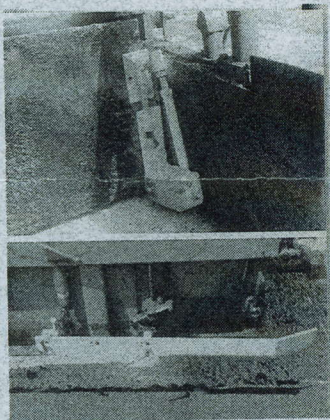
Relatively new in some areas of the country, NDOT only recently began using highway edgedrains as a technique for preserving and extending the life of Nevada's Highways. While we have learned much about the design of edgedrains through the experiences of other highway agencies, NDOT is certainly a newcomer in the area of maintaining these systems. Fortunately, the FHWA Office of Technology Applications recognized the states' needs in this area and developed a demonstration project on drainable pavement systems, led by their very own

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Pre-Compaction

for the purpose of accelerating testing, evaluation, and implementation of technologies which are designed to improve the durability, efficiency, environmental impact, productivity, and safety of highway, transit and intermodal transportation systems". As a means to address the implementation portion of Section 6005, the Priority Technologies Program (PTP) was designed expressly to accelerate the deployment of new or innovative transportation technology by the successful testing and evaluation of technologies which have high potential for bringing real benefits to transportation users. One unique feature of the PTP is its charge that activities be field office initiated and managed for the application and evaluation of transportation technology that has national or regional significance. In essence, the PTP is a field initiated and managed Experimental Projects program.

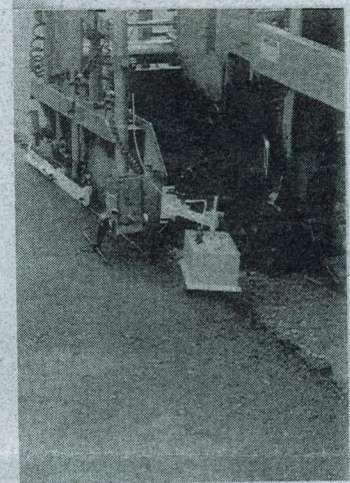


For this PTP project, the Federal Highway Administration's Nevada Division purchased two Joint Maker Systems for NDOT. The equipment was installed on the two pavers which were used during the 1996 season to pave US 50 in the Stagecoach area east of Carson City, Nevada. Within this 10-mile section of US 50, approximately eight miles of one longitudinal joint were constructed using the Joint Maker System, leaving the remaining two miles as a control section using conventional paving techniques. NDOT will continue to monitor the performance of this longitudinal joint over the next three years with a final report to be published by July 1, 1999, providing cost comparisons, installation procedures, density comparisons, overall benefits to the department, and an implementation plan if applicable.

In addition to improved pavement quality and the potential for extended pavement life, this new paving technology is designed to provide substantial safety benefits on the job site. Improved safety is expected for crew members that will no longer be required to spend time exposed to traffic during the raking of longitudinal joints. In addition, the reported reduction in time required to complete most paving jobs will also reduce workers' exposure to traffic and less disruptions to the driving public as well. Taking into account the potential safety improvements, reduced

Edge Follower

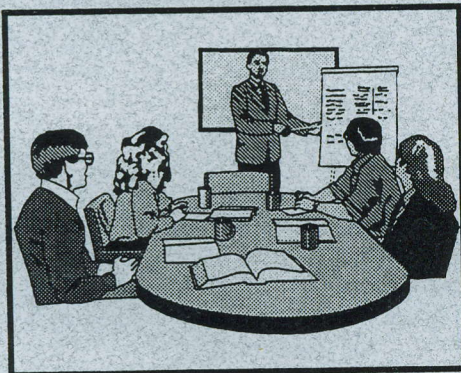
A non-contact electronic sensing control system that automatically positions the screed end gate in proper proximity to the cold mat to insure precise mat alignment. In addition to the sensor unit, this system includes the Edge Follower control unit, fail-safe alarm, and all necessary cabling and mounting hardware.



Joint Maker

This mechanical device provides for the placement of adequate asphalt mix to achieve high density, interlocked aggregate joint construction. The product package includes two joint makers and right and left side kicker plates.

maintenance costs to fill failed longitudinal joints, and a potential for overall lower paving costs, it would certainly appear that this project was well worth the time and effort required by all involved.



Product Evaluation Committee

PEC RECAP

SEPT. 11, 1996 & DEC. 10, 1996

"Due to delays beyond our control, the Fall 1996 issue of this newsletter was not published. The September 11, 1996 PEC meeting recap is included in this issue."

POLYGUARD'S PAVEMENT-REINFORCING FABRIC

First reviewed by the PEC during the March 1996 meeting, the Polyguard pavement-reinforcing fabrics (woven and non-woven) are viewed as potentially-useful materials for specific overlay projects requiring selective retro-reflective crack protection. Unsited for application on roadways having wide-spread cracking, these fabrics are intended for use on individual pavement cracks considered too large to be controlled by the thinner, more typical reinforcement fabrics that are intended for application over entire roadway sections.

these fabrics, the Materials Division recommended a field test site on Charleston Park Road, near Las Vegas. This location was selected due to the size and number of cracks. In addition, it provides enough room to test both products along with a control section using typical NDOT strategies for the control of retro-reflective cracking.

Based on recommendations from the Materials Division and District I, the committee approved a field test of both the NW-75 and 665 pavement reinforcing fabrics. Look for an update on this field test in upcoming issues of the RTR.

After researching upcoming overlay projects for an appropriate application of



ADVANCED DRAINAGE SYSTEM'S High-Density Polyethylene Flared Culvert End Sections

Mr. Rick Foster, ADS representative, provided a presentation and answered questions concerning their high-density polyethylene (HDPE), flared, culvert end sections. Having already approved a similar product last year, the committee was careful to ensure comparable quality through questions comparing the two products. Mr. Foster provided information about the product's design, material, and UV resistance, in answer to a variety of questions from the committee. He informed the committee that HDPE end sections have been in use throughout the country for the past 30 years and have an expected life span of 50 to 70 years under normal conditions.

Based on Mr. Foster's presentation and the committee's desire to provide increased competition in this area, the ADS HDPE end section was approved for use on a case-by-case basis at the discretion of District Maintenance and the Hydraulics Section. It is expected that HDPE end sections will provide the department with a broader range of culvert materials to choose from when designing for the variable conditions found throughout Nevada. In particular, HDPE end sections provide an excellent choice when faced with the high-pH soils found in different areas of our state.



THREE NEW BRIDGE JOINT SYSTEMS: WATSON BOWMAN'S JEENE JOINT, DOW CORNING'S 902 RCS, and KOCH'S BJS

Leaving the metaphorical bridges to our politicians, NDOT Bridge Engineers were busy completing their final reports on three new bridge joint systems that have been tested over the past three to five years. While the department has had very good success using mechanically-fixed steel and neoprene strip seals and

compression seals for our bridge expansion and growth joints, there has been a lot of product development in this area due to the many problems associated with joint sealing systems and materials overall.

The different types of bridge joint systems presented to the Product Evaluation Committee during the past six years has run the gamut from simple, silicone/rubber joint sealants, to elastomeric neoprene "bladder" profiles that are adhered to epoxy-coated joint walls during installation, under pneumatic pressure. The three new bridge systems approved at the September PEC meeting include: Watson Boman's Jeene Joint System; Dow Corning's 902 RCS (rapid-cure silicone); and Koch's BJS asphaltic plug design.

The Jeene Joint System was first presented to NDOT in September 1990, by Hydrozo, Incorporated, and has since become a part of Watson Bowman's product line. After approval for field testing, it was installed in several growth joints (joints between the bridge approach slab and the roadway pavement) on bridge structures in the Las Vegas area. The principal investigator responsible for providing final reports on all three joint systems, Todd Stefonowicz, Principal Bridge Engineer, stated that after five years the Jeene Joint remained fully intact and completely bonded to the approach slab and the concrete pavement with no joint leakage evident.

Dow Corning's 902 RCS was installed on the N. McCarran bridge over US 395, in Reno, during the summer of 1993. It was tested as a single-component system directly adhered to the joint walls with no header or nosing material used. It was also tested as the sealant component in Silicone Specialties, Incorporated's BJS system which includes a two-part polymeric nosing material. While the SSI nosing material is still under review, the 902 RCS did prove itself to be a durable, low-modulus expansion-joint sealant that is particularly well suited to sealing irregularly-shaped walls without the need for a joint header or nosing. Todd reported that after three years, this product performed well in both test installations, showing no evidence of leakage or bonding problems.

The Koch BJS asphaltic plug system was also tested on the N. McCarran Bridge over US 395, installed during the summer of 1993. This smooth,

waterproof expansion-joint system uses a backer rod to support a thermoplastic, polymeric sealant, covered with an eight-inch steel bridging plate that is then covered with a compacted binder/aggregate matrix. Field tested for the same three-year period alongside the 902 RCS test joints, this expansion-joint system was also found to provide satisfactory performance with no evidence of damage or joint leakage.

Based on recommendations from the Bridge Division and their overall field-test performance, the committee approved all three products. The Jeene Joint System has been approved for use on new and rehabilitation projects. The other two products: Dow Corning's 902 RCS and the Koch BJS, are approved primarily for joint rehabilitation work where the joint widths and expected movements are within manufacturer's installation recommendations. All three of these joint systems will continue to be monitored for long-term performance. Additional NDOT installations of these joints are recommended on a limited basis at varying locations to determine their performance under different climatic and traffic conditions.



MAXWELL PRODUCT'S ELASTOFLEX 60C CRACKFILLER

First reviewed by this committee on September 13, 1994, the Elastoflex 60C crackfiller has successfully completed a 15-month field test on SR 290, north of Winnemucca. The principal investigator for this field test, Craig Crawford, District III Highway Maintenance Supervisor, stated in his final report that the product performed very well. It remained pliable and bonded to the asphalt pavement with no apparent loss of material throughout the test period. Included in this test were two control sections using NDOT-approved crackfillers alongside the Elastoflex 60C.

Based on Craig's recommendation and its performance as compared to that of the two control products, the committee approved the Maxwell Elastoflex 60C crackfiller for addition to the approved list of Type D crackfillers.

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Demo No. 87

edgedrain guru, Mr. Bob Baumgardner.

As an integral component of FHWA's overall project on drainable pavement systems, the "Video Inspection of Highway Edgedrains" project was designed to specifically demonstrate the effectiveness of closed-circuit video inspection of edgedrains in the field. According to Mr. Baumgardner, it became evident early on in the development of edgedrains that many of the roadways incorporating them were not demonstrating the expected improvements. While some edgedrain problems were obvious through careful visual inspection, others were undetectable without digging them up or finding a way to actually inspect them internally. And so was born the use of closed-circuit video camera technology for edgedrain inspections.

After the demonstration in Las Vegas, Patty Mamola, District I Assistant District Engineer, Maintenance, commented that this was a very beneficial project for

everyone in attendance. She found that while many NDOT maintenance personnel were aware of the edgedrains currently in place, they were not at all familiar with the tools and techniques used in their maintenance. During the Carson City slide-show presentation, it was also conveyed by members of Maintenance Crew 3, from District II, that they knew very little about proper edgedrain inspection and maintenance techniques. It was generally agreed that this demonstration provided an invaluable opportunity for NDOT employees to come together on this subject and to develop a greater understanding of everyone's role in the design, construction and maintenance of edgedrains. While it was satisfying to hear that the open-loop, segmented drains that we are currently using were also the edgedrain design most recommended by Mr. Baumgardner, it was somewhat disappointing to learn that we did not yet appear to have an edgedrain inspection strategy in place.

Over and over again, Mr. Baumgardner stated that he could not overemphasize the importance of careful

inspection and appropriate maintenance strategies to ensure the successful application and use of edgedrains. And in the end, Mr. Baumgardner left us with one overriding message about edgedrains: "If you're going to build them, design them to be maintained. If you're not going to provide the funds to maintain them, don't build them."

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