THE UNIVERSITY OF TEXAS AT AUSTIN + COLLEGE OF ENGINEERING
TxDOT
TEXAS PAVEMENT PRESERVATION CENTER
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Issue Highlights

TRB 86th Annual Meeting

The TRB 86th Annual Meeting is an information-packed program that attracted approximately 10,000 transportation professionals from around the world to Washington, D.C., January 21-25, 2007. The meeting program covered all transportation models, with more than 2,800 presentations in 500 sessions addressing topics of interest to all attendees – policy makers, administrators, practitioners, researchers, and representatives of government, industry and academic institutions. The spotlight theme for 2007 was "*Transportation Institutions, Finance, and Workforce: Meeting the Needs of the 21st Century".*

2007 Smart Highways CTR Symposium

The Center for Transportation Research at the University of Texas at Austin hosted its annual symposium on April 4, 2007. The theme of this year's symposium was "Smart Highways" with keynote speaker, Gregory Krueger – manager of the Statewide ITS Program for Michigan DOP, addressing a subject on highway construction costs, particularly recent developments and the outlook.

Mark Your Calendar:
2007 Pavement Preservation Seminar

The 2007 Pavement Preservation Seminar will be held on October 8-9, 2007 at the Austin Convention Center in conjunction with the 24th Annual Association of General Contractors of Texas Trade & Equipment Show. Sponsors for the Seminar are the Asphalt Emulsion Manufacturers Association (AEMA), the Associated General Contractors of Texas (AGC), the Foundation for Pavement Preservation (FP^2), the Texas Pavement Preservation Center (TPPC), and the UT Center for Lifelong Engineering Education (CLEE).

TRB 86th Annual Meeting
Selected Pavement Preservation Papers

Evaluating Minnesota Crack Sealants by Modified Bending Beam Rheometer Procedure by James McGraw, John Olson

ASTM D 6690 crack seal specifications do not accurately predict field performance for cold weather climates like Minnesota. Under low temperature conditions, crack sealants which meet ASTM D 6690 specifications exhibit poor adhesion and cohesion, greatly compromising the effectiveness of this treatment. As a result, the Minnesota Department of Transportation (MnDOT) is conducting research to establish guidelines for sealant use in Minnesota. This study evaluates low modulus hot-pour sealants developed for Minnesota's climate through use of the modified Bending Beam Rheometer test (BBR) - a method created by the U.S.-Canada Crack Sealant Consortium. Results of this study indicate that the method created by the U.S.-Canada Crack Sealant Consortium can successfully be tested by state DOTs in local laboratories; this method includes Creep Stiffness, Creep m-value, and Creep Rate tests. Research indicates that measurements provided by the three test measures offer a more comprehensive approach than ASTM tests - yet to reap benefits of this methodology, it is necessary that researchers apply more than one of the above mentioned testing measures. After applying these test methods, MnDOT was able to identify differences between low modulus crack sealants and draw comparisons with these and ASTM Type II products. Research indicated that some ASTM Type II sealants, suggested by the ASTM D 6690, may perform to the same level as low modulus products. Once the US-Canada Crack Sealant Consortium sets performance parameters on its modified BBR testing methods, a crack sealant performance-based grading system can be established.

Low Temperature Characterization of Hot-Poured Crack Sealant Using Modified SHRP Direct Tensile Tester by Imad Al-Qadi, Shih-Hsien Yang, Samer Dessouky, Jean-Francois Masson

In this study, Imad L. Al-Qadi et al. examined new methods for predicting low-temperature performance of hot-poured crack sealants. Previous research indicates that predictive performance models of crack sealants do not accurately account for low-temperature conditions, where these treatments usually fail in adhesion and/or cohesiveness. The proposed method attempts to address low temperature field performance by assessing polymer-modified sealant and sealants containing crumb rubber. Testing methods modified the Direct Tensile Tester (DTT) practices to examine hot-poured crack sealant's properties. Researchers developed a means to define optimum specimen size for testing. This contributed to both improved accuracy and repeatability of this study. Additionally, this study set parameters on the suggested loading range - 1.5 to 3mm/min for this material. Results of this study suggest that polymer-modified sealant has better ductility and strength than sealants containing crumb rubber.

Repeatability and Reproducibility of the Newly Developed Hot-Poured Bituminous Sealant Viscosity Test by Imad Al-Qadi, Eli Fini, Mostafa Elseifi, Hector Fiqueroa, Jean-Francois Masson, Kevin McGhee

Hot-poured bituminous asphalt used in crack sealing and filling is an important pavement maintenance technique. When properly applied, this treatment prevents water and debris from accessing pavement structure - extending pavement life at a low cost. The success of this treatment largely depends on the installation process. Factors such as sealant penetration of pavement overlay (HMA), its ability to fill cracks/voids, as well as follow surface irregularities, each play a part in adhesion and bonding of the sealant to the pavement structure. Until recently, sealant testing methods defined by ASTM and AASHTO have relied on empirical data; these measures often did not correlate with field performance. New methods aim to predict field performance by controlling sealant installation processes; these methods monitor the sealants' viscosity levels during installation - a condition which affects the sealant during installation as well as the treatment's bond strength. Al-Qadi et al. aimed to validate the repeatability and reproducibility of the new testing method. The team used statistic analysis of sealant testing within and between seven laboratories investigating this field performance measure. They determined that the new testing method is acceptable with only slight variations of 1.6% within laboratories and 6% between laboratories. This measure is similar to that used for asphalt binders at 3.5% and 14.5% respectively based on ASTM D4402-02 and 3.5% and 12.1% based on AASHTO 2006 T316. Upper and lower limits of viscosity will be determined after further testing of the adhesion strength of crack sealants to aggregates.

Characterizing Existing Surface Condition to Evaluate Chip Seal Performance by Douglas Gransberg

According to Douglas Grasberg, many North American highway agencies are overly invested in the belief that chip seal application is unpredictable. Grasberg counters that existing pavement assessment methods can determine if chip seal is the proper treatment and indicate factors which contribute to the premature aging of the treatment. Specifically, Grasberg calls for quantitative and qualitative analysis of pavements prior to and after treatment, claiming this method can lead to increased predictability of chip seal application. In this study, Grasberg analyzed chip seal use on rural roads in Texas. The research analyzed pre- and post-sealed pavements with the qualitative windshield survey, the Texas Department of Transportation Pavement Management Information System ratings, and the quantitative Transit New Zealand T/3 "sand circle" test

(TNZ T/3). This combination of tests allowed the researcher to analyze the impact of texture depth of the substrate on the success of chip seal treatments. Conclusions at the early point of this study indicate strong correlations between pavement substrate and the success of chip seal treatments. Most significantly, this research indicates that premature texture loss of chip seal treatments occurs at a faster rate when applied to pavements with a high occurrence of flushing. This research may help determine if chip seal is the appropriate preservation technique. Additionally, the methodology of this study offers practitioners a more comprehensive means to assess the cause of treatment failure, whether it results from pre-seal pavement conditions or the chip seal product. Overall, this study implies that use of engineering measurements and characterization of pre-seal pavement can predict premature chip seal failure.

Cost-Effectiveness of MIrcosurfacing and Thin Hot-Mix Asphalt Overlay: Comparative Analysis by Samuel Labi, Mohammad Mahmodi, Chuanxin Fang, Charles Nunoo

Using pavement management data from Indiana, this team comparatively analyzed cost-effectiveness of microsurfacing and thin hot mix asphalt (HMA) overlays. Major considerations for the cost-effectiveness included treatment susceptibility to climate severity and traffic loading. Measures of Effectiveness (MOE) included treatment service life, increase in pavement condition, and area bounded by performance curve. Mircosurfacing, a treatment which mixes polymer-modified asphalt emulsion, crushed mineral aggregate, mineral filler, and a hardening control additive immediately prior to laying, proved to be generally more cost-effective than HMA overlay. When considering the first MOE, treatment service life, microsurfacing was 51-59% more cost-effective than HMA overlay, despite having a shorter service life. This was most apparent in situations with low traffic loading and high climactic severity. In the second MOE, increase in pavement condition, microsurfacing appeared more cost-effective under all conditions except those with both high traffic volume and high climate severity. Finally, the third MOE, area bounded by performance curve, demonstrated that microsurfacing was 54-71% more cost-effective than thin HMA overlays, regardless of traffic or climatic conditions. These findings can guide cost-driven decision making, providing relevant information to highway agencies and informing practices.

An Investigation of Prime Coat Effectiveness in Surface Treatments Constructed on Base by Vignarajah Muthulingam, Sanjaya Senadheera

Muthulingam and Senadheera tested the effectiveness of prime coats on flexible granular base materials used in Texas highways. The role of the prime coat as both the "glue" which fuses a base material to its surface treatment and sealant which prevents moisture or dust from affecting the base material is crucial for creating cost effective pavement surfaces. In this experimental study, Muthulingam and Senadheera looked to assess the influence of base material, base surface finish, and moisture content of the base layer on prime coats through measuring prime penetration, pullout strength of the prime and flexural strength of the primed base. This study addressed the most common means of prime coat application in Texas, namely spray prime, worked-in prime and covered prime, as well as base finishing techniques such as blade and roll, slush roll, trimming, and laydown machine. The results of this study concluded that the effectiveness of prime coats depends on a number of factors, including its penetration, prime coat binder, and prime coat techniques. In light of these complex relationships, more research is necessary to develop a protocol for prime coat application. Already this team noted that the optimal base moisture condition varies as a result of base material, surface finish, and the prime coat binder.

Evaluation of the Performance of Recycled Asphalt Sections in California Environmental Zones by Sameh Zaghloul, Joseph T. Holland, Amir Abd El Halim

California Department of Transportation (CalTrans) initiated a study to evaluate in-service pavements in California. In this study, researchers collected data on the field performance of special materials, like Rubber Asphalt Concrete (RAC), Recycled Asphalt Pavement (RAP), and Pavement Reinforcing Fabric (PRF). This paper analyzed the RAP field performance data collected in this study. Sixty RAP sections were selected which encompass a total of three of California's environmental zones-namely Desert (DS), Mountain (MT), and North Coast (NC). According to Zaghloul et al., researchers evaluated field performance by measuring in-situ structural capacity, pavement distress condition, roughness condition, and consistency of construction. Through use of Falling Weight Deflectometers (FWD), the International Roughness Index (IRI), distress surveys and laboratory testing of core samples, researchers developed deterioration models to predict pavement service life. Researchers concluded that RAP sections located in the North Coast will be triggered by ride quality after 17 years; other factors like structural capacity and distress indicate that RAP sections will remain in service for 18 years and 21 years respectively. Under Desert conditions, researchers predict that distress will trigger RAP sections after only 9 years; however, regular maintenance can extend the predicted service life up to 15 years. Similarly, factors like structural capacity and roughness were predicted to trigger pavements exposed to Desert conditions after 15 years. Under Mountain conditions, researchers anticipate structural capacity to trigger pavements after 11 years, distress after 13 years, and roughness after 15 years. Overall, North Coast pavements exhibited the highest performance level, possibly resulting from use of cement treated base material. This material has a higher modulus than typical aggregate base course. However, since only five North Coast sections were analyzed, these results are inconclusive. Further analysis will compare RAP

performance with other treatments or materials.

Long-Term Field Performance of Cold In-Place Recycled Roads in Iowa by Jungyong Kim, Hosin Lee, Charles Jahren, Dong Chen, Michael Heitzman

For more than two decades, United States roadway managers have selected Cold In-place Recycling (CIR) to rehabilitate primary and secondary asphalt roads. This method proves to perform well at a low cost, yet few long-term performance studies have suggested methods for predicting service life. In this study, Kim et al. examined CIR roadways in Iowa. This team aimed to develop a performance model for CIR to predict service life and indicate key environmental characteristics which impact CIR performance. The team created an inventory of all CIR roads in Iowa, taking into account construction information, subgrade and base characteristics, and traffic levels. After considering these factors as well as pavement age, 26 test sections were selected. Test sections were subjected to a pavement condition survey using Automated Image Collection System (AICS) and results were combined with distress or rutting data to create the Pavement Condition Index (PCI). This index along with measurements of subgrade soil support and core samples of the pavement allowed researchers to analyze and identify key contributing factors of CIR longevity. Results of this study indicate that subgrade support greatly impacts CIR performance. This study implies that subgrade support impacts service life more than traffic volume. Additionally, low levels of support correlate with higher incidences of rutting, patching, and edge cracking. These factors along with others predict a longer service life of CIR pavements with good subgrade support; pavements with good support have a predicted service life of up to 34 years, while those with low levels are predicted to last up to 22 years. This research recommends that future CIR studies focus on pavement core samples, as this would enable researchers to better understand causes of distress within the CIR layer. Additionally, it suggests pavement test sections be reevaluated in five years to verify predicted service life.

Evaluation of Long-Term Performance of Cold In-Place Recycled Asphalt Roads by Dong Chen, Charles Jahren, Hosin Lee, R. Willams, Sungwan Kim, Jungyong Kim

Dong Chen et al. examined Cold In-Place Recycling (CIR) performance in Iowa. The goal of this study was to quantify the effect of aged-engineering properties and impact factors such as age, traffic, and support on CIR performance. The team selected 24 CIR roadways throughout Iowa which vary in age, traffic, and support conditions. Roadways considered in this study were constructed between 1986 and 2004. Researchers analyzed this data set through use of field distress surveys, field tests, laboratory tests, and statistical analysis. Results of this study concluded that the modulus of the CIR layer and the air voids of CIR asphalt binder have the greatest effect on CIR performance under high traffic conditions. Additionally, this study supported the theory that CIR layer is a stress-relieving layer and suggested that less stiff and more porous CIR pavements can best fulfill this role. Within the scope of this study, results suggested that higher values of Indirect Tensile Strength have a positive affect on CIR performance under low traffic conditions, while higher traffic conditions were associated with lower levels of CIR performance across the board. Finally, this research did not find support conditions of pavement to be a significant performance variable. Researchers suggest future efforts analyze a larger sample size, approximately 50 test sections, and reduce the variability of the response variable, relative Pavement Condition Index (PCI), by taking more core samples and increasing use of the Falling Weight Deflectometer (FWD) test. With sufficient information, future research will better distinguish between effects of HMA and the CIR layer. Also, it is suggested that phase angles be taken into consideration to account for the elastic and viscous properties of asphalt binders.

Road Maintenance Practices in Malaysia by Tahir Ahmad, Juraidah Ahmad, Mustaque Hossain

Tahir Ahmad et al. examined the privatization of federal roadway maintenance in Malaysia. This practice, compared with its public agency counterpart, has fundamental differences in administration and execution of maintenance procedures. Private maintenance agreements are performance based; this results from both strict budgetary allocation and finite contract length. Privatization of maintenance procedures is broken down into three broad categories: routine, periodic, and emergency maintenance; each of these categories includes all items within right-of-way of the network. Routine maintenance procedures are performed over the contract cycle and according to performance standards. These procedures include pavement maintenance, re-grading road shoulders, replacing damaged furniture, and normal maintenance procedures such as grass cutting, cleaning, and repainting. Additionally, routine maintenance procedures include patrolling for network inspection. Periodic maintenance is a set of planned procedures based on roadway inspection and evaluation. These procedures are budgeted annually under two subheadings, pavement and non-pavement activities. Emergency maintenance procedures are those which address traffic flow under conditions of stress such as roadway blockage, flooding, or culvert collapse. Ahmad et al. concluded that the privatization of Malaysian roadways has several fundamental differences compared with its public counterpart. Essentially these differences place responsibility of roadway safety and ride on the roadway operator, based on available funds.

Black Ice Detection in Open-Graded Friction Courses by Manuel Trevino, Terry Dossey, Yetkin Yildirim

New Generation Open-Graded Friction Course (NGOGFC), or Permeable Friction Course (PFC) pavements, have many potential benefits including good friction, lower noise, reduced hydroplaning, reduced splash and spray, and reduced nighttime glare in wet weather conditions. However, some states have experienced durability or maintenance problems with this pavement type. Most significantly, under winter conditions NGOGFC pavements have been known to freeze faster and longer than other pavements, as well as experience black ice. This study has developed a methodology to detect black ice formation on NGOGFC pavements by monitoring key factors such as temperature and moisture, with sensors embedded in pavement structure. Methodology was tested in laboratory experiments and implemented onsite in NGOGFC pavements in North Texas. Results of this study confirmed that this methodology for detecting ice formation on porous pavements is reliable. Laboratory tests paralleled field data, confirming that sensors are capable of identifying the heat of fusion temperature plateau effect key to detecting black ice formation. Future research efforts will incorporate remote real time pavement temperature monitoring and enable ice detection. With the addition of a Yagi antenna, this system will achieve remote sensing up to 22 miles-enabling these sensors to communicate with maintenance offices within this range. Additionally, wireless devices, namely point transceivers, will be installed at various sites. This will allow for real time monitoring of pavements and inform offices of the effectiveness of maintenance procedures. The significance of this study is not limited to NGOGFC sections but also to bridges; TxDOT will expand implementation of these procedures to freeze-prone structures in hope of decreasing winter-related accidents.

Estimation of Pavement Lifespan Using Stochastic Duration Models by Jidong Yang

Pavement Management Systems (PMS) play a vital role in predicting pavement life and making informative maintenance/rehabilitation decisions. In this paper, Jidong Yang examines the possibility of using pavement condition surveys to predict pavement life. Yang contends that a stochastic duration model can be created using this dataset, deriving a pavement life-span model of in-service pavements from empirical data. In this research, Yang utilized Florida Pavement Condition Survey Database and Florida Traffic Information CD. Together these sources provided Yang with pavement condition data and annual traffic characteristics such as peak season factors and vehicle classification. With this information, Yang developed parametric duration models based on various hazard assumptions. He concluded that a loglogistic hazard function can better portray pavement failure mechanisms. Implications of this research suggest that reconstruction may be necessary after certain cycles of rehabilitation (as continuous rehabilitation does not take into account the augmented hazard for each cycle), greatly impacting cost-effectiveness. Yang recommends coding pavement structural data into the PMS database when roads are reconstructed or rehabilitated, as these factors will enhance model performance.

Preservation Effects on the Performance of Bituminous on Aggregate Base Pavements in Minnesota by Erland Lukanen

Minnesota Department of Transportation (MnDOT) evaluated the effects of pavement preservation activities on pavement performance. In this study, Erland Lukanen examined bituminous over aggregate base pavements (BAB) constructed between 1985 and 2005 in Minnesota. He divided this data set into two broad categories: pavements with no preservation and pavements which received preservation. He further divided the second subset, pavements with preservation, into those which have received either a mill and/or thin overlay and those which have not received either a mill or overlay. By analyzing a larger dataset, namely those which have or have not received pavement preservation, Luckanen was able to analyze overall performance trends and identify performance benefits of preservation activities. Additionally, he was able to implicate a relationship between preservation activities and modes of deterioration like ride, cracking, and rutting. This study concluded that preservation activities significantly increase the performance index ratings of pavements. Likewise, these activities decreased the rate of decline of the Ride Quality Index and lessened the growth of the three distress types which contribute to decline in Surface Ratings, namely transverse cracking, multiple cracking, and rutting. In general, pavements which received mill and thin overlay demonstrated the highest level of performance. Future research efforts will focus on the cost-effectiveness of pavement preservation, an increasingly important measure when petitioning for funding.

Summary and Assessment of Arizona Department of Transportation's Maintenance Cost-Effective Study by David Peshkin

Beginning in 1995, Arizona's Department of Transportation (ADOT)'s SPR 371 Maintenance and Cost Effectiveness Study has identified maintenance and cost effectiveness treatments suitable for evaluation in Arizona. Since this time, Arizona DOT has tested alternatives, evaluating treatment performance and cost-effectiveness. In 1999, this ongoing project incorporated a study of bituminous pavement sections, breaking this study down into three phases: Phase I-wearing course treatment, Phase II-surface treatment, and Phase III-sealer rejuvenators. In this article, Peshkin evaluates Phase I and Phase II of this process. Phase I-wearing course treatment evaluates the effectiveness of using premium plant produced hot mix, like an open-grade friction course, on high volume bituminous roadways. The goal of this project is to achieve a 12-15 year lifespan with minimal maintenance. Researchers have incorporated long-

term monitoring and accelerated testing through applying mill and overlay at different thicknesses. According to Peshkin, likely benefits of this treatment include delayed onset of environmental cracking, delayed fatigue cracking, and reduced rutting - as well as improved ride, weather resistance, and better surface texture. He calls for several actions to complete this phase - namely the acts of locating, evaluating, and rating key performance indicators. These measurements should be evaluated using manual and automated processes. Phase II refers to ADOT maintenance activities like chip seal and slurry seals - usually applied to lower volume roads. In this Phase, researchers aimed to evaluate the use of warranties, determine whether proprietary products can be specified in competitive low-bid processes, evaluate the effect of chip size on performance, compare binder types (polymer-modified vs. CRS-2), and evaluate the role of timing in treatment performance. Peshkin urges researchers to act quickly to make the most of available data. He claims that all test sections should be evaluated with special consideration of the "do nothing" sections. Unlike Phase I, Phase II treatments have a limited lifespan - and thus require acute attention during the experiment process. He anticipates benefits of these treatments to include improved surface characteristics and longer life between treatments. Peshkin asserts that next steps in this process should include clarifying data collections methods, determining collection frequency, and proposing methods of analysis and anticipated results. Overall, Peshkin suggests that researchers define "failure" and create an objective set of rules for removing sections from the study. He suggests that researchers create an evaluation schedule based on anticipated conditions. Peshkin hopes researchers will raise the profile of this experiment, updating stakeholders in progress, review of material and impact of findings. This should happen annually and touch upon key points like pavement life cycle, cost, and performance findings. These findings should be translated into implementation plans. Peshkin's review of this project alerts researchers to look beyond the creation of experiments and consider the necessity of accurate and thorough follow through. According to Peshkin, ADOT's SPR 371 Maintenance and Cost Effectiveness Study set out with lofty goals and has not capitalized on this opportunity to the fullest extent.

Long-Term Performance of Thin Bonded Concrete Overlay in Texas by Dong-Ho Kim, Seong-Cheoi Choi, Yoon-Ho Cho, Moon Won

In 1986, Texas Department of Transportation (TxDOT) began a research initiative examining various bonded concrete overlays (BCO) on continuous reinforced concrete pavement (CRCP). This factorial experiment tested 4 inch BCO on existing 8 inch pavements on IH-610 in Houston, TX. Ten sites were selected on this roadway. Variables in the study included reinforcement type, either welded wire fabric or steel fibers, course aggregate type, including siliceous river gravel or limestone, and condition of existing CRCP. After 20 years, this study concluded that the 4 inch overlay improved the structural capacity of the pavement. This was demonstrated by testing deflection before and after overlay application with a reduction factor of one-third. The welded wire fabric proved to be better at reinforcing overlaid concrete than its counterpart, steel fibers, which did not prevent punchouts or spalling to the same degree. Additionally, the study indicated crushed limestone aggregate with welded wire fabric had the highest performance ratio. Overlays with limestone benefited from its low coefficient for thermal expansion and low elasticity. Overall, this variable exhibited no single distress over the 20 year study. Most significantly, this study highlighted a low correlation between shear bond strength at interface of old and new concrete and overall performance of pavement. This final conclusion may indicate that other variables play a role in BCO performance; however with only 10 testing sites, this result is inconclusive. Overall, implications from this study will be incorporated into TxDOT BCO design/materials/construction practices.

Ultrathin Bonded Wearing Course as a Pavement Preservation Treatment for Jointed Concrete Pavements by Judith Corley-Lay, Jeffery Mastin

According to Judith Corley-Lay et al., ultrathin bonded wearing course (UTBWC) is an important pavement preservation technique. This technique, unlike thick overlays, is usually only 5/8th of an inch thick; in turn, this treatment minimizes the peripheral costs associated with thick overlays like adjustment of signs, guardrails, bridge clearance and shoulders, while adding years to the life of a pavement. In this study, Corley-Lay et al. examined the effect of UTBWC on jointed plain concrete in North Carolina. This research is significant for North Carolina, a state that constructed large amounts of concrete roadways in the 1960's and 1970's, due to the simultaneous "aging out" of large portions of this infrastructure. In this study, researchers selected five pavement sections which include both rural and urban roadways. The goal of this research was to determine the affects of UTBWC on the life extension of aging pavement in North Carolina. Researchers evaluated the effectiveness of this treatment by using pavement condition ratings, IRI, and in one case the impact of the treatment on noise reduction. Results of this study determined that UTBWC can extend pavement life by 6-10 years, a significant increase considering the pavement's age. Additionally, this treatment greatly affected the ride quality, as demonstrated by an 80 point improvement by the roughest roadway in this study. The effect of this treatment on reflective cracking also appeared positive, rendering this distress to be narrow and of low severity. Researchers suggest that future use of this treatment take into account the condition of the slab; slabs which are shattered or unstable should be reconstructed prior to UTBWC treatments. Additionally, roadways which exhibit large dips or otherwise need profile reshaping should have a leveling course applied prior to this treatment.

AASHTO-NTPEP Joint Sealant Field Evaluation Procedure by James McGraw, Mike McGough, Eddie

Johnson

In 2003, Minnesota Department of Transportation (MnDOT) conducted the first Portland Cement Concrete joint sealant field evaluation for the AASHTO National Transportation Product Evaluation Program (NTPEP). Based on the Strategic Highway Research Program's (SHRP) Materials and Procedures for Repair of Joint Seals in Portland Cement Concrete Pavements-Manual of Practice, the NTPEP Joint Sealant Technical Committee developed a procedure for Mn/DOT to use both in laboratory and in field evaluations of joint sealants. The NTPEP procedure provides uniformity to field evaluation practices across participating state DOTs, as well as aids in site selection and pre-installation processes. Results of this new process seem to be positive. The data collected in the NTPEP process can be used to create Qualified Products Lists which establish guidelines for contractors for identifying approved products for construction and maintenance projects. Additionally, this format devises joint field evaluation management guidelines that can be used to train inexperienced personnel. This process has also revealed that current indicators for field performance, namely stone/debris retention SCN and water infiltration (cohesion/adhesion bond failure) held at equal weight, may not accurately predict field performance. This study suggests that greater emphasis on water infiltration may lead to increased accuracy for predicting field performance. Mn/DOT will further consider these findings and make formal suggestions to NTPEP Joint Sealant Committee.

Asphalt-Rubber Asphalt Concrete Friction Course Overlays as Pavement Preservation Strategy for Portland Cement Concrete Pavement by Mark Belshe, Kamil Kaloush, Jay Golden, Michael Mamlouk, Patrick Phelan

Arizona Department of Transportation (ADOT) began its "Quiet Pavements" projects to curtail roadway noise impact on communities. This project has been remarkably successful, decreasing noise impacts in communities surrounding urban freeways up to 4 to 6 decibels; yet, the thin overlays of Asphalt Rubber-Asphaltic Concrete Friction Course (AR-ACFC) over existing Portland Cement Concrete Pavement (PCCP) also appear to extend the life of the pavements. This study examined and quantified the impact of AR-ACFC overlays on PCCP. It was hypothesized that these overlays mitigate thermal variances, a stress believed to cause 80% of PCCP damage. Study methods included temperature sensors to quantify thermal behavior of PCCP with and without AR-ACFC, use of Mechanistic-Empirical Pavement Design Guide to simulate pavement temperature changes, and calculations of thermally induced curling stresses to model pavement behavior. Results of this study concluded that AR-ACFC overlays have a significant impact on the thermal gradient of PCCP. This treatment can reduce thermal stresses by 25% during daytime high temperatures and 8% during nighttime lows. The only case where AR-ACFC has an adverse impact on PCCP thermal gradients is during nighttime lows with no traffic loads, such as shoulder areas with overlays. Further studies should be performed to obtain necessary information regarding the economic impact of AR-ACFC overlay treatments.

The Use of High Molecular Weight Methacrylate to Seal Bridge Deck Cracks: An Overview of Research by Ashraf Rahim, D. Jansen, N. Abo-Shadi, J. Simek

Cracking is one of the most common distress types observed on concrete deck bridges. This distress can lead to structural deficiency, as untreated cracking allows moisture and sediment into the substructure, possibly causing accelerated corrosion of reinforced steel and deterioration of concrete. In this study, A. Rahim et al. examined the use of High Molecular Weight Methacrylate (HMWM) as a bridge sealant. This study looks to summarize previous research on the effectiveness of concrete bridge deck sealants, survey state agencies on their current use of HMWM, and develop guidelines for HMWM use. The conclusions of this study determined that all cracks must be sealed as soon as possible; otherwise, cracks may reach the chloride concentration threshold, resulting in corrosion and structural deficiency. With these concerns in mind, research demonstrated the importance of proper deck preparation and cleanliness required for successful sealant application - especially on older deck surfaces. HMWM sealant can be used to restore structural bond and flexural strength of pavements, so long as the pavements are not subjected to deicing chemicals, high chlorine environments. Additionally, cracks must be small; the survey indicated that HMWM is most often used to seal cracks less than 1.6 mm in diameter. This treatment should be applied every 4-5 years, or as needed, and application temperature should fall between the range 7°C (45°F) and 29°C (85°F) .

Our Mission

The mission of TPPC, in joint collaboration with the Center for Transportation Research (CTR) of the University of Texas at Austin and the Texas Transportation Institute (TTI) of Texas A&M University is to promote the use of pavement preservation strategies to provide the highest level of service to the traveling public at the lowest cost.

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