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Civil Engineering

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General

Crack Control for Ledges in Inverted 'T' Bent Caps
R. R. H. Zhu, H. Dhonde, and T. T. C. Hsu.
Houston Univ., TX. Dept. of Civil and Environmental Engineering. Jan 2004, 6p, PSR-0-1854-S. See also PB2002-104368, PB2005-106314, and PB2005-106315. Sponsored by Texas Dept. of Transportation, Houston. and Federal Highway Administration, Austin, TX. Texas Div. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-109454WCE Price code: PC A02/MF A01

Inverted 'T' bent caps are used extensively on Texas bridges because they are aesthetically pleasing and offer a practical means to increase vertical clearance. The cross-section of an inverted 'T' bent cap consists of a 'web' with short cantilever 'ledges' at the bottom to support the bridge girders, thus minimizing the structural depth of bridges. The problem is that at service load unacceptable diagonal cracking frequently occurs between the cantilever ledges and the web. In addition to giving the appearance of structural distress, excessive crack widths can lead to the corrosion of reinforcement and the shortening of service life of bridges.

Engineering Careers
Bureau of Reclamation, Denver, CO. 2005, 16p. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-108762WCE Price code: PC A03/MF A01

This publication discusses engineering careers within the Bureau of Reclamation to meet the needs of the agency in operating existing structures as well as the development of new programs for renewable resources and alternative energy.

——*Foreign Technology*——

HERON, Volume 49, No. 3, 2004
Technische Univ. Delft (Netherlands). 2004, 92p. See also PB2005-107444. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-107466WCE Price code: PC A06/MF A01

Contents:
- On Stability of a Clamped-Pinned Pipe Conveying Fluid;
- Buckling of Coped Steel Beams and Steel Beams with Partial Endplates;
- and Effect of Reinforcement on Early-Age Cracking in High Strength Concrete.

——*Foreign Technology*——

Journal of the Chinese Institute of Engineers. Volume 28, No. 2, March 2005. Transactions of the Chinese Institute of Engineers, Series A
S. S. Chen, and F. J. Shiou.
Chinese Inst. of Engineers, Taipei (Taiwan). cMar 2005, 202p. See also PB2005-103063. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-107471WCE Price code: PC A11/MF A03

Contents:
- Application of Fuzzy Optimum System Hierarchy Analysis Selection Method for Determining Repair Order of Existing Reinforced Concrete Bridges;
- An Empirical Approach;
- Prediction Method of Air Pressure Distribution on Building Vertical Drainage Stack;
- A Proposed Guideline for Verifying the Attainment of Soil Remediation for Taiwan;
- Slope Stability Analysis using Strength Reduction Technique;
- Determination of Aquifer Parameters using Radial Basis Function Network Approach;
- Transmission of Vibrations from High Speed Trains through Viaducts and Foundations to the Ground;

Prepared by the National Technical Information Service
U.S. Department of Commerce, Technology Administration, Springfield, VA 22161 (703) 605-6000

A Construction Simulation System (COMSim) with Object-Oriented Modeling Elements;
Numerical Predictions on the Dynamic Response of a Suspension Bridge with a Trapezoidal Cross-Section;
On the Non-Iterative Procedure of Direct Displacement-Based Seismic Design for Portal R.C. Bridges;
Using Inelastic Design Spectrum;
A Constitutive Model for the Uplift Behavior of Anchors in Cohesion less Soils;
A Study of Reinforced Concrete Bridge Columns Retrofitted by Steel Jackets;
Automated Image Mosaic king;
Life Prediction of Stainless Steels by Cyclic and Stable Hysteresis Curves;
Fatigue Behavior of Carbon/Epoxy Composites under Pretorsion and Low-Energy Impact Effects;
Enhancement of Thermal Performance in Sintered Miniature Heat Pipe;
The Effects of the Processing Variables on the Microstructure and Tensile Properties of Naturally Aged AA6022 Wrought Alloys;
Developing a Four-Layer System Rutting Model in Highway in Taiwan;
and Effects of Soil Properties on Surfactant Adsorption.

Civil Engineering

Application of Electromagnetic Geophysics (EMG) Technology to Subsurface Investigations
M. E. Kalinski, and R. S. Sripada.
Federal Highway Administration, Madison, WI. Wisconsin Div. Jun 2005, 56p, WHRP-05-09. This report is documentation for PB2005-500173. It is available free with purchase of that product. It can also be ordered separately. Dates of coverage: January 7, 2004 - June 30, 2005. Prepared in cooperation with Department of Civil Engineering, University of Kentucky Lexington, KY. Sponsored by Wisconsin Highway Research Program, Madison, WI. Also available on CD-ROM. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-102756WCE Price code: PC A05/MF A01

Electromagnetic geophysics (EMG) consists of several emerging, non-destructive, wave propogation technologies that have the potential to minimize the number of required soil borings and associated costs, by providing reliable indirect information about subsurface conditions. Currently, some methods of EMG used to assess subsurface soil conditions and characteristics are, because of their complexity and specialized character, viewed as something of a black box technology. The objective of this project was to analyze several of the various EMG methods, capabilities, applications and limitations, and issue guidelines for possible WisDOT use of EMG in site characterizations. Research tasks included assessment of current practice, literature search, contractor data collection, and collection of data on equipment, cost and training.

Application of Electromagnetic Geophysics (EMG) Technology to Subsurface Investigations (on CD-ROM)
Federal Highway Administration, Madison, WI. Wisconsin Div. Jun 2005, one CD-ROM disc, WHRP-05-09-CD. System requirements: Windows/NT 95 and higher, Adobe Acrobat Reader 5.0 or higher, Microsoft Word. Documentation is included or may be ordered separately as PB2005-102756. Prepared in cooperation with Department of Civil Engineering, University of Kentucky Lexington, KY. Sponsored by Wisconsin Highway Research Program, Madison, WI. Available on one CD-ROM disc. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-500173WCE Price code: CD-ROM CP D01

This report includes one CD-ROM disc with EMG consultants SOQs, equipment Manufacturer Information and providing a comprehensive overview of Electromagnetic Geophysics (EMG) in terms of description of methods, synopsis of consultant capabilities and a summary of available EMG equipment. A study was performed to investigate current methods for using EMG technology to assess the capabilities, limitations, and cost associated with these methods, and to identify EMG consultants and equipment that may be of benefit to WisDOT for performing site investigations in Wisconsin. Based on the results of this study, six EMG methods were identified and described. Based on the information provided by 10 consultants, several consultants who may be attractive candidates for providing EMG services to WisDOT were identified. Information was also compiled on 17 pieces of EMG equipment manufactured by 7 companies.

Guidance for Design, Installation and Operation of Soil Venting Systems
G. Mickelson, and G. A. Edelstein.
Wisconsin Dept. of Natural Resources, Madison. Nov 2003, 68p, PUB-RR-185. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-109271WCE Price code: PC A05/MF A01

This document is a guide to using soil venting as a remediation technology. Soil venting is a technology that uses air to extract volatile contaminants from contaminated soils. The technology is also known as soil vapor extraction, in situ volatilization, in situ vapor extraction, in situ air stripping, enhanced volatilization, in situ soil ventilation, and vacuum extraction. The term bioventing has been applied to soil venting projects when biodegradation is a significant part of the remediation process and/or biodegradation is enhanced with nutrient addition. Soil venting is a multi-disciplinary process. The designer should have a working knowledge of geology and basic engineering to design an optimal system. A basic knowledge of chemistry is also necessary to develop a quality sampling and monitoring plan. This document is intended as general guidance.

Influence of Fold and Fracture Development on Reservoir Behavior of the Lisburne Group or Northern Alaska. (First Annual Report, May-October 1999.)
W. K. Wallace, C. L. Hanks, M. T. Whalen, and J. Jensen.
Alaska Univ., Fairbanks. Geophysical Inst. May 2000, 86p. Prepared in cooperation with Texas A and M Univ., College Station. Sponsored by Department of Energy, Washington, DC. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port

Royal Road, Springfield, VA, 22161, USA.
DE2005-834668WCE Price code: PC A06/MF A01

The Lisburne Group is a major carbonate reservoir unit in northern Alaska. The Lisburne is detachment folded where it is exposed throughout the northeastern Brooks Range, but is relatively undeformed in areas of current production in the subsurface of the North Slope. The objectives of this study are to develop a better understanding of four major aspects of the Lisburne: (1) The geometry and kinematics of detachment folds and their truncation by thrust faults. (2) The influence of folding and lithostratigraphy on fracture patterns. (3) Lithostratigraphy and its influence on folding, faulting, fracturing, and reservoir characteristics. (4) The influence of lithostratigraphy and deformation on fluid flow. The results of field work during the summer of 1999 offer some preliminary insights: The Lisburne Limestone displays a range of symmetrical detachment fold geometries throughout the northeastern Brooks Range. The variation in fold geometry suggests a generalized progression in fold geometry with increasing shortening: Straight-limbed, narrow-crested folds at low shortening, box folds at intermediate shortening, and folds with a large height-to-width ratio and thickened hinges at high shortening. This sequence is interpreted to represent a progressive change in the dominant shortening mechanism from flexural-slip at low shortening to bulk strain at higher shortening. Structural variations in bed thickness occur throughout this progression. Parasitic folding accommodates structural thickening at low shortening and is gradually succeeded by penetrative strain as shortening increases. The amount of structural thickening at low to intermediate shortening may be inversely related to the local amount of structural thickening of the Kayak Shale, the incompetent unit that underlies the Lisburne. The Lisburne Limestone displays a different structural style in the south, across the boundary between the northeastern Brooks Range and the main axis of the Brooks Range fold-and-thrust belt. The steep forelimbs of angular asymmetrical folds typically have been cut and displaced by thrust faults, resulting in superposition of a fault-bend fold geometry on the truncated folds. Remnant uncut folds within trains of thrust-truncated folds and the predominance of detachment folds to the north suggest that these folds originated as detachment folds. Fold asymmetry and a more uniformly competent Lisburne Limestone may have favored accommodation of a significant proportion of shortening by thrust faulting, in contrast with the dominance of fold shortening to the north. Two dominant sets of fractures are present in the least deformed Lisburne Limestone: Early extension fractures normal to the regional fold trend and late extension and shear fractures parallel to the regional fold trend. These two major fracture sets remain as deformation increases, but they are more variable in orientation, character, and relative age. Compared to fold limbs, the fold hinges display greater density and extent of fractures, more conjugate and shear fractures, and more evidence of penetrative strain. This suggests that hinges remained fixed during fold growth. Late extension fractures normal to the fold axis are common even where penetrative strain is greatest. Fracture density is greater in fine-grained carbonates than in coarse-grained carbonates over the entire spectrum of deformation.

Sacramento District History (1929-2004)
W. Collins, L. Asay, B. J. Davy, B. Doyle, and J. P. Fast. Army Engineer District, Sacramento, CA. 2004, 262p. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
ADA436393WCE Price code: PC A13/MF A03

Although the Sacramento District was established in 1929, this document recaptures the legendary history from the mid-1800's and the repercussions the Central Valley endured regarding the navigation of the rivers and streams, which, at that time, were clogged with sediment from the activities of mining. This volume is the second of its kind for the Sacramento District. The first historical account covers the time period from 1929 through 1973 and was published in 1976. While this book provides an historical perspective of the Sacramento District in the beginning chapter, it is the specific activities during the period from 1973 to 2003 that are described in detail in the remaining chapters. This description reveals the evolutionary growth of the Sacramento District, which has persevered amid a sea of changes brought about by Federal and state regulatory agencies and a most sensitive California constituency. The comprehensive research involved obtaining more than 33 personal oral history interviews with the District's clients, District employees, and past District Commanders. In addition, 25 transcribed archived oral history interviews were completed, which assisted in providing the intimate details for recounting specific projects the District had been involved with. Other key documents that were consulted included U.S. Army Corps of Engineers' reports, press releases, the District's Public Affairs Reports, newspaper articles, as well as internal correspondence. Specific sources are provided via numerous endnotes.

Construction Equipment, Materials, & Supplies

Accelerated Curing of Silica Fume Concrete
FAMU/FSU Coll. of Engineering, Tallahassee. Dept. of Civil and Environmental Engineering. 30 Apr 2005, 112p.
PB2005-109451WCE Price code: PC A07/MF A02

For complete citation see Highway Engineering

Characterization of the Punching Shear Capacity of Thin Ultra-High Performance Concrete Slabs
D. K. Harris, and C. L. Roberts-Wollmann. Virginia Highway and Transportation Research Council, Charlottesville. Jun 2005, 70p, VTRC-05-CR26. See also PB94-138369. Sponsored by Virginia Dept. of Transportation, Richmond. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-110436WCE Price code: PC A05

Ultra-high performance concrete (UHPC) is a relatively new type of concrete that exhibits mechanical properties that are far superior to those of conventional concrete and in some cases rival those of steel. The main characteristics that distinguish UHPC from conventional reinforced concrete are its very high compressive strength (20 to 33 ksi), the addition of steel fibers which enables tension to be carried across open cracks without conventional reinforcing steel, and a very high resistance to corrosion and degradation. The mechanical properties of UHPC allow for smaller, thinner sections as compared to conventional reinforced concrete sections. However, as it is a new material, the use of UHPC

has been limited to a few structural applications due primarily to the high cost of the material and the lack of established design guidelines. In previous research, a material model based on physical tests was used in conjunction with finite element models to develop an optimized cross-section for a prestressed UHPC girder for bridge applications. The cross-section is a double-tee with bulbs at the bottoms of the webs to accommodate the prestressing strands. As it is envisioned in bridge applications, the double-tees will be placed directly adjacent to one another, and the top flange will act as the riding surface after a thin asphalt overlay is placed. Based on the longitudinal compressive stresses, the top flange of the girder can be quite thin. However, there exists the possibility that a punching shear failure could occur from the application of a point load such as a wheel patch load if the flange is made too thin. The research reported herein was initiated to characterize the punching shear capacity of thin UHPC plates and to develop recommendations on the minimum top flange thickness for the optimized double-tee. Twelve small slabs (45 in x 45 in) were tested to failure to characterize the punching shear strength of UHPC. The variables considered were the slab thickness (2, 2.5, and 3 in) and loading plate dimensions (from 1 in x 1 in to 3 in x 3 in). The results of the testing were compared to several existing models for punching shear. The two equations that predicted strengths most reliably were the current ACI punching shear equation and a modified bolt pull-out equation. After evaluation of the test results, the minimum slab thickness required to prevent a punching shear failure in the top flange due to an 8 in x 20 in wheel patch was determined to be 1 in. Three larger slabs were also tested. These slabs had the same clear span length as the top flange of the optimized double-tee and were loaded with a wheel patch load. The slabs were all approximately 3 in thick and all failed in flexure rather than punching shear. It was concluded that the casting method has a strong influence on the orientation of the steel fibers, which in turn influences the flexural strength in orthogonal directions in the slab. The top flange thickness will be governed by transverse bending rather than punching shear, and the 3 in slabs were not able to support the full wheel load plus impact and load factor. The results of this research help in the continued optimization of a UHPC shape for use in highway bridges. If material use in the girder is minimized, UHPC bridges can become economically competitive with HPC bridges, but offer the benefits of more rapid construction and better durability.

Creep, Shrinkage and CTE Evaluation: MoDOT's New Bridge Deck Mix Companion Testing to HPC Bridge Deck
Missouri Univ.-Rolla. Center for Infrastructure Engineering Studies. Feb 2005, 48p.
PB2005-108774WCE Price code: PC A04

For complete citation see Highway Engineering

Development and Validation of Steel Reinforced Polymer (SRP) for Strengthening of Transportation Instrastructures
P. Casadei, A. Nanni, and T. Ibell.
Missouri Univ.-Rolla. Center for Infrastructure Engineering Studies. Jun 2005, 64p, UTC/R94. Sponsored by Department of Transportation, Washington, DC. Research and Special Programs Administration. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-108773WCE Price code: PC A05

This report presents the characterization, laboratory and field validation of steel reinforced polymer (SRP) and steel reinforced grout (SRG) strengthening materials for strengthening of transportation infrastructures. These new composite materials consist of steel cords formed by interwoven steel wires embedded within a polymer resin or cementitious grout matrix. The properties of SRP are evaluated experimentally and compared to micromechanical equations to determine a suitability of these equations for the prediction of material constants. Laboratory tests were undertaken on shallow reinforced concrete beams strengthened with SRP and SRG materials and comparing experimental results to identical reinforced concrete beams strengthened with fiber reinforced polymer, with equal amount of strengthening. All beams were tested in a four point bending configuration, constantly monitoring deflections, strain and crack width opening. A type of anchor system to retard complete peeling of SRP/SRG laminates have been investigated and results of its performance are presented. Based upon the promising results of the two previous test campaigns, a series of tests on prestressed concrete double-T real-scale beams strengthened with SRP materials have been undertaken. The in-situ test campaign was made possible, due to the demolition of an existing concrete structure. Tests consisted in a control beam, a beam strengthened with one ply of SRP and a third and last beam strengthened with two plies of SRP and by anchoring at both ends the plies with SRP U-wraps. All beams were tested in a three point load configuration and were monitored at midspan for deflections as well as strains in the composite material.

Development of a New Method for Assessing Asphalt Binder Durability with Field Validation
C. J. Glover, R. R. Davison, C. H. Domke, D. B. Knorr, S. H. Jung, Y. Ruan, and P. Juristyarini.
Texas Transportation Inst., College Station. Aug 2005, 338p, RPT-0-1872-2, FHWA/TX-05/1872-2. Sponsored by Texas Dept. of Transportation, Austin. Research and Technology Implementation Office. and Federal Highway Administration, Austin, TX. Texas Div. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-109984WCE Price code: PC A16/MF A03

This project was a comprehensive study directed at developing an improved method of screening asphalt binders for long-term pavement performance. A new dynamic shear rheometer (DSR) function and a new aging procedure should warn of premature asphalt hardening and resulting fatigue cracking. For unmodified asphalts the new DSR function GN/(0N/GN) correlated well with ductility (at 15 degrees C, 1 cm/min) below 10 cm. The correlation was originally developed for DSR measurements at 15 degrees C and 0.005 rad/s. These conditions were time-temperature superposition shifted to 44.7 degrees C and 10 rad/s to produce a method that is easily accessible to standard laboratory rheological equipment and methods. The recommended aging procedure uses the pressure aging vessel (PAV) apparatus but takes advantage of the higher average aging rate when the asphalt is aged in thinner films. This change, combined with somewhat longer aging, results in a more rigorous test of durability than the standard PAV method. At the same time, the resulting rankings of aged materials are more representative of rankings that

are obtained from aging at atmospheric air pressure and 60 degrees C.

Evaluation of the Tyrsolv Crumb Rubber Asphalt Modifier
R. Sukley, R. J. Klopp, and T. L. Ramirez.
Pennsylvania Dept. of Transportation, Harrisburg. Bureau of Construction and Materials. Mar 2005, 92p. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-107663WCE Price code: PC A06/MF A01

This report covers the mix design, plant modifications, construction and performance of the Tyrsolv asphalt modifier. Tyrsolv is a treated ground rubber made from waste tires. Three projects using ground waste tires as an asphalt modifier (Tyrsolv) were placed. The first project, constructed in 1995 and located in District 6-0, Chester County, SR 0041, failed from the beginning due to a non-uniform handling of the product. The second project was constructed in 1998 in District 9-0, Fulton County, on Interstate 70. A third project was constructed in 1998 on Interstate 81 NB in Schuylkill County. PTI determined that Tyrsolv has the potential to enhance the base asphalt properties two PG grade on high temperature side of the grading without adversely affecting the low temperature grading. Although Tyrsolv Asphalt costs more, and did not out perform control mixes, it did perform satisfactory. PENNDOT may consider the use of Tyrsolv providing an approach can be developed to make it cost competitive with conventional sources of asphalt.

Fatigue Life Characterization of Superpave Mixtures at the Virginia Smart Road. Final Contract Report
I. L. Al-Qadi, S. R. Diefenderfer, and A. Loulizi.
Virginia Tech Transportation Inst., Blacksburg, VA. Aug 2005, 66p, VTRC-06-CR1, FHWA/VTRC-06/CR1. Prepared in cooperation with Illinois Univ. at Urbana-Champaign. Dept. of Civil and Environmental Engineering. Sponsored by Federal Highway Administration, Richmond, VA. Virginia Div. and Virginia Dept. of Transportation, Richmond. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-110103WCE Price code: PC A05

Laboratory fatigue testing was performed on six Superpave HMA mixtures in use at the Virginia Smart Road. Evaluation of the applied strain and resulting fatigue life was performed to fit regressions to predict the fatigue performance of each mixture. Differences in fatigue performance due to field and laboratory production and compaction methods were investigated. Also, in-situ mixtures were compared to mixtures produced accurately from the job mix formula to determine if changes occurring between the laboratory and batch plant significantly affected fatigue life. Results from the fatigue evaluation allowed verification of several hypotheses related to mixture production and compaction and fatigue performance.

Literature Review for Long-Term Research on Bituminous Coarse Aggregate
D. Little, J. Button, P. Jayawickrama, M. Solaimanian, and B. Hudson.
Texas Transportation Inst., College Station. Jul 2001, 58p, RPT-0-1707-1, FHWA/TX-01/0-1707-1. Sponsored by Texas Dept. of Transportation, Austin. Research and Technology Implementation Office. and Federal Highway Administration, Austin, TX. Texas Div. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-109981WCE Price code: PC A05/MF A01

The Soils and Aggregates Branch of the Construction Division of the Texas Department of Transportation (TxDOT) has the primary responsibility for overseeing aggregate quality issues. An overall process review of selected testing and monitoring protocols used within the branch is needed to ensure that the needs of TxDOT and the state of Texas are continuously met. Two key areas are addressed in this review: (1) a review and upgrade of the Aggregate Quality Monitoring Program (AQMP) and (2) a review and upgrade of the proposed Surface Aggregate Classification System. The assessment of the AQMP includes evaluation of other tests that might be required as replacements and/or supplements for the tests currently used to monitor quality. The study also includes an assessment of the frequency and protocol of testing and suggests changes where necessary. The Surface Aggregate Classification System evaluation will involve defining the best tests and protocols to ensure excellent wet weather skid properties (level 1) and to ensure excellent overall hot-mix quality (level 2) for a safe and durable hot-mix surface.

Minnesota Taconite as a Microwave-Absorbing Road Aggregate Material for Deicing and Pothole Patching Applications
Minnesota Univ.-Duluth. Natural Resources Research Inst. Aug 2005, 30p.
PB2005-110450WCE Price code: PC A03/MF A01

For complete citation see Highway Engineering

Municipal Products Evaluations 2: Base Stabilization with Foamed Asphalt
M. Solaimanian.
Pennsylvania Transportation Inst., University Park. 18 Mar 2003, 44p, FHWA-PA-2002-035-97-04. Sponsored by Pennsylvania Dept. of Transportation, Harrisburg. Bureau of Planning and Research. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-107660WCE Price code: PC A04/MF A01

The use of foamed asphalt for stabilizing the base of roadway pavements is not a new concept. The method has been used successfully in many projects. Two projects of this kind were selected for performance evaluation under a PENNDOT sponsored research program. The two municipal, low-traffic roads are located in Pennsylvania in Cecil and Peters Townships. The deteriorated roads needed rehabilitation. Therefore, they were milled, pulverized, and stabilized with foamed asphalt bases during July and August 2001. The stabilized road provided a strong base for the hot mix asphalt overlay that was placed during September 2001. During

this period, construction was monitored by the research team. The roads were inspected at different time intervals for signs of distress. Loose samples from the stabilized base material were procured at the time of construction and were characterized in the laboratory. The results of evaluation so far indicate that the roads have been performing very well. No signs of distress have been observed on either of the roads. This research project as well as several other projects has indicated that base stabilization with foamed asphalt can be a very effective and economical approach for rehabilitation of deteriorated pavements.

Portable Falling Weight Deflectometer Study
Maine Univ. at Orono. Dept. of Civil and Environmental Engineering. 11 Mar 2005, 336p.
PB2005-108789WCE Price code: PC A16/MF A03

For complete citation see Highway Engineering

Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges
Federal Highway Administration, Washington, DC. Office of Engineering. Dec 1995, 128p, FHWA-PD-96-001. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-110123WCE Price code: PC A08/MF A02

This Guide has been prepared for use by the States, Federal and other agencies in recording and coding the data elements that will comprise the National Bridge Inventory data base. By having a complete and thorough inventory, an accurate report can be made to the Congress on the number and state of the Nation's bridges. The Guide also provides the data necessary for the Federal Highway Administration (FHWA) and the Military Traffic Management Command to identify and classify the Strategic Highway Corridor Network and it's connectors for defense purposes. The coded items in this Guide are considered to be an integral part of the data base that can be used to meet several Federal reporting requirements, as well as part of the States' needs.

Soil Air Voids Method for Compaction Control
Montana State Univ., Bozeman. Dept. of Civil Engineering. Aug 2005, 112p.
PB2005-109519WCE Price code: PC A07

For complete citation see Soil & Rock Mechanics

Steel-Free Hybrid Reinforcement System for Concrete Bridge Decks
A. Belarbi, and H. Wang.
Missouri Univ.-Rolla. Center for Infrastructure Engineering Studies. Dec 2004, 230p, UTC/R52. Sponsored by Department of Transportation, Washington, DC. Research and Special Programs Administration. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-108777WCE Price code: PC A12

A research project was initiated to develop a nonferrous hybrid reinforcement system for concrete bridge decks by using continuous fiber reinforced polymer (FRP) rebars and discrete randomly distributed polypropylene fibers. This hybrid system may eliminate problems related to corrosion of steel reinforcement while providing requisite strength, stiffness, and desired ductility, which are shortcomings of FRP reinforcement system in reinforced concrete. The test results showed that with the addition of fibers, structural performances of the system are improved. Although polypropylene fibers do not increase the ultimate bond strength, they provide enhanced ductile bond behavior. Also, with the addition of fibers, the flexural behaviors are improved with the increase of the ductility index m by approximately 40%, as compared to the plain concrete beams. In addition, with the addition of polypropylene fibers, the durability of the system was improved. Furthermore, some design recommendations are proposed based on analytical models and test results.

Vibrational Evaluation of Tendons in Segmental Sections of Sunshine Skyway Bridge Main Spans
University of South Florida, Tampa. Dept. of Civil and Environmental Engineering. 1 Aug 2005, 38p.
PB2005-109967WCE Price code: PC A04/MF A01

For complete citation see Highway Engineering

Highway Engineering

Accelerated Curing of Silica Fume Concrete
N. Yazdani, S. Haroon, and M. Fils-Aime.
FAMU/FSU Coll. of Engineering, Tallahassee. Dept. of Civil and Environmental Engineering. 30 Apr 2005, 112p, DB-488. Sponsored by Florida State Dept. of Transportation, Tallahassee. and Federal Highway Administration, Tallahassee, FL. Florida Div. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-109451WCE Price code: PC A07/MF A02

Silica fume is a common addition to high performance concrete mix designs. The use of silica fume in concrete leads to increased water demand. For this reason, Florida Department of Transportation(FDOT) currently allows only a 72-hour continuous moist cure process for concrete containing silica fume. Accelerated curing has been shown to be effective in producing high-performance characteristics at early ages in silica-fume concrete. However, the heat greatly increases the moisture loss from exposed surfaces, which may cause shrinkage problems. This experimental study was undertaken to determine the feasibility of steam curing of FDOT concrete with silica fume in order to reduce precast turn around time.

ACTT Workshop: Wyoming. Held in DuBois, Wyoming on September 21-22, 2005
Federal Highway Administration, Washington, DC. 2005, 90p, FHWA-IF-05-010. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-110154WCE Price code: PC A06/MF A01

Accelerated Construction Technology Transfer (ACTT) is a strategic process that uses innovative techniques and technologies to reduce construction time on major highway

projects while enhancing safety and improving quality. The process is implemented by conducting 2-day workshops for State departments of transportation (DOTs). The American Association of State Highway Transportation Officials (AASHTO) and the Federal Highway Administration (FHWA) jointly fund ACTT workshops. In September 2004, the Wyoming Department of Transportation (WYDOT) hosted a workshop that brought together transportation professionals from around the Nation. The primary objective of the workshop was to draw on the expertise of participants to help WYDOT achieve its goal of minimizing construction time for its US-287/26, between Moran Junction and Dubois. The $100 million project is to reconstruct this 37-mile stretch of the highway to upgrade to a super-two facility with passing lanes. The primary project challenge is to complete the project under traffic while minimizing socioeconomic, environmental, and wildlife impacts.

Condition Assessment of Timber Bridges. Part One. Evaluation of a Micro-Drilling Resistance Tool
B. K. Brashaw, R. J. Vatalaro, J. P. Wacker, and R. J. Ross.
Minnesota Univ.-Duluth. Natural Resources Research Inst. Apr 2005, 16p, FPL-GTR-159. Sponsored by Forest Products Lab., Madison, WI. and Federal Highway Administration, Madison, WI. Wisconsin Div. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-109919WCE Price code: PC A03

The research presented in this report was conducted to evaluate the accuracy and reliability of a commercially available micro-drilling resistance device, the IML RESI F300-S (Instrument Mechanic Labor, Inc., Kennesaw, Georgia), in locating deteriorated areas in timber bridge members. The device records drilling resistance as a function of drilling depth, which allows the operator to assess the location of deterioration in the member cross section. Bridge components containing different levels of natural decay were used as test specimens in this study. The IML RESI F300-S was first used to assess decay in the timber bridge specimens. The specimens were then sawn along their length into slabs to expose their interior condition. The interior faces of these slabs were inspected visually and with a stress-wave probe to confirm if deterioration was present. On the basis of these tests, we conclude that this micro-drilling device accurately determines if deterioration is present at the point at which the test is performed.

Construction Management Practices in Canada and Europe
American Trade Initiatives, Inc., Alexandria, VA. May 2005, 80p, FHWA/PL-05-010. Sponsored by Federal Highway Administration, Washington, DC. Office of Policy. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-107592WCE Price code: PC A06/MF A01

Construction management is an essential element of transportation project success, and evolving industry roles are creating changes in conventional U.S. construction management practices. The Federal Highway Administration, American Association of State Highway and Transportation Officials, and National Cooperative Highway Research Program sponsored a scanning study of construction management practices used in Canada and Europe for effective project delivery, contract compliance, and quality assurance. The U.S. team observed the Canadian, European, and U.S. transportation communities face similar political, financial, and resource challenges, but Canadian and European agencies have developed construction management systems that promote more collaboration between the public and private sectors and create stronger long-term partnerships. The international agencies are more willing to delegate traditional highway functions to the private sector when cost and schedule benefits are significant. The team's recommendations for possible implementation in the United State include developing risk assessment and allocation techniques, using qualifications in procurement, piloting early contractor involvement, applying alternate bids and designs in procurement, conducting preproposal meetings, and using appropriate alternative payment methods.

Conversion of the Statewide Noise Barrier Inventory Into a Spatially Referenced Geodatabase
M. Berrios, P. McGilvray, S. L. Forelle, K. Volarich, M. Stamm, E. Householder, P. Brett, C. Bragdon, S. Burton, and C. Bryk.
Florida Atlantic Univ., Fort Lauderdale. 29 Apr 2005, 94p, FAU-1020-411-43. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-109966WCE Price code: PC A06

In January of 2004, the Environmental Management Office of the Florida Department of Transportation (FDOT) Central Office and the Catanese Center for Urban and Environmental Solutions (CUES) at Florida Atlantic University (FAU) embarked initiated conversion of the existing statewide noise barrier inventory spreadsheet into a user-friendly geodatabase. The statewide Noise Barrier Geodatabase (NBGD) is the first and only comprehensive geodatabase designed to serve as an inventory for existing and future barriers.

Creep, Shrinkage and CTE Evaluation: MoDOT's New Bridge Deck Mix Companion Testing to HPC Bridge Deck
J. Myers, J. Nidhi, and J. La Gamma.
Missouri Univ.-Rolla. Center for Infrastructure Engineering Studies. Feb 2005, 48p, UTC/R85. Sponsored by Department of Transportation, Washington, DC. Research and Special Programs Administration. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-108774WCE Price code: PC A04

Missouri Department of Transportation (MoDOT) RDT Research Project R-I00-002 'HPC for Bridge A6130 - Route 412 Pemiscot County' was recently completed in June of 2004. Among other research tasks, part of this research study investigated the creep, shrinkage and coefficient of thermal expansion (CTE) of Missouri's first high performance concrete (HPC) superstructure bridge. This study examined these aforementioned properties on both the prestressed concrete (PC) girders and the cast-in-place (CIP) deck which both utilized HPC on this aforementioned project. In 2003 the Missouri Department of Transportation (MoDOT) studied nine different mix designs for possible use in bridge deck applications (MoDOT Report RI01-044, 2003). The objective of this internal MoDOT study was to reduce the content of

cementitious material to reduce shrinkage, but maintain good durability characteristics. Of the original nine mix designs, one was ultimately selected for use in an actual bridge deck application, namely, MoDOT Bridge A6671 near Waynesville, Missouri. There was interest to study how the mix design used in this bridge compared to the previous HPC deck mix design used in Bridge A6130.

Development of a New Method for Assessing Asphalt Binder Durability with Field Validation
Texas Transportation Inst., College Station. Aug 2005, 338p.
PB2005-109984WCE Price code: PC A16/MF A03

For complete citation see Construction Equipment, Materials, & Supplies

——Proceedings, Symposia, Etc.——

Development of Improved Procedures for Business Accommodation on Transportation Construction Projects
R. Ellis, and S. Washburn.
Florida Univ., Gainesville. Dept. of Civil and Coastal Engineering. 2005, 130p. Sponsored by Florida State Dept. of Transportation, Tallahassee. Research Management Center. and Federal Highway Administration, Tallahassee, FL. Florida Div. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-109965WCE Price code: PC A08

Recognizing the transportation construction project can adversely impact adjacent businesses the Florida Department of Transportation sponsored this research project with two primary objectives: to determine the business accommodation needs and priorities for different types of businesses, and to develop strategies for improving business accommodation during transportation construction projects. Business managers of businesses located within highway construction work zones were interviewed concerning their experiences and needs. Focus group meetings of business representatives were conducted. Current planning, design and construction management processes were reviewed with regard to business accommodation issues. Strategies for improving business accommodation were developed. This research resulted in the development of a business survey specification and survey document.

Evaluation of the Tyrsolv Crumb Rubber Asphalt Modifier
Pennsylvania Dept. of Transportation, Harrisburg. Bureau of Construction and Materials. Mar 2005, 92p.
PB2005-107663WCE Price code: PC A06/MF A01

For complete citation see Construction Equipment, Materials, & Supplies

Fatigue Life Characterization of Superpave Mixtures at the Virginia Smart Road. Final Contract Report
Virginia Tech Transportation Inst., Blacksburg, VA. Aug 2005, 66p.
PB2005-110103WCE Price code: PC A05

For complete citation see Construction Equipment, Materials, & Supplies

Frederick County Road Orders 1743-1772
G. Luckman, and A. B. Miller.
Virginia Highway and Transportation Research Council, Charlottesville. Jun 2005, 400p, VTRC-05-R32. See also PB2002-106323. Sponsored by Virginia Dept. of Transportation, Richmond. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-110437WCE Price code: PC A18/MF A04

The road history projects undertaken by the Virginia Transportation Research Council establish the feasibility of studies of early road networks and their use in the environmental review process. These projects, by gathering and publishing the early road orders of the vast parent counties, also lay the foundation for additional research by local groups over a broad area of Virginia. This volume marks the twenty-third entry in the Historic Roads of Virginia series, first initiated by the Virginia Transportation Research Council (then the Virginia Highway & Transportation Research Council) in 1973. Frederick County Road Orders 1743-1772 expands the coverage of early western Virginia transportation records begun in the previously published Orange County Road Orders 1734-1749 and Augusta County Road Orders 1745-1769.

Implementation Issues of Metallic Dampers for Seismic Retrofit of Highway Bridges
G. Chen, and S. Eads.
Missouri Univ.-Rolla. Center for Infrastructure Engineering Studies. Apr 2005, 110p, UTC/R57. Sponsored by Department of Transportation, Washington, DC. Research and Special Programs Administration. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-108776WCE Price code: PC A07

The objective of this study is to develop an economical solution with metallic dampers for the seismic retrofit of highway bridges in low occurrence seismic zones, such as in the Central and Eastern United States. Select low carbon steel rods were first tested for their ductile behavior and material strength. Large-scale, tapered rods were then tested for their energy dissipation capability and fatigue strength under regular, irregular, and earthquake loads. A full-scale damper made of five tapered rods was designed next for the seismic retrofit of a three-span continuous steel-girder bridge in southeast Missouri; its system performance including joints and connection members was validated with laboratory tests. The damping ratio of tapered rods was shown independent of loading frequency and specimen size; it rapidly increased at small displacements and approached a value of 0.35 approximately 0.40 in the range of over 1.8 inches. Even at a displacement of 2.4 inches, the steel rods can survive over 100 cycles of loading with little degradation of their damping property. The full-scale, five-rod damper has been demonstrated to reveal a progressive failure mode that is desirable for earthquake applications. Hysteretic models of Type D rocker bearings were developed for possible consideration in the seismic retrofit design of seismically inadequate highway bridges.

Investigation of Long-Term Prestress Losses in Pretensioned High Performance Concrete Girders

T. E. Cousins.
Virginia Highway and Transportation Research Council, Charlottesville. Jun 2005, 76p, VTRC-05-CR20, FHWA/VTRC05-CR20. See also PB2004-100115. Sponsored by Federal Highway Administration, Richmond, VA. Virginia Div. and Virginia Dept. of Transportation, Richmond. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-110435WCE Price code: PC A06

Effective determination of long-term prestress losses is important in the design of prestressed concrete bridges. Over-predicting prestress losses results in an overly conservative design for service load stresses, and under-predicting prestress losses, can result in cracking at service loads. Creep and shrinkage produce the most significant time-dependent effect on prestress losses, and research has shown that high performance and high strength concretes (HPC and HSC) exhibit less creep and shrinkage than conventional concrete. For this reason, the majority of traditional creep and shrinkage models and methods for estimating prestress losses, over-predict the prestress losses of HPC and HSC girders. Nine HPC girders, with design compressive strengths ranging from 8,000 psi to 10,000 psi, and three 8,000 psi lightweight HPC (HPLWC) girders were instrumented to determine the changes in strain and prestress losses. Several creep and shrinkage models were used to model the instrumented girders. For the HPLWC, each model over-predicted the long-term strains, and the Shams and Kahn model was the best predictor of the measured strains. For the normal weight HPC, the models under-estimated the measured strains at early ages and over-estimated the measured strains at later ages, and the B3 model was the best-predictor of the measured strains. The PCI-BDM model was the most consistent model across all of the instrumented girders. Several methods for estimating prestress losses were also investigated. The methods correlated to high strength concrete, the PCI-BDM and NCHRP 496 methods, predicted the total losses more accurately than the methods provided in the AASHTO Specifications. The newer methods over-predicted the total losses of the HPLWC girders by no more than 8 ksi, and although they under-predicted the total losses of the normal weight HPC girders, they did so by less than 5 ksi.

Literature Review for Long-Term Research on Bituminous Coarse Aggregate
Texas Transportation Inst., College Station. Jul 2001, 58p.
PB2005-109981WCE Price code: PC A05/MF A01

For complete citation see Construction Equipment, Materials, & Supplies

Managing Archaeological Investigations
T. H. Klein, L. Sebastian, S. M. Ruscavage-Barz, S. Ford, and J. E. Watkins.
SRI Foundation, Rio Rancho, NM. c2005, 70p, NCHRP-SYN-347. Sponsored by Transportation Research Board, Washington, DC., American Association of State Highway and Transportation Officials, Washington, DC. and Federal Highway Administration, Washington, DC. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-108848WCE Price code: PC A05/MF A01

This National Cooperative Highway research Program (NCHRP) synthesis report focuses on practices that improve the cost, timeliness, and public benefit of archaeological investigations, in addition to those that streamline the overall transportation project delivery process and enhance the stewardship of archaeological resources. Information on these effective practices was obtained through a literature search and a survey of a variety of agencies and organizations. The survey involved state departments of transportation (DOTs), FHWA state division offices, state historic preservation offices (SHPOs), Native American tribes, and cultural resource management firms. Thirty-four state DOTs, five FHWA offices, seven SHPOs, six tribes, and five cultural resource management firms responded to the survey. The literature review and survey identified a wide range of effective practices associated with the management of archaeological investigations. These practices fall into the following categories: Communication; Internal Business Practices; Project Delivery: Integrating Section 106, National Environmental Policy Act (NEPA), and Design; Pre-Project Planning; Innovative Approaches to Section 106 Steps.

Minnesota Taconite as a Microwave-Absorbing Road Aggregate Material for Deicing and Pothole Patching Applications
D. M. Hopstock, and L. M. Zanko.
Minnesota Univ.-Duluth. Natural Resources Research Inst. Aug 2005, 30p, CTS-05-10. Sponsored by Minnesota Univ., Minneapolis. Center for Transportation Studies. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-110450WCE Price code: PC A03/MF A01

This report presents modeling of temperature profiles for application of microwaves to pothole patching and roadway deicing. Values of key parameters are estimated and presented for asphalt-aggregate composites containing varying magnetite content (compacted and with voids), ice, and water. The key parameters are: microwave absorption coefficient at 2.45 GHz, density, heat capacity, and thermal conductivity. This reports summarizes the work we were able to complete, including a large number of equations characterizing key parameters and an extensive list of references. The natural magnetite in taconite is an outstanding microwave absorber. Consequently, when a truck-mounted microwave generator is driven over an ice-covered roadway constructed with crushed taconite as the aggregate, the microwaves should pass through the ice and be absorbed as heat at the road-ice interface, allowing the ice to be easily detached and scraped away. This energy-efficient process is the only non-chemical method of deicing practical for many miles of roadway. Adoption of this deicing method could lead to a significant demand for taconite aggregate. The same microwave equipment used for deicing could be used year-round for pothole patching applications, with the microwave energy used to generate just the required amount of hot mix on-site for permanent repairs.

Municipal Products Evaluations 2: Base Stabilization with Foamed Asphalt
Pennsylvania Transportation Inst., University Park. 18 Mar 2003, 44p.
PB2005-107660WCE Price code: PC A04/MF A01

For complete citation see Construction Equipment, Materials, & Supplies

Pavement Notebook for FHWA Engineers, October 1996
Federal Highway Administration, Washington, DC. Office of Engineering. Oct 1996, 352p, FHWA-PD-96-037. See also PB95-269221. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-110476WCE Price code: PC A17/MF A03

This notebook is intended to be a working tool that provides a readily available compilation of current FHWA policy and guidance on pavements. Users are encouraged to add material as they see fit. The notebook is composed of: (1) Reference to appropriate Federal-aid Highway Program Manual directives; (2) Other issuances, such as Technical Advisories and Notices which present short-term instructions or interim policy; (3) FHWA memorandums clarifying policy or providing technical guidance; (4) Discussions reflecting current state-of-the-art or philosophy; (5) Material on developmental and research areas related to pavements.

Portable Falling Weight Deflectometer Study
B. C. Steinert, D. N. Humphrey, and M. A. Kestler.
Maine Univ. at Orono. Dept. of Civil and Environmental Engineering. 11 Mar 2005, 336p, NETC-R52. Sponsored by New England Transportation Consortium. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-108789WCE Price code: PC A16/MF A03

This research investigated the effectiveness of the Portable Falling Weight Deflectometer (PFWD) for evaluating the support capacity of pavements during the spring thaw and evaluating the adequacy of sub grade and base compaction during construction. The performance of ten asphalt and gravel surfaced low volume roads were evaluated through spring thaw and recovery. Comparisons were made to the traditional FWD as well as other portable measuring devices. It was shown that the PFWD was able to follow seasonal stiffness variations and compared well with FWD derived moduli on both asphalt and gravel surfaces. Recommendations were made for using a PFWD to determine when to place and remove load restrictions. Field and laboratory tests were conducted to develop correlations between composite modulus, percent compaction, and water content for a range of aggregate types typical of New England. Comparisons were made between multiple PFWDs. A tentative technique was recommended for using a PFWD for compaction quality control for aggregate base and sub base courses. This is based on a rough equivalency between the PFWD composite modulus and percent compaction for aggregate at optimum water content. Factors are provided to correct the modulus at the field water content to the equivalent value at optimum.

Quiet Pavement Systems in Europe
D. Gibbs, R. Iwasaki, R. Bernhard, J. Bledsoe, and D. Carlson.
American Trade Initiatives, Inc., Alexandria, VA. May 2005, 54p, FHWA/PL-05-011. Sponsored by Federal Highway Administration, Washington, DC. Office of Policy. and American Association of State Highway and Transportation Officials, Washington, DC. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-107640WCE Price code: PC A05/MF A01

Noise pollution is a growing concern in the United States. A major contributor of highway noise is at the tire-pavement interface, which means that quieter pavements could lead to reduction in traffic-generated noise. The Federal Highway Administration, American Association of State Highway and Transportation Officials, and National Cooperative Highway Research Program sponsored a scanning study of quiet pavement systems used in Europe to reduce traffic noise. All of the countries the scan team studied-Denmark, France, Italy, the Netherlands, and the United Kingdom-have policies requiring consideration of quiet pavement where noise is a concern. The focus is on three technologies-thin-surfaced, negatively textured Gap-graded asphalt mixes, single- and double-layer highly porous asphalt mixes, and exposed aggregate concrete pavements. The countries are conducting extensive research on quiet pavement technology. The team's recommendations for U.S. implementation include evaluating the use of double-layer porous asphalt mixes to reduce noise on high-speed roadways, reducing the size of the aggregate used in mixes applied to the wearing surface, and trying thin-textured surfacing using a small aggregate in urban and other areas with lower traffic speeds.

Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges
Federal Highway Administration, Washington, DC. Office of Engineering. Dec 1995, 128p.
PB2005-110123WCE Price code: PC A08/MF A02

For complete citation see Construction Equipment, Materials, & Supplies

Vibrational Evaluation of Tendons in Segmental Sections of Sunshine Skyway Bridge Main Spans
A. A. Sagues, C. Cotrim, and V. Balakrishna.
University of South Florida, Tampa. Dept. of Civil and Environmental Engineering. 1 Aug 2005, 38p. Sponsored by Florida State Dept. of Transportation, Tallahassee. and Federal Highway Administration, Tallahassee, FL. Florida Div. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-109967WCE Price code: PC A04/MF A01

The objective of this project was to plan, prepare for, and analyze vibrational data acquired from the external tendons in the segmental sections of the Sunshine Skyway bridge main spans by a separate contractor. Findings of this project were obtained for the majority of tendons in the main spans of this bridge and conveyed to the Florida Department of Transportation (FDOT) in an interim report dated January 8, 2004. Refined analysis methods developed under the ongoing FDOT Project BC353-44 have been used to expand the number of tendons that could be analyzed and to provide more accurate estimates of tension of the other tendons. This report presents those expanded and updated analyses, including evaluation of data from tendons obstructed by

contact against other tendons.

Soil & Rock Mechanics

Calibration of Seismic Attributes for Reservoir Characterization. Annual Report
W. D. Pennington.
Michigan Technological Univ., Houghton. Nov 1999, 38p. Sponsored by Department of Energy, Washington, DC. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-834559WCE Price code: PC A04

No abstract available.

DRDC Suffield Soil Laboratory Program. Progress Report - Piston and Onager Sites
J. Barchard, and A. Kupper.
DEFENCE RESEARCH AND DEVELOPMENT SUFFIELD (ALBERTA). Jan 2004, 33p, DRDC-CR-2004-112. The original document contains color images. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
ADA436651WCE Price code: PC A04/MF A01

AMEC Earth AND Environmental Limited (AMEC) was retained by Defence Research AND Development Canada (DRDC) Suffield to carry out laboratory testing on soil samples from prairie soil samples from the Mine Effects Site near Building 148 on the Experimental Proving Ground at DRDC Suffield. AMEC's geotechnical laboratory in Edmonton, Alberta received three large, bag soil samples in late October 2003 for DRDC's Piston, Onager East and Onager West sites. The following laboratory tests were requested by DRDC: 1. Determination of water content of soil samples; 2. Preparation of compacted samples in range of natural water contents; 3. Consolidation tests using ASTM D2435 on two samples; and 4. Triaxial undrained tests (CUP) using ASTM D4767 on three samples. A typical range of natural water contents of 13 to 19 percent was provided to AMEC by DRDC Suffield for similar soil at these sites. For testing, compacted samples were prepared at water contents within the natural water content range, with target water contents of approximately 15 percent. Results are provided according to American Standard Testing Methods (ASTM) standards where applicable. Results for the Triaxial undrained tests (CUP) using ASTM D4767 on three samples are provided in CR 2004-138, DRDC Soil Laboratory Program Triaxial Test Results - Onager Site.

SASW/Study of Greater St.Louis and Surrounding Region
N. Anderson.
Missouri Univ.-Rolla. Center for Infrastructure Engineering Studies. Dec 2004, 42p, UTC/R120. Sponsored by Department of Transportation, Washington, DC. Research and Special Programs Administration. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-108772WCE Price code: PC A04

University of Missouri-Rolla (UMR) proposes to acquire multi-channel surface-wave (seismic analysis of surface waves; MASW) seismic data at 20 test sites in greater St. Louis and the surrounding region. These MASW data will be processed and analyzed (seismic analysis of surface waves), and used to construct subsurface shear-wave velocity profiles (to depths on the order of 50 feet). These shear-wave velocity data will be integrated into a regional soil characterization map currently being prepared by the CUSEC State Geologists.

Soil Air Voids Method for Compaction Control
R. L. Mokwa, and S. Fridleifsson.
Montana State Univ., Bozeman. Dept. of Civil Engineering. Aug 2005, 112p, FHWA/MT-05-010/8117-23. Sponsored by Montana Dept. of Transportation, Helena. Research Program. and Federal Highway Administration, Helena, MT. Montana Div. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-109519WCE Price code: PC A07

This research project was structured to evaluate the air voids method as a means of assessing the quality of a compacted layer of soil. A literature review was conducted to examine existing published information on the air voids method and to explore how extensively others have used the method. Laboratory testing was conducted to gather information for a variety of soils and to identify potentially suitable and potentially problematic soil types. The laboratory testing program included particle size gradation, hydrometer, Atterberg limits, relative density, specific gravity and impact compaction tests. Data from over 20 Montana Department of Transportation soil survey reports was collected, categorized, and reviewed to statistically examine trends in regards to compaction parameters and the use of the air voids method.

PRODUCT ANNOUNCEMENT

HIPAA 101 Video Gives Basics of the Administrative Simplification Provisions for Electronic Transactions

Centers for Medicare and Medicaid Services video now available from NTIS

HIPAA 101 is a video program designed to inform the health care provider community about the administrative simplification provisions of the Health Insurance Portability and Accountability Act of 1996 or HIPAA. In addition to creating consumer protection for health care benefits, HIPAA standardizes financial and administrative health transactions for privacy and security. The *HIPAA 101* video program is available from the National Technical Information Service.

This video will help the health care provider community understand:

- The history of HIPAA and its benefits
- How to tell if you are a 'covered entity'
- The standards that have been adopted for electronic transactions and code sets
- Why the designated standards maintenance organizations may be important to you
- What you need to do to be compliant with the administrative simplification provisions
- How HIPAA's rules and deadlines will be enforced

HIPAA applies to all health care clearinghouses, all health plans, and health care providers that conduct certain transactions in electronic form or who use a billing service to conduct transactions on their behalf.

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PRODUCT ANNOUNCEMENT

NTIS Releases Columbia Accident Investigation Report on CD

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Columbia Accident Investigation Board Report Volume 1, August 2003(on CD) is available from NTIS, call 1-800-553-6847 or (703) 605-6000, for $40 plus $5 handling fee, no additional charge for shipping; quote order number PB2003-107244KSV. Most major credit cards accepted. Fax orders to (703) 605-6900. Order online at http://www.ntis.gov/products/columbia.asp. For your convenience, the NTIS Web site also provides a link to the full text document on the NASA Web site.

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