MOinfo

MLTRC
Missouri Local Transportation Resource Center

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in this issue

SOIL NAIL LAUNCHERS PROVE TO BE HELPFUL

2003 PDS SHOWCASE

HOLT COUNTY BRIDGE FOR SALE

NEW ITEMS IN THE MLTRC LIBRARY

In Search Of

- Program Manager
- Ambassador
- Circuit Rider

Qualified applicants should contact Mohammad Qureshi toll-free at 866-667-6237 for information.

HOLIDAY CLOSING

The MLTRC office will be closed December 23 thru January 7.

SWORDS INTO PLOWSHARES

British Military Launcher Now Available for Civilian Applications

The British military developed a compressed air launcher to deploy nerve gas. This device could send quart-size nerve gas canisters 7 miles. When nerve gas warfare went out of style, a civilian company acquired the launcher and modified it to launch steel bars. It will shoot a 20 foot long bar fully into the ground.

The U. S. Forest Service (USFS) brought this device to the United States for a demonstration project. State DOT personnel from Colorado, Washington and Oregon participated in the demonstration and evaluation. It was concluded that the Soil Nail Launcher could quickly and economically repair landslides, wall failures, abutment and wing wall failures and provide emergency scour protection.

The Soil Nail Launcher accelerates a 1.5-inch steel bar up to 220 miles per hour. These massive bars are 20 feet or more in length. As these high-speed steel projectiles enter the earth, it appears a shock wave is created, causing the soil to "jump away", allowing the bar to pass without significant abrasion. The soil then collapses onto the bar, creating a powerful bond. Tests show this bond to be much greater than with percussion-driven nails. Pull-out tests indicate bond strength can be as high as 40 PSI. In tests with galvanized bars launched into gravel stockpiles, the retrieved bars showed little loss of galvanization.

> ...the Soil Nail Launcher could quickly and economically repair landslides, wall failures...

Launched nails can be solid bar, threaded bar, or hollow bar. The hollow bars can act as horizontal drains. The bars can be plain, galvanized or epoxy coated.

One of the major advantages to this method is that launched soil nails are functional immediately. An excavation that could take a week or more with traditional nails can be stabilized in a day or less with launched soil nails. Construction projects can be completed well ahead of schedule where nailing is on the critical path.

Launched nails can be used to stabilize fill and cut slope failures on highways and railroads as well as vertical excavations for construction projects. Pavement and guardrail and trackage can be left undisturbed. Railroad slopes and failing walls can be repaired without interference with train traffic and only one lane closure is needed on highways.

Nails can be inserted horizontally to create tiebacks so that whalers can be added to stabilize failing piling walls. Failing bin, crib and wing walls can be saved with launched nails. These nails can anchor erosion mats on slopes and they can support steel mesh and shotcrete on vertical cuts. Launched nails are ideal for temporary applications and may be considered permanent in most environments.

Visit www.soilnaillauncher.com for additional information.

Article submitted by: Bob Barrett, 549 South Broadway, Grand Junction, Colorado 81503, phone (970) 270-4624.

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MLTRC reserves the right to edit content for length and clarity. Please include your name, address, phone number and email address on all submissions. Images that accompany documents via email must be sent as a separate attachment and resolution must be at least 300DPI.

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2003 NATIONAL SHOWCASES:

Real-time Technology Experiences

Local road and bridge professionals are expected to do more with less and still keep pace with increasing citizen demands. In addition to this, municipalities are realigning budgets to enhance security, so an even more formidable challenge exists. Sounds impossible to manage, doesn't it? Well, not quite! Local professionals, a remarkable fraternity, were instrumental in developing an information exchange format which produces the real-time evaluation experience they require to hasten the implementation of new technologies. This format allows them to keep pace with new technology and do it cost effectively. Our unique Product Demonstration Showcases allow decision makers to evaluate all aspects of a product or service in actual use, no matter whether it is sharing a local in-house solution, or evaluating technology originating from federal, state or industry sources.

The Showcase format involves the host agency, sharing the stage with their industry partner, providing:

- a complete start-to-finish overview of how they implemented the technology;
- their actual cost-benefit assessment;
- a complete review of the product or process by the industry partner (vendor, contractor or consultant);
- guided site visits for real-time field situation evaluations; and,
- a real-time field demonstration of the installation process.

Our 2003 Spring Showcase portfolio demonstrates a remarkable range of technologies including solutions implemented by enterprising local agencies. Each Showcase delivers realized and future potential cost benefit. Showcases also provide substantial interaction and each day concludes with an open forum discussion. These are the most efficient, cost-effective information exchange opportunities you will ever experience. We know from previous Showcases that every one offers the potential to return your participation investment many times over. These Showcased technologies can improve customer services and produce a sizable return on your investment, so take advantage of these remarkable opportunities and bring along your decision-making team. You won't be disappointed.

BRIDGE FOR SALE

Holt County, MO—
Little Tarkio Creek Bridge spanning the East Fork Little Tarkio Creek is available for adaptive re-use at a new location. Erected in the late 1940s, this bridge is one of only two known examples of this Pratt Truss subtype in Missouri. The structure is a steel, 6-panel, rigid-connected Camelback Pony Truss. It is 100' long and carries a 14' wide roadway. It can be dismantled and match marked for further handling by party accepting ownership. If the bridge is transferred to another party, the transfer deed may include preservation covenants that require the new owner to preserve and maintain the bridge in accordance with established standards for historic bridges. Contact Philip Schrick, McDonald & Warger, Inc., PO Box 236, Liberty, Missouri 64069 or call (816) 781-6182, fax (816) 781-0643.

HOT *item!*

JUST ARRIVED! *Gravel Roads Maintenance and Design Manual*

HARDCOPY OR CD-ROM: To request a hardcopy or CD-ROM, contact the MLTRC or visit our website at www.umr.edu/~mltrc.

ONLINE:
View the publication online at the National LTAP center's website at www.ltapt2.org/gravel/gravelroads.htm.

PUBLICATIONS

ITS/Operations Resource Guide 2002 — Provides comprehensive listing of over 300 documents, websites, training courses, software tools, and points of contact related to Intelligent Transportation Systems. Includes resources on transportation security, planning, system operations, transit, freight operations, Intelligent Vehicle Initiative, and cross-cutting resources.

Asphalt Pavement Maintenance Field Guide — this handbook provides guidelines on preventive asphalt maintenance for a variety of distresses and conditions.

Results from a Safety Survey: Workforce Development for Transportation Professionals — provides results of a survey of federal, state and local staff and the academic community to assess how and what kinds of resources and topics should be the target of training safety professionals. Covers surveys and interviews and safety training for local transportation agencies; features training through the Local Technical Assistance Program (LTAP), including success stories and safety training activities in 2000.

Pavement Management Catalog: Pavement Management Software, Data Collection Equipment — New edition of Pavement Management Software Catalog, issued in January 1997. Includes software packages of interest to states and local jurisdictions. Includes public domain and private software.

Intelligent Transportation System Peer to Peer Program — Describes Joint Program Office's Peer to Peer Program, which provides technical assistance through a network of over 120 USDOT-approved ITS professionals.

Evaluation of the Tricon Retained Soil Wall System — Describes evaluation of Tricon Retained Soil Wall System, a mechanically stabilized earth (MSE) structure, to determine the basic capabilities and limitations for its use as a viable precast MSE retaining wall system. The evaluation was based on material, design, construction, performance and quality assurance information.

Evaluation of the Inter-Lok Retaining Wall System — Describes evaluation designed to determine the basic capabilities and limitation of the INTER-LOK System for use as a technically viable precast MSE retaining wall system.

Evaluation of the Geo-Con Vert Wall System — Describes evaluation of Geo-Con VERT Wall System, an in-situ retaining wall system designed as an alternative to other types of cut walls such as solder pile and anchored retaining walls. Evaluation determined the basic capabilities of the wall system for use as a technically viable permanent excavation support retaining wall system.

Crack Seal Application — Covers: preliminary responsibilities, pre-application inspection, project inspection, clean up inspection, and common problems and solutions.

VIDEOS

Pennsylvania Bridges: Maintaining the Past — Preserving the Future — Describes PennDOT's bridge safety program, which includes frequent inspections and preventive maintenance. Program provides "the right treatment, at the right time, for the right bridge."

ELECTRONIC PUBLICATIONS

Incorporating Intelligent Transportation Systems into Planning Analysis — Presents transportation modeling technique that shows how ITS can improve the reliability of the transportation infrastructure, so that travelers know how long it will take them to reach their destination.

Managing Highway Assets: Bridge Preservation — Describes PennDOT's bridge preservation program, which includes frequent inspections and preventive maintenance.

CD-ROMS

Manual on Uniform Traffic Control Devices Proposed Revision No. 2 Training Slides — Contains PowerPoint presentations for explaining proposed revision of MUTCD.

To check out items in the MLTRC library, please visit our website or call toll free 1-866-MO-ROADS (667-6237).

SEASONAL TIP:

Jump A Dead Battery the Right Way*

1. Check electrolyte level of the dead battery.
2. Check that batteries are same voltage.
3. Do not try to jump start a frozen battery.
4. Position the vehicles close enough so the jumper cables can reach. Be sure the vehicles are not touching; this will cause a direct short circuit.
5. Turn off the ignition of both vehicles and any electrical devices.
6. Check the cables to make sure they do not have loose or missing insulation. If they do, you could get a shock and the vehicles could be damaged.
7. Connect the cables in the following manner:
   FIRST — Connect the red/positive (+) cable to the positive (+) terminal of the dead battery. Do not let the other end of the cable touch any metal.
   SECOND — Connect the other end of the red/positive (+) cable to the positive (+) terminal of the good battery.
   THIRD — Connect the black/negative (-) cable to the good battery's negative (-) terminal.
   FOURTH — Connect the remaining black/negative (-) cable to a heavy metal part on the engine of the car with the dead battery. Be sure it is away from engine parts that move and at least 18 inches away from the dead battery. Do not connect the other end of the negative cable to the dead battery.
8. Start the engine of the vehicle with the good battery and hold the accelerator down slightly to increase the idle speed.
9. Try to start the car with the dead battery. (If the engine doesn't start it probably needs servicing.)
10. Remove cables in the reverse order that you attached. To prevent electrical shock, make sure the ends of the cables do not touch each other or any metal until all ends have been removed.

Hydrogen and oxygen are generated during jumping and charging a wet cell battery. This explosive gas mixture can seep out of vent caps. Attaching or removing jumper or charger clamps can create a spark that could ignite this gas mixture causing the battery to explode. USE CAUTION!

Wet cell batteries contain a strong sulfuric acid solution. Make it a habit to wear protective eye gear when jumping and charging batteries. Be careful with tools! No smoking! Caution: Disconnect department radios, etc.

**Source: Michigan's Local Transportation Assistance Program.*

Want a specific seminar or training in your area?
WE WANT TO HEAR FROM YOU!

Let us know if your address has changed.

Mohammad Qureshi, MLTRC Director
tel 866-667-6237 OR *email* mltrc@umr.edu

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REACHING TOWARD THE SKY FOR ASSET MANAGEMENT

What do prairie remnants, culverts and stop signs have in common? They are all assets of the Missouri Department of Transportation. Chris Shulse, the District 3 Roadside Manager, is taking on the task of creating a model inventory of MoDOT's assets along a 36-mile stretch of Highway 36 west of Hannibal.

Last year, Chris and his staff used GPS mapping to inventory prairie remnants located in the right-of-way. In the near future, this information will be fed into herbicide sprayers to increase their effectiveness and reduce chemical use in roadside management. The data will also be used to track the department's environmental stewardship and speed up the environmental clearances that may be necessary on future highway projects.

The next phase of the project is expanding to collect GPS coordinates for many other roadside features, like culverts and stop signs that are the responsibility of MoDOT. Along with their exact coordinates important information will be collected and entered into the central database and will be accessible to all divisions. Pavement history, construction plans, and even a short video clip from ARAN, the pavement rating van, will be tied to a point on an Arcview map.

With this project MoDOT is showing its commitment to responsibly managing the vast number of assets located within the state's 385,000 acres of right-of-way. By using the latest equipment and progressive data management tools, this is an inventory model that creates a framework that will be built upon for years to come.

For more information contact Chris Shulse in District 3 at (573) 248-2419, or Melissa Anderson in Research, Development and Technology at (573) 522-9296.

MISSOURI GUIDE FOR Pavement Rehabilitation

A copy of this guide may be downloaded in Adobe format from the MoDOT RDT website at http://www.modot.state.mo.us/rdt/Publications.htm#2002. Additional questions about this guide may be directed to John Donahue at (573) 526-4334 or donahj@mail.modot.state.mo.us.

DESCRIPTION

The Missouri Guide for Pavement Rehabilitation is an attempt to make sense of the performance of Missouri State system pavements. Pavements were evaluated by functional classification: National Highway System (NHS), remaining arterials, and collectors; and pavement type: Portland cement concrete (PCC), asphalt concrete (AC) overlaid PCC, full-depth AC, and AC overlaid AC. Special emphasis was placed on arterial routes. Pavement design and performance information from other states was also closely studied for possible application in Missouri.

Performance data consisted primarily of Automated Road Analyzer (ARAN) data accumulated during the previous five to seven years. ARAN data scores are equally split between roughness and visual distress. Guidance for acceptable/marginal/unacceptable performance scores was derived from the results of a series of public road rallies.

The Guide explains the reasons for different types of pavement deterioration in Missouri, including loading and environmental related factors. Some information is provided regarding the evolution of pavement design up to the significant design overhaul in the early 1990s. Rehabilitation strategies discussed include conventional AC overlays, stone matrix asphalt (SMA) overlays, rubblization with overlays, unbonded and bonded PCC overlays, diamond grinding, edge drain retrofit, dowel bar retrofit, full-depth repairs, and undersealing, while reconstruction strategies include jointed plain, jointed reinforced, continuously reinforced concrete and full-depth Superpave mix design asphalt. The experiences of other States using these techniques are presented along side Missouri's to provide a fuller picture of their value. The anticipated long-term benefits of increased smoothness at the time of construction are also reviewed.

Historical performance trends for PCC, AC/PCC, and AC/AC pavements in Missouri are highlighted with numerous graphs. Some explanations for different distress and roughness trends are attempted. The Guide finishes the analysis with a cursory comparison of life-cycle costs for AC and PCC pavements.

CONCLUSIONS

The following conclusions drawn are based on a combination of factual performance data trends and engineering judgment. Recognition is given to the significant modifications that have occurred to rigid and flexible pavements during the past eight years. Missouri has adopted thicker structural layers, drainable bases, JPCP design with short joint spacing and widened driving lanes, Superpave and SMA mix designs, QC/QA specifications for both industries and tightened material specifications. While the data analysis used the best performance

information available at MoDOT, it could not reflect the full measure these modifications will have on future performance. Future performance data will provide that enlightenment. Also, where design and performance information was gathered from other state DOTs, consultants, and industry sources, an educated guess was ultimately required by the MoDOT engineering staff to determine how it would apply to Missouri's highway system.

NEW PCC

PCC pavements on divided NHS routes in Missouri last an average of 25 years before rehabilitation is required.

Missouri's jointed plain concrete pavement (JPCP) design compares very favorably with other States' long life (40+ years) pavement designs.

Continuously reinforced concrete pavement (CRCP) with specific design features has maintenance-free characteristics that, based on performance data from other States, make it an optimum design strategy for the highest volume NHS urban routes.

PCC REHABILITATION

Rubblization of old PCC on NHS and remaining arterial routes can be a viable rehabilitation strategy under the right conditions.

Diamond grinding existing PCC pavements with moderate faulting on NHS and remaining arterial routes is an optimum rehabilitation strategy if no subgrade stability problems are evident.

Thin AC overlays may be used as short-term strategies before placement of unbonded PCC overlays.

AC overlays on PCC on divided NHS routes in Missouri last an average of 10 years before rehabilitation is required. This is congruous with other States' expected performance. Stone matrix asphalt (SMA) overlays on concrete have increased AC overlay lives an average of two years based on extrapolated estimated trends derived from a statistically small percentage of overlays.

Superpave AC overlays have demonstrated improvement over conventional AC mixes, but the benefit is not yet quantifiable because of very limited performance data.

Unbonded PCC overlays have performed very well in Missouri. Thin AC overlays may be used as short-term strategies before placement of unbonded PCC overlays.

NEW FULL-DEPTH AC

Full-depth Superpave pavements have only recently been implemented in Missouri and very limited data is available, but early performance results have been good.

Missouri's AC pavement design has common characteristics with the "perpetual pavement" concept.

AC pavements with low stability subgrades require either a thick rock base or subgrade modification.

AC OVERLAY ON AC

Thin AC overlays (~ 1 ? inch) on AC on NHS and remaining arterial routes last an average of six years before rehabilitation is required.

Continued on next page

TECH BRIEFS CONTINUED FROM PREVIOUS PAGE...

Similar thin AC overlays on AC on collector routes last an average of four to seven years before rehabilitation is required depending on the type of mix.

GENERAL

High initial smoothness on NHS and remaining arterial routes, obtained through any practical combination of construction methods, should result in extended pavement service life.

Longitudinal drainage pipe systems can easily be modified to allow easier inspection and cleanout, which would ensure a return on the initial investment.

General life cycle cost analysis, including present and future construction costs and their associated user costs, indicates that ***new AC*** is more cost-effective on lower arterials, while ***new PCC*** is more cost-effective on higher-volume arterials.

General life cycle cost analysis, including present and future construction costs and their associated user costs, indicates that an ***AC overlay*** is more cost-effective on lower arterials, while an ***unbonded PCC overlay*** is more cost-effective on higher-volume arterials.

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