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MARYLAND TRANSPORTATION TECHNOLOGY TRANSFER CENTER

Local Technical Assistance Program (LTAP)
University of Maryland at College Park

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INSIDE:

Governor O'Malley Announces Funding for Bicycle Safety Education in City of Baltimore

Baltimore Department of Transportation Joins Forces with Bike Maryland to Spread Awareness of Bicycling Safety

Supporting safe bicycle access throughout the state, Governor Martin O'Malley today announces $44,500 as funding support for the City of Baltimore's Bicycle Safety Education Program. The Department of Transportation will partner with Bike Maryland's "Bike Minded Program" to communicate safety awareness throughout the city.

"Whether for tourism, recreation, exercise or commuting, our message is that Maryland roadways welcome bicyclists," said Governor Martin O'Malley. "Our State is evolving to include bicycling as a more environmentally beneficial and healthy way of commuting, and to continue those efforts we need bicyclists and drivers to know and follow the basic rules of the road for everyone's safety."

The project includes updating, publishing and distributing "Bike Baltimore" maps, which will be available in English and Spanish, hosting workshops on bicycle safety, and organizing outreach by law enforcement. These efforts will not only communicate safety rules to cyclists, but will also alert motorists to the need to drive with caution and share the road. The City of Baltimore will contribute the remaining funding for the $96,800 project.

"Year after year, Baltimore is becoming a more bike friendly city," said Baltimore Mayor Rawlings-Blake. "We are grateful for Governor O'Malley's continued support of our efforts to increase bicycle use and safety, which supports our goal of making Baltimore a more attractive city for families."

Over the past two years, Baltimore has seen a 40 percent increase in the number of bike commuters. The opening of five new bike shops in the past four years also signals the growth in bicycling popularity. With Charm City Bikeshare scheduled to launch in September 2012 and the Jones Falls Trail opening in 2013, Baltimore can expect even more cyclists on local roads.

The Bicycle Safety Education Program enhancements are funded through the Transportation Enhancement Program (TEP), which funds non-traditional, community-based transportation-related projects. This year Maryland awarded six TEP projects totaling more than $4.1 million. The Governor determines which projects qualify for funding based on need and potential benefit to the public. The Maryland Department of Transportation's State Highway Administration oversees the federal program, which has awarded more than $206 million for 270 projects in Maryland since the TEP program began in 1991.

This article was reprinted from www.MarylandRoads.com.

Interested in learning more about bicycle safety?

Check out our Bicycle Design and Planning as well as our Pedestrian & Bicycle Accommodation courses. Visit our course catalog online to learn more about these courses!

Information transportation agencies need to identify alkali-silica reaction (ASR) in concrete structures and pavements can be found in the Federal Highway Administration's (FHWA) new Alkali-Silica Reactivity Field Identification Handbook (Pub. No. FHWA-HIF-12-022).

"The guide provides a quick visual reference to assist users in detecting and distinguishing ASR in the field from other types of damage," said Gina Ahlstrom of FHWA.

ASR occurs when silica in some aggregates and alkalis in concrete combine with water to form a gel-like substance. As the gel absorbs water and expands, it can cause the concrete to crack. Over time, the cracks enable other forms of distress to occur, such as freeze-thaw damage or corrosion. This can lead to premature deterioration and loss of service life for concrete pavements and structures.

Another type of alkali-aggregate reaction is alkali-carbonate reaction (ACR), which involves certain types of dolomitic rocks. This reaction can also result in the expansion and cracking of concrete elements. As cases of ACR are more limited, however, the handbook concentrates on identifying ASR.

The handbook graphically illustrates the sequence of how ASR occurs. Field symptoms of ASR are then described, including cracking, expansion, localized crushing of concrete, extrusion of joint material, surface pop-outs, and surface discoloration and gel, which may be alkali-silica gel or lime leaching from the cracked concrete. Photos provide a visual reference for identifying symptoms.

This concrete highway barrier is affected by alkali-silica reaction (ASR).

Users of the handbook will find information and photos on the effect of exposure conditions, including moisture and temperature. Concrete that is exposed directly to moisture, for example, is likely to exhibit more severe symptoms of ASR than concrete that is less exposed.

Also discussed is how ASR can occur simultaneously with other deterioration processes or may make the concrete more vulnerable to these processes after ASR damage has occurred. Examples include steel corrosion and freeze-thaw deterioration. The handbook highlights non-ASR-related distress and notes that all forms of deterioration should be considered when performing a condition survey.

A brief overview is provided on managing pavements and structures affected by ASR. A confirmed diagnosis as to the presence and extent of ASR requires laboratory testing and petrographic examination of concrete cores. By combining the results of the laboratory investigation and the symptoms from the site investigation, agencies can determine the likely contribution of ASR to the observed damage. More information on managing affected structures is available in the 2010 FHWA Report on the Diagnosis, Prognosis, and Mitigation of Alkali-Silica Reaction in Transportation Structures (Pub. No. FHWA-HIF-09-004). The report is available at http://www.fhwa.dot.gov/pavement/concrete/pubs/hif09004/asr00.cfm. FHWA expects to release a new document, Alkali-Silica Reactivity Surveying and Tracking Guidelines, by fall 2012.

The handbook's three appendices feature collections of photographs illustrating ASR in bridge structures, concrete pavements, and other transportation structures such as highway barriers, light poles, and curbs.

To download a copy of the handbook, visit www.fhwa.dot.gov/pavement/concrete/asr/field.cfm. For current information on ASR, visit FHWA's online ASR Reference Center at www.fhwa.dot.gov/pavement/concrete/asr.cfm. Launched under FHWA's ASR Development and Deployment Program in 2009, the center contains more than 300 specifications, guidance documents, test methods, and other references on ASR. Updates on ASR can also be found in FHWA's free quarterly technical update, Reactive Solutions. The update is available at www.fhwa.dot.gov/pavement/concrete/reactive/index.cfm. To subscribe, send an email to asrnewsletter@transtec.us. For more information on the handbook or the ASR Development and Deployment Program, contact Gina Ahlstrom at FHWA, 202.366.4612 or by email: gina.ahlstrom@dot.gov.

This article was reprinted from the August 2012 issue of FOCUS, a publication of the United States Department of Transportation and Federal Highway Administration

Maryland Work Zone Crashes Plummet to Lowest Level in a Decade

The Maryland State Highway Administration (SHA) is making steady progress in keeping both workers and drivers safe in work zones.

According to SHA's 2011 crash data, work zone-related crashes, injuries, and fatalities across Maryland have hit a 10-year low. In just the last three years, deaths in these work zone crashes dramatically decreased—from nine in 2009 to three in 2011. Also through those three years, injuries decreased from 827 to 688, while the number of crashes dropped from 1,685 to 1,486.

Maryland believes there are a number of factors to these decreases, one being the use of the Maryland SafeZones automated speed enforcement program, which issues citations to drivers who exceed the posted speed limit by more than 12 mph in work zones.

"The decrease in work zone crashes and the reduction in citations tell us that the SafeZones cameras are effective and motorists are getting the message to slow down in our highway work zones," said SHA Administrator Melinda Peters in a statement. "This is not only good news for workers but for motorists as well since the majority of those injured in work zone related crashes are drivers or occupants in passenger vehicles."

Since the SafeZones program launch in 2010, SHA has cut down on work zone speeding by 80 percent. Before the program, SHA estimates seven of every 100 drivers in a given work zone were speeding. Now, with the use of the program, SHA estimates that number has dropped to an average of less than two work zone drivers out of 100.

"SafeZones is a critical part of our overall work zone safety program, because education of the driving public combined with effective enforcement is a powerful traffic safety tool," Peters said.

Additional information on SHA's SafeZones is available at www.safezones.maryland.gov.

Check out our Introduction to Temporary Traffic Control and Work Zone Design courses scheduled for November 29th and December 11th-12th. For full course descriptions see page 6.

This article was reprinted from the August 31, 2012 issue of AASHTO Journal Weekly Transportation Report.

CITE Blended Courses for 2012

The Consortium for ITS Training and Education (CITE) announces its Blended Course schedule for 2012. A "blended" course combines the best features of both instructor-led and web-based instruction. Features include: live discussions through the use of conference calls, convenient, flexible web-based learning, a specific time schedule in which to complete the course, and student interaction through the use of a discussion board.

Scheduled courses include:

- Introduction to Systems Engineering, September - October 2012
- Traffic Signal Timing, September - October 2012
- Road Weather Information Systems (RWIS) Equipment and Operations, October - December 2012

For more information about or to register for CITE's Blended Courses visit: www.citeconsortium.org

Ultra-High Performance Concrete Connections for Bridges Superior Strength and Durability

Field-cast ultra-high performance concrete (UHPC) connections were used to construct the Route 31 Bridge in Lyons, NY.

As transportation agencies look for innovative solutions to facilitate the rapid construction of highway bridges, they are turning to ultra-high performance concrete (UHPC) for superior strength and durability.

"UHPC has advanced the state of the art for construction of prefabricated bridge elements and systems," said Ben Graybeal of the Federal Highway Administration (FHWA). A new Tech Note released by FHWA, Construction of Field-Cast Ultra-High Performance Concrete Connections (Pub. No. FHWA-HRT-12-038), highlights how UHPC enables significant simplifications in the design of the field-cast connections that link prefabricated bridge components. New UHPC connection details eliminate the conflict points between the reinforcing bars and other discrete connectors, allowing for easy field assembly.

As of early 2012, field-cast UHPC connections between prefabricated bridge components have been used in 18 bridges in the United States and Canada. These bridges use a range of details to connect different precast concrete modular bridge components, including adjacent box beams, full-depth precast deck panels, and deck-bulb-tee girders. Examples include the Route 31 Bridge over the Canandaigua Outlet in Lyons, New York, and the U.S. Route 6 Bridge over Keg Creek in Pottawattamie County, Iowa. Both bridges use field-cast UHPC in longitudinal connections for pre-decked superstructure elements.

The Route 23 Bridge in Oneonta, NY, was built using precast concrete deck panels and field-cast UHPC connections.

UHPC is an advanced cementitious composite material first developed in the 1990s and commercially available in the United States since 2000. It is typically acquired from a supplier in three separate components: a pre-bagged cementitious powder, steel fiber reinforcement, and chemical admixtures. Water is then added at the construction site, and the UHPC is mixed and placed into the formwork using standard construction equipment.

Compared to more conventional concrete materials, UHPC exhibits superior properties such as exceptional durability, high compressive strength, usable tensile strength, and long-term stability. It generally contains high cementitious material contents, low water-to-cementitious material ratios, compressive strengths above 21.7 ksi (150 MPa), and sustained tensile strength resulting from internal fiber reinforcement.

Buy America provisions are relevant to the steel fiber reinforcement used in UHPC. States planning to use UHPC in projects should work with their FHWA division office early in the design process to determine the availability of a domestic manufacturer, and if necessary, submit a Buy America waiver request for FHWA's consideration.

The Tech Note takes readers through the steps involved in constructing field-cast UHPC connections, including design, prefabricated component preparation, formwork, mixing and placing, initial and final curing, surface profiling, and material testing. The design of the field-cast connections, for example, is critical to the overall performance of

Continued on page 6

Our Currently Scheduled Courses

The following courses are currently scheduled and we are still adding to the list! For more information or to schedule a class, contact Janette Prince at 301.403.4623 or register online by visiting us at www.mdt2center.umd.edu.

CONSTRUCTION MATHEMATICS

Ed Stellfox

September 19, 2012, 8:30am - 3:30pm

College Park, Maryland

$89 for all participants

CEUs: 0.6

PDHs: 6.0

Construction inspectors may need to brush up on math skills specifically related to construction inspection, especially basic geometry, fractions, area, volume and conversions. The class lead by Ed Stellfox is a good refresher, and excellent preparation for the construction inspection class. The course was designed for road workers, foremen, superintendants, construction inspectors and supervisors in need of a refresher, especially in preparation for the Construction Inspections class. Depending on the interest of the participants, the course may cover: whole number and fractions, decimals (for measurement and payment), mixed operation fractions and decimals, formula evaluation, techniques of algebra, ration and proportion, percentage, hints for problem solving, useful formulas, square and square roots, conversion, and transportation construction examples.

ASPHALT ROADS - COMMON MAINTENANCE PROBLEMS

Ed Stellfox

September 25, 2012, 8:30am - 12:30pm

College Park, Maryland

$59 for all participants

PDHs: 4.0

Municipal employees with road maintenance responsibilities should understand the causes of common maintenance problems on asphalt roads and be familiar with proper repair materials and methods. This course discusses causes and repair procedures for common problems such as cracking, potholes, rutting, corrugations, etc. The procedures cover materials, equipment, and techniques for lasting repairs. Also included, a brief discussion of surface treatment.

LOW COST SAFETY IMPROVEMENTS

Mark Hood, P.E.

October 1, 2012, 8:30am - 3:30pm

College Park, Maryland

$100 for Maryland local government

$125 All other participants

PDHs: 6.0

This course provides participants with methods for implementing effective, low cost safety improvements targeted at high crash areas. It emphasizes the basic and enhanced application of traffic control devices, low cost safety improvements, and their specific safety benefit (crash reduction factors). Traffic crash data collection, identification of hazardous locations, and engineering study procedures are also discussed. Emphasis is placed on low cost solutions that may be made at the local level.

TECHNIQUES FOR REDUCING CONSTRUCTION AND MAINTENANCE COSTS

Ed Stellfox

October 16-17, 2012, Day 1 8:30am - 3:30pm,
Day 2 8:30am - 12:30pm

College Park, Maryland

$99 For all participants

PDHs: 10.0

Counties and municipalities bear a considerable financial burden with respect to the construction and maintenance of roadways. Inflation, increasing cost of labor, materials and fuel have risen steeply in the past few years. At the same time, municipal budgets have not kept pace. It is essential to conserve resources, find energy efficient and low maintenance materials and to use more efficient techniques. This workshop will conclude with groups of participants developing a cost control plan for a project.

BLUEPRINT READING FOR HIGHWAY WORKERS

Glynn Stoffel

October 22, 2012, 8:00am - 3:00pm

College Park, Maryland

$110 Maryland local government

$125 All other participants

PDHs: 6.0

Today's highway workers use a variety of blueprints and drawings to guide them in accurately performing the construction and maintenance of roadways and related components. Upon successful completion of this course instructed by Glynn Stoffel, the student will be able to read and interpret many of these blueprints as well as demonstrate the ability to produce accurate and legible field sketches.

WINTER MAINTENANCE

Ed Stellfox

November 8, 2012, 8:30am - 3:30pm

$89 for all participants

PDHs: 6.0

This course covers all aspects of winter operations- planning and organizing, methods of snow and ice control, salt usage, and winter equipment maintenance. Instructed by Ed Stellfox this lesson will include usage of snow maps, formal snow plans, snow plow and salt spreader operation. This course in intended for municipal officials, road commissioners, supervisors, superintendents, publics works and maintenance personnel, equipment operators, and city or town managers.

Continued on page 6

HIGHWAY CAPACITY INTERRUPTED FLOW

Dane Ismart
November 28, 2012, 8:30am – 12:30pm
College Park, Maryland
$105 Maryland local government participants
$120 for all other participants
CEU's: 0.6
PDHs: 6.0

This one-day course will cover the theory and methodology of the 2010 Highway Capacity Manual for interrupted flow. The Chapters that will be covered include: Signalized Intersections, Unsignalized Intersections (A) Two-Way Stops (B) Four Way Stops, and Urban Arterial. Changes in each of the interrupted Chapters of the 2010 Highway Capacity Manual will be highlighted during the lectures. The Highway Capacity Software will be demonstrated to the class using sample problems. The new roundabout capacity procedure is covered under a separate course.

INTRODUCTION TO TEMPORARY TRAFFIC CONTROL

Juan Morales
November 29, 2012, 8:30am – 3:30pm
College Park, Maryland
$100 Maryland local government participants
$125 for all other participants
PDHs: 6.0

An introductory course to temporary traffic control in work zones, TCC is a one-day course designed to give participants a complete overview of traffic control in work zones, including applicable standards, devices used, component parts and their requirements, and installation/removal considerations. The following topics will be covered: definition of temporary traffic control (TTC), quantification of the safety problem, manuals and standards applicable in the State of Maryland, fundamental principles of TTC, component parts of the TTC, introduction to traffic control devices, tapers and other transitions, and installation and removal considerations.

WORK ZONE DESIGN

Juan Morales
December 11-12, 2012, 8:30am – 3:30pm
College Park, Maryland
$199 Maryland local government participants
$235 for all other participants
PDHs: 12.0

The course will give participants knowledge of the entire temporary traffic control (TTC) process: planning, design, review, installation, maintenance, and evaluation of proper maintenance of traffic (MOT) controls for work zones. The procedures and devices covered are generally taken from Part 6 of the Manual on Uniform Traffic Control Devices (MUTCD) and are modified to meet practices and standards in Maryland.

Ultra-High Performance Concrete Connections for Bridges Superior Strength and Durability

(continued from page 4)

the structural system. Designers must consider both service and ultimate limit states, as well as the practicality of construction and the long-term durability of the deployed system. Prior to completing the UHPC connections between prefabricated components, the components must be fabricated, transported, and assembled on the bridge. Critical steps include the preparation of the bonding surfaces where the precast component meets the field-cast UHPC. While UHPC can bond exceptionally well to conventional concrete, the bond strength is highly dependent on the surface of the precast concrete. As with other cementitious grouts, UHPC is not likely to form a strong bond with smooth, dry, precast concrete. An enhanced bond can be obtained by using concrete that has an exposed aggregate surface finish.

UHPC composite connection test specimens are subjected to cyclic loading.

The formwork required to contain UHPC when it is placed into a connection requires tighter control than the formwork commonly used in field-cast concrete applications, as UHPC exhibits higher pressure than conventional concrete and can easily leak between formwork that is not appropriately sealed.

Guidance is also provided on mixing and placing the concrete. UHPC is sensitive to mixing deviations, so the supplier's specifications for mix proportions and timings must be followed. Mixing UHPC requires significant energy in order to disperse the liquids uniformly within the powder matrix. Both portable concrete pan mixers and conventional concrete ready-mix trucks have been used on projects to mix UHPC. The volume of UHPC that can be mixed is approximately half that of conventional

Continued on page 7

Ultra-High Performance Concrete Connections for Bridges Superior Strength and Durability

(concluded from page 6)

concrete that could be processed in the same mixer. Typically, either motorized or nonmotorized wheelbarrows have been used to place UHPC into field-cast connections, with connection spaces being filled consecutively. UHPC should always be placed into connection spaces so that successive placements are poured into concrete that was recently cast and remains fluid.

A portable concrete pan mixer is used to prepare UHPC for placement during construction of field-cast connections

Although UHPC tends to exhibit long dwell times before it begins to set, once setting begins, strength gain occurs rapidly. The initial setting behavior is dependent on the temperature of the UHPC. Although cooler temperatures are beneficial for mixing and placing UHPC, warmer temperatures are better for the rapid setting of the concrete. This setting can be accelerated by supplying supplemental heat to the UHPC and surrounding prefabricated elements. Heat can be supplied externally (e.g., ground heating mats) or internally (e.g., resistance heating wires), but forced air heat should not be applied to exposed UHPC surfaces.

The Tech Note also highlights material testing for UHPC. While established testing procedures for conventional concrete are generally applicable to UHPC, procedures may need to be modified in some instances to appropriately capture the behavior of the UHPC. Modified procedures for flow testing and compression testing, for example, are discussed.

To download the Tech Note, visit www.fhwa.dot.gov/publications/research/infrastructure/structures/bridge/12038/index.cfm.
Further information on a specific type of UHPC connection can be found in FHWA's new Tech Brief, Ultra-High Performance Concrete Composite Connections for Precast Concrete Bridge Decks (Pub. No. FHWA-HRT-12-042). The Tech Brief describes a study FHWA conducted on the performance of field-cast UHPC composite connections between precast modular bridge decks and supporting girders. This evaluation is part of Transportation Pooled Fund Study TPF-5(217), which is being done in partnership with the New York State Department of Transportation.

Two full-scale test specimens were built for the study. One used conventional concrete with standard composite connection details, while the other used UHPC and novel connection details. Each specimen simulated both a steel girder connection and concrete girder connection to precast concrete deck panels. The specimens were subjected to both cyclic loads and static loading. The UHPC connections withstood loads greater than those required by the American Association of State Highway and Transportation Officials Load and Resistance Factor Design Bridge Design Specifications and surpassed the performance of the conventional test specimen.

Also featured in the Tech Brief are recommendations for using the UHPC composite connection detail. These recommendations are conceptual guidance, rather than formal design specifications. To download the Tech Brief, visit www.fhwa.dot.gov/publications/research/infrastructure/structures/hpc/12042/. The full report on the FHWA study is available through the National Technical Information Service at www.ntis.gov (search for NTIS Accession No. PB2012-107569).

For more information on UHPC, contact Ben Graybeal at FHWA, 202.493.3122 or by email at benjamin.graybeal@dot.gov.

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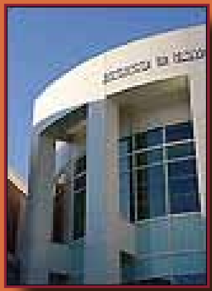

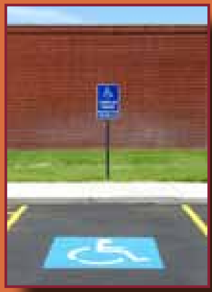

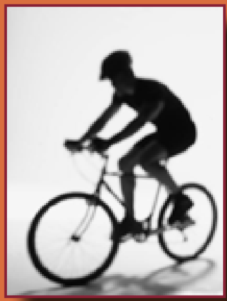

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Requesting a course is simple, visit www.mdt2center.umd.edu and fill out our request training form or call Janette Prince at 301.403.4623 and she'll be glad to assist you.

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