


ADDRESS UPDATE

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YOUR INTERESTS

- ☐ Technotes Newsletter
- ☐ Assisting T² as a resource
- ☐ Roadway Design
- ☐ Temporary Traffic Control
- ☐ ITS
- ☐ Soils
- ☐ Structures
- ☐ Roadside Maintenance
- ☐ Other
- ☐ Training Announcements
- ☐ Traffice Engineering
- ☐ Lighting
- ☐ Road Safety
- ☐ Traffic Control Devices
- ☐ Water
- ☐ Pavement

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technotes

MARYLAND TRANSPORTATION TECHNOLOGY TRANSFER CENTER

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

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Highway Traffic Up in 2005

New Data Reveal America's Traffic Congestion Getting Worse

Travel on American highways climbed to an all-time high in 2005, said U.S. Secretary of Transportation Mary Peters. According to the newly released "*Highway Statistics 2005*," an annual compilation of data reported to the FHWA by all U.S. states and territories, Americans drove nearly three trillion miles on American highways last year. This figure – 2,989,807,000,000 vehicle miles traveled – represents 27.4 billion mile increase over travel in 2004 and nearly 25 percent more than in 1995.

"These figures underscore the importance of our efforts to fight traffic congestion," said Secretary Peters. "It is clear that our ability to keep traffic moving smoothly and safely is key to keeping our economy strong."

There were 241.2 million vehicles registered in the United States last year, including 6.2 million motorcycles – the most ever recorded in both categories. "America is the most mobile nation in history," Federal Highway Administrator J. Richard Capka said, "and, as these new data show, our interstate is every bit the critical infrastructure President Eisenhower foresaw 50 years ago when he created it."

The "Highway Statistics" series, which consists of statistical data on motor fuel, motor vehicles, driver licensing, highway-user taxation, state and local government highway finance, has been produced each year since 1945.

To view "Highway Statistics 2005" or its predecessors, visit http://www.fhwa.dot.gov/policy/ohpi/hss/hsspubs.htm
Source: Federal Highway Administration

of road geometry, but also allowed for rapid creation of a digital model of the road for the driving simulator at TFHRC. Another group of sixteen participants was recruited to drive the HDS representation of the road and experience the same set of pavement marking treatments. The HDS study captured driver performance measures and subjective ratings similar to those collected in the field. The validation exercises indicated a high level of correlation between driver performance measures for similar road sections between the field and HDS, which implied that the results are comparable. The success of the validation efforts provided confidence that using the simulator could be a safe and cost-effective way to explore the effectiveness of other potential safety improvement treatments of interest to the DOT.

U.S. Department of Transportation
Federal Highway Administration

PENNDOT

FHWA Works with PennDOT to Study Pavement Marking Treatments on Rural Two-Lane Roads

The FHWA staff at Turner-Fairbank Highway Research Center (TFHRC) worked with the Pennsylvania Department of Transportation (PennDOT) to conduct a two-phased effort aimed at understanding how varying pavement marking treatments affect driver performance. The first phase involved experiments with driving subjects in the FHWA's instrumented field research vehicle. The second phase involved replicating the field experiments in the highway driving simulator (HDS) at TFHRC. PennDOT made a section of rural, two-lane road available for nighttime test runs and provided a contractor to apply the various pavement marking treatments over a three week period. The field experiment took place on a six-mile segment of two-lane rural road. Sixteen drivers not familiar with the section of road were recruited as participants. Each participant drove the same road section in each direction at night in an instrumented vehicle eight times over a three-week period during which incremental changes were made to the pavement markings. These incremental changes included increasing the brightness of the centerline or adding wider edge lines. Detailed data was gathered for speed, lane position, and forces acting on the vehicle for each run, as well as driver ratings about the ease of driving each section of the road.

Penn State University is collaborating on the data analysis and generating measurements for factors such as centerline or edge line encroachments, speed profiles and variance, and driver deceleration (braking) as indicators of the influence of the pavement markings treatments on safe driving behavior. The second part of the study involved the development of a computer model of the same road section using the detailed geometrics and roadside data gathered by the FHWA's Digital Highway Measurements Vehicle. The detailed digital data not only provided an engineering quality description

"The analysis of driver preference rankings from both the field and simulator studies led to the subjective finding that drivers favor more and brighter markings as they negotiate curves on two-lane rural roads at night."

The researchers plowed through the mountain of data gathered in this study to analyze subjective and objective measures of performance. The analysis of driver preference rankings from both the field and simulator studies led to the subjective finding that drivers favor more and brighter markings as they negotiate curves on two-lane rural roads at night. The analysis of objective data found that drivers were prone to drive 2-4 miles per hour faster with better markings on the same road. The analyses of lane positioning performance measures or combinations of measures failed to yield any strong conclusions on the nature of the pavement marking treatments. Continued analysis is planned to see if there may be useful insights gained by considering effects of pavement marking treatments on the tangents and curves. Further HDS studies are anticipated to assess the effects of modifi cations of the pavement marking treatments such as longer extension into tangent sections or greater use of roadside delineators. An FHWA report integratingthe results of the various contractor and staff efforts is planned, but the individual research papers and contractor reports are available upon request. For more information contact:
Dr. Ken Opiela (202) 493-3371 or Kenneth.Opiela@fhwa.dot.gov.

From SAFETY COMPASS :: A Publication of the Federal Highway Administration Safety Program :: December 2006 :: Volume 1 Issue 1 :: Page 1

PRIORITY TECHNOLOGIES AND INNOVATIONS LIST

The technologies and innovations (T&Is) described below are ones that the Federal Highway Administration (FHWA) believe warrant special attention.

This list is not intended to include all T&Is available. Many T&Is are considered good concepts, practices, and/or success stories that should continue to be shared, while others are being developed but are not yet ready to be put into use. This list is intended to be a living list and updated periodically.

511 Traveler Information—An easy-to-remember three-digit telephone number available to state and local transportation agencies nationwide so that they can readily provide information on highway and transit conditions to travelers by telephone.
Contact:
Bob Rupert, 202-366-2194. Robert.Rupert@fhwa.dot.gov
Mac Lister, 708-283-3532. Mac.Lister@fhwa.dot.gov

Accelerated Construction Technology Transfer*—This undertaking promotes creative techniques to reduce construction time and enhance quality and safety.
Contact:
Dan Sanayi, 202-366-0551. Dan.Sanayi@fhwa.dot.gov
Rob Elliott, 404-562-3941. Rob.Elliott@fhwa.dot.gov

Asset Management Guide—The guide illustrates asset management principles and identifies techniques and methods for adopting the decisionmaking framework in transportation agencies.
Contact:
Stephen Gaj, 202-366-1559. Stephen.Gaj@fhwa.dot.gov
Thay Bishop, 404-562-3695. Thay.Bishop@fhwa.dot.gov

Air Void Analyzer*—The technology can be used to provide real-time evaluation for measuring air content, specific surface, and the spacing factor of fresh portland cement concrete.
Contact:
Gary Crawford, 202-366-1286. Gary.Crawford@fhwa.dot.gov
Angel Correa, 404-562-3907. Angel.Correa@fhwa.dot.gov

Continuous Flight Auger Piles—The technology is characterized by the drilling of a hollow-stem auger into the ground, pumping grout or concrete into the hole, and installing reinforcement in the pile. This eliminates the need for a temporary casing.
Contact:
Silas Nichols, 410-962-2460. Silas.Nichols@fhwa.dot.gov

Cable Median Barriers*—Cable median barriers are an effective mechanism for preventing fatal and disabling accidents and are more forgiving than traditional concrete and metal beam barriers.
Contact:
Dick Powers, 202-366-1320. Dick.Powers@fhwa.dot.gov
Frank Julian, 404-562-3689. Frank.Julian@fhwa.dot.gov

Dispute Resolution Guidance for Environmental Streamlining—The procedures present strategies for interagency collaborative problem solving during the transportation development and environmental review process.
Contact:
Ruth Rentch, 202-366-2034. Ruth.Rentch@fhwa.dot.gov
Don Cote, 720-963-3210. Don.Cote@fhwa.dot.gov

DYNASMART-P—A traffic analysis tool that can integrate travel demand models into the planning process. The tool can evaluate ITS technologies and provide traffic operations data for air quality analysis.
Contact:
John Tolle, 708-283-3541. John.Tolle@fhwa.dot.gov
John Halikas, 202-366-2183. John.Halikas@fhwa.dot.gov

Expanded Polystyrene (EPS) Geofoam—Lightweight material that can be used as fill behind walls and other support structures.
Contact:
Peter Osborn, 410-962-0702. Peter.Osborn@fhwa.dot.gov

Fiber-Reinforced Polymer*—Material that can be used to repair cracks in overhead sign supports by wrapping the support with the fiber-reinforced material.
Contact:
Benjamin Tang, 202-366-4592. Benjamin.Tang@fhwa.dot.gov
Shoukry Elnahal, 410-962-3648. Shoukry.Elnahal@fhwa.dot.gov

Highway Economic Requirements System, State Version—A software model that is designed to evaluate the implications of alternative programs and policies on the conditions, performance, and user cost levels associated with highway systems.
Contact:
Robert Mooney, 202-366-4631. Robert.Mooney@fhwa.dot.gov
Lisa Randall, 720-963-3209. Lisa.Randall@fhwa.dot.gov

Improved Decisionmaking Using Geographic Information Systems—A software program that allows for manipulation, analysis, and display of geographically referenced data.

Contact:
Mark Sarmiento, 202-366-4828. Mark.Sarmiento@fhwa.dot.gov
Ben Williams, 404-562-3671. Ben.Williams@fhwa.dot.gov

ITS Deployment Analysis System (IDAS)—A tool that can predict cost/benefit of ITS investments and provide data/information to agencies to analyze ITS operational improvements.
Contact:
Robin Mayhew, 360-753-9416. Robin.Mayhew@fhwa.dot.gov
John Halikas, 202-366-2183. John.Halikas@fhwa.dot.gov

Load and Resistance Factor Design and Rating of Structures—An AASHTO Load and Resistance Factor Design (LRFD) and Rating (LRFR) bridge specification provides for more uniform levels of safety, which should lead to superior serviceability and long-term maintainability.
Contact:
Firas Ibrahim, 202-366-4598. Firas.Ibrahim@fhwa.dot.gov
Shoukry Elnahal, 410-962-3648. Shoukry.Elnahal@fhwa.dot.gov

Maintenance Decision Support System (MDSS)—A tool that uses weather forecasting and data fusion techniques to provide maintenance managers precise surface condition forecasts and treatment recommendation thus reducing maintenance costs for winter operations
Contact:
Ray Murphy, 708-283-3517. Ray.Murphy@fhwa.dot.gov.
Roemer Alfelor, 202-266-9242. Roemer.Alfelor@fhwa.dot.gov

Mechanistic Empirical Pavement Design Guide—The design guide uses the latest, proven models and algorithms that will allow the pavement design community to better predict and address the critical performance elements of the pavement structure.
Contact:
Leslie Myers, 202-366-1198. Leslie.Myers@fhwa.dot.gov

continued on page 11

Roadway Quality Management Program

Part 1 – New Pavement Construction Standards

Implementing a roadway quality management program will help to ensure that municipalities are building and maintaining high quality roadways. This series of articles will discuss the key components of a quality management programthat include pavement construction standards, utility control policies, contracts and specifications, and construction inspection. Part 1 will discuss the importance of implementing a comprehensive roadway quality management program, as well as, the need for adequate pavement construction standards. In order to properly maintain any roadway system, all required maintenance and rehabilitation or other activities such as utility work in the roadway must be properly constructed.

Additionally, new roads must be required to meet reasonably high quality standards. A poorly built road can deteriorate quickly and thereby become a "money pit" that will drain the municipality of precious funds for many years to come. Since the cost of these additional maintenance problems must be added to an already strained maintenance budget, the results could be financially devastating. Therefore, any successful roadway preservation program must include a comprehensive quality management program to ensure that all new roads, as well as, preventive maintenance and rehabilitation projects, are properly constructed. The importance of a comprehensive quality management program cannot be overstated. We do not live in a perfect world, mistakes do happen and errors are made, even by the best contractors. The occurrence of mistakes can be amplified by the"low-bid" system utilized by government agencies to award construction contracts. There is a "fairmarket value" for the cost to construct a project. When forced to bid in a "low-bid" environment, there is a tendency for contractors to take shortcuts to create a competitive advantage. Unfortunately, short cuts do occur in construction way too often. This "short-cut" phenomenon is similar to drivers speeding when there is no one enforcing the speed limit.

There must be a safety net to protect the taxpayers. Proper contract documents coupled with a good inspection control program will help to ensure that the taxpayers receive a dollar's worth of goods and services for each dollar spent. A comprehensive quality management program should include the following elements:

- Contracts and Specifications
- Inspection Program
- New Pavement Construction Standards
- Utility Control Ordinance

NEW PAVEMENT CONSTRUCTION STANDARDS

Agencies may have implemented pavement management systems that allow them to maximize tax-payers' investment in the maintenance, repair and rehabilitation of existing road surfaces. However,in order to cost-effectively manage a roadway system, stringent requirements must be in place to ensure that new roads, usually in subdivisions, are properly designed and constructed. Otherwise, it becomes a case of the "money pit syndrome." As stated above, good money spent to fix poorly designed and/or constructed roads is a waste of tax-payers' money. For example, initially the pavement may be structurally inadequate to begin with. Then, once the failures occur, rather than properly repairing the root cause of the problem, many agencies will compound the problem by spending as little money as possible to "cover up" the problems. Failure to fix the underlying problems will require additional repairs sooner rather than later.

Unfortunately, many local agencies have adopted "minimum" construction standards for subdivisionstreets that are generic in nature. Many times the"minimum" standards are inadequate, resulting in streets which only last for a few years before major maintenance or rehabilitation is required. Minimum road construction standards typically result in poor performance due to several technical deficiencies in the design of the pavement thickness such as:

1. Traffic Loads. A common practice for determining the structural capacity of a pavement is to base it on a certain number of vehicle trips per dwelling unit per day, using only car traffic or a minimal amount of heavier vehicles. This method usually fails to properly account for heavy traffic using local roadways. Heavy vehicles produce much more damage than do automobiles. For example, a fully loaded tractor-trailer will cause thousands of times more damage than a car. Therefore, failing to account for heavy truck traffic can result in the design of structurally inadequate pavements. A typical subdivision street may be exposed to different types of heavy vehicles including: school buses in the morning and afternoon; if private trash haulers are used - several trash collection trucks from different companies may drive down a street on a single day; building supply delivery trucks - especially during the construction phase (many times significant base material damage is done, but the damage is never properly corrected); and large moving vans. If the street serves as a shortcut to places such as a school or industrial park, these numbers may go up significantly. For subdivision streets, accounting for damage caused by construction vehicles is crucial. Many times, a majority of the truck traffic that a pavement will experience during its initial design life occurs in the construction phase prior to placement of the final wearing course. This can accelerate the deterioration because the pavement is not at full strength. Although most agencies will require the"worst" areas to be patched, the remaining portion of the pavement may have lost a significant portion of its remaining life. This can result in early failure of the pavement which now becomes a financial burden for the tax-payers.Anything short of complete removal of the asphalt layer in this street will ensure a quick failure of the final wearing course.

2. Soil conditions. Soil conditions can vary greatly from one end of a municipality to the other, as well as, from one end of a street to the other. Since the load carrying (support) capability and moisture susceptibility of the soil can greatly affect the long term performance of the pavement, the variability of soil types and characteristics must be addressed. Minimum subgrade characteristics and soiltesting requirements should be specified in the design requirements. Also, specifications must adequately address how to deal with unexpected soil conditions. A six-month old pavement failed because the soft/wet subgrade problem was not properly addressed.

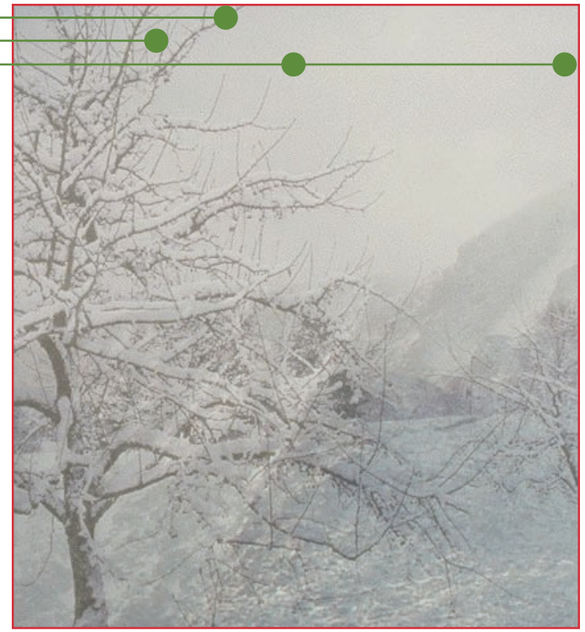
3. Drainage. Proper drainage is essential to the long-term performance of any pavement. Even when the best materials and construction practices are used in building or maintaining a road, if the drainage is poor, the life of the pavement will be much less than expected. Excessive moisture in the granular courses and the subgrade beneath the pavement surface causes damage in several ways, including:

i. Weakening of the Support Layers. Moisture in the soil reduces the internal friction between soil particles which lowers the shear strength of the soil. If the soil moisture is high, especially for long periods of time, the pavement could be severely damaged. Pavements rely on the lower layers to provide a stable, uniform support for the surface layers. When the lower layers are weakened by excessive moisture, they cannot adequately support the surface layers. This loss of support allows the surface layers to flex excessively, resulting in premature failure of the pavement.

ii. Spring Thaw. In northern regions that experience deep freezing, frost heave can be a problem. In warmer areas such as Delaware that experience freezing but not deep freezing, spring thaw can be a more serious problem. In the spring, when the ice lenses in the "frost layer" melt, the trapped water weakens the supporting soil layers. This is the reason why the formation of potholes is typically the greatest during late winter and/or early spring.

iii. Expansive Soils. Soils that are susceptible to shrinkage and swelling will experience significant changes in volume when moisture is allowed to accumulate. This change in volume can cause extensive damage to pavements. Shrinkage will result in loss of support for the pavement layers. Swelling will generate upward forces creating a heaving effect similar to frost heave. In areas where wet subgrades can be a problem, the use of a permeable drainage layer and an underdrain system should be considered. Removing weak soils and/or the use of geosynthetics can also help greatly.

By: Alan S. Kercher, P.E.- T2 Center Consultant



Winter Road Maintenance System May Enhance Road Management

Managing roads and traffic during winter emergencies can be difficult. Weather conditions change so quickly that traffic and roadway managers sometimes find themselves reacting to situations that have already changed or that they were unable to anticipate. Currently, several road weather technologies exist at national laboratories that can aid state and local weather and traffic managers; however, these new technologies are neither integrated nor tailored to support weather-based road maintenance decisions.

To solve these problems and other problems affecting winter road maintenance decisions, the Federal Highway Administration (FHWA) is leading the development of the Winter Maintenance Decision Support System (MDSS)—a computer system that integrates existing road and weather data sources into one functional platform.

The MDSS will make existing winter weather and road information open, integrated, and understandable, allowing traffic and road managers to better maintain roads during winter emergencies. The system will also anticipate changes in winter conditions, and provide a decision support tool that recommends the best course of action for road maintenance. Upon completion, the MDSS will enable traffic managers to effectively coordinate snow-removal, emergency response, and rescue vehicles. It will also enable managers to be proactive in clearing or closing roads for greater safety.

Slated for a multi-year study, the first phase of the MDSS project concluded in fiscal year (FY) 2001. It was dedicated to working with six national labs—the Cold Regions Research and Engineering Laboratory (CRREL), the National Center for Atmospheric Research (NCAR), the Massachusetts Institute of Technology-Lincoln Laboratory (MIT/LL), the National Severe Storms Laboratory (NSSL), Environmental Technology Laboratory (ETL), and the Forecast Systems Laboratory (FSL)—in developing a prototype MDSS.

The focus of the work being conducted in Phase II is to develop and demonstrate a functional prototype MDSS. MDSS researchers also hope to evaluate the operation of selected components of the prototype. The MDSS researchers met recently in Boulder, CO, where they selected four States—Minnesota, Utah, New Hampshire, and Washington—to help evaluate the prototype graphical user-interface (GUI); in 2002, they plan to continue monitoring the design of the GUI and system-user interactions with it. Over the course of the next few years, FHWA will build off this work, aiding in the implementation of the MDSS in an operating environment among State Departments of Transportation and the private sector.

An internal review of the MDSS project will be held in April to determine the progress and merits of continuing the project toward completion.

Rudy Persaud - (202) 493-3391

21 TIPS FOR SAFE BACKING

1. Safe driving is mostly *attitude - attitude - attitude*
2. Put macho, ego and humility in the glove box and leave them there
3. Park and back defensively
4. When in doubt - don't back up
5. Position yourself so you don't have to back up if possible
6. Don't back up if you don't have to
7. While backing, you will always have a blind spot
8. Every backing situation is different
9. Plan backing to back the minimum distance possible
10. Back toward the drivers side of the truck if possible
11. Get out and look prior to backing
12. Check for all types of obstacles - including overhead
13. Back immediately after checking
14. If you don't have a back-up alarm, sound your horn before backing, and periodically while backing
15. Continually check mirrors on both sides while backing
16. Use a spotter if possible
17. Eliminate noise and distractions while backing (open window, cease irrelevant conversation, turn down: radios, CB's, stereos, etc.)
18. Back slowly in the lowest gear possible
19. Start backing from a proper position
20. Back into parking lot spaces; so you can drive out, or better yet, drive through; so you are facing out
21. When parallel parking, leave enough room in front; so you don't have to back up when exiting

FHWA Resource Center
SAFETY & DESIGN TEAM

PEDSAFE

Problem: Walking frequently has been overlooked in the quest to build sophisticated transportation systems. The tools available in the *Pedestrian Safety Guide and Countermeasure Selection System (PEDSAFE)* are designed to enable practitioners to effectively select and review engineering, education, or enforcement treatments to mitigate a known crash problem or to help change motorist and/or pedestrian behaviors.

Putting It In Perspective
- In 2003, 4,749 pedestrians were killed and approximately 70,000 were injured in traffic crashes in the United States.

Solution: Provide practitioners with the latest information available for improving the safety and mobility of those who walk

PEDSAFE is an online system designed to assist practitioners with the selection of countermeasures to address pedestrian safety and mobility problems. It is the next generation of the FHWA report titled Pedestrian Facilities User Guide-Providing Safety and Mobility (FHWA-RD-01-102). PEDSAFE is available in hard copy or on CD-ROM.

The PEDSAFE system includes several interactive tools and is designed to:
- Provide information on the countermeasures available for preventing pedestrian crashes and/or improving motorist and pedestrian behavior.
- Highlight the purpose, considerations, and cost estimates associated with each countermeasure.
- Provide a decision process to select the most applicable countermeasures for a specific location.
- Provide links to case studies showing the various treatments and programs implemented in communities around the country.
- Provide easy access to resources such as statistics, implementation guidance, and reference materials.

The PEDSAFE system
The Pedestrian Safety Guide and Countermeasure Selection System is intended to provide practitioners with the latest information available for improving the safety and mobility of those who walk. The online tools provide the user with a list of possible engineering, education, or enforcement treatments to improve pedestrian safety and/or mobility based on user input about a specific location.

Successful Applications
This project is new, with no known applications to date.

Deployment Statement
Information on PEDSAFE is detailed in a one-page flyer (FHWA-SA-05-001) that can be distributed at conferences and other events.

Deployment Goal
Localities use the PEDSAFE countermeasure selection system to develop and implement potential countermeasures and solutions to help solve their crash problems.

Deployment Status
As of December 2005, all hard copies of PEDSAFE had been distributed. FHWA, however, is in the process of printing 2,500 additional copies, which should be available by March 1, 2006. In addition, as of December 2005, approximately half of the 5,000 PEDSAFE CD-ROMS had been distributed.

Additional Resources
For more information on pedestrian safety. http://safety.fhwa.dot.gov/ped_bike/ped/index.htm

For additional information, contact:
Tamara Redmon, FHWA Office of Safety
Phone: 202-366-4077
E-mail: tamara.redmon@fhwa.dot.gov
Aida Berkovitz, FHWA Resource Center
Phone: 415-744 -2614
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E-mail: tamara.mccrae@fhwa.dot.gov

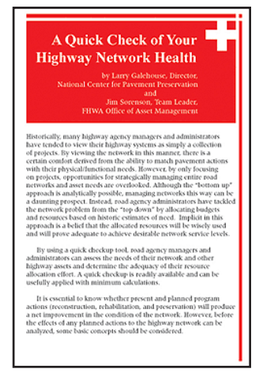
Checking Your Highway Network's Health

How healthy is your pavement network? Are you using your funds strategically to achieve the most value for your highway expenditures? How much will your system deteriorate if you defer preservation work?

A new brochure available from the Federal Highway Administration (FHWA) and the National Center for Pavement Preservation (NCPP) offers highway agencies guidance on strategically managing their entire pavement networks, asset needs, and available budgets. In the past, agencies allocated budgets and resources based on historic estimates of need and equitable distribution. A Quick Check of Your Highway Network Health (Publication No. FHWA-IF-07-006) provides a tool for highway agency managers to assess the needs of their pavement networks and determine the adequacy of their resource allocations. This tool generally uses information at hand or data generated by the agency's management systems.

The simple checkup tool examines the effect of current planned reconstruction, rehabilitation, and preservation work on pavement life and deterioration and provides agencies with information sufficient to either improve network condition or maintain the status quo by preventing further deterioration. For example, an agency would first evaluate reconstruction and rehabilitation work by examining the lane miles, design life, and lane-mile cost for each proposed project or planned strategy. Pavement preservation treatments would then be evaluated by examining the life extension offered by the treatment. These less costly treatments, including concrete joint resealing, thin hot-mix asphalt overlays, microsurfacing, chip seals, crack seals, and others can extend the life of roads in good condition. The agency can then decide how best to allocate funds among reconstruction, rehabilitation, and preservation to achieve the greatest improvement in its overall network condition. "Integrating reconstruction, rehabilitation, and preservation in the proper proportions will substantially improve network conditions for the taxpayer while safeguarding the highway investment," says Larry Galehouse, Director of the NCPP. The checkup tool approach allows decisionmakers to see the effects of resource allocations on the health of their pavement networks. "It is about managing the system condition with the budgets provided or demonstrating the need for additional funds," says Jim Sorenson of FHWA's Office of Asset Management.

To obtain a copy of the brochure or for more information on the quick check-up tool, contact Joe Gregory at FHWA, 202-366-1557 (email: joseph.gregory@fhwa.dot.gov), or the National Center for Pavement Preservation at 517-432-8220 (email: ncpp@egr.msu.edu). Information is also available at http://wwwcf.fhwa.dot.gov/exit.cfm?link=http://www.pavementpreservation.org.



A Quick Check of Your Highway Network Health publication cover

CURRENTLY SCHEDULED COURSES FOR 2007

The following courses have already been scheduled for 2007. More classes are also being added on a regular basis. Act now to make sure that you or your constituents get a seat before they fill up! For more information or to schedule a class call Janette Prince at (301) 403-4623 or visit our website at http://www.ence.umd.edu/mdt2center.

ACCESS MANAGEMENT

April 17-18, 2007, 8:00 am – 4:00 pm
Dane Ismart
College Park, MD
$195 Maryland Local Government
$275 Maryland State Government
$295 Federal/Private/Out-of-State
CEU's: 1.2

Traffic engineers have long recognized that eliminating unexpected events and separating decision points simplifies the driving task. Since access control reduces the number, complexity, and spacing of events to which the driver must respond, it results in improved traffic operation and reduces accidents. Other benefits include reduced delay, improved traffic flow, increased capacity, and improved fuel economy. This course covers not only why, but also how to manage access, from a policy, legal, and design perspective.

ASPHALT ROADS COMMON MAINTENANCE PROBLEMS

April 24, 2007, 8:30 am-12:30 pm
Ed Stellfox
College Park, MD
$25 All Registrants
CEU's: 0.0

Municipal road crews 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.

INTRODUCTION TO TEMPORARY TRAFFIC CONTROL

April 30, 2007, 8:15 am- 4:00 pm
Juan Morales
College Park, MD
$100 Maryland Local Government
$150 Maryland State Government
$175 Federal/Private/Out-of-State
CEU's: 0.0

An introductory course to temporary traffic control (TTC) in work zones, 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.

WORK ZONE DESIGN

May 1-2, 2007, 8:00 am- 4:00 pm
Juan Morales
College Park, MD
$200.00 Maryland Local Government
$275.00 Maryland State Government
$295.00 Federal/Private/Out-of-State
CEU's: 1.2
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. While the functions of planning, design, review, and operation of temporary traffic control are covered in detail, issues concerning safety of pedestrians and highway workers, human factors, and legal responsibility are also addressed.

HIGHWAY CAPACITY ANALYSIS

May 15-17, 2007, 8:15 am – 4:30 pm
Dane Ismart
Linthicum, MD
$250.00 Maryland Local Governments Only
$395.00 Maryland State Government
$430.00 Federal, Private, and Out-of-State
CEU's: 2.2

This course provides a working knowledge on the basics of capacity analysis and the use of the Highway Capacity Manual (HCM) and Highway Capacity Software. The course includes lectures, sample problems. Topics addressed will cover the analysis of a wide range of facilities from freeway systems to signalized and un-signalized intersections. Design issues and their effect on capacity will be covered as well as the major changes in the latest version of the Highway Capacity Software. In this course you will hear how the methodologies were developed.

ASPHALT RESURFACING

May 22, 2007, 8:30 am – 12:30 pm
Ed Stellfox
College Park, MD
$25 all registrants
CEU's: 0.0

This course reviews the various asphalt mixes, their components and their uses. Asphalt resurfacing procedures are covered, including preparation, material, equipment, operation and safety. Special emphasis is placed on proper rolling and compaction of the asphalt overlay. Superpave mix design is discussed.

TORT LIABILITY AND RISK MANAGEMENT

May 22, 2007, 8:30 am – 4:00 pm
Ron Eck
College Park, MD
$50 all registrants
CEU's: 0.0

This workshop provides an overview of the legal duties and responsibilities of roadway personnel. Key legal concepts relating to the liability of roadway agencies are reviewed from a risk management standpoint. Common types of claims/ lawsuits brought against street departments and highway agencies are identified through examples/case studies. Examples include traffic control devices, work zones, roadway and shoulder surface conditions, sight distance, and pedestrian incidents. Risk management principles, aimed at: (1) reducing/preventing crashes and claims and (2) helping agencies defend claims, will be highlighted. Practical risk management activities will be identified.

PEDESTRIAN/BICYCLE ACCOMMODATION

May 23, 2007, 8:30 am – 4:00 pm
Ron Eck
College Park, MD
$95 all registrants
CEU's: 0.0

Many communities in the United States were not designed for pedestrian and bicycle travel. However, today walkability and bikeability are viewed as signs of a livable community and encourage physical activity. The goal is to create an environment that encourages people to walk and bike for transportation, recreation and exercise. This workshop provides current information on the design, operation and maintenance of successful pedestrian and bicycle facilities. Emphasis is placed on making participants aware of the characteristics and needs of pedestrians and bicyclists and on the importance of an interdisciplinary approach to planning and implementing pedestrian and bicycle programs.

TRAFFIC SIGN RETROREFLECTIVITY

May 24, 2007, 8:30 am – 12:30 pm
Ron Eck
College Park, MD
$50 all registrants
CEU's: 0.0

Traffic signs provide an important means of communicating information to road users. They need to be visible to be effective. The nighttime environment presents many sign visibility challenges. Since drivers cannot see as many visual cues as they can during the day, this places greater reliance on signs and other traffic control devices. To provide nighttime sign visibility, most signs are made from retroreflective sheeting. Retroreflectivity is the property of a material that re-directs light back to the originating source. Since the retroreflective properties of signs deteriorate over time, road and street officials should assess their schedules for inspecting, cleaning and replacing signs to ensure that these maintenance activities meet the objectives of the Manual on Uniform Traffic Control Devices and, more importantly, the needs of drivers at night. This workshop will help practitioners gain a better understanding of sign retroreflectivity issues in order to improve the overall nighttime visibility of traffic signs.

STORM SEWER SYSTEMS & PAVEMENT DRAINAGE

May 31-June 1, 2007, 8:30 am – 4:30 pm
Brian Roberts
College Park, MD
$250.00 Maryland Local Governments Only
$295.00 Maryland State Government
$325.00 Federal, Private, and Out-of-State
CEU's: 1.4

This two day course provides students with a thorough knowledge of surface pavement drainage design and hydraulic design of storm sewer systems. The course includes a brief review of hydrology for pavements, detailed information on sizing curb open inlets, grates, and curb and gutter flow. One day is spent on sizing storm sewers, computing energy losses and hydraulic grade line calculations. Example problems are performed using nomographs and calculators (bring your calculator!)

SITE IMPACT ANALYSIS

June 6-7, 2007, 8:00 am – 4:00 pm
Dane Ismart
Linthicum, MD
$200.00 Maryland Local Government
$275.00 Maryland State Government
$325.00 Federal, Private, and Out-of-State
CEU's:1.2
Participants will learn the standard techniques for estimating the traffic impacts of both small and large site developments. Content includes procedures for land use forecasting, trip generation, trip distribution and assignment, site impact layout design, and level of service designation. The workshop will be conducted with manual procedures, but computer software packages suitable for site impact will also be demonstrated.

UNPAVED & GRAVEL ROAD MAINTENANCE

June 14, 2007, 8:30 am – 12:30 pm
Ed Stellfox
College Park, MD
$25 all registrants
CEU's: 0.0

This course addresses basic maintenance techniques for unpaved and gravel roads. Topics include road materials, blading or dragging, reshaping or regrading for proper crown, regravelling, stabilization or full-depth reclamation, and dust control, with an introduction to road management techniques.

BRIDGE MAINTENANCE INSPECTION

June 18, 2007, 8:30 am – 3:30 pm
Dane Ismart
College Park, MD
$75 Maryland Local Government
$95 All Other Registrants
CEU's: 0.0

This course emphasizes the importance of good drainage with discussions of water and its effects on roads, problems caused by improper drainage, and ways to handle these problems. It covers types of drainage facilities, ranging from ditches, culverts and subdrains to inlets and end structures, their uses, materials, installation, and maintenance. It also introduces geosynthetics for drainage applications.

CONSTRUCTION INSPECTION FOR LOCAL AGENCY EMPLOYEES

June 19, 2007, 8:30 am – 3:30 pm
John Hopkins
College Park, MD
$75 Maryland Local Government
$95 All Other Registrants
CEU's: 0.0

This one day session will cover some of the major duties and responsibilities of an individual responsible for the quality of a project. It will address the importance of understanding the plans, the contract, the order of operations, the materials to be used and the various quality control tests used in project inspection. This course is presented in a straight forward manner and deals with the reality of everyday factors involving contractors and agencies.

INTERMEDIATE CONSTRUCTION INSPECTION

June 20-21, 2007, 8:30 am – 4:00 pm
John Hopkins
College Park, MD
$150 MD Local Government
$175 MD State Government
$195 Federal/Private/Out-of-State
CEU's: 1.2
An intermediate class focusing on the construction, inspection, measurement and testing of materials associated with road way construction. Includes real-life scenarios and problems faced on the job, and covers general practices and MD standards.

ASPHALT RECYCLING

July 11, 2007, 8:30 am – 12:30 pm
Ed Stellfox
College Park, MD
$50 all registrants
CEU's: 0.0

This course discusses the advantages of asphalt recycling as part of your road maintenance program. It covers techniques for recycling asphalt pavement, including surface recycling, hot mix recycling, and cold mix recycling. The course emphasizes cold mix recycling, full depth reclamation, reviewing materials, equipment and operations. It also presents recent examples of asphalt recycling projects in several states.

TRAFFIC ENGINEERING SHORT COURSE

July 16-20, 2007, 8:30 am – 4:00 pm
Mr. Joseph Cutro
Mr. Tom Hicks
Mr. Woody Hood
Mr. Dane Ismart
Mr. Gerry Alexander
Mr. Wamahdri Williams
Mr. Rick Hawthorne
Linthicum, MD
$300 MD Local Government
$650 MD State Government
$700 Federal/Private/Out-of-State
CEU's: 3.5

This five-day short course covers many aspects of traffic engineering, including design, data analysis, operation and management. Also, related factors, such as road use characteristics, public influence and traffic calming are addressed in the class. The course is designed for persons with an engineering background and/or traffic engineering responsibilities in a

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related field. Junior level traffic engineers, transportation planners, highway designers, city/county engineers without traffic engineering background, and possibly some experienced traffic technicians will benefit from the class. Materials include a student workbook and "Fundamentals of Traffic Engineering," a publication by ITS, Berkley.

INTERSECTION DESIGN & ANALYSIS
August 6-7, 2007, 8:30 AM - 4:30 PM
Dane Ismart

College Park, MD
$100 Maryland Local Government Only
$150 Maryland State Government
$175 Federal, Private, and Out-of-State
CEU's: 1.2

This course will have broad general coverage of at-grade intersection analysis and design features. The analysis will include signalized, unsignalized and roundabout intersections. Specific coverage will include capacity analysis, signal warrants, queue analysis and safety selected design features. Software packages such as HCS, CIDRA and RODEL will be demonstrated.

WINTER MAINTENANCE
August 6, 2007, 8:30 AM - 3:00 PM
Ed Stellfox
College Park, MD
$50 All Registrants
CEU's: 0.0

This course covers all aspects of winter operations - planning and organizing, methods of snow and ice control, salt usage, and winter equipment maintenance. Lesson will include usage of snow maps and formal snow plans.

CONSTRUCTION MATHEMATICS
August 9, 2007, 8:30 AM - 3:00 PM
Ed Stellfox
College Park, MD
$50 All Registrants
CEU's: 0.5

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 is a good refresher, and excellent preparation for the Construction Inspection class.

STRATEGIES FOR IMPROVING HIGHWAY SAFETY
August 21-22, 2007, 8:15 AM - 4:00 PM
Juan Morales
College Park, MD
$200 Maryland Local Government Only
$275 Maryland State Government
$295 Federal, Private, and Out-of-State
CEU's: 1.2

To acquaint the participants with the options available to improve traffic safety and save lives. The 2-day course will examine the causes behind highway crashes and actions that can be taken to improve safety. This course provides a comprehensive overview of engineering, education and enforcement strategies available to improve highway safety.

BICYCLE DESIGN AND PLANNING
September 18, 2007, 8:30AM - 4:00 PM
Dane Ismart
Linthicum, MD
$95 All Registrants
CEU's: 0.0

Many communities in the United States were not designed for pedestrian and bicycle travel. However, today walk-ability and bike-ability are viewed as signs of a livable community and encourage physical activity. The goal is to create an environment that encourages people to walk and bike for transportation, recreation and exercise. This workshop provides current information on the design, operation and maintenance of successful pedestrian and bicycle facilities. Emphasis is placed on making participants aware of the characteristics and needs of pedestrians and bicyclists and on the importance of an interdisciplinary approach to planning and implementing pedestrian and bicycle programs.

ROUNDABOUT PLANNING AND DESIGN
September 19, 2007, 8:15 AM – 4:00 PM
Dane Ismart
Linthicum, MD
$75 Maryland State Government
$95 Federal, Private, and Out-of-State
CEU's: 0.0

This one-day workshop will provide participants with an introduction to the planning and design of the modern roundabout. Topics covered in the roundabout course will include geometric design, signing, striping, safety, and accommodation of pedestrians and bicyclists.

An important component of the course will be a discussion of the advantages and disadvantages of roundabouts. SIDRA and Rodel software packages will be demonstrated to the class participants and used for capacity and operational analysis of roundabouts. The basic structure of the course will be built around the FHWA Report, "Roundabouts: An Informational Guide". Maryland's Roundabout Guide will also be discussed and included as part of the course.

INTRODUCTION TO GEOSYNTHETICS
October 9, 2007 8:30 – 12:30 PM
Ed Stellfox
College Park, MD
$25 All Registrants
CEU's: 0.0

This course is an introduction to geosynthetics, beginning with a discussion of geosynthetics, what they are, how they are made and how they can be used in a road maintenance program. The course then looks at other geosynthetics and their road system uses, including geogrids, geocells and geowebs, presenting new materials with new applications.

SIGNAL WARRANT & INTERSECTION CONTROL ANALYSIS
October 16, 2007, 9:00 AM – 4:30 PM
Dane Ismart
College Park, MD
$95 Maryland Local Government Only
$125 Maryland State Government
$150 Federal, Private, and Out-of-State
CEU's: 0.0

This course will cover the eight MUTCD signal warrants:
Warrant 1: Eight-Hour Vehicle Volume
Warrant 2: Four-Hour Vehicular Volume
Warrant 3: Peak Hour
Warrant 4: Pedestrian Volume
Warrant 5: School Crossing
Warrant 6: Coordinated Signal System
Warrant 7: Crash Experience
Warrant 8: Roadway Network

The course will also cover warrants for four-way stops as well as alternatives to traffic control signals. A detailed discussion of the advantages and disadvantages both in the terms of capacity and safety of various types of traffic controls will be presented. The basis for both the installation and the removal of traffic control devices will be covered.

As part of the course, workshop problems will be given to the class participants. The class will be provided intersection field data and will determine if signals are warranted for the sample intersections. After completing the workshops, MUTCD signal warrant analysis software will be demonstrated and the workshop problems will be evaluated based on microcomputer analysis.

PRIORITY TECHNOLOGIES AND INNOVATIONS LIST (CONT.)

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Pavement Smoothness Methodologies—The new pavement smoothness specification covers smoothness test methods, smoothness equipment specifications, and equipment certification programs.
Contact:
Mark Swanlund, 202-366-1323. Mark.Swanland@fhwa.dot.gov
Bob Orthmeyer, 708-283-3533. Bob.Orthmeyer@fhwa.dot.gov

PedSafe—An online, interactive system that allows users to "diagnose" a pedestrian-related issue based on site characteristics and formulates potential solutions to improve conditions for pedestrians within the public right-of-way.
Contact:
Tamara Redmon, 202-366-6595. Tamara.Redmon@fhwa.dot.gov

Prefabricated Bridge Elements and Systems*—These systems minimize traffic impacts of bridge construction projects, improve construction workzone safety, and make construction less disruptive for the environment by minimizing the needed lane closures, detours, and use of narrow lanes.
Contact:
Vasant Mistry, 202-366-4599. Vasant.Mistry@fhwa.dot gov,
Shoukry Elnahal, 410-962-3648. Shoukry.Elnahal@fhwa.dot.gov

QuickZone—A user-friendly computer software tool for estimating and analyzing length of queues and delays in work zones.
Contact:
Tracy Scriba, 202-366-0855. Tracy.Scriba@fhwa.dot.gov
Daniel Grate, 404-562-3912. Daniel.Grate@fhwa.dot.gov

Red Light Cameras—The traditional enforcement of violations for running red lights is automated by using camera systems at light-controlled intersections that detect an offending motorist, capture an image of the license plate, and issue a citation by mail.
Contact:
Louisa Ward, 202-366-2218. Louisa.Ward@fhwa.dot.gov
Craig Allred, 720-963-3236. Craig.Allred@fhwa.dot.gov

Road Safety Audits*—Improve transportation safety using an independent audit team to conduct a formal safety performance examination of an existing or future road or intersection.
Contact:
Louisa Ward, 202-366-2218. Louisa.Ward@fhwa.dot.gov
Craig Allred, 720-963-3236. Craig.Allred@fhwa.dot.gov

Roundabouts—A circular intersection that requires entering vehicles to yield to existing traffic in the circulatory roadway.
Contact:
Clayton Chen, 202-366-4656. Clayton.Chen@fhwa.dot.gov
Joe Bared, 202-493-3314. Joe.Bared@fhwa.dot.gov,
Fred Ranck, 708-283-3545. Fred.Ranck@fhwa.dot.gov

Rumble Strips—Shoulder rumble strips are continuous grooved indentations in roadway shoulders that provide both an audible warning and a physical vibration to alert drivers that they are leaving the roadway.
Contact:
Dick Powers, 202-366-1320. Dick.Powers@fhwa.dot.gov
Frank Julian, 404-562-3689. Frank.Julian@fhwa.dot.gov

Transportation, Economics, and Land Use System (TELUS)—This information-management and decision-support system helps State DOTs and metropolitan planning organizations prepare their annual transportation improvement programs and statewide transportation improvement programs.
Contact:
Bruce Spears, 202-366-8870. Bruce.Spears@fhwa.dot.gov,
Ed Christopher, 708-283-3534. Ed.Christopher@fhwa.dot.gov

http://www.fhwa.dot.gov/crt
http://www.fhwa.dot.gov/resourcecenter/misc/technology.cfm

(*) Demotes an American Association of State Highway Transportation Officials (AASHTO) Technology Implementation Group approved technology.

INTRODUCTION TO TEMPORARY TRAFFIC CONTROL
October 29, 2007, 8:15 am- 4:00 pm
Juan Morales
College Park, MD
$100.00 Maryland Local Government
$150.00 Maryland State Government
$175.00 Federal/Private/Out-of-State
CEU's: 0.0
An introductory course to temporary traffic control (TTC) in work zones, 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.

WORK ZONE DESIGN
October 30-31, 2007, 8:00 am- 4:00 pm
Juan Morales
College Park, MD
$100.00 Maryland Local Government
$150.00 Maryland State Government
$175.00 Federal/Private/Out-of-State
CEU's: 1.2

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. While the functions of planning, design, review, and operation of temporary traffic control are covered in detail, issues concerning safety of pedestrians and highway workers, human factors, and legal responsibility are also addressed.

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.