Pavement Preservation Program

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Connecticut Department of Transportation

The Connecticut Department of Transportation has recently implemented a Pavement Preservation Program. Pavement Preservation aims to extend the life of existing structurally sound pavements through the application of appropriate treatments at the opportune time such that the benefit-to-cost ratio for maintaining the serviceability of the State's pavements is optimized.

BACKGROUND

Momentum for pavement preservation in Connecticut was generated in July 2006 with a Technical Assessment visit by the Federal Highway Administration’s (FHWA) Office of Asset Management and the National Center for Pavement Preservation. A working group of key Department personnel was formed in August 2006 with members from Staff and District Maintenance, Pavement Management, Asset Management and the FHWA Division office. These individuals have adopted a plan, with FHWA concurrence, for implementing pavement preservation in our state. The plan is based on the need to use a program approach to preservation, to develop a “toolbox” of preservation treatments, to establish a robust and objective project-selection process, and to monitor treatment and program performance. In addition, pavement preservation represents a change from addressing roads on a “worst first” basis toward keeping good roads in good condition. This will require education for both Department staff and the general public.

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The T2 Center and CHSSA Host the 2009 Technology Transfer Expo

On September 16, 2009, the Technology Transfer Center and the Connecticut Highway Street Supervisors Association (CHSSA) held the 8th annual Technology Transfer Expo at the University of Connecticut in Storrs. 500 representatives from local and state agencies had the opportunity to visit 53 exhibitors to see the latest in equipment and technology and to participate in technical education sessions and a series of demonstrations on topics including Sander Calibration, 2010 Emissions Standards, Advancements in De-Icing Technology, Stormwater Filtration, 4WD Loader Demonstration and an introduction to the new Work Zone Intrusion Alarm.

Each year representatives from local municipal agencies participate in the Dr. Jack Stephens Memorial Safety Challenge. This competition gives public works employees the opportunity to demonstrate high levels of proficiency in many safety related skills including Work Zone Safety, Flagger Techniques, Trenching and Excavation, Personal Protective Equipment, Sweeper Operation and Backhoe Operation.

For the Town of Colchester, it was a great day, not only did their public works employees demonstrate their knowledge in all of these areas, they also won all three of the top spots. The winners were:

RAY SIKORSKI  
Town of Colchester – Public Works

PATRICK CLARK  
Town of Colchester – Public Works

CHUCK ZINGLE  
Town of Colchester – Public Works

Congratulations to the Town of Colchester!

The winners of the Dr. Jack Stephens Memorial Safety Challenge (from left to right): Town of Colchester – Public Works employees Chuck Zingle, Patrick Clark and Ray Sikorski. Also pictured is Kevin Kelly, Highway Supervisor for the Town of Colchester.
Town of East Lyme Wins the 2009 B.E.S.T. Award

Delivery of services and the operations of public works organizations expand daily. We all, as a discipline, are asked to do more every day, usually with the same or less to work with. The pro’s know that having the right stuff makes the job a lot easier, and a pro knows how to manage his time. A big issue is time; time to get back to the shop for a tool, time to check out a job, time to “switch gears” from paving to a downed tree across a road.

This is the idea behind the BEST competition and award, new this year at the Technology Transfer Expo. BEST stands for Best Equipped Supervisor’s Truck. It may not be the newest, or the shiniest, but the BEST is a foreman’s tool for tackling the many jobs we have to do in a day, day in and day out.

CHUCK HOLYFIELD, FROM THE TOWN OF EAST LYME, WAS THE 2009 BEST AWARD WINNER

So, do you want to know what is in Chuck’s truck?

- First aid supplies, rubber patient gloves, RED bags
- One large “box light” one smaller flashlight
- Extra fuses two types
- Pink ribbon
- White ribbon (allows it to be written on and shows better for general marking)
- Tums, Aspirin and ibuprofen
- Golf balls (2) for determining flow of pipes and road crowns
- ERG, emergency response guide.
- Cell phone charge
- Portable radio and spare battery
- Connecticut map
- Map of surrounding towns
- 2-25’ tape measures one 200’ tape, one 50’ tape measuring wheel, 2 folding rulers
- Metal detector
- Spare pens pencils, note pads.
- Phone book
- Towels paper and cloth
- Rain coat and hat
- Jacket and hats (even in the summer)
- Plow pins large and small also two types of clips
- Trailer light plugs and adapters, trailer hitch balls 1½, 2, 2½ spare hitch lock, spare connector
- Never seize, penetrating oil, misc. nuts washers and bolts. Mechanics wire Electrical tape
- Duct tape, electrical connectors, electrical wire
- Wrenches Metric and US, ¼ socket set, ½ socket set, Allen wrenches torx sockets and bits, screwdrivers all types. Electrical test light
- Spare gloves. Spare hearing muff and plugs. Spare safety glasses, spare rain coat, spare safety vest
- 2 Rolls of caution tape
- Funnel
- Mark out paint and holder
- 15’ tow/lift chain, Tie down straps (2), Bungee cords, Zip ties several sizes. String and string level (1000’) Golf shafts with no head for stakes (12)
- Flares
- Round Long handle shovel, square long handle shovel, Pick, litter picker, litter bags
- Catch basin grate extractor. (long pole with hook)
A Pavement Preservation program consists primarily of three components: preventive maintenance, minor rehabilitation (non structural), and some routine maintenance activities as seen below:

Preventive maintenance is typically applied to pavements in good condition having significant remaining service life. As a major component of pavement preservation, preventive maintenance is a strategy of extending the service life by applying cost-effective treatments to the surface or near-surface of structurally sound pavements. Examples of preventive treatments include asphalt crack sealing, chip sealing, slurry or micro-surfacing, thin and ultra-thin hot-mix asphalt overlay, concrete joint sealing, diamond grinding, dowel-bar retrofit, and isolated, partial and/or full-depth concrete repairs to restore functionality of the slab; e.g., edge spalls, or corner breaks.

Routine maintenance consists of day-to-day activities that are scheduled by maintenance personnel to maintain and preserve the condition of the highway system at a satisfactory level of service. Examples of pavement-related routine maintenance activities include cleaning of roadside ditches and structures, maintenance of pavement markings and crack filling, pothole patching and isolated overlays. Crack filling is another routine maintenance activity which consists of placing a generally, bituminous material into “non-working” cracks to substantially reduce water infiltration and reinforce adjacent top-down cracks.

**PAVEMENT PRESERVATION PROGRAM ACTIVITIES**

Program implementation has begun with the development of a project-selection process for thin hot-mix asphalt (HMA) surface overlays on limited-access roadways as follows:

1. *Pavement condition data (roughness, rutting, and cracking) are examined and distress criteria are established for development of a prioritized preliminary list of candidate projects.*

2. *A photolog review of selected roadway segments is conducted to identify major geometry or safety issues, to adjust project termini, and to verify condition data.*

3. *A review is conducted by District Maintenance planners to identify potential conflicts with planned maintenance activities or permit projects.*

4. *Field verification of the resulting projects is conducted.*

Scoping will include a safety assessment to comply with FHWA guidance regarding preservation project eligibility. This will be a priority as the timing of preservation treatments is essential to their success and selected projects have to be completed in the 2009 construction season. Following the safety assessment and field verification, the resulting list of projects will be submitted to FHWA for approval. Inspection on these projects will be administered by the Office of Construction.

**Town of Norwich** - Route 2 Eastbound, from Log mile 37.03 to 38.18 (1.15 miles). (Milling and paving with 1.5 inches Superpave 0.375 inch Design Level 3.)

**Town of Bozrah** - Route 2 Westbound, from Log mile 31.68 to 35.19 (3.51 miles). (Milling and paving with 1.5 inches Superpave 0.375 inch Design Level 3.)

**Town of Montville** - Route 2A Eastbound, from Log mile 4.67 to 6.34 (1.67 miles). (Milling and paving with 1.5 inches Superpave 0.375 inch Design Level 3.)

**Towns of Montville & Waterford** - Route 693 Northbound and Southbound, from Log mile 0.00 to 1.41 mile (1.41 miles). (Milling and paving with 1.5 inches Superpave 0.375 inch Design Level 3.)

It is anticipated that this pavement preservation effort will develop into a $10 million to $12 million per year program.

**CONTINUING IMPLEMENTATION**

While the first treatment in this program will be a thin surface overlay, the working group has been also completed specifications for crack sealing and rubber chip sealing as additional components of a pavement preservation program. The project-selection process will be further refined to include traffic-volume considerations in project prioritization. Pavement Management will be tracking the performance of the program and reporting their findings annually.

Pavement Preservation is only one component of an integrated Pavement Management System. Other necessary components include the annual Vendor-In-Place (VIP) resurfacing program, a program for major rehabilitation and/or reconstruction, and a system for maintaining serviceability of pavements until a major rehabilitation project can be completed. The current VIP paving program alone cannot address the backlog of paving needs.

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This Pavement Preservation Program (PPP) can extend the life of existing pavements through the application of the right treatment at the right time on the right roadway. This will assure that the benefit-to-cost ratio for maintaining the serviceability of the pavement is optimized. Pavement preservation assumes that the structural condition of each pavement is sound, i.e. distress exhibited is minimal.

**VISION STATEMENT**

The PPP will be integrated with the Department’s PMS and, by extension, to its Asset Management System, so that upon implementation the agency will have the ability to implement asset-management principles in its pavement-preservation decisions. Pavement preservation represents a business process that crosses functional lines; as such, coordination and integration—among the Asset Management Unit, the individual program management system (Pavement Management Unit), and the offices responsible for the execution of the program (Construction and Maintenance)—will be a key to its success.

A PPP will encompass all structurally sound, rehabilitated, reconstructed, or newly constructed pavement segments. The PPP will first estimate, then validate, strategies for extending pavement life economically through the application of preservation treatments. The PPP will identify pavement failure modes and treatments to prevent—or mitigate—the progression of these failure modes. Although initially based on existing state-of-the-practice, the effectiveness of each treatment will be judged through life-cycle cost analysis and pavement-performance monitoring on an annual basis.

**GUIDING PRINCIPLES**

1. The PPP consists of appropriate strategies to extend the time to future rehabilitation for all eligible pavement structures while providing adequate serviceability. By extending pavement life through timely and cost-effective interventions to maintain pavement condition, Pavement Preservation is an important component of a strategy to optimize funds for pavement investments over the long term.

2. Pavement preservation is to be approached from a network level, so that strategic decisions are made at the program level and their impact can be estimated and eventually measured.

3. Life-cycle cost analysis is the basis on which the performance of the preservation strategies are forecast, validated, and/or judged.

4. The PPP will be implemented in the context of broader management systems such as pavement management and safety management. This means that “strategy accounting” will be key among the programs. Pavement segments that fall out of one program will fall into another within this larger context.

5. A funding source will need to be secured for each treatment.

6. Participation in the regional Pavement Preservation Partnership provides technical resources to address region-specific pavement-preservation needs.

7. Performance Measures specific to roadway condition will be essential to ensure the necessary accountability for a PPP.

8. In order to provide a sustainable program, each rehabilitated pavement, reconstructed, or newly constructed pavement should enter a PPP. This means proper documentation is essential as well as a proactive approach to achieving extended life through:
   a. Evaluation of construction quality;
   b. Monitoring of condition;
   c. Selection of preservation treatment based on failure mode(s);
   d. Timely application of appropriate preservation treatments.

Role of Pavement Preservation within CT DOT’s Pavement Management System

The Department’s PMS has two major components; a database component and the management system proper. The roadway database is based on the network definition provided by Planning, Inventory, and Data (PID), and, along with planning data (traffic volumes, functional classification, political boundaries, road configuration and dimensions, and so on), it contains pavement condition data collected by the Division of Research (roughness, rutting, cracking, geometrics), Materials Testing (material properties), Maintenance (project limits), and Construction (material properties and project limits).

The management system proper, currently being implemented, utilizes pavement segments (analysis units) as the basis on which to analyze pavement performance and evaluate the cost-effectiveness of programmatic decisions over the long term.

PMS’s are designed to optimize the use of pavement funds to achieve stated goals in the pavement condition of the network over the medium-to-long term (5 to 10 years). Although this definition does not include capital improvements (facility expansion), it is sufficiently broad to encompass reconstruction, rehabilitation, preservation, and temporary repair options. (Note that although preservation typically includes preventive maintenance activities, routine maintenance is not included.) The interplay of these four major components is especially important since there are significant associated financial and economic impacts.

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FOUR COMPONENTS OF AN INTEGRATED PAVEMENT MANAGEMENT SYSTEM:

- **Pavement Reconstruction** is the replacement of the entire existing pavement structure by the placement of the equivalent or increased pavement structure. Reconstruction usually requires the complete removal and replacement of the existing pavement structure. Reconstruction is required when a pavement has either failed or has become functionally obsolete.

- **Rehabilitation projects** extend the life of existing pavement structures either by restoring existing structural capacity through the elimination of age-related, environmental cracking of embrittled pavement surface or by increasing pavement thickness to strengthen existing pavement sections to accommodate existing or projected traffic loading conditions.

- **Preservation** aims to extend the life of existing structurally sound pavements through the application of appropriate treatments at the right time. These treatments are usually applied at the surface or near the surface and are not designed to address structural needs but rather to protect the integrity of the existing pavement.

- **Temporary repair projects** provide short-term pavement serviceability while deferring the appropriate treatment (usually reconstruction) when there is a higher cost-benefit ratio obtained by using the reconstruction to accommodate funding elsewhere. They also hold a pavement together when there is an early failure or an unforeseen event that has caused premature distress (oil spills, etc.).

These four components do not exist in isolation, but present significant interaction; optimizing the use of pavement funds at the network level requires decisions among these major components at the individual project level.

Decisions on one of these four programs impact the others; for instance, the decision to reconstruct a pavement segment should trigger a programmatic preservation action sometime in the future. On the other hand, the decision not to reconstruct but to temporarily repair a pavement segment today constitutes a deferment of the reconstruction, not a change in scope. Additionally, properly managing these pavement assets requires “strategy accounting,” that is, identifying when pavement segments fall out of one program and into another.

Proper documentation of this process will provide an indication of performance and lead to the establishment of program-performance benchmarks/measures. A feedback cycle with pavement condition data and treatment-cost data will allow the optimization of the program over the medium to long term.
Special Thanks to the 2009 Technology Transfer Expo Exhibitors

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Vivian Castelli, T2 Center staff, gets a birds eye view of the Expo, thanks to CUES, Inc.
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