Delaware T² Center

TRAVEL-LOG

Volume XIV Issue 1 Spring/Summer 2004

T² Center Staff

Dr. Ardeshir Faghri
Director, Delaware Center for Transportation

Larry Klepner
T² Program Coordinator

Alan Kercher, P.E.
T² Engineer

Wanda Taylor
Program Assistant

Sandi Wolfe
Secretary

University of Delaware Engineering Outreach

Kathleen Werrell
Assistant Dean

Joe Tanner
Coordinator

DelDOT Liaison

Dan LaCombe
Research Coordinator

Federal Highway Administration Liaison

Rosemary Samick
Transportation Specialist

Important Telephone Numbers

T² Center:
302-831-6241
Fax: 302-831-0674

Workshop Registration Information: 302-831-8302

Kercher Engineering, Inc.
302-894-1098
Fax: 302-894-1099

Preventive Maintenance – Part 3

Successful Implementation of a Pavement Preservation Program

Written by: Alan S. Kercher, P.E.
T² Center Consultant

This is the third part in a three part series about preventive maintenance for pavements. We practice preventive maintenance in our everyday lives and possibly with municipal equipment such as dump trucks and backhoes, but when it comes to maintaining our roadways, most agencies will always defer repairs until the pavements have failed, resulting in very expensive repairs. This article will provide some guidance to help an agency make the switch from a reactive " worst-first" mentality to a pro-active "best-first" approach.

Although it is a fact that pavement preservation is the most cost-effective long term method of managing a pavement network, few local agencies have successfully implemented such a program. Success requires that an agency implement the 3R's approach. This will require the decision-makers to have a solid knowledge base concerning the current condition of the pavements and the long-term consequences associated with different levels of funding. Additionally, all pavement improvement projects must be designed and constructed properly. In order to gain support of the community at large, the public must be educated as to why pavement preservation is the best long-term approach to managing any pavement network.

I. The 3 R's: The Right Treatment at the Right Place at the Right Time

For any pavement preservation program to be successful, the right treatment must be applied at the right place at the right time. Crack sealing and surface treatments will not be cost-effective if applied to a severely deteriorated pavement. All agencies need to take the following steps:

1. **Select the right treatment** - agencies should take advantage of the many types of repair treatments that are available today. This should include patching, crack sealing, surface treatments (including chip seals, micro-surfacing and NovaChip), overlays, as well as, recycling techniques such as cold in-place recycling and full depth reclamation. For any of these treatments to be cost-effective, trained personnel should be utilized to determine under what conditions each treatment is appropriate.

2. **Select the right road** – pavement conditions must be evaluated in order to determine which streets are good candidates for each type of maintenance or repair treatment. This is typically accomplished by performing a pavement condition survey. The survey should include the evaluation of distresses such as structural and environmental cracking, material defects/ aging, rutting, roughness, drainage and possibly safety issues (i.e. skid resistance). Each agency must determine which pavement deficiencies must be evaluated. A simple rule is to evaluate only deficiencies that would cause the agency to repair the pavement. If an agency isn't going to repair longitudinal joint cracking, then that distress does not need to be evaluated unless the agency wants to track the information for research purposes.

3. **Timing is everything** – since there is a relatively short amount of time when the more cost-effective treatment can be properly utilized, proper timing is crucial to a successful pavement preservation program. Figure 1 shows the different repair categories superimposed on a generic pavement deterioration curve (pavement condition vs. age). Simply put, if preventive or routine maintenance is delayed for several years, small cracks can become much larger cracks and spread throughout the pavement. This increased level of deterioration will require a more expensive repair.

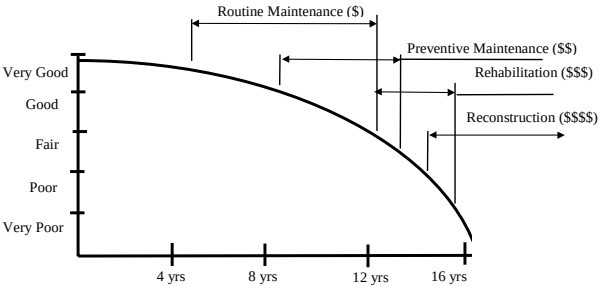


Figure 1 - Maintenance and Rehabilitation Strategies

Adapted from: Road Surface Management for Local Governments FHWA, DOT-1-85-37

II. Implement a Pavement Management System

Determining when you need to change the oil in your car is easily accomplished. However, trying to keep track of the current pavement condition of each street, knowing what should be done to each street and how much it will cost is not so easily accomplished. Fortunately, pavement management systems such as RSMS (Road Surface Management System) developed by the New Hampshire T^2 Center are available to assist agencies in managing these costly assets. Pavement management systems will provide a systematic approach to gathering and analyzing data, as well as presenting information in a clear, logical manner so that decision makers will understand the long term consequences of today's budgeting decisions.

Benefits of a pavement management system include:

- Contains a database with powerful analytical tools
- Provides strong report generating and mapping (w/GIS) capabilities
- Generates long-term budgets based upon different levels of funding and "worst-first" vs. "best-first" funding scenarios
- Creates a historical database that allows for tracking of "performance" over time
- If properly implemented, it will allow an agency to select the right treatment at the right place at the right time.

III. Developing Long-Term Budgets

From a long-term theoretical standpoint, the best-first policy is the most cost-effective method of managing a roadway network. In the real world, however, it is not realistic to expect the entire budget to be spent on the streets in good condition. Most elected officials and the public would quickly disregard anyone who would suggest such a crazy plan. However, not attempting to change from a "worst-first" policy to a "best-first" policy is cheating the public. Therefore, a compromise is necessary. In most cases, the T^2 Center suggests starting slowly and building up a preventive maintenance program over time. For example, possibly allocate 10% to 20% of the budget the first year towards preventive maintenance and increase by five to ten percent each year thereafter until a cost-effective balance is reached.

Although developing a balanced long-term budget can be a daunting task, it can be more easily accomplished with the use of a computerized pavement management system. Most computerized pavement management systems provide users with the ability to generate long-term projections of the overall network condition level for various combinations of funding for reconstruction, rehabilitation and preventive maintenance projects. Thereby, providing the municipality's decision-makers with a much clearer picture of the projected long-term consequences that would result from this year's budgeting decisions.

IV. Proper Engineering

Once a network level budget is developed, trained personnel must investigate each of the streets selected and determine the full scope of work necessary for a successful project. This should entail a thorough investigation of each street that may include but not be limited to:

- Field measurements
- Identifying all necessary prep work such as crack sealing and patching and necessary surface cleaning
- Identifying potential drainage issues
- Identifying potential sidewalk and curb issues
- Identifying potential utility and right-of-way issues
- Pavement corings and/or test pits

Once the scope-of-work has been identified, pavement designs and other engineering issues must be resolved. Lastly, thorough contract documents must be prepared by someone experienced in writing contract documents and is knowledgeable about the type of construction activities to be covered by the documents. Quality construction starts with properly written contract documents that create a level playing field which allows the "quality conscious" contractors to have a fair shot at winning the bid. Additionally, contract documents create the "set of laws" which will govern the construction project. Weak contract documents make enforcement of proper construction techniques, as well as, conflict (dispute) resolution very difficult.

Warning – cutting and pasting specifications from other projects, especially when done by inexperienced personnel can be a very risky and costly practice.

V. Quality Construction

Construction inspection is necessary in order to ensure that the contractor is meeting the requirements set forth in the contract documents. Even the best contractors will admit they make mistakes (off the record, of course). Agencies must remember that the "lowest bid" environment creates low profit margins and contractors have tremendous pressure to complete the project as quickly as possible and for the least cost. Having well-trained, knowledgeable inspectors present during construction will definitely help to minimize problems and will provide reliable documentation of what actually happened during the project.

VI. Public Relations

Pavement preservation is founded on maintaining the streets that are in relatively good condition, not just simply spending all of the available funds on the few streets that are in the worst condition. To the average citizen, many of the streets to be repaired as part of a preservation program will appear to be in relatively good shape. As such, this new approach will most likely result in citizens complaining that money is being "wasted" on streets that are in good condition while other streets in worse condition aren't being repaired. Minimizing the number of complaints will require that the municipality educate the public in the wisdom of pavement preservation.

The T^2 Center will be glad to assist your municipality in implementing a pavement preservation program including assistance with the development and implementation of a pavement management system.

SAVING LIFES: A VITAL FHWA GOAL

By A. George Ostensen, FHWA Associate Administrator for Safety

Improving highway safety in the United States has been a primary focus of the Federal Highway Administration (FHWA) since the agency was established more than 100 years ago. Due to FHWA's efforts, as well as, the hard work of highway engineers, state department of transportation (DOT's), local transportation agencies, and the automobile industry, driving has become an increasingly safe activity.

Despite advances and improvements, however, many people lose their lives each year on the nation's roadways. In 2001, as Americans traveled 2.8 trillion miles, more than 42,000 people died in automobile crashes. This is equal to one person dying every 13 minutes – far too high a price to pay for mobility.

For its part, FHWA is continuing to keep safety at the centerline of its efforts as one of the agency's three "must-do" priorities. The three "Vital Few" goals – safety, environmental stewardship and streamlining, and congestion mitigation – are essential to FHWA's success over the next three to five years, requiring the full strength of the agency to succeed.

FHWA's National Safety Strategies

Recognizing the value of a comprehensive approach, the agency developed a set of six national strategies:

- Encourage the implementation of strategic safety programs at the state, local, and metropolitan planning organization (MPO) levels to make safety consciousness a part of project planning, development, and operations.
- Protect vehicle occupants by supporting Federal, State, and local efforts to increase seat belt use nationally.
- Prevent roadway departures by helping drivers stay on the road, primarily through enhancements to roadway visibility and installation of effective warning systems to alert drivers to lane departure situations.
- Minimize the consequences of roadway departures by improving the methods and practices used to select high-priority areas, identifying the causes of roadway departures, and then implementing proactive programs to reduce this kind of crash. This gives states and local agencies the flexibility to implement area-specific countermeasures.

- Conduct comprehensive intersection analyses to determine where safety problems exist and then develop cost-effective countermeasures.
- Foster more a systematic approach to community safety, including implementation of comprehensive pedestrian safety programs.

Adapted from the Second Quarter 2003 issue of the LTAP Journal

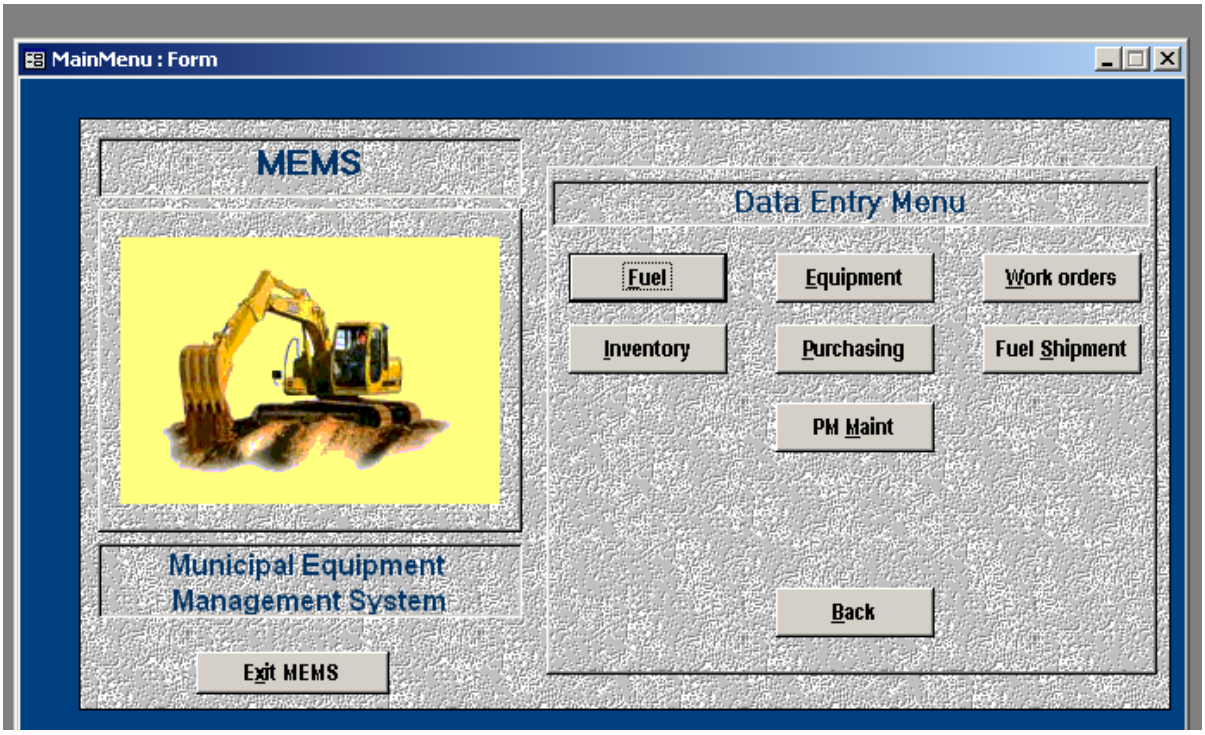
In response to the FHWA's focus on Safety, upcoming issues of the Travel Log will contain articles addressing safety issues such as traffic calming, unwarranted stops signs, proper signing, etc.

MUNICIPAL EQUIPMENT MANAGEMENT SYSTEM 2002 (MEMS 02)

MEMS 02 is an equipment maintenance management system developed by the Maine T2 Center. It is a windows based software program that was developed based upon a DOS-based version originally developed by the New Hampshire T2 Center in the late 1980's. MEMS primary purpose is to help municipalities manage a fleet and equipment maintenance program. MEMS was designed to provide a user-friendly management system for any size municipality. The program can organize information, maintenance and repair schedules, work orders, part purchases and inventory, fuel purchases and consumption, employee and vendor information, as well as, provide detailed reports in all these areas. Users have a choice of using all MEMS has to offer, or selecting just what they want based on their need.

MEMS works as an (Microsoft) Access database. The good news is that the user does not need to be familiar with Access (it has pre-formatted screens to handle all the data entry and report generation), however, you will need to have a minimum of Microsoft Access 97 on your computer. Also, the program will only run in Windows, sorry Mac users.

Although the Delaware T2 Center recently offered a one-day course on the MEMS software program, the T2 Center will be glad to make a site visit to meet with any municipality who is interested in using the software program.



How Can We Help You?

No, this is not an article about one of America's largest retail chains. It's not about what we have imprinted on our vests. We want to tell you how the Delaware T² Center can help you meet your training and technology transfer needs. We like to remind you of this every once in awhile because new people, elected officials and municipal officials, are constantly coming on board. Some of them have never heard of the T² Center.

The T² (Technology Transfer) Center program in our state is a partnership among three entities: (1) the Federal Highway Administration, (2) The Delaware Department of Transportation, and (3) the University of Delaware's Center for Transportation. There are 58 centers across the United States that work closely with local and state transportation agencies. One of our most important duties is to provide transportation related training and on-site technical assistance to Delaware's 57 towns and cities.

Alan Kercher, P.E., of Kercher Engineering, Inc., is our specialist who will work with you. He has been a technical consultant working with the T² Center since 1992. He has worked with about one-half of the municipalities in Delaware, and would like to include the other half over the next couple of years. Here are some of the things he has done:

Training Sessions (usually 1 or 2 day sessions for groups of municipalities)

- Selecting the best repaving or street reconstruction strategies
- How to conduct a traffic sign inventory
- Snow and ice control strategies
- Asset management including GASB-34 requirements
- Work zone safety

On-site Technical Visits (usually for an individual municipality)

- Solving drainage problems
- Setting pavement management schedules and priorities
- Traffic flow problems
- Street/utility issues
- Sidewalk maintenance and construction

The main thing for you to know is that there is no cost to you for these and other T² Center services to your town or city. So, if you would like to get more involved with the T² Center, you may contact us as follows:

1. Call Alan Kercher at 302.894.1098
2. Call Larry Klepner at 302.831.6241
3. Email us at lklepner@ce.udel.edu

T^2 Center Request Form

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____ I have an idea for a future newsletter article on the topic of

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____ I would like to submit a newsletter article, please contact me.

____ Please consider these topics for future training sessions

Name: _____

Title: _____

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Municipality: _____

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Delaware T^2 Center
Delaware Center for Transportation
360 DuPont Hall
University of Delaware
Newark, DE 19716

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360 DuPont Hall
University of Delaware
Newark, DE 19716

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The Technology Transfer (T²) Program is a nationwide effort financed jointly by the Federal Highway Administration and individual state departments of transportation. Its purpose is to interchange the latest state-of-the-art technology into terms understood by local and state highway or transportation personnel.

The Delaware T² Center Travel-Log is published semi-annually by the Delaware Technology Transfer Center at the University of Delaware. T² Center articles also appear semi-annually in the TransSearch - the newsletter of the Delaware Center for Transportation. Any opinions, findings conclusions or recommendations presented in this newsletter are those of the authors and do not necessarily reflect views of the University of Delaware, Delaware Department of Transportation, or the Federal Highway Administration. Any product mentioned in the newsletter is for information purposes only and should not be considered a product endorsement.

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