

Interchange

Sharing the Best in Transportation Technology

Inside

- 2** Bridge Maintenance Recommendations
- 4** It Takes a Community
- 5** Tech Note #67 Work Zone Safety
- 9** Talking Asphalt: A Closer Look at Tack
- 10** Thin Hot Mix Asphalt (HMA) Overlays
- 11** Intelligent Compaction Technical Service Support Center (TSSC)

massDOT
Massachusetts Department of Transportation



U.S. Department of Transportation
Federal Highway Administration



UMass Amherst Transportation Center



Baystate Roads Program
mass.gov/baystateroads



Photo courtesy of MassDOT

Pothole and Winter Recovery Program Announced

MassDOT Secretary Richard A. Davey announced the 2014 Pothole and Winter Recovery Program to support and accelerate the repair of potholes and other damage caused by the recent severe winter weather. The \$40 million one-time program will assist all municipalities and MassDOT in performing necessary repairs on state and local roadways and facilities.

“We experienced an extraordinary winter season that caused damage to our roads, bridges, and vehicles well beyond the typical year,” said MassDOT Secretary and CEO Richard A. Davey. “This one-time, targeted program will speed repair and recovery and maintain safe travel for motorists.”

“Our cities and towns already challenged by what seemed to be

never ending snow and ice removal now face higher than expected costs in fixing streets, signs, and other transportation facilities,” said MassDOT Highway Division Administrator Frank DePaola. “These funds to be spent immediately this spring and summer will allow all communities to make the most basic and necessary repairs and provide quick improvements for the traveling public.”

The \$40 million program includes \$30 million allocated to all municipalities according to the same Chapter 90 formula used to provide longer term local road and bridge project funds. MassDOT will receive \$10 million to address the greater than

Please see POTHOLES on page 12

Take Care of Your Bridges Now Before It's Too Late!

Municipal Bridges - Maintenance Recommendations for Municipalities

By Daniel S. Crovo, P. E., District 5 Bridge Engineer



The lack of simple bridge maintenance in many Massachusetts municipalities is significantly affecting bridge structural capacity, personal safety, and overall condition. Under Federal law, MassDOT inspects, or receives inspection reports on all bridges on public highways in the state every two years. These reports must be reviewed by MassDOT within 90 days of the field inspection. The reports are then sent to each municipality.

In these biennial inspections, the MassDOT inspection crews typically find that municipal bridges and minor spans are not well maintained and very little attention is generally paid to them. If a major concern is evident, then MassDOT will immediately contact that municipality. In some cases, bridges have been closed or severe restrictions have been recommended to the local municipal officials.

It should be noted that MassDOT simply performs the inspection and makes recommendations on weight posting, repairs, or other limitations. In some cases, MassDOT may provide

limited engineering services and other assistance through the District Bridge Engineers. However, the maintenance of minor spans on town ways and low-use bridges is the full responsibility of municipalities.

It is recommended that all towns budget for basic maintenance, deck repair, paint, and other minor repairs. Otherwise, it is likely that more expensive repairs or full replacement will face decision-makers in the future.

Here is a checklist of basic maintenance which municipalities should perform on their bridge(s) and/or minor spans:

Annual Cleaning

Remove all sand and debris from the deck and around beams at least once a year (preferably spring). Use

fire trucks to wash down and remove salt, because salt readily deteriorates concrete and corrodes steel. This activity provides you with the most benefit — at the least cost — and provides an opportunity to check the condition of the structure for needed repairs.

Erosion

Check under and around abutments to spot eroded areas (the best time to do this is when water is at its lowest in late summer). Add stone protection (rip rap) to stabilize eroded areas and provide bridge support. Remove excess

winter sand from approaches to allow runoff to flow into the ditches instead of onto the bridge.

Wood Decks

Check planks for breaks, rotting, excessive wear and looseness. Replace damaged planks (“piecing in” is not recommended), re-nail planks



to beams, add a waterproofing layer (tarpaper) between the beams and planks and treat with a preservative when dry.

Concrete Decks

Look for signs of leakage, cracks and rust stains from underneath. Don't pave over concrete decks (this accelerates concrete deterioration). Every two years coat exposed concrete decks with a sealer. Sealing should be done yearly for the first two years for new concrete.

Steel Beams

Remove all dirt and/or debris yearly and paint beams, as needed, to prevent corrosion. Complete painting is usually needed every 10-20 years with occasional touch-up painting in between. Touch-up painting mainly involves the beam ends and bearings.

Timber Beams

Check for deterioration. Test with a hammer and/or occasionally drill holes to sample the interior condition. Holes must be filled in after drilling to prevent further decay.

Abutments and Piers

Check for movement and stability. Look for cracks, movement of rocks, leaning or bulging, scour and undermining. Cut and remove all brush and trees growing close to the abutments to improve air flow



and limit potential damage. Repair any damaged or missing stones or concrete. Remove debris that can potentially plug bridge openings from the upstream channel.

Fill all ruts and eroded areas. Check for a smooth transition from the road onto the bridge. Vehicles ramping and landing on a bridge deck can cause a force equal to double their weight.

Guardrails

If none exist, install something sturdy. If wood or steel rails (or wire cables) are bent, broken, or in poor condition, replace or reinforce deteriorated parts.



Signs

Inspect, straighten and clean warning signs. If necessary, erect new signs (both at and in advance of the structure). Two conditions require additional signage —

Bridge Approaches

Trim all trees and bushes to create adequate sight distance, especially around signs.

weight posting and overpass clearances of less than 14'6". All signs must meet MUTCD standards. Remove any brush that is obstructing warning signs.

Bearing Devices

Identify all fixed and moveable bearing devices. Clear any obstructions that would prevent a moveable support from functioning.

Cracks

Measure and keep a record of any cracks in — or movement of — the abutment main wall and wing walls.

Remember to take care of your bridges now, before it's too late! 



It Takes a Community

By Dr. Rockie Blunt
Contributing Writer

I was in Lenox recently, conducting a workshop entitled Succeeding as a Foreman V. When the class ended and the room was empty, I unplugged my computer, packed away my notes and wheeled my equipment out to the car. Looking across the large parking lot, I noticed a group of my students clumped together in front of their trucks talking with each other. They were still there when I waved to them and drove away. One phrase came to my mind, and I said it out loud: “Communities of Practice.”

If you have taken a Baystate Roads workshop with me, or heard me talk about how people learn, you know that I have said repeatedly that learning does not have to be restricted to schools or training courses, and it doesn't have to be organized and led by a teacher or expert. Learning takes place anywhere and anytime, and nowhere is this more true than with Communities of Practice (CP). Consider these three points:

Communities of Practice is “social learning.”

The main thrust of CP is that people are inherently social; we need to interact with others and we are quick to form groups. We do this for a variety of reasons—to report on our experiences, exchange information, seek advice—all of which lead to an increase in our knowledge. When we share tips and techniques for doing a job, or discuss ideas for solving a problem, we are learning from others.

Communities of Practice is informal learning.

Learning doesn't have to be formal, or even planned. When two or



three people gather around the water cooler—or their trucks in the parking lot—they are probably discussing a common business issue (unless they're bemoaning this year's Celtics). I was once told by a chief of police that



when you see two cruisers parked side by side off the road, chances are the officers are updating each other on a recent crime or reviewing goings-on in the neighborhood that bear watching. In both these examples, the learning is informal or spontaneous, and for that reason, managers should not be too quick to break up the conversation. As Thomas Davenport and Laurence Prusak mention in their book, *Working Knowledge*, “Managers shouldn't underestimate the value of talk.”

Communities of Practice takes place everywhere.

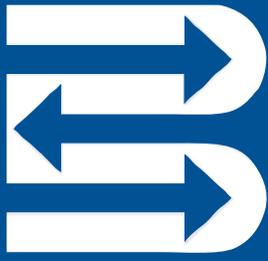
Although it's easy to assume that our learning is somehow separate from our daily lives, CP reminds us that we learn as part of everyday experiences—on the job site, on the athletic fields, in the office and at home. It reminds us, too, that we are constantly changing roles in the process: sometimes we're learners, sometimes teachers, and sometimes observers.

Etienne Wenger, a leading authority on Communities of Practice, has written, “If you're serious about knowledge, you have to be serious about communities.” I like to think that the foremen in Lenox who attended my training session learned something in class. But, I'm also betting that by the time they drove away that day, they had done some serious learning outside of the classroom.

Who is in your community? Who do you learn from?

Rockie Blunt, President of West Boylston, MA-based Blunt Consulting Group, has worked with municipal and state agencies for many years.





Baystate Roads Program Local Technical Assistance Program (LTAP)

TECHnotes

#67-WORK ZONE SAFETY



Background

Construction and maintenance are ongoing activities aimed at keeping our roadways safe and efficient for roadway users; however, the very work zones that contain these construction and maintenance activities can create an unexpected condition along the roadway for motorists. Both the Federal Highway Administration (FHWA) and the Commonwealth of Massachusetts have established formal policies to help keep work zones safe for both drivers and workers, alike.

A work zone should be established at any location where construction or maintenance work is ongoing, which may include long-term or temporary work zones as well as moving work zones. The work zone should be set up such that traffic is separated from potential hazards, whether they be on the shoulder or in the center of the traffic lane. Work zones should last for the duration of time work is being performed. If necessary, a work zone should remain

Knowing the Stats:

In the United States, 130 people were killed in 2012 in work zones related accidents. In Massachusetts, there were 3 fatalities in 2012 that occurred in work zones. It is the responsibility of any transportation agency to see that work zones are as safe as possible.

Data Source: Workzonesafety.org

in place even when the worker are not present to separate traffic from roadway hazards.

Work Zone Safety

A fundamental safety element in a work zone is managing vehicle speeds. Some measures that help manage speeds are posting signs for a speed reduction by the work zone or providing advance signage

alerting motorists of the potentially unexpected conditions ahead. Yet another method is to reduce lane width, abiding acceptable guidelines and standards, within the work zone itself. Although this may already occur as a result of construction, it may encourage drivers to find a safer, slower speed.

Construction of an adequate transition and termination zone before and after the designated work zone is another important consideration. This will smoothly move traffic into a path away from workers and equipment and safely back into the lane following the work zone, which can typically be done using signage. Dimensions for these geometric transitions can be found in the Manual on Uniform Traffic Control Devices (MUTCD Part 6). This signage should inform the driver of the geometry of any potential lane changes as well.

More Work Zone Safety Tips

Education

Informing the public about upcoming or ongoing construction or maintenance can provide enhanced safety and operational benefits. Informing the public regarding a work zone may allow them to seek out alternate routes and be aware of the work zone.



(W20-1)

Signage

Erecting temporary signs declaring the presence of a work zone ahead allows drivers added time to slow down or stop when the work zone is reached. Signs should be placed with adequate sight distance for drivers to react appropriately. Signs should follow MUTCD standards (MUTCD Chapter 6F). Any temporary signs should not impact existing signage. Another consideration is the physical condition and retroreflectivity of the sign.

Pedestrian, Bike, and Transit Accommodations

Pedestrian and bicyclist safety is as important as motor vehicle safety. Make accommodations for any work zone that shifts pedestrians or bicyclists out of their normal path. A temporary sidewalk or temporary bike lane is one possible solution. If the work zone obstructs a bus stop or roadside pull out, create temporary ones to accommodate users. (MUTCD Chapter 6D)



(M4-9a)



Barriers

Limit access to the work zone. Allow for vehicular traffic to pass through the work zone, but delineate the zone with barriers to provide safety to the workers. This doesn't necessarily require the use of "Jersey Barriers"; something as simple as traffic cones, reflectorized plastic drum barrels, or Type III barricades can be effective.

Please see SAFETY TIPS on page 8

Work Zone Signage Choices

Although the signs below do not necessarily represent the actual sequence of signage within a work zone, they do provide information about various signs that may prove useful regardless of the work zone location.



Give ample time and sight distance for drivers to realize that they are approaching a work zone. (Example Sign W21-1)



If the roadway path has changed, give ample time and distance to drivers so they know what the roadway geometry will be in the upcoming work zone. (Example Sign W20-5)



If the roadway changes path, show the change in geometry of the roadway so that the driver can prepare for any required maneuvers. (Example Sign W1-4)



If the work zone creates potential roadway hazards, alert drivers of those hazards. This includes pavement changes, roadway dips, or bumps, as shown here. (Example Sign W8-1)



Just as at the end of a detour route, tell drivers where the work zone has ended and where they may proceed with their normal traffic flow. (Example Sign G20-2)



Detour Sign (M4-9)

In some instances it becomes necessary to set up a detour route to divert traffic from the work zone. A detour should be clearly marked with signage that conveys the new travel path to the driver. This includes signs warning of a detour, signs that direct the path of travel, and a sign that ends the detour. Detour signage must lead drivers back to their original path.



End Detour Sign (M4-8a)

Safety Tips

Continued from page 6

Police/Road Flagger Presence

Massachusetts requires a police presence or a certified civilian road flagger within a work zone. A police officer and road flagger help direct traffic and increase work zone visibility. More information on civilian road flaggers can be found at <http://www.massdot.state.ma.us/highway/RoadFlaggers.aspx>



Lighting

An additional safety measure is to provide additional lighting to the project site, which may allow drivers to better see obstructions and possible hazards at night.



Important Reminder

All work zone signs and other traffic control devices shall comply with the MUTCD Part 6

Resources

The Manual on Uniform Traffic Control Devices (MUTCD) Published by the FHWA, the MUTCD defines the standards used by transportation professionals nationwide to install and maintain traffic control devices on all streets and highways. The most recent version (2009, with revisions May 2012) can be found at <http://mutcd.fhwa.dot.gov/>

The National Work Zone Safety Information Clearinghouse

This web site is dedicated to providing comprehensive information to improve motorist, worker and pedestrian safety in roadway work zones. Available at www.workzonesafety.org Standard Details & Drawings for the Development of Traffic Management Plans Details and drawings developed by MassDOT for the purpose of standardizing the temporary Traffic Management Plans used to control traffic during road and bridge construction projects. These drawings should meet the majority of typical work zone setups, but can also be used as examples for more customized applications. Available through MassDOT at www.massdot.state.ma.us.



The Baystate Roads Program is a cooperative effort of the Federal Highway Administration (FHWA), Massachusetts Department of Transportation (MassDOT), and the University of Massachusetts. Program Director, Dr. John Collura, and Program Manager, Dr. Christopher J. Ahmadjian, provide technology transfer assistance to all communities in the Commonwealth. Our purpose is to provide information and training on transportation and related topics, to answer the needs and problems of local agencies, to identify and transfer new technologies and innovations into a usable format, and to operate as a link between transportation research and practicing highway personnel. www.baystateroads.org.



Talking Asphalt: A closer look at tack

By Dwight Walker
Asphalt Institute

I think asphalt tack is often an overlooked part of asphalt paving. Bad mistake! A good tack or bond coat is critical for optimal performance. “Tack” is the traditional term, but some people prefer “bond;” the terms are interchangeable.

Why is tack important?

The short answer is “pavement performance.” Most people recognize slippage failures where tack was applied poorly or the pavement was dirty, but tack influences the load-carrying capacity of the overall pavement structure. Research has shown that a good tack or bond coat can significantly influence the pavement performance. A poor tack coat results in less bonding between pavement layers and can decrease the structural capacity. When the pavement layers separate (de-bond) due to tack failure, fatigue cracking can occur. One study found that a 10 percent decrease in bonding strength between two pavement layers could cause an approximate 50 percent loss in fatigue life.

Tack basics

There are some basic considerations for tack coats, including:

Materials

Asphalt emulsions are widely used for tack coats, with slow setting (SS) grades most commonly specified. Emulsions are used because they can be diluted (one part water to one part emulsion) for uniform spray application. Some agencies choose paving grade asphalt binders.

Application rate

A tack coat should be applied to a clean, dry surface and is typically recommended for all overlays. The

appropriate application rate depends on the type and condition of the old surface. A thin, uniform coating should be applied to 90 to 100 percent of the old surface. For emulsions, the normal application rate ranges from 0.5 to 0.15 gallons per square yard. The rate may need to be adjusted for old (versus new) surfaces, for milled surfaces, and when mixes include highly absorptive aggregates or high RAP contents. Also, be aware that too much tack can lead to slippage or bleeding.



MassDOT specifies 0.07 gallons/square yard for milled surfaces and 0.05 gallons/square yard for smooth surfaces. The final product should be uniform and consistent across the surface rather than blotchy or string-like.

Application technique

Most tack failures are the result of poor application technique. A thin, uniform coating is critical. Having clean spray nozzles set at the correct spacing and setting the spray bar at the proper height are basic – but key points.

Innovations

A couple of recent innovations can help with getting good bonding. These include:

Trackless tack

This relatively new, proprietary material is a specially formulated asphalt emulsion that dries to a drivable, no pick-up condition, in as little as 10 minutes. Some producers claim that their trackless tack can help achieve higher density with less compactive effort.

Spray pavers

These specialty pavers spray the tack and apply the overlay mix in a single pass, so no vehicles travel on the emulsion, thus eliminating tack pick-up and damage to the bond coat. A spray bar in front of the paver’s auger distributes the tack material and a built-in microprocessor controls the application rate. In addition to a better bond, these pavers can save work time and minimize construction delays.

While many agencies have made tack “incidental” to the bid price, it is an essential consideration for optimal pavement performance. 

Reprinted with permission from the Asphalt Institute. <http://www.asphaltmagazine.com/news/detail.dot?id=ac4a4d33-14fa-4506-9a1f-2bb70ce78342>



Thin HMA overlays are an important pavement preservation tool, with their design optimized for 3/4 to 1 1/2 inches in depth
 Photo courtesy of Texas Transportation Institute

Thin Hot Mix Asphalt (HMA) Overlays

What:

Plant-mixed combination of asphalt cement and aggregate placed in depths of 3/4 to 1 1/2 inches over aging asphalt or concrete pavements as a pavement preservation treatment. The liquid asphalt binds the aggregate --- often 4.75 mm nominal maximum aggregate size (NMAS) -- together in a strong but flexible pavement structure. Because there are hot mix plants and experienced HMA contractors almost everywhere, thin HMA overlays have been one of the most common pavement preservation treatments. Polymer modified asphalt may be used for improved performance, and reclaimed asphalt pavement (RAP) may be incorporated into the hot mix to lower cost and as a more environmentally-friendly option.

Where:

Over pavements with good structure but low severity surface distresses such as rutting, raveling, polished aggregate and friction loss. Thin

HMA overlays are suitable for both flexible (asphalt) and rigid (concrete) pavements. A fine-milled surface will enhance smoothness of the paved mat. Any cracks should be sealed before application of thin hot mix overlays.

Why (advantages):

Thin HMA overlay are the most effective preventive maintenance treatment for re-profiling and improving rideability. They have no loose stone to cause vehicle damage, and the construction and traffic return are quick. They seal and protect the existing pavement, correct surface deficiencies, and improve surface friction. HMA contractors and equipment are available almost everywhere.

Why not (disadvantages):

Unsealed cracks will reflect through the overlay, and sealed cracks may even cause a problem. Without a good tack coat on the exiting

pavement, there is danger of slippage, shoving and delamination. The cost is more than some other pavement preservation treatments.

When:

Thin HMA overlays should be applied when the pavement structure is in good condition, and there are only low severity surface distresses.

Estimated life extension:

Estimated life extension: 6-17 years over pavements in good condition; 5-10 years on pavements in fair condition; 2-4 years for pavements in poor condition.

For more information on successful paving, consult the Thin Hot Mix Asphalt Overlay Checklist put together by FP2 Inc. and the Federal Highway Administration. Download it at <http://www.fhwa.dot.gov/pavement/preservation/ppcl03.pdf>.

Article reprinted with permission from FP2 Inc.

Intelligent Compaction Technical Support Service Center (TSSC)



SERVICES

- **Phone and email support**
General IC questions, specifications, workshop requests, Veda support.
- **Local assistance**
IC spec development/reviews, pilot project/IC system selections.
- **Workshops**
One-day workshop to cover IC basics, data management, Veda, hands-on case studies.
- **Optional IC equipment demo**
½ day show-and-tell by IC and GPS equipment vendors.
- **Technical documents**
Whitepapers, tech brief, application notes, standards, and reference documents.

INTELLIGENT COMPACTION: SMART PAVING WITHOUT GUESSWORK

The Intelligent Compaction (IC) Technical Support Service Center (TSSC) is sponsored by the FHWA Every Day Counts (EDC) 2 initiative to provide public support for IC.

TSSC is part of the FHWA efforts to deploy nationally Intelligent Compaction.

Phone and email support is available five days a week (Monday – Friday) from 8:00am to 5:00pm CST.

For further information, contact:
Antonio Nieves Torres
FHWA EDC IC Team Lead
(202) 366-4597 Antonio.Nieves@dot.gov

George K. Chang
The Transtec Group, Inc.
(512) 451-8233 gkchang@thetranstecgroup.com

Michael M. Arasteh
FHWA Resource Center
(410) 962-0678 Michael.Arasteh@dot.gov

EDC 2
Innovation



IC Support Hotline:
+1 (512) 659-1231



IC Support Email:
ICSupport@TheTranstecGroup.com



FHWA EDC IC Website
www.fhwa.dot.gov/Construction/ICTSSC

Baystate Roads Program
214 Marston Hall
University of Massachusetts
130 Natural Resources Road
Amherst, MA 01003-9293
ST 140031

BULK MAIL
U.S. POSTAGE
PAID
AMHERST, MA
PERMIT NO. 2

MASS

Interchange

Mass Interchange is a quarterly newsletter published by The Baystate Roads Program (LTAP). The Local Technical Assistance Program (LTAP) is a national effort of the Federal Highway Administration (FHWA) designed to improve access to highway, road, and street technology for local agencies. Local capabilities and needs differ, and it is the recognition and accommodation of this fact that has been primarily responsible for the program's success. Flexibility in the delivery of technology is a key to responding to the multitude of needs felt by a group as diverse as the local agencies. LTAP is, therefore, based on a policy that employs a national network of technology transfer centers established in partnership with the State highway agencies and staffed with personnel skilled in providing an interface with their respective local constituencies. Because the program relies on input from many sources, inquiries, articles and ideas are encouraged.

To contact the Baystate Roads Program
call (413) 545-2604 or FAX 413-545-6471
mass.gov/baystateroads



Potholes

Continued from page 1

normal winter damage to Interstate highways and other state roads.

The Pothole and Winter Recovery Program is funded through existing FY2014 authorizations available to the department prior to the expected passage of the Transportation Bond Bill and requires all work to be completed by September of 2014.

MassDOT also appreciates the public's help throughout this winter season in reporting pothole locations on state roads, allowing repairs to be made as quickly as possible. If you see a pothole, please call MassDOT at 857-DOT-INFO (857-368-4636), Toll Free at 877-MA-DOT-GOV (877-623-6846), or visit our online contact information web page to send us an e-mail. 

Congratulations Road Scholars

The Baystate Roads Program would like to recognize the following individuals for becoming Road Scholars.

Megan Cromer - Mass DOT District 1

Richard Parasiliti - Northampton DPW

Richard Rydant - Central Massachusetts Regional Planning Commission (CMRPC)