Technology NEWS

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Iowa LTAP Local Technical Assistance Program

Providing transportation technology transfer for Iowa's cities and counties

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Institute for Transportation

Micro-surfacing for pavement rehabilitation

This article was adapted from the Thin Maintenance Surfaces Handbook *by Charles Jahren and Cliff Plymesser.*

Pavement deterioration is inevitable, but micro-surfacing can help agencies extend the life of a pavement quickly and cost-effectively. As agencies undertake asset management programs due to limited finances, use of thin maintenance surfaces such as micro-surfacing will become more prominent.

Micro-surfacing is a mixture of polymer-modified emulsion, 100 percent crushed aggregate, water, and mineral filler that is pre-mixed and placed as a slurry onto a pavement. Micro-surfacing can be applied to roads of any traffic volume. It can be especially useful in busy intersections and other locations that must be reopened to traffic quickly after construction. Micro-surfacing can be used for nighttime construction, while slurry seal cannot.

Advantages of micro-surfacing

- Seals the surface of a pavement.
- Enhances the appearance of a pavement by providing a uniform black or gray surface, which is a good background for pavement markings.
- Provides a new wearing course, restoring friction and skid resistance. The degree of friction and skid resistance is largely dependent on the quality of the aggregate.
- Reduces raveling and further oxidation of the underlying asphalt binder.
- Can be used to fill ruts up to 1.5 inches deep. Rut filling can be performed without a full-width pass.
- Can be opened to traffic within one hour after application, even in cooler temperatures or at night.

Disadvantages of micro-surfacing

- After the micro-surfacing has cured, it is brittle and will reflect cracks quickly. However, due to the presence of polymers that make the material more resilient compared to a slurry seal, the cracks will be unlikely to spall after the crack initially reflects.
- The ratios of emulsion, aggregate, water, and mineral filler must be kept in a narrow range, which can be troublesome during construction.
- Compared to slurry seal, there is less time to perform hand work.

Micro-surfacing is a thin maintenance surface that can help agencies extend the life of a pavement quickly and cost-effectively (Photo credit: Angel Morandeira, Iowa State University)

Micro-surfacing continued on page 3

Acronyms and Abbreviations in *Technology News*

AASHTO	American Association of State Highway and Transportation Officials
APWA	American Public Works Association
FHWA	Federal Highway Administration
IHRB	Iowa Highway Research Board
InTrans	Institute for Transportation (at ISU)
Iowa DOT	Iowa Department of Transportation
ISU	Iowa State University
LTAP	Local Technical Assistance Program
MUTCD	Manual on Uniform Traffic Control Devices
NACE	National Association of County Engineers
TRB	Transportation Research Board

U.S. Department of Transportation
Federal Highway Administration

Iowa Department of Transportation

About LTAP

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From the director: Development of new resources

As most of you know, we've recently increased our online registration capabilities. We offer this option for almost all our events at this point. While there have been a few glitches along the way, we appreciate your patience and compliments. We are also always looking for suggestions on how the system can be improved (my email address is kknapp@iastate.edu).

Everyone does seem to like the ability to register more than one person by entering only one set of contact information (e.g., address, phone, and email). This capability allows one person to be the primary contact and distributor of information for an office where everyone may not have an email. It is important to remember, however, that when you use our online registration you should always get a confirmation email if your registration was successful. If you don't (and it's not in your "junk mail"), give us a call.

Looking down the road—We have been redesigning our website during the last year. We hope to release our new "look" soon and then continue to work at it. We would like the new website to be more of a destination resource for people looking for our event offerings and other events and resources that we hear about regularly (sometimes on very short notice).

Our new website should allow us to more quickly post events and allow the content to remain more current. The hope, of course, is that everyone will come to the website to check things out and visit when they have a need and on a regular basis.

We also plan to have a resource area on the website that is split into particular subjects. This area will be slowly populated with what we hope will be useful documents and/or links of value. This information can be used in combination with our LTAP library and the resources on the InTrans website.

In this issue of the Technology News, you'll find discussions about pavement micro-surfacing and adaptive signal control technologies. In addition, we also have the annual notification of our winners from the 2012 Snow Roadeo.

Have a great fall.

Keith

Micro-surfacing continued from page 1

Rules of thumb for micro-surfacing

- The higher quality the aggregate, the higher quality the micro-surfacing.
- Thickness of micro-surfacing is approximately the same as the largest aggregate size.
- Micro-surfacing should not be placed on a pavement that has severe cracking. It will reflect all the cracks quickly and not provide a watertight seal for them.
- If the pavement is experiencing rutting and the ruts continue to deepen, filling them with micro-surfacing will result in only a temporary improvement.
- When filling ruts, use multiple lifts on deeper ruts. Use a rut box for the best results. If the ruts are shallow, use a scratch course to level the pavement. (A scratch course is a lift of micro-surfacing that is placed without finishing to fill ruts. It is called a scratch course because the spreader will often "scratch" the high spots on the road.) By using a scratch course or a rut box, the final application will be smoother and have a better appearance.
- Tire noise increases immediately after construction, but after the micro-surfacing is trafficked, the noise levels will drop.
- Minnesota DOT requires the construction of nighttime test sections to ensure micro-surfacing quality and prevent substitution of micro-surfacing for a rapid setting slurry seal. This was specified because it was thought that a slurry seal will not cure within an hour at night but that a micro-surfacing will.
- Material on high spots of a pavement may ravel off due to snow plow damage.

Equipment

- Street sweeper
- Slurry mixer and spreader (continuous)
- Nurse trucks

Alternatively, the slurry mixer and nurse truck can be combined into one vehicle, and the spreader can be swapped between trucks. This arrangement will provide greater maneuverability, which can be desirable in urban areas.

Construction process

Because of the high cost and specialized nature of the equipment, micro-surfacing construction is performed by a contractor. The construction process consists of the following steps:

- Set up traffic control in accordance with the MUTCD.
- Sweep the pavement to remove debris.
- Remove vegetation from cracks.
- Cover any utility covers with construction paper to make sure that the slurry seal does not cover them.
- Make sure all necessary equipment is onsite and properly functioning. Also ensure that the necessary materials are onsite.
- Begin by placing the micro-surfacing at intersections and radii using hand tools.
- Place the full-width pass of the micro-surfacing on the pavement.
- Do not allow any traffic until the slurry has cured and is stable enough for traffic. With micro-surfacing, this can be done within one hour.

Application rates

The application rate is typically 20–30 lbs/yd2 for a Type III gradation. The rate depends on the gradation of the aggregate.

If a smaller aggregate gradation is used, fewer pounds per square yard are needed for the application.

The mix design should be performed by the contractor. Agencies will usually specify the aggregate type and gradation to be used.

For more information

For more information on micro-surfacing or other thin maintenance surfaces, contact Paul Wiegand, Director, Iowa Statewide Urban Design and Specifications (SUDAS), 515-294-7082, pwiegand@iastate.edu.

The Institute for Transportation has several resources available on thin maintenance surfaces. Web links are provided below, or contact Jim Hogan, Iowa LTAP Librarian, 515-294-9481, hoganj@iastate.edu, for hard copies.

Development of Updated Specifications for Roadway Rehabilitation Techniques (Iowa Highway Research Board Project TR-598), http://www.intrans.iastate.edu/reports/tr-598_updated_specs4roadway_rehab_w_cvr.pdf

Thin Maintenance Surfaces Handbook (Iowa Highway Research Board Project TR-507), http://www.intrans.iastate.edu/publications/_documents/handbooks-manuals/thin-maintenance-surfaces/thin_maint_surf.pdf

Micro-surfacing provides a new surface wearing course and enhances the pavement's appearance (Photo credit: John Mallen, Iowa State University)

FHWA's Every Day Counts Initiative: Adaptive signal control technologies

Adapted from FHWA's Every Day Counts website, http://www.fhwa.dot.gov/everydaycounts/technology/adsc/

Improving Traffic Flow

Wait, go, stop, wait, wait some more; most drivers have spent time fuming at red lights. Maybe the intersection was empty, yet the light stayed red for a maddening amount of time. Or perhaps the road is so congested that you have to wait three or more full light cycles before you can make a left turn. Why don't traffic lights adjust to actual conditions?

Adaptive signal control technologies (ASCT), in conjunction with well-engineered signal timing, can do just that. By receiving and processing data from strategically placed sensors, ASCT can determine which lights should be red and which should be green. ASCT helps improve the quality of service that travelers experience on our local roads and highways. Fewer unnecessary delays mean traffic moves quickly and smoothly.

The process is simple. First, traffic sensors collect data. Next, traffic data is evaluated and signal timing improvements are developed. Finally, ASCT implements signal timing updates. The process is repeated every few minutes to keep traffic flowing smoothly.

On average, ASCT improves travel time by more than 10 percent. In areas with particularly outdated signal timing, improvements can be 50 percent or more.

Faster Responses to Traffic Conditions

The traditional signal timing process is time consuming and requires substantial amounts of manually collected traffic data. Traditional time-of-day signal timing plans do not accommodate variable and unpredictable traffic demands. This produces customer complaints, frustrated drivers, and degraded safety.

In the absence of complaints, months or years might pass before inefficient traffic signal timing settings are updated. With ASCT, information is collected and signal timing is updated continually.

Special events, construction, or traffic incidents typically wreak havoc on traffic conditions. While large-scale construction projects and regular events can be anticipated, determining their impact on traffic conditions can be extremely difficult. Other disruptions, such as crashes, are impossible for time-of-day signal timing to accommodate.

Cutting Costs

Outdated traffic signal timing incurs substantial costs to businesses and consumers by causing traffic delays and congestion on major roads. For consumers, this causes excess delays and fuel consumption. For businesses, it decreases productivity and increases labor costs.

Outdated signals also affect departmental costs. Personnel must respond to citizen

ASCT technology (Photo credit: FHWA Every Day Counts Initiative)

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complaints when traffic signals do not meet traveler needs. They compile data for transportation specialists who then analyze the data and develop updated signal timing using the traditional signal timing process before generating their recommendations.

Because these specialists must balance the needs of one intersection against system requirements, this is time consuming as well as expensive.

With ASCT, the data collection and analysis are done automatically. More important for travelers, signal timing updates are made as situations occur.

Types of ASCT

Implementing ASCT will maximize the capacity of existing systems, ultimately reducing costs for both system users and operating agencies.

Many choices are available from many vendors, with more in development. Available adaptive signal control technologies include the following:

- Split Cycle Offset Optimization Technique (SCOOT)
- Sydney Coordinated Adaptive Traffic System (SCATS)
- Real Time Hierarchical Optimized Distributed Effective System (RHODES)
- Optimized Policies for Adaptive Control (OPAC)
- "Virtual Fixed Cycle"
- ACS Lite

InSync, developed by Rhythm Engineering (Lenexa, Kansas), combines a strategy of global and local intersection optimization methodology to improve arterial progression while reducing side street and left turn delay. There are many others in existence and in development.

Other Benefits

Adaptive signal control technologies are also kinder to the environment. Using ASCT can reduce emissions of hydrocarbons and carbon monoxide due to improved traffic flow.

Real-time management of traffic systems is proven to work, yet these systems have been deployed on less than 1 percent of existing traffic signals. FHWA is now working to bring these technologies to the rest of the country.

For more information

For more information about adaptive signal control technologies, contact the Iowa LTAP, 515-294-8103, kknapp@iastate.edu.

ASCT technology in Ohio (photo credit: FHWA Every Day Counts Initiative)

FHWA launches web-based Federal-aid resource for local public agencies

This article was adapted from the Federal-aid Essentials for Local Public Agencies website. Check it out at http://www.fhwa.dot.gov/federal-aidessentials/

In August 2012, FHWA launched Federal-aid Essentials for Local Public Agencies, a web-based transportation resource designed to help local agency professionals navigate the Federal-aid Highway Program.

Federal-aid Essentials is structured for busy agency staff who want further understanding of Federal-aid policies, procedures, and practices. You will find quick answers, straight to the point, and presented in plain language to help you make the right decisions in successfully completing federally funded projects.

The Federal-aid Essentials website contains a resource library of informational videos and related materials. Readily accessible and available when you need an answer, each video addresses a single topic presented in everyday language, condensing the complex regulations and requirements of the Federal-aid Highway Program into easy-to-understand concepts and illustrated examples. This website allows you to indicate areas of interest and receive alerts when material that matches your interests becomes available. You also can give feedback that will help FHWA continue to provide useful assistance.

Federal-aid Essentials can become your personal reference library available 24 hours a day. Consult Federal-aid Essentials at the start of a new roadway project concept, or when questions arise about financing, right-of-way, or environmental impacts. Or, you may have a concern about civil rights, or a need for more information on project development or construction administration. You may simply want to review the process to closeout a project. Federal-aid Essentials offers a wide range of video modules to address questions and concerns.

While Federal-aid Essentials provides a good oveview of the Federal requirements, local governments should contact the Iowa DOT for official guidance on how these requirements are administered in Iowa. Federal-aid Essentials includes a comprehensive directory of state resources, consisting of links to local program websites, manuals, references, local technical assistance programs, and local program coordinators. Federal-aid Essentials helps you pursue better, faster and smarter ways of delivering the Federal-aid program, with the overall goal of ensuring a strong, safe infrastructure serving the public interest.

For more information, visit the website at http://www.fhwa.dot.gov/federal-aidessentials/

Conference calendar

October 2012			
2	PCC Overlays Under Thru Traffic	Mason City	Melisse Leopold 515-964-2020 mleopold@snyder-associates.com
3	Iowa Local Agency Safety Workshop	Spencer	Tom McDonald 515-294-6384 tmcdonal@iastate.edu
4	Iowa Local Agency Safety Workshop	Red Oak	Tom McDonald
8	APWA Winter Maintenance Operator	Council Bluffs	http://iowa.apwa.net
9	Crash Analysis Workshop–Waterloo MDST	Waterloo	Bob Sperry 515-294-7311 rsperry@iastate.edu
9	APWA Winter Maintenance Operator	Des Moines	http://iowa.apwa.net
9–12	NHI Fracture Critical Inspection Techniques for Steel Bridges	Ames	Sharon Prochnow 515-294-3781 rsperry@iastate.edu
10	APWA Winter Maintenance Operator	Des Moines	http://iowa.apwa.net
11	APWA Winter Maintenance Operator	Davenport	http://iowa.apwa.net
12	APWA Winter Maintenance Operator	Dubuque	http://iowa.apwa.net
16	Iowa Local Agency Safety Workshop	Ames	Tom McDonald
18	Iowa Local Agency Safety Workshop	Ottumwa	Tom McDonald
23	PCC Overlays Under Thru Traffic	Ames	Melisse Leopold
24	Iowa Local Agency Safety Workshop	Iowa City	Tom McDonald
25	Iowa Local Agency Safety Workshop	Waterloo	Tom McDonald
November 2012			
14	Updated–Accessible Sidewalks and Curb Ramps: Design to Installation	Ottumwa	Keith Knapp 515-294-8817 kknapp@iastate.edu
15	Updated–Accessible Sidewalks and Curb Ramps: Design to Installation	Red Oak	Keith Knapp
20	PCC Overlays Under Thru Traffic	Atlantic	Melisse Leopold
28–30	2012 Iowa State Association of Counties Fall School of Instruction	Des Moines	http://www.iowacounties.org
December 2012			
4–6	Iowa County Engineers Annual Conference	Ames	Keith Knapp
19	PCC Overlays Under Thru Traffic	Cedar Rapids	Melisse Leopold
January 2013			
8	PCC Overlays Under Thru Traffic	Sioux City	Melisse Leopold
18	PCC Overlays Under Thru Traffic	Ottumwa	Melisse Leopold
29	Work Zone Safety	Ames	Tom McDonald
30	Work Zone Safety	Cedar Rapids	Tom McDonald
31	Work Zone Safety	Cedar Rapids	Tom McDonald
February 2013			
1	Work Zone Safety	Ottumwa	Tom McDonald
March 2013			
4	Work Zone Safety	Mason City	Tom McDonald
5	Work Zone Safety	Mason City	Tom McDonald
11	Work Zone Safety	Storm Lake	Tom McDonald
12	Work Zone Safety	Sioux City	Tom McDonald
13	Work Zone Safety	Council Bluffs	Tom McDonald
28	Work Zone Safety	Ames	Tom McDonald
August 2013			
15-16	2013 Mid-Continent Transportation Research Symposium	Ames	Judy Thomas 515-294-1866 jathomas@iastate.edu

Stormwater management training

The Iowa Economic Development Authority is offering a variety of stormwater training opportunities in October.

Comprehensive Approaches to Stormwater Management for Design Professionals is being offered in Eastern Iowa on October 8, Central Iowa on October 9, and Western Iowa on October 10.

In addition, the Putting Policy into Practice: Green Infrastructure Tour is being offered on October 18.

For more information about these and other training opportunities from the Iowa Economic Development Authority, visit their website at http://www.iowaeconomicdevelopment.com.

2012 Iowa Snow Roadeo winners

More than 80 people participated in the 2012 Iowa Snow Roadeo, held September 13 at the Iowa State Fairgrounds.

The Roadeo is an annual Iowa LTAP event that gives snow plow truck drivers, loader operators, and grader operators the opportunity to test their knowledge and showcase their skills by navigating courses that imitated the challenges faced by winter road maintenance personnel when removing snow from city streets and county roads.

Out of xx competitors in the loader competition, Brian Snyder (City of West Des Moines) took first place; John Virden (City of Des Moines) took second place; and Jimmy Hutson (Des Moines County) took third place.

In the motor grader competition, out of xx competitors, Patrick Linehan (City of Davenport) took first place, while John Virdin (City of Des Moines) placed second and Larry Laughridge (City of West Des Moines) placed third.

Out of xx participants in the snow truck competition, the City of Des Moines had a strong showing with the team of C.J. Houseman and Justin Maschke taking first place and the team of Paul Forck and Lew Lintz taking second place. Russ Dickerson and Scott Lindquist from the City of Ames placed third.

Loader winners: 1st (left)–Brian Snyder, City of West Des Moines; 2nd (middle)–John Virden, City of Des Moines; 3rd (right)–Jimmy Hutson, Des Moines County

Grader winners: 1st (left)–Patrick Linehan, City of Davenport; 2nd (middle)–John Virden, City of Des Moines; 3rd (right)–Larry Laughridge, City of West Des Moines

Snow plow truck winners: 1st (left)–C.J. Houseman and Justin Maschke, City of Des Moines; 2nd (middle)–Paul Forck and Lew Lintz, City of Des Moines; 3rd (right)–Russ Dickerson and Scott Lindquist, City of Ames

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