Using recovered materials in highways

Waste materials generated by industry and consumers can be useful in building highways, filling embankments, and backfilling trenches. Using recovered materials this way helps dispose of them constructively and avoids filling up expensive landfill space. Often they can replace expensive, and sometimes scarce, virgin materials. Recycled glass, bottom ash, foundry sand, and steel slag have all been used successfully in state and local projects. All are easily crushed and blended using conventional aggregate processing equipment.

A new fact sheet, Using Recovered Materials in Highway Construction, No. 20, and a videotape on using recovered materials, are now available, produced by the T.I.C. in cooperation with the Wisconsin Recycling Market Development Board. They discuss how to use the four most common recovered materials and identify more than two dozen successful application sites around the state.

Base course and embankment fill are among the most common uses. Producers classify their waste materials into standard industrial byproduct categories and certify them with the state Department of Natural Resources. As a result, they can normally be used with no additional permits or certification from DNR.

Glass of mixed colors can’t be recycled into new glass and is a prime candidate for construction use. It is locally available from recycling centers around the state. Crushed to a maximum size of about 1/8 inch, it can be used by itself as a backfill material or blended with natural aggregate. Standard specifications for using glass and other reclaimed materials are available from the Wisconsin Department of Transportation. Wisconsin is a leader in evaluating and using recycled materials in highway construction. WisDOT has done considerable testing and evaluation and numerous demonstration projects. The Recycling Market Development Board has worked with recycling facilities to identify, test and classify suitable materials.

Contact the T.I.C. for copies of Using Recovered Materials in Highway Construction, Bulletin No. 20. Contact the Recycling Market Development Board at 800/435-7287 for information on materials availability. Your WisDOT district office materials section can help with specifications or advice on appropriate use.

Waste glass is one reclaimed material that has many uses, such as trench backfill and base course material. Waste glass is one reclaimed material that has many uses, such as trench backfill and base course material.

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**Quick fix for hot mix repairs**

From Michigan comes a single truck system for small hot-mix road repairs. The key? A front-mounted steel drum roller that uses hydraulic down pressure for wedging and pothole patching.

“This works great,” says Mike Roper, managing director of the Otsego County, Michigan, Road Commission. “It smooths off the repair so you don’t have a bump.”

The relatively inexpensive roller—under $4500—mounts on the plow frame of a single-axle tandem truck. The 48-inch steel roller weighs 1100 pounds and exerts up to 2500 psi of pressure. It includes an integral roller wash and scraper system. Otsego County found the device so useful that pothole patching.

Roper says, “It’s a quick job to take it on and off. It’s all self-contained with its own hydraulics. All it needs is power.”

“Nothing is gained, and the crew’s labor is wasted. Javeline patch can last, research shows, and you don’t need to square up the hole or use a vibratory compactor to make that happen. Repairs using the “throw and roll” method will last a year or longer if you use high quality materials and make sure to compact the patch. The easiest way to compact is to drive over the patch two or three times with the truck. Using separate compaction equipment will produce even better results.”

“Patching material should combine high quality crushed aggregate with few fines with emulsified asphalt binders having an anti-stripping additive. It need not be very expensive. The lowest cost material tested in the study, PennDOT 485, performed as well as proprietary mixes costing twice as much. And it can be easily produced in local hot mix plants.”

The pothole study included 1250 pothole patches in 22 locations around the US. It was conducted by the SHRP research project of the Federal Highway Administration. Details for PennDOT 485 patching material are available from the T.I.C. Call, write, fax or email for a copy.

For more information about truck-mounted rollers, phone AIS at 800/320-1247. Story adapted from the April/June 1998 issue of The Bridge, newsletter of the Michigan LTAP center.

**Compaction crucial for pothole fixes**

How often do you see crews toss some cold mix in a pothole, pat it with the shovel and drive off? No wonder that pothole is back—bigger than ever—in a week or two. Nothing is gained, and the crew’s labor is wasted. Javeline patch can last, research shows, and you don’t need to square up the hole or use a vibratory compactor to make that happen. Repairs using the “throw and roll” method will last a year or longer if you use high quality materials and make sure to compact the patch.

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**SU PERPAVE benefits**

Wick paving contractors in Eagle River, “It’s good because it requires you to pay attention to the fine aggregate angularity, and because the level of mix design corresponds to traffic counts,” he says. He also appreciates having more levels in the MV classification than before.

The new technology required drastic changes in laboratory analysis and testing. Fortunately the asphalt industry, Wisconsin’s paving industry, and WisDOT have converted to this system and can do the required tests.

Local agencies can now begin asking for these products because the industry can deliver.

**How to try SUPERPAVE**

The first step is easy. Specify the asphalt binder using Performance Graded (PG) specifications. WisDOT has selected one grade for its projects. Local highway and street agencies will want to select others that better reflect regional differences—softer asphalt for up north, for example. The AASHO MP1 table gives guidance on selecting the right PG asphalt.

“Refineers understand the system,” says Hussain Bahia. “You can be specific in requiring asphalt that is performance graded for your conditions.”

The next step is to use SUPERPAVE mix design to specify aggregate gradation, asphalt content, voids, etc. WisDOT now has considerable experience with SUPERPAVE mix designs for high volume (HV) roadways. Local agencies will need to work with their suppliers to identify similarly successful MV and LV mixes appropriate for county and local roads.

One approach is to have commonly used mixes evaluated by the SUPERPAVE system for the area’s temperatures and the project’s traffic volumes. Alternatively, a mix design specialist can suggest a mix based on those data.

“Customers need to do their homework first so they’re not surprised,” says Pilkil. “They need to select a job, research, talk to the contractor, get a budget estimate and then try one.”

Costs to use SUPERPAVE technology are comparable to those for existing processes, according to Bahia. Some contractors who tried SUPERPAVE designs found that the mixtures they produced cost less, while others indicated there was an increase in design and testing costs. Testing costs are in the range of $2000-$3000 for a typical 100,000 ton asphalt paving project.

The benefits are substantial. Pavements designed specifically for the environment and conditions will result in longer pavement life and fewer construction and maintenance delays for the traveling public. The Federal Highway Administration estimates that $40 billion is wasted every year because of delays related to highway maintenance.

Now that Wisconsin’s progressive asphalt industry can effectively supply these better performing pavements, the next move is up to local agencies. They must be willing to become more knowledgeable customers and know how to ask for these quality products.

For help in selecting performance graded asphalt and SUPERPAVE mix designs, contact your paving contractor and consulting engineer. You can also contact the Asphalt Research Program of UW-Madison at 608/262-8949. WisDOT has a State Standard Specification for Performance Graded Asphalts which you can review or reference in your bid specs. Copies of the AASHTO performance graded asphalt chart are available from the T.I.C. Call, fax, e-mail or write (see form below).
Setting speed limits on local roads

Across the country, speeding is a major concern—with good reason. Seventy percent of drivers exceed posted speed limits, most by 10 mph or more, according to one study. And, as speeds go up, crash severity and injury risk increase—by 5% for each one mph, another study suggests.

Setting speed limits can be a challenge for local officials. They must balance a variety of competing, and often vocal, concerns from drivers, residents, fire departments, law enforcement agencies, and traffic engineers. To be legal and enforceable, speed limits must be properly set following state statutes and adopted by local ordinance. A new fact sheet from the T.I.C. will help.

Driving behavior is difficult to manage, however. Most drivers choose a speed that feels safe and comfortable to them with little attention to posted limits. Many other things influence what speed they choose:

• road geometry
• land use
• traffic volume and prevailing speed
• weather and road conditions
• presence of pedestrians, bicyclists and parked cars
• their own attitudes, habits and capabilities
• their vehicle’s type and characteristics
• enforcement and public attitudes

Before setting limits on a road section, you must do engineering and traffic speed studies, according to the statutes. You may find county Traffic Safety Commissions and district WisDOT engineering staff helpful. It is particularly important to coordinate limit setting and enforcement with your local law enforcement agency.

In general, speeds should be consistent, safe, reasonable and enforceable so as to encourage voluntary compliance. When limits are unreasonably low drivers disregard them and learn disrespect for all limits. At the same time low limits may give pedestrians and residents a false sense of security. On the other hand, unreasonably high limits create unnecessary risks.

When limits are set so that 85% of drivers voluntarily comply, it is then possible and reasonable to enforce them with the 15% who drive too fast.

Setting Speed Limits on Local Roads, No. 21, explains the philosophy, summarizes statutory limits, and describes the process for changing limits. It also discusses signs, enforcement, advisory speeds, and other speed issues.

The state has set speed limits for all roads. However, municipalities can change them under authority and guidelines in the Wisconsin Statutes. For example, the statutory limit is 25 mph on residential streets within a village or city. Local authorities responsible for the roadway can raise or lower that limit by as much as 10 mph.

Common sense says that regulating speed is a good way to make streets and highways safer. As a result, citizens may demand lower speeds, especially after a severe crash or pedestrian injury.

Test your Flagging I.Q. — What’s wrong with these pictures?

1. No equipment. A flagger should always use the proper equipment. At a minimum, a traffic cone, a stop/slow paddle and a safety vest, shirt or coat of approved color are required. Approved colors are orange, yellow, yellow-green, and fluorescent versions of these colors. Too often flaggers use an 18”x18” orange flag instead of the required stop/slow cone. In emergency situations only, a red-orange 24”x24” flag can be used, but must be replaced with a stop/slow cone as soon as it is available. The 18”x18” orange flag is not permitted for flagging.

2. No escape route. A flagger should stand there is always a free escape route. Too often a flagger stands next to a parked car or other obstruction that blocks a safe and quick get-away.

3. In shade and not on shoulder. A flagger needs a hat, sun glasses, water, and sun screen for protection from the sun.

4. Not on shoulder. A flagger should stand on the shoulder. Sometimes a flagger has to wait for the road to be more visible to approaching cars. If this is necessary, the flagger should only enter the road after one or more cars are stopped. The flagger should always return to the shoulder before releasing traffic.

Crossroads

Spring 1999

Crossroads

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Asphalt pavement warranties successful

Warranties, long available on products from toasters to TVs, are now being offered on hot mix asphalt pavement projects in Wisconsin. Contractors have built nearly 300 miles of warranted projects on state highways since 1995 and the state is very pleased with them.

“We’re pretty excited about it,” says John Volker, Chief Product Quality Manger for WisDOT. “We’re always looking out for the taxpayer, and we think we’re getting our money’s worth out of it.”

The warranted pavements are performing better than typical pavements and cost less per ton than standard projects, according to an October 1998 WisDOT Progress Report on Asphaltic Pavement Warranties.

For warranty projects the owner specifies the final product in terms of condition and performance, such as roughness, noise level, ride quality, skid resistance, and lane width. The owner also agrees to do what is necessary to achieve the results specified within the warranty period. WisDOT establishes the warranty project criteria and parameters.

Warranties are a good way to help contractors understand the owner’s quality standards and performance criteria. With the help of WisDOT, contractors are better able to accurately price projects.

WisDOT provides oversight and professional services to prepare the specifications for the warranty project.

Warranties are offered on hot mix asphalt. They give the contractor responsibility for selecting the mix formula and all materials, and for developing a quality control plan. Contract bonds and five year warranty bonds are required.

They also set up a conflict resolution team as the final authority if a conflict occurs.

Establishing warranty criteria is a critical element. Criteria are described in terms of common types of pavement distress: edge raveling, flushing, longitudinal cracking, rutting, pot-holes, etc. A threshold level and remedial action is defined for each type. For example: Flushing, 20% of the segment length, remove and replace distressed surface mixture full depth.

Warranties are only available on the hot mix asphalt portion of asphalt paving projects. Native soils are extremely variable, so contractors and WisDOT have been very careful to choose sites with stable, well-drained soils that are adequate, we can do a warranty project.

Currently there are no unified and verifiable criteria for quality subgrade and base course preparation. Differences of opinion as to what would support the new base and asphalt “caused many arguments” and created “very stressful project situations,” according to the WisDOT’s Progress Report. The Department’s warranty design program is working on establishing functional and effective specifications for bases and subgrades.

Contract elements

Sample specifications are available for laying warranted asphaltic pavements over flexible bases and over concrete pavements. They give the contractor responsibility for selecting the mix formula and all materials, and for developing a quality control plan. Contract bonds and five year warranty bonds are required.

Asphalt pavement warranties successful

T.I.C. workshops

Specific details and locations for workshops are in the announcements mailed to all Crossroads recipients. For additional copies, or more information, call the T.I.C. at 800/442-4615.

Flagger Instructor Training. A 1 1/2 day training course for road supervisors and safety trainers who supervise or train flaggers for construction and maintenance operations. Participants will get the training and tools they need to properly train their own employees to be effective work zone flaggers. Participants will receive an instructor’s training kit that includes the Flagger Training Instructor’s Guide, a professional quality Flagger Training video, and 20 copies of the Flagger’s Handbook.

April 13-14 Wausau
April 15-16 Brookfield
April 19-20 Eau Claire
April 21-22 Cable

Flagger Training. This half-day workshop is for agencies that do not have their own flagger training instructors. It will be taught in various locations during May and June. Look for a brochure or call T.I.C. at 800/442-4615 if you would like to schedule a session at your location.

Roadway Maintenance. This workshop is your opportunity to improve your street and road maintenance operations. It will include preventive maintenance techniques and investigating and repairing pavement failures.

March 10 Green Bay
March 11 Brookfield
March 12 Barneveld
March 15 Rhinelander

Liability for Local Road Agencies. Learn your responsibilities for managing local road liability and ways to limit liability. The topics included are local government immunity, negligence, snow and ice removal, and traffic control. This is part of series on Local Transportation Issues.

If you haven’t received a brochure for the series call your local county Extension office or (608) 262-9960.

Consult your asphalt paving contractor and industry representatives to see if warranty work is feasible in your area. “Many contractors like it because they can control the quality ‘right now’,” says Jerry Waelt. “The workers take pride because they know that everything is hinging on their work. Contractors are willing to do warranty work because they know their product and they know it will stand up.”

“I think it’s a good idea,” says paving contractor Brian Pritik. “It’s a good tool for people to use in the right conditions, and it helps us deliver the project more smoothly.”

For copies of warranty specifications contact John Volker, WisDOT Bureau of Highway Construction, 608/246/H830.

Calendar

Crossroads

Getting started

Local officials could start at the project’s earliest design stage. Ask your consulting engineer if the project, or a segment of it, might be a suitable candidate for a warranty pavement. It is important to have good pavement history and accurate subgrade information.

Review warranty specifications and modify them to meet your needs and expectations. Copies are available from John Volker at the WisDOT Bureau of Highway Construction. Warranty construction, which was experimental, is now a standard process and approved by FHWA for federal highways.

- asphalt pavement construction has many benefits.
- soils are variable and subgrade preparation is very important.
- continued on page 5

UW-Madison Seminars

Local government officials are eligible for a limited number of scholarships for the following engineering courses in Madison. For details, call the office on page 7, call 800/442-4615, or e-mail: famun@engr.wisc.edu.

- Pavement Design May 12-13
- Planning and Financing Stormwater Management Programs May 17-19
- Municipal Engineering Fundamentals for Non-Engineers June 7-9
- Traffic Signal Design and Operations July 12-14

Other Training Opportunities

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Fleet Management Management April 12-21
Managing Street and Highway Design Projects April 19-20
Environmental Impacts of Highway Projects April 26-28
Mastering the Budget Process in Public Works May 10-12
Highway Drainage Design May 10-11

Other Training Opportunities

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Training flaggers to be safe and effective

Flagging may be an entry-level job but your flagger is the most visible member of your maintenance or construction crew. The safety of the crew and of the passing drivers depends on the flagger doing a good job. Every flagger should be appropriately trained and properly equipped.

Training for trainers—with handbooks and a video—help you prepare to do the needed training. The T.I.C. is again offering its 1½-day Flagger Training Course at five locations around the state. This course will give street, highway construction, and utility supervisors, and safety trainers the tools to properly train their own employees to be effective work zone flaggers.

Course participants will participate in the half-day flagger training course and then learn how to use the instructor’s kit to make their own training sessions interesting and effective. Participants receive the Flagger Training Instructors Guide, a professional-quality training video, and 20 copies of the Flaggers Handbook. For agencies too small to have their own flagger training, the T.I.C. will offer the half-day flagger course around the state in May and June.

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Crossroads Spring 1999

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“I get so tired of seeing workers put a shovel full of hot mix in a pothole and walk away,” said Norm Weber, sales manager of Ontario Excavating Co., Inc., Otsego, Michigan. “It’s too good. The guy’s crew is wasted. Pothole patches can last, research shows, and you don’t need to square up the hole or use a vibratory compactor to make that happen. Repairs using the “throw and roll” method will last a year or longer if you use high quality material and make sure to compact the patch. The easiest way to compact is to drive over the patch two or three times with the trucks tires. Using separate compaction equipment will produce even better results.

Patching material should combine high quality crushed aggregate with fine fives with emulsified asphalt binders having an anti-striping additive. It need not be very expensive. The lowest cost material tested in the study, PennDOT 485, performed as well as proprietary mixes costing twice as much. And it can be easily produced in local hot mix plants.

The pothole study included 1250 pothole patches in 22 locations around the US. It was conducted by the SHRP research project of the Federal Highway Administration.

How often do you see crews toss some cold mix in a pothole, pat it with the shovel and drive off? No wonder that pothole is back—bigger than ever—in a week or two. Nothing is gained, and the crew’s labor is wasted.

Compaction crucial for pothole fixes

With the roller mounted on a truck, the truck provides protection. The hydraulic pressure and the weight of the truck make a nice smooth patch.

Compaction crucial for pothole fixes

For more information about truck-mounted rollers, phone AIS at 800/320-1247. Story adapted from the April/June 1998 issue of The Bridge, newsletter of the Michigan LTAP center.

Quick fix for hot mix repairs

From Michigan comes a single truck system for small hot-mix road repairs. The key? A front-mounted steel drum roller that uses hydraulic down pressure for wedging and pothole patching.

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Waste materials generated by industry and consumers can be useful in building highways, filling embankments, and backfilling trenches. Using recovered materials this way helps dispose of them constructively and avoids filling up expensive landfill space. Often they can replace expensive, and sometimes scarce, virgin materials.

Recycled glass, bottom ash, foundry sand, and steel slag have all been used successfully in state and local projects. All are easily crushed and blended using conventional aggregate processing equipment.

A new fact sheet, Using Recovered Materials in Highway Construction, No. 20, and a videotape on using recovered materials, are now available, produced by the T.I.C. in cooperation with the Wisconsin Recycling Market Development Board. They discuss how to use the four most common materials, are now available, produced by the T.I.C. in cooperation with the Wisconsin Recycling Market Development Board. They discuss how to use the four most common recovered materials and identify more than two dozen successful application sites around the state.

Base course and embankment fill are among the most common uses. Producers classify their waste materials into standard industrial byproduct categories and certify them with the state Department of Natural Resources. As a result, they can normally be used with no additional permits or certification from DNR.

Glass of mixed colors can’t be recycled into new glass and is a prime candidate for construction use. It is locally available from recycling centers around the state. Crushed to a maximum size of about 1/8 inch, it can be used by itself as a backfill material or blended with natural aggregate. Standard specifications for using glass and other reclaimed materials are available from the Wisconsin Department of Transportation.

Wisconsin is a leader in evaluating and using recycled materials in highway construction. WisDOT has done considerable testing and evaluation and numerous demonstration projects. The Recycling Market Development Board has worked with recycling facilities to identify, test and classify suitable materials.

Contact the T.I.C. for copies of Using Recovered Materials in Highway Construction, Bulletin No. 20. Contact the Recycling Market Development Board at 800/435-7287 for information on materials availability. Your WisDOT district office materials section can help with specifications or advice on appropriate use.

Waste glass is one reclaimed material that has many uses, such as trench backfill and base course material.