Many advantages to flowable fill

Flowable fill, which goes by the formal name of Controlled Low-Strength Materials (CLSM), offers numerous advantages over standard backfill materials. It does not settle, for one. It is self-leveling, generally needs no compaction, and establishes load carrying capacity within a few hours.

Flowable fill allows all-weather construction—especially important in winter. It will displace water in a trench from rain or melting snow, and it can be heated like other ready-mix concretes and placed in cold weather. Due to these advantages, it often has a lower immediate cost than other backfill materials despite generally costing more per cubic yard.

Utility trenches can be smaller because they don’t have to accommodate compaction equipment. When closed with flowable fill the site can be covered with a permanent pavement patch and opened to traffic the same day. The patch remains solid because the fill doesn’t settle. If necessary, flowable fill, which generally is designed with a long-term compressive strength of 50-150 psi, can be excavated again with conventional digging equipment.

Although it is about as permeable as compacted granular fill, flowable fill effectively resists erosion. It has been used under culverts and other pipes to prevent water from eroding the support, and to fill voids under pavements, sidewalks, bridges and other structures where natural soil or granular fill has eroded away.

Flowable fill is readily available from local concrete suppliers. It is a mixture of water, Portland cement, aggregates, and sometimes fly ash. Proportions are determined by the application and necessary characteristics like flowability, strength, excavatability, density, etc. There are ASTM standards for flowable fill mixtures, but it is not always necessary to use standardized materials. Native sandy soils, quarry waste products, and pea gravel have all been used successfully as aggregates.

Fly ash is sometimes used in flowable fill to improve flowability. It can also increase strength and reduce bleeding, shrinkage and permeability. Flowable fill with fly ash is available in Wisconsin from WEPCO and other electric utilities. It is produced under agreement with the Wisconsin Department of Natural Resources.

For more information on flowable fill, contact the T.I.C. for a copy of Controlled Low-Strength Materials. Use the form on page 7.
Idea Exchange

Signs, mirrors and lights help plow drivers

Onalaska has added accessories to their plow trucks to improve safety. New large signs, as shown in this photo, warn motorists to be careful behind trucks. The city has mounted the signs on all their tailgate and V-box spreaders. “They cost about $500 all together,” says John Marcou of the Onalaska Streets Department. “We figure that if we can prevent one backing accident they are more than paid for.”

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Suggestions from participants addressed snowplow driver fatigue and boredom. One was to keep the truck cab at a cooler temperature and dress appropriately. Warm temperatures tend to make the driver more drowsy. Others reported snacking on vegetables and fruit to help fight boredom and fatigue. Keeping the cab clean and clear of non-essential items was recommended. Snowplow driver fatigue becomes a critical issue after extended hours of plowing under difficult conditions. The national Commercial Drivers License requirements do not limit hours of operation for municipal employees, who are exempted, as they do for the over the road drivers.

Agencies are encouraged to provide safety equipment and comfort options for snow plow trucks. Among those suggested are: heated exterior mirrors, electric windows to allow the driver to open the passenger window for additional ventilation. Provide the best driver seat available. Agencies are now also including AM/FM radios and weather channel radios to supply additional information and help reduce driver fatigue and monotony.

continued on page 3

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Name ___________________________ Title/Agency ________________________________ Address ___________________________________________ City __________________ State ___ Zip ____________

Phone (         ) ______________________ fax (          ) _________________ e-mail _______________________

My idea, comment or question is ________________________________________________________________

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At the request of utilities, degradation fees and formulas are being reviewed by the Public Service Commission. Its findings are likely to affect them. Crossroads will report the outcome of these deliberations in a future issue.

Technical recommendations

A variety of remedies are recommended as a result of the recent extant-of-damage studies. Wider overcuts, extra depth of asphalt, and shape of patch all can help compensate for the weaknesses caused by pavement cuts. Some of these are:

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- Require pavement be saw cut before excavation.
- Minimize excavation size. Use trenchless methods if possible.
- Require proper bedding for pipes.
- Set specific backfilling and compaction requirements, and test to see they are met. Consider requiring flowable fill (see story on page 8).
- Require greater patch depth on asphalt, T-shaped patches on concrete.
- Set and enforce safety requirements for both workers and traffic.

Inspect. Inspect. Inspect.

Policies and communications

You cannot ensure that proper techniques are used or recover fees for street deterioration without a right-of-way occupancy policy. Your municipality should establish a permitting process, prepare written technical specifications, and enforce them. The T.I.C. has sample policies you can use as a starting point. (See Resources on page 5.)

Nothing is more disheartening than watching utilities or others cut into brand new pavement. Except for emergencies, most utilities plan repairs and replacements up to two years ahead. As a result, effective communication can coordinate utility work with reconstruction and overlay plans. Dane County, for example, has a meeting each February with representatives of municipalities and utilities to discuss and adjust plans before the construction season begins. Get started on right-of-way and utility cut policies soon. The life you save may be your pavement’s.

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Dark winter days make inspection easier. Staff can inspect signs during the first hour or two of the morning when it is still dark. Start with the most critical signs: Stop. Do Not Enter, and other warning signs. Signs can also be spot-checked based on their installation date.

It is also important not to overuse the color so it doesn’t lose its effect.

Highway Safety Workshops are a workshop on sensible signage and pavement marking for local government maintenance, and safer driveways, intersections and roadides.

Jan 5 Green Bay Jan 19 Cable
Jan 6 Brookfield Jan 21 Tomah
Jan 7 Barneveld Jan 20 Eau Claire
Jan 18 Rhinelander

Local Transportation Issues ETN Series The UW Local Government Center and the T.I.C. address transportation issues in workshops on ETN (100+ Wisconsin cities). Thursdays from 10:30 am to 12:20 pm. $10 per session. Call 608/262-9960 for a brochure.

Local Transportation Aids and Other Local Roads Issues (ETN, Jan 10) Learn about funding and qualifying for WisDOT local transportation improvement and assistance programs. Also covers new WBIR local road database software, and other Local Roads Advisory Committee recommendations.

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

Wisconsin T.I.C. unless otherwise noted.

Roadway Maintenance Learn how to improve your street and road maintenance operations. Topics will include how to rate the condition of your local roads, how to plan your maintenance program, and techniques for preventive maintenance and rehabilitation.

March 13 Rhinelander March 20 Green Bay
March 14 Cable March 21 Brookfield
March 15 Eau Claire March 22 Barneveld
March 16 Tomah

Roadway Maintenance

Wisconsin Pocket Guide to Work Zone Safety. It also covers pedestrian, worker, and flagger safety. Participants include maintenance personnel who plan and set up work zones. This training is conducted by the Wisconsin T.I.C. and the T.I.C. address transportation issues in workshops.

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UW-Madison Seminars Local government officials are eligible for a limited number of scholarships for the following engineering courses in Madison. For details, use the form on page 7, call 800/442-4615, or via e-mail: sauer-eng@wisc.edu.

GIS for Public Works, Feb 7-8 Managing Urban Forestry Programs, Feb 21-22 Maintaining Asphalt Pavements, Mar 27-28

Other Training Opportunities Pesticide Applicator Training for Right-of-Ways Fee $45/person. PreRegister through your County Extension Office or call 608/262-7588 by the date indicated. Course runs from 8:30 am to 2:00 pm. March 26 Milwaukee PreRegister by January 12
January 27 Waushau PreRegister by January 13

Public Works Supervisory Academy A certificate program in supervisory skills consisting of 10 one-day courses offered by UW-Madison at many state locations on an ongoing basis. Contact Gregg Miller, Professional Development and Applied Studies, (608) 263-6236.

Manual of Practice for an Effective Anti-Icing Program, Federal Highway Administration, 1996. This publication is a summary of recommended practice for using liquid anti-icing programs. The work is based on studies in several states. Intended for maintenance personnel responsible for managing anti-icing programs. Limited supply.

Controlled Low-Strength Materials (CLSM), American Concrete Institute ACI 229R-99, 1999, pp 15 basic information on CLSM—flowable fill technology, emphasizing CLSM’s ability to be cost saving and advantages over conventional compacted fill. Addresses technical properties, mix proportioning, construction, and quality control procedures.
Winter is a good time to inspect signs

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Frequently, all signs in a segment or corridor are the same age and can all be inspected on one trip. Stenciling dates on the back of signs also helps track aging.

Use a systematic review, based on your sign inventory if you have one, to plan for replacements and to estimate budget costs for spring town meetings.

On the next page are answers to some other sign maintenance questions commonly asked by Heydel.

## Resources

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### Equipment


### Training Opportunities

- Basic Work Zone Traffic Control for road supervisors and officials handling work zones, and contractors or safety personnel associated with road projects. This workshop covers traffic control devices, the parts of a workzone, and the steps that look good during the day can be nearly invisible at night because they have lost their reflectivity. Heydel is an instructor in the T.I.C. Highway Safety Workshops being offered in January. Check the Calendar for dates and locations.

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### Transport Costs

- Utility Accommodation Policies: To help your agency review, update or draft a new utility accommodation or street occupancy policy, the T.I.C. offers two samples. The Madison Co. Town Utility Policy is based on the WisDOT Utility Accommodation Policy. It offers a consistent approach and permit process for state, county, and town roads. The City of Madison Street Occupancy Ordinance and Permit, adopted Feb. 1999, includes a degradation fee.

### Snow Fence Guide

- Strategic Highway Research Program, 1999, 60 pp. Control of snow on highways and their drainage systems. It offers a consistent approach and permit process for state, county, and town roads.
Pavement cuts cost more than you think

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Pavement life goes down drastically around utility cuts—by five years according to a study in California; by seven to eight years according to a Vermont study. And, the best pavements suffer the greatest loss of useful life.

More damage comes from excavations made without pre-cutting the pavement. Jagged edges and stress cracks made by opening the pavement with a backhoe often produce poor patches and deteriorating pavement.

Degradation fees

Given these recent findings, some communities are charging pavement cut fees that better reflect the actual damage costs of the excavations. These degradation fees are in addition to the administration and inspection fee charged for the permit and the required proper repair.

One fee formula suggested by a study done for the Wisconsin Alliance of Cities, Inc., considers age of street, overlay and sealcoat using a straight-line depreciation schedule. The study also recommends a patch that is two feet wider than the cut on all sides.

Here is a sample degradation fee developed using this formula. It assumes a 20-year life for streets, a 12-year life for overlays, and a 5-year life for sealcoats. Average costs per sq. yard are based on a 1997 survey of Wisconsin cities.

<table>
<thead>
<tr>
<th>Area of cut</th>
<th>3 x 5 feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Age</td>
</tr>
<tr>
<td>Street</td>
<td>$3.6</td>
</tr>
<tr>
<td>Overlay</td>
<td>$11.5</td>
</tr>
<tr>
<td>Sealcoat</td>
<td>$5</td>
</tr>
<tr>
<td><strong>Total fee</strong></td>
<td><strong>$168</strong></td>
</tr>
</tbody>
</table>

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Reversible plows are now available with a flared moldboard to replicate a one-way plow in both directions. One agency has even mounted their one-way plow on a reversing frame to be able to use it in unusual situations for clean up.

Tips from Winter Maintenance Workshops

Some participants commented that new operators tend to drive too fast. While no specific speed guidelines will fit all conditions, operators must drive at a speed at which they are comfortable and confident to handle the equipment under diverse conditions.

Plowing private driveways

An informal survey of work- shop participants revealed a wide range of policies and approaches to plowing private driveways. Many towns do not have a policy, whatever. This seems to be especially true in the southern part of the state.

Up north, many towns do provide full or limited plowing services on request. Almost all towns that do this have a reimbursement system, and many require a waiver of liability for plowing on private property.

There are some interesting exceptions. Some governments are willing to clear vision corners of private drive- ways during unusually heavy snow conditions. Others limit driveway plowing to persons with special needs, such as volunteer fire department personnel and the elderly or handicapped.

Winter preparation

In addition to the checklist provided in the handouts, participants suggested a late fall shoulder maintenance program to ensure shoulders do not have harmful drop-off. This can be conducted just before freeze-up. Some agencies maintain a small stockpile of salt and salt/sand mixtures.

Snowplowing

Using shoes on plows for gravel roads was suggested. They are particularly helpful early and late in the season to avoid plowing off excessive gravel. Interest seems to be growing in using underbody blades for ice and snow pack removal. These blades are finding applications in urban as well as rural areas.

Urban streets need to be inspected, however, for protruding manholes and valve covers. These must be adjusted or the pavement patched so plows do not damage them. Some cities are now doing manhole repairs with infrared heaters to prevent plow damage during the winter.

Plows

 Wing plows continue to grow in popularity both in rural and urban areas. They make a significant improvement in efficiency with their ability to clean a wider lane than front mounted plows alone. They must be raised and lowered to avoid digging in the front edge. (Raise the front first, then the rear: lower the rear first and then the front.) Wing plows can be fitted with chains to prevent the front edge from digging into the shoulders. Some agencies have put shoes on their wings to reduce shoulder damage.

Visibility for wing plows is important. Drivers may tend to pass the vehicle and not realize the wing plow extends into their lane. Agencies are using flags, reflectors and lights to highlight the location of the wing plow.

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Flowable fill, which goes by the formal name of Controlled Low-Strength Materials (CLSM), offers numerous advantages over standard backfill materials. It does not settle, for one.

It is self-leveling, generally needs no compaction, and establishes load carrying capacity within a few hours.

Flowable fill allows all-weather construction—especially important in winter. It will displace water in a trench from rain or melting snow, and it can be heated like other ready-mix concretes and placed in cold weather. Due to these advantages, it often has a lower impervious cost than other backfill materials despite generally costing more per cubic yard.

Utility trenches can be smaller because they don’t have to accommodate compaction equipment. When closed with flowable fill the site can be covered with a permanent pavement patch and opened to traffic the same day. The patch remains solid because the fill doesn’t settle. If necessary, flowable fill, which generally is designed with a long-term compressive strength of 50-150 psi, can be excavated again with conventional digging equipment.

Although it is about as permeable as compacted granular fill, flowable fill effectively resists erosion. It has been used under culverts and other pipes to prevent water from eroding the support, and to fill voids under pavements, sidewalks, bridges and other structures where natural soil or granular fill has eroded away.

Flowable fill is readily available from local concrete suppliers. It is a mixture of water, Portland cement, aggregates, and sometimes fly ash. Proportions are determined by the application and necessary characteristics like flowability, strength, excavatability, density, etc. There are ASTM standards for flowable fill mixtures, but it is not always necessary to use standardized materials. Native sandy soils, quarry waste products, and pea gravel have all been used successfully as aggregates.

Fly ash is sometimes used in flowable fill to improve flowability. It can also increase strength and reduce bleeding, shrinkage and permeability. Flowable fill with fly ash is available in Wisconsin from WEPCO and other electric utilities. It is produced under agreement with the Wisconsin Department of Natural Resources.

For more information on flowable fill, contact the T.I.C. for a copy of Controlled Low-Strength Materials. Use the form on page 7.