

Good drainage lengthens road life

Improving roadway drainage can make your roads last longer. Last fall's **Roadway Drainage** workshops highlighted ways to identify the cause of drainage problems and how to follow up with effective improvements. The workshop instructor was David Orr, Technical Assistance Engineer with the Cornell Local Roads Program in New York. A former county highway engineer, Orr shared his experience with a very enthusiastic audience in this Wisconsin T.I.C. workshop series. For those who could not attend, here are several key points.

Good quality base course It is very important to insist on (and test) good quality aggregate for all roadway base and surfacing materials. One common sense step is limiting the fines in base course aggregate to less than 8%. It is not easy to tell the fine content of a graded aggregate just by looking, as a classroom demonstration showed. In the workshop most participants could not identify the best quality material from among three base course samples, even after touching them. This shows that running a simple gradation test on your aggregate is an essential, economical way to improve local road performance.



Roads with poor crown and no shoulder or ditch will suffer pavement failure.

should be maintained regularly to remove grass and debris that builds up along the edge and traps water.

Under drains Installing under drains can cut localized road failures from sub-surface water. These systems should be installed to drain the base course thoroughly to its bottom. It is important for the long term performance of the drains to keep fine materials out of them. Unfortunately, many fiber-wrapped pipes offered commercially for under drains are simply not effective in removing silt and clay material.

For the most effective long-term performance of under drains, enclose the pipe in granular material and wrap the entire trench in a geotextile designed for a separation layer. If you wrap the pipe with a geotextile, its apparent sieve opening should be 40 or smaller. Others have found that using washed concrete sand around the pipe will filter out the fines and not clog the under drain system. Do not confuse well-graded, washed concrete sand with uniformly sized mason sand. The mason sand will not be effective.

Pavement crown

Orr reviewed the value of good pavement and shoulder crowns for getting water off the road and into the ditch. The shoulder cross slope should be slightly steeper than the pavement crown to improve drainage away from the pavement. Shoulders

Under drains must be maintained. Design them to discharge into a ditch and cover the outlets with a rodent screen. Locate the outlet 6-12 inches above the ditch's flow line. This avoids back flow and clogging when silt and debris fill the ditch. Inspect the outlets periodically and clean as necessary.

Geotextiles have also proven effective in preventing road failures where there are poor subsoils and a high water table. The geotextile separates the base course from the fine-grained soils and water below. Non-woven geotextiles resist puncture well and give excellent long-term performance.



Culverts need proper cover and end treatments to prevent erosion and undercutting.

Installing culverts Most culvert installations are replacing existing culvert pipes. Orr cautioned participants to review the culvert's effectiveness before simply replacing it with the same size and type. Consult local residents and long time maintenance personnel about which pipes can adequately handle heavy storm flows.

A check on the sizes of upstream and downstream culverts can also be revealing. A simple way to spot undersized culverts is to compare the square footage of their openings. Changes in land development up stream from the culvert can also significantly impact pipe adequacy. Consider not only existing conditions but also improvements planned for the next few years.

Careful attention to backfilling around pipes is the most important step in avoiding damaged or collapsed culverts. It is good practice to place the backfill in 6 to 8 inch layers and compact each layer. Orr also cautioned about the false economics of using a culvert pipe that is too short. Pipes should be aligned with the stream's natural flow, not just placed perpendicular to the road. They need to be long enough to provide good protection at the end of the pipe and to avoid erosion and undercutting during heavy flow. It is always cheaper to buy an adequate length of pipe than to try to fix erosion and stream flow problems afterwards.

Diggers Hotline Orr reminded everyone to call Diggers Hotline at least three days before doing any excavation and to use its services. When you are planning an excavation, Diggers Hotline locates underground utilities and advises on safe working clearance for overhead lines. Orr also uses the Hotline to track other projects scheduled in his right-of-ways.

Protecting the environment Transportation liaison staff from Wisconsin DNR regional offices spoke at each workshop. They reviewed state regulations on erosion control and constructing and maintaining local roads near wetlands and navigable streams. DNR staff welcome questions about the regulations and will help local officials meet state requirements. They urged participants to contact them when planning work near

navigable streams and wetlands or projects that will uncover more than five acres of soil. A list of DNR transportation contacts for each county and a summary of the regulations were distributed and are available from the T.I.C.



Protect exposed ditch soil from erosion. Seed immediately and use erosion control blankets.

Maintenance Road-side ditches must be maintained. Ideally the ditch bottom should be at least one foot below the bottom of the base course. Its slope may need to be different from the roadway's slope to maintain flow and avoid erosion. Ditch slopes between 1% and 3% are most desirable.

Periodic cleaning is normally required to remove the build up of silt and debris. You can minimize ditch erosion if cleaning minimizes the area disturbed. Orr recommended to remove silt only from the ditch bottom and to avoid scraping soil from the slope on the sides. Exposed ditch soil should be seeded immediately by hand sowing the seed and walking it in. On steep ditch slopes that are subject to erosion, Orr recommended using erosion control blankets. These come in a variety of materials.

Culvert inspection and cleaning The workshops also highlighted the need for periodic culvert inspection and cleaning. A handy, short inspection form was included in the workshop handouts.

This inspection form, the *Roadway Drainage* manual, the *Diggers Hotline Guide*, and the handouts from DNR are available from the T.I.C. (See *Resources*, page 6.)

Good drainage makes your roads last longer. It requires regular maintenance and special attention when making pavement improvements.

Calendar

T.I.C. workshops

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

Maintaining Gravel Roads How to build and better maintain gravel roads taught by Ken Skorseth, Field Operations Manager of the South Dakota Transportation Technology Transfer Service. Workshop covers routine grader operations, fixing ruts and washboards, and proper surface materials/fabrics.

Mar 13 Rhinelander Mar 15 Eau Claire
Mar 14 Cable Mar 16 Tomah

Pavement Management for Local Roads: PASER & PASERWARE Learn to use the T.I.C. pavement surface rating system (PASER) to evaluate street and road conditions. See how the T.I.C. pavement management software (PASERWARE) helps keep good records of PASER ratings, set maintenance priorities, prepare budgets, and communicate proposals to decision-makers and the public.

April 6 Barneveld May 10 Cable
April 18 Stevens Point May 11 Eau Claire
April 19 Green Bay May 16 Tomah
April 20 Brookfield May 17 Fond du Lac
May 9 Rhinelander May 18 Brookfield

Basic Highway Surveying Methods A new one-day, hands-on workshop on basic plan reading, measuring, calculations, and setting grades will be held the weeks of June 12 and 19. Includes classroom and field exercises. Brochures will be mailed soon. Class limit is 20. Class locations:

Monroe Wauwatosa Manitowoc Barron
Marinette Rhinelander Sparta

UW-Madison Seminars

Local government officials are eligible for a limited number of scholarships for these engineering courses in Madison. For details, use the form on page 7, call 800/442-4615, or email: sauer@engr.wisc.edu

- Maintaining Asphalt Pavements**, Mar 27-28
- Improving Public Works Construction Inspection Skills**, Mar 29-30
- Preparing the Public Works Budget**, Mar 27-28
- Presenting the Public Works Budget**, Mar 29
- Municipal Engineering for Non-Engineers**, Mar 30-31
- Minimizing the Impact of Utility Cuts**, Apr 10-12
- Development Review and Access Management**, Apr 10-12
- Managing Street and Highway Design Projects**, Apr 13-14
- Traffic Signal Design, Maintenance, and Operations**, May 1-3
- GIS for Public Works**, May 2-4

Other Training Opportunities

Public Works Supervisory Academy is a certificate program in supervisory skills that consists of 10 one day courses offered by UW-Madison and taught at locations around the state on an ongoing basis. Contact Gregg Miller, Professional Development and Applied Studies, for more information at (608) 263-8256.

Better Communities through Traffic Calming A conference sponsored by WisDOT, Bureau of Traffic Safety (BOTS), on how traffic calming is making large and small communities safer and more appealing. The main conference is in Milwaukee on May 11. A mini-conference is in Eau Claire on May 8 and DePere on May 9. To register call 414/286-3263 or visit the safety partners web site at www.danenet.org

Spring APWA Conference May 10-12 at Milwaukee's Midwest Express Center. Wed. evening tours, reception and dinner are at Discovery World. Technical engineering and public works sessions are Thurs. morning with equipment-related presentations in the afternoon. Thurs. lunch is on the exhibit floor so participants can enjoy a major indoor vehicle display and exhibits. The business meeting and a talk on legal issues relating to public works projects/services by a City of Milwaukee Assistant Attorney are on Friday. Registration materials will be mailed to APWA members in early April. Non-members should contact Mariano Schifalacqua, Deputy Commissioner of Public Works Milwaukee, 414/286-3302 or Bill Kappel, Director of Buildings and Fleet, 414/286-2369.