The Center Line

Local Technical Assistance Program *Serving North Dakota Transportation Agencies*

North Dakota Transportation Technology Transfer Center

North Dakota State University

Vol. 21, No. 1

Fall 2004

Annual County Road Advisors Conference 2004 "You Show Us" Contest: North Dakota Enteries

FIRST PLACE

SAND SPREADER STAND

COUNTY: Barnes

CONTACT: Gary Yanish
Assistant Highway Supervisor
Tel 701 845 8508

ADDRESS: PO Box 306
Valley City, ND 58072

PROBLEM STATEMENT:
Each spring and fall, and sometimes in between, it is necessary to remove or install the sander attachment to the truck box. It is a little cumbersome to attach and does require two and perhaps 3 operators for this, with an approximate weight of 150 pounds involved. Also there is a concern for safety and employees injury in this operation.

On the right, Merle Swenson, SD LTAP, presents the 2004 "You Show Us" contest North Dakota State winner plaque to Barnes County entrants Gary Yanish, center and Jerry Loibl, left.

SOLUTION:
Gary Yanish came up with the idea of building framework and then using a come-along to do the lifting for them. Salvaged box beam guard rail (4" x 8") was used . The framework is 4 feet by 5 feet, and 8 feet high beams with crossbar was welded in place. Jerry Loibl, welder, assembled the framework. A come-along was then attached to the center of the crossbar. The sander can then be raised and lowered with the use of the come-along, and one person can attach and detach the sander from the truck. The short chain attachment on top of the framework is a guide for the operator in backing up to the framework.

LABOR, MATERIALS AND COSTS:
The box beam used was scrap metal. A 2 ton come-along was purchased for $19.00. A smaller come-along could have been used. The framework was assembled and welded by Jerry Loibl in less than a day. In attaching to the truck, only a small amount of adjustment is required.

SAVINGS AND BENEFITS:
The savings is minimal since this activity doesn't occur frequently with only a limited number of vehicles, however when it is necessary to remove or install a sander the operator can do this alone rather than wait for someone else to assist.
By using this mechanism the possibility of injury to the employee is reduced, since no lifting is required and only a small amount of hand adjustment is necessary for alignment.

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Routing Slip

Don't file this newsletter too quickly. Read it, photocopy what you want, sign below, and please pass it on — especially to the front-line troops.

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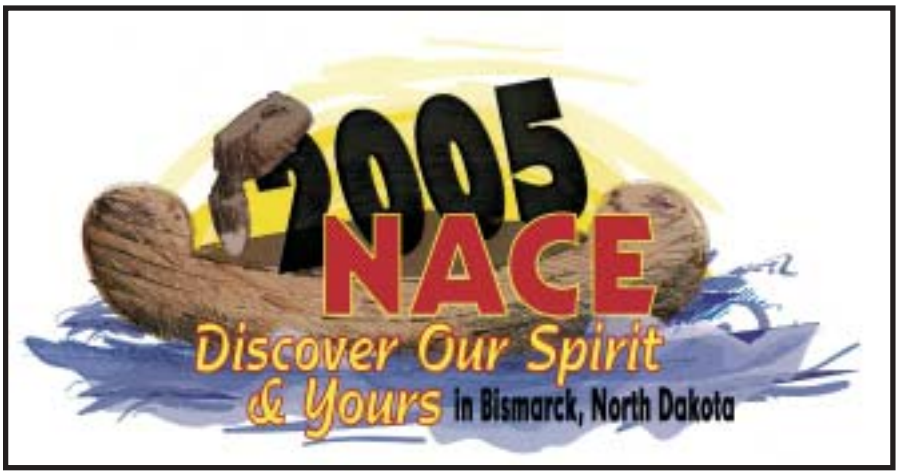
Return to:

_____

Gary Johnson with the hot box for asphalt mix



Sand Spreader Stand
Barnes County, ND

Sand Spreader Stand
Barnes County, ND

OTHER WINNERS

HOT BOX FOR ASPHALT MIX

COUNTY: Grand Forks

CONTACT: Gary Johnson
Equipment Operator III
Tel (701) 780-8248

ADDRESS: Grand Forks County
PO Box 5682
Grand Forks, ND
58206

PROBLEM STATEMENT:

Pothole repair on our asphalt roadways is an ongoing work activity. Grand Forks county uses the special " proprietary mix" which is provided in 50 pound bags. This mix can be used as cold mix or heated. We feel the heated mix provides a better finished product. With the smaller quantities used, a heating mechanism was not available other than direct heat with a torch.

SOLUTION:

A trailer with a flat bed was obtained. A metal box was built and mounted on the back of the trailer to be used as a heating chamber. A double floor with a 3 inch spacing was provided to apply indirect heat on the mix. The box is approximately 3 feet by 4 feet in size and 30 inches high. A door is provided on top for placing of the mix. Also, doors are provided on the end for taking out the hot mix and placing in the potholes. The box will hold 20 bags of mix. The burner is 25 psi (400,000 btu) heating system, using propane gas.

Immediately in front of the hot box is a storage area where a pallet of the

mix can be placed, making it convenient for loading the mix and placing into the hot box. The propane tank is located on the front of the trailer. A smaller propane tank with a small torch is carried along for cleaning of the tools. A compartment below the bag storage area is provided for storage of rakes and shovels. Also a small storage bin for empty bags is provided.

Prior to going out to the work site, the hot box is filled with mix. The burner is lit prior to leaving the yard and remains lit while traveling to the work site. When arriving at the work site the mix is hot and ready to be placed.

A leaf blower is also available. Prior to placing the mix, the hole is blown out with the use of the leaf blower.

LABOR, MATERIALS AND COSTS:

The entire trailer assembly was assembled in the shop. Purchased materials were an axle and wheels ($400), heater ($100), flatbed and other metal ($300). Total cost for purchased materials was about $800.00, along with using other salvaged materials from around the shop.

Labor for doing this was about four days. Work was done during slack winter days when there was no snow to remove.

SAVINGS AND BENEFITS:

The convenience of having the mix readily available speeds up the patching process, permitting more mix to be placed in a day. We know the process is more efficient this way, however it is difficult to estimate any savings or increased work production.
The benefit of using heated mix is, we feel, a better finished product The patching material can be placed cold, however it is felt better compaction is obtained with the hot mix, resulting in a patched pothole that will last longer than using conventional methods.

Having all the materials and tools required located on one unit also will provide for more safety when working on the roadway. With a more efficient operaton, less time will be spent working on the roadway, resulting in less interruption to the public.

The hot box is both practical and versitile

ADAMS COUNTY ROAD SUPERINTENDENT RETIRES

By: Vernon Monger

Dean Erickson, the Adams County Road Superintendent has recently retired. Dean was a county road department employee for over 31 years and the road superintendent for the past 12 years.

Several years ago when Adams County and the city of Hettinger combined their road and street departments, Dean became responsible for the city public works department as well as the county road department.

Dean has been very involved in the LTAP programs over the years and has implemented many of the computer programs into the county system. He has also been very supportive of the LTAP training programs scheduled in his area and maintains the programs have been very valuable to his operations.

Dean and his wife now reside in Bismarck and although he is retired, Dean will continue to pursue other interests in the Bismarck area.

Theo Schalesky has replaced Dean as the road supervisor, having worked in the road department for a number of years.

Dean Erickson retires after 31 years

GIS MAPPING

COUNTY: Mercer

CONTACT: Kenneth Nelson
Tel: (701)873-5586

ADDRESS: PO Box 412
Beulah, N.D. 58523

PROBLEM STATEMENT:
Mercer County needed an accurate inventory and accountability of all cemeteries, platted and un-platted within the county. To date, the only map the county had was very old and in poor shape, with only a handwritten "x" to show the approximate location of a cemetery. In addition to being very hard to read, the map was inaccurate and incomplete.

SOLUTION:
Extensive research has and is being conducted by the GIS Technician – Darcy Thompson employed through the County Highway Department, to construct a modern, workable map. The editing of existing information from the County Recorder's office and church records, as well as the discovery of new sites through public involvement, are all contributing to a successful project's end. The local newspaper helped get the word out by running an article describing this huge task. This inspired many phone calls, with one person traveling from several states away to visit with the county and show them a burial site on rural property still under his ownership.

Although Mercer County has implemented a successful GIS (Geographic Information Systems) program since 1998, they did purchase a notebook / tablet PC earlier this year to aid in the task of collecting GIS information in the field. A mobile GPS unit which attaches to the tablet PC was purchased as well. In addition to holding all the county's GIS information compiled over the last 7 years, the tablet PC/ GPS unit was invaluable in collecting the information needed for the cemetery project. The GPS unit is attached through 1 of the 3 USB ports which had to be emulated to a Com port. When the burial site is located, the technician acquires the point which is then automatically dumped directly into real world coordinates. The operator then inputs all additional information such as the cemetery's name, a number assigned to each one, and any notes there might be into the attribute table. Once back at the office, the project is then uploaded into the county's main GIS computer, where it will then be one more theme or "layer" available to add to the county map.

In addition to gathering GPS locations, digital photographs of each cemetery were also taken by Darcy. Back at the office, these photos were uploaded into the main GIS computer, and were then "hot linked" to the icons for each respective cemetery. The user or interested taxpayer can then see with one click the GPS'd location and digital photo of each cemetery all on one screen, which can be printed if needed. Eventually, all photos and

maps will be printed out and made into a "scrapbook" kept at the county office, but viewable by the public. Plans also include a printed wall map showing locations.

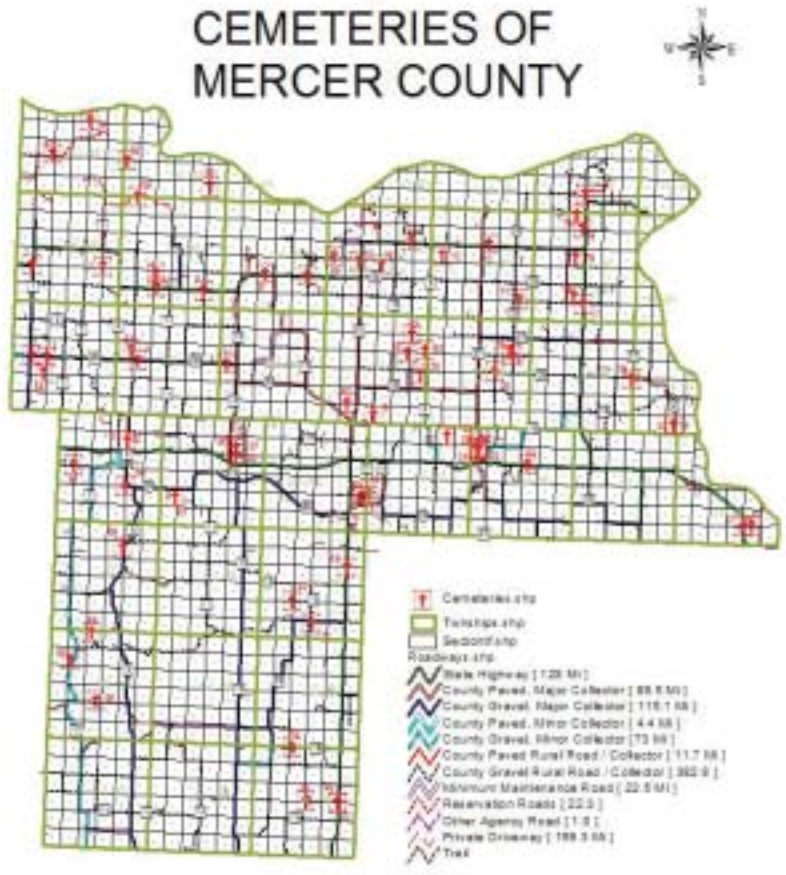
The existing records show that there were approximately 64 cemeteries/ burial sites identified. To date, there are 75 sites being input into the GIS program. As with any county, Mercer County is responsible to maintain and care for any cemetery that has no affiliation with a current church. (see ND Century Code Section 23.06.30) Having an accurate map will make this annual task much easier for county crews to complete.

Mercer County has also incorporated several other different themes which aid in the every day operation of the county and its employees. Some of these themes include: Oil, natural gas, & carbon dioxide pipelines, transmission lines, aerial photography, 7.5 minute quadrangle maps, survey control points, incorporated city limits, aquifers, school districts, emergency services districts, watersheds, election precincts, road right of ways, the county road sign inventory, bridges, soil classifications, aggregate pits, and land ownership.

LABOR, EQUIPMENT AND MATERIALS USED:
NEC Tablet PC
Magellan tablet PC compatible GPS Unit
ArcGIS 9x platform

COST:
NEC Tablet PC w/ CD/R & CD/RW capabilities, ArcGIS 9x & GPS unit = $3,500.00
These items are used for all themes in the GIS platform and are not strictly for the use of gathering the field data for the cemeteries.

SAVINGS/BENEFITS:
The historical significance of having the most up to date and accurate map of burial sites dating back to the 1830's is priceless, and there is much to be gained ethically with the preservation of these sites. Also, various departments of Mercer County have received calls from the public asking about cemetery locations. This project will make such requests easier to fulfill.



Sample GIS map for the cemeteries of Mercer County

How Does Retroreflectivity Work?

by George Huntington, WY LTAP

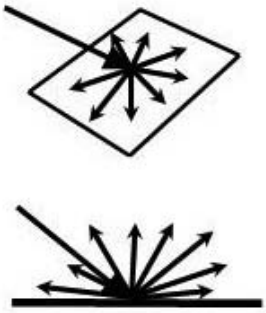


Figure 1.
Diffuse Reflection

Light can be reflected in a number of ways. Diffuse reflection scatters light in all directions, like when light bounces off a piece of white paper, as in Figure 1. Specular reflection takes place when light bounces off a mirror, as in Figure 2. Retroreflection bounces light back in the direction it came from, as in Figure 3. Signs have retroreflection so the light from a vehicle's headlights bounces back to the driver's eyes.

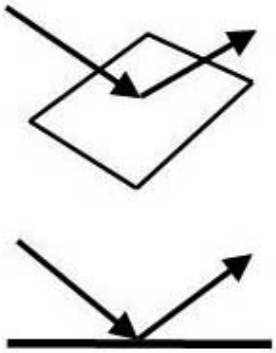


Figure 2.
Specular reflection

Different retroreflectivity materials send light back differently. Figure 4 shows the retroreflectivity cone. Some retroreflective materials return light in a very tight, bright cone. They can be seen from a long distance, but when a driver gets close to a sign and there is too great an angle between the viewer, the sign, and the headlights, the retroreflected light may not be seen. Other signs have a wider cone so they are still bright even when the angle between the headlights and the driver's eyes becomes larger. Figure 5 shows the angle that affects the brightness of retroreflected light as seen by the driver. Retroreflected light is more easily seen from a passenger car where the vertical distance between the headlights and the driver's eyes is less than with a taller vehicle.

For this reason, it is better to evaluate retroreflectivity from a truck or van since the angle between the headlights and the driver's eyes is greater. (It's also better to have an older person inspect retroreflectivity since our night vision deteriorates as we age.) Also notice that when the vehicle is farther from the sign, the angle gets smaller. Signs for placement on an urban street where they are seen from a closer distance, should have

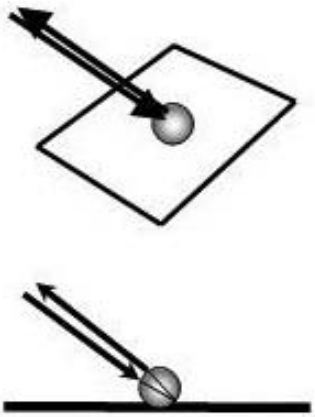


Figure 3.
Retroreflection

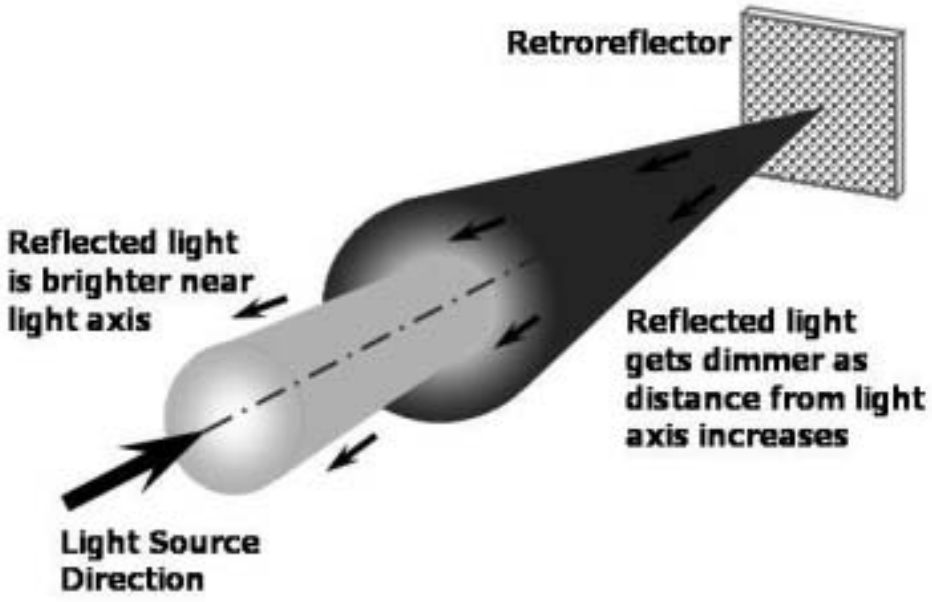


Figure 4. Retroreflectivity cone

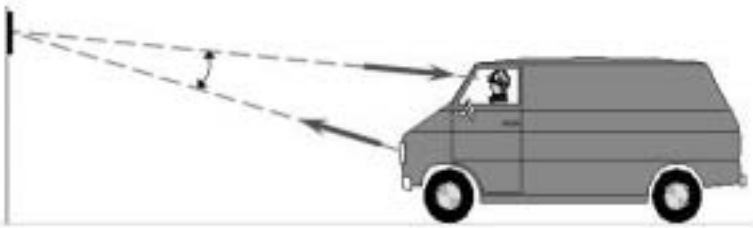


Figure 5. Viewing angle

a wider retroreflectivity cone, than signs on a rural road where they will be seen from further away.

Retroreflective sign material comes in two basic types, beads and prisms. Engineering grade material, which has been around a long time, have beads that bounce light back as shown in Figure 6. The glass beads in pavement marking paint retroreflect light in the same way. In general, engineering grade material has a fairly wide retroreflectivity cone but it isn't very bright. Prism materials, those with the small geometric patterns, bounce light off three flat surfaces of tiny prisms as shown in Figure 7. They generally return a brighter light than the beads of engineering grade sheeting. Different prism types have different retroreflectivity cones, so when purchasing sheeting material for signs, try to get material that is appropriate for its placement location.

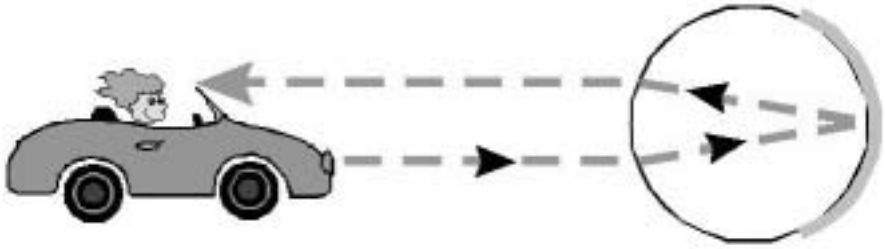


Figure 6. Bead retroreflection

One last point: With either sign type, the retroreflective beads or prisms are covered by a plastic material with a smooth surface. When installing signs, they should be twisted slightly away from traffic so the outside surface doesn't reflect light like a window pane. Specular reflection from the sign may direct glare at the driver, particularly truck drivers who may be as high as the sign. Glare is often a problem with temporary traffic control signs placed near ground height. Give 'em a little twist.

Thanks to Gene Hawkins of the Texas Transportation Institute for the figures and concepts in this article.

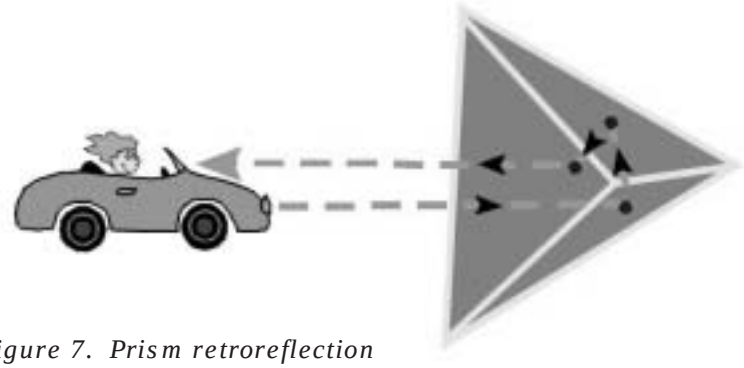


Figure 7. Prism retroreflection

COMING EVENTS

ND LTAP CENTER WORKSHOPS

Winter Survival
November 2, 2004
Dickinson, ND
November 3, 2004
Williston, ND

ND LTAP Road Scholar Graduation Ceremony
February 3, 2005
Minot, ND

Culvert Installation and Maintenance
February 15, 2005
Mandan, ND
February 17, 2005
Grafton, ND

Gravel Road Maintenance
March 8, 2005
Carrington, ND
March 9, 2005
Beulah, ND

Asphalt Pavement Repair
March 30, 2005
Bismarck, ND
March 31, 2005
Oakes, ND

Roadway Safety
Spring, 2005
Carrington, ND
Spring, 2005
Dickinson, ND

APWA & LTAP CLICK, LISTEN & LEARN SCHEDULE
www.apwa.net/Education/CLL/

Innovative Ideas for Sidewalk Management
November 17, 2004

Workplace Safety: Pre-Operation Inspection of Equipment
December 9, 2004

Minimum Sign Retroreflectivity Rulemaking

by Greg Schertz, P.E. - Federal Highway Administration - Denver

This fall, the Federal Highway Administration (FHWA) had proposed some amendments to the Manual on Uniform Traffic Control Devices (MUTCD) that may change how North Dakota municipalities maintain their signs. The proposed maintenance methods would establish a basis for improving nighttime visibility of traffic signs to promote safety, enhance traffic operations, and facilitate comfort and convenience for all drivers.

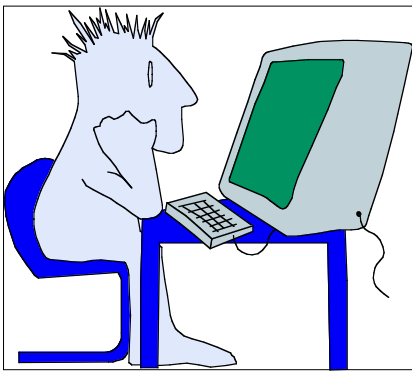
The public had the opportunity to comment on these changes through October 28, 2004, although this deadline may be extended. The changes can be viewed on the web at http://mutcd.fhwa.dot.gov/texts/2003-15149FR.htm. Comments can be mailed to the U.S. Department of Transportation, Dockets Management Facility, Room PL-401, 400 Seventh Street, SW., Washington, DC 20590, or submitted electronically at http://dmses.dot.gov/submit or http://www.regulations.gov.

The existing MUTCD requires that traffic signs be illuminated or retroreflective. However, until recently little information was available about the levels of retroreflectivity necessary to meet the needs of drivers and thereby define the useful life of signs. The notice is proposing guidance (as a "should" statement) for evaluating and maintaining traffic sign retroreflectivity to address the needs of drivers. The methods proposed would allow agencies options for evaluating and managing their signs to meet the minimum retroreflectivity levels in the FHWA publication entitled "Maintaining Traffic Sign Retroreflectivity" available at http://safety.fhwa.dot.gov/fourthlevel/sa03027.htm. These minimum levels are not proposed as part of the MUTCD language, in response to AASHTO concerns, but instead would be established by reference in the FHWA publication.

Five alternative maintenance methods are proposed to assess and manage minimum retroreflectivity levels for traffic signs: (1) visual nighttime inspections using calibrated signs, and so on, (2) actual sign retroreflectivity levels measured using a retroreflectometer, (3) replacement based on individual sign life, (4) blanket replacement of all signs in an area, and (5) use of a sampling of control signs that represent field signs. Under the proposed amendment, these methods could be used alone or in combination and would allow for a wide range of options for an agency to adapt them to their current sign management processes given the technical ability of their staff.

The notice proposes a seven-year compliance period for regulatory, warning, and post mounted guide signs and a 10-year compliance period for overhead guide signs and street name signs. The notice also proposes that certain signs may be excluded from the guidelines, such as parking signs and Adopt-A-Highway signs.

COMPUTER CORNER



FALL 2004

By: Russ McDaniel, ND LTAP

In the Spring, 2004 issue of The Center Line newsletter, Vernon Monger of the ND LTAP staff, introduced you to Mr. Jon Mill. Jon is the North Dakota Burleigh County Engineer and has served on the ND LTAP advisory committee for a number of years. Vern's article detailed Jon's professional career, hobbies, etc. and it was an impressive account. But two items in that story were of special interest to me.

One was the fact that he grew up in Two Dot, Montana and I understand Two Dot is a very special place.

The other was Jon's praise of the ND LTAP program. I was pleased that he singled out the computer programs developed by LTAP and indicated that Burleigh County uses the Microcomputer Data Management System (MDMS) and that it serves their needs very well.

Now Jon may joke and even exaggerate just a little when he talks about Two Dot (you should hear his account of the day he was born) but I think he was serious when he expressed his views regarding the MDMS program.

He went on to express his thought that, in his opinion, "there are several counties and cities that are not taking full advantage of MDMS and that he would like to see that changed". It was this comment that really gained my attention because I know I am largely responsible here.

I share Jon's concern that more counties and cities could benefit from using the MDMS program. I agree too that many existing users are not taking full advantage of the program.

I suspect the reason for this may be because potential users, and existing users as well, do not fully understand the benefits of using the program. The blame for this falls squarely on my shoulders because, it is apparent, I have not done an adequate job of presenting the program. Hopefully, this article will serve as a first step to remedy that condition.

The MDMS program is simply a process for maintaining records of each employee's daily time and activities.

HERE IS HOW IT WORKS:

Most all county road and city street department employees are required to submit daily time cards. Although no two of these cards are exactly the same design, they are very similar.

To be compatible with MDMS requirements, these time cards must include the following data items.

- Date
- Employee ID code
- Regular hours and overtime hours
- Equipment ID code and the number of hours or miles it was used - if he or she used equipment.
- Road or street ID code - if applicable
- Activity code - required for all

Continued on next page

APWA & LTAP
CLICK, LISTEN & LEARN

Self Assessment: A Checklist for Improvement
February 3, 2005

Get on the Same Page! Operations Manual to the Rescue
February 24, 2005

Tracking Public Works Technology: GPS, AVL, RFID
March 23, 2005

Target Legal 1 – Hidden Liabilities
March 31, 2005

OTHER EVENTS

ARTBA 2004 Roadway Work Zone Safety Conference & Exhibition
November 3-6, 2004
Baltimore, MD

National LTAP Association Winter Business Meeting
January 9, 2005
Washington, DC

Transportation Research Board (TRB) Annual Meeting
January 9-13, 2005
Washington, DC

Annual North Dakota Association of County Engineers Conference
February 2-4, 2005
Minot, ND

ATSSA Northland Chapter "How To" Conference
"How-To Arrive Alive in 2005"
March 22-23, 2005
Fargo, ND

Jon Mill

Burleigh County Engineer

- Activity code - required for all records
- Project code - if applicable
- District code - if applicable

- Department code - if applicable
- Roadway material codes and quantities - if applicable
- Fuel codes and quantities - if applicable

If MDMS is to be used to track equipment repair and maintenance costs, shop employees time cards must also include:

- Work order number - optional
- Cost of parts installed - from the supply on hand
- Cost of parts installed - special purchase
- Cost of parts a vendor or service garage may have installed
- Cost of Labor a vendor or service garage may have charged for services.
- A brief narrative describing the repair or service performed.

With these basic data items, you can readily examine and respond to a wide range of queries. For example, a road or street does not get bladed, a bridge does not get repaired, snow does not get removed, equipment does not get serviced or repaired, fuels are not used, etc. unless an employee is involved.

There are far too many report options and combinations of data items to be detailed here, but the following is an example of the type of reports that can be generated.

Let's assume you have been collecting these data items for a year and you have them on file in your computer. Let's assume too that a commissioner arrives at your office with a list of questions as follows:

- What was the total cost of grading all roads in 2004?
- How many times did you blade my road compared to a neighboring commissioner's road?
- What did it cost to blade my road?
- How much money did we spend grading County Route #10 in April compared to the costs in August, 2004?
- How many yards or tons of gravel were used to re-gravel County Route #10.
- What did employee John Doe do the week of July 12?

MDMS will generate a detailed or summary report in only a minute or two that would answer these types of questions.

The report would include the number of employee hours, his or her rate per hour and a total employee cost. It would include the equipment hours, the rate per hour and a total equipment cost. Additionally, the report would include the cost of roadway materials . . . roadway material details such as type and quantities are provided in a separate report. And finally, it would show a grand total of employee, equipment and material costs.

MDMS includes a wide range of both detailed and summary pre-designed reports to choose from. These reports can be printed or displayed on screen with a click of the mouse. For example, a user could:

- Compare operating costs for different makes of trucks or blades.
- Fuel consumption rates
- Employee sick leave records
- Equipment usage. Is there enough usage to justify owning versus renting?
- Roadway materials
- Compare operating costs for two brands of similar equipment

Another MDMS feature, that we think is second to none, is the report component builder. The report component builder is a very user friendly procedure to define the content of your reports.

Without this feature, users need to learn and understand operator symbols such as '=' equal to, '<=' less than or equal to, '>=' greater than or equal to, '<>' not equal to, and the list goes on.

In addition, users would need to use the terms '.and.' & '.or.' exactly as a computer intends them to be used. This sounds simple enough but, when we speak, most of us do not use these terms in the way the computer reads them.

There is one item in particular that I have always believed could be used to better advantage. That item is the Project field.

This is an optional item but one that can be used to great advantage for a wide range of conditions. It can be used to isolate costs for a particular project. For example, lets assume you have provided for an activity to track costs for bridge repair but you would like to isolate the costs for a particular bridge repair. If you assign a project number to this one job, the report generator will allow you to produce a report for either this single bridge repair or all bridge repairs.

Another example where North Dakota Highway Managers have used project numbers to an advantage is to track activities and costs for the Federal Emergency Management Agency's (FEMA) flood program. FEMA requires detailed reporting for each damage site and by assigning each of these sites a unique project number, MDMS can provide detailed reports for each location. Using FEMA site ID numbers as project numbers is the recommended procedure. This is an example of what Jon and I are talking about when we expressed our concerns that some existing MDMS users are not using the program to its full advantage.

One final example - a few years ago, a severe snow storm resulted in unexpected snow removal costs for the city of Wahpeton. Because the City Engineer knew he would have to request a substantial increase in his snow removal budget, he assigned a project number to track costs of removing snow from this particular storm. When he presented his budget adjustment request to the City Commission, he was armed with details to support that request. The details included man hours, both regular time and overtime, along with equipment hours and the resulting costs.

I hesitate to point out the program is user friendly because all developers claim their product is user friendly and we all know that is not the case. For example, a few years ago there was a TV commercial where a 10 year old boy states, "this computer program is so simple, even my Dad can use it". We here at the NDLTAP Center claim MDMS is at least as easy use as the one the little boy was plugging.

Mr. John Wright, Office Manager at the Traill County Highway Department and a long time user of the MDMS program, estimates it takes him approximately 20 minutes per day to enter employee time card data into his computer. He is reluctant to estimate the savings in time over a manual process but did not hesitate to indicate that the time saved is significant.

So, what do I do now as step #2? I am not a salesman, so I don't have the skills needed to go out and sell, even a product with no cost. However, if you would like more information or would like me to pay you an on-site visit to review the program, my number is 701-328-2658. My e-mail address is rmcdanie@pioneer.state.nd.us. We would welcome your call and we are anxious to help.

The program along with an operations manual is available to users at no cost. In addition, my services, both on-site and by telephone, are provided at no cost.

Jerry Lein

Wahpeton City Engineer (Retired)

John Wright

Traill County Office Manager

MAKE SNOW PLOWS MORE VISIBLE

One of the biggest problems with snow plows is being hit from behind. Typically, these collisions occur because the motorists following can't see the plow through the cloud of snow behind it. Increasing the visibility of equipment gives motorists more time to decelerate, reducing the chance of impact.

Make your plow more visible to following motorists by installing retroreflective tape and using bright color on the back of the plow and related equipment.

Retroreflective tape sends light from an approaching car's headlamps directly back toward the car's headlamps, making the vehicle more visible to the car's driver, even through a snow cloud. Use the red and white (silver) retroreflective tape (DOT C-2), installing it horizontally along the sides of the truck or plow and horizontally along the bottom and near the top rear.

Source: Adopted from Iowa Technology News, 2002.

Pre-Season Winter Maintenance Checklist

The following checklist can help you make sure your snow plows and other maintenance equipment are in good working order before the first storm hits.

—Ground Engaging Components—

Cutting edges and guards

- Inspect all cutting edges. Replace those that are broken or excessively worn.
- Inspect wear guards. Replace those that are broken or worn.

Running gear

- Inspect running gear shoes. Replace those that are broken, worn or missing.
- Inspect adjuster leg components, and replace all those that are damaged.
- Grease internal threads and sliding members.

Hardware

- Replace all missing or broken bolts. Use grade 8 plow bolts for steel cutting edges.

——Hydraulics——

Hoses

- Plug or cap any QC fittings and any open hose ends.
- Inspect hoses for any leaks or potential leaks. Replace as needed.
- Secure hoses with hose clamps.

Cylinders

- Check for leaks (If V-rod end seals are leaking, try tightening the pack nut ˘ turn. This method will often stop a small leak.).
- Inspect the cylinders for any chrome rod dents or scratches.
- Apply a light coat of oil or grease on the exposed rod surfaces.

Frame and Moldboard *Joints*

- Check pins, bushings, and pivot bolts for wear.
- Make sure all keepers are in place.
- Make sure shear bolts and pins are the same grade as those originally in the equipment (usually grade 2 or grade 5). Although you may be tempted to replace these bolts with a grade 8 bolt to reduce the need for replacement when plowing, the original-grade bolts are designed to shear, protecting the driver and the equipment.

Weldments

- Check for cracks.

——Setup——

- Replace worn or broken parts found by above inspections.
- Position plow in storage/parking space on a solid surface.
- Adjust running gear, if equipped, to hold plow frame at the level needed to reconnect to the truck. This adjustment will also properly set the running gear for plow operation.

——Replacement Stock——

- Check your stores of replacement stock.
- Order replacement stock by mid-fall to avoid shortages when the first storm hits.

——Visibility——

- Check the visibility of your truck.

Source: Iowa Technology News, 2002.

What is a Road Safety Audit?

A road safety audit is a formal safety performance examination of an existing or future road or intersection by an independent audit team.

Road safety audits can be used in any phase of project development from planning and preliminary engineering, design and construction. RSAs can also be used on any sized project from minor intersection and roadway retrofits to mega-projects.

The following executive summary provides additional background information on RSA's.

The executive summary and other supporting slides found throughout this site refer to road safety audit reviews (RSARs), which are road safety audits conducted on existing roadways. The current definition of road safety audits includes both existing and future roadways.

Most State DOTs have established traditional safety review processes through their high hazard identification and correction programs. However, a road safety audit and a traditional safety review are different processes. It is important to understand the difference between the road safety reviews that are commonly performed and newer road safety audits. The main differences between the two are shown in the table.

The site was developed by the Institute of Transportation Engineers (ITE) in cooperation with the Federal Highway Administration (FHWA).

Reprinted from the Roadway Safety Audits web site at:
www.roadwaysafetyaudits.org

Road Safety Reviews	RSAs
■ A safety review uses a small (1-2 person) team with design expertise.	■ A safety audit uses a larger (3-5 person) interdisciplinary team.
■ Safety review team members are usually involved in the design.	■ Safety audit team members are usually independent of the project.
■ Field reviews are usually not part of safety reviews.	■ The field review is a necessary component of the safety audit.
■ Safety reviews concentrate on evaluating designs based on compliance with standards.	■ Safety audits use checklists and field reviews to examine all design features.
■ Safety review do not normally consider human factors issues. This includes driver error, visibility issues, etc.	■ Safety audits are comprehensive and attempt to consider all factors that may contribute to a crach.
■ Safety reviews focus on the needs of roadway users.	■ Safety audits consider the needs of pedestrians, cyclists, large trucks as well as automobile drivers.
■ The safety review is reactive. Hazardous locations are identified through analysis of crash statistics or observations and corrective actions are taken.	■ Safety audits are proactive. They look at locations prior to the development of of crash patterns to correct hazards before they happen.

This Road Safety Audits web site was developed in the interest of information exchange. The site provides an easy, centralized way to access a variety of resources related to safety audits including: an overview of road safety audits and road safety audit reviews; the benefits of conducting road safety audits and incorporating them into safety programs; the legal considerations and implications of road safety audits; how to conduct road safety audits; and links to various road safety audit resources.

Before

This is a photo of an intersection in Grand Rapids, Michigan, before a road safety audit was conducted. The 2 traffic signal heads are hung on a diagonal span of wire and only one head is over the travel lanes. There are two lanes approaching the intersection separated by a dashed white pavement marking.

After

This is the same intersection after a road safety audit was conducted. The traffic signals are now hung on a box span of wire and they are now able to be hung directly over the travel lanes. Now there are three traffic signal heads, two for the through lane and one for the left turn lane. Pavement markings now show a separate left-turn lane at the intersection.

Photos courtesy of AAA Michigan.

WINTER DRIVING TIPS

The first frost and snowfalls have already hit parts of the country, meaning its time to dust off winter driving safety skills.

Here are a few winter-driving reminders from the National Highway Transportation Safety Administration and the Federal Emergency Management Agency:

- Install good winter tires and consider studs.
- Know what your brakes will do: stomp on antilock brakes, pump non-antilock brakes.
- Remember that stopping distances are longer on water-covered ice and ice.
- During daylight, rehearse maneuvers slowly on the ice or snow in an empty lot.
- Steer into a skid.
- Keep a windshield scraper and small broom for ice and snow removal.
- Keep the fuel tank at least half filled during the winter season, so your engine and its heater can keep running and keep you warm if you do get stuck and help is not immediately available.

Remote Imaging in Confined Spaces: Culvert and Down-Hole Applications

Amit Armstrong, Ph.D., P.E., Technology Deployment Engineer
Vancouver, WA

Why?

During a typical highway design and construction process, the need to assess the condition of existing culverts, cross-drains, and underdrains was the primary reason for acquiring the Rovver® 600 robotic remote imaging tool. This assessment is especially important for the small diameter pipes located under high fills and retaining walls that cannot be inspected manually. Use of this tool has allowed our highway engineers to make "fact based" decisions in either replacing these pipes or accurately identifying the locations for rehabilitation using trenchless technologies. The geotechnical engineers have utilized the down-hole capabilities of this tool for verification of newly installed slope stability measuring devices, as well as, condition assessments of existing installations. The ability to position the camera into confined, normally inaccessible or unsafe areas will allow our construction inspectors to verify structural reinforcement spacing, placing, and clearances for quality assurance and quality control purposes. The ability to push the camera into openings as small as 2-inches allows for the inspection of most in-place drainage systems and naturally occurring features. During the design process, the data collected once can be shared, with all of the primary stakeholders, many times throughout the project life-cycle.

The Rovver® 600

The Rovver® 600, manufactured by Everest VIT, Inc., is a self-propelled remotely operated motorized crawler. The versatile and modular component design provides capa-bility to inspect inside pipes with diameters ranging from 2- to 36-inches. The Rovver can be outfitted with either an axial camera head for down-hole and push pole appli-cations; or with a pan or tilt camera head using a fully articulating manually focused low-lux lens for larger pipes. Both these lenses will provide digital video and digital still images. The camera heads can operate independently of the Rovver crawler assembly. Both of these camera heads contain an embedded ring of LEDs around the perimeter of the lens to provide lighting.

The Rovver Applications

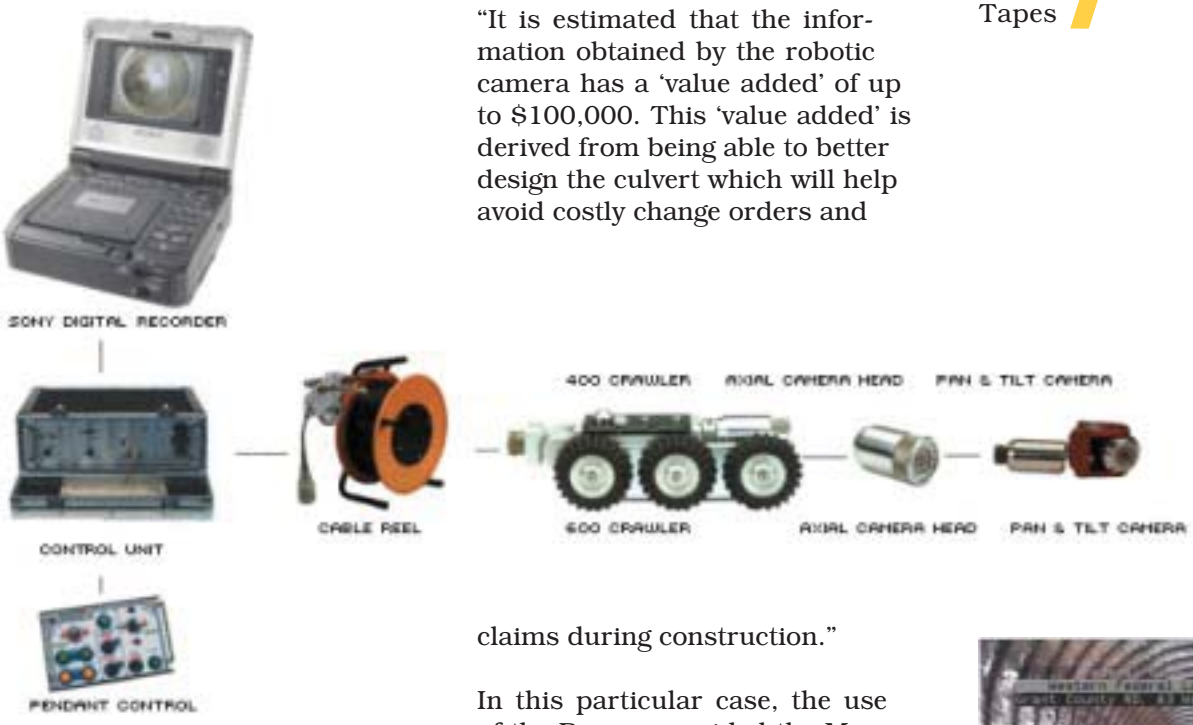
Rovver was used to assess the condition of all major poured-in-place box culverts, installed by the CCC in the 1930's, at Alder Camp Road in the Redwood National Park in California. Ryan Tyler, Project Manager, Federal Highway Administration realized the benefit of utilizing the Rovver:

"The ability to actively view the drainage structures on the Alder Camp affords us the ability to make 'fact based' decisions, which significantly mitigated the risk of our decisions. Our clients, the National Park Service, also took part in this effort, which added support and buy-in for the hydraulic recommendations at these sites, and strengthened our overall team."

"Although the use of the Rovver increased PE costs, that amount is

minute compared to the potential associated construction costs reflecting unknown con-ditions of in situ structures (in the case of Alder Camp Road)."

The use of Rovver tremendously helped the project team in their overall hydraulic analysis, condition assessment of the existing structures in order to accurately determine the appropriate treatment/rehabilitation efforts required. It was determined that a number of the box culverts did not require replacement as initially estimated resulting in significant savings.



The Rovver was also used to assess the condition of a 24-inch culvert on the Swamp Creek – East Project located near Libby, Montana. The inlet of the pipe was dry while the outlet was producing a steady stream of water. Richard B. Jackson, Geotechnical Engineer, Montana DOT was aware that the culvert is being fed by collector pipes that ran parallel to the highway. However, the exact location and number of collector pipes, as well as the overall condition of the entire spring collection system was not apparent to Montana DOT engineers. After using Rovver to collect data, Richard Jackson stated:

"The information provided by the robotic camera will be invaluable in the design of the roadway embankment and culvert. A decision has to be made as to whether we extend the existing culvert or build a new culvert and spring collection system."

"It is estimated that the information obtained by the robotic camera has a 'value added' of up to $100,000. This 'value added' is derived from being able to better design the culvert which will help avoid costly change orders and claims during construction."

In this particular case, the use of the Rovver provided the Montana DOT design-staff the condition assessment of the 24-inch culvert and the precise location and number of collector pipes feeding into this culvert.

The Rovver Availability

The Rovver is available for use, free of charge, to any State, County, or City Transportation Department as part of Technology Deployment Program of Western federal Lands Highway Division in Vancouver, WA. The Rovver can be requested through your local LTAP/TTP center (insert your contact information) or directly through WFLHD (Amit Armstrong, 360-619-7668).

Rovver Specifications

- Depth Rating: 1 bar (14.7 psi)–Equivalent to water depth of 10 m (33 ft)
- Temperature Rating: 32°-150° Fahrenheit
- Power Supply: AC Inverter connection to inspection vehicle battery
- Video Format: MiniDV Tapes

Rovver Image of CMP Interior

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The Transportation Technology Transfer Program is a nationwide partnership under the Local Technical Assistance Program (LTAP) of the Federal Highway Administration, state departments of transportation, universities, and others. The program's purpose is to translate into understandable terms the latest transportation research and technologies. This information is made available to local officials transportation personnel in towns, cities, counties and townships.

Federal support for operation of the North Dakota TTT Center at North Dakota State University (NDSU) is matched by the North Dakota Department of Transportation, NDSU, the North Dakota Insurance Reserve Fund and the ND TTT Center. Guidance for the ND TTT Center is provided by an Advisory Board composed of members representing the federal, state, local and private sector transportation community. This newsletter is designed to keep you informed about new publications, videos, innovative technologies and training opportunities that will be helpful to you and your local unit of government.

Reader's Response

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