*"Improving Alaska's quality of transportation through technology application, training, and information exchange."*

TECHNOLOGY FOR

# Alaskan Transportation

Local Technical Assistance Program

Fall 2002
July–September
Volume 27, Number 3

**In this issue . . .**



# Transportation System Damage Primary Result of 7.9 Earthquake

*Alaska Dept. of Tranportation and Public Facilities Commisioner Joe Perkins inspected the damage that occurred from mile 67 to 78 Tok Cut-off in interior Alaska (see map on page two).*

The largest earthquake to occur in Alaska since 1964, occurred on Sunday November 3, 2002, about 90 miles south of Fairbanks. The Denali Fault earthquake registered 7.9 on the Richter scale, causing damage to roads, highways, rural homes, drinking water systems, and fuel storage systems, and requiring Alyeska to shut down the Trans-Alaska Pipeline for several days.

Although no severe injuries were reported, interior Alaska's roads and airports received a significant pounding. Damage to Interior road and airport infrastructure is currently estimated in excess of $40 million and has contributed to Governor Tony Knowles' request for federal disaster relief funding.

The unseasonably warm temperatures helped expedite repair ef-

*continued on page 2*

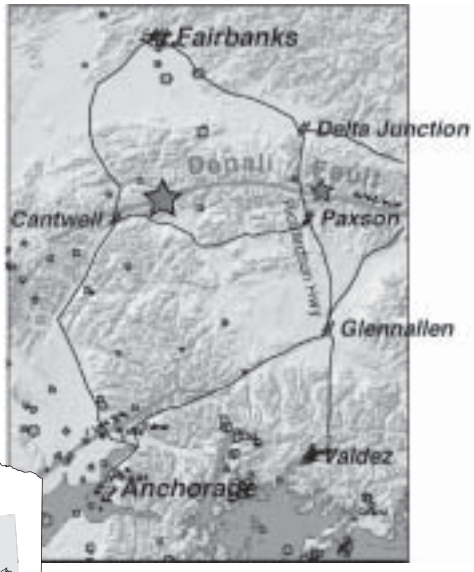
## Earthquake continued

forts by the Alaska Department of Transportation and Public Facilities. The Parks Highway was opened within four hours, the Richardson Highway in eleven hours, Northway Road and Mentasta Road within 12 hours, and the Tok Cut-off within twenty-four hours. Maintenance and operations crews responded immediately to the event and should be commended for their exemplary effort.

*Above and center: Emergency repairs being done to the Tok Cut-off. Below: The Richardson Highway gets realaigned from the earthquake.*

*Another angle of the same area of road damage shown on page one.*

*Photo by Patty Craw, DGGS*




*Location of November 3 magnitude 7.9 Denali Fault earthquake (large star) and magnitude 5.1 aftershock (smaller star to east). Dark symbols show epicenters of recent crustal earthquakes. Source: USGS National Earthquake Information Center. An excellent web site produced by them is at:* http://neic.usgs.gov/neis/bulletin/02_EVENTS/EQ_021103/.
The Alaska DOT&PF has road repair data and photos at their web site: http://www.dot.state.ak.us/

*Damage to the Trans-Alaska Pipeline included collapsed crossbars on the vertical support members*

# The Opening Session of AASHTO's 88th Annual Meeting a Perfect Game, Featuring Jim Morris, the Oldest Rookie

The American Association of State Highway Transportation Officials (AASHTO) 88th Annual Meeting was officially called to order Monday, October 14 at the Performing Arts Center in Anchorage. The ceremonial start to AASHTO's largest event of the year featured a special welcome from Anchorage Mayor George Wuerch and Alaska Department of Transportation Commissioner Joe Perkins, who was elected on Sunday, October 13, as AASHTO's vice president.

The Alaska Department of Public Safety Honor Guard presented the flag and the delegates enjoyed a stirring National Anthem medley by the trio of Greg Earl, Mark Jacobsen and Kevin Holtz. One Delegate remarked that it was "an exceptional rendition" of the National Anthem. Reverend Dr. Michael James Oleska from the St. Innocent Russian Orthodox Cathedral delivered the invocation in Yup'ik and English.

The Honorable Emil H. Frankel, assistant secretary for transportation policy, discussed federal aid to highway and transit programs and highlighted the administration's 2003 priorities in the reauthorization of Transportation Equity Act for the 21st Century (TEA-21). Mr. Frankel cited the events of September 11 and reduced federal revenues as complications in the reauthorization process.

*Alaska Department of Transportation Commissioner Joe Perkins speakes before a distinguished panel at this years meeting*

*The Opening Session's highlight and keynote speaker was Jim Morris, the subject of the recent movie "The Rookie," who at age 35 became the oldest rookie in Major League Baseball.*

The opening session's highlight and keynote speaker was Jim Morris, the subject of the recent movie "The Rookie," who at age 35 became the oldest rookie in major league baseball. Morris knew at an early age he wanted to play major league baseball, but he would climb many hurdles before realizing his dream. Constant moves as a Navy brat meant random training schedules and playing for new teams virtually ever year, making it difficult to hone his skills. Despite that, Morris' hard work and natural talent meant he could hit and throw a baseball with the best.

Mr. Morris delighted the crowd with his inspirational speech incorporating his life experiences. Had the speech been one of his legendary pitches, it would have been a knee-high, 98-mile-an-hour fastball over the outside corner of the plate, slamming into the catcher's mitt like a thunderclap.

# Alaska T2 Build a Better Moosetrap

Due to the success of other LTAP "Mousetrap" programs across the country, Alaska is implementing a mousetrap program Alaska style: entitled "Build a Better Moosetrap." If you have an innovative working idea submit the following form to Alaska T2. Published moosetraps will receive a certificate of achievement and be eligible for the Alaska Moosetrap of the Year award.

## Build a Better Moosetrap Submittal form

Name of the Better Moosetrap _____

Submitter's Name _____

Title _____

Agency _____

E-mail Address _____

Address _____

Phone Number _____

Developer's Name _____

Title _____

Agency _____

E-mail Address _____

Address _____

Phone Number _____

### Description of the Better Moosetrap

Why did you build it?_____

_____

_____

_____

How does it work?

_____

_____

_____

How was it built? (please send photos and drawings)

_____

_____

_____

How does it perform?

_____

_____

_____

The Better Moosetrap award will be given each quarter to the most innovative working idea submitted by a public agency and published in *Alaskan Transportation.*

### Award

The best concepts will be published in the *Alaskan Transportation* newsletter and posted on the DOT&PF web page. Published Moosetraps will also receive a special certificate.

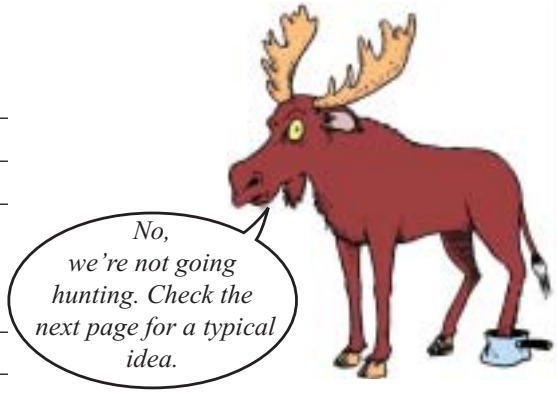
### Eligibility

City, state, and borough transportation agencies are eligible.

**Mail to:**
Research & TechnologyTransfer
Alaska DOT&PF
2301 Peger Road
Fairbanks, AK 99709-5399

**E-mail**
david_waldo@dot.state.ak.us

**Questions:**
Dave Waldo
david_waldo@dot.state.ak.us
(907) 451-5323



# Charlie Jenson's Snowplow Bit Changer

Washington State LTAP features a very successful program entitled "Build a Better Mousetrap." The program provides an opportunity for the public employee to showcase their innovative working idea with others across the state and country. The "mousetraps" save time and money and often provide a safer means of doing a task.

By Wendy Schmidt, WST2 Assistant Editor

Smashed fingers, sore muscles, and twisted knees were the motivating factors behind an invention by Charlie Jensen, maintenance tech. II of the WSDOT Twisp Maintenance Shop in North Central Region. Charlie's snowplow "bit changer" began as "kind of a picture in my head" and became a device that converts changing bits on snowplows and graders from a 40-minute job involving heavy lifting to a safer and easier 20-minute undertaking. Jensen's supervisor, Linda Dougherty, submitted the invention to the Washington State Technology Transfer Center as a "Better Mousetrap." It was selected to receive one of this quarter's "Better Mousetrap" awards. Charlie will receive a special recognition certificate and baseball cap, a congratulatory letter, and a Highways & Local Programs coffee mug.

During the winter months, the three carbide steel bits on the bottom edge of snowplow blades need to be removed and replaced every 4 or 5 weeks. Each bit weighs about 50 lbs. Usually, a person lifts a bit in to place with one hand and rests it on his knee or a wood block while slipping the bolts into place with the other hand, frequently resulting in pulled muscles, twisted knees, and smashed fingers. The 7-foot long, 150 lb. grader bits require a similar installation effort with a two-man crew. Charlie's bit installer lifts bits into place with minimal human effort in half the time. It's like an extra set of hands on wheels. It makes the job of changing bits a lot easier!

Jensen's bit changer resembles a hand truck. "The only things I had to buy were the wheels," Charlie said. "The rest of the parts came out of the scrap bin." It is designed on the principle of a fulcrum point vs. weight. The bits are balanced by a counterweight that slides up or down the handle to raise or lower the plow bit. A blade is placed in a holder above and in front of the wheels. The holder swivels about an inch so the plow blade doesn't have to be lined up square.

*Charlie Jensen with a bit ready to install.*

When the holder is rolled up to the face of a snowplow blade, the counterweight is slid up the handle length. The farther up the handle the counterweight goes, the higher the holder containing the plow bit rises. The handle is bent downward at the far end to provide the "third foot." When the holes on the bit line up with those on the plow blade, the operator is free to insert the bolts—all without having to lift the bit! The counterweight has its own handle to make sliding it easy.

The device also has a handy carrying table made of a 2-1/2 foot long section of 3-inch angle iron, which is welded on the handle side of the wheels. It will carry all three bits needed in a single trip from the supply pallet. Diagonal braces of 1-inch angle iron provide support for the handle.

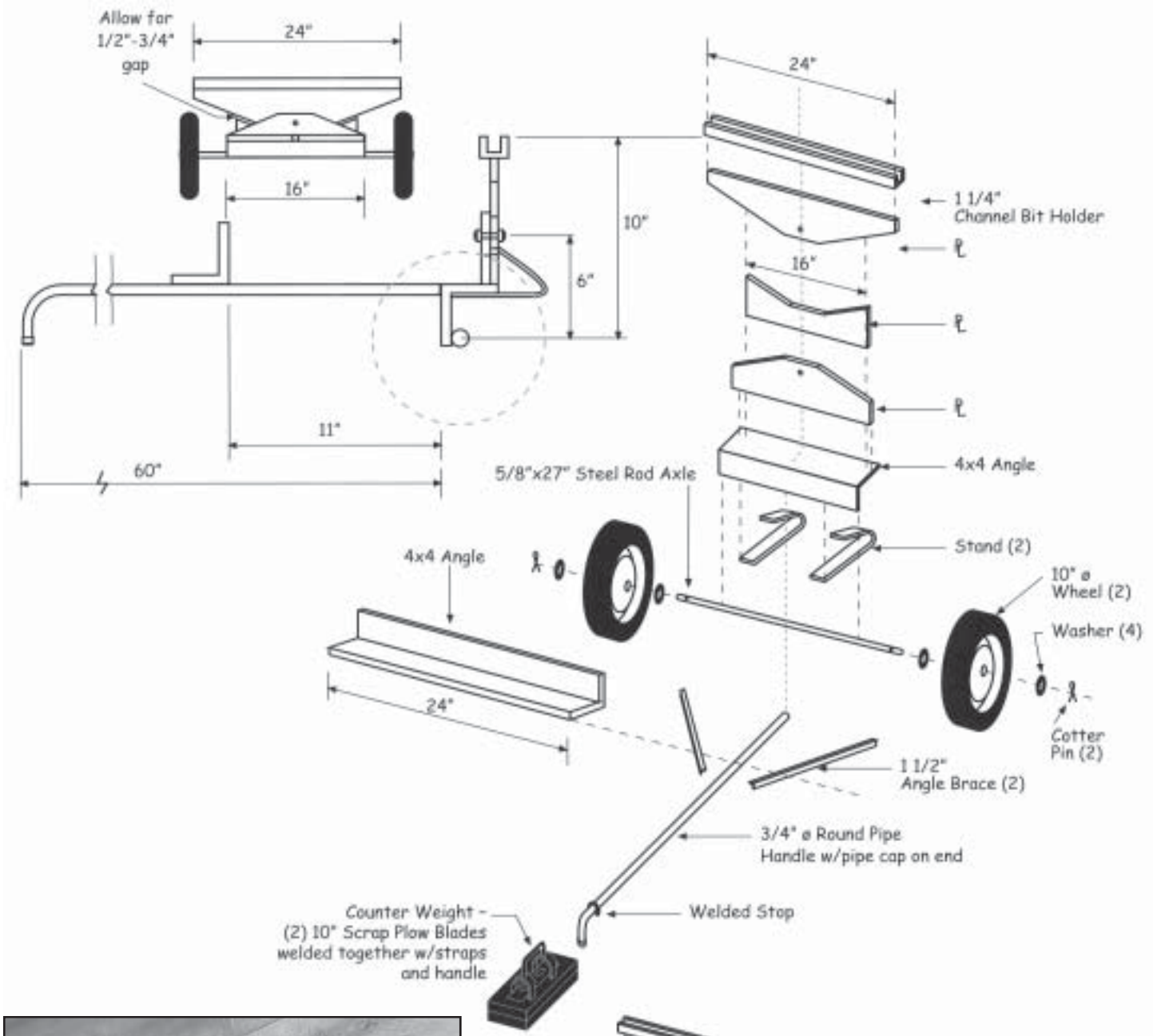
For more information, you may contact Charlie at (509) 997-3081.

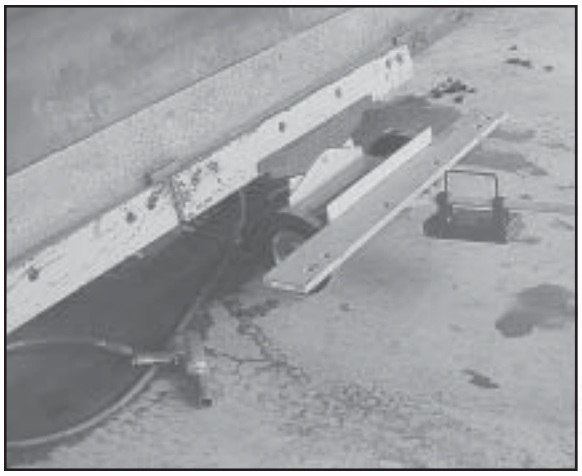
continued

Note: WST2 would like to thank Jeff Adamson, communications manager for the North Central Region, Washington State Department of Transportation, for his contribution to this article.

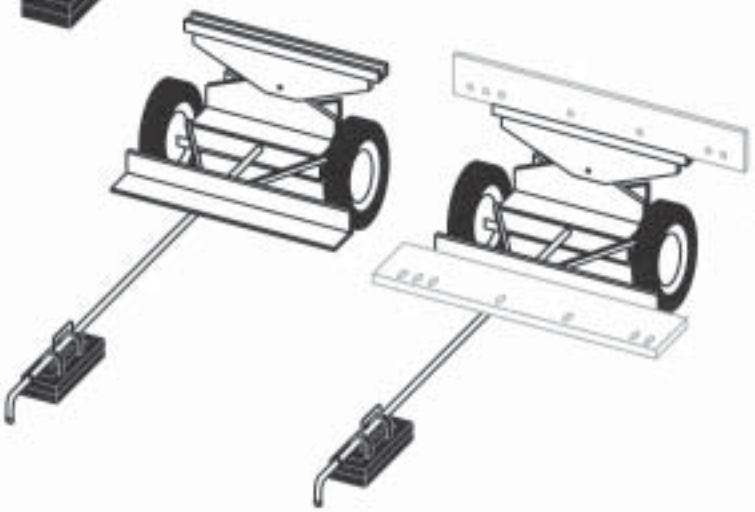
# Build a Better Moosetrap





*A steel bit in place for installation. It helps with rubber blades too.*



*The bent end of the handle provides support.*

## Announcements

# NACE Storm Water Management And Drainage Guide Available

The National Association of County Engineers (NACE) has published the *Stormwater Management and Drainage Guide*, which replaces the out dated action guide *Drainage and Soil Erosion and Water Pollution Prevention.*

This new 150-page-plus guide outlines up-to-date information on best practices. Chapters include: Rationale for Stormwater Management, Planning for Stormwater, Design of Basic Draining Elements, Design of Stormwater Management Systems and Practices, and Management Practices for the Maintenance of Wetlands. Additional copies are $7 for members and $10 for nonmembers.

To place an order, visit the NACE web site at


*The National Association of Counties (NACo) sponsers the website where The National Association of County Engineers (NACE) offers their* Stormwater Management and Drainage Guide.

## Planning, Design, and Field Notes

# The 2002 PNS Snow Conference June 3-5, 2002

*Report by Robert Magnuson*

First let me thank the State of Alaska for their support which allowed me to attend the 2002 PNS Snow Conference. A special thanks to the Border Technology Exchange program for providing the funding.

I came away from the conference with many new ideas and suggested practices, some of which I hope to incorporate into the Transportation Maintenance Branch's operations. As we in the Yukon move towards accountability planning, it becomes necessary to incorporate performance measures or indicators into our plans. One session I attended explained how essential it is to get the operators (front line workers) involved. I agree that we need to let them know that the work they do and how they do it is very important and has a huge impact on our productivity and accountability to the public. Both government and private contractors are becoming more aware of the need to demonstrate accountability to the public. How they rise to the challenge of providing a higher level of service without an increase in funding as well as meeting public expectations is key to any program's success.

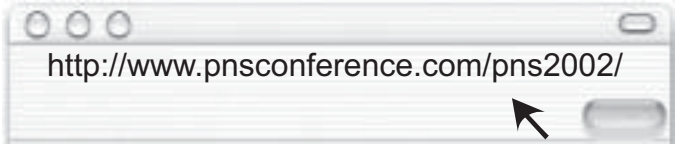
The panel discussion on the anti-icing and pre-wetting techniques was of great interest. Speakers from Vancouver and Kamloops, BC, and the states of Idaho, Montana, and Washington explained the testing process they experimented with to find what techniques worked best in their particular areas. It was clear that no one technique was better than the other. However, in most cases maintenance crews had to adjust their chemical mix and application techniques to adapt to their climate and road conditions, as well as modify the equipment to get optimum results from their products.

Virtually all topics covered at the conference gave consideration to environmental issues. The environmental session I attended confirmed that all maintenance jurisdictions must take the best possible measures to protect the environment by the proper handling, use, and storage of road salts and chlorides. This is becoming an issue that must be addressed. We anticipate a new regulatory regime will be in place by 2005 in Canada, giving us until then to develop environmentally responsible plans to manage our chlorides in the future.

The conference trade show was very valuable, especially the showcasing of advanced technologies in winter maintenance equipment and materials. It is very important that we stay abreast of new technologies being developed in other parts of North America and the world relating to highway maintenance systems.

The conference was very successful and well worth attending. I strongly encourage continued participation in the future.

For more information on the conference:



# Anti-icing Technology

Adapted from the *Illinois Interchange, Winter 2001*

Anti-icing is the practice of preventing the formation of bonded snow or *ice* to the pavement by timely applications of a chemical freezing-point depressant. This proactive approach differs from conventional deicing practices, which require the application of a melting agent as a reaction to the accumulation of snow and ice on the pavement.

Anti-icing is a systematic approach to winter road maintenance that can be adapted to an agency's unique conditions and available tools. It includes three critical components: operations, decision making, and personnel. The operations component consists of the winter maintenance forces' capability for the timely application of chemicals to the roadway in a solid and/or liquid form. This component also includes plowing accumulated snow and ice from the pavement so that a second application of chemicals can be applied to a clear-as-possible pavement surface if necessary. The equipment and materials needed to support these activities consists of spreaders, anti-icing materials, solid and liquid chemical storage facilities, and plows with appropriate cutting edges. Anti-icing materials include liquid sodium chloride, liquid calcium chloride, liquid magnesium chloride, liquid calcium magnesium acetate, liquid potassium acetate, and fine-graded salt prewetted with some liquid. Some liquids are used to prewet salt and some are sprayed directly on the road surface as the anti-icing agent.

Decision-making components necessary to support anti-icing include weather service forecasts, real-time conditions of pavement surfaces, and road weather information as determined from road weather information systems (RWIS) if available, nowcasting (the use of real-time data for short-term forecasting), traffic information, information on present pavement observations and friction measurements from patrols, and post-storm evaluations of treatment effectiveness. Anti-icing demands accurate local weather and storm prediction data. Applying the material on the roadway too early or too late may be wastetul and ineffective.

The personnel component consists of personnel standby and call-in procedures and personnel trained to use available weather and pavement data in the decision-making process. After the initial application of anti-icing material, personnel, materials, and equipment must be available and prepared for reapplication as the conditions dictate.

One major benefit to be derived from the use of anti-icing technology is a better understanding of the conditions under which anti-icing operations should, and should not, be used. Additional benefits are:

- Improved efficiency and effectiveness of highway agencies' winter maintenance operations and cost savings in time, labor, materials, and equipment.
- Improved vehicle traction and consequently, highway safety during wintertime conditions.
- Improved levels of service of highways during wintertime conditions.
- Reduction, in certain locations of the United States, in the quantity of materials (both chemicals and abrasives) used in snow and ice control.
- Reduced environmental and infrastructure impact of snow and ice control operations in sensitive areas.
- Improved knowledge concerning the use of liquid chemicals and prewetted solids in anti-icing operations.

Field tests have shown that while an anti-icing strategy may not be appropriate for every storm, it is a valuable tool for fighting some winter storms, for pavement frost control operations, and to help eliminate "black ice" conditions. The tests indicate that anti-icing materials are most effective when applied before the pavement temperature reaches the freezing point, and they remain effective until temperatures reach -6 degrees C (20 degrees F). For storms initiating at or continuing into temperatures below -6 degrees C (20 degrees F), agencies should consider switching to their deicing program. High winds, heavy drifting, and prolonged heavy snow conditions have also limited the effectiveness of anti-icing practices. However, applying anti-icing chemicals to the pavement before the storm will hinder the snow pack from bonding to the pavement and will aid in snow removal once conditions improve.

Several agencies participating in the tests noted that anti-icing must be a team effort and that everyone associated with the anti-icing process must be involved from the very beginning. Everyone must understand the new technology and the expectations of new methods to achieve the desired results. The more information everyone has the easier it is to get a program established that achieves a higher level of service at potentially less cost. Total team involvement also provides a greater chance of program success.

Another important element of any anti-icing program is advance public information releases. The public seeing chemicals spread (especially if the chemical is liquid) before the snow accumulates will generate some inquiries if not complaints. Advance information can turn negative public reaction into positive public reaction.

*The Technology Transfer Center has several videotapes and publications listed in the attached bibliographies. For more information contact Alaska Technology transfer at 451-5320 or the Keith B. Mather Library at 474-7503.*

## Bibliography

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TE220.5.E84 1999@DOT

# Deicing/Anti-icing Spreader Calibration

Source: the *Snowfighters Handbook*

## Calibration

Different materials will spread at different rates at the same setting, so spreaders must be calibrated with the material that will be used.

## Spreader Calibration Procedure

Calibration of spreaders is simply calculating the pounds per mile discharged at various spreader control settings and truck speeds by first counting the number of auger or conveyor shaft revolutions per minute, measuring the salt discharged in one revolution, then multiplying the two and finally multiplying the discharge rate by the minutes it takes to travel one mile.

With hopper-type spreaders, specific gate openings must be calibrated. Measure from the floor of the conveyor to the bottom edge of the gate.

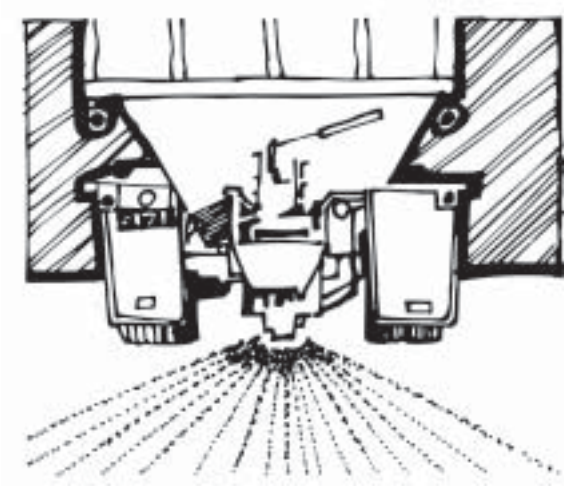
Each spreader must be calibrated individually; even the same models can vary widely at the same setting.

## Equipment Needed

1. Scale for weighing.
2. Canvas or bucket/collection device.
3. Chalk, crayon, or other marker.
4. Watch with second hand.

## Calibration Steps

1. Warm truck's hydraulic oil to normal operating temperature with spreader system running.
2. Put partial load of salt on truck.
3. Mark shaft end of auger or conveyor.
4. Dump salt on auger or conveyor.
5. Rev truck engine to operating RPM (at least 2000 RPM).
6. Count number of shaft revolutions per minute at each spreader control setting, and record.
7. Collect salt for one revolution and weigh, deducting weight of container. (For greater accuracy, collect salt for several revolutions and divide by this number of turns to get the weight for one revolution.) This can be accomplished at idle or very low engine RPM.
8. Multiply shaft RPM (Column A) by discharge per revolution (Column B) to get discharge rate in pounds per minute (Column C), then multiply discharge rate by minutes to travel one mile at various truck speeds to get pounds discharged per mile. *For example, at 20 MPH with 30 Shaft RPM and 7 lbs. discharge: 30 x 7= 210 x 3.00 = 630 lbs. per mile.*



## Calibrating Automatic Controls

Automatic controls come with factory calibration cards that indicate the proper rate of spread for each setting. However, when there is a need to calibrate, use the following steps:

1. Remove or turn off spinner.
2. Set auger on given number, such as No. 2.
3. Tie sack or heavy canvas under discharge chute.
4. Mark specific distance, such as 100 or 1,000 feet.
5. Drive that distance with spreader operating.
6. Weigh salt collected in sack or canvas.
7. Multiply weight of salt by 5.2 (in case of 1,000 feet) or 52.8 (in case of 100 feet).

This will be the amount of salt discharged per mile, which remains constant regardless of speed, but calibration must be done for each control setting.

# CALIBRATION CHART

Agency: _____

Location: _____

Truck No.: _____ Spreader No.: _____

Date: _____ By: _____

| GATE OPENING (HOPPER TYPE SPREADERS) | | | | POUNDS DISCHARGED PER MILE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | MINUTES TO TRAVEL ONE MILE | | | | | | | | |
| Control Setting | Shaft RPM (Loaded) | Discharge Per Revolution (Pounds) | Discharge Rate (Lbs/Min) | 5 mph x 12.00 | 10 mph x 6.00 | 15 mph x 4.00 | 20 mph x 3.00 | 25 mph x 2.40 | 30 mph x 2.00 | 35 mph x 1.71 | 40 mph x 1.50 | 45 mph x 1.33 |
| 1 | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | |
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| 10 | | | | | | | | | | | | |

# Place Culverts Correctly the First Time

From South Dakota LATP 's *Special Bulletin #43*
By Ken Skorseth, SD LTAP Field Services Manger

There is an old saying that goes like this: "We never seem to have time to do something right, but we can always find the time to go back and do it over!" Too often, this describes the process of culvert installation. For example, if the job involves replacing a small pipe in a local road, it is usually done with little planning and is usually perceived as a quick, one-day project. Perhaps one day is sufficient to do the job if all of the planning has been done ahead of time and the correct equipment and material is on the job. But knowledge and planning are the real keys to make the job successful.

Culvert installation is a big subject, but this bulletin will be limited to basic discussion of two things: (1) sizing the culvert (pipe) correctly, and (2) an overview of good installation techniques. The primary focus will be on pipe replacement in existing roadways since that is what local crews are most often required to do.

## Sizing Pipes Correctly

How do you select the correct size pipe both in diameter and length? If the job is simply replacement of an existing pipe, the safest thing to do is replace with a pipe of the same diameter. This will generally keep the department out of possible liability claims resulting from increasing or decreasing the flow of water onto or from adjoining property. However, there are times when the diameter of the pipe(s) does need to be changed. In some cases, poor judgment was used in the past and existing pipe installations are not good. Also, the area to be drained may have been altered in some way since the original installation.

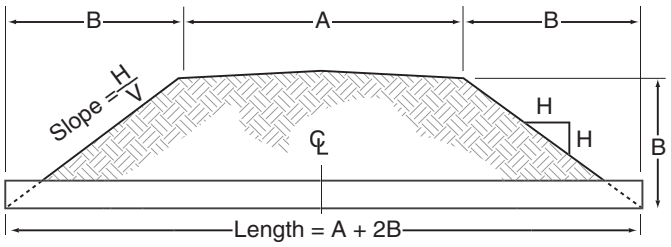
If it is the manager's judgment that a larger or smaller diameter is warranted, certain steps should be taken. First of all, adjoining landowners can be good sources of advice on how the pipe(s) has handled the flow in the past, particularly if the manager has not had the opportunity to observe it personally over a long period of time. If it is a new installation, the local Farm Service Agency office should have topography maps that show the area to be drained as well as the elevations, which will help predict the flow. The size of upstream and downstream pipes or structures also needs to be checked to make sure drainage is not drastically altered.

*This culvert failed due to installation problems and will have to be replaced.*

Any help you can get to make an intelligent decision in determining diameter will serve you well. Finally, if you change the size of an existing pipe, it is wise to document in writing the reasons for doing so and present this to your local drainage board and get their approval.

The next step is to determine correct length. This may not be as simple as it sounds. Don't try to use a standard approach such as "if the road is 24 feet wide, we'll put in a 30-foot pipe!" Every road is different. To begin this process, you have to determine the height of the road shoulder above the stream bed or ditch bottom. Then, you need to calculate a minimum 2:1 slope (3:1 or greater is better) for the foreslope of the roadway after the pipe installation is finished.

There are two reasons for this simple step. First, there is a nationally recognized standard published by the American Association of State Highway and Transportation Officials (AASHTO) for the geometrics of a roadway. Even for very low volume rural roadways, the AASHTO recommendation is a minimum 2:1 foreslope. A higher road classification has a greater foreslope recommendation. Once you have calculated the length of pipe needed to reach the toe (bottom) of the foreslope from the edge of shoulder on each side of the road, then the width of the traveled roadway and shoulders is added to determine the overall length of




Example: Roadway =[1]24 ft., Slope = 1 1/2:1,
Depth of Fill =[1]10 ft. Then B = Side Slope 5 C = 1 1/2 C
and Length = [1]24 + (3 x 10) = [3]54 ft.

*Computation of Culvert Length–Flow Line on Flat Grade. Used with permission of National Corrugated Steel Pipe Association.*

the pipe. (See illustration at the top of this page.) As simple as this sounds, it is too often neglected in the planning phase of pipe installation.

The second reason is simply for safety. If the end of a pipe does not extend out far enough from the road shoulder, the force of fast-flowing water will often cause the soil to erode away from the area near the end of the pipe. This can even erode back into the shoulder and even into the traveled part of the roadway. This creates a dangerous condition and a serious liability if someone drives into the washed out area and has an accident. At the very least, it creates a condition that requires frequent inspection and repair after each heavy rain.

There is another safety concern as well. If a vehicle runs off the road, a very steep foreslope and a pipe end that is very near the roadway will often cause a rollover accident. The finished foreslope after pipe installation should be no steeper than the slopes of the road away from the pipe and, as mentioned earlier, should meet the minimum AASHTO recommendation for that roadway classification. The AASHTO recommendations can be found in the SD DOT Secondary Road Plan, available at county highway department offices.

*The eroded area at the edge of the road is a hazard and is due to a culvert that is too short and the soil constantly erodes away from the foreslope above it until the road shoulder is affected.*

*The end of the culvert is nearly hidden at the base of the slope. It is far too short for the height of this grade.*

*Here is a contrast with a culvert of correct length that extends well out to the toe of the foreslope.*

*continued*

*Here is a good example of proper length of culvert so that it extends out to the toe of the foreslope of the roadway.*

## Good Installation Techniques

If a few basic rules for good installation are followed, excellent long-term performance can be expected for pipes whether they be steel, concrete or polystyrene.

The first challenge is to do some basic field surveying to record the existing elevation at the inlet and outlet of the pipe that is in place (or to record the elevation of the stream bed or ditch on brand new installation). Generally, a replacement pipe should be placed at the same elevation as the original. However, there may be reasons to raise or lower the new pipe.

Do some good site inspection ahead of time to determine what the elevation should be—then make sure the pipe is placed accordingly. Don't use the "eyeball" method of determining elevation! On many jobs, simply using a hand level will be sufficient to do the basic surveying needed.

The next step, and a very critical one, is to determine if the soil at the site will make an adequate foundation for the new pipe. Sometimes this is hard to

*A hand level is used here to determine the height of the grade at the shoulder. This height multiplied by 2 equals a 2:1 foreslope which is the minimum recommendation even on a very low-volume road. The base of the survey rod shows where the end of this pipe should be.*

*Culvert that was installed without careful check of flow line during installation.*

determine before excavating. Have a good source of select material readily available in case you have to undercut and remove poor soil. Another key item in planning is to excavate a large enough area so that you can work along side of the new pipe and do proper compaction whether by hand or with equipment.

Once the old pipe is removed, inspect the foundation soil. Don't take chances—If the soil is wet and weak, it probably won't support the new pipe well. Remember, you are working on a project that should have a 35- to 50-year life. A little extra effort to do it right initially will assure that it performs for a long time. It doesn't take that much select material, particularly on smaller pipe installations, to make a good foundation. Local mater-ials vary, but a granular material with enough fines in it to seal around the pipe is a good select material both for foundation and backfill if needed.

Make sure that the foundation is finished evenly with the elevation right on the flow line at both the upstream and downstream sides.

The next step is to set the pipe and align it properly. If more than one section of steel pipe is used, make sure the connecting band is installed tightly and over the center of the joint. If concrete pipe is used, make sure the joints are tight (it is becoming a standard practice to wrap each joint with a filtration fabric that will not allow fine soils to migrate into the pipe). On large diameter installations, it is also wise to order pipe that can be tied together so that the sections do not separate. Never start backfilling until the pipe is in the correct position and resting firmly on the foundation on its entire length.

*Here is an example of replacing weak and poor soils with good aggregate foundation material prior to setting the new pipe.*

*Good example of fabric wrap on the joints of concrete pipe and ties placed between the pipe sections.*

Next, the backfilling begins. The National Corrugated Steel Pipe Association's culvert installation manual tells us: "Too much emphasis cannot be placed on the necessity of adequate compaction of backfill. Faulty compaction has led to more trouble with pipe installations, flexible and rigid, than all other factors combined!" There is no way to say it better.

There are two important things to consider in backfilling: use no more than six-inch lifts at a time and compact it evenly and well, particularly under the haunch (lower half) of the pipe. Backfill material should be free of rocks larger than three inches in diameter. The material must be dumped carefully and evenly along both sides of the pipe. Avoid dumping large quantities at once against or on top of the pipe. The material should also have enough moisture to compact well, but not too much so as to become unstable. This can be difficult to achieve, but produces excellent results. Watch the weather closely, particularly the chance of heavy rain during installation.

Hand tamping is adequate and is often the best method to compact and seal the backfill against the lower half of the pipe. If you use mechanical compaction, work parallel to the pipe, not against it. If large equipment is used for compaction, don't over compact so that the pipe begins to lift or is push laterally out of alignment. Continue filling in even lifts until the installation is finished. It is best to have at least two feet of fill over a pipe, even on low-volume rural roads.

One final thing: Depending on the velocity and volume of water that will flow through the pipe, slope protection may be needed around the ends of the pipe. This can simply be riprap material such as field stone

that is of suitable size. Quarry stone is much better if it is available within a reasonable distance. On large pipe installations where water velocity is high, flared ends on the pipe are cost effective in helping funnel the flow into the pipe and stilling the flow somewhat at the outlet. Pour-ing concrete headwalls and cutoff walls around and below the pipe may be necessary on large installations as well.

It is good to get engineering advice on large pipe installations and particularly in deep fills. The backfill load alone can crush metal pipes if correct gauge and type is not specified. Some analysis of the soils ahead of time is also recommended on those jobs.

Remember, the real goal of both management and crew should be to replace a pipe in such a manner that, barring catastrophic flooding, the pipe will remain in place with minimal maintenance for its entire life. With a little extra effort, this can be done—and it's cheaper in the long run than to return to the site one or more times to do major repair.

*Hand tamping under haunch of pipe is critical to seal the culvert in the backfill soil as well as to prevent deforming of the pipe when loads pass over it after the road is reopened.*

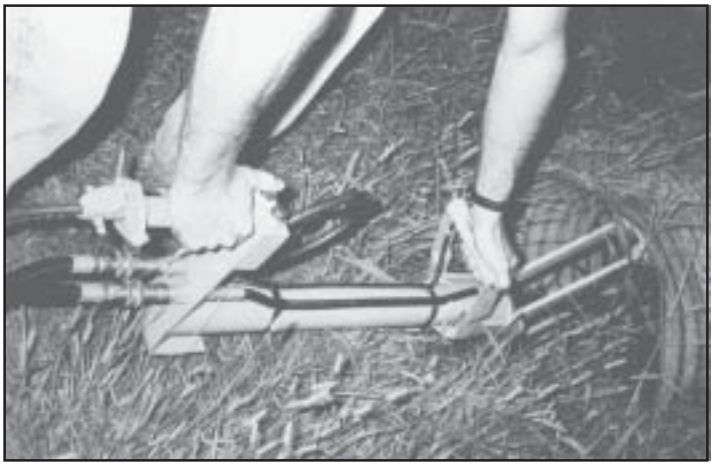
# Culvert Pipe End Reshaper

Adapted from *Oklahoma LTAP News, April 1997*

Crushed corrugated metal culvert pipe ends are a common rural road maintenance problem. Without correction, water backs up in the pipe and ditch leading to water in the embankment and ultimately road failure from water saturation.

Typically, road crews have tried to fix crushed pipes by using a jack of some type to reshape the ends – typically an ineffective method.

Another option is to replace the entire culvert. While this is an excellent remedy, it can be expensive because of equipment and labor costs and inconvenient due to road closure.



The devise consists of a welded hydraulic cylinder with a scissors type jack attached to the actuating rod. When the jack is collapsed it can be placed in the end of the crushed pipe. The cylinder is than retracted, the jack expands and the pipe end is reshaped. The entire process takes about as long as it takes to read this paragraph. The devise can be constructed for about $300 in materials

One of the goals in designing the device was to make use of common "off the shelf" components. Neither the parts nor the design are very complicated and assembly requires only a minimum amount of machining and welding.

# Dust From Heavy Trucks: How to Handle a Big Problem for a Small Project

By Ken Skorseth Reprinted with permission from the *South Dakota LTAP Newsletter, Winter 1998*

How can we treat a few blocks of gravel road for dust control? This question often comes to our office.

Often there are no easy answers. In a few areas of the state there are contractors who store dust control products such as liquid magnesium chloride and have small trucks available to treat short sections of roads or streets. However, in many areas that service is not available. Dust control products are available in transport-load quantities only and projects of one mile in length or more are needed to make the work feasible.

To help prove that almost any street or road department could do dust control treatment on very small projects, with basic equipment, the South Dakota LTAP recently assisted with a project. The length of the project was only 400 feet.

The town of Clear Lake, SD, recently opened a new rubble site just over a mile from town. Access to the site is on a gravel township road. The road had a low traffic count prior to the rubble site opening. Now the road carried up ro 100 vehicles on Saturdays, the most active day for the rubble site. One rural resident lives adjacent to the road and the dust became a real nuisance. The town asked how they might treat a short section of the gravel road immediately adjacent to the farmer's home.

We worked out these basic methods.

- The town used their own dump truck to haul fresh gravel to the site. The material is reasonably good surface gravel with enough plastic fines to give a natural binding characteristic.
- The gravel was placed one week prior to treatment.
- On the day of the treatment, the town used their grader to loosen approximately one inch of the gravel surface and spread it evenly across the roadway. They had obtained 15 bags of flake calcium chloride (50-lb. bags) from the local SD DOT maintenance shed on the previous day.
- They used a small water truck with a spray bar inserted in the back of a dump truck to pre-wet the surface.
- The flake calcium chloride was then spread at the rate of one and three-quarters pounds per square yard on the pre-wetted surface. A borrowed utility tractor and an old borrowed fertilizer spreader were used to make a nice, even application.

Afterward, three quick passes were made with the water truck to help dissolve the chloride flakes and assure that the brine would be absorbed into the gravel. This was done carefully to assure the flakes dissolved, but not to excess so that the brine would wash off the road.

Because the town owns a small rubber-tired roller, they rolled the surface to provide a smoorher finished surface. This is not essential, but advisable. The dump truck could have been used, or even traffic can provide ordinary compaction, but the roller certainly did improve this job.

The job has performed very well and the farmer is very grateful. But more importantly, we proved you can do this work with very basic equipment. The cost of the bagged calcium chloride was just under $100 and the project took only four hours to complete. The total cost of the project including the material was approximately $300. (Note that these are 1998 figures.)

## Bibliography:

Chemical additives for dust control: what we have used and what we have learned / Bolander, Peter. p. 42-49; RID: ocm3810422
TE7.H5 no.1589@DOT

Dust control: Australasian experiences with various chemical additives / Giummarra, George J. p. 50-53; RID: ocm38101427
TE7.H5 no.1589@DOT

Holistic approach to research into dust and dust control on unsealed roads / Jones, D. p. 3-9: RID: ocm42467234
TE7.H5 no.1652 v.2@DOT

# Dust Palliative Selection and Application Guide


The Dust Palliative Selection and Application Guide is an excellent resource to help transportation employees correctly choose and apply the dust suppressant for their particular application, condition, and climate. The guide also provides an overview of the expected performance characteristics and potential environmental impacts of the various palliatives.

The guide has good tables, figures, and flow charts (see below), useful in making decisions on cost effectiveness, benefit characteristics, and economic feasibility.

The guide is available in .pdf format at the Alaska Technology Transfer website or from USDA Forest Service, San Dimas Technology and Development Center, Publications Department, 444 E. Bonira Avenue, San Dimas, CA 91773, phone (909) 599-1267.

DOT web site:


- Rest the cursor on "World of DOT"
- Rest the cursor on "Programs"
- Click on "Research & Technology"
- Click on Libraries
- Use "Dust Palliative" in the title search of the Research & Technology Transfer Library

Table 3—Product selection chart.

| | Traffic Volumes, Average Daily Traffic | | | Surface Material | | | | | | | | Climate During Traffic | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Plasticity Index | | | Fines (Passing 75μm, No. 200, Sieve) | | | | | | | |
| Dust Palliative | Light <100 | Medium 100 to 250 | Heavy >250 (1) | <3 | 3–8 | >8 | <5 | 5–10 | 10–20 | 20–30 | >30 | Wet &/or Rainy | Damp to Dry | Dry (2) |
| Calcium Chloride | ✓✓ | ✓✓ | ✓ | ✗ | ✓ | ✓✓ | ✗ | ✓ | ✓✓ | ✓ | ✗ (3) | ✗ (3,4) | ✓✓ | ✗ |
| Magnesium Chloride | ✓✓ | ✓✓ | ✓ | ✗ | ✓ | ✓✓ | ✗ | ✓ | ✓✓ | ✓ | ✗ (3) | ✗ (3,4) | ✓✓ | ✓ |
| Petroleum | ✓ | ✓ | ✓ | ✓✓ | ✓ | ✗ | ✓ (5) | ✓ | ✓ (6) | ✗ | ✗ | ✓ (3) | ✓✓ | ✓ |
| Lignin | ✓✓ | ✓✓ | ✓ | ✗ | ✓ | ✓✓ (6) | ✗ | ✓ | ✓✓ | ✓✓ | ✓ (3,6) | ✗ (4) | ✓✓ | ✓✓ |
| Tall Oil | ✓✓ | ✓ | ✗ | ✓✓ | ✓ | ✗ | ✗ | ✓ | ✓✓ (6) | ✓ (6) | ✗ | ✓ | ✓✓ | ✓✓ |
| Vegetable Oils | ✓ | ✗ | ✗ | ✓ | ✓ | ✓ | ✗ | ✓ | ✓ | ✗ | ✗ | ✗ | ✓ | ✓ |
| Electro-chemical | ✓✓ | ✓ | ✓ | ✗ | ✓ | ✓✓ | ✗ | ✓ | ✓✓ | ✓✓ | ✓✓ | ✓ (3,4) | ✓ | ✓ |
| Synthetic Polymers | ✓✓ | ✓ | ✗ | ✓✓ | ✓ | ✗ | ✗ | ✓✓ | ✓✓ (6) | ✗ | ✗ | ✓ | ✓✓ | ✓✓ |
| Clay Additives (6) | ✓✓ | ✓ | ✗ | ✓✓ | ✓✓ | ✓ | ✓✓ | ✓ | ✓ | ✗ | ✗ | ✗ (3) | ✓ | ✓✓ |

Legend

✓✓ = Good ✓ = Fair ✗ = Poor

Notes:

(1) May require higher or more frequent application rates, especially with high truck volumes
(2) Greater than 20 days with less than 40% relative humidity
(3) May become slippery in wet weather
(4) SS-1 or CSS-1 with only clean, open-graded aggregate
(6) Road mix for best results

# Coping With Complaints

Reprinted with permission from the *Illinois Inherchange newsletter, Spring 2002*

You are part of the frontline troops. You are possibly the only personal contact complainants will ever have with the government. When they have a problem and no one will fix it, they are apt to be hostile by the time they get to you. Your skill in handling their problem may confirm or change their perception of their local government.

When you are called into a firing line situation and are confronted by an angry situation and are confronted by angry or hostile citizens, the following steps will help defuse the situation.

## Defusing

1. Greet the complainants with a smile and friendly handshake.
2. Tell them as quickly as possible that you want to work with them to solve the problem. This will move the conversation onto a constructive basis and away from government or individual attacks.
3. Ask them to move with you to a quiet location where you can talk uninterrupted.
4. Ask them to tell you about the problem.
5. Listen to them. By listening, not just hearing, you begin to put their problems into perspective and questions start to formulate in your mind.
6. Do not interrupt the complainants at this point. Mentally set a reasonable time limit and let them tell their whole story without interruption. Anything you say while they are venting may just provoke more anger.
7. Note your body language. Hands should be loose or folded, not crossed over the chest.
8. Compensate for mental lag time. People talk at 150-200 words per minute; you think at 600-800 words per minute. Use the time constructively. Ask yourself:
   a. What is the main point?
   b. What is the evidence?
   c. Is this reasonable to me?
   d. Are the complainants giving sources of information?
   e. Are there alternatives?
   f. Is this consistent with my past experience?
9. Be aware of filtering and distortion.
   a. Don't discount bits of information.
   b. Don't magnify beyond their intent. This is most likely to happen when they are threatening or hostile.
   c. Don't attach additional information or meaning to what they say.
10. Watch for signs that the complainant is winding down.

## Taking Charge

1. Express your concern and your understanding of the complainants' frustration. Tell them you are sorry they have had this problem. State that you will work with them toward finding a solution.
2. As they calm, begin to ask questions. This will force them to organize their thoughts, put you in control, and give you information you need to address the problem.
3. Be sure you ask the six questions every good investigator asks—who, what, when, where, why, how.
4. Use active listening skills and give them time to fully respond to each of your questions. Paraphrase their statements. asking "Is that right?" or "Is that correct?" and give them opportunity to respond. When you and the complainants have agreed on a definition of the problem, ask what they seek in terms of a solution. Paraphrase again to make sure you understand.

Do not make any commitment at this point. Do not make any statement about fault. Do not agree with them about the cause of the problem or about any responsibility for its remedy.

You have reached an agreement on their perception of the problem and what they believe the solution should be.

## Closing Discussion

1. Tell the complainants you need to research the problem with your boss or staff.
2. Tell them a time when they will hear back from you.

Then call back even if you have not yet reached a decision. Failure to call back typically results in their seeking help further up the chain of command, and then you will be complained about along with the original problem.

Give yourself a pat on the back for a job professionally and well done. Recognize that you cannot win them all, and that you are not expected to win them all.

# Soil Nail Launcher

The Soil Nail Launcher, a tool developed by the British military to launch nerve gas canisters, will send 20-foot-long steel bars into the ground at 220 miles per hour. Yes, that's two hundred and twenty miles per hour.

It is mounted on a tracked excavator and can reach over embankments and up on slopes. Small embankment failures can be repaired in a matter of hours. Launched nails can be used to repair failing walls, abutments and wings.

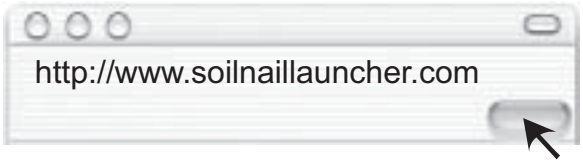
It is transported on a trailer. The excavator can ride and operate from a flat car or run along independently with little or no interference with traffic.

Where slides have been repaired with vertical rails or piling and those piling are bending, the launcher can send nails in horizontally to act as deadmen or tiebacks for attachment of whalers. This will restabilize those installations and do it very quickly.

This new tool offers new options to railroad and highway builders and maintainers.

*Pavement and guardrail can be left undisturbed, and only one lane closure is needed on highways.*

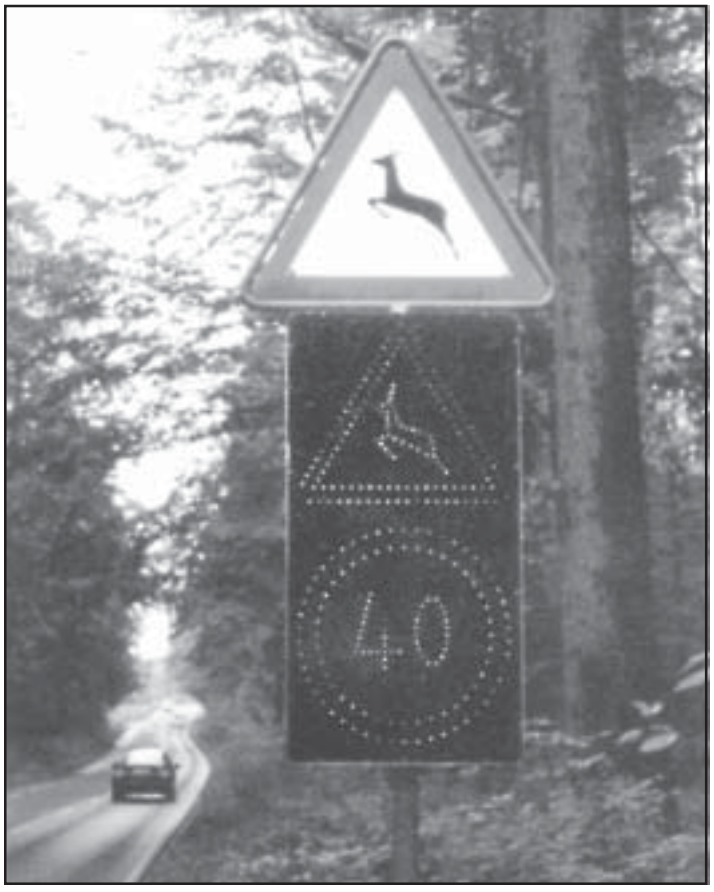
Please check the following web site for more detailed information:




# Wildlife Signs: Wildlife Connectivity Across European Highways

The following is an excerpt from *Wildlife Connectivity Across European Highways,* printed by the International Technology Exchange Program. The information was acquired by an interdisciplinary delegation from the Federal Highway Administration and the American Association of State Highway Officials, while in Europe for a technology exchange.

Countries visited reported that standard wildlife signing has proved ineffective in Europe, because drivers become accustomed to them. The European countries are now using combination approaches. Combining wildlife signs with speed limit signs seems to increase their effectiveness. Including flashing lights also is believed to increase the effectiveness. The Swiss are using a series of solar-powered heat sensors to determine animal presence, which then triggers a fiberoptic wildlife warning sign to reduce speed to 40 km/h (right). This installation has significantly reduced wildlife mortality on a two-lane regional road.

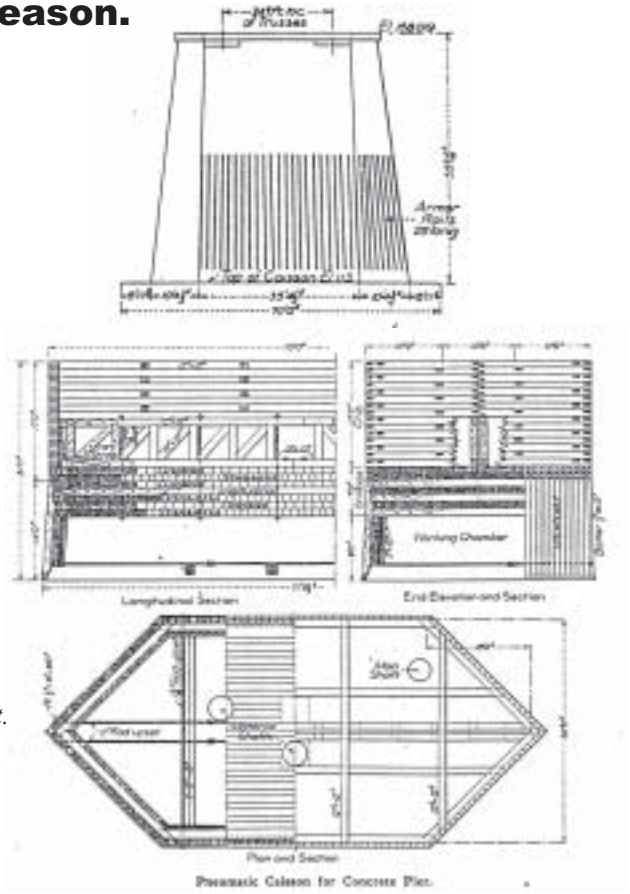


## Twenty-seven years ago this construction season.

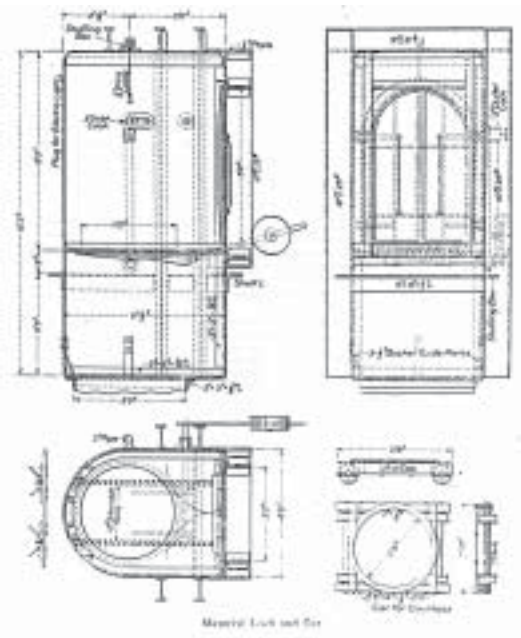
*A barge lifts a steel bridge girder into place in June 1975, during construction of the Dalton Highway. This highway was built to access the northern part of Alaska for construction and then maintenance of the Trans-Alaska Pipeline Project, which was completed in 1977.*

## Ninety-two years ago this construction season.

*The Miles Glacier Bridge, now called The Million Dollar Bridge, was built by the Copper River and Northwestern Railway and finished in 1910. The Territory of Alaska took possesion of it in 1945. The photo shows its present condition after the northernmost of four spans, was knocked off the pier in the 1964 earthquake. The auto ramp was added in 1973.*



*These drawings from the 1910* Engineering Record *show the method of getting workers down into the pressurized caissons to excavate and build the 21 ft. x 64 ft. concrete and wood piers (right). The following text is excerpted from that publication.*



There were installed on the caissons one man shaft and two material shafts. The man shaft, 3 ft. in diameter, was made of 3/8-in. steel plate. The man lock was a steel cylinder 7 ft. in diameter and 6 ft. 8 in. high. ...

The material lock was of special design arranged to permit the hoisting and lowering of the spoil buckets, independent of the position of the upper door. It surmounted the 3-1/2-ft. material shaft, had a rectangular cross section rounded at one end, and was reinforced by two vertical I-beam yokes. A horizontal diaphragm containing the lower door was placed 4 ft. above the bottom of the lock to provide for operating the door, and the 3 x 5-ft. vertical upper door was made in two leaves, permitting the entrance and exit of the spoil buckets. The buckets were hoisted and lowered by a 1/2-in wire rope passing through a fixed stuffing box in the top of the lock. When the bucket was hoisted the vertical upper doors were opened and a small four-wheel truck was rolled through them on a pair of shore rails temporarily laid on the floor of the lock over its bottom door. The buckets were lowered on the trucks, unhooked and rolled outside on a track supported by a special shelf angle riveted to the lock. Both locks were tested to 40-lb. pressure before shipment.

# Training Calendar 2002

## November

**Asphalt Summit & Drainage course.**
November 12-14 in Anchorage.

**Construction Contracting Warrant System - Level I: Alaska Rules, Regulations, Policy and Procedure.**
November 18 in Anchorage and Nov. 25 in Fairbanks. (DOT & sister agencies only.)

**Construction Contracting Warrant System - Level III: Negotiation.**
November 18 in Fairbanks, November 19 in Anchorage, and November 21 in Juneau.

## December

**NHI 380032A: AASHTO Roadside Design Guide.**
December 2-3 in Fairbanks and December 5-6 in Anchorage.

**Media Relations Training for State and Local Governments.**
December 3 in Anchorage, December 4 in Fairbanks, and December 6 in Juneau

**Risk Management & Tort Liability on the Roadways: What You Need to Know to Protect Your Agency!** Sponsored by APWA. December 5 via audio-web conference. Contact Simon Howell.

**Warrant Level I: Alaska Rules, Regulations, Policy and Procedure.**
Juneau: December 10 (DOT & sister agencies only).

**Writing Skills Workshop**
Anchorage, December 3-4; Fairbanks, December 9-10. Contact Simon Howell.

## January

## February

**Fundamentals of Geometric Design.**
Anchorage: February 3-7

## March

**AASHTO Leadership Institute**
March 3-7

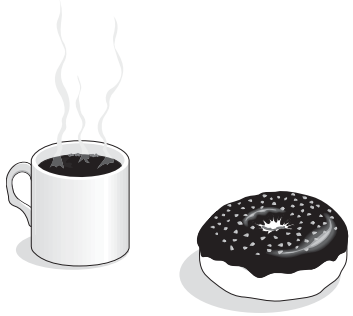
**Advanced Geometric Design.**
Fairbanks: March 3-7.

## April

**Advanced Geometric Design.**
Anchorage: April 14-18

For information about T2-sponsored training, contact Dave Waldo at 907-451-5323, david_waldo@dot.state.ak.us, or Simon Howell at 907-451-5482, simon_howell@dot.state.ak.us, or go to www.dot.state.ak.us, rest cursor on "Hot Topics," then click on "Training Opportunities."

# Meetings & Events 2002

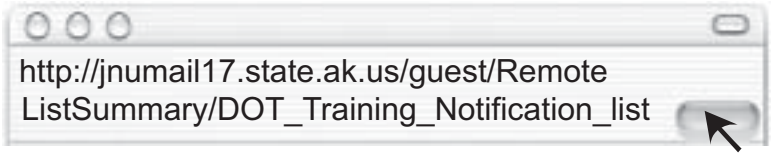


## Meetings Around Alaska

| Society | Chapter | Meeting Days | Location & Contact | |
|---|---|---|---|---|
| ASCE | Anchorage | Monthly, 3rd Tues., noon | Northern Lights Inn | |
| | Fairbanks | Monthly, 3rd Wed., noon | Captain Bartlett Inn | |
| | Juneau | Monthly, 2nd Wed., noon* | Westmark Hotel | * except June–Aug. |
| ASPE | Anchorage | Monthly, 2nd Thurs., noon | West Coast International Inn | |
| | Fairbanks | Monthly, 1st Fri., noon | Captain Bartlett Inn | |
| | Juneau | Monthly, 2nd Wed., noon* | Westmark Hotel | * except June–Aug. |
| ASPLS | Anchorage | Monthly, 3rd Tues., noon | Executive Cafeteria, Federal Building | |
| | Fairbanks | Monthly, 4th Tues., noon | Ah Sa Wan Restaurant | |
| | Mat-Su Valley | Monthly, last Wed., noon | Windbreak Cafe | George Strother, 745-9810 |
| AWRA | Northern Region | Monthly, 3rd Wed., noon | Rm 531 Duckering Bldg., University of Alaska Fairbanks | Larry Hinzman, 474-7331 |
| ICBO | Northern Chapter | Monthly, 1st Wed., noon | Zach's Sophie Station | Jeff Russell, 451-5495 |
| ITE | Anchorage | Monthly, 4th Tues., noon** | Sourdough Mining Co. | Laune Koziesek, 343-8145 ** except July & Dec. |
| IRWA | Sourdough Ch. 49 | Monthly, 3rd Thurs., noon** | West Coast International Inn | |
| | Arctic Trails Ch. 71 | Monthly, 2nd Thurs., noon** | Oriental House | |
| | Totem Ch. 59 | Monthly, 1st Wed., noon | Mike's Place, Douglas | ** except July & Dec. |
| Asphalt Pavement Alliance | Alaska | 3rd Wednesday of every other month | varies | John Lambert 267-5294 |
| PE in Government | Anchorage | Monthly, last Fri., 7 a.m. | Elmer's Restaurant | |
| Society of Women Engineers | Anchorage | Monthly, 1st Wed. 6:30 p.m. except July and August | varies | Karen Helgeson, 522-6513 |

# Alaska T2 Training Notification Listserve – Sign Up Today!

Alaska Technology Transfer is pleased to announce our new training listserve open to Federal, State, and local transportation agencies - including consultants, contractors, and other transportation professionals. Now you can receive updated training information every few weeks. To subscribe to the listserver via a web browser connect to the following address:




# What's Wrong With This Picture?

*This flagger may be confusing the motorists by letting the sign drop. No positive direction is given to either stop, or procceed slowly.*



http://www.dot.state.ak.us
- rest the cursor on "World of DOT&PF"
- rest the cursor on "Programs"
- double-click on "Research & Technology"


*This newsletter is funded by the Federal Highway Administration and the Alaska Department of Transportation and Public Facilities. The material contained herein does not necessarily reflect the views of the Alaska Department of Transportation, Federal Highway Administration, or the T² staff. Any reference to a commercial product or organization in this newsletter is only for informational purposes and is not intended as an endorsement.*



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