



Road Business

A University of New Hampshire Technology Transfer Center publication

Vol. 19 No. 4

Winter 2004



Participants practice with a transit at the Lines, Levels and Slopes workshop.

On the Road in New Hampshire

100 Master Roads Scholars

This October the UNH T² Center presented its 100th Master Roads Scholar award. In presenting the award to Dave Lent of Merrimack (see page 5), Dave Fluharty, Director of the Center, said, “These awards indicate the commitment that individuals and towns have to professional and personal development.”

The Roads Scholar Program recognizes educational and training of municipal highway practitioners. It recognizes those who have successfully completed numbers of UNH T² Center workshops. A typical one day workshop is five contact hours. To achieve the Master Roads Scholar level people need to attend 20 workshops or 100 contact hours.

After achieving the Master Roads Scholar level the UNH T² Center publishes a brief article about the new Master in the *Road Business*. One question posed is, “what motivates you to take so many

classes?” Many mention a strong desire to learn and stay current in their field. Bud Moynahan, retired Master Roads Scholar from Rye asked, “Where else can you learn this stuff? There are few other courses that are relevant.”

Master Roads Scholars want to improve their own and their department’s performance. Ernest Allain of Berlin takes classes “to get better knowledge and bring the knowledge back for use in the city.” Jim Dicey of Troy believes that “any knowledge will improve the way I do my job and the classes make my job easier (for me).”

All intend to continue training. Sheldon Morgan of Gilford has attended 43 workshops. Master Roads Scholars enjoy the networking opportunity that classes allow. Donald Atwood said, “He knows that others have the same problems and is interested in their approaches to similar situations.”

There are two more similarities with Master Roads Scholars: they all send their employees to training and their supervisors support their achievement.

Congratulations to the first 100 Master Roads Scholars! It has been a pleasure! We look forward to meeting the next 100 Master Roads Scholars.

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Email Etiquette Tips

In many cities and towns, email is becoming the preferred method of communication. It's fast, inexpensive, and often less frustrating than playing "phone tag." Public Works relies more on email everyday and many citizens would prefer to send an email than place a phone call. This article contains a few, important tips for email use.



Use upper and lower case. AVOID TYPING IN ALL CAPS. THIS IS THE EQUIVALENT OF SHOUTING! Many people see a message typed in all caps as rude and disrespectful. The recipient may perceive this as an angry email.

Proofread. Proofread. Proofread. Use punctuation, correct grammar and spellings. Always proofread email before sending and use spell check.

Watch message length and tone. Avoid long, rambling messages. Readers may stop reading before they get your main point or points. Long messages are often confusing. Also, however, excessively short unclear messages. Be more polite than usual.

Use detailed and specific subject line descriptions. This helps the recipient quickly determine the point of the email. It may speed up response time. Detailed subject lines help senders to manage and locate emails. Many readers will delete an email without opening it based on the subject line. A quality subject line tells readers the purpose of the email.

Avoid cutesy email addresses. Most agencies have standard email formats. Some people use a personal account for business purposes. Avoid using a cute name for your address because people form an impression of the sender based on this address.

Use "high priority" or "urgent" sparingly. Only use when absolutely necessary and when a message needs immediate attention. When someone always sends out urgent messages, recipients may start to ignore your emails that are truly critical. *Remember the boy who cried wolf...*

Don't send chain letters, urgent virus warnings, or other hoax letters. Many virus warnings are not legitimate. Before forwarding these messages, verify that their legitimacy. Check with the agency's email administrator regarding the legitimacy of these warnings.

Source:

Carr, Kim, Country Roads & City Streets, WV LTAP, Summer 2004, Vol. 19, No. 2

New Hampshire Roads Scholars

We are pleased to recognize individuals who, during the Fall of 2004, have achieved the following levels in the UNH T² Center Roads Scholar Program.

Master Roads Scholar. Participated in UNH T² Center training activities which totaled 100 contact hours and covering the range of topics required for Roads Scholar II.

<u>Name</u>	<u>Affiliation</u>
Ernie Ball	NHDOT
David Blanchard	Derry
Carl Currier	Hooksett
Roger Deboisbriand	Nashua
Kevin Hammond	Raymond
James Hanson	Claremont
David Lent	Merrimack
Dave Quint	Dover

Senior Roads Scholar. Participated in UNH T² Center training activities which totaled 70 contact hours and covering the range of topics required for Roads Scholar II.

<u>Name</u>	<u>Affiliation</u>
Bruce Adler	Chesterfield
Allan Bolduc	Meredith
Alex Cote	Deerfield
Ed Chase	Merrimack
David Crosby	Alstead
Gene Cuomo	Fitzwilliam
Robert Eaton	NHDOT
William Fralick	NHDOT
Kim Kercewich	Alstead
Mark Ober	Ashland
Dan Philips	Rochester
Jim Plante	Chesterfield
Jeff Strong	Merrimack
Buddy Sweeney	Claremont

Roads Scholar II. Participated in UNH T² Center training activities which totaled 50 contact hours and covered a set of minimum subject areas including road design and construction basics, other technical, tort liability and safety, and supervision or personal development.

<u>Name</u>	<u>Affiliation</u>
David Cantor	Salem
Reagan Clarke	NHDOT
David Desfosses	Portsmouth
Gordon Ellis	Epsom
Dean Hooper	Claremont

Michael Kercewich	Alstead
Carl Knapp	Weare
Robert Levesque	Durham
Steve Lucier	Bradford
Mike O'Neill	NHDOT
Thomas Richter	Portsmouth
Glen Smith	NHDOT
Alan Swiadad	Bedford
Gerard Turco	NHDOT

Roads Scholar I. Participated in UNH T² Center training activities which totaled 30 contact hours.

<u>Name</u>	<u>Affiliation</u>
David Almon	NHDOT
Tim Anair	Meredith
Kenneth Barton	Eastman Community Hollis
Thomas Bayrd	Mason
Robin Berry	Bow
Brian Bourgoine	Lyman
John Boynton	Meredith
Andy Brackett	Northfield
Bruce Brown	Alexandria
William Bucklin	Hooksett
Robert Burbank	Meredith
Pete Bushnell	Lisbon
Kevin Clement	Madison
Joe Dickinson	Merrimack
Ernie Doucette	Thornton
Thomas Dubey	Exeter
Phyllis Duffy	Northfield
Harold Fife	NHDOT
Ray Gilpatric	Madison
Rob Hatch	Chichester
David Kenneally	Dartmouth
Shawn Littlefield	Merrimack
Wayne Lombard	Bedford
John Mathieu	NHDOT
Jim Mountford	NHDOT
Richard Patten	Chesterfield
Michael Plante	Laconia
Luke Powell	Dunbarton
Alan Sheldon	Hooksett
John Soulia	Northfield
Sumner Weeks	

Master Roads Scholars



Master Roads Scholar Ernie Ball

Ernie Ball is an equipment operator at the NHDOT. Ernie has worked for the NHDOT for seven years. Ernie also worked for thirteen years as a truck driver at Steinbeke and Sons in Boscawen.

Ernie feels the status of Master Road Scholar is valuable because of the knowledge he has acquired. Ernie states “There is always something new to learn because technology is constantly changing.”

Ernie’s supervisor, Mike Reifke, is also a Master Road Scholar. He supports Ernie and others on the crew to further their education.

Ernie has two daughters and one granddaughter. His eldest daughter lives in California and is expecting a baby girl in November. Ernie is looking forward to their visit in December.

Ernie’s enjoys antique tractor-pulling. He loves to restore old tractors to see how they handle. Ernie owns six antique tractors, all dating between 1941 to 1953.



Master Roads Scholar Carl Currier

Carl Currier drives trucks and operates heavy equipment in the Town of Hooksett. He has worked in Hooksett for sixteen years. Before joining the town, Carl drove trucks for Bailey Distributors in Manchester for two years and worked for Plourde Sand and Gravel as a loader operator. Carl has driven trucks since 1966.

Carl feels that reaching the status of Master Roads Scholar is important because he has gained a lot of information on various topics from different workshops. Carl especially enjoys attending new workshops because of the value they hold in the innovative and original ideas and information they have to offer. Carl stated that despite his new status in the Roads Scholar Program, he will continue to attend workshops.

Carl is pleased that his foreman supports the Roads Scholar Program and encourages crew members to take classes. He believes it is important for individuals to advance in their careers by gaining crucial knowledge from workshops. Maybe this has to do with the fact that his foreman is a Master Roads Scholar himself!

Besides working hard, taking classes, and enjoying his newly earned achievement, you may catch Carl doing his favorite pastime activity: fishing.



Master Roads Scholar Kevin Hammond

Kevin Hammond is a truck driver, equipment operator, and mechanic for the Town of Raymond Public Works Department. Prior to working in Raymond, he was a yard foreman at a pipe plant and an equipment operator for an excavator. In the mid-1980's Kevin was appointed as Highway Agent in Epping.

Kevin missed the job variety of Raymond and returned eleven years ago. In total, he has devoted thirty years to the Town of Raymond!

Kevin believes the status of Master Road Scholar "holds a lot of value. I can use the information I learn in workshops and apply them to job duties when needed." Kevin attends other workshops for state licensure.

Kevin reports that Raymond Public Works Director, Dennis McCarthy, who is also a Master Roads Scholar, encourages his employees to take classes. Due to this support, four people from the Town of Raymond are Master Road Scholars.

Kevin has been married for thirty years. He enjoys his job so much that he runs the back hoe at his home on weekend. He also hunts. He reports that these two activities relax him, and he likes the quiet serenity of being in the woods.

Kevin is a certified NH firefighter, along with Dennis McCarthy and other co-workers. They mostly volunteer for the Town of Raymond in the evenings, and other surrounding towns as needed.



Master Road Scholar David Lent

David Lent, Deputy Director of Public Works in the Town of Merrimack, has served the town for the last eight years. David earned his B.S. in Civil Engineering from Clarkson University in Pottsdam, NY in 1972. Prior to working with the Town of Merrimack he worked 10 years for the New Hampshire Department of Transportation. He also worked for consulting and engineering businesses for 15 years. David has spent his entire career working in the public works field.

David feels that his Master Roads Scholar status is extremely important to him. It allows him time to participate with staff during training. He originally took classes to determine which ones would be appropriate for his staff. Soon, he realized that he was benefiting from them despite having an engineering degree. David believes there is something for everybody in UNH T² Center workshops.

David intends to continue participating in training classes even though he has achieved Master Roads Scholar status. His supervisor, who also takes classes, feels David's achievement sends a powerful message to the other workers that learning is important.

David has been married for 33 years and is blessed with a son and daughter.

Surface Treatments

When to Use Them and How to Ensure Quality

Surface treatments include thin overlays, chip seals, and sand seals. Applied to the right roads at the right time, they slow the rate that roads deteriorate, and make best use of limited budgets. This article describes when municipalities should use all three, and describes how to ensure high quality chip seals and sand seals. (Spring workshops will cover overlay inspection and testing.)

What Are Surface Treatments?

Thin overlays are 1 to 1½ inch hot mix asphalt (HMA) placed with a paver on an emulsified asphalt tack coat. A 1 inch overlay costs about \$2.25/sy, and a 1½-inch about \$3.35/sy. Chip seals are crushed aggregate spread over and then rolled into a layer of medium-set emulsified asphalt. They will seal pavements for 4 to 5 years, and cost about \$1.35/sy. Sand seals are 3/8 inch minus aggregate rolled into a layer of slow-set asphalt emulsion. When applied to low traffic, low speed roads, they should seal the surface for 2 to 3 years. Sand seals cost about \$1.00/sy.

Surface treatments provide a wearing surface over existing pavement to seal cracks, waterproof the surface, improve friction, and smooth rough roads, and rejuvenate hardened or oxidized asphalt.

When to Use Surface Treatments

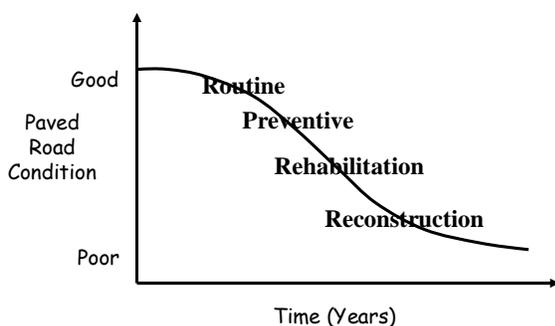


Figure 1. Classic Road Deterioration Curve

Roads deteriorate as shown in the Figure 1 curve. Surface treatments are a “Preventive” maintenance strategy applied when pavements are in the second stage of failure. In this state, pavements have

the following distresses:

- Alligator Cracking
 - Severity -- Just visible
 - Extent -- less than 10% of the area
- Longitudinal and/or Transverse Cracks
 - Severity -- less than or equal to ¼ inch wide
 - Extent -- greater than 30% of the area

In addition, each road should have a stable base and a proper crown. If rutting exists, the city/town must shim before applying a surface treatment. Crews should also fill large cracks (greater than ½ inch wide).

Ensuring Quality

Quality begins with applying the treatments to the right road as described above. The next step is to have adequate specifications. One-inch HMA overlays should be NHDOT Specification 401 Type E. A 1½-inch thick overlay should be Type D. Section 410 describes proper HMA placement. The tack coat should conform to NHDOT Specification 410. The UNH T² Center can provide specifications for chip seals and sand seals.

Other factors contribute to the quality of chip seals and sand seals:

- Environmental
- Surface conditions
- Equipment
- Construction procedures
- Traffic control

Environmental. Emulsified asphalt is a mixture of asphalt, water, and additives. It “cures” as water evaporates from the mixture. If curing is too slow, it delays formation of the asphalt-aggregate bond. If too fast, the asphalt can stiffen before this bond occurs.

Air and pavement temperatures and relative humidity affect curing times. Contractors should not apply seals during or after rain, or even when misty or foggy. Because weather is not controllable, managers should consider the weather when deciding

whether to seal on a specific day.

Air and pavement temperatures of 70°F are ideal, and 50°F is too low. The best relative humidity is in the 40 to 80 percent range. Cooler temperatures or high humidity slow emulsion curing. Very hot weather and low humidity can cause it to be too fast.

Surface Conditions. The usual practice is for city/town crews to prepare the road surface. As noted, the road must have a proper crown and no ruts. Crews must protect all structures -- manhole covers, valve covers, catch basins, etc. The surface must be clean and dry. Crews should remove debris the day before application, and swept immediately prior to emulsion application.

Equipment. Contractors apply chip and sand seals with an emulsion distributor and an aggregate spreader. They imbed the aggregate into the emulsion with rubber tired and steel rollers.

The distributor must spread a uniform coat of asphalt at the specified rate. Its heating and circulation system maintains a proper emulsion temperature. Proper spray bar pressures, height, and configuration ensure a uniform, fan-shaped coverage along the entire bar length. Electronic controls vary application for various truck speeds.

The spreader must apply a uniform aggregate layer at the specified rate. Too little aggregate can cause bare spots and eventual “bleeding” of the emulsion. Too much can result in window damage and wasted material.

Rubber tired and steel rollers align aggregates and seat them into the asphalt. Each should be 8-ton or more. Municipalities should never use haul trucks or traffic in place of rollers.

Construction Procedures. Inspectors should ensure that contractors conform to the specifications. The following are of particular importance.

As noted, applications outside certain temperature and humidity ranges will affect seal quality. A clean, dry surface is essential. The emulsion coating should be uniform across the road and along its length.

Aggregates should be crushed, clean, single-sized, durable, and as angular as possible. The stones

can be slightly damp, but not wet. Too much or too little moisture can inhibit the binder-aggregate bond. Too much can create a film around the aggregate. Dry stones absorb water from the emulsion, and can cause it to break too soon.

The contractor should check distributor and spreader calibration before starting work and during the day. Inspectors should ensure frequent calibration and cleaning. They should confirm application rates from weigh tickets and the covered area. They should also look for emulsion or aggregate bare spots or over application. Either indicates the need to check calibration.

Initial rolling must immediately follow stone application. The first roller should be rubber tired because it will not crush the stones. Wheels must be equally inflated to prevent streaking. The contractor should complete all rolling within 30 minutes after stone application.

Traffic Control. Allowing traffic too soon, or at too fast a speed, can affect quality. Usually one road lane is left open during chip or sand seal application on the other. After the contractor completes rolling, the city/town can reopen the lane to traffic at a maximum speed of 20 mph for at least 2 hours. Municipal crews can then sweep excess stones, and reopen the road lane to normal speeds.

Sources:

Martin, Tom.. 2003. “Quality Assurance of Surface Treatments.” *Pothole Gazette*. Summer. IN LTAP.
NHDOT. 2002. *Standard Specifications for Road and Bridge Construction*.
<http://www.state.nh.us/dot/specifications/index.htm>

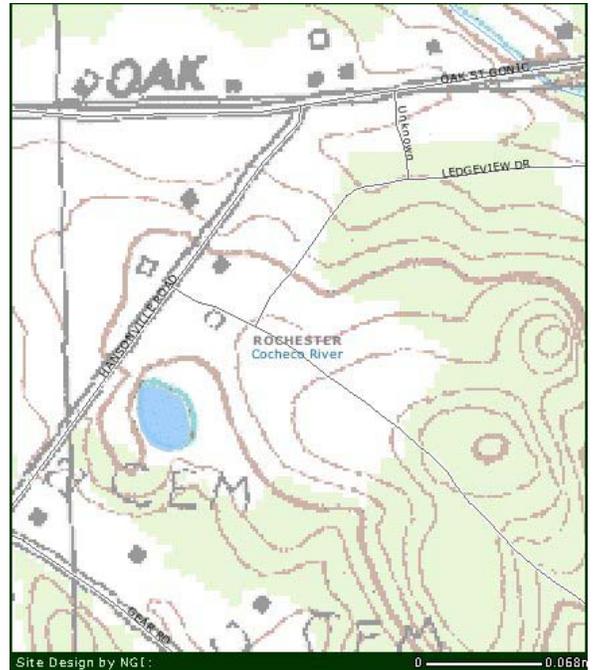


USGS Topographic Maps for Wetlands Permit Applications

Using the GRANIT Conservation Lands Viewer

Wetlands permit applications require a copy of the USGS topographical map identifying the proposed project location. The steps below describe how to use the GRANIT Conservation Lands Viewer to produce maps for your town. To use this web-based, interactive mapping tool, you need internet access and a web browser.

1. Go to website <http://www.granitmap.sr.unh.edu>.
2. Below the graphic in the middle of the page, click on “Click here to go to the Viewer.”
3. The Map Display Settings in the upper right hand corner allow you to set a background image for your map. Under “Image Backdrop” (drop down box) in the right panel, click on the arrow and select “USGS Topo Quads.” (The image will not appear immediately. It displays only when you have zoomed into a small area, as described below.)
4. In the Utilities section in the upper right, click on “QUICK FIND.”
5. In the dialogue box, be sure the “Towns and Cities” button is highlighted in the upper half box and find your town in the lower half box. Then click “Find.” When the map appears behind the dialogue box, close the dialogue box.
6. Highlight the “zoom in” icon (+ magnifier), and click on the map to get more detailed views of the desired location until topographic lines appear (Scale 0 to 0.17 mi). You can also use this tool to describe a rectangle on your screen that will become your viewing area.
7. Highlight the hand-shaped icon, and move the map to show the desired location.
8. When you have defined the image you want, you can print in two ways:
 - a. To print directly from the Viewer, click on “PRINT MAP” in the Utilities section, name the map, and click “OK.” Print the map from the next box that appears, and close it.
 - b. To insert the map into another document, click on “SAVE MAP” in the Utilities section, click on the “Save this image” icon in the upper left corner. In the Save Picture dialogue box, name the image (File name), define a path for its storage (Save in), and click “Save.” Then open the desired document, insert the image, add desired information, and print.
9. Mark the printed map as described in the wetland permit application.



Thanks to Fay Rubin at UNH Complex Systems Research Center for describing this procedure.



Publications

University of New Hampshire Technology Transfer Center

Copies of the following books and pamphlets, and our complete list of publications, are available through the UNH T² Center. The website has the most up-to-date list of publications. When requesting an item with a charge, please include the check with your form. If ordering by mail, follow the instructions below. To request by telephone, call 603-862-2826, or in NH, 800-423-0060. You can also request by fax to 603-862-2364, on-line at www.t2.unh.edu, or by e-mail to t2.center@unh.edu

The following materials are available for free:

_____ **Accessible Sidewalks and Street Crossings.** An informational guide to designing appropriate and safe structures for pedestrians with disabilities. *USDOT & FHWA.*

_____ **Basic Math for Local Agencies.** Including a pre-test, examples with answers, and comprehensive explanations of basic math principles; this guide is all you need to learn basic necessities of math. *UNH T² Center.*

_____ **Nonpoint Source Pollution, 2004.** Focuses on the best management practices to control nonpoint source pollution. This guide includes a section on land use, citizen involvement, funding opportunities, prevention, and more. *NHDES.*

_____ **Road Salt and Water Quality.** Emphasis is on the importance of preventing sodium chloride and other chemicals used to treat the roads in winter from entering the environment. *NHDES.*

_____ **Roundabouts: An informational Guide.** This in-depth guide explains the necessary design principles to have a safe, effective roundabout. There is an emphasis on the geometric design elements, state and federal standards, and cost. *US DOT & FHWA.*

_____ **Salt Storage Building Design.** Explains, with illustrations, state and federal regulations on the storage of salt. *UNH T² Center.*

_____ **Series of Quick Guides for New Hampshire Towns.** Set includes ten diverse topics including culvert installation and maintenance, ditch construction and maintenance, cut and fill slopes, stormwater inlets and catch basins, mowing and brush control, and snow and ice control. *Various NH agencies.*

_____ **Snow Disposal Guidelines.** Environmental Fact Sheet with recommended NHDES guidelines for snow disposal. *NHDES.*

_____ **The Salt Storage Handbook.** A practical guide for handling deicing salt. *The Salt Institute.*

_____ **The Snowfighter's Handbook.** A practical guide for snow and ice control before, during, and after a storm. *The Salt Institute.*

_____ **Utility Cuts in Paved Roads.** This field guide will assist in properly locating and marking existing utilities, pavement cutting, excavation, backfill, surface restoration, and site clean-up. *US DOT & FHWA.*

To Request Material by Mail

Check the items you would like to receive. Fill out this form and include a check in the envelope, if necessary. Cut out this page and mail to the UNH T² Center.

Name: _____ Position: _____
Organization: _____ Address: _____
Town/City: _____ State: _____ Zip: _____
Phone: _____ Fax: _____
Email: _____

Videos

University of New Hampshire Technology Transfer Center
Road Business, Winter 2004, Vol. 19, No.4



The following videos are available from the UNH T² Center Video Library. The website has the most up-to-date list of videos. You can have five videos for a two-week period with no charge. To request by mail, check the videos you would like to borrow (up to 5), fill out the mail request form, staple closed, affix stamp, and mail. To request by telephone, call (603) 862-2826 or (800)423-0060 (in NH). Visit our complete publication and video catalog on the web at <http://www.t2.unh.edu>. Or email t2.center@unh.edu

___ **M-298, Crack Sealing Flexible Asphalt Pavement**, 8 min. Explains the fundamentals of crack sealing, including advantages and disadvantages of different techniques and basic safety aspects. *US CRREL*.

___ **PA-234, Equipment Management Systems Series**, 60 min. Discusses equipment inventory, maintenance and management of parts, supplies and finances. The video also explains the equipment management information sub system and EMS implementation, and preventative maintenance.

___ **DC-251, The Importance of Road Drainage**, 19 min. Describes surface and subsurface drainage, drainage systems, and procedures for their inspection and repair. Also notes the importance of properly planned drainage systems. *FHWA*.

___ **ST-245, Motor Grader Operations**, 72 min. Discusses basics of the motor grader including blade position, maneuvering, and operating techniques. *NE Department of Roads*.

___ **M-232, Pothole Repair in Asphalt Concrete Pavement**, 13 min. Provides a step-by-step method for repairing potholes in a surface treatment (seal coat only) pavement including proper placing of traffic control devices, marking damaged areas, cutting out and removing damaged material, and filling holes. *IRF*.

___ **M-285, Response to Winter**, 21 min. Information regarding level of service a transportation department should expect to provide during winter. Also, discusses winter operations including maintenance function codes and crew member duties. *PENNDOT*.

___ **DC-252, Roadway Design: Balancing Safety, Environment and Cost**, 13 min. Emphasizes the importance of considering safety, environment and cost when designing a road. Explains how engineers must cooperate with the public in coming to a mutual agreement when constructing a roadway. *LRRB*.

___ **PA-217, Safety Restoration Snow Removal Guidelines**, 25 min. Presents snow and ice removal safety hazards, and methods for correcting them. Also discusses the importance of snow and ice removal management plans and how they can be implemented. *US DOT/FHWA*.

___ **M-201, The Snowfighters**, 24 min. Methods, procedures, and equipment for effective and efficient snow removal on streets and highways. *The Salt Institute*.

___ **M-297, Using Snow Plows on Motorgraders**, 16 min. In depth overview on different types of plows, usage conditions, how to connect each type, and ways to plow using the proper plow type. *FHWA*.

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Place
Stamp
Here

Milestones:

Sanbornton, Wilton, and Wolfeboro have joined Mutual Aid.

The *Builder Inspectors* have joined Mutual Aid. Inventory forms are available on-line at www.t2.unh.edu/ma or call the UNH T2 Center

Websites:

UNH T2 Center: <http://www.t2.unh.edu>

NH DOT Traveler's Information
<http://www.nh.gov/dot/511/>

NH Department of Safety, Motor Carrier Unit Frequently Asked Questions
<http://nh.gov/safety/dmv/hpeo/answersmc.html#q1>

NH Wetlands Bureau
<http://www.des.state.nh.us/wetlands/index.html>

PW.NET

Want to know what is happening in other towns? Learn the very latest in regulations? Need a place to ask questions of other public works officials? Want to be the first to receive notifications of UNH T2 Center workshops? Then, subscribe to PW.NET. It's free. Send an email message to: kathy.desroches@unh.edu

In the body of the message type:

Add pw.net your name

For instance: Add pw.net John Doe



The Importance of Drainage

Inadequate drainage greatly contributes to road failure. Proper drainage is vital as water affects road serviceability. To maintain a good roadway network the road manager must keep water out of it.

A drainage system reduces water damage and saves money. The major elements to a drainage system are:

1. Roadway
2. Shoulders
3. Ditches
4. Culverts.

These elements work together to prevent water from passing through the road surface. The roadway and shoulder move water to the side and carry it away. Even properly design roads could flood, washout, and develop potholes if drainage is neglected. Fix problems immediately.

Damaged shoulders, ditches, and culverts result in poor drainage. They allow water to stand on the road or seep back into the base, which saturates and weakens the base/road.

To avoid overflow and washouts, keep ditches and culverts free of debris and sediment.

Water penetrates the roadway through surface cracks and weakens the base and subgrade. This results in potholes, cracks, and pavement failure. Crack sealing is a primary way to keep the water out of the base and subgrade. A seal may be applied after.

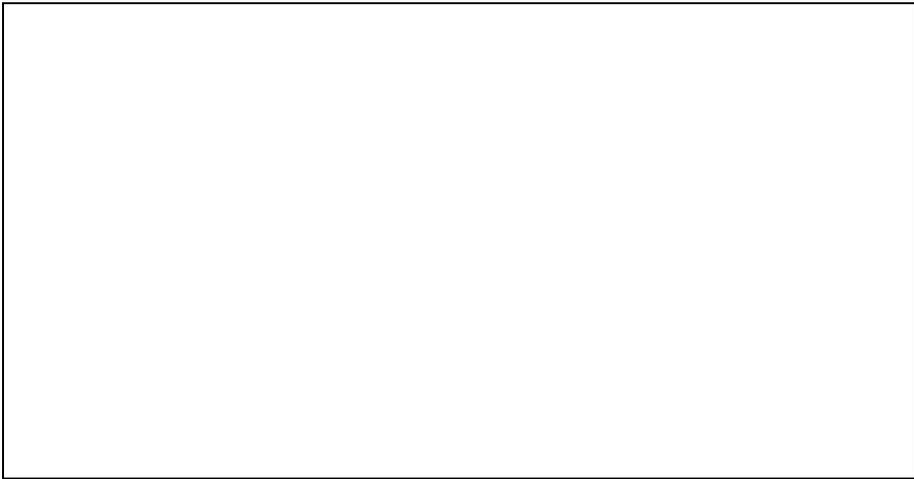
Maintain vegetation in ditches to prevent erosion. Mow vegetation and cut brush to keep water flowing smoothly. Keep culverts free of sediment to avoid road deterioration and flooding.

Smooth and reshape gravel roads to allow the road and shoulder to shed water to the ditches and away from the roadway.

Adapted from: *Water--Roads Number One Enemy*" Illinois Interchange Vol. 9 No.4

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Calendar

*Planned UNH T² Center workshops
Spring of 2005*

*For additional information or registrations,
call the UNH T² Center or check the website*

Bridge Repair
1 Location

Culvert Installation and Maintenance
1 Location

Drainage, Drainage, Drainage
2 Locations

Erosion Control BMPS
2 Locations

Geotextile Application
2 Locations

Inspection and Testing
2 Locations

Municipal Permits
1 Location

Municipal Road Standards
1 Location

MUTCD, NH Traffic Sign Rules
March 8, 2005, Lincoln

Project Planning
1 Location—Gilford

Public Speaking
2 Locations

Repair Treatments
1 Location

Road Side Design and Maintenance
1 Location

Road Surface Management System
1 Location

Work Zone Traffic Control
2 Locations

