On the Road in New Hampshire

New Hampshire Road Agents Association Has Many Accomplishment During Lee Murray’s Presidency

During his five years as President, Lee Murray has led the New Hampshire Road Agents Association (NHRAA) through many changes and accomplishments. Lee the Road Agent in New Boston, was featured as a Master Road Scholar in the Spring 1996 issue of Road Business. In that interview, he spoke of his role as President of the NHRAA and of his hopes for its future. Under his direction, many of his dreams for the association have come true.

In the mid-1990’s, under Lee’s leadership, the NHRAA assumed responsibility from the UNH T² Center for the Mountain of Demonstrations. By 1997, it was completely the NHRAA’s event, featuring demonstrations, displays, and booths of equipment, products, and services. They have increased the number exhibitors to 85, and in 1999 had 12 demonstrations.

The most visible change was to move the Mountain of Demonstrations to the Gunstock Ski Area in Gilford from Waterville Estates. Members of NHRAA have been pleased with the change, and Lee hopes the show will continue to grow.

The NHRAA have created a scholarship fund that has made 2 annual awards since 1998. NHRAA has worked with Howard P. Fairfield, Inc to create a Public Works Employee of the year award. The first award was presented this year at the Mountain of Demonstrations. And, they have created the newsletter, The Road Runner. It contains valuable information for Public Works.

The NHRAA have strongly supported the New Hampshire Public Works Mutual Aid Program. At the time of press, fifty-five communities have enrolled in the program. NHRAA support includes strong membership on the governing committee, speakers for the orientation training and many ideas to increase participation.

Lee has other dreams for the NHRAA. He would like to see the Association become more involved with Plow Safety Awareness. He has a recurrent nightmare of burying a playing child in a
Public Works
Best Practices Committee

In early 1998, some public works officials and representatives from supporting organizations became interested in the APWA accreditation and self-assessment process. That April and May a group met and concluded that a NH-specific process was needed. Meeting monthly since then, as the Public Works Best Practices Committee, their mission is:

To foster improved services to residents through the development of a self-evaluation and improvement program, including the review and establishment of recommended polices, operating procedures and guidelines, for agencies conducting public works activities in New Hampshire.

Compensation Funds of New Hampshire (CFNH) sponsored a Self-Assessment Workshop last October. Stimulated by the participants' interest in self-assessment and accreditation, the Committee began developing model policies for Snow and Ice Control. This spring the UNH T² Center workshops emphasized self-assessment in several workshops.

In the near future CFNH will make sample public works safety procedures available to members. It will closely follow state Department of Labor rules. It is designed so towns and cities can customize and adopt it.

The Committee also plans to develop accreditation criteria and procedures. The basis will be its present and future model policies. Developing accreditation criteria and policies to support it is a major effort. If you would like to help, or offer comments, contact one of the committee members listed below.

David Breman, Water and Sewer Department, Sunapee;
Dave Crane and Jonathan Kipp, CFNH;
Mike Faller, Public Works Department, Meredith;
Dave Fluharty, UNH T² Center;
Steve Gray, Highway Maintenance Engineer NHDOT;
Bill Herman, NHMMA & Town of New Durham;
Sheldon Morgan, Public Works Department, Gilford;
Carl Quiram, Public Works Department, Goffstown;
Harriet Spencer, AFSCME;
Bob Strout, NHRAA & North Hampton;
Paul Vlasich, NHPWMEA & Dover;
Ken Ward, NHMA, PLT;
Chris Way, NHDES.
Ripples in the Road
Stefanie R. Fishman, Project Assistant

Properly constructed and maintained gravel roads are adequate for low volume traffic. As most road managers know, the most common maintenance problems are loss of aggregate, drainage, and corrugations, or “washboarding.” This article focuses on preventing and repairing corrugated roads.

Washboarding causes wear and tear on vehicles. It causes vehicles to vibrate, annoying drivers and riders. Less understood, but more importantly, drivers have less control of their vehicles. The deeper the corrugations, the less safe the road.

What Is Washboarding?

Washboarding is a series of high and low spots in a wavelike pattern. As shown below, the waves tend to form from shoulder to shoulder. The road resembles an old-fashion washboard. Also, driving on a corrugated road often feels like riding on a very large washboard.

A corrugated, washboard-like gravel road

Corrugation severity is defined by its depth, the height of a ridge from its crest to the bottom of the adjacent valley (see diagram). Low severity is a depth less than 1 inch, moderate is 1 to 3 inches, and high severity is greater than 3 inches. The pitch is the length of a corrugation measured from crest to crest, typically 7 to 8 inches.

Why Does It Happen?

Similar to the asphalt top course on paved roads, gravel is the “wearing surface” of an unpaved road. The large stones, in contact with each other, distribute vehicle loads to the road base beneath it. The stones are held by smaller particles, especially “fines” which pass a 200 sieve (a screen with 200 wires per inch). With insufficient fines, vehicle tires more easily move the stones. As their particle-to-particle contact decreases, so also does their ability to distribute loads.

In addition, continuing traffic begins to move the stones into the pattern of ridges and valleys. Traffic causes corrugations in two ways:
- The force of the tires and the road surface,
- The motion of vehicles bouncing ups and down on their springs and tires.

The degree of damage depends on tire hardness and vehicle acceleration, deceleration, turning, and speed. Because hard tires excerpt greater force per square inch on the road surface, they break and scatter aggregate more than do soft tires. Acceleration, deceleration, and turning also increase tire-to-road surface forces. Therefore, corrugations usually occur first at road and driveway intersections, and at tops and bottoms of hills.

High speeds increase both tire force and bouncing. Fast moving vehicles, therefore, quicken the formation of corrugations and increase their depth.

Continued on page 8
New Hampshire Road Scholars

We are pleased to recognize the individuals who, during the Spring of 1999, have achieved the following levels in the UNH T\textsuperscript{2} Center Road Scholar Program.

**Master Road Scholar.** Participated in UNH T\textsuperscript{2} Center training activities totaling 100 contact hours and covered the range of topics required for Road Scholar II.

<table>
<thead>
<tr>
<th>Road Scholar</th>
<th>Affiliation</th>
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<tr>
<td>Donald Atwood</td>
<td>New Hampton</td>
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<td>Roland Bergeron</td>
<td>Litchfield</td>
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<tr>
<td>Steve Gagnon</td>
<td>Concord</td>
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<tr>
<td>Phil Howard</td>
<td>Lempster</td>
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<tr>
<td>Walt Kiblin</td>
<td>Lyndeborough</td>
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<tr>
<td>Richard Petell</td>
<td>Gilford</td>
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**Road Scholar**  

<table>
<thead>
<tr>
<th>Road Scholar</th>
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<tr>
<td>Anne Bedaw</td>
<td>Swanzey</td>
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<td>Michael Faller</td>
<td>Meredith</td>
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<td>Larry Jackson</td>
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<td>Ron Lavoie</td>
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<td>Ricky Moran</td>
<td>Danbury</td>
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<td>Mark Tapply</td>
<td>New Ipswich</td>
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<td>Glen Tuttle</td>
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**Senior Road Scholar.** Participated in UNH T\textsuperscript{2} Center training activities, which totaled 70 contact hours and covered the range of topics required for Road Scholar II.

<table>
<thead>
<tr>
<th>Road Scholar</th>
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<tbody>
<tr>
<td>Bruce Berry</td>
<td>Rindge</td>
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<tr>
<td>Alan Cote</td>
<td>Derry</td>
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<td>Richard Davis</td>
<td>Raymond</td>
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<td>Jay Fitzgerald</td>
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<td>Ronald Hansen</td>
<td>Eastman</td>
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<td>Scott Keddy</td>
<td>Community</td>
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<td>Bruce Moreau</td>
<td>Merrimack</td>
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<tr>
<td>Bud Piper</td>
<td>Wolfeboro</td>
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<tr>
<td>Paul Vlasich</td>
<td>Dover</td>
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<tr>
<td>Keith Weed</td>
<td>Claremont</td>
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<tr>
<td>Ken Crowell</td>
<td>Peterborough</td>
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<tr>
<td>Henri Frechette</td>
<td>Surry</td>
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<td>Ray Guarino</td>
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<td>Ned Connell</td>
<td>Epping</td>
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<td>Scott Clark</td>
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<td>Lake Sunapee</td>
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**Road Scholar II.** Participated in UNH T\textsuperscript{2} 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 or safety, and supervision or personal development.
Steve Gagnon is the Senior Road Foreman with the City of Concord. Steve has worked for the City of Concord for 25 years. He started at the bottom, as a temporary worker for 2 years then onto laborer, truck driver, and foreman. Before joining the city, he worked as a carpenter's helper and with a printing firm as a journeyman feeder on a five-color press.

Steve takes classes because he likes to learn and the "Information I get I pass onto my crew." His supervisor thinks his achievement is a wonderful accomplishment.

Steve has been married to Bev for 19 years. They have two sons and are new grandparents with a recently born granddaughter named Cynthia Ann. Steve likes to travel, putter in his flower garden, and cook.

Congratulations to Master Road Scholar Steve Gagnon.

Welcome Richard Petell to the ranks of Master Road Scholars. Richard is the Highway Superintendent in Gilford. He has held this position since 1987. Prior to becoming the Superintendent, he worked as a foreman, heavy equipment operator, and laborer. He served in the Supply Branch of the Army during Vietnam. After the Army, he worked full-time, while attending night school to earn his Bachelors in Management from New Hampshire College.

Richard attends classes to improve himself. He believes this is one way to do so and to stay current with new developments. The Director of Public Works, Sheldon Morgan, and the Selectmen are very pleased with his accomplishment and gave him a big round of applause at a recent meeting.

Richard sends his crew to classes whenever it is possible and practical. He likes them to take what he refers to as the basics: traffic control, drainage, and safety.

Richard and Alice have been married for 25 years. They have two children. Richard enjoys gardening. He grows vegetables and has just begun to grow flowers. He loves to play and watch all sports and his favorite team is the Red Sox.

Congratulations to Master Road Scholar Richard Petell.
Bridge Management Programs

Workshop Participants Develop Program for Local Agencies

In three Bridge Maintenance workshops this April, participants defined an effective bridge maintenance program. They then discussed how to put one into use in their town or city. Their conclusions should apply in other municipalities, and are summarized below. Their basics of a bridge maintenance program are to inspect bridges, determine corrective actions, plan and budget, and maintain bridge files.

Inspection

The NHDOT inspects all New Hampshire bridges every two years, and “red-list” bridges annually. It has recently revised the report to make ratings and descriptive information easier to understand.

Participants emphasized the need for their inspections at least annually, and after major storms. Several noted that local inspectors should consider the areas around the bridge in addition to the bridge itself. They emphasized inspecting the road, the roadway drainage, and upstream water flow.

Speakers emphasized the need to inspect guardrails on and approaching bridges. Also related to motorist safety, many managers thought that local agencies should inspect bridge-related signs at least annually.

Some workshop participants had used the NHDOT inspection reports as a guide for their own inspections. Whereas NHDOT inspections document deficiencies, local inspections emphasize how to correct them.

Determine Corrective Actions

The participants recommended that bridge managers assemble a list of the deficiencies and actions. In addition to NHDOT and local inspections, managers should look at prior records to see if past, preventive maintenance is again due. Some workshop participants had a list of work items, which their crews performed annually. Items from their lists included:

- Clean -- sweep and wash -- the deck and structure.
- Patch and seal cracks in asphalt decks.
- Clean and repair expansion joints.
- Cut brush for drainage and sight distances on bridge approaches.
- Grade approaches, in and on the sides of the roadway and into the stream, adding appropriate material as needed.
- Remove debris upstream and at the bridge.

Some crews applied boiled linseed oil to concrete surfaces annually for the first several years, and then every two years. They scraped and painted metal and wood as needed to provide protective coatings.

These work items prevented, or at least slowed, bridge deck and structure deterioration. In addition, municipal crews accomplished many one-time repairs.

Plans and Budgets

Participants emphasized the need to plan and budget for accomplishing maintenance and repairs. Several managers planned periodic repairs for specific months of the year. For example, they cleaned and washed bridges each April, and then inspected them. In May, they graded and reshaped roadway drainage to ensure that water ran off clear of the bridge and its abutments.

Many cities and towns have included funds for periodic repairs in annual budgets. For most one-time, non-emergency repairs, they budgeted for the following year. Setting priorities was necessary for both planned work and budgets.

Major repairs usually required a capital reserve fund, a bond issue, or some other funding mechanism. Special funds were also required for municipal contributions to the NH Bridge Aid Program to rehabilitate or reconstruct bridges. Some municipalities engaged an engineering firm to analyze complex problems, design solutions, and prepare cost estimates.
Maintain Bridge Files

More municipalities now have bridge files than was indicated in the 1996 UNH T2 Center bridge maintenance workshops. A complete file would include the following:

- Drawings and other descriptive information.
- NHDOT and local inspection reports.
- Records of work done, by whom and when.
- Pictures and plans for future work.

Bridge managers in some municipalities do not maintain bridge files. The most frequent reason given was that their town offices keep the NHDOT inspection reports. Participants felt that the Public Works or Highway Department should maintain the above listed information. Departments can get copies of recent reports from the NHDOT Existing Bridge Section at 271-3714.

Additional Information

The UNH T2 Center has a number of publications and videos on bridges and bridge maintenance. Please call or email us with any questions or information requests.

Acknowledgements

Our thanks to the participants of the Bridge Maintenance workshops for their lively discussions and useful ideas. Thanks also to the instructors: Steve White of Fay, Spofford, and Thorndike. Dave Powelson and Dean Bennett, who manage the NHDOT Bridge Inspection Program. Bob Barry and Nancy Mayville, from the NHDOT Bureau of Municipal Highways, who manage the NH Bridge Aid Program.

NCHRP 350* Requirements for Work Zone Devices
What They Mean for NH Municipalities

FHWA has mandated that all work zone devices used on the National Highway System (NHS) meet NCHRP 350 requirements. For new purchases of devices, FHWA has established various deadlines for meeting the NCHRP 350 criteria. One deadline has passed and others will occur soon.

Although few municipal roads are in the NHS, the standards and deadlines could apply in liability suits. It is therefore recommended that municipal road managers require suppliers to self-certify that new devices meet NCHRP 350 criteria. Municipalities can use existing devices as they complete their normal service life.


Source: http://www.atss.org/nchrp350.htm
Continued from page 3

These factors have the greatest effect on roads with a weak base, poor drainage, or both. A weak base deflects under loads, and becomes deformed into the same wave-like pattern as the surface. Poor drainage leaves water in the road, or allows it to percolate in from the sides. Too much water lubricates the base and surface particles. Thus, water increases particle movement, and corrugation formation and depth.

**Preventing Washboarding**

Municipalities can reduce washboarding by taking the following actions:
- Encourage drivers to slow down
- Set and enforce speed limits
- Use well-graded materials for wearing surface and base courses
- Maintain road and roadway drainage
- Use synthetic binders

Lower vehicle speeds will help prevent washboarding. They will also reduce acceleration and deceleration, and their adverse affects.

Most drivers on a gravel road live on it. Daily, a corrugated road adversely affects their safety, riding comfort, and vehicle condition. Municipalities can encourage some residents to slow down by informing them of the effect that speed has on washboarding. (Keeping roads narrow and with sharp curves slows traffic, but such roads are unsafe. Safe roads should be the first priority.) In addition, some residents and non-residents will respond to posted and enforced speed limits.

Visible maintenance actions will encourage drivers to reduce speed and police to enforce speed limits. Routine maintenance, such as grading roads and filling potholes, will also reduce the occurrence of washboarding.

A properly constructed road will itself help prevent corrugations. The wearing course and base should be of well-graded materials; that is, aggregate and fines in particular proportions by weight. (Call the UNH T2 Center for recommended proportions and thickness.)

Surface and base courses should be compacted and maintained to drain water out of the road. Highway departments should maintain ditches and culvert to carry water away from the road.

Synthetic binders, such as calcium chloride and magnesium chloride, retain fines and provide a hard road surface. The hard surface also improves drainage.

**How Can It Be Fixed?**

If corrugation severity is low (less than one-inch depth), equipment operators can correct washboarding by routine blading or by dragging with a rack. If severity is moderate (1 to 3 inch depth) the highway department should add material. High severity corrugations (more than 3 inches deep) usually require the following, more expensive, steps:
1. Scarify the corrugated surface.
2. Cut down 3 to 4 in.
3. Add more gravel as needed.
4. Add a synthetic binder.
5. Mix the materials in place and reshape the surface.
6. Compact the surface to be sure there is no loose aggregate.

It is a good practice to correct corrugation after it rains since the moisture needed to compact and reshape the surface will be present. Therefore, the best seasons for repair are the spring and fall.

When dealing with washboarding prevention is cheaper than repair. The road must be properly constructed and maintained. If washboarding still occurs because of heavy traffic (greater than 200 cars per day), the municipality should consider paving the road.

**Sources:**

- Stormseth, Ken, "Dealing With Washboarding", South Dakota Local Transportation Assistance Program.
Publications
from the
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 T^2 Center. 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 or by e-mail to kathy.desroches@unh.edu.

The following materials are available free of charge.

___UNH T^2 Center Video Catalog

___Vegetation Control for Safety A guide for street and highway maintenance personnel. Goes through site clearance and safety operations for vegetation control.


___Local Low Volume Roads and Streets Basic information for town officials, crew managers, and road managers on rural streets and other less-traveled roads.

___Flexibility in Highway Design. A guide written for highway engineers and project managers who want to learn more about the flexibility available to them when designing roads. It illustrates successful approaches used in other highway projects.

___Improving Highway Safety at Bridges On Local Roads and Streets This guide discusses effective low cost methods of improving and enhancing bridge and bridge approach safety.

___Maintenance of Small Traffic Signs A guide for maintaining small traffic signs geared toward maintenance personnel.

___Series of Quick Guides for New Hampshire Towns A set of pamphlets dealing with the topics below. Developed by the UNH T^2 Center and distributed as a set. 1) Culvert Installation and Maintenance, 2) Ditch/Channel Construction and Maintenance, 3) Vegetative Erosion & Sediment Control, 4) Non-Vegetative Erosion & Sediment Control, 5) Cut and Fill Slopes, 6) Beaver Pipe: Construction and Maintenance, 7) Stormwater Inlets and Catch Basins, 8) Mowing and Brush Control, 9) Snow and Ice Control, and 10) Obtaining Permits.

The following materials involve a minor charge. Please send a check with the form when requesting one of these materials.

___Participant's Manual for Preventive Maintenance Treatments Workshops. A UNH T^2 Center Publication. Describes the elements of a preventive maintenance program for local roads, the methods and materials for effective preventive maintenance treatments, and the road conditions that should receive them. Comes in a binder. $15

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 T^2 Center.

Name:__________________________
Position:________________________
Organization:____________________
Address:________________________
Town: ___________ State: _______ Zip: ________

Check is enclosed payable to: University of New Hampshire

$15________

Road Business, Summer 1999, Vol. 14, No. 2
Videos
from the
University of New Hampshire Technology Transfer Center
Road Business, Summer 1999, Vol. 14, No. 2

The following videos are available from the UNH T² Center Video Library. 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 at a time), 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 our website at http://www.t2.unh.edu.

_M-301, Protecting Our Pavement: Preventive Maintenance_ 14 min Maintain roads through preventive maintenance, so the life of the pavement is extended. This video shows about what it preventive maintenance is and why it is important; also advantages and techniques.

_ST-207, Safety Features for Local Roads and Streets_ 170 min This tape shows typical highway safety conditions and roadside obstacles. It presents the ways to eliminate or minimize accident severity. It looks at ditch slopes, culvert ends, driveways, cross roads, cable and concrete barriers, bridge railings, sign posts and mailboxes.

_M-223, Cleaning and Clearing of Bridges_ 13 min Discusses the 8 easy steps to cleaning and clearing bridges. This video tells what tools are involved in the cleaning and clearing of bridges, and what types of things to look for, as far as repairs, that may be needed for the future.

_M-269 New Life for Old Roads_ 7 min. Describes the Full Depth Reclamation process, noting precautions to take in order to ensure success.

_DC-251, The Importance of Road Drainage_ 19 min The basis for this film is that if you do not plan the drainage of water that way you want, nature will drain it for you. Describes surface and subsurface drainage, drainage systems, and procedures for their inspection and repair.

_DC-225, Traffic Barriers_ 46 min. Consists of an overview of traffic barriers, how they work, why they're used, what factors cause them to fail, and installation of different systems: the cable barrier system, the box beam barrier system, W-beamwood and steel signpost systems, concrete barrier systems, and traffic barrier terminals.

_M-257. Pavement Structure Repair and Techniques, Asphalt Chip Seals_ 21 min Lists methods of asphalt chip sealing, necessary equipment, and demonstrates the proper chip sealing procedure. Also discusses other important factors, such as the temperature of the pavement and the size of the aggregate used.

_M-208, Down is Up_ 20 min Preventive maintenance is stressed to reduce down time on construction sites.

_M-238 Smoothing and Reshaping of Earth and Gravel Roads_ 20 min. Shows the steps needed for maintaining and repairing earth or gravel roads. Smoothing and reshaping are covered separately, and equipment is discussed.

_Video Catalog._
Milestones:

Don Atwood has joined the Town of New Hampton as the Director of Public Works.

Mike Bobinsky has left the City of Dover and has joined the City of Dunlap, Utah as the Deputy City Manager, Pete Lavoie will be acting as Community Service Director until a new director is hired.

Chum Cleverly, Director of Public Works in Bow, received an award from the Rotary Club for Vocational Service. His role in Mutual Aid for Public Works played a big part in the selection for the award

David Foster is the new City Engineer in Somersworth.

Wyatt Fox is the new Road Agent in Greenfield.

Richard White has left the City of Portsmouth and is working in Rochester as the Superintendent of Public Buildings.

Websites:

More helpful websites for Public Works employees. Here are just a few. If you have others that your colleagues could benefit from, send the urls to kathy.desroches@unh.edu. We’ll publish the site and your name in Road Business. (No commercial sites please).

UNH T² Center: http://www.t2.unh.edu

To see a list of events planned for Public Works see the latest addition to the T² Center’s Website http://www.t2.unh.edu/training/events.html

For a variety of information look to “Safety and Training Division” on the NH Department of Labor website. Information available includes, but is not limited to: Public Employee Regulations, Administrative rules, Written Safety Programs, Joint Loss Management Committees, and Safety Inspections http://www.state.nh.us/dol

To obtain Materials Safety Data Sheets (MSDS) for all products http://msds.pdc.cornell.edu/issearch/msdssrch.htm http://www.usp.edu/safety/Msds.htm

Y2K Sites
http://www.utne.com/y2k/index.html

PW.NET

Want to know what is happening in other towns? Need a place to ask questions of other Public Works Officials? 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
Road Business
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kathy.desroches@unh.edu
http://www.t2.unh.edu

Calendar
Planned UNH $T^2$ Center workshops
Fall of '99
For additional information or registrations,
call the UNH $T^2$ Center
or check the web-site.

Basics of a Good Road
2 Locations

Brakes and Hydraulics
1 Location

Budget Preparation and Presentation
3 Locations

Customer Relations
2 Locations

Environmental Compliance
3 Locations

Incident Command System for Public Works
2 Locations

MEMS
2 Locations

Mutual Aid Orientation for Public Works
3 Locations

Project Planning
2 Locations

RSMS
2 Locations

RSMS Applications
1 Location

Self Assessment Environmental Compliance in Highway Garages
2 Locations

Self Assessment of Safety Policies
3 Locations

SIMS
2 Locations

Winter Operations
2 Locations

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