A Summer on New Hampshire Roads

by

David Winslow

Last Spring I was a civil engineer major at the end of my junior year. I had plenty to worry about, including finding a summer job. When the UNH TCenter offered me a job to survey town's roadways, I was excited. Not only a job, but one that would give me valuable work experience.

Working as a team using the Road Surface Management System (RSMS), my partner, Scott Allaire, and I learned a lot that we’d never learn in a classroom. We learned things that come only from experience. Like how to look at a road and understand what is going on underneath the pavement. Understanding what caused a particular failure mode, and what would be the best repair. What I think that I learned most about was how public works operated in towns.

The first town Scott and I surveyed was Bow. This was great. We both lived in Manchester, and Bow was just up the road. Bright and early on May 25th we went to meet with the road agent, Chum Cleverly. We both had plenty of questions. Scott wrote most of them on a small scrap of paper. We must have looked like two bumbling fools when asking him questions: Scott reading and looking at his "cue-card", and me trying to remember if we forgot anything.

We then hit the road and began the survey. Things ran smoothly until the fourth day. We had been driving up and down Robinson Road a half dozen times trying to locate side roads we might have

continued on page 8

On The Road In New Hampshire

Civil Engineering Students
Conduct Road Surface Management Surveys

The following article was written by one of six UNH civil engineering majors who conducted road surface management surveys this past summer. In two-person teams, Scott Allaire, Ronald Apodaca, David Konesko, Mark Lentz, Christopher Malcolm, and Dave Winslow surveyed 752 paved and 119 unpaved miles of road for seventeen towns. The feedback has been so positive that we plan to make the program available in 1995.

Another factor in that decision was the exceptional performance of these students. They worked independently, and the quality of their analyses and reports was consistently superb.

Thanks, Fellas

Pavement Management Featured in This Issue

For over five years we have distributed the Road Surface Management System (RSMS), and have trained people in how to apply it. Over that period our staff and consultants have seen many municipalities benefit from this pavement management tool. We have also observed Town Managers, Selectpersons, and Council Members become increasingly concerned with pavement management. We have therefore prepared several articles directed to people in those positions.

An article on pavement management basics begins on page 2. There are two descriptions of our employing UNH students for RSMS surveys. On page 1 Dave Winslow tells about the surveys from his viewpoint of a team-member. On pages 5-7 we formally describe the surveys including application procedures.

ALSO IN THIS ISSUE

Pavement Management . . . . 2
RSMS Surveys . . . . . . . 5
Cost Estimating for Surveys . 6
Publications . . . . . . . 9
Videos . . . . . . . 10
Winter Operations
Recommendations . . . . . 11
Training Activities Calendar . 12
Pavement Management: What Is it? Why Use It?

Key Concepts and Advantages

The "Good Old Days"

For many years people concerned with public works have known that

1. All road surfaces deteriorate over time,
2. It costs less to have good roads than bad roads, and
3. Treating roads while still serviceable prevents or reduces the rate of deterioration.

Into the late 1980s, public works professionals addressed these concerns by focusing on treatments -- techniques, materials, equipments, skills, etc. The dominant decision-making processes, therefore, centered on selection and application of best treatments. Management considerations, such as which road should receive treatment, had little importance because revenues were usually adequate to fund maintenance and repair plans.

A road agent or similarly positioned individual established these plans and budgets by one or more of several approaches.

- **Routine Maintenance.** Established routine maintenance standards; for example, every four years or so seal coating those pavements "due" to receive that treatment.

- **"Worst First."** Priorities established by appearances. Decision-makers gave the highest priorities to the worst looking roads and lowest priorities to the best looking.

- **The Veteran Road Agent.** Reliance on the long-time caretaker of a town's roads and streets. He knew them like his children, and many sought his recommendations even after he was no longer responsible.

These approaches enabled town officials to adjust priorities in response to political considerations. For example, priorities could be easily adjusted for areas that produced many complaints or accidents.

What some might regard as those "Good Old Days" are gone in many locations and fast disappearing in the rest. Municipal budgets on the whole have come under increasing pressure: some road maintenance budgets have stayed at constant levels; most have decreased.

An Emerging Process: Pavement Management

To town officials and citizens alike, more streets appear to become deteriorated each year. Repair costs, on the other hand, seem to increase rapidly. In all too many instances, both perceptions accurately reflect reality.

More and more municipal officials and residents require road agents and public works directors to justify their decisions and their priorities. Many officials and citizens question their road manager's decision-making processes, and increasing numbers insist on use of management processes to help make cost-effective decisions.

Nearly all modern management systems were developed within the theoretical framework derived from a number of studies and illustrated in Figure 1. During the first 40% of deterioration, the pavement performs well. To the untrained eye, it looks good. Once deterioration reaches the level labeled "Fair" in Figure 1, the deterioration rate increases significantly. Indeed, the pavement deteriorates so fast, it seems to fall apart.

As the deterioration rate increases, so does the cost to renovate. Properly maintained streets, those in "good" to "excellent" condition in Figure 1, require an annual maintenance investment four to five times less than if the pavement is allowed to deteriorate to the "poor" or "failed" conditions and then reconstructed or rehabilitated.

Why does it cost four or five times more to renovate a bad road than a good one? The basic reason is one needs to maintain and repair only the top portion of the good road. For bad or failed roads, one must repair or replace the subbase. Therefore, the optimum time for major pavement maintenance investment is when the deterioration rate begins increasing; that is, when a road is slipping from good to poor condition.

Another way to interpret Figure 1 is in terms of treatment categories. (See the box below for distinctions between these categories.) In these terms, it is better to apply routine and preventive

![Figure 1. Pavement Deterioration over Time.](image-url)
Network-Level Analysis

The stages of a network pavement management system are:

1. An Inventory,
2. Condition Assessment,
3. Repair Strategies and Cost Estimates,
4. Prioritization, and
5. Impact of Funding Decisions.

Inventory. A network inventory defines what is being managed and divides the network into management units. The kind of information gathered is based on the type of roads to be inventoried. The RSMS inventory files include information on road name, its dimensions, and specific characteristic such as number of lanes, surface type, and shoulder type.

Condition Assessment. Road condition assessment defines the condition of each management section and the health of the network. Modern pavement management systems, including RSMS, have specific definitions for pavement deficiencies, and means to quantify the severity and extent of roadway "distresses."

Repair Strategies and Cost Estimates. After the road condition data has been recorded (usually in a computer), the local road manager's role changes from observer to analyst. The manager has two tasks: to determine (1) repair strategies appropriate for condition types, and (2) unit-price cost estimate for each strategy. This initial analysis is without regard for what funds will be available.

To take advantage of the pavement management system as a decision making tool, managers should assign several repair strategies for each condition type. This would be especially important for those who use the same techniques year-after-year. What was most cost effective in the past might not be now.

Prioritization and Optimization. Repair strategies are determined without regard to the available funds. In this stage the road manager compares the funds required with the funds available. Within the funding parameters, the road manager identifies the section for repair which will yield the highest return for the available funds. The goal is to provide the greatest overall network condition for the funds expended.

Five Categories of Repair Alternatives

Deferred Maintenance. No action or specific repair to make the road passable. Usually applies when there is no intent to extend the useful life of a road surface.

Routine Maintenance. Patching small areas and general cleaning of the surface, adjacent areas, and structures. For example, patching potholes, crack sealing, ditch and culvert cleaning, and mowing of shoulders and adjacent areas. Usually performed by a municipality's road crew and included in annual budgets.

Preventive Maintenance. Coating of the surface to prevent or slow further deterioration. Relatively inexpensive repair will enable a pavement to last for many more years. Even those preventive repairs beyond the road crews' capability should be provided for in annual budgets.

Rehabilitation. Major repairs of the road surface, usually an asphalt overlay after surface preparation. Much more expensive per mile than routine or preventive maintenance, but less than reconstruction. Nearly always performed by contractors, and will likely require a capital improvements plan.

Reconstruction. Repairs which involve excavation of the subbase, the addition and/or stabilization of aggregate, and a new surface. Because the repairs are very expensive and must be performed by contractors, their accomplishment will likely require a capital improvements plan.
Whereas early pavement management systems applied complex "optimization tools," most now use practical ranking systems based primarily on road condition and traffic. Some systems also include the type of service the road provides (e.g., commercial, agricultural, residential, tourism), and the road managers’ experience. Users of the RSMS program can prioritize projects by setting percentages for traffic volume, roughness, and road condition.

**Impact of Funding Decisions.** Few local road managers in New Hampshire have sufficient funds to adequately maintain even the high priority roads. He or she must therefore assess the impact of funding decisions on:

- Future network condition,
- Future fund needs,
- Sections with deferred needs, and
- Sections with stop-gap treatments.

Local road managers must, at least annually but often more frequently, convince officials of funding needs. In theory, government agencies attempt to provide the maximum social benefit for the money provided to them by the public. In practice, funds are generally allocated by elected officials who must stand for reelection every two years. Those allocating funds are often more interested in the reconstruction or rehabilitation than routine or preventive maintenance, perhaps because the former show clearer evidence of their actions. Whatever the reason, even though less expensive and more cost effective over the long-term, routine and preventive maintenance generally require considerable justification.

Some users of RSMS have found Figure 1 to be convincing when justifying funding requests. It illustrates the impact of diverting funds from routine and preventive maintenance to reconstruction or rehabilitation of already badly deteriorated pavements. As an RSMS user stated at a recent workshop, it is more cost effective to keep road conditions “above the knee of the curve.”

**Benefits of Pavement Management**

Two benefits dominate the many identified by users of pavement management decision making systems:

- More efficient use of available resources, and
- The ability to justify and secure more funding for pavement maintenance and rehabilitation.

Other benefits include:

- More accurate and accessible information on road systems,
- Evaluation of funding decision impacts,
- Selection of more effective maintenance and rehabilitation strategies, and
- Ability to answer pavement questions from appointed and elected officials.

Cost effective decisions depend on accurate condition assessments. As conditions change, so also should the funding and execution plans. Gathering condition data takes time, and road crews and managers often cannot be spared. Subsequent articles provide a data collection alternative for new or revised pavement management plans: UNH civil engineering majors during the summer.

**Availability of Pavement Management Software**

Private software packages usually require a license for use; public domain does not. The UNH T-Center can furnish information, including reviews, about some private packages, and will search for information about others on request. The RSMS software package is in the public domain. New Hampshire users can obtain it from the UNH T-Center. Residents of some other states can obtain it from their T-Center. These states also provide training and some technical support.

RSMS is also available through two distributors of transportation-related software packages: (1) McTrans Center for Microcomputers in Transportation and (2) Personal Computing in Transportation (PC-TRANS).

**REFERENCES**


**Editors Note**

We wrote this article for a specific target audience: select persons, council members, town managers and administrators, and other town officials. In our view they need the basics of pavement management provided above. The referenced sources discuss many other aspects to pavement management. Individual who want additional information, whatever their position, should call the UNH T-Center.

**McTrans**

512 Weil Hall
University of Florida
Gainesville FL 32611-6585
Ph. (904) 392-0378

**PCTrans**

2011 Learned Hall
University of Kansas
Lawrence KS 66045
Ph. (913) 864-5655
RSMS Surveys by UNH Civil Engineering Majors

Municipalities Can Apply Now for Summer 1995 Surveys

An All-to-Common Problem: Bad Roads

Nearly all New Hampshire municipalities have the same problem: many of their paved roads need rehabilitation or reconstruction. Additional miles of paved and aggregate roads also require repairs. Capital improvement and road maintenance budgets are seldom adequate to meet these needs. The Town roads are deteriorating more quickly than their local road manager — road agent, public works director, and the like — can maintain much less reconstruct them. The public is expressing dissatisfaction about the situation.

Many local road managers are frustrated because they do not have the resources to repair their roads. Town Boards often recognize the problem and seek long-range work and budget plans to restore municipal roads. Use of a pavement management package, such as the Road Surface Management System, will yield this plan. RSMS objectives include:

1. Inventory the road system,
2. Determine and document the condition of each road,
3. Assign maintenance or repair methods for each condition type,
4. Determine costs of maintenance and repair methods,
5. Assign repair and maintenance methods to each road,
6. Establish maintenance and repair priorities, and
7. Establish long-range work and budget plans.

To use this plan, however, requires:

- Gathering inventory and road condition data by riding all roads several times,
- Entering that data into a computer, and
- Operating the reports to get reports for management analysis.

Performance of these tasks with the local road manager and his crew requires taking them from road work. In other words, many municipalities need not only a management system but also trained people to help them carry it out.

Solution: RSMS Surveys by UNH Students

During the past summer, the UNH T-Center hired six students who surveyed roads, using RSMS, for seventeen municipalities. (See “On the Road in New Hampshire” on page 1). It will repeat the program in 1995. Table 1 summarizes the respective responsibilities of the UNH T-Center and of municipalities who choose to participate. In essence, the division of responsibilities is as follows:

- The UNH T-Center will conduct the road inventory and condition assessment, enter data and operate computers, and provide a final report.
- Municipalities will perform the management functions inherent in a pavement system, and reimburse UNH for student labor and mileage.

A formal proposal and a cost estimating worksheet follow on pages 6 and 7.

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>MUNICIPALITY</th>
<th>UNH T-CENTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan survey</td>
<td>Provide maps and road classification information</td>
<td>Plan route, define segments, and enter data into computer</td>
</tr>
<tr>
<td>Inventory</td>
<td></td>
<td>Field survey and data entry</td>
</tr>
<tr>
<td>Condition Assessment</td>
<td></td>
<td>Field survey and data entry</td>
</tr>
<tr>
<td>Repair Strategies</td>
<td>Determine repair alternatives</td>
<td>Enter into computer</td>
</tr>
<tr>
<td>Cost Estimates</td>
<td>Provide cost estimates</td>
<td>Enter into computer</td>
</tr>
<tr>
<td>Priority Criteria</td>
<td>Establish weights for priority setting</td>
<td>Enter into computer</td>
</tr>
<tr>
<td>Reports of maintenance and repair requirements and recommended priorities</td>
<td>Analyze</td>
<td>Run reports and forward to road managers and town officials</td>
</tr>
<tr>
<td>Work and Budget Plans</td>
<td>Prepare plans from reports</td>
<td>Clarify information when requested</td>
</tr>
</tbody>
</table>

Table 1
RSMS Survey Respective Responsibilities

page 5
A Proposal to Selectpersons and Other Municipal Officials
for
Road Surface Inventories and Assessments
by
UNH Civil Engineering Majors

The UNH T²Center proposes the use of civil engineering majors during the summer of 1995 to help New Hampshire municipalities manage their local roads. The students would, with the municipality's local road manager, apply the Road Surface Management System (RSMS) to paved and unpaved roads. The end product will be a bound report, and a camera-ready copy, with a recommended plan for road maintenance and repair and for funding levels to execute it.

Table 1 on page 5 displays the respective responsibilities of participating municipalities and the Center. Regretably, UNH T²Center funding levels dictate that we provide this service on a reimbursable basis. WE WILL CHARGE ONLY WHAT IT COSTS US. The form on page 7, based on the assumptions below, enables calculation of a cost estimate for this service. Because publication of the estimating procedure must apply to all possible situations, it is conservative. If you wish to discuss specific situations, or have any questions, call Dave at the UNH T²Center -- (603) 862-4348 or (800) 423-0060 (in NH).

The UNH T²Center staff will begin the student selection process at the beginning of the spring semester. We therefore request you notify us of your interest by January 23, 1995. We would appreciate formal commitment as soon after that as possible, but will wait until after town meetings if necessary. Schedules of the surveys will be arranged with local road managers or other designated officials.

---

Cost Estimate Assumptions

This cost estimating procedure is based on the following assumptions:

- Two-student teams, working 4 ten-hour days per week, will perform the inventories, condition assessments, and computer operations.
- Each team can inventory thirty miles of paved and forty miles of unpaved road per day.
- Each team can assess twenty miles of paved and thirty miles of unpaved road per day.
- Each team will require two days to prepare for the over-the-road work, and three days to evaluate the data and prepare the report.
- Travel to and from the Municipality will be from Durham.
- The Municipality will provide maps and other planning information in a timely manner.
- The local road manager will expeditiously assign repair strategies for the road conditions identified during the survey.

This cost estimating procedure is intended for use in programming funds. We have, therefore, made conservative assumptions so that variances will likely result in decreased rather than increased costs. Travel distance, for example, will be calculated from Durham or from the team member's residence, whichever is less. Also, in many towns the survey teams will be able to inventory and/or assess road faster than the assumed rates.
Cost Estimate Form

Basic Factors
1. Enter miles of paved road
2. Enter miles of unpaved road
3. Distance: Municipality to Durham

Estimated Days in the Field
4. Divide line 1, miles of paved road, by 25
5. Divide line 2, miles of unpaved road, by 35
6. Add values from lines 4 and 5
7. Multiply the value from line 6 by 2
8. Round value in line 7 to nearest whole number
9. Total Days: Add 5 to the value in line 8

Cost Calculations
10. Multiply the distance in line 3 times the estimated total days in line 8
11. Multiply the value in line 10 times $0.72
12. Multiply line 1, miles of paved road, time $0.72
13. Multiply line 2, miles of unpaved road, times $0.72
14. Multiply estimated total days in line 9 by $165
15. Total Estimated Cost: Add the values in lines 11, 12, 13, and 14

Cost Estimate Example

Basic Factors
1. Enter miles of paved road
2. Enter miles of unpaved road
3. Distance: Municipality to Durham

Estimated Days
4. Divide line 1, miles of paved road, by 25
5. Divide line 2, miles of unpaved road, by 35
6. Add values from lines 4 and 5
7. Multiply the value from line 6 by 2
8. Round value in line 7 to nearest whole number
9. Total Days: Add 5 to the value in line 8

Cost Calculations
10. Multiply the distance in line 3 times the estimated total days in line 8
11. Multiply the value in line 10 times $0.72
12. Multiply line 1, miles of paved road, time $0.72
13. Multiply line 2, miles of unpaved road, times $0.72
14. Multiply estimated total days in line 9 by $165
15. Total Estimated Cost: Add the values in lines 11, 12, 13, and 14

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Enter miles of paved road</td>
<td>57</td>
</tr>
<tr>
<td>2</td>
<td>Enter miles of unpaved road</td>
<td>23</td>
</tr>
<tr>
<td>3</td>
<td>Distance: Municipality to Durham</td>
<td>65</td>
</tr>
<tr>
<td>4</td>
<td>Divide line 1, miles of paved road, by 25</td>
<td>2.28</td>
</tr>
<tr>
<td>5</td>
<td>Divide line 2, miles of unpaved road, by 35</td>
<td>0.66</td>
</tr>
<tr>
<td>6</td>
<td>Add values from lines 4 and 5</td>
<td>2.94</td>
</tr>
<tr>
<td>7</td>
<td>Multiply the value from line 6 by 2</td>
<td>5.88</td>
</tr>
<tr>
<td>8</td>
<td>Round value in line 7 to nearest whole number</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>Total Days: Add 5 to the value in line 8</td>
<td>11</td>
</tr>
<tr>
<td>10</td>
<td>Multiply the distance in line 3 times the estimated total days in line 8</td>
<td>715</td>
</tr>
<tr>
<td>11</td>
<td>Multiply the value in line 10 times $0.72</td>
<td>$514.80</td>
</tr>
<tr>
<td>12</td>
<td>Multiply line 1, miles of paved road, time $0.72</td>
<td>$41.04</td>
</tr>
<tr>
<td>13</td>
<td>Multiply line 2, miles of unpaved road, times $0.72</td>
<td>$16.56</td>
</tr>
<tr>
<td>14</td>
<td>Multiply estimated total days in line 9 by $165</td>
<td>$1815.00</td>
</tr>
<tr>
<td>15</td>
<td>Total Estimated Cost: Add the values in lines 11, 12, 13, and 14</td>
<td>$2387.40</td>
</tr>
</tbody>
</table>
missed. I saw what might be a side road, but it was too late to turn. I went to the bottom of the hill and made a u-turn. A red Jeep Cherokee whizzed by me. I just thought it might be some crazy nut on the road.

I turned into the side road, but it was a private drive. I put the car in reverse. I put the car in reverse, and began to back out. Before I could realize what happened, the Jeep Cherokee came to a screeching halt at the end of the driveway. Before the dust settled, a gray-haired, stocky-built man came slowly to the car. I began to wonder, "Does this guy have a vengeance against me or something?"

When he got over to my car he asked me what I was doing. After Scott and I explained what we were doing, he introduced himself. (I cannot remember his name.) He was the chief of police. After he knew our intent he was glad to help us locate the roads we had trouble finding. After more talk we were back on the road.

The following days passed without incident. Roughly a week later we were stopped again. This time it had all the trimmings: cruiser, blue lights, the works. We had stopped along a road to take our morning break. About 500 feet up the road the police had pulled someone over for speeding. Before he finished writing the person up, we started working again and went on by him. Moments later, Scott told me that we were going the wrong direction; the roads we had to survey were the other way. After turning around, we went past the cop again. He proceeded to follow us onto the road we were looking for. We were going only 5 to 10 mph. He pulled us over, and told us we looked suspicious. (No! Really?). He let us go after checking out our credentials.

After finishing the survey we prepared the report at the T² Center. It was our first report, and took us substantial time. It was a lot of tedious work: reading, rereading, doing the analysis again. We had the computers to do the number crunching and give us reports, but to work right every detail had to be right.

After we turned in the Bow report, we were given a new assignment: Londonderry. What a challenge. 155 miles of road. We were ready, but my car wasn't. On the first day the starter went. I had to call my father, and he bailed us out. I got the car to my house, and my father told me to take his. Since it had air conditioning, I didn't hesitate. In relative comfort, we were back on the road.

The weeks that followed went perfectly -- I never got pulled over once. Wouldn't you know it? Those weeks were scorchers. Up in the 90's with what felt like 100% humidity. Scott and I found out that we spent as little time as possible outside the car.

The highlight of working in Londonderry was working with the City Engineer, Janusz Czyzowski. At our first meeting, I didn't know what to think. He was glad to see us, willing to give us what we needed, and willing to answer all our questions. He was always inserting a joke or two whenever he could. I felt very comfortable around him.

In later meetings he showed Scott and me so much about pavement; e.g., calculating costs, what goes into a total roadway reconstruction. From drainage to engineering fees, he showed us so much. What was great was that we took what we learned and showed the other groups working on other towns. They too had learned a lot; we weren't the only ones to benefit from this experience.

Moving on we went to Derry, Londonderry's neighbor. It's amazing! They're neighboring cities, but oh so different. Alan Cote, the city's engineering technician, got us on the right path. There were a lot of Class 6 roads in Derry, which lightened our work somewhat. Still, 152 miles of town maintained road was a challenge. The experience we had with Londonderry's roads came in handy.

The major difference with Derry was that it had a busy downtown area. We saved that area for last. When the time came to survey that part, it really didn't turn out to be that bad. I did happen to accidentally go down a one-way street the wrong way, though it was only for a block. I'm glad the street was not that heavily traveled. That one-way street happened to be newly paved, and some shoulder work was going on, I must have given the work crews a good laugh.

Derry happened to be the only other town I got pulled over in. This time it wasn't for suspicious activity. It was for making an illegal left turn. This is how it went down. I was at an intersection I needed to loop around. Making a left turn was the easiest way to go about it. Neither Scott nor I saw the "No Left Turn" sign right under the stop sign on the sign post. (Personally, since the stop sign was almost right next to the car, I can't see how anyone could see the sign.) I made the left turn and the cop parked 50 feet down the street pulled me over. The officer came up and asked for the usual. Meanwhile I'm confused. I didn't think that I would have looked suspicious. He then told me I made an illegal left turn.

I explained to him what happened and what Scott and I were doing. I told him that we had notified the police department of our presence in the town. Ever since Bow we did this and had minimal problems. He went back to his cruiser to check the story out. After a few minutes, he came back. No ticket.

Preparing the report for Derry took little time. By now we knew what we had to do.

We then went on to Allenstown, our final town of the summer. A whole 17 miles of road. It was the perfect way to end the summer. We figured at 20 miles a day each for the inventory and condition survey, we would be done in 2 days with a day of two for the report. A cake walk. No problem. For once there was no problem in doing a town. It actually took five days. We had some meetings to go to; minor details to wrap up with other towns.

Overall it was a good summer. I got paid a decent wage, learned a lot, gained valuable experience, and have plenty of memories that will last a lifetime.

---

Mark Your Calendar

Friday, June 9, 1995

8th Annual Mountain of Demonstrations
PUBLICATIONS

from the
University of New Hampshire Technology Transfer Center

Copies of the following books/pamphlets/cards are available through the UNH T²Center. You can request them by mail or telephone. If by mail, follow the instructions below. To request by telephone, call (603) 862-4348 or (800) 423-0060 (in NH).

- **Nonpoint Source Pollution.** A Guide for Citizens and Town Officials describing best management practices to control nonpoint source pollution. Published May 1994 by the New Hampshire Department of Environmental Services.

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

- **The Salt Storage Handbook.** A practical guide for storing and handling deicing salt. Published by The Salt Institute.

- **Asphalt Pavement Repair Manuals of Practice.** Perhaps the most practical book to come out of the Strategic Highway Safety Program this two-part manual describes:
  - Materials and Procedures for Sealing and Filling Cracks in Asphalt-Surfaced Pavements, and

- **A Guide for Erecting Mailboxes on Highways.** General principles and guidelines covering location, mail stop and mailbox location, mail stop design, and mailbox support and attachment design.

- **Maintenance of Small Traffic Signs.** A Guide for Street and Highway Maintenance Personnel. 37 pages. Covers:
  - Importance of Maintaining Small Traffic Signs
  - Repair and Replacement of Sign Panels
  - Repair and Replacement of Sign Supports
  - Materials and Equipment to Maintain Small Traffic Signs

- **Handbook of Successful Supervision.** Intended for use by persons who carry out the responsibilities of local government supervisors. (FHWA-RT-91-002)

- **A Series of Quick Guides for New Hampshire Towns.** A set of pamphlets, developed by the UNH T²Center with other agencies, covering the following topics.
  1. Culvert Installation & Maintenance
  2. Ditch/Channel Construction & Maintenance
  3. Vegetative Erosion & Sediment Control
  4. Non-Vegetative Erosion & Sediment Control
  5. Cut & Fill Slopes
  6. Beaver Pipe: Construction & Maintenance
  7. Stormwater Inlets & Catch Basins
  8. Mowing and Brush Control
  9. Snow & Ice Control
  10. Obtaining Permits

---

**To Request Material by Mail**

Check the items you would like to have. Fill in your name, address, and other information. Cut out this page, fold so the UNH T²Center address is on the outside, tape closed, and mail.

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Address</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Category:</td>
</tr>
<tr>
<td></td>
<td>Private ____</td>
</tr>
<tr>
<td></td>
<td>Federal ____</td>
</tr>
<tr>
<td></td>
<td>State ____</td>
</tr>
<tr>
<td></td>
<td>Local ____</td>
</tr>
<tr>
<td></td>
<td>Academic ____</td>
</tr>
<tr>
<td></td>
<td>Other (__________) _____</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Address</th>
<th>NH _____</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zip</td>
</tr>
</tbody>
</table>
VIDEOS

from the
University of New Hampshire Technology Transfer Center

The following videos from UNH T²Center Video Library are particularly applicable to local road management this time of year. To request mail by mail, check the videos you would like to have and follow the instructions on the mail request form on the previous page. Tape closed and mail. To request by telephone, call (603) 862-2826 or (800) 423-0060 (in NH).

Catalog. UNH T²Center Video Loan Program.

- M-201 The Snowfighters. Methods, procedures, and equipment for snow removal on streets and highways. 24 minutes.

- M-242 Snow Plow and Spreader Operations. Describes the important features of preparing for winter maintenance and operations, and of executing the program. Reviews equipment and daily checks, and describes good snow plow operator tips. GOOD REFRESHER! 48 minutes

- M-243 Plow Power. Shows proper techniques for residential road plowing operations -- main roads, intersections, one-way streets, and cul-de-sacs. Emphasizes safety and responsibility issues. 15 minutes

- M-245 Snow Plowing and Sanding Techniques. Covers basic snow plowing and sanding techniques. 20 minutes

- M-246 Snow Quiet Patriots. Directed to snow plow operators and covers various snow moving equipments. Discusses preparing for storms, planning routes, communicating, and widening roads. 12 minutes

- M-265 Salt -- The Sensible Deicer. Compares the use of salt as a deicer with and without abrasives. Provides information on costs, melting abilities, and traction and spring clean-up considerations. 20 minutes

- M-272 Snowfighting from A to Z. The first part describes the snowfighter's job and what it takes to keep roads clear. It compares the use of salt and abrasives. The second part details the history of salt along with describing its many uses. 73 minutes

- PA-218 Snow and Ice Control, Part I. Discusses equipment maintenance, route management, and methods of service for various road types. Also includes guidelines for motor safety. 14 minutes

- PA-218 Snow and Ice Control, Part II. Explains the factors of temperature and snow type. Illustrates usable materials and how they should be handled. 14 minutes

Technology Transfer Center
Civil Engineering Department
University of New Hampshire
Durham NH 03824-3591

page 10
Winter Operations Recommendations

Deicing Methods and Dilemmas

During workshops on November 9 and 16, ten speakers discussed the benefits and disadvantages of various deicing methods. We list their names here to publicly acknowledge their contributions to these successful training activities.

- Eric Williams
  - Nonpoint Source Coordinator
  - NH Dept of Environmental Services
- Frank Mitchell
  - Water Quality Educator
  - UNH Cooperative Extension
- Richard Mitchell
  - Sales Representative
  - AKZO Salt Company
- Paul Brown
  - Marketing Devel. Engineer
  - General Chemical Company
- Robert A. Hogan
  - State Maintenance Engineer
  - NH Department of Transportation
- Michael D. Metcalf
  - Senior Project Engineer
  - Dufresne-Henry, Inc.
- Ed Chasse
  - Public Works Operations Manager
  - City of Concord
- Earle M. Chelsey
  - Dr. of Public Works and Engineering
  - City of Merrimack
- David Wadleigh
  - Road Agent
  - Town of Tilton
- Donald J. Morgado
  - Town Administrator
  - Town of Moultonborough

We have shown speakers’ positions and affiliations to indicate the variety of perspectives represented by this group. Mike Metcalf provided a handout, which, in our view, summarized major points made by speakers. His list (with minor editing) is printed in the adjacent column.

Recommendations to Reduce Water Supply Contamination Potential

1. Map all public water supplies.
2. Map boundaries of public water supply watersheds.
3. Determine direction of groundwater and surface flow to water supply locations.
4. Map private water supply locations.
5. Collect information on private well construction -- dug, drilled, etc.
6. Identify and map potential sources of road salt contamination.
   a. Roads requiring more deicing.
   b. Salt storage piles, covered and uncovered.
   c. Snow dumping locations.
   d. Drains and culvert outlets.
7. Identify and map salt-sensitive locations.
8. Cover and relocate salt storage piles as necessary.
9. Establish policies which minimize use of sodium chloride (NaCl), especially where it might affect water supplies.
   a. Salt use should never be a substitute for plowing.
   b. Use calcium chloride (CaCl2) and/or sand instead of or mixed with sand.
   c. Apply snow plowing techniques to roads consistent with their usage; for example, lightly traveled roads need not be kept bare.
   d. Calibrate salt spreaders at least annually, and require calibration of hired spreaders.
   e. Establish a record-keeping system for salt use, especially in water supply or other sensitive areas.
   f. Train drivers and, to the extent feasible, assign them to specific routes.

What to Eat on Snow Plowing Nights

As Road Business readers know all too well, public works and highway department crews often battle snow and sleet through many nights. Recent research into sleep deprivation has revealed some ways to lessen the effects of loss of sleep. One set of findings suggest what to eat before and during night-time work.

During nighttime hours, the body slows down. It does not want to digest a donut, a "Whopper with Cheese," a "Big Mac," or most other fast foods. Greasy, heavy protein foods bring on sleep! Operators can still enjoy eating with well-balanced meals and snacks. Such meals are compatible with a slower, nighttime digestive system.

Main Meal Before Night Work.

- Light protein foods -- chicken, turkey, fish, cooked beans and peas.
- Low-fat foods only; no heavy fats such as fried foods or donuts.
- Vegetables, fruits, breads, pasta, and/or potatoes.
- Low-fat or skim milk instead of regular; cheeses and yogurt.

Meals During Breaks.

- Soup and salad.
- Soup and a light sandwich.
- Light protein foods and vegetables.

Snacks Before and During Work.

- Low-fat dairy products.
- Fruit, popcorn, cereal, plain cookies, and/or baked crackers

Coffee and tea contain caffeine, and smoking and chewing tobacco contain nicotine. These are initial stimulants, but soon become depressant; they make the heart beat slower. CUT BACK.

DO NOT CONSUME ALCOHOL BEFORE OR DURING SNOW PLOWING OPERATIONS.

From Comp Connections Nov-Dec 1993 by Compensation Funds of New Hampshire.
WANTED: INSTRUCTORS, PROGRAM DEVELOPERS

To accomplish its planned 1995 training program the UNH TCenter is seeking program developers and instructors. Program developers could use information from the TCenter, but would also provide much themselves. If you're interested in developing and/or presenting all or a part of a program listed in the Calendar, call Dave at (603) 862-4348 or (800) 423-0060 (in NH).

CALENDAR

For information and/or registration call (800) 423-0060 (in NH) or (603) 862-2826

February, 1995

Metcation for Designers and Contractors

Planned for Spring 1995

Tort Liability, 3 locations
Sign Inventory Management System (SIMS), 2 locations
Timber Retaining Walls, Fairlee VT Basics of a Good Road, 2 locations

June 10, 1994

NH Road Agents Association 8th Annual Mountain of Demonstrations, Waterville Estates, Campton NH

Problem Solving & Decision Making, 2 locations
Road Surface Management System (RSMS), Two locations
Municipal Equipment Management System (MEMS), 2 locations
RSMS Upgrade and Applications, 3 locations
Repair Strategies, 3 locations
MEMS Upgrade and Applications, 2 locations
Soil Erosion and Wetlands, 2 locations
Motor Grader Operations, 2 locations
Work Zone Traffic Control, 6 locations if half-day, 3 locations if one-day
Regional Planning and Geographic Information Systems, 2 locations

Judy Soule, a Thompson School of Applied Sciences student, receives a scholarship from the NH Public Works Association. John Starkey, NH PWA President, presents the scholarship and Professor Robert Moynihan looks on.