Above: Carl Quiram, assistant city engineer from Dover with the RSMS Fifth-Wheel Odometer -- "...just one the system's many useful features."

On The Road In New Hampshire

Road surface management saves thousands for New Hampshire's towns, large and small

The City of Dover started using the NH T³ Road Surface Management System (RSMS) in the summer of 1988. Their engineering and maintenance department staff used a truck equipped with the RSMS Fifth-Wheel to survey every road in Dover and collect information on road surface conditions as they traveled.

The RSMS has several features which the Dover crews found particularly useful:

First, the RSMS uses a laptop computer for all data collection and storage; second, road surface condition information is entered into the computer using an electronic Digitizing Tablet; and third, the RSMS uses a Fifth-Wheel Odometer to automatically collect mileage information during the road surface condition surveys. The result of these three features is that the survey crew is able to concentrate on observing road distresses, rather than on writing or shuffling notes back and forth. Best of all, the same laptop computer used for collecting data, can be used for producing road management reports. As Carl Quiram, assistant city engineer for Dover, says, "The entire process is both fast and effective. We were able to completely survey an average of 40 miles of road per working shift."

Dover used the results of the RSMS to plan their 1989 maintenance schedule. In data collection alone, Dover estimated that RSMS saved them more than $7000.

In addition to Dover, several other New Hampshire towns started using the NH T³ Road Surface Management System (RSMS) in 1988. These towns include Berlin, Franklin, Henniker, New Durham, Plaistow, Rollinsford, and Salem. All of the towns have been pleased with the RSMS approach to roadway management. Salem has even estimated that the program has saved them $29,000.

The use of RSMS continues to spread in 1989. In addition to some municipalities in Massachusetts and Vermont, the towns of Bedford, Bow, Concord, Epping, Hanover, Lebanon, Meredith, and Newport are all getting ready to start RSMS this spring.

For more information on the NH RSMS, contact Ed Schmeckpeper at (603) 862-4346 or (800) 423-0080.
The Problem of protecting concrete surfaces from the ravages of winter is as old as the use of concrete itself. In spite of its smooth, rock-hard appearance, small, almost microscopic pores exist in the concrete surface. During the warmer months, moisture evaporates rapidly from these pores with no harm to the surface. In the winter, however, freezing water can cause measurable damage. At lower temperatures, water in the pores freezes and remains solid until the temperature rises enough to permit thawing. Several freeze-thaw cycles may occur during an average winter day. Since water expands when frozen, the effect of repeated freeze-thaw cycles is to initiate scaling and later spalling of the top surface. This is particularly true for concrete less than four years old.

The problem is aggravated by the use of most de-icing agents. These agents react with concrete and markedly accelerate the deterioration process. In particular, chlorides will penetrate concrete and cause corrosion of reinforcing steel. As the level of chlorides in concrete becomes excessive, the rate of corrosion increases. Reducing the ease with which chlorides penetrate concrete surfaces is an effective means of preventing corrosion of rebar and subsequent concrete deterioration.

The scaling and pitting which beset concrete surfaces, often after a single winter, point up a problem which urgently demands a solution. Two possible approaches to this problem are the use of air-entrained concrete and protective coatings, such as linseed oil.

Prominent among the corrective measures suggested is the use of air-entrained concrete. This material contains myriads of tiny air bubbles distributed more or less evenly throughout the mass. The air bubbles help to inhibit scaling and spalling due to freeze-thaw cycles and the use of de-icing chemicals. Today practically all new concrete highway construction employs air-entrained concrete.

Air-entrained concrete failures occur frequently enough to be a source of serious concern to highway maintenance engineers. Plausible explanations, such as incorrect quantity of entrained air, improper formulation, inferior quality of aggregate, excessive troweling of the top surface, etc., are often offered when air-entrained concrete fails in service. The fact remains that failures continue to occur and while more vigilant inspection at the time of placing the concrete may obviate some of these difficulties, it would add to the cost and could not eliminate the possibility of human error.

Protective coatings are harmless, easily applied, low-cost materials, which can be applied in thin coats to seal the pores of the concrete and thus prevent the entrance of water and corrosive solutions. These are a practical means of correcting the trouble at its source. Although we will primarily review linseed oil as a protective coating, various other substances, such as synthetic resins, silicates, and silicones have also been suggested as protective coatings for concrete. One major manufacturer of synthetic resins has recently undertaken an advertising campaign in national magazines to call public attention to the problem and to highlight the need for winter roadway protection.

The water-repellency characteristics of linseed oil films, suggested many years ago, its application for the purpose. The Portland Cement Association and the Salt Institute have pointed out the value of linseed oil as a protective coating for non-air-entrained concrete. Others have even suggested the use of boiled linseed oil for additional protection with air-entrained concrete. A number of state, county, and municipal highway departments have used and are still using linseed oil for both types of concrete.

To apply a protective coating of linseed oil costs around ten cents per square yard for materials. While application costs can vary, estimates indicate that this will not exceed an additional ten cents per square yard when readily-available, efficient, spreading equipment is used.

Linseed anti-spalling compound protects concrete surfaces in two ways: by penetrating the porous surface of the concrete to a depth of approximately 1/8"; and by combining with atmospheric oxygen to form a protective coating through which destructive moisture and salt solutions cannot penetrate. It can be used to protect roads, bridge decks, sidewalks, curbs, abutments, endposts, concrete handrails, and all exposed concrete surfaces from de-icing agents. Usually, it is not applied to the undersides and back sides of structures which are less exposed to chlorides.

**Specific directions for using boiled linseed anti-spalling compound are as follows:**

**Material**

- 50% Double Boiled Linseed Oil and 50% Petroleum Spirits (AASHTO M-233-79 Type II).

**Time of Application**

Surfaces should be cleaned and washed annually in the spring of the year and oiled every two years. Linseed Anti-Spalling Compound can be used on old and new concrete.

It is most effective if applied to new concrete upon completion of the initial curing period, usually considered to be about 28 days after placement. However, when necessary, it has been successfully applied to new concrete after two weeks curing.

Linseed anti-spalling compound can be applied to concrete of any age. However, it is most effective in preserving sound concrete surfaces.

**Pre-application conditions**

- The concrete should be dry and the solution should not be applied within 24 hours of a rainstorm.

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To Buy Or Not To Buy?

Keeping up with the computer Joneses, by Dr. Dot

I often hear the statement, "I just bought my computer two months ago and already there's a new one on the market making mine obsolete."

Part of this statement is true. Computer companies will always be developing faster and more flexible microcomputers with new gadgets (sometimes referred to as bells and whistles). It is a fact of life that computer companies make money by selling new machines. Naturally, these companies would like you to feel your computer is obsolete so that you will run out and buy the latest, most powerful, biggest, and fastest model that was just introduced.

The last part of the above statement, "...making mine obsolete," however, is not necessarily true. Your present microcomputer may not be obsolete now nor even in the foreseeable future. What determines whether or not your computer is obsolete is how it is being used and whether it meets your needs. There are microcomputers that were produced five years ago that are capable of handling the demands of today's average user. In the same light, the fastest microcomputers being produced today are not able to meet the demands of some "power users."

I think it helps to make an analogy with the car. If you are only driving back and forth to work on two miles of gravel roads, you don't need a Porsche or a Cadillac. In fact, the old Ford might be a lot better suited to the task. It would be nice to sit in a Cadillac, but is it worth the money and repair expenses? The same can be said for your computer hardware.

Software tends to follow a similar pattern. It seems that just as you are getting used to one version of a word-processing package, the company comes out with a new upgrade. Do you need to spend more money? Usually not. Several consumer surveys have confirmed that most users do not take advantage of the advanced capabilities of their present software. It was also indicated that the average user does not even know that these advanced capabilities exist.

It has been said that most people make use of about 10% of their brains. The same can be said for the way we use microcomputers. Most of us are just beginning to scratch the surface. When it comes to available computer power, you might be better

Don't Get Zapped

An easy way to turn your computer into an anchor

Flash! Kaboom! The zig-zag of lightning and the crash of thunder are not particularly significant for most of us because we take adequate precautions. Your personal safety may be adequate, but what about your computer?

A lightning strike miles away can be transmitted directly to your computer, doing dastardly things to the hardware, software, and precious data. A nearby hit can turn your whole system into a smoldering doorstep. Aside from the perils of lightning, momentary power outages and routine power surges can also cause problems. So how can you protect your investment?

You can purchase a surge protector from your computer dealer or electronics store that will offer some protection. The degree of protection varies from model to model, with the greatest protection usually afforded by the most expensive models. In addition, most models offer conveniences like multi-outlets which allow you to plug in (and protect) all of your peripheral equipment as well. Some also have built-in circuit breakers to protect against overloads, and a master on/off switch. Prices often range from about $20 to $100, a small price to pay for protection.

Adapted from the "Technology Transfer Quarterly," Transportation Research Center, University of Florida, Fall of 1988.
Hard Hats -- Who Needs Them?

Don't lose your head over false objections!

Here are some answers to questions and comments most commonly heard.

"Why all the emphasis on hard hats?"

Remember, the brain is the control center of the body. The slightest damage to any part will cause a malfunction of some area of the body, either temporarily or permanently. The skull, under normal circumstances, protects the brain, but when the possibility of brain damage from outside sources exists, additional protection is required.

"My hard hat is too hot in the summer."

Tests in hot weather have shown that the temperature inside a hard hat is 12 degrees cooler than a baseball style cap. Your head is kept cool because of the ventilation provided by air spaces between the shell and the suspension. The hat’s surface reflects the heat too.

"My hard hat is too cold in the winter."

Liners that come down over the ears are readily available for cold days. Hard hats must not be worn on top of everyday hats or parkas, and of course, you must not remove the suspension.

"My hard hat is too heavy and strains my neck."

The weight of the hat should go unnoticed if the hat is properly worn and maintained. The average safety hat weighs about 143 ounces. Your head weighs about 13 pounds. That is one ounce of protection for every pound of head. It’s a real bargain!

"When should I wear a hard hat?"

Check with your supervisor for the official rules for safety and protective clothing or for more information contact the New Hampshire Municipal Trust Worker’s Compensation at 1-800-852-3328. As a general rule, however, always wear a hard hat when working:

- on or adjacent to the traveled portion of the roadway (generally the right-of-way)
- in contractor’s hard hat zones
- while operating heavy equipment
- where there is danger of head injury from impact, falling, or flying objects
- where there is danger of contact with a high voltage electrical source.

Stop Signs

The most frequently misused sign in New Hampshire

The most common regulatory sign in use on New Hampshire streets and highways is the STOP sign. Unfortunately, it is also the sign most frequently used improperly.

STOP sign installations that do not conform to the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) standards invite liability suits against the local jurisdiction responsible for the installations.

The last sentence in Section 2B-5 of the MUTCD reads, “STOP signs should not be used for speed control.” Speed control is probably the most common misuse of the STOP sign. A worried mother calls and says the cars on her street are speeding and she has little kids, and could you do something like put a STOP sign at her intersection? Don't do it!

Enforcing the speed limits is much more effective, for two reasons.

- Studies have shown that speeds between intersections are not significantly reduced but actually tend to increase slightly after the installation of a STOP sign. Most vehicles will go the same speed as they did prior to the installation within 50 to 100 feet of the sign.

- Improper installations promote disregard for all STOP signs.

In other studies of STOP signs installed to control speed, it was found that most of the signs were disobeyed on a wide scale. When not forced to stop by a priority vehicle only 5-20 percent of all drivers came to a complete stop, 40-60 percent slowed to less than 5 mph and 20-40 percent of all drivers did not stop at all.

Another common misuse of STOP signs is the multiway STOP sign installation. Most intersections under local jurisdiction do not warrant this type of control (Section 2B-6 of the MUTCD discusses the multiway installation). Prior to installing a multiway STOP, traffic volumes on approaching roadways should be approximately equal and the minimum volumes should be at least 500 vehicles per hour for any eight hours of an average day (total volume of 500 vehicles from all approaches, not 500 vehicles from each approach).

Remember, anything in New Hampshire that does not correspond to the standards set forth in the Manual on Uniform Traffic Control Devices is negligence and opens you up to an “open-and-shut” tort case.

Any questions? How can you get a copy of the MUTCD? Call the New Hampshire Technology Transfer Center at 1-800-423-0060.

Highway Robbery:
Your Ideas Count

An idea from a New Hampshire Road Agent, Garth Witty, town of Mont Vernon, goes nationwide

*Signal*, an ATSSA (American Traffic Safety Services) national publication, recently published an article titled *Highway Robbery: Signs Yield High Return*. One of the big suggestions was to "Zip code your road signs." Highway departments around the U.S. can thank Garth Witty for this good Yankee advice. Below is a copy of the February 1989 *Signal* article.

Highway robbers are stealing and selling the aluminum in a metallic crime wave that is sweeping the country. All over the country thieves are unbolting guard rails and ripping down signs. In California alone, the Wall Street Journal reports that highway bandits have made off with about $200,000 of the material so far this year.

The daily market price of aluminum has more than tripled between 1986 and this year, promoting the thievery. California has asked motorists to report suspicious roadside work crews operating without official vehicles or uniforms. In other states, workers are welding rather than bolting guard rails in place. An Illinois DOT spokesperson said that, "If crews don't get to an accident scene fast after somebody's knocked down a light pole, the light poles disappear too." (Road & Bridges, November 1988)

**Zip Code Your Road Signs**

A recent article in *Traffic Reporter* states that zip codes imprinted on the backs of signs often help towns get their signs returned. A New Hampshire road agent discovered that by engraving the town's zip code on the back he got about 30% of his signs back. Some states require identification numbers on signs, but few citizens can recognize these, whereas zip codes are easier to identify and return. Use of "Loc-Tite" cement adhesive on sign mounting nuts and bolts was also recommended to reduce theft.

If you have any ideas that you would like to share with other public works employees around New Hampshire (or maybe the whole nation) please send them in to the T² center. We would be happy to pass on the information.

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**The “Highwayman”**

by Warren Fowler

Highway superintendents come in all shapes and sizes...mostly large. A towns-person meeting a highwayman, and shaking his hands, may feel he's having a Smithfield Ham proffered him but later realizes he's simply grasping a well-worn, oversized hand carrying the scars of countless wars and emergencies.

Emergencies fought in the dead of the night, with hands so numbed with cold they don't feel the pinch of iron on flesh as they argue with feisty plow hitchers. Other knowing hands heft a crow bar to a boulder perilously close to the new water main and deftly work their artistry, nudging it so the backhoe can finally do its job. You and I boast of ten fingers. Some hands we speak of don't carry a full compliment. Whatever the problem, the knowing mind and those cankered hands of the highwayman always win the day.

Highwaymen are a curious mix of professions — no singular attribute stands out except...an infinite amount of patience. No matter how many times concrete has been poured for myriad, ordinary jobs, life has a way of throwing a curveball.

The highway crew pouring the parking area in front of the firehouse finds the cement's not running right. No reason. It should have been a piece of cake. Never mind, the crew gets the concrete poured, the job done right. The reason is: personal pride. Doing the job right. Lord knows it isn't because of their high pay scale.

The highway superintendent vies with the obstetrician for a number of sleepless nights. It's always 2 a.m. when the water main bursts: geysering volumes of precious water all over the place at the most critical time of the year. Summer, when the reservoir is already overtaxed.

The superintendent fights for every precious minute, knowing better than anyone else how much the town needs those wasted gallons. Not only is the pipe repaired; the next day he's back fixing the gullies caused by the swiftly flowing water. His last act of the day is one of a loving gardener. He deftly sows grass seed over the defaced area, erasing another problem so life can go on normally.

And if you're inclined to believe all small New England villages sport water mains and sewers—then think again. How about the hilltowns? Hamlets like Becket and Blandford. Chester and Egremont. Middlefield, Monterey and Mount Washington. We were talking about water mains and sewers weren't we? Pretty high class stuff, what? What about the highwayman who maintains plain, old, garden-variety dirt roads? What about him?

Yes, what about him? What's to maintaining a dusty, old country lane? Cows meander along it come milking time. A few beat-up trucks rattle along it daily. Then there's the guy from the city with three small kids and the pretty blonde wife. He's the big-time TV writer who bought the old Snow Farmstead near the top of Jug End Mountain road. They also have a new Chevy Blazer so what's to worry about?

Well, ordinarily nuthin', but then our highwayman is suddenly awakened one night about two and a half hours after he's snuggled down. Wide awake now because he's right in the middle of one of those high-tech, high-volume thunder and lightning storms the Lord sees fit to throw at mankind every once in a while in a fruitless effort to wash away their sins.

We don't know how successful the Lord was with the sinner, but He sure as hell knows how to pick the right crevice on a sloping dirt road, match it up with a wisp of a rivulet so that in the space of two or three hours He's managed to create a spectacular torrent of water. This newly formed river

continued on p. 6
For the innocent who's never played, the rules are quite simple. All the player needs is the support of Mother Nature. In those early winter snows, before Jack Frost really knows whether he's going to hang around for the rest of the season or not, he's sometimes lax enough not to really make crisp, light, dry snow. In his slovenly way he produces a mixture of wet, heavy slush. This is a product no one really enjoys - least of all the highway plowman. But to keep those lonesome hours from becoming too deadly, our friends might just adjust the speed and thrust of his plow so that every aluminum RFID mailbox becomes his arcade.

Most homeowners are on to his game and consequently have braced their boxes against the impish wiles of the highwayman. However, there's always the fellow who says, "Aw, this is good enough for now...I'll really do a good job before the cold weather comes."

This is the guy who warms the bones of our weary plowman. As our highwayman sees "I'll-Do-it-Later"'s mailbox caroming end over end into the darkness where his headlights never shine, our victor smiles to himself, wiggles down deeper in his lumpy seat, and, as he feels a surge of refreshing vigor creep over his tired bones, murmurs to himself, "Gotcha!"

Finally he plays his last role - that of loving father and husband. He's already put in a day that would break most men, but he's on stage again for the last few hours of the day, doing what's expected of fathers; playing his part as husband. He doesn't really object to either role, but a cold beer and a snooze in front of the TV wouldn't be such a bad thing either.

So here we have the composite picture of the highway superintendent. A man with the patience of Job. The insomnia problems of the obstetrician. The artistic eye of the landscape artist, the political wiles of a Disraeli, the vexation of an imp, the gentleness of a father, and the warmth of a loving husband.

Argumentative at times, like the rest of us, but it's his warmth in his heart, driving him to do his best for the sake of humanity that creates the final image.

Quite a complex individual, our "highwayman." He wears shoes not every man can fill...big ones.

The above editorial was reprinted in its entirety from the Berkshire County Highway Association membership brochure.
New England/New York Timber Bridge Conference

Mark Your Calendar For June 23rd

Plan to join us for the New England/New York Timber Bridge Conference. It will broaden and upgrade your knowledge about modern alternatives for construction and maintenance of bridges. And don’t forget the family!

This conference will present current information on the use, construction, and maintenance of contemporary timber bridges. Information useful to decision makers and engineers will be presented on the use of timber in constructing and rehabilitating highway bridges. The suitability of timber as a bridge construction material, modern concepts for use of timber in bridge construction, and its benefits as a cost-effective alternative to other construction materials. Decision factors that need to be considered for the successful completion of timber bridge projects will be reviewed by officials and technical experts representing government, universities, trade associations, and the private sector.

This conference will be useful for local elected officials, highway engineers, public works managers, contractors, and consulting engineers. Members of the forest products industry from New England/New York and the surrounding states will be interested in presentations concerning the use of local timber resources in the construction of timber bridges.

Exhibits of available commercial products are planned. In addition, each participant will receive a binder containing a wide variety of information on all aspects of timber bridge design, construction, and maintenance.

Conference Topics:

1. Timber Bridges - Past and Present
2. Decision Factors on a Timber Bridge Project
3. Timber Bridge Impacts on Local Economies
4. Selecting a Timber Bridge System
5. Timber Culverts
6. Timber Bridge Design and Inspection
7. Timber Bridge Planning, Approval, and Construction
8. Preservative Treatments
9. Local Species in Bridge Construction
10. Specification for Design and Construction of Timber Bridges
11. Future Designs and Materials for Timber Bridges
12. Environmental/Aesthetic Concerns
13. Guardrail Design

Participating Organizations

State Forestry Agencies
USDA - Forest Service
State Transportation Agencies
USDA - Office of Transportation
Cooperative Extension Service
USDA - Soil Conservation Service

Watch your mailbox, fliers detailing conference specifics will be sent to all New Hampshire addresses on our mailing list.

Technology Transfer Centers
New England Association of RC&D Areas
Black River - St. Lawrence RC&D Area
Greater Adirondack RC&D Area
New England Conference
On Roadway Pavements

ONLY $30.00

Set for May 16th in Andover, MA

Mark your calendar for May 16 when road officials throughout the northeast will meet at the New England Conference on Roadway Pavements in Andover, Massachusetts. The all-day conference is sponsored by the New Hampshire Technology Transfer Center, other technology transfer centers in New England, the New England chapter of APWA, and the Asphalt Institute. This is the first New England-wide conference of its kind in many years. It will bring together state and municipal highway officials as well as engineers, contractors, and vendors from the private sector to discuss many timely issues relating to local roads.

The day should be of considerable interest to New Hampshire municipal officials responsible for roads.

Topics will include:

- How to Obtain Funding for Local Highway Programs
- Early vs. Late Season Paving
- Surface Distress Surveys
- Geotextiles in Pavements
- Local Level Mapping
- Managing the Utility Cut Problem
- Compaction Equipment for Small Towns

Key speakers will include Wick Elderkan of the Highway Users Federation who will speak on “Federal Programs for Municipalities After the Interstate” and Peter J. Howe of the Boston Globe speaking about “Public Relations During Roadway Construction”.

The registration fee is only $30.00 payable to Vermont Local Roads Program, St. Michael’s College, Winooski, VT. 05404. Please write or call the New Hampshire Technology Transfer Center today at (800) 423-0060 for further information.

Lodging is available at the Sheraton Andover Hotel and Conference Center (Rolling Green, 311 Lowell Street, Andover, MA 01810). In order to obtain the special rate of $75.00 for a single room (single or double occupancy), you must ask for New England Technology Transfer/Baystate Roads Program. Call the reservation desk (or ask for extension 247) at (508) 475-5400.
The 2nd New Hampshire Road Agent Association Meeting
-- Demonstrations Everywhere --

!!! FREE !!!

June 23rd In Waterville Estates
Look For The Flier In The Mail

Chip Seals
Gravel Roads
Geotextiles

Culverts
Welding
Cutbacks or Emulsions?

Exhibits
Lunch
And More

Portable Shoring Device Demos

!!! FREE !!!

This could be one of the most important hours you’ve ever spent.

Anybody who does any kind of trenching, excavation, or culvert work is encouraged to attend. We would especially like to see road agents and any fire department or rescue personnel who may be called to trench or to a trench cave-in. Serious trench cave-ins are reported every year in New Hampshire. Let's make 1989 different! Let's make it safer at work and happier at home!

Each session will last about one hour. Each cave-in could last forever.

Dates, Times, and Locations:

Tuesday, April 25
8:30 AM  Peterborough highway Garage
10:30 AM  Londonderry Highway Garage
1:00 PM   Concord Hall Street Wastewater Plant

Wednesday, April 26
8:30 AM  Exeter Highway Garage
10:30 AM  Somersworth Highway Garage
1:00 PM   Conway Highway Garage

Thursday, April 27
8:30 AM  Lincoln Highway Garage
10:00 AM  Tilton Highway Garage
1:00 PM   Newport Highway Garage

Sponsored by: New Hampshire Municipal Workers’ Compensation Fund, 1-800-852-3328
**Did You Know?**

*The roadbed bug*

According to a story in the April 30, 1988 issue of *Science News*, bacteria are suspected of playing an important role in the breakdown of asphalt pavement. The culprits are usually bacteria that belong to the genus *Pseudomonas* and migrate from the soil into moisture-laden cracks, where they feed on the hydrocarbon rich asphalt. The result is the gradual deterioration of the pavement into rubble. As the practice of recycling asphalt for road use increases, engineers may have to start paying attention to the damaging effects of microbial attack on the strength and life span of recycled asphalt.

**Four Big Events To Remember!**

*Details inside*

- Portable Shoring Device Demonstrations -- Nine New Hampshire Locations
- The First New England Technology Transfer Conference on Roadway Pavements -- Andover, MA
- The New England/New York Timber Bridge Conference -- Fairlee, VT
- The Second Annual New Hampshire Road Agent Association Meeting -- Waterville Estates, NH