ROAD BUSINESS

Vol. 9 No. 2

Spring 1994

High Response to Needs Survey

UNH T°Center Preparing Programs to Meet Confirmed and Additional Needs

Individuals from nearly one-third of New Hampshire's towns and cities responded to the UNH T°Center "needs survey." Because researchers consider this a high response rate for mailed questionnaires, we can confidently act upon the conclusions.

Survey results, conclusions, and planned actions will be discussed in two articles which begin on page 2. The first focuses on service delivery. It discusses general conclusions drawn from comparing characteristics of those who responded against characteristics of those who did not. The second article summarizes data and describes conclusions about service content, and notes some planned actions of the UNH T°Center.

On The Road In New Hampshire

Mountain of Demonstrations Provides Unique Training

On June 10 over 500 men and women from all six New England states attended the New Hampshire Road Agents Associations 7th Annual Mountain of Demonstrations. Hosted by the Waterville Estates Association in Campton, with administrative coordination by the UNH T°Center, this event brings together individuals from both private and public agencies whose work relates in some way to local road maintenance and repair.

From 103 New Hampshire towns and over 30 in surrounding states, road crew personnel and supervisors visited 19 booths, examined over one hundred pieces of equipment, and saw over a dozen live demonstrations of road maintenance or repair methods.

After traveling an average of 63 miles if from New Hampshire, and further if from other states, attendees parked their cars at the Campton Town Garage or at Campton Sand & Gravel, and rode a shuttle bus for the short drive up the Mountain to Waterville Estates. They then registered, received a lunch ticket and program, and began their visits to indoor booths.

After a stop for coffee and donuts (the NHRAA provided 1000 donuts), they moved to an outdoor deck and more booths. Crossing a wooden bridge constructed at a past Mt. of Demos, they observed the construction of a concrete parking lot including drainage structures and curbing.

Next they looked at the variety of equipment parked along intersecting roads. At the intersection they boarded a shuttle bus to take them to the live demonstrations and additional equipment displays positioned on Waterville Estates roads and public works parking area.

Returning to the central area around noon, 638 participants and vendor personnel ate lunch (sponsored by the NHRAA, All States Asphalt, and the NH Municipal Association Property Liability Insurance Trust). When they were ready to return home, buses transported them back to the parking lots.

The Mountain of Demonstrations is a joint of the NHRAA, Waterville Estates Association, the UNH T°Center, and many vendors. Large numbers of road crew personnel, supervisors, and others receive a lot of information in a short period of time. Many in fact, come back year after year (almost 75% of the New Hampshire participants had attended before, and two-thirds of them at least twice).

The UNH T°Center welcomes suggestions for improving future events.

ALSO IN THIS ISSUE

Needs Survey Results 2
Municipal Bridge Aid Program 4
Pavement Crack Treatments 5
Available Written Materials 9
Available Videos 10
Diesel Fuel 11
Training Activities Calendar 12
Needs Survey Results and Conclusions

UNH T²Center Prepares to Meet Confirmed and Additional Needs

Over eighty percent of the Needs Survey respondents were from towns that have recently sent people to UNH T²Center training activities. They want us to provide training in the future in the same manner as in the past. For example, they most desire one-day training sessions on Tuesday, Wednesday, or Thursday during the spring or fall in Concord or Manchester.

The people who neither responded to the survey nor have attended training activities appear to have, as a pattern, two characteristics:

1. They are located in relatively remote geographical areas.
2. They have a part-time employee or contractual arrangement with the town.

Our past workshops have been in locations more convenient to the respondents than to those in relatively remote areas. This summer we began holding workshops around the state in that we held one in Lebanon and another in Portsmouth. We plan to use more locations, including in the north.

Survey respondents expected their town to pay their salary while they attend a training activity, and pay or reimburse them for the course fee. Road managers and crew members who are part-time employees or have a contract would usually lose wages for the time away from their job, as well as have to pay the course fee themselves.

In addition to holding day-long workshops state-wide, we are also considering shorter activities for several subjects. These will not, however, overcome the wages and fee issues. To find other alternatives we will seek a clearer understanding of these individuals' situations. We plan to conduct telephone interviews this fall to gather additional information.

Users of UNH T²Center Services Define Needs for Training, Newsletter, and Other Actions

Information from the Needs Survey has enabled the UNH T²Center staff to draw many conclusions about the content of future services -- training activities, newsletters, public works software, the Road Scholar Program, and videos. The following is a discussion of those conclusions and of plans to respond to them.

The conclusions are based on information provided largely by individuals who regularly use our services. Of the 100 towns represented in UNH T²Center training activities over the 1992 through the present period, fifty-six percent were also represented among the respondents. As we explore ways to reach others, we must continue to serve our "regular customers" by responding to their needs as expressed in this survey.

These individuals are experienced local road managers. They have been, on average, in their current position almost eight years. They are active in associations which spread knowledge about their specialized occupations: over three-fourths are members of the NH Road Agents Association and over half are members of the NH Public Works Association. These high membership rates are consistent with their primary source of information: 87.4% said they get it from other road agents or public works directors.

Three-fourths also said they look to the UNH T²Center for information. Nineteen of every twenty respondents read Road Business. Their preferences for training activity and newsletter subjects is therefore very useful and highly important to us. Table 1 summarizes their preferences.

Training Activity Subjects

The high preference for topics related to drainage training activities is consistent with our having more requests for three recent workshops on that topic than we could satisfy. We will also emphasize drainage in the Basics of Good Roads workshops planned for this fall, and have scheduled several Road Drainage workshops for next spring. (See "Calendar," page 12.)

Paved road maintenance and paved road construction will be addressed in several workshops. We had planned a workshop on Repair Strategies and Cost Estimating to help users of the Road Surface Management System. We will now ensure its availability to a wider audience next fall. We also plan to cover, in the future, additional, more specialized topics; for example, geotextiles.

Respondents strongly expressed their desire for the planned (in August) Work Zone Traffic Control workshops. We plan to use half-day workshops on work zone safety, traffic control, and job safety to reach those who have yet to use our services (see accompanying article). We are requesting a grant to enable our conducting such state-wide training activities next spring.

We had planned to have workshops on tort liability in 1995. A preliminary analysis of early responses convinced us to move it up to the fall of this year. The final analysis confirmed this decision, and prompted us to plan on offering it again during 1995.

It was anticipated that motor grader

---

Needs Survey Respondents:

Thank You

The UNH T²Center staff greatly appreciates your taking time out of your busy lives to complete the Needs Survey.

The many responses have helped us direct our future actions. You have thereby contributed to technology transfer and benefited other road managers and crews. Many thanks.
operator training would be a highly desired topic. Because of its cost, we asked about expenses and fees towns would likely be willing to pay. A high percentage of respondents indicated that salary payment was likely (93% for a one workshop, 84% for a two-day). Over two-thirds indicated a fee for hands-on, in-the-field training of less than $100 and one-third less than $150. We might, therefore, have to restrict the amount of time individual, hands-on training.

The preferences for "personal development" training indicated that managers are concerned about their people as well as their roads. Given forty-seven choices, report preparation, planning, conflict resolution, managing people, and communications skills were in the top twenty-one. A Managing People workshop is planned for this fall and we are considering additional programs.

Training Activity Times

Respondents strongly favored Tuesdays, Wednesdays, and Thursdays over other days for training activities. They also preferred spring and fall months as the best times of the year. We plan to concentrate our workshops into these weekdays and time periods. The exceptions will be for unusual circumstances and for programs intended for other than road repair or snow plow personnel; for example, office staff, mechanics, and consulting engineers.

Newsletter Topics

The top preferences for Road Business articles is consistent with those for training, Work Zone Safety being a notable exception. As we develop training courses, we will draw from course materials for newsletter articles. We are also attempting to hire a part-time research assistant to find and edit appropriate materials to cover the preferred topics.

RSMS and MEMS

Over half the respondents (54.2%) use the Road Surface Management System and about one-fifth (18.5%) the Municipal Equipment Management System. These levels of usage, are, in our view, very low, especially among the local road managers most active in our other programs. Having worked closely with many users, we have seen these management tools make road managers more effective, and ultimately their jobs easier.

We will direct our efforts to town officials as we continue to encourage road managers to use road management and equipment management systems. For those who want to use either RSMS or MEMS as their management system, upgrades of both software packages are underway.) Also, we will continue to facilitate their use, through training activities and in-the-field assistance.

Road Scholar

One surprise was that only 40% of the respondents were Road Scholars. Since the respondents represent the more active participants in our programs, we thought the percentage would be higher. This spring we revised the program and published it in Road Business. Our goal is to have the program recognized as a basis for promotions and wage increases. We place considerable emphasis on training quality to make such recognition warranted.

Videos

Another surprise was the low percentage of respondents (29%) who said they had borrowed videos from the UNH Temp Center. It was encouraging that 86% requested information. The part-time staff member mentioned above for newsletter research will also review videos to ensure the highest quality.

Information Requests

The respondents tended to have participated in UNH Temp Center training activities, but not the full range of available services. They did, however, request information about them. We hope these results encourage others to also.
New Hampshire's Municipal Bridge Aid Program

State Assistance Available for Bridge Repair or Rehabilitation

Deteriorated municipal bridges are a significant problem for many towns throughout the United States. To help New Hampshire communities the State has established a Municipal Bridge Aid Program.

The program is administered by the Bureau of Municipal Highways, an organizational entity within the New Hampshire Department of Transportation (DOT) set up to assist New Hampshire communities with road related matters. That assistance is usually in the form of financial aid, including the Municipal Bridge Aid Program. Sooner or later, nearly every municipality with its own bridges will need to apply for this Program.

RSA 234 provides the DOT with statutory authority to provide municipalities with Bridge-Aid funds to assist them in defraying construction and rehabilitation costs of

1. Municipality-owned bridges on Class IV and V highways, and
2. Municipality-maintained bridges on Class II highways.

During the 1993 legislative session the General Court significantly altered several sections of the law. The most important change was that projects accepted into the Program are now funded at a ratio of 80% state or federal funds and 20% municipal funds. The funds available for Fiscal Years 1994 and 1995 are $10 million each year: $4 million federal, $4 million state, and $2 million municipal.

To determine whether federal or state funds are used for a project depends on its type, magnitude, and complexity. Use of federal funds is more restrictive than state funds, and are generally applied to larger replacement projects. State funds are provided for rehabilitation, for relatively straightforward replacement projects, and for work or wood covered bridges.

The DOT accepts projects into the Program in the order it receives applications. The scheduling for construction, however, depends on the scope of work and availability of DOT staff to design the rehabilitation or replacement. In general, design for rehabilitation can take from one to three years; design for a replacement bridge requires two to four because of the more complicated environmental, right-of-way, and design requirements.

To be considered for the Municipal Bridge Aid Program, a bridge must have a clear span of at least ten (10) feet. Bridges constructed or rehabilitated with Bridge Aid funds must, when completed, have a capacity of at least fifteen (15) tons. The DOT staff expects the Legislature to modify this requirement during this session. The probable changes would require that new construction meet legal load capacities, but rehabilitation capacities would remain at fifteen tons.

Rehabilitation of wooden bridges is specifically provided for in the Bridge Aid Program. One limitation, important for some wooden bridges, is that when work is completed they must carry at least six (6) tons.

To initiate estimates and construction under the Bridge Aid Program, a municipality's governing body (selectpersons, Town/City Council, or mayor) must complete and submit specific forms. These forms are available from the DOT's District Offices or the Administrator, Administrator, Bureau of Municipal Highways (name, telephone number and address at end).

Town officials should submit requests for estimates in the summer or early fall. This will allow field review and estimate preparation in time for consideration at the municipality's town meeting. Immediately after the town appropriates its share of the estimated project cost, town officials should request construction bridge aid.

A municipality is restricted to having one bridge per year accepted into the Program. This limitation can be waived if availability of funding or emergency circumstances warrant it.

One alternative within the Bridge Aid Program is that a town can perform the design and let the construction contract. This usually means engaging and supervising a private engineering firm. For specifics about this alternative, town officials should contact the Administrator, Bureau of Municipal Highways.

The DOT can also serve municipalities by performing maintenance and repair work on any town or city road or bridge. Such work must comply with RSA 228:49 and is approved based on the magnitude and type of work required and staff availability. Under such circumstances work on a bridge might qualify for bridge aid assistance.

Robert T. Barry, the Administrator of the Bureau of Municipal Highways, participated in the Bridge Maintenance Workshops this spring. The considerable interest in his presentation prompted us to ask him for his notes for this article. We thank him for providing them.

Town officials wanting to apply for the Bridge Aid Program, or just to learn more about it, can contact Mr. Barry by telephone at 271-2107, or by letter to him at

NH Department of Transportation
John O. Morton Building
P. O. Box 483, Hazen Drive
Concord NH 03301

The UNH T°Center sincerely thanks the officials of Pittsfield, Peterborough, Newmarket, and Plymouth for their hosting RSMS and Bridge Maintenance workshops this spring.

We also want to express our appreciation to the instructors, caterers, and, above all, the participants, who contributed so much to these and other training activities.
Pavement Crack Treatments

Crack Types; and Crack Sealing Versus Crack Filling

Asphalt pavements crack because at least one component of the road is inadequate to support the traffic that moves over it. Whether on the surface or in the subbase, that component has deteriorated enough for a crack to form. Sealing or filling that crack properly should decrease road roughness, and, more importantly, slow the deterioration.

A common and useful scheme to categorize cracks is by their direction relative to road length and width.

Longitudinal cracks run lengthwise; that is, parallel to the roadway centerline. They are usually found at construction joints and between traffic lanes. Transverse cracks run perpendicular to the roadway centerline, at least across one full lane width. Generally spaced at regular intervals, they are caused by expansion or contraction of the roadway material.

Sealing or filling does not solve the cause of either longitudinal or transverse cracks. Crack treatment is a form of preventive maintenance; it prevents or reduces, at least for some period, further deterioration of the surface and the base.

Proper crack treatment can provide a useful road surface for two to five years. In general, repairs of cracks caused by an inadequate surface material will last longer than those caused by improper design or a poor base.

Determining the Type of Maintenance

The appropriate type of maintenance for cracked pavements depends on the severity and extent of the cracks. Severity refers to characteristics of crack itself. Extent refers to the relative frequency of cracking. Table 1 shows recommended types of maintenance and repair for various combinations of severity and extent.

Low severity but high extent cracking might best be treated through chip seals or a thin overlay. For very severe cracking of low or moderate extent, spot or partial-depth patching might be best. Finally, moderately severe cracks occurring to a moderate extent might be treated effectively through sealing or filling operations.

In general, high extent and moderate or high severity cracks indicate a very decayed pavement. Crack sealing or filling in these circumstances is both uneconomical and technically unsound in that they do little to delay the need for more extensive corrective actions.

Most road agents or highway superintendents have particular crack treatments they prefer to use and periods during the year when they prefer to use them. They tend to base their practices on the equipment and skills available. Alternative choices, which should at least be considered for longer lasting repairs, are based on overall pavement condition (extent of cracking) or crack characteristics (severity). These might require purchase or lease of equipment and training personnel for its operation.

On occasion, cracked pavements have other characteristics. Edges of cracks might exhibit vertical distresses, such as cupping, lipping, or faulting. They might have significant vertical deflections or movements under traffic loading. Such deficiencies can add significantly to overall pavement roughness and worsen rapidly.

To correct these deficiencies repair alternatives such as patching and/or milling should be considered. In some instances, if the amount of vertical deflection and the severity are not too high, crack treatment might provide a useful road for several years.

Sealing and Filling

Many types of crack treatments have been developed, each for use in a particular situation. They have been grouped, and are described below, in terms of two categories of treatment: crack

Table 1. Guidelines for Determining the Type of Maintenance

<table>
<thead>
<tr>
<th>Severity</th>
<th>Extent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low: Hairline cracks, little or no spalling</td>
<td>Low</td>
</tr>
<tr>
<td>Moderate: Up to 1/8&quot; wide, some spalling</td>
<td>Crack Treatment</td>
</tr>
<tr>
<td>High: Well-defined, foreign materials, much spalling</td>
<td>Crack Repair</td>
</tr>
</tbody>
</table>

Extents

Low | Overall longitudinal cracking is less than 10% of the section length and/or transverse cracks are 50 ft. apart.
Moderate | Overall longitudinal cracking is between 10% and 30% of the section length and/or transverse cracks are between 25 and 50 ft. apart.
High | Overall longitudinal cracking is over 30% of the section length and/or transverse cracks are less than 25 ft. apart.
Nearly all nonworking cracks are longitudinal, but some are diagonal cracks. Because of the relatively close spacing or free edges between longitudinal and diagonal cracks, little movement occurs. Minimal movement permits the use of less expensive, less specialized crack-filler materials.

When to Seal and When to Fill

Ideally, crack sealing is conducted when temperatures are moderately cool (45 to 65°F), which are most common in the spring or fall. Sealing newly developed cracks minimizes dealing with...

---

**Figure 1. Material Placement Configurations**
deteriorated crack segments (i.e., secondary cracks, spalls) which adversely affect seal performance.

Sealing cracks in moderately cool temperatures is beneficial from two standpoints. First, cracks are partly opened so that a sufficient amount of material can be placed in the crack even if cutting in not performed. Second, the width of the crack channel, whether cut or uncut, is nearly at the middle of its working range. The sealant material will be subjected to a minimum of extension or contraction.

Most crack-filling treatments can be applied year-around, but are best applied during cool or moderately cool weather (35 to 55°F). At these temperatures, cracks are most or all the way open, and operators can insert more material into them.

Like sealing treatments, crack-filling should be applied shortly after nonworking cracks have developed. Filling cracks shortly after they are fully developed delays further growth caused by the collection of debris and/or stripping of asphalt. Use of durable filler materials will reduce the number of repeat applications.

Selecting a Placement Configuration

Sealing and filling treatments can be performed in numerous configurations. The most common are shown in Figure 1 (pages 6 and 7). These configurations are grouped into four categories:

1. Flush-fill
2. Reservoir
3. Overband
4. Combination (reservoir and overband)

In the flush-fill configuration, operators dispense material into the existing, uncut crack, and strike off excess material. Configuration A in Figure 1 illustrates the flush-fill configuration.

In a reservoir configuration, crews place material only within the confines of a cut crack (i.e., crack reservoir). They place the material either flush with or slightly below the pavement surface. Configurations D, F, H, J, and K in Figure 1 are reservoir-type configurations.

In an overband configuration, crews place the material into and over an uncut crack. If the material over the crack is shaped into a band using a squeegee, then the simple band-aid configuration is formed (Configuration B). Leaving the material over the crack unshaped creates a capped configuration.

A combination configuration consists of placing material into and over a cut crack. A crewperson uses a squeegee to shape the material into a

Figure 1. Material Placement Configurations

continued on p. 8
(2) use silicone sealants when the width is approximately twice the depth.

Sealants in cracks which are very narrow relative to their depth often lose adhesion over periods of temperature fluctuation. Relatively wide and shallow cracks, on the other hand, resist adhesion loss.

Bond-breaker application should be considered only when the following two factors apply.

1. The costs of installing backer rod are anticipated to be lower than the cost-benefits of improved performance.

2. Working cracks are relatively straight (as with joint reflection cracks) and are accompanied by very little edge deterioration.

Most hot-applied, rubber-modified sealants are recommended for direct application; the increased cost of using backer rod with these materials is not justified. Silicone is almost always the only material recommended for placement with backer rod.

A meandering crack is often difficult to follow accurately with cutting equipment. Operators occasionally miss portions of the crack and create two adjacent channels. This presents the dilemma of whether to seal both the cut and uncut crack segments or cut the missed crack segment as well and seal both reservoirs. A similar dilemma arises with secondary cracks along the primary crack.

Routers and saws usually have controls to vary the depth of cut, and the operator determines the width. Backer rod can be placed in deep reservoirs (1.0 to 1.5 in) to a depth that allows for the desired width to depth ratio. This depth normally varies between 0.5 and 0.75 in. The backer rod should be about 25 percent wider than the width of the crack reservoir. It will then maintain its vertical position and provide proper shape for the material.

The decision of whether or not to overband a sealant or filler material depends primarily on the material being used. Some materials, such as silicone and emulsion, simply must not come in contact with traffic. Also, some materials wear away more easily under traffic than others.

If overbanding of hot-applied, rubber-modified asphalt is desired, it also must be decided if the material will be shaped into a band-aid or left as a capped configuration. The latter process generally requires one less laborer, but possibly at the sacrifice of treatment effectiveness. This is because shaping with a squeegee or dish attachment helps establish a "hot bond" for the entire band. In capped configurations, the material may continue to flow and level out after being applied. Bonds created during this self-leveling process are likely to be weaker than "hot bonds" because they will have formed at decreased temperatures.

The dimensions of the band-aid are typically 3 to 5 inches wide and 0.125 to 0.188 inches thick. The simple band-aid configuration (Configuration B) evolved out of a desire to make application quick and easy by eliminating crack-cutting operations. The recessed band-aid configuration (Configuration L) has the best performance of the reservoir-type configurations because the added band provides a wearing surface.

Editor's Note

The information and recommendations in this article were drawn from Asphalt Pavement Repair Manuals of Practice (Strategic Highway Research Program, 1993, National Academy of Sciences). In a future issue we will use the same publication to discuss materials, procedures, and equipment for crack maintenance and repair.

This manual also describes pothole repair, and was the basis for an article on that topic in the last issue of Road Business.

The UNH TpCenter has a small number of the manuals for distribution. Call the TpCenter and we will mail you a copy as long as supplies last.
AVAILABLE WRITTEN MATERIALS
from the
University of New Hampshire Technology Transfer Center

Many copies of the following books/pamphlets/cards are available through the UNH T²Center. You can request them by mail or telephone. If by mail, check the items you would like to have, fill in your address at the bottom of the page, tear out the page and fold so the UNH T²Center address is on the outside. Tape closed and mail. To request by telephone, call (603) 862-4348 or (800) 423-0060 (in NH).

Highway.Utility Guide. Addresses the full array of issues which can arise from highway and utility facilities sharing common right-of-way.

  • 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

  • Line of Sight Clearance
  • Trees in Clear Zone
  • Mowing for Safety
  • Safety Tips for Vegetation Control

Financing Rural Road and Bridges in the Northern New England States. Reports the results of an academic study, but is written in simple language. An excellent book for Town Managers, Selectmen, and similar officials.

Rating Unsurfaced Roads. An Army Corps of Engineers "field manual for measuring maintenance problems."

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

Local Low Volume Roads and Streets. A clear, comprehensive description of construction, maintenance, and repair basics. Cites numerous references, which are also available through the UNH T²Center. (The UNH T²Center recently distributed one copy of this book to every NH municipality.

The following materials remain from last summer’s Work Zone Safety Workshop. Those marked with an asterisk (*) are specifically for field use.

Design and Operation of Work Zone Traffic Control: Participants Notebook. Contains useful information for self-teaching, local training, or reference.

Work Zone Traffic Control Information Catalog. Federal Highway Administration summary of standards, guides, handbooks, manuals, and training courses related to WZTC.


*Pocket-sized booklet Work Zone Safety for Rural Agencies.

*Traffic Control Card; Important Information.


To request material by mail, fill in your name and address below, and see instructions above.

Name

Address

Address

NH Zip

Page 9
AVAILABLE 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, fill in your address on the previous page, tear out the page and fold so the UNH T²Center address is on the outside. Tape closed and mail. To request by telephone, call (603) 862-2826 or (800) 423-0060 (in NH).

__ Catalog. UNH T²Center Video Loan Program.

__ DC-201 Pothole Repair. 12 min. Demonstrates traffic control during repair, cleaning, filling and cleanup.

__ DC-213 Blading Unpaved Roads. 22 min. Illustrates operations described in the NACE Engineers Training Guide Series booklet “Blading Aggregate Surfaces.”

__ M-205 Potholes - Causes, Cures, and Prevention. 17 min.

__ M-223 Cleaning and Clearing of Bridges. 13 min.

__ M-228 Repair of Depressions, Rutting and Corruga-
tions. 14 min.

__ M-230 Replenishing Earth and Gravel Shoulders. 19 min. Demonstrates shaping and compaction.

__ M-231 Mechanical Cleaning of Unlined Ditches. 20 min. Cleaning ditches with a motor grader and a backhoe.

__ M-232 Pothole Repair in Surface Treatment Pavement. 13 min.

__ M-233 Regraveling. 17 min. Shows basic steps and procedures.

__ M-234 Patching Unpaved Roads. 11 min. An eight-step procedure to provide a long, lasting repair.

__ M-235 Re-shaping Earth and Gravel Shoulders. 15 min.

__ M-254 Potholes: Causes, Cures, and Preventions. 13 min.

__ M-256 Pavement Structure Repair Techniques. 27 min. Gravel road aggregates, structure, and maintenance techniques using a motor grader.

__ M-256 Ditch Maintenance. 17 min.


__ M-264 Clean Cut Ditches. 10 min. Purpose of ditches, maintenance techniques, and special precautions.

__ M-264 Edge Rut Repair. 13 min. Demonstrates shoulder repair, and explains the purpose of each step.

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

Quality Flexibility Needed in Diesel Fuel Contracts

During January 1994, diesel fuel gelled frequently in all manner of diesel-powered equipment. Clogging fuel lines and filters, gelling made snow plowing even more difficult than usual, and added costs to already extended snow removal budgets.

In response to several queries, we examined how and why gelling occurred much more last winter than in past ones. We concluded that several factors, acting together, caused the unavailability of adequate diesel fuel across much of New Hampshire. Each factor — economics, temperature, and reduced fuel storage flexibility — are discussed in turn.

The Economic Factor. To sell to consumers, companies must provide fuel which is both of adequate quality to perform, and competitively priced. Higher quality fuels cost more to produce than lower quality fuels; fuels that operate at a lower temperature cost more than fuels that flow at a higher temperature.

The economic factor, in other words, influences decision makers to provide the lowest quality fuel which will be adequate for operating conditions. If suppliers have higher quality fuel than needed for local conditions, they will have low sales or must sell at very low margins or even at a loss. Sometimes, suppliers have fuel of inadequate quality for the conditions.

The Temperature Factor. A major factor in oil company decisions about fuel quality is the expected low temperature. It appears that decisions for 1994 were based on the previous three winters, which were unusually mild. Not only were temperatures for many days in January 1994 colder than the three year average, they were colder than the thirty-year average. In short, on many mornings snow removal equipment, and other diesel-powered vehicles, needed higher quality fuel than during 1991-1993 and other above average years.

The Fuel Storage Factor. Economic and temperature factors were more important in January 1994 than in past years because suppliers had less flexibility in fuel storage. When able to store several grades of diesel fuel, they could provide low cost fuel during average periods and higher quality fuel during periods of unusually low temperatures.

Beginning in the fall of 1993, they could store less grades of diesel fuel because they had to reserve tanks for two sets of mandated fuel classifications: low-sulphur vs. high-sulphur fuel by the Environmental Protection Agency (EPA) regulations and taxable vs. non-taxable by the Internal Revenue Service (IRS) regulations. For example, a fuel dispensing terminal which had for years provided four grades of diesel fuel from four tanks needed six tanks to have the same number of grades in January 1994. With only four tanks, the fuel companies' economic decision-making became even more important. They could store only one grade of diesel fuel for municipalities.

Suggestions for 1995. When municipalities contract for 1994-1995 fuel purchases, they should request at least two fuel prices: one for diesel which will operate during "normal" temperatures and one for below average temperatures. Requests for only one price could force suppliers to bid based on fuel suitable for lower than average temperatures, which costs more than fuel needed for average temperatures.

Because the EPA and IRS regulations will remain in effect this winter, fuel terminals will still have less flexible storage than in past years. They should, however, be better prepared to mix kerosene with diesel fuel when low temperatures are forecast. Administrators should compare the cost of a supplier who has such capability against a supplier who does not.

Editor's Note: This article is drawn from an internal UNH TCenter report. That report is available upon request, by letter or telephone.

Metric Conversion

Effects on Local Road Managers and Crews Remain Uncertain

Federal and state governments are using metric units in designs for all federally funded highway projects to be awarded after September 30, 1996. AASHTO and other standards-setting organizations have established metric dimensions for roads and their components.

It is not clear when these standards and associated practices will affect local road managers and crews. Until last month, the federal government's policies for metric conversion of signs seemed to be the likely initial affect. Last August the Federal Highway Administration (FWHA) solicited comments from the public on three options:

- Option 1 — Extend conversion over a 4-7 year period through routine maintenance replacement;
- Option 2 — A quick, coordinated conversion effort over 6 months to a year;
- Option 3 — A two-phased conversion process using dual posting of both metric and English.

On June 27 FWHA announced they would delay implementation of any metric sign conversion until after 1996, or until Congress acts. With this decision, there appears little immediate need for a significant educational effort aimed at local road managers and crews.

Because design engineers will be affected by metric conversion before local road managers, the UNH TCenter plans to conduct a workshop for that audience. Tentatively scheduled for January 1995, it will be open to non-engineers as well. In the meantime, individuals desiring information, such as those in communities involved with a federally funded highway project, can call or write the UNH TCenter.
Road Business
Technology Transfer Center
Civil Engineering Department
University of New Hampshire
Durham NH 03824-3591
800/423-0060 (NH) or 603/862-2826

UNH T² Center Staff:
David H. Piharty Manager
Charles H. Goodspeed University Liaison
Jennifer Rand Administrative Assistant
A. R. Van de Meulebroecke T² Engineer

Calendar

By UNH T² Center

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

Work Zone Traffic Control
August 23 in Portsmouth
August 24 in Concord

Planned for Fall, 1994
Basics of a Good Road
Road Surface Management System
Municipal Equipment Management System
Road Repair Strategies and Cost Estimates
Tort Liability
Managing People
Timber Retaining Walls
Winter Operations
Deicing

Planned for 1995
Metrciation
Geotextiles
Sign Inventory Mgt. System
RSMS Upgrade
MEMS Upgrade
Road Drainage
Work Zone Traffic Control
Soil Erosion Control; Wetlands
Motor Grader Operations

By Other Organizations

By NHMA-PLIT; (800) 852-3358.
Snow Plow Rallies:
September 8 Exeter
September 13 Concord
September 15 Laconia
September 19 Derry
September 22 Lisbon
September 27 Jaffrey
September 29 Hanover
October 6 NH Plow-off
October 12-13 National Plow-off

BOARD OF DIRECTORS

New Hampshire Road Agents Association

Past President: Douglas Mellin, Town of Hampton

1993-1995 Term
Larry Jackson
Town of Littleton
Richard Gonsalves
Town of Plymouth
David Wadleigh
Town of Tilton
Brian Bardin
Town of Dublin
Lee Murray
Town of New Boston
Bud Moynahan
Town of Rye

1994-1996 Term
Maurice Cuthbertson
Town of Lisbon
Alfred Elliot
City of Franklin
Kenneth Roberts
Town of Alton
Edwin Mattson, Jr.
Town of Fitzwilliam
Leighton Cleverly
Town of Bow
Robert Strout
Town of North Hampton

Road Business is published quarterly by the Technology Transfer Center at the University of New Hampshire (UNH). The UNH T² Center is supported by the Federal Highway Administration (FHWA), the New Hampshire Department of Transportation (NHDOT), and the University of New Hampshire. Any opinions, findings, conclusions, or recommendations presented in this newsletter are those of the authors and do not necessarily reflect the views of FHWA, NHDOT, or UNH.

Any product mentioned in Road Business is for informational purposes only and should not be considered a product endorsement.