Not surprisingly, Bow was the first town to sign on to the program. At press time, twenty communities have signed on.

The agreement package has a diagram of the mutual aid procedures. It contains an inventory form for participating municipalities to list their available equipment, personnel, and supplies. The UNH T² Center will maintain this information in a database.

Each participating municipality will receive a notebook containing lists of equipment, personnel, and supplies available from other municipalities. This will enable a community emergency access to what they need in the way of equipment, personnel and supplies. NHMA will assemble the notebook, sorted via municipality and equipment, personnel, and supplies. It will also be available via floppy disk format using Excel. NHMA will send updates quarterly.

Chum was the first speaker at the program orientation held this fall. More are scheduled for 1999. Incident Command System for Public Works training is being scheduled for 1999.

The dues for joining the program are $25.00. If you have questions, contact Chum at 228-2207 or, Heather at NHMA 800-852-3358, or Kathy at UNH T² Center 800-423-0060, or check the website at www.t2.unh.edu/ma/.

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THE INFORMATION AGE IS HERE
Incorporating GIS
By John Severance

Road Agents and Public Works Directors need to manage a multitude of information to efficiently operate their municipal road and drainage systems. Their information sources are often a hodgepodge of construction plans, sketches, maps, drawings, and notes. Storing and finding this information can be a large problem. A Geographical Information System (GIS) is a viable solution.

GIS consists of layers of information over an accurate base map. One layer might include the road system, another drainage, and a third signage. With the click of a “mouse,” a user can access features of a road section such as culverts and inverts, catch basins and inverts, pipe sizes, depths, conflicting buried utilities, previous construction plans, percent slope, road crown, width and length, last maintenance, and condition. Data from other systems, such as RSMS and SIMS, can add information to the GIS base map.

Advantages

- All information is digitally stored in one place.
- Information retrieval is quick and easy.
- The system is easy to update and keep current.
- Selected areas can be printed to provide maps and visual information to managers, crews, and the public.
- Information, such as construction plans, sketches, pictures, and AutoCAD drawings, can be scanned and linked to the base map.
- Calculations and future costs can be determined through mathematical modeling and from databases such as RSMS.
- A road layer can be viewed with other layers such as water, sewer, and parcels, to show features that may conflict or prove advantageous for expansion.
- Municipalities can establish a GIS in annual increments. For example, it can budget for a base map and culverts one year, catch basins and drainage another year, and so on.
- By establishing GIS as an ongoing process, it will provide current, accurate information.

Suggestions

- Start with an accurate base map because it is the foundation for all additional information. An accurate tax map is often adequate.

continued on page 11
Pretreating Roads Saves Money
Provides Safe Roads Sooner after Winter Storms

Many highway departments are changing their methods of snow removal. The most common new method is pretreatment rather than post-treatment with chemicals. Some New Hampshire municipalities are also limiting sand use.

Pretreatment

More and more departments apply salt just before and during early snowfall. They then plow accumulated snow leaving about an inch on the surface. The resulting brine creates a film over much of the road surface. This film prevents compacted snow from bonding to the surface, enabling easy removal on the final pass. When the storm ends, they tilt plows to their upright position, and remove the snow to bare pavement.

This pretreatment method of winter operations is sometimes called “anti-icing” because it prevents formation of ice or ice-like snowpack. In nearly all cases, “deicing” is unnecessary. Pretreatment requires less salt, and time to spread it, than conventional deicing. In addition to saving money, agencies provide safe roads sooner after the storm. Pretreatment also reduces environmental affects.

The NHDOT has pretreated roads for many years. Its official policy, published in 1992, recommends 300 lbs. of salt per lane mile for sleet and freezing rain, and 250 lbs. for snow. Because specific patrol sections have peculiar physical conditions, the policy allows supervisors to increase application rates during some storms. It emphasizes, however, that “these areas should be judged and treated separately and not used as a barometer to evaluate and subsequently direct complete applications over the entire section.”

During severe storms, crews might have to apply more salt as they plow, usually at a rate less than the initial application. They occasionally apply salt lightly after a storm to remove residual snow and ice. Even with these supplemental applications, the overall result of pretreatment is use of far less material than required for post treatment operations. In addition, in contrast to deicing, NHDOT maintained roads are safer sooner.

Many departments in northern states have adopted similar policies and procedures. Some use as little as 100 lbs./per lane mile of salt in light snows, with periodic reaplication during light snow storms of long duration. During short periods of moderate or heavy snowfall, they shorted the periods of reapplication and/or increase the application rate.

Timing of the pretreatment is so important that managers need dependable weather forecasts. The NHDOT, and some municipalities, engage commercial forecasters who provide forecasts of expected snowfall intensities during specific periods. Local judgement is often necessary where elevations differ within a city or town.

Liquid chemical applications are of two types. One is “prewetting” rock salt with a liquid to lower its effective temperature. The chemical, stored in “saddle-tanks,” is sprayed on the salt as it leaves the spreader. It should be noted that prewetted material is applied at same rate as dry salt. The most common prewetting agent is calcium chloride in the eastern U.S., and magnesium chloride in western states.

A second liquid application is spraying chemical directly on the roadway. Nationally, the most common chemicals are salt brine and magnesium chloride in solution. In general, liquid application should occur earlier than for solid chemicals. According to FHWA, “late applications onto pavements with more than a light covering of slush or snow can result in excessive dilution of the chemical.” Therefore, accurate forecasts of storm arrival time are critical.

Liquid chemicals are most often used for special purposes. Several New Hampshire municipalities apply liquid magnesium chloride on steep hills, a few in the form of the commercial continued on page 11
New Hampshire Road Scholars

We are pleased to recognize the individuals who, during the Summer and Fall of 1998, have achieved the following levels in the UNH T\(^2\) Center Road Scholar Program.

**Master Road Scholar.** Participated in UNH T\(^2\) Center training activities totaling 100 contact hours and covering the range of topics required for Road Scholar II.

**Senior Road Scholar.** Participated in UNH T\(^2\) Center training activities, totaling 70 contact hours and covering the topics required for Road Scholar II.

**Road Scholar II.** Participated in UNH T\(^2\) Center training activities totaling 50 contact hours and covering a set of minimum subject areas including road design and construction basics, other technical, tort liability or safety, and supervision or personal development.

<table>
<thead>
<tr>
<th>Road Scholar</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bruce MacBrien</td>
<td>Meredith</td>
</tr>
<tr>
<td>Dennis McCarthy</td>
<td>Raymond</td>
</tr>
<tr>
<td>Ron Basha</td>
<td>Lyndenboro</td>
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<td>Harold Blanchette</td>
<td>Hopkington</td>
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<td>Elton Blood</td>
<td>Swanzey</td>
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<tr>
<td>Naomi Bolton</td>
<td>Weare</td>
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<tr>
<td>Ralph Carter</td>
<td>Sanbornton</td>
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<tr>
<td>Douglas Deporter</td>
<td>NHDOT</td>
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<tr>
<td>Michael Faller</td>
<td>Meredith</td>
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<td>Kurt Grasset</td>
<td>Hancock</td>
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<td>Gregory Hatfield</td>
<td>Whitefield</td>
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<td>Carl Knapp</td>
<td>Weare</td>
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<td>Ron Lavoie</td>
<td>UNH</td>
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<tr>
<td>Henry Maylo</td>
<td>Pembroke</td>
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<td>Ernest Nason</td>
<td>Wakefield</td>
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<td>Robert Pantel</td>
<td>Hooksett</td>
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<td>Paul Paradis</td>
<td>Rye</td>
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<td>Calvin Prussman</td>
<td>Newbury</td>
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<td>Suzanne Purdy</td>
<td>Portsmouth</td>
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<td>Thomas Richter</td>
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<td>Kevin Sheppard</td>
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<td>Richard Smith</td>
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<td>Robert Smith</td>
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<td>Michael Sousa</td>
<td>Enfield</td>
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<tr>
<td>Charles Staples</td>
<td>Westmoreland</td>
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<td>Tim Sweeney</td>
<td>Bow</td>
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<tr>
<td>Ed Thayer</td>
<td>Washington</td>
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<td>Glen Tuttle</td>
<td>UNH</td>
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<tr>
<td>Richard White</td>
<td>Portsmouth</td>
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<tr>
<td>Bud Piper</td>
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Master Road Scholars

Bruce MacBrien has been the Meredith Assistant Public Works Director for three months. Like many people, he worked his way up through his profession to achieve this position. For thirteen years, Bruce worked for the New Hampshire Department of as a laborer, truck driver, assistant patrolmen, and finally patrolmen.

Bruce takes classes to continue to gain knowledge, so he can be the best in his field. He feels by attending classes he can learn new ways to complete some of the many tasks he performs.

The town of Meredith is very supportive of education. Bruce now attends classes with Mike Faller, the Public Works Director. Bruce and Mike encourage all their employees to attend classes. Bruce says that it makes his job easier if all the workers are educated.

Bruce lives next door to his parents with his wife, Cammie and their two children, Chad and Casey. He enjoys hunting, especially with his children.

Congratulations to Master Road Scholar Bruce MacBrien.

The Selectmen of Greenville are very happy with the achievements of Charles Butterick, the town's the Public Works Director. Before joining the highway department, Charles was in the U.S. Navy for six years. After the navy he worked with the Greenville Wastewater Treatment in 1976, Water Department in 1986, and then Highway Department in 1988.

Charles attends classes to stay in tune with the changing technology and to stay in contact with other highway people. He sends his crew to classes, too. Charles finds that the most crucial workshops to attend are those dealing with road work safety because much of the work they perform is on roads.

Charles grew up on a farm in Greenville and lives there with his with wife, Linda, and their two children. His hobbies include farming vegetables, and Christmas trees. He has 2500 trees in the ground, and he sells about 100 trees a year. Next year you might want to think about visiting his farm. Starting on the weekend after Thanksgiving you can cut down your own tree.

Congratulations to Master Road Scholar Charles Butterick.
Cost Effective Pothole Repairs

By Stefanie R. Fishman,
Project Assistant

Potholes form when water becomes trapped beneath the pavement surface. Water can enter the road base through surface cracks or from road sides. The water freezes, often causing frost heaves. The ice melts from the top down, leaving a trapped pool of water. As vehicles run over it, the unsupported surface layer collapses. The pothole expands as traffic hits the hole.

In the summer, highway departments can take preventive measures such as sealing cracks and improving drainage. In the winter and spring the only alternative is pothole patching. To ensure a longer-lasting pothole patch, crews must apply the right combination of materials and procedures.

Materials

Although hot-mix asphalt patches last longer than cold-mix it, crews must keep the material hot during the patching operation therefore cold mix is usually used. Cold mix is less expensive, easier to use, and can be stockpiled.

Three types of cold mix can be used: local cold mix, agency-specified cold mixes, and proprietary cold mixes. Local cold mix is a blend of local aggregates and liquid asphalts, either cutbacks or emulsions. When highway departments specify cold mixes, asphalt plants will produce the material according to these specifications using high-quality aggregates and modified liquid asphalts. Proprietary cold mixes are commercially produced blends of carefully matched aggregates, liquid asphalts, and additives. By applying cold-mix in the following techniques, highway departments can make repairs that will last for many months.

Repair Techniques

Repairs can be performed during weather conditions, ranging from clear spring days to harsh winter storms, with temperatures from 0°F to 100°F. Repairs are generally performed as an emergency repair under harsh conditions or as a routine maintenance, scheduled for warmer and drier periods. Highway departments have successfully used three methods for pothole patching: throw-and-roll, semi-permanent, and spray injection. The method of choice depends on how much an agency can spend, the equipment available, and productivity needed.

Throw-and-Roll

The throw-and-roll method consists of the following steps:

- Place mixture into the pothole which may or may not be filled with water and debris. Use any type of hand tool such as a shovel or pitchfork to fill the hole. Fill the hole so that there is a crown in the center.
- Compact the material by rolling over it 6 to 8 times with truck tires. Some crews have found it useful to cover the patch with sand before rolling a truck over the patch to prevent material from sticking to tires.
- Check the level of the patch to make sure the center of the patch is ¼” to ½” above the pavement surface.
- If the patch is low add more cold mix and repeat the patching steps again.

This method is similar to the standard “throw-and-go”, “dump-and-run” or the “pitch-and-pat” methods except truck tires compact the patches. Compaction provides a tighter patch for traffic to drive over it without creating depressions and it provides better water runoff. The extra 1 to 2 minutes to compact the patches will produce a significantly better patch.

Semi-permanent

Semi-permanent patching is the most widely recommended method of repair. It includes the following procedures:
• Remove water and debris from the pothole, using a broom, shovel, compressed air or whatever is available.

• Straighten pothole edges making sides as vertical as possible. This can be done using a jackhammer, pavement saw, or milling machine, etc.

• Place the mix by hand using a shovel and rake. Placement should be made in no more than 3” lifts.

• Compact patch from the center towards the edges to provide better compaction at the edges and corners. Hand devices such as a vibratory plate compactor or single-drum vibratory rollers are recommended for this task.

This repair requires more equipment and workers than the throw-and-roll or spray injection methods, but results in a very tightly compacted patch.

Spray Injection

This method is quick, provides a long-lasting patch, and uses low cost materials. However, it requires a skilled operator to obtain a good patch and the equipment costs is higher than the other procedures. The spray-injection procedure consist of the following steps:

• Blow the hole clean and dry of water and debris.

• Spray a tack coat of binder on the sides and bottom of the pothole.

• Blow asphalt and aggregate into pothole. The compaction is provided by the velocity or the aggregate sprayed into the hole.

• Cover the patch with a layer of aggregate.

Winter Patching

The best results are obtained by scheduling repair work during dry, warm weather. However, potholes usually form of wet and cold weather. In such cases, careful selection of materials and procedures is important to obtain a long-lasting patch.

Aggregates for winter patching should be high quality, crushed aggregate with few fines. The binder should be emulsified asphalts with some anti-strip additive to prevent stripping of the asphalt. The mixture should be workable at low temperatures to allow both easier handling and compaction. The most important aspect is that the binder-aggregate-additive mixture be compatible. Since winter patching seldom allows the time to use the semi-permanent procedure, use the throw-and-roll method with a high quality or highway department specified mix to provide a longer-lasting patch.

Spring Patching

Patches placed in the spring have a longer life than those in the winter because of the more favorable weather and the end of the freeze-thaw cycle. Spring patching can be done by any of the procedures discussed above: the throw-and-roll, semi-permanent, or spray injection procedures. Cost and the availability of equipment and workers should be the most important criteria.

Managers should make sure that material stockpiled over the winter is workable in a range of temperatures. Materials workable at very low temperatures tend to be very sticky and hard to use at higher temperatures. High-quality crushed aggregate with few fines, and emulsified asphalt, should be used for spring patching. Antistripping additives are recommended to keep asphalt from stripping away from aggregates.

The SHRP Asphalt Pavement Repair Manual of Practice provides illustrations of the methods discussed above. Readers can obtain the book from the UNH T2 Center.

Sources:

“Fix It and Forget It: A Training Course in Pothole Patching” (LO36) which is available from the Local Technical Assistance Program (American Public Works Association, 1301 Pennsylvania Avenue NW, Suite 501, Washington DC 20004; phone (202) 347-7267, fax (202) 737-9153; Email ltap@patriot.net)

RSMS Surveys by UNH Civil Engineering Majors
Municipalities Can Apply Now for Summer 1999 Surveys

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 can seldom meet these needs. Town roads are deteriorating more quickly than their local road manager can maintain, much less reconstruct, them and the public is vocal about the situation.

Many local road managers are frustrated because they lack the resources to repair the roads. Town Boards 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 software to get reports for management analysis.

Performance of these tasks with the local road manager and his crew requires taking them from roadwork. 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

The UNH T²Center has hired civil engineering majors the past five summers to help New Hampshire municipalities manage their local roads. Continuing the students will, 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.

The division of responsibilities is as follows:

- The UNH T²Center 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 pavement management, and reimburse UNH for student labor and mileage.

Regrettably, UNH T²Center funding levels dictate that we provide this service on a reimbursable basis. WE WILL CHARGE ONLY WHAT IT COSTS US. To obtain a cost estimate, contact Dave at the UNH T² Center (603) 862-4348 or (800) 423-0060 (in NH). Dave is can discuss specific situations and answer any questions.

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Publications
from the
University of New Hampshire Technology Transfer Center

Copies of the following books and pamphlets and our complete list of publications are available through the UNH T² Center. If you are requesting an item with a charge, please include the check with your form. If ordering by mail, follow the instructions below. To request by telephone, call 603-862-2826, or in NH, 800-423-0060. You can also request by fax to 603-862-2364. You can e-mail to cplourde@cisunix.unh.edu.

The following materials are available free of charge.

___ UNH T² Center Video Catalog

___ The Salt Storage Handbook. A practical guide for handling deicing salt. Published by the salt institute.

___ The Snowfighter’s Handbook. A practical guide for snow and ice control before, during, and after a storm. Published by the Salt Institute.

___ Revised! Nonpoint Source Pollution. This guide describes the causes of nonpoint source pollution, and suggests ways that NPS pollution can be prevented.

___ Calcium Chloride Package. A package of informative articles and pamphlets explaining the benefits of deicing with calcium chloride.

___ Call Digsafe Before You Dig. Printed in April ’98. Contains the latest information that any excavator needs to know before digging.


The following materials involve an extra cost. Please send a check with the form if requesting one of these materials.

___ Manual of Practice for Anti-icing of Local Roads. A rewrite of Manual of Practice for an Effective Anti-icing Program published by FHWA, this UNH T² Center workshop notebook describes the difference between deicing and anti-icing, and it elements of a good anti-icing program. $15

___ Part IV of the Manual on Uniform Traffic Control Devices (MUTCD). Published by ATSSA, this book reprints the MUTCD standards for uniform work zone traffic control. $15

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

Name: ____________________________

Position: __________________________

Organization: ______________________

Address: __________________________

Town: ___________ State: _____ Zip: ______

Check is enclosed payable to: University of New Hampshire

$15 _____________ $30 _____________
Videos
from the
University of New Hampshire Technology Transfer Center
Road Business, Winter 1998, Vol. 13, No.4

The following videos are available from the UNH T²Center Video Library. You can have five videos for a two-week period with no charge. To request by mail, check the videos you would like to borrow (up to 5 at a time), fill out the mail request form, staple closed, affix stamp, and mail. To request by telephone, call (603) 862-2826 or (800)423-0060 (in NH). Visit our complete publication and video catalog on our website at http://www.t2.unh.edu.

___ DC-212 Effective Snow Fences 20 min. Demonstrates the benefits of snow fences based on the needs of chief administrative officers.

___ M-242 Snow Plow and Spreader Operation Parts 1, 2 and 3 Part 1 (16 min) points out the equipment needed for demonstration on using a snow plow/spreader and hook-up instructions for a snow plow and tailgate spreader. Part 2 (13 min.) shows daily checks, inspecting, and servicing the equipment. Part 3 (20 min.) contains plowing and spreading techniques.

___ M-246 Snow Fighter's...Quiet Patriots 17 min. Preparation for winter, snow and ice removal, and after-storm care of equipment.

___ M-247 Planning and Organizing Winter Operations 12 min. Preparations for winter operations including ordering parts and materials, stock piles, checking drainage areas, rental agreements, snow plowing map, crew, and staff meetings.

___ DC-243 Plows of the Future 8 min. Improvement of snow plows and how SHRP is researching them. Snow Scoop is featured.

___ M-297 Using Snow Plows on Motorgraders 16 min. Describes the types of plows and conditions for their use, how to connect each type, and how to plow using the proper plow type.

___ M-248 White Gold 26 min. Emphasizes the proper selection and operation of snow equipment. Discusses the advantages and limitations of various types of equipment, plows, and blades.

___ M-273 Frost Action in Soils 13 min. Describes how frost heaves are formed, the effects they have, and testing of frost action.

___ M-285 Response to Winter 21 min. Discusses the levels of winter service a department of transportation expects to provide. Provides better understanding of winter operations including maintenance function codes and the duties of the workers.

___ PA-219 Snow Removal—Colorado 18 min. Defines snow removal policies and snow and ice removal management, including pre-season management.

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

Technology Transfer Center
33 College Road
University of New Hampshire
Durham, NH 03824-3591

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Milestones:

*Gene Cuomo* has been promoted to Road Agent in Fitzwilliam.

*Lee Ford* is the new Road Agent in Wilmot.

*Walter Kiblin* has been promoted to Road Agent in Lyndeborough.

*Carl Knapp* has been promoted to Road Agent in Weare.

continued from page 2

- The software should allow for future growth and for queries, modeling, networking, and additional layers.
- Data must be consistent and accurate. “Garbage in equals garbage out.”
- Other departments should be involved in planning, data entry, and implementation.
- Provide for annual updates, with municipal employees a consultant, to incorporate additions and changes to road and drainage systems.
- Use a GIS consultant for the initial setup of the GIS, and ask them questions as you proceed.

Computers are becoming as common as telephones, and digitized information is used increasingly. Prices continue to tumble, making hardware and software attainable and useful to small towns. Thanks to advances in user-friendly software, the average person can access, store, and use information with a GIS. By keeping information accurate, current, and accessible, municipal managers can efficiently operate a system that meets current and future needs. With the arrival of the Information Age, coupled with increasing demands of services from the public, a GIS might soon be a necessity rather than a luxury.

John C. Severance  
Manager, Public Works Information Management  
Cartographic Associates, Inc.  
(800) 322-4540  
www.cai-info.com  john@cai-info.com

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continued from page 3

product “Ice Ban Magic.” In some states, city and state departments apply magnesium chloride to surfaces of long bridges. In some western states, departments treat roads several hours before snowfall to improve road friction during early stages of the storm. Subsequent treatment is necessary to control chemical dilution.

Abrasives

Sand and other abrasives DO NOT melt ice, nor do they significantly increase friction. Salt/abrasive mixes must be spread at higher application rates than straight chemical for effective pre- or post-treatment. Whether applied alone or in a mix, clean up costs and environmental affects can be significant. The most common reasons given for spreading abrasives are to please the public or local police.

The publications page of this newsletter lists several publications available from the UNH T² Center. Members of PW.NET can exchange information about what’s working and what isn’t. Readers can also call the UNH T² Center with specific questions.

Sources


UNH T² Center. 1996. Manual of Practice for Anti-icing of Local Roads. (See publications page)


PW.NET

Want to know what is happening in other towns? Need a place to ask questions of other Public Works Officials? Then, subscribe to PW.NET! It’s free. Send an email message to: kathy.desroches@unh.edu

In the body of the message type
Add PW.NET your name

For Instance:
Add PW.NET John Doe
Road Business
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33 College Road, Kingsbury Hall
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Fax: 603-862-2364
kathy.desroches@unh.edu
http://www.t2.unh.edu

Calendar
Planned UNH T² Center workshops
Spring '99
For additional information or registrations,
call the UNH T² Center
or check the web-site.

Basics of a Good Road
2 Locations
RSMS Applications
1 Location

Drainage, Drainage, Drainage
2 Locations
Self Assessment Environmental Compliance in
Highway Garages
2 Locations

Geotextile Applications
2 Locations
Self Assessment of Safety Policies
3 Locations

Incident Command System for Public Works
2 Locations
SIMS
2 Locations

Mutual Aid for Public Works
3 Locations
SIMS Applications
1 Location

SIMS
2 Locations
Workzone Traffic Control
2 Locations

RSMS
2 Locations