Bridge Installation:

The Concrete Systems crew installed the bridge components and workers from the city of Keene provided support services. The Keene crew constructed the footings, did the excavation, and performed all the work required to prepare the site for the Con-Span bridge installation. As shown in the photographs on pages 6 and 7, a crane was used to lift the bridge components from the flatbed trailers and set the pieces in place.

The bridge structure is comprised of four sections, each section is 8 feet wide, and extends across the entire stream. The sections for this bridge have a 24' span and a 9' rise at the center. The two end sections include an integral guardrail support. The bridge also includes upstream and downstream wingwalls on both sides of the bridge. "One advantage that this type of bridge has compared to other prefabricated bridges," explained Thomas Dutton, Keene City Engineer, "is that the guardrails were designed to meet the new NHDOT standards." The new standards specify a 30,000 lb horizontal load.

Four NHDOT staff members who showed up to watch the bridge being erected said that there was only one problem with the bridge installation... "It went up too fast!" The first bridge unit was erected starting at approximately 9:00 AM and the last bridge section was in place by before 10:30 AM.

The Con-Span bridge components are sized so that they may be shipped by tractor trailer. For the Keene bridge the end sections each weigh 28 tons and the interior

Where Are Your Hazardous Materials?

If you’re in charge it’s your responsibility to inform... If you’re a worker it’s your right to know... A large number of vehicle maintenance products seem to be hazardous. There are also paints, adhesives, welding gasses, acids, pesticides, bowl cleaners, aerosols, and a variety of other materials. New Hampshire’s RSA 277-A, the Worker’s Right to Know Act (W.R.T.N.), requires making a yearly inventory of hazardous materials, and having "Materials Safety Data Sheets" on hand for

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all hazardous materials.

In addition to W.R.T.N. the disposal and handling of hazardous materials must follow the procedures outlined in RSA 147 A-D (for additional information about RSA 147 A-D contact the New Hampshire Environmental Services, Division of Waste Management, at 271-2900). However, managing hazardous substances is mainly a matter of careful housekeeping: keep track, load from the back, and use it up. If you don't have any hazardous waste you won't have to worry about hazardous waste rules.

Making An Inventory

The first step in managing hazardous materials more safely is to make an inventory. This involves reading the labels of products. Hazardous ones often have warning labels. Most cleaners and solvents are hazardous, as are penetrating oils, gasket and thread makers, rust inhibitors, diesel fuel conditioners and gas line deicers, and epoxy resin adhesives among many others. The difficulty behind the inventory task is that no single comprehensive list exists. Furthermore, reading the label may be difficult for many items since it is common practice to buy products in bulk then put smaller quantities into other containers. Also, labels often deteriorate on older products. None-the-less, under New Hampshire law every hazardous substance must be properly labeled.

Should you need assistance in developing your inventory we recommend calling the Compensation Funds of New Hampshire (CFNH) at 1-800-852-3328. This organization handles workers compensation for most of the towns in New Hampshire and does a tremendous job in the area of loss prevention. Check with your town office, you may already be a part of CFNH. If you aren't give them a call anyway and find out what they have to offer.

Another great source for assistance is the New Hampshire Labor Department. We recommend calling Stephen Beyer, Safety Engineer, at 271-2024. We found Stephen to be extremely helpful and willing to answer any questions that we had about hazardous materials in the work place.

Use it Up

In many highway garages there are a lot of old products in half-empty containers. Most of them are still good but nobody wants to use them. Disposing of these products makes the maintenance garage a hazardous waste generator. Even one bottle of a hazardous substance must be treated in accordance with the state's hazardous waste laws. The key is to use that stuff up before it gets too old to use or the containers deteriorate. Ninety-eight percent of it should never become hazardous waste. You might try closer inventory control so partial containers are finished before new ones are started and to make sure that products do not stay on trucks for weeks and months at a time.

Buy Non-hazardous Replacements

Many companies now offer non-hazardous solvents and other products. As you reduce your inventory, replenish it with non-hazardous replacements. If your suppliers don't offer any tell them that you want them.

Beware of Salespeople Bearing Samples

Some garages have a whole shelf of free samples. It may be free when the sales person offers it to you, but will have to pay for disposal if it is hazardous. We recommend never taking samples unless you're sure you will use it. If you do try it, use it up.

WARNING - Hazardous materials present in this workplace!

This sentence commands attention, and it should, because it brings attention to information which every employee needs to know. Awareness caused by this statement could save a life, which is why in 1983 legislation was passed regarding an employee's right to know about hazardous substances in the workplace. This legislation is known as the Worker's Right To Know (W.R.T.K.). In general, it states that employers must:

1. Train all employees within 30 days of hire on the nature of the substances to which they will be exposed, detailing correct and safe handling of these substances under any circumstances, and advising employees of the potential risks involved.

2. Post an obvious notice (notice must contain the word warning, in large letters) listing the names of all toxic substances to which employees may be exposed. This notice must also contain: hazards caused by exposure to the substance, known symptoms of exposure and over-exposure, emergency treatment methods for exposure and overexposure, the conditions required for safe use and exposure to the substance, clean up procedures for leaks and spills, and emergency procedures in case of fire or other circumstances which would increase the hazardous or toxic properties of the substance.

3. Post availability of MSDS (Materials Safety Data Sheets) on such substances, and provide MSDS within 72 hours from an employee request. MSDS are available from the manufacturer, producer, or formulator of a substance.

4. Submit MSDS's to local fire departments, as well as inform them as to the location of hazardous substances in your facilities.

5. Maintain MSDS files for 30 years after discontinued use of a toxic substance.

Employees rights include:

1. Reception of training prior to work involving toxic substances.

2. Reception of MSDS's on toxic substances in their workplace.

3. Refusal to work with such substances and to file a complaint with Department of Labor with no chance of discharge or disciplinary action by employer.

Along with these rights, employees have the right to know the following information:

1. The names of toxic substances which are present in the workplace, and names of products which contain any toxic substances (this is not required for commercial products, but is recommended by the NH Department of Labor).

continued on p. 6
sections each weigh 24 tons. When longer spans are required the end sections are constructed in 4' widths, to reduce shipping weight.

Just because the Con-Span bridge is modular and can be shipped by truck does not mean that it is intended for lightweight applications. The Keene bridge was designed to be able to support an HS20 loading. This loading corresponds to an 18-wheel tractor-trailer weighing 72,000 pounds.

After setting the sections in place the base of each bridge unit was shimmed into proper alignment with steel plates and then grouted underneath to obtain full bearing. This portion of the work was done by employees from the Keene Department of Public Works. The seams between the sections were sealed with an asphaltic mastic, and then covered with a heavy plastic tape to prevent soil from washing out between the bridge sections.

Next came the installation of the wingwalls (Notice in the photos on page 7 that the soil anchors and drainage pipe are built into the wingwall). Connection hardware was used to attach the wingwalls to the end sections. The four wingwalls required approximately 1/2 hour each to install. Normally wingwalls are installed in less than a 1/2 hour but this particular installation took longer mainly due to ice in the connections.

After the last section was in place, Bruce Tatro of the Keene Department of Public Works asserted, “It’s only been a little more than an hour and we already have a bridge -- sort of an instant bridge.”

Technical Notes on the Keene Installation:

- Notice that the individual bridge sections are not connected together in any way, rather, they are held in place by their own weight (see Figures 1 & 2 on this page).

- Due to concerns with wetlands and site dewatering, the construction of the foundation took longer than the actual bridge installation. These concerns would be common to ANY bridge at this location and do not reflect upon the concrete modular bridge.

What did all this cost?

- The contract price for the bridge structure and wingwalls was approximately $32,000.00. This included the delivery and installation of the bridge components.

- The total project cost including roadway excavation, footings, guardrails, fill, and paving was estimated to be slightly over $100,000.00.

Who to talk to?

- First, talk to Thomas Dutton, City Engineer for Keene, to hear about the city’s experiences firsthand: call (603) 352-6550.

- For additional questions please call the New Hampshire Technology Transfer Center at 1-800-423-0060.

The above article was written by Ed Schmeckpeper, T² Center Engineer.
Dam It -- Those Beavers!

*A few suggestions for beaver maintenance in your area by Katrina Gates, NH T^2 Center*

The topic of beaver management in New Hampshire is a serious matter. Beaver dams are known to clog culvert ends and create flooding. There are many aspects to consider and one must be sure to make careful, well-informed decisions. This article is designed to assist in making those decisions.

It is important to keep in mind that beavers have positive effects upon nature. Beavers, as we all know, have the unique ability of constructing sturdy, well-designed dams. These dams impound water, creating ponds in which the beavers will build their lodges. Naturally this is important to the beaver since the lodge is primarily used for winter food storage. However, these ponds serve other functions after the beaver have gone. Once abandoned, the pond will attract other wild habitat, such as ducks, grouse, deer, and even moose. Fish life may be improved, with increased trout, pickerel, or horned pout.

Unfortunately, beavers do not create such ideal conditions for everything. Instead, as suggested above, their dams often cause flooding of roads or create blocks in culvert ends. Thus, we have the question of beaver maintenance.

Below are a few suggestions for beaver maintenance in your area:

**Trapping**

It is often necessary to decrease the beaver population. Trapping is one method for doing this. In New Hampshire, the trapping season runs from November 1st to early April. However, pelt prices are down from the $17.00/pelt realized in the 89/90 season to $10.00/pelt in 1991. This has made trappers less interested and leaving the beaver population to increase. Other alternatives, though, are available.

**Shooting**

Shooting beavers, as with trapping, leads to a decrease in the population.

According to Eric Orff of the New Hampshire Fish & Game Department, if the beavers are causing damage to personal property there are no set laws concerning the shooting of beavers. However, shooting is not recommended. Instead, the Fish & Game Department prefers trapping -- and only when necessary. In all cases, preservation of the beavers is desirable due to their positive environmental benefits. Hence, the Fish & Game Department will assist with alternate methods of beaver damage control when requested.

Fences With Perforated Drain Pipes

To prevent clogging of culvert pipes you may erect fences around the upstream end of the culvert openings. Perforated drain pipes added through the fence keeps water flowing (see Figure1a on p. 5). This deters the beavers because they will not be able to maintain the pond’s water level.

Removing the Dams

One temporary solution is to remove the dams by hand. When doing this, you must consider that beavers can rebuild dams overnight, and that some are so sturdy that blasters may be needed.

Deer Repellant

Another temporary solution is the use of deer repellant. Simply hang a rag covered with deer repellant near the dam or culvert. The scent will deter beavers for a while, but eventually they will realize that there is no danger and return to the area.

Hang a White Flag

A method offered by the “Oregon Roads Newsletter,” is to simply hang a white flag in an area of dam construction. Sometimes this simple approach will work. It is believed that the color and motion of the flag keeps beavers away.

For more information on beaver management in NH, contact your local Fish and Game Department.

The above article includes excerpts from “Beavers and Their Control,” Wildlife Fact Sheet #10, University of New Hampshire’s Cooperative Extension Service. Special thanks to Eric Orff, NH Fish and Game Department, #3, for his cooperation and assistance in writing this article.
Figure 1a: Building a horseshoe shaped fence around the upstream side of the culvert keeps beaver from plugging it with debris

Figure 2a: Plans for construction of beaver pipe made of pine or other soft wood

12" board

10-penny coated nails
cleats put on at installation site to join two 12-foot sections in 24-foot pipe -- cleats 2 1/2' x 3" x 1"
downstream end open

spreader slats to reinforce top
solid board on top
12 feet ————
spreader slats 14' x 4' over mesh
3" staples
8-penny nails that protrude through pipe bent toward open end

4' wide #12 1/2 wire 2" x 4" welded mesh cut 20" wide in center of a mesh, leaving prongs -- mesh extends over entire length of the pipe
Left: The Con-Span bridge components are sized so that they may be shipped by tractor trailer. A crane was used to lift the bridge components from the flatbed trailers and set the pieces in place.

Right: Each of the bridge's main sections weighed 28 tons. After setting the sections in place, the base of each section was shimmed into proper alignment with steel plates.

Left: After the sections were shimmed they were grouted underneath to obtain full bearing. The seams between each of the sections were sealed with an asphaltic mastic (the application of the mastic can be seen in the above photo).
Left: As with the main sections, the wingwalls were set in place with a crane. Notice that the soil anchors and drainage pipe are built right into the wingwalls.

Right: Connection hardware was used to attach the wingwalls to the end sections. It takes less than 1/2 hour per wingwall to install.

Left: In just a few hours Keene had a new bridge able to support an HS20 loading -- this loading equates to an 18-wheel tractor-trailer weighing 72,000 pounds.

Due to the design of the Con-Span bridge it was possible to engineer the guardrails to meet the new NHDOT standards specifying a 30,000 lb horizontal load.
Policies & Procedures

Atkinson has a new manual worth looking at.

Earlier this year the town of Atkinson, New Hampshire had a manual developed for them by a consulting firm that is truly worth sharing with other towns in our state. The manual is designed to assist both the board of selectmen and the road agent by outlining the general policies and procedures that surround the town's highway operations.

The book is basically divided onto two parts: (1) highway policies & procedures; (2) New Hampshire RSAs specifically related to highway operations. The first part outlines the policy on contracting goods/services, on equal employment opportunity, on conflict of interest, and the roles and responsibilities of the selectmen and highway agent. It covers operating procedures such as budget preparation, project planning and scheduling, system record keeping, and roadway and equipment maintenance. It lays out an understanding of administrative duties such as departmental monitoring, complaint response, personnel practices, and insurance and liability protection. In addition, the manual covers emergency response procedures (including snow & ice control), bridge inspections and maintenance, highway aid and recovery of damages.

The second part of the manual (the appendix) is a copy of pertinent RSAs. How often have you wanted to have a single easy to use collection of RSAs that relate primarily to highway operations?

From this angle the town of Atkinson has a good working document in their hands. We were pleased to find that many of the items designated as important highway operations were things that the T² Center has been working on with other towns. In particular, the RSMS (Road Surface Management System) program that is currently being implemented in numerous towns, the MEMS (Municipal Equipment Management System) that is now being tested in four towns, and the SIMS (Sign Inventory Management System) also in a testing phase in two New Hampshire towns. All of these programs relate to crucial aspects of highway operations. We were additionally happy to see that the many training programs sponsored by the T² Center over the last four years target other facets of highway operations also outlined in the manual.

For more information on highway training or on the specific programs mentioned above contact the T² Center at 1-800-423-0060 or 603-862-4348. For more information on the content, use, need and purpose of the Highway Operations Procedure Manual contact the town of Atkinson, New Hampshire at 603-362-5268. For specific information on the development, references, and organization of the manual contact DRJ Associates, Incorporated at 603-898-4219.

Hazardous Substances...
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2. The physical hazards related to a toxic substance; such as flammability, and reactivity.

3. Overall health effects due to over-exposure, and the symptoms of over-exposure, for instance; dizziness, nausea, headache, etc.

4. Intake routes which may cause health hazards, which are: inhalation, ingestion, absorption, and injection.

5. Safety procedures, which include but may exceed handling procedures and protective equipment.


7. A non-technical description of possible health hazards related to the toxic substance.

8. Date on which MSDS's were compiled, and the name and address of person or company responsible for compiling the MSDS.

It is important to note that these laws apply only to public sector employees. The private sector must conform to OSHA's Hazard Communication Standard.


LRLC - Local Road Library Catalog

Thousands of short local road articles now at your fingertips

Road Business is just one of 46 newsletters distributed around the country. Each of these publications is packed full of short practical articles geared toward local government officials responsible for road and bridge maintenance and construction.

The New Hampshire Technology Transfer Center has recently developed an exciting new computer program to assist you to quickly and easily locate any of the thousands of articles now on file at the New Hampshire Technology Transfer Center. Each article listing includes title, description, and complete source information.

We refer to this new program as LRLC (Local Road Library Catalog). To run LRLC requires MS-DOS 2.0 (or higher) and a hard drive (if any of this sounds confusing just give us a call and we'll be more than happy to show you how simple it really is). We are offering the program to all interested towns at no cost. Most of you have some access to a computer at either your town office, your library, or your local school. If not, you can come in and use ours. To receive your copy of LRLC please contact the New Hampshire T² Center at 1-800-423-0060.

Even the most inexperienced computer user will find the LRLC program easy to manipulate. Each article is classified in a manner that will allow users to make either very general or very specific topical searches. Articles can be searched for by choosing any number of primary categories, secondary categories or key words. Additionally, one can request that articles be searched for by state and/or year. The end result is a list of articles meeting your specified parameters.

For example, you want to acquire some information about culverts -- just follow these three steps:

(1) Enter culvert as a key word and in less than 5 seconds you can see descriptions

continued on p. 10
Are "Super Singles" Good For Your Roads?

"Super Singles" can cause three times more damage to your roads.

What are "Super Singles"?

First, "Super Singles" are NOT a new type of singles or dating club. Rather, a "Super Single" is an individual tire which replaces two conventional truck tires. As shown in Figure 1b, the "Super Single" tire is wider than an individual standard truck tire. This makes an 18 wheel tractor trailer (one axle with two tires, four axles with four tires, two on each end) into a ten wheeler (two tires on each of the five axles). "Super Single" tires are used to simplify tire maintenance, and are becoming popular for use on lumber trucks and ready-mix trucks.

How do "Super Single" tires compare to standard dual tires?

Unfortunately, trucks using "Super Single" tires cause nearly three times as much road damage as a similarly loaded trucks with conventional dual tires.

While the "Super Single" tire is wider than an individual standard truck tire, it is narrower than a pair of tires. The result is that the forces on the road from the "Super Single" tire are concentrated over a much smaller area compared to conventional dual tires, which results in higher pavement stresses and much greater road damage.

This increase in damage has been correlated by road deterioration tests conducted at the FHWA Turner-Fairbanks Highway Research Center in McLean, Virginia, on asphalt pavement. As shown in Figure 2b, these tests indicate that when loaded to 18,000 pounds per axle, the truck with "Super Single" tires causes tremendously more damage than the truck with conventional dual tires. What was even worse, was that the difference between the two increased significantly with additional traffic.

How do you deal with them?

There are several possible ways of dealing with "Super Single" tires. First, you could ban trucks with "Super Single" tires from your town roads. Second, if banning is not practical, you could institute weight restrictions for any truck using "Super Single" tires. A truck with "Super Single" tires should be loaded at most to approximately 3/4 as much weight as a truck with conventional tires. This guideline can be used to help insure that trucks with "Super Single" tires cause no more damage than those with conventional tires. Finally, you could require the trucks with "Super Single" tires to post road bonds to provide for future road maintenance.

The above article was written by Edwin Schmeckpeper, T² Center Engineer.
1990 Edition of "The Green Book"

A Policy of Geometric Design of Highways and Streets

Used worldwide as a universal standard for highway design, the AASHTO "Green Book" has now been updated in a new 1990 edition. The 1100 page publication is illustrated with both photographs and detailed sketches. It presents geometric features of rural and urban highway design developed the American Association of State Highway And Transportation Officials.

Addressed in the book are highway functions, design controls and criteria, elements of design, cross section elements, local roads and streets, collector roads and streets, rural and urban arterials, freeways, at-grade intersections, and grade separations and interchanges.

The book costs $37.00 plus $4.50 postage and handling. To order write to: AASHTO, 44 North Capital Street, N.W., Suite 225, Washington, D.C. 20001; or call the T^2 Center at 1-800-423-0060 for a copy of an order sheet.

Transportation Solutions for Small and Medium-Sized Areas

Third National Conference -- October 9-11, 1991

This is a national conference oriented specifically to the needs of transportation managers, planners and engineers. There will be a focus on tutorial sessions and case studies in small cities. You will be able to take home solutions that you can apply in your community. Topics include: using the 1990 census effectively, GIS, 1991 Transportation Act, innovative financing technology, environmental issues, congestion management, long range planning, and management skill development.

The conference will take place October 9 to 11 at the Sheraton Burlington Hotel & Conference Center, Burlington, VT. For registration information call Steven Gayle at (607) 778-2443 or contact the NH T^2 Center at 1-800-423-0060.

Keep an Eye Out for T^2 Courses

The following courses will be sponsored by the T^2 Center this summer and fall... watch your mailbox for details

Sign Inventory
August 14th
Chase's Restaurant
Meredith, NH
August 15th
Holiday Inn
Manchester, NH

Work Zone Safety
August 22nd & 23rd
VoTech Center
Concord, NH

Introduction to AutoSketch
Mondays & Wednesdays
September 9th through October 2nd
Salem High School
Salem, NH

ATTENTION PHOTOGRAPHERS!

LOST & FOUND

We found a nice camera after the Mountain of Demonstrations show held June 14 in Waterville Estates, New Hampshire. If you think that the camera might be yours please give the Technology Transfer Center office a call at 1-800-423-0060 or write to the following address describing the camera:

Technology Transfer Center
University of New Hampshire
Department of Civil Engineering
231 Kingsbury Hall
Durham, NH 03824
How Much Salt Will Be Needed This Winter?

Plan your salt program early.

Estimating future salt requirements is tough. Few public works officials ever hit the figure right on the nose. Here are a few guidelines for estimating future salt needs:

1. Never reduce last winter’s figure because you hope next winter will be milder.

2. Be sure to take into account new mileage added to your road or street system. Don’t overlook new subdivision streets. Interstate or express highways and routes acquired from other political subdivisions.

3. Improve winter maintenance operations. Going to straight salt or adding more salt routes can substantially influence salt requirements while providing a higher level of service.

In anticipating needs, make realistic estimates based on average needs over the previous five-year period. Serious consideration should be given to the possibility of unseasonably cold temperatures, blizzard conditions, prolonged cold spells and unusually large amounts of snow. All of these conditions, often unpredictable, can affect your use of salt. Salt should be ordered by mid-summer for winter and fall delivery. Then there is assurance of getting the material well ahead of winter. The demand for deicing salt places great pressures on the shipping and hauling interests that deliver salt from production point to users. Transport problems grow more complicated once winter begins and the demand for salt increases.

Early ordering and stockpiling of deicing salt assures a ready supply, with the material delivered during good weather. When bids are placed early, the supplier has ample time to find and prepare a suitable stock point in the area. Salt cannot be transported by barge once waterways are frozen—another reason to advise your supplier of needs early.

Remember that your contractual requirements may slow the purchasing process. Often, a waiting period is required between the time bid notices are advertised and a supplier is selected.

The above information was reprinted from The Salt Storage Handbook, a Salt Institute Publication.

Use the chart below to figure approximate salt needs for your area.

**TABLE 1: Tons/Metric Tons of Salt Required per Season -- Based on 4 applications per storm per two-lane mile/kilometer**

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Note: Minimum storage requirement is usually half of annual salt use.
Gravel Road Maintenance
Classroom & Hands-on Training
Tentative Schedule Late August
Room for 20 persons
Call ahead for reservations

Drainage
Course is geared toward the Road Agent
Tentative Schedule Mid October
Manchester & Meredith
Call to get on waiting list

Rehabilitation of Existing Bridges
Will include information on Timber
Tentative Schedule Late October
Manchester

Basics of a Good Road
Covers general road design specs,

construction, and inspection
Tentative Schedule Early November
Manchester & Meredith

Fleet Maintenance
Introduces the Municipal Equipment Management System
This is a program specifically designed for NH towns and cities
Manchester & Meredith

Introduction to Spreadsheets
Geared toward the beginning computer user
We will cover the basics of Lotus type spreadsheets for MS-DOS (IBM) type machines
Manchester, Meredith, Littleton
Tentative Schedule Early December

For additional information about these courses please contact the T² Center.

LRLC...
continued from p. 8
about 39 articles such as...

Title: Backfilling Culvert Pipe
Description: Materials & procedures for backfilling culvert pipes

Title: Tips on Road Drainage
Description: Drainage techniques, culverts, driveways, etc.

Title: Want Culverts to Last Longer?
Description: Match pipe material to soil and water conditions

(2) Pick out the articles that you think might supply you with the information you need;
(3) Get a copy of the articles that interest you from the NH T² Center by calling our 800 number, writing to us, or dropping in and searching our files.

For More Info call 1-800-423-0080

TECHNOLOGY TRANSFER CENTER (T²C)
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