Above: The town of Pittsfield has a brush cutting program that pays. They bought their own chipper and modified it slightly to meet their needs.

On The Road In New Hampshire

Pittsfield has marketed 661 tons of wood chips with a revenue figure of $10,923

Recently George Batsbeldor, the Road Agent for the town of Pittsfield called the T Center and invited me to come up for a visit. George explained, "We've got a program up here that may interest some other towns in the state." When I got up to Pittsfield I knew George was right. There isn't a town in New Hampshire that couldn't use a little more money... Wouldn't you like a few more thousand in your budget?

George and his three man crew, "Sparky" Gordon, Steve Carson, and Lance Houle, are both the brains and the action when it comes to Pittsfield's public works projects. In 1988 they developed a brush clearing program designed to pay for itself.

"In the past we would rent a chipper, and get rid of the chips wherever we could," explained George. "The charge for renting from a local contractor was $25.00 per hour on the meter. This was the least expensive method of renting that we found. The lowest daily rental rate was about $150.00."

The town now owns a Model 200 Brush Bandit 12" chipper. It is designed to chip brush and trees up to 12" in diameter. The chips are small enough to be used for mass burning at power plants. Pittsfield is presently selling chips to Timco, Inc. of Barnstead, for the fueling of their Cogenration Plant.

"We ship mostly in the fall when there are no leaves on the trees. We go out when we find spare time between scheduled projects and our seasonal work load. With the four of us we can chip and deliver approximately 10 tons of chips per day."

"By purchasing the Brush Bandit, we not only saved the town the cost of renting a chipper, but we also produced revenue by marketing the chips," George explained, "We started this brush control program in November of 1988. To date we've marketed 661 tons of chips -- a revenue of $10,923. On top of that, we have saved $5,875 in rental charges. This totals to $17,798."

The chipper cost Pittsfield $13,400 to purchase. This means that they have realized $4,398. This winter they expect to make another $1,650 and that doesn't include the "hidden" benefits — burning wood to heat the town garage thereby saving fuel costs in the winter; increasing sunny areas on the roads reducing the amount of salt required for deicing; increased visibility making safer roadways for the driving public... Its an all around good program!

--- ALSO IN THIS ISSUE ---

- Fight Erosion with Sacked Sand-Cement Riprap ——— 2
- Inside Your Computer: 3 System Files & How They Work ——— 5
- A Diet Tip For Gravel Hungry Roads ——— 6
- A New Solution for a Serious Problem ——— 8
- Seat Belt Myths ——— 9
- Robotic Road Crews in the Future ——— 10

photos on p. 7

Cold Exposure and Frostbite

New Hampshire road workers spend much time working in cold weather. Guarding against overexposure and knowing how to recognize frostbite can prevent serious injuries. Become familiar with the following guidelines:

Preventing Injuries from Extreme Cold

- The extent of injury caused by exposure to abnormally cold temperatures depends on additional factors such as wind velocity, type and

continued on p. 4
Fight Erosion With Sacked Sand-Cement Riprap

Sacked sand-cement riprap is limited only by the imagination of the individual using the material

by Thomas L. Copas, P.E.

Erosion of ditches and abutments is a never ending problem for highway construction and maintenance officials. Some solutions for these problems, such as slope or ditch paving, are expensive and require the use of specialized equipment and highly trained personnel. Stone riprap is also expensive and may not be readily available. Sacked sand-cement riprap may be one alternative for some of the erosion problem.

Either natural or manufactured sand, portland cement, cotton or burlap sacks, a mixing hoe and a shovel, along with a few gallons of water, are all that is needed to produce sacked sand-cement riprap. A local agency can produce satisfactory sacked sand riprap with a hand mix operation when only a few bags are needed.

Step 1 - Five shovels of sand for each shovel of Portland cement are placed on a mixing platform which may be a sheet of plywood, a truck bed, or a section of the roadway. One bag of cement when combined with approximately 500 pounds of sand should produce enough mix for six (6) sacks of sand-cement riprap.

Step 2 - Mix sand and cement until well blended and of uniform color. In some cases it may be possible to mix the sand and cement in the equipment yard in a cement or mortar mixer. If dry sand is used and the resulting mix is kept under cover, it may be stockpiled for short periods.

Step 3 - Place the mixed material in approximately one (1) cubic foot cotton jute, or burlap bag. Leave space at the top to permit the bag to be tied, stapled or stitched. Bags of woven plastic are satisfactory; however, DO NOT use plastic lined bags as they will not permit the water to penetrate the mix during the soaking step.

Step 4 - Place the filled bags with the tied ends against the bank or covered by the bottom end or the side of another bag. There should be no tied ends visible when the bags are placed.

Step 5 - The soaking of the in-place sacks is an important step that is most often overlooked or not properly done. Enough water should be sprinkled on the sacks to completely soak all of the sand-cement material. If no water was wasted, a gallon or so should be adequate. However, to be certain that the sack is soaked, three or more gallons should be applied slowly.

Three uses of sacked sand-cement riprap will be discussed briefly. The first will be the roadway ditch, the second the protection of abutments, and the third the protection of pipe ends.

(1) Erosion in roadway ditches is usually caused by steep grades which result in the high velocity of the flowing water. Figure 1 shows a typical 3% profile ditch. Individual 8-inch sacks of sand-cement can be placed at 25-foot intervals effectively reducing the grade to less than 1%, thus substantially reducing the erosion potential. Figure 2 shows the placement of a single sack across the ditch. In some cases it may be desirable to place additional sacks as shown in Figure 2b & c.

(2) The repair of an eroded bridge abutment is illustrated in Figure 3. Note the use of a cut off or toe wall at the bottom of the sacked sand riprap slope. Also, note that the material placed behind the riprap is to be compacted. Some of the sacks are placed at 90 degrees to the slope to help provide additional stability. The soil should be placed so that the compacted layers are about the same depth (about 8-inches) as the sacked riprap.

(3) The erosion at the ends of drainage pipe can be prevented by using sacked sand-cement riprap as shown in Figure 4.

There are no standards for many of the uses that may be made of sacked sand-cement riprap. It is limited only by the imagination of the individual using the material. But in all cases -- the in-place sacks must be completely soaked. In some cases water from nearby streams can be carried to the site or an old fuel drum can be used to haul water.

After the sacked sand-cement is placed and soaked, and a few days of curing is completed, the protection should last for many years.

Figure 2  Ditch Blocks

Figure 3  Sacked Riprap to Correct Abutment Erosion

Figure 4  Protection of Pipe with Sacked Riprap
Cold exposure... continued from p. 1

duration of exposure, temperature, and humidity. Freezing is accelerated by wind and humidity or a combination of the two factors.

- Wear proper clothing
- Limit exposure as much as possible
- Take frequent, short rest periods
- Keep moving

- Exercise fingers and toes if necessary, but do not overexert.
- Do not drink alcohol before exposure to cold
- Do not bathe before exposure
- Do not smoke before exposure
- Learn to recognize the symptoms of overexposure and frostbite

- Cold hands may be warmed by placing them under dry clothing against the body, such as in the armpits.

Clothing for Extreme Cold

- Thermal-type woolen underwear
- Outer clothing which will repel wind and moisture
- Face helmet and head and ear coverings
- Two pairs of socks

- Carry extra dry socks when working in snow or wet conditions.
- Warm boots

- Make sure boots are not so tight that circulation becomes restricted.
- Wool lined mittens or gloves

covered with wind and water repellent material

Symptoms of Cold Exposure

- Shivering
- Numbness
- Low body temperature
- Drowsiness
- Marked muscular weakness

- Skin becomes white, gray, or waxy yellow

- Color indicates deep tissue damage. Victims are often not aware of frostbite until someone tells them or sees the pale, glossy skin.

- Skin tingles, then becomes numb
- Pain may occur, then let up
- Blisters may form
- Area of frostbite swells and feels hard

- In advanced cases mental confusion and poor judgment occur, the victim stagers, eyesight fails, the victim falls and may pass out, shock is evident, and breathing may cease. Death, if it occurs, is usually due to heart failure.

Order of Treatment for Cold Exposure

- Get to a warm room as quickly as possible
- Remove wet or frozen clothing and anything that is binding
- EXAMPLES: Necklace, watch, ring, belt
- Rewarm by adding clothing, wrapping in a blanket, or by getting into a tub of water that is warm but not hot to the forearm.

- Dry thoroughly after soaking in warm tub.
- Drink hot liquids (CAUTION: Do not drink alcohol.)
- Carry out appropriate procedures as described for frostbite.

Symptoms of Frostbite

- Frostbite results when crystals form in the fluids and underlying soft tissues of the skin. The effects are more severe if the injured area is thawed and then refrozen. Frostbite is the most common injury resulting from exposure to cold elements. Usually, the frozen area is small. The nose, cheeks, ears, fingers, and toes are most commonly affected. Just before frostbite occurs, the affected skin may be slightly flushed.

- Protect frozen area from further injury
- Warm frostbitten areas as soon as possible
- Give artificial respiration if needed

The above article was reprinted from Transportation Information Exchange News, No. 14, November 1985
Inside Your Computer: 3 System Files
And How They Work

by: Petr Brym

Bad or missing command interpreter... insufficient file handles... bad command or file name... where have you seen this? You may have deleted, modified or overwritten one of three important system files: COMMAND.COM, CONFIG.SYS and AUTOEXEC.BAT.

This article describes the function of these three important files, and how you can safely change or replace them. The COMMAND.COM file is loaded into memory when you turn on the system. Each time you start your machine, the operating system (DOS) searches for a CONFIG.SYS file and, if it finds one, it references the information contained in the file. Next, DOS searches for the AUTOEXEC.BAT file. If DOS finds an AUTOEXEC.BAT file, it performs the commands in that file.

CAUTION: Get some help before you work on these files, unless you feel very comfortable with the information in this article. A good place to go for help is the New Hampshire Technology Transfer Center. Call our toll free number at 1-800-423-0060.

COMMAND.COM

Basic commands in memory
COMMAND.COM is the DOS command interpreter which provides you with the basic DOS commands such as COPY, DEL, and RENAME. This file must be present in the root directory of your hard disk (usually the root directory on your hard drive is C:\), or in the root directory (A:\) on your floppy bootable disk at the time you turn on and start up your computer. During this process, vital commands are loaded into the computer's temporary memory or "RAM" (this stands for Random Access Memory). If the COMMAND.COM file is missing from the root directory or damaged the error message "Bad or missing command interpreter" appears. Also, be sure that the COMMAND.COM file is the correct version (you can type VER to see what version of DOS you are running). The wrong version of COMMAND.COM can cause basic commands such as FORMAT not to work properly. Without the proper COMMAND.COM you will not be able to use your machine because the basic commands loaded into memory from COMMAND.COM will not be available.

COPY CON C:\\CONFIG.SYS
FILES = 20
BUFFERS = 20
CTRL-Z

(note: to type CTRL-Z hold down the CONTROL key & press Z)

The message "1 file copied" appears. This copies the FILES and BUFFERS lines into a file called CONFIG.SYS directly from your keyboard (the "CONsole").

If you need to modify an existing CONFIG.SYS file, use EDLIN (see your DOS manual) or a text editor of your choice. You must treat this file as a text file, not as a word processing document (i.e. WordPerfect, WordStar, MS-Word). If you save your CONFIG.SYS file as some word processing document, it will not function properly. This is because it will contain word processing formatting codes that DOS cannot read. After you save your file as a text or non-document, be sure NOT to save the file again as a word processing file when exiting your word processor.

AUTOEXEC.BAT

Commands to execute at startup
AUTOEXEC.BAT is a text file containing commands to be automatically executed when you start your computer. The DOS command PROMPT $PSG is often found in the AUTOEXEC.BAT so that the command prompt reflects the current drive and directory (e.g., C:\wp516). One of the most important commands to include in the AUTOEXEC.BAT file is the PATH command:

PATH = C:\C:\DOS;C:\WP

This PATH command lists all the directories the computer should search for programs. The PATH command makes it easier to use your machine. Because the WP subdirectory is listed in the PATH command, executed at startup by AUTOEXEC.BAT, the computer will find the program and run it when you type "WP" even if you are not currently in the WP subdirectory. By contrast, when you type "DBASE", the program will not run unless you set the default to the DBASE subdirectory by typing "cd DBASE" at the DOS prompt to change directory. When the AUTOEXEC.BAT file is accidentally deleted or damaged, your machine will appear to respond differently to your commands, and you will have to work harder to use your machine. You should have a copy of your AUTOEXEC.BAT file.
A Diet Tip for Gravel Hungry Roads

You can improve your gravel road's health by adding fiber -- in the form of a geotextile -- to its diet

by David Smiley, Phillips Fibers Corporation

Recently I read an article dealing with the cost of gravel lost on gravel roads because of improper blade angles used by motor grader operations. There is another reason for lost gravel which requires another answer to solve the problem.

Hundreds of tons of aggregate are lost each year due to gravel-hungry roads which simply "eat up" much of the aggregate after it is placed. This causes a frequent need for replacement of the gravel and additional grading.

The common use of nonwoven geotextiles in modern road design addresses this problem and is directly applicable to unpaved roads.

When incorporated into a pavement structure, the nonwoven geotextile normally performs three basic overlapping functions consisting of separation, drainage/filtration, and load distribution/reinforcement. It is becoming apparent through experiments and performance case histories that the separation effect is of primary importance in many applications involving both wet and dry subgrades.

As movement occurs along the road surface, usually in conjunction with environmental stresses on the road, a mixing of dissimilar materials within the road structure occurs. It has been estimated that as little as 10 to 15% intermixing of some subgrade materials with clean aggregate can render the aggregate dysfunctional as a structural component. In the case where aggregate is the surfacing material, its effects as a dust palliative, friction course, and stable driving surface are compromised as soon as the inevitable mixing with subgrade fines occurs.

Lightweight nonwoven (4 oz. per square yard) geotextiles have a history of money saving success in some parts of the county where they are routinely used in gravel roads to separate imported gravel from the native road base such as areas in Oklahoma (New Hampshire has also experienced positive outcomes due to nonwoven fabrics). You can improve your gravel road's health by adding fiber -- in the form of a geotextile -- to its diet.

Pittsfield Has A Brush Clearing Program That Pays For Itself

Above: George Batchelder, Pittsfield's Road Agent, eyes a small tree for cutting

Above: Steve Carson works to clear out small trees and brush... notice the chaps and hard hat worn for safety

Below: Pittsfield saves on fuel by heating most of their garage with wood collected from their clearing jobs... They built this wood splitter out of old parts that would otherwise be treated as waste

Above: "Sparky" Gordon operates Pittsfield's wood chipper... He gives a new definition to "brush" when he puts through some of the larger logs like the one shown in this picture
Work Zone Safety - A New Solution For A Serious Problem

One work zone safety situation that has troubled highway agencies for years involves a disproportionate number of accidents occurring during slow-moving winter maintenance activities like salt spreading. Through research being conducted by the Strategic Highway Research Program (SHRP), an innovative product is now available to address this concern:

The Salt Spreader Truck-Mounted Attenuator (TMA)

The newly available Salt Spreader TMAs solve several problems simultaneously. Damage caused by rear-end collisions to salt trucks will be lessened considerably and dramatic savings in equipment and labor can be achieved.

Improved Safety:

Winter-related accidents account for the largest number of accidents in the maintenance work zone. These accidents primarily involve rear-end collisions with slow-moving, salt-spreading and snow-removal trucks. On-road moving activities represent 35% of maintenance work zone accidents, but only 14% of the maintenance hours are spent on these activities. This illustrates that there is a disproportionately high number of serious accidents related to slow-moving maintenance activities. A new TMA Interface Structure, which allows increased use of TMAs during salt-spreading operations, can greatly reduce injuries and damage caused during such collisions.

Reduced Costs:

The new TMAs also have a big impact on costs. Until now a separate "shadow vehicle" frequently had to be employed to carry the TMA. The new TMA permits the use of both a TMA and a salt spreader on the rear of the same truck. The support structure is a steel frame serving as an adapter between a salt truck with a center discharge-type spreader and commercially available TMAs. All TMA support and hydraulic members are placed on either side of a center opening through which the salt spreader/spinner passes. When not in use, the TMA may be tilted up to a vertical position. The 90 degree tilt-up capability makes it more maneuverable around yards and loading facilities. As the TMA interface structure is adaptable to several different TMAs, existing TMAs owned by a highway department can be used, avoiding an investment in additional equipment.

The TMA Interface Structure has undergone rigorous testing during development. Tests were carried out following the guidelines set forth in NCHRP Report No. 230, "Recommended Procedures for the Safety Performance Evaluation of Highway Appurtenances." The "worst case scenario" test consisted of crashing a 4500-pound vehicle into the TMA and support structure at 45 mph at an angle of 15 degrees. In addition, extensive vibrational tests were done on the support structure at a frequency of 5-8 hertz and an amplitude of 0.6 inches. The TMA Interface Structure passed all tests and is now ready for application.

Informed maintenance managers recognize safety devices in terms of potential savings rather than just costs. The injuries prevented and the lives of maintenance workers and the motoring public saved by using TMAs provides strong justification for the product. The savings in equipment and manpower resulting from eliminating the shadow vehicle is also clear. There is no doubt that the cost of this equipment is minimal compared to the savings it provides!

The Salt Spreader TMA is now commercially available. Five units have been field tested in the states of Illinois, New York, and Missouri.

For more information call the New Hampshire Technology transfer Center at 1-800-423-0060 or write or phone SHRP:

S.C. Shah
Strategic Highway Research Program
818 Connecticut Avenue, N.W., Suite 400
Washington, D.C. 20006
Phone: (202) 334-3774

The above information was reprinted from PRODUCT Alert, a publication of the Strategic Highway Research Program.
Seat Belt Myths

Myths are great for the ancient Greeks but the facts could save your life

The following article is reprinted, with minor changes, from Commercial Motor Vehicle Driver safety Belt Usage, published by the Office of Motor Carriers of the Federal Highway Administration.

The responsibilities of a commercial driver are many, but your use of seat belts is one of the most effective means you have to protect yourself and your company or agency from death and injury and revenue loss.

When you wear your seat belt, you increase your chance of avoiding death and injury by up to 50 percent. The first step in increasing your safety is overcoming commonly held and dangerous myths about seat belt use.

Myth: "I face traffic every day. Crashing is the least of my worries."
Fact: The risks inherent in commercial driving cannot be ignored. You drive more miles than the average person and are on duty for long periods of time and in all kinds of weather. You are on the road at night when you are most likely to encounter drunk drivers. Driving for extended periods of time or in heavy traffic can be stressful and your awareness can be reduced.

Myth: "I'm a good driver. I don't need to wear a seat belt."
Fact: Good drivers usually do not cause collisions, but they often are involved in crashes caused by bad drivers, bad weather, mechanical failure or tire blowout. Good driving skills help avoid crashes, but the statistics speak for themselves: you are highly vulnerable to crashing. If you do crash, seat belt use can save your life and prevent long-term disability.

Myth: "I get in and out of my vehicle 20 times a day. I don't have time to fasten my seat belt that many times."
Fact: It takes about three seconds to buckle up. Even if you get in and out of a vehicle 20 times a day, buckling up requires only one minute a day.

Myth: "People should have freedom to choose whether or not they want to wear seat belts."
Fact: Wearing a seat belt keeps a driver in the seat and in control of the vehicle, protecting passengers as well as others on the road. Besides, if someone is hurt or killed in a crash, a lot of other people bear emotional suffering as well as the cost. The National Highway Traffic Safety Administration estimates that the annual cost of U.S. motor vehicle and pedestrian accidents is more than $74 billion. This is not just an individual problem, but one that greatly affects our society.

Myth: "The seat belt is a pain in the neck. It's uncomfortable and my clothing catches in it."
Fact: A few seconds adjusting the belt at the beginning of your trip will prevent discomfort and inconvenience. You cannot argue the trade-off in safety.

Myth: "My vehicle is equipped with the latest safety features that make it safer than the average vehicle on the road."
Fact: Despite safety standards for commercial motor vehicles, you may still be injured in a crash. In addition, the extra equipment in commercial vehicles such as radios, tachographs and on-board computers can actually contribute to your chances of being injured.

Myth: "In encountering a dangerous driving situation, my first duty is to react, not to take the time to buckle my seat belt."
Fact: If you take the time to buckle up each time you enter your vehicle, you can be sure of staying at the wheel and in control of the vehicle. This increases your ability to properly react to the situation and pose less of a threat to motorists.

Myth: "I wear my belt when I'm on the highway, but I don't need it when I'm traveling in the city at low speeds."
Fact: More than 80 percent of crashes occur at speeds between 30 and 40 miles per hour. A vehicle will stop or slow down if it collides with another object, but an unrestrained occupant will continue to move at the same speed. Imagine hitting the ground after jumping from a five-story building. That is the same force with which you would hit the windshield at 40 miles per hour.

Myth: "If I crash, I would rather be thrown clear of the wreckage."

As a professional driver, your actions and attitude toward using seat belts influence those with whom you come in contact. Help us change the motoring public's attitude toward seat belts. Your positive attitude can help reduce the death and injuries on our nation's roadways.

The following article is reprinted, with minor changes, from Commercial Motor Vehicle Driver safety Belt Usage, published by the Office of Motor Carriers of the Federal Highway Administration, as cited in The Bridge, Vol. 6, No. 1, Fall 1991, Michigan Technological University.
Did You Know?

Robot Road Crews In the Future??

Robots that could replace freeway maintenance workers exposed to hazardous tasks are being developed by the University of California at Davis. The California DOT is sponsoring a $1.2 million project, prompted by the numerous deaths and injuries of highway maintenance workers in the past and the need to speed up repairs on increasingly crowded roads.

The idea is to develop machines that do such tasks as placing and/or replacing lane markers, litter pickup, crack sealing, stripping, etc.

The above was reprinted from ITRE Transportation Tracks, Fall 1990.

But not in the to distant future...

A company in Albuquerque, New Mexico is moving in the direction of a mechanized approach to road maintenance. Although their revolutionary asphalt repair machine requires an operator, it uses robotic type arms and reduces the need for a full crew. The company is One Man, Inc. and it has developed a pothole repair machine that is advertised as self-contained, fully mechanized, and non-polluting.

For more information you can contact Duke McCracken by calling 505-898-1900 or by writing to:

One Man, Inc.
7301 Jefferson NE
Suite A-113
Albuquerque, New Mexico 87109.

We wish you and your families the very best throughout the Season!

TECHNOLOGY TRANSFER CENTER (T³C)

University of New Hampshire
Department of Civil Engineering
Transporation Research & Computation Group
Durham, New Hampshire 03824-3591

4-20083

Road Business is published quarterly by the New Hampshire Technology Transfer Center at the University of New Hampshire. The Center is supported by the Federal Highway Administration, New Hampshire Department of Transportation, 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 views of The University of New Hampshire, New Hampshire Department of Transportation, or the Federal Highway Administration. Any product mentioned in Road Business is for informational purposes only and should not be considered a product endorsement.