The famous “Shim-and-Overlay”

When do I need to shim? How do I avoid delamination? Is there a trade off between good design and practical maintenance?

Recently I received a good question, “How deep does a rut have to be in order for me to be concerned about it?” The gentleman looking for the answer to this question was just getting ready to do a thin hot mix overlay — about one-inch thick. What he wanted to avoid was building a rut into his newly surfaced road, but he also wanted to avoid using a shim coat (or leveling course) if at all possible — we all

continued on p. 4

--- ALSO IN THIS ISSUE ---

- Errata Sheet - MUTCD _______ 4
- Opening & Protecting Culverts _______ 5
- Why Not Re-Tire -- The US could save 400,000 barrels of oil per day _______ 5
- Frozen Culverts _______ 6
- Scrambled Disk s And Fried Drives _______ 6
- Set Up A Work Zone -- Not An Accident Zone _______ 8
- Local DPW Employees Required To Pass CDL Test _______ 10

continued on p. 2
Gilford knows this and as Sheldon explained, "We're spending serious money every year on dust control and rutting. We have to find the best surface for our roads to help keep these costs down."

The Catpath project was set in motion as follows: The DPW discussed the dust problem with the Board of Selectman and then presented the idea of the Catpath test sight. The board gave it's approval and the project was underway. The road was prepared by grading, forming a good crown, cleaning ditches, and cleaning drains. Three different surface materials were chosen — Hardpack (blue stone), Ledgepack, and 1.5" CBR Gravel. A non-woven geotextile (SUPAC 4NP) was chosen based on the Temple project. Each surface material was placed over the fabric to a depth of four inches, wetted, and rolled for good compaction. One section of Catpath was left undisturbed to act as a control section for performance comparisons.

From the onset of the project, Gilford DPW has been monitoring the conditions of the various sections of experimental road. "We've been using the templates from the gravel portion of the RSMS program developed by your group," explained Sheldon, "and we will be continuing to monitor the road into the Summer of 1991."

(NOTE: RSMS is the Road Surface Management System developed by the Technology Transfer Center. The gravel roads management portion of the program is based on the research conducted by the Army Corps of Engineers at CRREL.)

To date the Ledgepack seems to maintain the best surface performance with the Bluestone appearing to be the worst. "Time will be the real judge, however. What we need to do is see what happens after the spring," mentioned Richard Petell. "One thing is for sure," said John, "regardless of this experiment, we will continue to put fabric under all our gravel roads. The geo is worth its weight in gold just from the standpoint that it keeps the road from flipping itself over."

John mentioned that they learned a few pointers about fabric installation during the Catpath project, "first of all, we placed the fabric down in three overlapping strips. The smaller fabric widths (about 8 feet vs. 16 feet) let us follow the curves in the road much more easily and allowed us to conserve fabric. Our actual installation required the exact amount of fabric we had predicted. Also, Catpath is an 18 foot road and our overlaps were right in the areas of the wheel paths which we believe provides us with a little more strength in our road. The one thing I would caution any town about is to be certain that their grader operator isn't overly rough. When the granular surface is only four inches deep a rough operator could easily disrupt or damage the fabric."
Above: After a good crown was put on the road geotextile fabric was rolled out in three strips (two strips can be seen in the photo). By using three narrower rolls of fabric Gilford was able to follow the curvature of the roadway with ease.

Below: The Catpath test sight was completed this year in the latter part of June and opened to traffic. Catpath is an ideal location for such a test. The road has experienced a steady increase in traffic and now it is a well traveled unsurfaced road.

Above: Three different surfaces were used to cover the fabric at a depth of 4-inches. This photo shows the partial placement of the blue stone (hard pack).

Below: Sheldon Morgan, Public Works Director, and Richard Pitell, Highway Superintendent, stand on Catpath inspecting one of the surface sections. They should be commended for their ingenuity and willingness to find an answer to a big problem in New Hampshire -- dust control.

Above: To assist in the necessary and frequent monitoring of Catpath Road, Gilford has adopted the unsurfaced roads template from the T^2 Center's R.S.M.S. (Road Surface Management System). The distress characteristics being monitored coincide with research performed on granular surfaced roads by CRREL (Cold Regions Research Engineering Laboratory).
Errata Sheet -- Manual on Uniform Traffic Control Devices

The Federal Highway Administration has issued an errata sheet for the 1988 edition of the Manual on Uniform Traffic Control Devices. Since the errata sheet did not get broad distribution, the information is listed here for your convenience.

Page 2B-11 -- Section 2B-17, first paragraph, the first sentence should read, "The standard size of the Lane Use Control signs shall be 30 X 36 inches when mounted overhead, and 30 x 30 inches when post mounted."

Page 2B-18 -- In the third line from the top of the page, change 20 inches to thirty inches.

Page 3B-5 -- Figure 3-4b, the pavement markings shown on the right of the turn only lanes should be white.

Page 3B-6 -- Figure 3-5a, add an asterisk between the first and second and the third and fourth turn arrows in the two-way left turn lane.

Page 3B-8 -- Section 3B-5, add the following speeds and distances to the table shown:

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Minimum Passing Sight Distance (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>450</td>
</tr>
<tr>
<td>35</td>
<td>550</td>
</tr>
<tr>
<td>45</td>
<td>700</td>
</tr>
<tr>
<td>55</td>
<td>900</td>
</tr>
<tr>
<td>65</td>
<td>1100</td>
</tr>
</tbody>
</table>

Page 3B-19 -- Figure 3-13a, the first and last "L" should read "2L".

Page 3B-20 -- Section 3B-12, third paragraph. The third sentence should read, "A two-way left turn shall be marked by a single direction, no-passing marking on each edge of the lane. Pavement marking arrows may be used as shown in figure 3-5a."

Page 3B-30 -- Figure 3-19, add asterisks to indicate optional use for the following: the thru/right turn and the thru arrow markings on the upper leg of the intersection, the thru/right turn arrow marking in the far right lane of the lower leg of the intersection, the thru/left turn arrow marking on the left leg of the intersection, and the left-turn radii from the bottom of the intersection. Delete the left-turn radii from the top of the intersection.

Page 3D-3 -- Section 3D-5, first paragraph, first line, replace the word "shall" with the word "should". In the same paragraph, the second sentence should read, "They should be placed not less than 2 or more than 8 feet outside the outer edge of the ..."

Page 3F-1 -- Section 3F-2, fourth paragraph, fourth line should read, "minimum 6-inch white band Placed..."

Page 6B-4 -- Figure 6-2, the arrow indicating the location of the ROAD CLOSED/DE-TOUR Signs should be pointing to the Type III barricade instead of the channelizing devices.

Page 6B-10 -- Figure 6-8, the Advisory Speed Plate on the right side of the detail drawing should have an orange background.

Page 9C-4 -- Figure 9-6, first diagram in upper left-hand corner, change "not less than 250" to "not less than 50."

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Shim and Overlay... continued from p. 1

have to find a way to stretch our dollars whenever feasible.

As discussed in the last issue of Road Business, Vol. 5 No. 2, rutting tends to inhibit uniformity of compaction. The common problem due to non-uniform compaction is that ruts will quickly appear in areas where they were previously present -- usually in the wheel paths as new pavement continues to compact under traffic. A shim coat will insure uniformity of compaction and reduce the likelihood of this type of rutting (see the above mentioned article for details or call the T² Center at 1-800-423-0060 for a copy of the article).

The difficult part about ruts is that they are deceiving. What may at a glance appear to be a superficial rut is often one that is greater than one-inch deep. This will have an effect on your one-inch overlay since the asphalt in the area of the rut will not get completely compacted during the rolling process. Hence, you will have built the potential for rutting into your newly paved road.

Our rule of thumb is as follows: if you can see a rut than you have a rut to be concerned about. This may sound a bit silly but what it means is that you almost always need to use a shim coat before overlaying. This is particularly true if your rut is greater than one-half of the overlay you intend to put down -- a typical case on New Hampshire municipal roads.

Dick Lassonde, Bituminous Engineer at the NHDOT Bureau of Materials and Research, strongly recommends that you always use a shim coat before an overlay. Not only will a shim coat help to avoid potential rutting but it will also help provide a smoother application of the asphalt thereby avoiding other potential rough spots caused by profile problems. That is, when you do not use a leveling course there is a temptation during the paving process to place the asphalt a little thicker in one place versus another in order to try and compensate for transverse dips. This practice often results in a rough road. In general, the trade off is that when you use a shim coat you will have a better road but it will cost a little more, hence, you will probably not be able to resurface as many lane miles. We recommend you seriously think about quality over quantity -- it usually saves in the long run.

Another common problem that crops up after a hot mix overlay is delamination. The reason for this is that over the long term the road just doesn't perform as a laminated beam. The surest way to avoid this problem is to use a tack coat. This approach is still recommended by the Asphalt Institute and other highway design engineers, however, New Hampshire has pretty much moved away from doing tack coats for various reasons -- cost being one of the considerations. Unfortunately, it will cost you a lot more if you experience delamination of your wearing course.

So what can you do about it? Is there a middle of the road approach? The answer is yes. Although a tack coat is the method of choice -- particularly when the older surface is dry -- you might be able to get by with a little trick we picked up from Dick Lassonde. The idea is to make your shim coat a little "heavy" on the liquid which will provide a good coating of asphalt around each particle (about a 0.2 % increase in asphalt should do it). The "heavy" shim coat will adhere to both the original road surface and the new overlay acting somewhat like a tack coat. Any fear of bleeding due to the "heavier" shim coat should be minimal since this course will be far enough below the wearing surface to avoid potential problems.
Opening and Protecting Culvert Ends

When cars and trucks drive at the edge of driveways and narrow roads they can flatten the culvert ends underneath. Town of Hazel Green patrolman Virgil Runde has come up with a way to open them back up and protect them. The spreader looks like a giant pinch clothes-pin and it works like a see-saw. When the portable hydraulic hand jack forces the open side closed, the other end opens and forces the culvert end apart.

The opener is made of two pieces of three inch channel iron, three feet long. The top piece is hinged with a 5/8 inch bolt on two nine inch verticals. Strap iron and reinforcing rod over the top strengthens it. Two chains hook the portable jack to hitches bolted to the bottom channel iron.

Once small culvert ends are spread, Runde has found that a used 15-inch tire can be fitted on the end to protect it and hold the soil in place. "I cut the inside bead of the tire about three times to get it on easier," says Runde. He says he tries to avoid cutting the outside bead so it will stay in place better.

After it is in place he cuts a slot on the top of the tire and fills it with gravel or concrete. Don't use a radial tire, he says, or you won't be able to cut the bead.

For more information contact Virgil Runde, (608) 854-2401

Reprinted from "Crossroads" Summer 1990

Why Not Re-Tire?

Ask your tire dealer about the "rolling resistance" and the milage performance of tires you may consider buying

Every two weeks, Americans wear almost 50 million pounds of rubber off their tires. That's enough to make 3 1/4 million new tires from scratch!

Here is some background for you to think about... Tires have a bigger impact on the environment than you might expect. By maintaining them properly, you help conserve the energy and resources that would go into making new ones, prevent the pollution generated by tire production, save gasoline, and reduce the problems created when we throw them away (they are bulky, do not decompose, and provide places for mosquitoes to breed).

As far as radial tires are concerned, they really do improve gas milage. Steel-belted tires are generally the most efficient. In fact, if all cars in the U.S. were equipped with the most efficient tires possible, the fuel savings would equal 400,000 barrels of oil per day. Something to reflect on during this Gulf Crisis!

Make a decision about what you buy next and use some of these tips when doing so. Buy the longest-lasting, most fuel efficient tires possible. Ask your tire dealer about the "rolling resistance" and the milage performance of tires you may consider buying. Make sure your tires are properly inflated, balanced and (every 6-8,000 miles) rotated. Support local and regional efforts to recycle tires, to use more recycled rubber in tires, and to convert discarded tires into energy.

Thawing a Culvert with a Tar Kettle

When the safety inspector told Waukesha County (Wisconsin) its 30-year-old culvert steamer was close to retirement, Fleet Manager Joe Gorski started looking for a replacement. New steamers cost about $35,000, he found.

"It's the kind of thing that can stand around for years and never be used," says Gorski, "then suddenly you're running it 24 hours a day."

When a friend at an antique steam engine club remarked on Minnesota's stringent boiler requirements, Gorski wondered how that state's highway crews opened frozen culverts. With a little detective work he discovered a thawing device that used hot water -- available for about $5500 from a Green Bay dealer.

But Waukesha's inventory of unused tar kettles gave him an idea. For about $2000, they mounted a 7 hp gas engine and a small water pump on a tar kettle and fitted it with a 60 foot wand. The pump is reversible, so it can refill the kettle from a nearby ditch. Crews used it this spring, and found it actually works faster than steam.

One problem was the leftover tar. The hot water loosened it and it plugged the components. The kettle had to be completely cleaned with repeated applications of solvent and steam.

For more information about the hot water culvert opener, contact Joe Gorski, Fleet Manager, Waukesha County Transportation Department, (414) 548-7740

Reprinted from Crossroads, Summer 1990

Frozen Culverts

An old time remedy for reducing frozen culvert problems

One of the more pesky problems a road agent or highway worker has to deal with is frozen culverts. Culverts with slow running water have a tendency to freeze when we experience an open winter -- a cold season with little snow. When a culvert freezes it can no longer do the job it was designed to do and trapped water on the inlet side will begin to cause one problem after another with your roadway. If you can keep a culvert from freezing, your job will be made a lot easier and your budget should reflect the improvement. I'm sure that the person who finds an effective low cost solution to frozen culverts will also become very rich. In the mean time, there may be something that you can do to help prevent freezing.

Walter Somero, Road Agent for the Town of Sharon, New Hampshire, has been using an old time solution. "I have had good luck with my method which I learned many years ago from John Crosby, a former road agent from the Town of Rindge, New Hampshire." Walter (most of his friends call him Butch) explained, "I put spruce or hemlock limbs or pieces of hardwood cut to whatever length I need against the culvert end. If you've got snow take and shovel the snow on the top of the boughs. I also have used pieces of blanket insulation if no snow was available." (see the figure below on this page)

The culvert usually freezes from the outlet end into the culvert and then the problem begins. A steam jenny is usually the quickest way to get the water to run again after the culvert has frozen. However, according to Butch, the insulation of limbs and snow on the end of a culvert prevents cold winds from going up the pipe and freezing the water. "I have used this method for many years. If we have snow to cover up the end these problems do not happen."

FIGURE 1: Preventing culvert freezing using hardwood boughs

Scrambled Disks and Fried Drives

Understanding Disk Organization and Protection from Data Loss

Many New Hampshire municipalities are beginning to use computers to help them in their work. Not only are computers being found in the town office assisting with payroll, taxes, and other municipal accounting operations but we are beginning to see an influx of computers into public works and highway departments. The following article discusses information necessary to efficiently operate an MS-DOS microcomputer equipped with a hard drive (MS-DOS machines are the most common computers on the market -- sometimes referred to as an IBM or IBM clone).

DISK ORGANIZATION

Today's computers can have large hard drives containing more than 300 million bytes (300 megabytes) of information. That's the equivalent of 240,000 pages of written text. Even the relatively common 40 megabyte drives, found in many of our municipalities, contain about 32,000 pages of information. Managing that amount of data requires the same care as you would take to organize your office files. In many respects, the procedures are the same.

The root directory on the disk is much like a file room. It represents the largest unit available. Many people put all files in this directory. This is like throwing all of your files in the middle of the floor. It rapidly becomes impossible to find anything. An office filing system organizes office files into file cabinets, file drawers, and file folders. The design for disk drive management is much the same. Directories are the file cabinets, and subdirectories are the file drawers.

Subdirectories allow one to organize software into different categories or types. For example, you may create a subdirectory for word processing, another for spreadsheets, another for databases, etc. Each of these can be subdivided into additional subdirectories. Your word

continued on p. 7
DOS and Drives... continued from p. 7

processing directory can contain a subdirectory for the software, another for reports, another for in-house memos and still another for outside correspondence. This allows both you and the computer to more easily search for specific files. It also provides for easy updating of your software as new releases come out.

There are utility programs that you can buy to help you organize your disk, but if you want to do it in DOS (Disk Operating System), it's pretty easy. The next issue of Road Business will go into more detail about creating and managing directories and subdirectories, however, if you need some assistance now just give us a toll free call (1-800-423-0060) and we can probably set you up fairly well over the phone.

DISK BACKUP

There are three cardinal rules of computing. They are Back-it-up, Back-it-up, and Back-it-up. The idea of "backing-it-up" means you should regularly copy all of your valuable data onto another disk or tape. Think of the most important project you have. If a fire destroyed all of your records -- or more likely your hard drive fails -- you would feel devastated. Days, weeks, even months of work could be lost.

Hard drives FAIL. It is only a matter of when. The average life of a hard drive is about three years. There are companies that will recover data from a damaged disk at a cost of about $10 per megabyte with a minimum of $40. However, they usually take a couple of weeks.

Proper disk organization greatly simplifies disk backup. There is no need to backup commercially available software since you already have the original disk. Usually, commercial software consumes the greatest portion of the available space on your hard drive. Therefore, only your work directories need backing up. If you are using floppy disks as a backup media, the number of disks required is minimal.

How often should you backup your files? That really depends upon how important they are. The greater the loss, the more often you should back them up. Some firms also store their backups at a separate location or in a fireproof vault. You need to decide on a schedule and stick to it.

You can use DOS copy commands to do your own backups, and there are also several good backup programs available. Each program has advantages and disadvantages. You should consult your local vendor and/or computer user groups for input. If you would like to learn how to use your

DOS commands to backup files call the Technology Transfer Center and we can get you on the right track in about five minutes.

BATCH FILES

Batch files reduce the extra typing required when using subdirectories. For example, to use a word processing program it is often necessary to use a redundant sequence of commands:

C:\>CD \.
C:\>CD WORDPROC\TEXT
C:\>C:\WORDPROC\RUN

Batch files eliminate this type of repetitive typing sequence. Batch files are simply a list of commands you would routinely type in from your keyboard to run a program such as your word processor. The only difference is that you can convince the computer to do the work for you once you've taught it how. You can use several methods to do so. The Disk Operating System (DOS) provides a simple procedure using COPY CON. This command allows you to create a batch file right from your keyboard. At the prompt type in COPY CON. Then type in the command sequence you would normally use [Note: COPY CON provides no prompt]. For example, to run your spreadsheet program, you may use COPY CON to enter the following file:

COPY CON SS.BAT
C:
CD \.
CD SPREAD
RUNSS
CD \.
C:
CD \.
CLS
<F6>
<ENTER>

The command COPY CON SS.BAT initializes (creates) a file and names it SS.BAT. All executable files must have a file extension of "COM", "EXE", or "BAT" (the file extension consists of the three characters after the "."). Batch files use the "BAT" extension. The second command line changes to the drive where the program is stored. The third line changes the directory to the Root Directory, the forth line changes to the directory that contains the spreadsheet, the fifth line tells the computer to run the program, the sixth line returns you to the root directory after you exit from the spreadsheet program, the seventh line makes sure you return to your desired hard drive partition, the eighth line ensures you are in the root directory of this drive, and the ninth line clears the screen. The <F6> tells the computer you are done entering commands into the batch file SS.BAT (note: you will see a "Z" on the screen after pressing the <F6> key). From this point forward all you need to do is type "SS" or "ss" to run your spreadsheet.

You can create much more complicated batch files if you wish. Review your DOS manual for further details.

AUTOEXEC.BAT

The AUTOEXEC.BAT is a special batch file which must be located in the root directory. The computer looks for this file when you turn it on. For example, you may want the computer to bring up a menu every time you turn the machine on. You will probably want the computer to set several operations such as the screen color or where certain files can be found, etc. You may already have an autoexec.bat file. You can check to see if you have such a file by entering the following command from your drive C: root directory: "TYPE AUTOEXEC.BAT". If it is there, review it and compare it to the following example.

ECHO OFF
PROMPT $PSG
PATH
C:\\C\DOS\C\BATCH\C\UTILITY
CLS

"ECHO OFF" keeps the computer from printing the command on the screen.

"PROMPT $PSG" sets prompt to display the disk drive and the directory at the beginning of each command line. This command line can also be used to set the screen color.

continued on p. 8
Set Up A Work Zone
-- NOT An Accident Zone --

One of the most hazardous jobs in the United States is that of the road worker. This summer I asked about 80 New Hampshire roadway workers if they had ever seen a work zone accident or if they had ever experienced a close call. 100% of them had experienced at least one close call.

It is your responsibility to set up a work zone that will ensure safety for both the road crew and the public. The way to do this is to think of a work zone in sections rather than as a singe area. To do this think of the two most important words:

**Warn and Guide!**

Often, I have been surprised to find myself approaching a work zone area. Usually this happens when I'm coming over the crest of a hill or traveling around a corner. The public should never be surprised. They should be warned. Also, I have frequently been confused as to how I should actually maneuver through the work zone. Again, the public should never have to second guess their travel route. They should be guided.

Most of the time, whatever causes a close call can be avoided. The best way to avoid work zone traffic problems is to learn how to set up a work zone the right way.

The first thing you need to know is that the state of New Hampshire has adopted the MUTCD (Manual on Uniform Traffic Control Devices) and this manual has a complete chapter (chapter VI) devoted to work zone traffic control (for more information on the MUTCD and chapter VI call the Technology Transfer Center at 1-800-423-0060). We would be happy to send you a handbook with a copy of chapter VI if you don’t have one already or if you need an extra to go into a truck’s glove compartment.

There are five essential sections or separate areas of a work zone that you need to be aware of:

- Advance WARNING Area - WARNS traffic what to expect ahead
- Transition Area - begins to GUIDE traffic out of its normal path
- Buffer Space - provides protection for traffic and workers
- Work Area
- Termination Area - GUIDEs traffic so the public can resume normal driving

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For more info call 1-800-423-0060

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THE PATH COMMAND

The path command tells the computer how to look for files. For example, if you type "SS" to run your spreadsheet, the computer with the autoexec.bat file listed above would look into the current directory for SS.BAT. Then it looks at C: \ DOS, then at C: \ BAT where it is stored (Note: it is a good idea to keep all of your batch files in a subdirectory called BATCH -- this will allow you to run your program from any drive/directory on your computer). The order is therefore the same as you enter it into the path command, so conflicts may arise because files can potentially have identical names. It is best to limit the path command to those directories that provide your commonly used files.

If you need to know what the current path is, simply enter the path command by typing PATH and pressing <ENTER>. If you want to see the current subdirectories now on your drive just type TREE at the prompt and press <ENTER>.

IN SUMMARY

There have been three basic concepts presented:

- Use subdirectories in the same manner that you would organize your office files. Create new ones as necessary to group files in a logical manner.
- Back up your work files regularly to protect against accidental loss. Don't wait until you get burned to realize how important this is.
- Use batch files to speed up your work.

Each of these concepts will help you increase your productivity with the computer. There are several numerous good books on DOS and disk management that you can get at any good bookstore. A rudimentary knowledge of DOS will help sort out many potential problems and help to increase your productivity.

The above article was adapted from the Alaskan Transportation newsletter, Winter 1989, Vol. 14, computer notes insert 8.
Two Diagrams Depicting Work Zone Traffic Control Plans
For Low Volume Roads

It is important to take notice of the distances referenced in the following diagrams. Sign spacing is critical and it is dependant upon the speed of the moving vehicle. A motorist simply cannot read signs that are to close together or react quick enough to avoid an obstacle. In the diagrams this is shown in the S sections (Spacing for advanced warning signs) and the T sections (Taper distance).

For more information on work zone traffic control please call the T Center at 1-800-423-0060.

### DIAGRAM NUMBER 1
WORK ZONE ON A TWO-LANE ROADWAY WITH LOW TRAFFIC VOLUME (FLAGGER NOT REQUIRED)

**NOTES:**
1. Flagger not required provided bi-directional traffic can move safely at reduced speed through the work area.
2. High-level warning device optional.
3. For speeds over 45 mph, refer to DIAGRAM 2.
4. If visibility to work zone is limited, refer to DIAGRAM 2.
5. Same criteria used when encroaching on shoulder lane of a multiline highway.

<table>
<thead>
<tr>
<th>Speed Limit (MPH)</th>
<th>S</th>
<th>T</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 or Below</td>
<td>200 feet</td>
<td>125 feet</td>
<td>8 feet</td>
</tr>
<tr>
<td>26-35</td>
<td>300 feet</td>
<td>250 feet</td>
<td>9 feet</td>
</tr>
<tr>
<td>36-45</td>
<td>400 feet</td>
<td>400 feet</td>
<td>10 feet</td>
</tr>
</tbody>
</table>

### DIAGRAM NUMBER 2
WORK ZONE ON A TWO-LANE ROADWAY WITH LOW TRAFFIC VOLUME (FLAGGER REQUIRED)

**NOTE:** For higher volume locations add a "ROAD WORK AHEAD" sign at spacing "S" in advance of the "ONE LANE ROAD AHEAD" sign.

<table>
<thead>
<tr>
<th>Speed Limit (MPH)</th>
<th>S</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 or Below</td>
<td>200 feet</td>
<td>125 feet</td>
</tr>
<tr>
<td>26-35</td>
<td>300 feet</td>
<td>250 feet</td>
</tr>
<tr>
<td>36-50</td>
<td>400 feet</td>
<td>450 feet</td>
</tr>
<tr>
<td>over 50</td>
<td>500 feet</td>
<td>600 feet</td>
</tr>
</tbody>
</table>

* The work zone diagrams printed on pages 8 and 9 of this newsletter were taken from the "Traffic Control in Work Zones" pocket guide prepared by the University of Kentucky Transportation Research Program. *
CDL (Commercial Drivers License)

Most DPW employees will have to pass a CDL test

A commercial motor vehicle is a motor vehicle or combination used in commerce to transport passengers or property. This pertains to ALL NEW HAMPSHIRE PUBLIC WORKS DEPARTMENTS! You must have a CDL to drive any of the following:

- A vehicle with a gross vehicle weight rating (GVWR) of more than 26,000 pounds.
- A trailer with a GVWR of more than 10,000 pounds.
- A vehicle designed to transport more than 15 persons (including the driver).
- Any size vehicle which transports hazardous materials which requires placarding.

Depending on your job requirements you may have to take any or all of the following:

- The General Knowledge Test
- The Tank Vehicle Test
- The Passenger Vehicle Test
- The Air Brake Test
- The Double/Trailer Test
- The Combination Vehicle Test
- The Hazardous Materials Test

The Technology Transfer Center has training tapes available for your use. You can either borrow a copy of these tapes for two weeks or you can purchase them on an "extended play VHS tape" for $16.50. All video purchases will be sent to you within a one week period.

For more information please contact the T² Center at 1-800-423-0060.

Road Business...

is a local roads Technical Newsletter published by the Technology Transfer Center. It is written for New Hampshire’s town and city employees who are responsible for planning and managing low volume roads. All of your comments, questions, and suggestions are welcome. Please use the mailer attached to this newsletter or call us toll free at 1-800-423-0060.

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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.