



ROAD BUSINESS



On the Road in New Hampshire

Regulations Will Challenge NH Municipal Highway Managers in the New Millennium

Recently enacted federal and state regulations will affect municipal highway departments in 2001 and beyond. More pending rules will take affect in the third Millennium. In addition, several regulatory agencies plan increased enforcement of past regulations. In total these rules can change road and bridge maintenance decision-making and priority setting. They will influence facility construction and municipal budgets. At minimum many will require increased documentation and permit applications. The new, old, and pending regulations include:

- Stormwater II (NPDES II)
- GASB 34
- *MUTCD Millennium Edition*, with a new part specifically for low volume roads
- Retroreflective street name signs
- Center and edge line marking
- Retroreflectivity minimums for traffic signs and pavement markings
- Wetlands permits

Each regulation is described below, with known anticipated affects noted. Sources of currently available information, and UNH T² Center plans for additional information, are described at the end of the article.

Stormwater II

In October 1999 the Environmental Protection Agency (EPA) enacted Phase II of its National Pollutant Discharge Elimination System Storm Water Program. (Abbreviated NPDES II, Stormwater II, or Phase II.) This rule will affect nearly all municipalities, with major impacts on

some. Its three areas of coverage are described separately below.

Industrial Activities. These rules could impact municipal garages, truck and vehicle washing, salt and sand storage, wastewater treatment plants, recycling centers, and refuse transfer stations. Municipalities will need a permit or a No Exposure Waiver for each activity with the potential to affect surface waters. To obtain a waiver, the agency must show that the materials "are not exposed to storm water" during storage or handling operations. Some municipalities will have to construct new or modify existing facilities. The deadline for applications is March 2003. For many cities and towns planning for compliance will have to occur sooner.

Regulated Municipal Separate Storm Sewer Systems (MS4s). Phase II regulates all MS4s in "urbanized areas." These cover all of 6 New Hampshire cities, and parts of 20 other cities and towns. EPA might add municipalities to the list, or modify the current areas by December 9, 2002.

Each designated municipality will have to develop a Storm Water Management Program. That program must contain six "minimum control measures."

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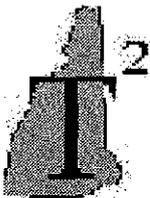
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Why You Should Join PW.NET

By Carl Quiram, Public Works Director, Goffstown

Today, finding information (or avoiding recreating the wheel) has become a breeze through the use of pw.net. Pw.net is a listserv sponsored by the UNH T² Center. Users send an email to pw.net asking a question that they don't have time to research, or to get a different point of view. Pw.net has been one of the single greatest communication advances that I have known in our business, we are all very busy and do not always have the time to do a lot of research on our own. In the past, we relied on word of mouth to solve problems or have waited for a workshop or newsletter article.

After sending a email message to pw.net, usually very quickly, many colleagues, who have probably already dealt with a similar issue, will point you in the right direction. I'll describe a personal example.

This past spring, after Town Meeting, we were approved to purchase a new sewer vacuum truck. The last one we purchased was in 1982 so we needed to develop an entirely new RFP. Our mechanic was rather intimidated by the daunting task of how to write a spec for this piece of equipment. I inquired of PW.Net if anyone had any such RFP and within 3 hours I had 8 different RFP's sitting on my desk to draw from. It saved me a great deal of time and got us a great truck that will certainly do the job for us. Being able to quickly ask for and receive information from peers is a valuable tool for today's fast-paced workplace.

PW.NET

Want to know what is happening in other towns? Need a place to ask questions of other public works officials? Want to be the first to receive notifications of UNH T² Center workshops? 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

Keeping Good Employees

By Marisa DiBiaso, Project Assistant

In this current job market it is vital to maintain high employee retention. A low supply of employees available to fill public works positions means that most departments can't afford to lose employees. The longer an employee works for a company, the more valuable he or she becomes. To retain good employees use a good benefits package, training, and efficient management. This article will explore ways that public works departments can retain employees.

Benefits

Benefit packages make a position more desirable, especially when hiring and retaining personnel. Benefits that might influence the length of time an employee stays with a company include:

- **Time off** can include paid vacations, sick time, and unpaid leave. Many people find free time more valuable than money, particularly with the younger generation and people with families.
- **Flexible schedules.** Irregular work schedules and 30 hours weeks are becoming more popular.
- **Health insurance.** A good health insurance program is always a bonus, often a necessity.
- **Retirement plans.** Retirement or saving plans can help with employee retention.

Ask current employees about their benefits. They may have suggestions on how benefit packages can be improved.

Training

Training programs attract and retain employees, among other advantages.

- The company gains a more skilled worker, making the worker feel more valuable and productive.
- More skills can mean more money to the employee.
- Training can qualify a worker for a better position.
- A job that boasts training can bring motivated individuals to the company, who are willing to expand their field of expertise.

- Safety training demonstrates that the company cares about the workers.
- Management training reinforces the relationship between workers and supervisors.

Management

Effective management is another important factor to retain employees. A high turnover of workers is often a sign that the management needs improvement. Assess management's leadership. A good leader can delegate authority, allowing the employee to make decisions.

Often, it is the management's responsibility to give the workers incentive. Giving awards or setting realistic, yet challenging, goals can provide incentive. The idea is to make the workers feel like part of a team and valuable to the company. It is the responsibility of the management to show appreciation and recognition for a job well done.

The management also has a duty to resolve conflicts. By solving problems fairly, management makes the best decisions for the company and the workers. Here are some steps for solving problems

- Determine the facts.
- Identify problems.
- Develop solutions.
- Implement the best solution.
- Follow up (or follow through).

Communication

Communication is the single best way to assess the effectiveness of the retention program and company policies. Listen to the workers' complaints and complements. Ask employees who've been around awhile why they stay. Interview departing employees, to learn why they're leaving. If anyone should know how to keep workers, it's the workers themselves.

There are many ways to retain employees. Examine the company's benefit packages, training, and management to see what improvements can be made. Communicate with workers

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Ditch Basics

By Marisa DiBiaso, Project Assistant

Water is the most destructive force in roads. Ditches are the best way to carry water away from roads and to the water table. Ditches catch sediment carried off the road surface. This makes it imperative that road managers keep ditches in good condition. This article will cover the basics of good ditches: inspection, shape, slope, lining, vegetation, and maintenance and repair.

Inspection

The first step to ditch basics is to regularly clean and inspect ditches to keep them working properly. Use the following checklist to help identify needed maintenance.

- Is the ditch free of obstructions?
- Does the ditch have a clear outlet?
- Is the ditch deep enough to drain the subgrade and cut off subsurface water?
- Is the ditch broad enough?
- Is the slope uniform; that is, free of high or low points to minimize ponding?
- Could debris control devices be used?
- Is there any erosion?
- Is a lining needed/does the existing lining need repair?
- Is the slope adequate?

Shapes

Highway crews can construct and maintain ditches in three cross-section shapes: parabolic (round bottom), trapezoidal (flat bottom), or triangular (v-shaped bottom).

- **Parabolic**--This ditch is best in terms of long-term cost and efficiency. It has about the same capacity as the trapezoidal with less erosion. Sides are easily vegetated, further reducing erosion. It is probably the most difficult and expensive to construct.
- **Trapezoidal**--The flat bottom is easier to construct than the round bottom (parabolic) ditch. Compared to the triangular shape, the flat bottom slows water and reduces erosion. It takes more time and expense to construct, but requires less maintenance and greater capacity.

- **Triangular**--The v-shaped bottom ditch is the most easily constructed and requires the least roadside area. Of the three types, it requires more maintenance, has the lowest water-carrying capacity, and is the most susceptible to erosion.

Slope

The lengthwise slope affects the velocity of flow. If the slope is too steep, the swift water flow causes erosion and maintenance problems. If the slope is too flat, water stays in the ditch and can infiltrate the road base. Water in the base deteriorates the road from within. To ensure water flow, the minimum desired lengthwise slope is 1.0%. It should never be less than 0.5%. The maximum for an unlined ditch is 5%. If the slope exceeds 5%, the ditch should be lined as described below to prevent erosion.

Ditches with earth sides should have side slopes from 1:4 or 1:2 (drop to run). To calculate slopes, see page 9 for a copy of "Measuring and Calculating Slopes."

Lining

Erosion creates sediment that is deposited in ditches and water bodies. The greater the erosion, the more maintenance needed. Excessive erosion can weaken the sides of the road itself.

Ditch lining is the most common way to prevent erosion. Linings can be of natural soil, vegetative, or paved. The material used depends on flow velocity. The following table illustrates the types of lining appropriate for various flow velocities.

Engineers use similar tables when designing waterways. Road managers can also use it empirically. If a lined, well-maintained ditch is eroding, then crews should apply a lining for a higher flow. If problems persist, the agency should consult a qualified engineer.

Type of Lining	Maximum Flow Velocity (ft/sec)
<u>Natural Soil Linings</u>	
Rip-rap sides and bottoms	15-18
Clean gravel	6-7
Silty gravel	2-5
Clean sand	1-2
Silty sand, clay	2-3
Clayey sand, silt	3-4
<u>Vegetative Linings</u>	
Average turf, erosion resistant soil	4-5
Average turf, easily eroded soil	3-4
Dense turf, erosion resistant soil	6-8
Gravel bottom, brushy sides	4-5
Dense weeds	5-6
<u>Paved Linings</u>	
Gravel bottom, concrete sides	8-10
Mortared rip-rap	8-10
Concrete or Asphalt	18-20

Vegetation

In addition to minimizing erosion in low-flow ditches, vegetation removes roadway pollutants from runoff water. Here are a few guidelines to remember about vegetation in ditches.

- Vegetative linings should be established BEFORE erosion begins.
- Seed, mulch, and, where necessary, fiber mats should be applied immediately after any ditch maintenance or storm damage.
- Fertilizer often speeds growth, but excessive fertilization can cause groundwater and surface water quality problems.
- Mowing prevents weeds and woody vegetation. Mowing too close will reduce the erosion resistance of the lining.

Maintenance and Repair

Ditch repair should be included in all road repair projects. Road rehabilitation and reconstruction are expensive and some municipalities omit ditch repair to save money. Some ignore ditches in minor projects, too. Inadequate ditches will allow water to infiltrate the road base. This creates inadequate drainage resulting in faster road deterioration than if the time and money was spent on proper ditching.

Periodically maintain all ditches. Schedule routine maintenance every five years. Poorly shaped, sloped, or lined ditches require maintenance more often. To maintain ditches in a five-year cycle, divide municipal roads into five areas. Plan and schedule work on each section in a given year.

Planning begins with inspection. Inspection in the fall enables a clear view of ditch conditions, and allows planning over the winter. Planned maintenance should produce ditches with adequate shape, slope, and linings. The following guidelines should be considered:

- The most efficient and effective ditches have flat or round bottoms. A backhoe or excavator most easily constructs trapezoidal or parabolic shaped ditches. If using a grader, run the wheel the ditch bottom.
- Compact the ditch bottom.
- The lengthwise and side slopes should be uniform.
- Immediately seed, mulch, and use fiber mats to establish vegetation, or immediately apply other necessary lining.

Ditches should be an appropriate depth. To keep water out of the base material, the ditch bottom should be below the base course. A depth of 18 inches is usually sufficient, but it may have to be deeper if water flows in from hillsides. The distance between cross culverts or ditch outlets influence depth. Inspection will indicate if depth is adequate, or if culverts or outlets should be installed.

Ditches are often constructed too deep. Lining is more difficult, and the added depth increases ditch erosion. Deep ditches can create a safety hazard to motorists, especially on roads with narrow shoulders.

Ditches are necessary to carry water off and away from roads and must be regularly maintained. They must have the proper shape, slope, and lining. Water flow, road surface sediment, and growing vegetation attack these features.

Sources:

- Basics of a Good Road.* UNH Technology Transfer Center. Durham, NH. June 2000.
 "Ditch/Channel Construction & Maintenance." *A Series of Quick Guides for New Hampshire Towns.* UNH Technology Transfer Center. Durham, NH.
Drainage, Drainage, Drainage. UNH Technology Transfer Center. Durham NH. January 1996.

continued from page 1

Construction Activities. Operators of a construction site must obtain a permit if they disturb one or more acres of land. If a municipality is a new construction operator, it must obtain a permit. Construction activity does not include routine maintenance of roads and ditches.

GASB 34

The Governmental Accounting Standards Board (GASB) establishes financial accounting and reporting standards for state and local governments. Its Statement No. 34 requires local governments to change financial reporting within the next three years, some sooner. The changes will also cause many municipalities to review how they manage road and bridge maintenance.

GASB 34 requires reporting capital assets by historical costs and depreciation. It also offers an "asset management" alternative to reporting depreciation. Both depreciation and asset management are expensive, but the asset management approach yields better road and bridge maintenance.

MUTCD Millennium Edition

The Manual on Uniform Traffic Control Devices (MUTCD) defines the standards used by road managers nationwide to install and maintain traffic control devices on all streets and highways. The Federal Highway Administration (FHWA) has rewritten and reformatted the 1988 edition and its amendments. It also added some new rules. Its Millennium Edition becomes effective on January 17, 2001.

Part 5 describes specific sign types, sizes, and placement for low volume roads. It defines low volume roads as having less than 400 average daily traffic and lying outside built-up areas.

Retroreflective Street Name Signs

By amendment to the old MUTCD, new street name signs *must* be retroreflective. The MUTCD *requires* contrasting colors for legend and background, and *recommends* white on green. It also *recommends* an increase in letter size for local roads greater than 25 mph. This requires larger

sign blanks and more expensive hardware and posts. Existing signs must meet these requirements by January 9, 2012.

Center and Edge Line Marking

The *MUTCD Millennium Edition* includes the January 2000 final rule that required or recommended center and edge line marking on certain roads. The "shall" and "should" rules are based on average daily traffic and other factors. In the future, some center and edge marking will have to be retroreflective, as described in the next section.

Retroreflectivity Minimums for Traffic Signs and Pavement Markings

During the 1990s government and private agencies studied traffic sign and pavement marking retroreflectivity. An AASHTO Task Force has analyzed these studies and recommended minimum retroreflectivity levels to FHWA. Proposed amendments to the MUTCD are likely in early 2001.

These rules will require that sign and pavement marking reflectivity be maintained to minimum levels. Municipal officials should also document inspection and maintenance. The UNH T² Center's Sign Inventory Management System will help highway departments manage their signs and pavement markings.

Wetlands Permits

For over a decade, RSA-A:3 has required an excavating and dredging permit before working in "any bank, flat, marsh, or swamp in and adjacent to any waters of the state...." The NH Department of Environmental Services (NHDES) is charged with wetland permit administration, including enforcement. It has informed many cities and towns, and the UNH T² Center, that it will increase enforcement of municipal activities in 2001.

Available Information

Additional information is currently available for these regulations from the following sources.

Guidelines for Road Restrictions

As many road managers know, pavement damage is most likely to happen during thawing periods. Thawing occurs during late winter and early spring (mud season) and during warm weather periods in the mid-winter months. To prevent potholes and cracks from forming,

1. Apply truck load restrictions during the thawing (or critical) period, or
2. Change the pavement structure to prevent or reduce damage.

Due to budget constraints, many agencies have only the first alternative. This article will discuss regulations and a systematic method for posting roads.

RSA 231:191

When placing load limit restrictions, managers must keep RSA 231:191 in mind. It grants cities and towns the authority to establish "Maximum Weight Limits on Class IV, V, and VI Roads." It allows them to post roads to prevent unreasonable damage or extraordinary municipal maintenance expense. The law states that postings shall be located at all entrances to the highway. Any person violating the maximum weight limit without written permission shall be required to repair damage attributed to his/her vehicle.

The following general guidelines can be used when placing weight restrictions. These guidelines, based on a study performed by Washington State Transportation Center (WSTC), and Douglas Dowey's use in New Hampshire's District 3, provide criteria to help determine:

1. Where to apply load restrictions,
2. The amount of the load restriction, and
3. When to apply and remove load restrictions.

The Problem

Frost action in soils can cause damaging effects. One effect is the frost heave. Another is the loss of ability of the road base to support heavy traffic. Reduced base course strength occurs during thawing periods. Ice melts from the top down, *Road Business, Winter 2000, Vol. 15, No. 4*

trapping water until lower ice layers melt. Trapped water saturates the wearing and base course layers. This results in more moisture than the pavement was designed for and reduces the strength of the pavement and its supporting base.

Any lowering of base material strength or increase in the number of loads reduces the life of the pavement. Therefore, reducing loads when the strength of the pavement materials is reduced is a reasonable way to maintain the design life and general serviceability of the pavement.

Where to Apply Load Restrictions

In New Hampshire seasonal load limits are usually placed on roads carrying less than 5000 vehicles per day and subject to excessive damage during the thawing period. To select which pavements are candidates for load restrictions, agencies should consider surface thickness, the type of subgrade, and local experience relating to observed moisture and pavement distress.

Surface Thickness. Agencies should consider load restrictions if the pavement surface thickness is two inches or less.

Type of Subgrade. Pavements or unpaved roads with a fine-grained subgrade are candidates for load restrictions. Silts and clays, common in New Hampshire, are considered fine-grained soils.

Local Experience. Highway managers should use their own knowledge to determine load limit application. This includes determining the historical performance of the road (i.e. drainage, behavior during thaws, and the structural sufficiency of the road foundation). Roadway usage including frequency, size, and number of trips heavy vehicles make are important considerations. The availability of alternative routes, projected damage, and cost of repairs should also be examined.

Load Restriction Amount

The load reductions used by the agencies interviewed in the WSTC study suggest that reducing the load on individual axles (or tires) by

about 40 to 50 percent reduces pavement distress to an acceptable level.

The results generally showed that the more loads are reduced, the greater the increase in pavement life. As shown in Table 1, potential pavement life increases are dependent on load reduction. Thus, if the 44 percent load reduction level is used, this results in a potential improvement in pavement life of about 90 percent.

Pavement Load-Reduction (%)	Pavement Life Increases (%)
20	62
30	78
40	88
50	95

However, the necessary level of load reductions is not as simple as the table suggests. For example, many thin or generally weak pavement structures need higher levels of load reduction during the

thaw periods to prevent significant pavement damage. Unpaved roads, especially those with a poor subgrade, are even more susceptible to damage from heavy vehicles.

The WSTC study showed that, when using load restrictions the load reductions should be a minimum of 20 percent. Load reductions greater than 60 percent appear to be excessive for paved roads. The general national practice for paved roads was to use load reductions ranging from 40 to 50 percent. The WSTC study confirmed this. However, the study lacked the data to make conclusions about unpaved roads. In some situations, many unpaved roads, especially very old roads that were not designed for modern truck loads therefore greater reductions than recommended for paved roads might be warranted. Local experience becomes very important with unpaved roads.

Degree Days Log

The WSTC guidelines used to apply and remove load restrictions are based on air

Degree-Days Log

A	B	C	D	E	F	G	H	I	J
Month	Day	High Temp	Low Temp	Avg. Temp (C-D)/2	FDD 32:Avg.	Cumulative FDD	MDD Avg.-29	Cumulative MDD	Notes
December	1	38	28	33	-1		+7		
	2	34	26	30	+2		+1		
	3	37	30	30.5	-1.5		+1.5		
	4	35	25	30	+2	2	+1		BEGIN CFDD
	5	32	20	26	+6	8	-3		
	6	33	20	26.5	+6.5	14.5	-2.5		
	7	31	19	25	+7	21.5	-4		
February	29					717.0			
March	5	33	24	28.5	3.5	720.5	-0.5		MAX CFDD
	6	38	26	32	0	720.5	+3	3	BEGIN CMDD
	7	39	29	34	-2	718.5	+5	8	
	8	37	25	31	+1	719.5	+2	10	SHOULD POST THIN
	9	41	30	35.5	-3.5	716	+6.5	16.5	
	10	42	33	37.5			+8.5	25	SHOULD POST THICK
	11	43	33	38			+9	34	
	12	41	29	35			+6	40	MIXT POST THIN
	13	44	34	39			+10	50	MUST POST THICK
April	20							170.5	
	21	57	40	48.5			+19.5	190	
	22	57	49	54			+25	215	LIFT RESTRICTIONS

Pictured above is a sample Degree-Days Log used to determine when to apply and remove load limits. The following pages explain how to use this log.

temperature. Agencies can determine when to apply load limits by using a Degree-Days Log. A sample of this log is located below. Degree-Days are the number of degrees between some data and the average temperature for a particular day.

In order to use the Degree-Days Log the following factors must be calculated:

1. The average daily temperature.
2. Freezing Degree-Days (FDD), which is the difference between 32°F and the average daily temperature.
3. Melting Degree-Days (MDD), which is the difference between the average daily temperature and 29°F.

To use the Degree-Days Log, first determine the average temperature (this can be obtained from newspapers, government weather stations, private meteorologists, or businesses such as heating oil companies). Enter this number into Column E. If the average temperature is not available then use the sum of the high (Column C) and low temperature (Column D) divided by "2". Enter this value in Column E. The high and low temperature can be obtained in the same manner as the average temperature. If the agency starts this project after freezing occurs, the information is available historically using the same methods mentioned above.

To find the FDD, subtract the average temperature from 32°F. Enter this number in Column F. The summation of the FDD is a measure of the extent to which the road surface and base are subjected to below-freezing temperatures. The Cumulative Freezing Degree-Days (CFDD) in Column G is a running total of FFD.

To minimize errors, indicate positive and negative values for FDD. For an average temperature less than 32°F, the FDD is "+" and the value is added to the CFDD. Conversely, an average temperature greater than 32°F should be recorded with a "-" sign and its value is subtracted from the CFDD. Begin calculating CFDD only when there is a clear pattern of positive values for FDD, see December 4 in the sample log.

The running total of MDD is the Cumulative Melting Degree-Days (CMDD). The MDD for each day is calculated by subtracting 29°F from the average and entering it in Column H.

Be sure to indicate positive and negative values for MDD. When an average for a given day is more than 29°F, the MDD should be recorded with a "+" sign and the value is added to the CMDD from the prior day. Conversely, an average less than 29°F should be recorded with a "-" sign and the value is subtracted from the CMDD from the previous day.

CMDD recording should begin in the spring when there is a clear pattern of positive MDD and there is an average temperature above 29°F. This will indicate a period of consistent melting of the road base.

CMDD are used to determine when to establish load limits. CFDD and CMDD are used together to determine when to remove them. Their applications are described below. Since the data for all of the values must be collected for several months, it is easiest if the tracking is done using a spreadsheet program, which can be obtained from the UNH T² Center.

When to Apply Load Restrictions

Load restrictions should be posted at the start of the thawing period. For thin pavements this occurs when 10 CMDD accumulate (see March 8). For thick pavements, load restrictions should begin when they accumulate 25 CMDD (see March 10). These thresholds are estimates of when thawing will be sufficient to reduce pavement strength.

Load restriction must be posted after thin pavements accumulate a 40 CMDD (see March 12) and thick pavements accumulate 50 CMDD (see March 13) following the start of the thawing period. These thresholds are estimates of when thawing will reach approximately four inches into the base course.

Users should note in Column J of the Degree-Days Log when values in Column I indicate the road should and must be posted. They should also note road conditions in Column J.

It is recommended that users apply the "should" values during the initial years of application. Then, using the suggested documentation, they can determine the best thresholds for all or groups of their roads.

These criteria are best suited for use during the start of the spring thaw period, generally February through April. A different condition exist for mid-winter thawing cases. A higher base temperature for CMDD (such as 31°F) might better predict mid-winter road restrictions. However, the WSTC researchers did not develop a specific value. Local experience remains the best basis for mid-winter restrictions.

The temperature based Melting Degree-Days criteria are best applied to fine-grained soils, which are common in local roads in New Hampshire. The analysis performed in the study showed more consistent results for this soil type than for coarse-grained soils.

Placing Load Restrictions

When a highway agency sets a load restriction, it should notify the public through the press or letters. It should place temporary signs on all limited roadways.

It is recommended that agency staff individually notify contractors and loggers who frequently use the affected roads. Because the need for restriction happens quickly, this notification should be by telephone, fax, and/or email. If the agency has a policy for partial road use, such as early morning for certain roads, it should provide affected users with the procedures to apply the policy. The agency should also clearly establish exceptions to the policy; for example, transport of perishable or essential products such as milk or fuel oil.

The agency should keep a record of the effective dates of the posting and the removal for each road or a set of roads. Once it has applied load restrictions, it should monitor roadways to determine when it can remove restrictions. These records will document specific road behaviors, and be useful in applying the guidelines in future years.

Duration of Load Restrictions

The length of the load restriction period should approximate the time required to achieve complete thawing. The WSTC equation to estimate this time is

$$CMDD = 0.3 \cdot CFDD_{max}$$

In the example, the maximum CFDD of 717 occurred on February 29. Using the above equation, 0.3 times this value is 215. Therefore, in the sample Degree-Day log the load restriction should be lifted on April 22. Experience in New Hampshire, however, has indicated that the 0.3 multiplier varies due to a number of factors.

- Variations in road construction--pavement thicknesses, base thicknesses and materials, shoulders and ditches.
- Shaded areas that limit sunlight reaching the road surface.
- Elevation differences sufficient to influence average daily temperatures.
- Water remaining on roadsides due to residual snow and ice.

The suggested procedure is to make duration judgements based on experience during the initial years of applying the guidelines. Users should note the maximum CFDD in Column J. Users should also document road conditions relative to the CMDD for specific road types. After several years, a factor can be determined that applies to road types, and substituted for 0.3 in the above equation.

This article was adapted by Stefanie R. Fishman from *Guidelines for Spring Road Use Restrictions*, which can be obtained from the UNH T² Center.

Sources:

- Guidelines for Spring Road Use Restrictions*, University of New Hampshire Technology Transfer Center, Durham NH, October 2000.
- How Vehicle Loads Affect Pavement Performance*, Wisconsin Transportation Bulletin, Transportation Information Center, Madison WI, 2000.
- Maximum Weight Limits on Class IV, V, and VI Roads*, Title 20, Transportation Section 231:191
- Procedural Guidelines for Establishing Seasonal Load Limit Regulations*, New Hampshire Department of Transportation, March 2000.

- **NPDES II.**
 - *Road Business, Fall 2000*
 - EPA Fact Sheets and other information at www.epa.gov/owm/sw/phase2/
- **GASB 34.**
 - *Road Business, Summer 2000.*
 - www.gasb.org
 - www.gfoa.org
- **MUTCD Millennium Edition.**
 - Electronic copies are available at <http://mutcd.fhwa.dot.gov/>.
 - Hard copies are planned for the spring.
- **Retroreflective Street Name Signs .**
 - *Road Business, Spring 1999*
 - MUTCD Millennium Edition, Chapter 2D
- **Center and Edge Line Marking..**
 - *Road Business, Spring 2000*
 - MUTCD Millennium Edition, Part 3
- **Retroreflectivity minimums.**
 - Researchers have published and presented papers in transportation engineering professional journals and meetings.
 - The first information for a general audience will probably be the proposed rule-making.
- **Wetlands permits.**
 - RSA-A:3 can be found at <http://sudoc.nhsl.lib.nh.us/rsa/>
 - NHDES Fact Sheets are at <http://www.des.state.nh.us/wet.htm>

UNH T² Center Assistance

Publications. The UNH T² Center has past *Road Business* articles and hard copies of many website documents. They will obtain other information as it is published. Information requests can be by phone, fax, or email to UNH T² Center.

Newsletter. Future *Road Business* articles will cover new regulations as published. Articles will cover local practices and suggestions for compliance with rules.

Workshops. In 2001 the UNH T² Center plans workshops covering these regulations. In addition to describing them, instructors will describe management and technical solutions to reduce impacts.

continued from page 3

to find out exactly what makes them stay at a job. Keeping workers satisfied benefits both the worker and the municipality.

Sources:

- "Attracting & Retaining Employees: Here are Some New Ideas to Try." *Solutions for Business*. 1999. Advancement L.L.C. 06 Jun. 2000 <http://www.advapara.com/newslet/aprilmay/employ.html>
- Hendrix, Larry D. "Retention- Keeping Good Employees Productive and on the Job." *Tourism Educational Materials*. 19 Jun. 2000. Michigan State University Extension. 06 Jun. 2000 <http://www.msue.msu.edu/imp/modtd/33129605.html>
- Kennedy, Marilyn Moats. "It Looks like a Benefit, but for Whom?" *Milepost* Mar. 1999, 10-12.

continued from page 8

ferent divisions and the city's homepage. Information is easy to locate, including contact information.

The Somersworth Public Works Department also has an effective website. Visually, it is interesting to look at, boasting construction-related graphics and even animation. A small amount of animation can be pleasing if it loads quickly. The overall effect is practical and not overwhelming. Links are clearly defined, the background and text colors contrast well, and the Department's homepage fits on one screen. The page loaded quickly.

An effective website conveys vital information without overwhelming the visitor. Care should be taken when choosing fonts and backgrounds. A simple website is often more professional than an extravagant one.

Claremont's website:

www.claremontnh.com/dpw_index.htm

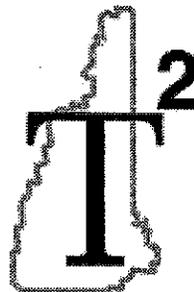
Somersworth's website: www.nh.ultranet.com/~sdpw/mission.htm

Useful design tips:

<http://www.geocities.com/featuredsites/tips.html>

Sources:

- "Website Design Tips". *The Best of Athens*. Aug. 28, 2000. <http://www.geocities.com/featuredsites/tips.html>.



Creating Effective Websites

By Marisa DiBiaso, Project Assistant

Public Works Departments can benefit by having a website. Websites are often the first place citizen's will look for vital information. This article will discuss tips for designing an effective website.

Information

The purpose of a website is to convey information. The following is a list of useful information to place on a public works webpage.

- Telephone number/e-mail lists,
- Recycling program,
- Solid waste removal,
- Hazardous waste disposal,
- Divisions: solid waste, waste water, drinking water, highway, administration, equipment, building/grounds,
- Job opportunities,
- Meetings,
- Road construction agenda,
- Plow policy,
- Link to town's homepage.

Keep It Simple

A simple page is more professional. Don't try to fit a lot of information on a single page as this creates confusion. Keep pages short, so visitors won't have to scroll down, and narrow so they should never have to use the horizontal scroll.

Avoid the temptation to make the page unique with animation and complex graphics that have big files. These files take more loading time. Visitors won't wait long for a page to load. Essentially, a simple page conveys information more effectively.

Links

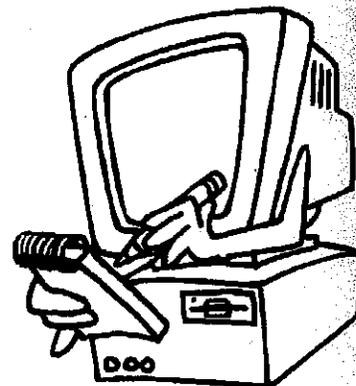
Many DPW's have links from their homepage to the departmental divisions and the town or city's homepage. Use links to keep the site more

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organized. When making other pages, keep the look of the webpages

consistent. Pages with a similar look assure visitors that they are still on the website. Links in the same location on all pages make

navigation easy for the users. Use templates for consistency when creating pages and to update them quickly.



Background

Choose the background for the website with care. Avoid glaring colors that are hard on the eyes. A background that is too complex distracts from the text. A photo or picture as a background makes the text difficult to read.

Text

Proper selection of text is key to a quality website. Here are some tips:

- **Size** – Text should be big enough to read, but not so big as to make the visitor scroll.
- **Color** – Use a color that contrasts the background, like a light colored text on a dark background or vice versa.
- **Font** – Try not to use more than 2 or 3 different font types. Unusual fonts won't be recognized by the computers of most visitors and will load with the computer's default font.

Sites

There are several Public Works websites that exemplify the mentioned tips. Claremont's website is neat and organized. There are links to dif-

continued on page 7

Publications

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. When 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, or by e-mail to t2.center@unh.edu

The following materials are available free of charge.

___ *UNH T² Center Publications and Video Catalog.*

___ *Administrative Rules for Safety and Health.* This publication from the New Hampshire Department of Labor describes the codes and rules for employee safety and health.

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

___ *Concrete in Practice Fact Sheets.* Includes 29 fact sheets covering various practices.

___ **NEW!** *Deicing, Anti-icing, and Chemical Alternatives.* Informative sheet discusses the benefits of anti-icing, deicing, prewetting, and liquid chemical alternatives.

___ **NEW!** *Load Limits Packet.* Includes legislation regarding load limits, Guidelines for Spring Road Use Restrictions, and a 3.5" disk containing an Excel spreadsheet for calculating Degree Days.

___ *Measuring and Calculating Slopes.* Informational sheet on how to measure a roadway slope. Recommended guidelines for roadway slopes are also included.

___ *NACE Action Guide: Tort Liability.* Explains liability and insurance for individuals, public agencies, and employees who are concerned with local roads and road care and maintenance. Also goes through the elements of a lawsuit.

___ *Road Salt and Water Quality.* Environmental Fact Sheet discusses road salt management, alternatives to road salt and the DOT Reduced Salt Pilot Program.

___ **NEW!** *Salt Storage Building Designs.* Section and plan views of a post and truss salt storage facility.

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

___ *Snow Disposal Guidelines.* NHDES Environmental Fact Sheet; flyer gives recommended guidelines for snow disposal.

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

___ **NEW!** *Statewide Travel Forecasting.* This FHWA book describes methods and techniques of statewide travel forecasting.

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: _____

Videos

University of New Hampshire Technology Transfer Center
Road Business, Winter 2000, Vol. 15, No.4

The following videos are available from the UNH T² Center 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), 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>. Or email t2.center@unh.edu

— **M-281, Anti-Icing & Deicing**, 30 min. This informative video discusses the benefits and differences between anti-icing and deicing methods. Basic chemistry of deicing chemicals is explained. Making brine, pre-wetting and snow fences are also covered.

— **M-283, Using Winter Weather Resources**, 35 min. This video explains how to use weather information to make decisions during winter operations. The video covers weather resources such as RWIS, DTN and local forecast information. Although Midwest weather and terrain is represented, there is detail describing basic weather terminology.

— **ST-256, Torts are Everybody's Business**, 5 min. Tort suits are lawsuits brought against a Department of Transportation because of road problems. This video answers many questions about what torts are and how they can be prevented. PA DOT

— **PA-232, Inspecting Unsurfaced Roads**, 8 min. This video describes one of the first steps in the Unsurfaced Road Management System--inspection. It briefly explains what defects to look for in an unsurfaced road and how to measure them. USA CRREL

— **DC-251, The Importance of Road Drainage**, 19 min. The basis for this film is that if you don't drain water from roads, nature will drain it for you. Describes surface and subsurface drainage, drainage systems, and procedures for their inspection and repair. FHWA

— **M-284, Preventive Maintenance: Project Selection**, 30 min. The principle of this video is to apply the *right* treatment to the *right* road at the *right* time. It explains the advantages of preventive maintenance and the importance of preserving the life of the road, rather than restoring it.

— **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. PA DOT

— **ST-219, New Directions in Sign Management**, 17min. Presents the problems that create the need for a sign management system. Highlights the main points of a management program. ATSSA

— **Video Catalog.**

Place
Stamp
Here

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

Milestones:

Jim Dicey had been promoted to Director of Public Works in Troy.

Melodie Esterberg was promoted from City Engineer to Public Works Director in Rochester.

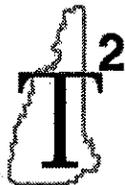
Master Road Scholar, *Walter Kiblin*, has left the town of New Boston and is working in Bennington.

Carl Knapp has been promoted to Director of Public Works in Weare. Previously he was the Road Agent.

Tom Plourde is the new Director of Public Works in Frankestown. Previously he was the Road Agent in Mont Vernon.

Barry Wante, instructor of Incident Command System, has been promoted to Police Chief in Keene.

Tom Willis has joined the city of Rochester as their City Engineer.



Websites:

There are many helpful websites for public works employees. If you have others that your colleagues could benefit from, send the urls to t2.center@unh.edu. We'll publish the site and your name in *Road Business*. (No commercial sites please).

UNH T² Center: <http://www.t2.unh.edu>

Federal Highway Office of Asset Management
<http://www.fhwa.dot.gov/infrastructure/asstmgmt/>
and
<http://www.fhwa.dot.gov/infrastructure/asstmgmt/amprimer.pdf>

Earth retaining walls:
<http://www.cerf.org/hitec/eval/ongoing/ers.htm>

Nonpoint Source Fact Sheets:
<http://www.epa.gov/owow/nps/facts/>

Recycled Materials Resource Center at UNH
<http://www.rmrc.unh.edu>

Stormwater Management Best Practices
<http://www.cerf.org/EVTEC/EVAL/WSDOT.HTM>

Article about Levels of Service in Winter Maintenance
<http://www.saltinstitute.org/news00-37.html>

What's new on www.t2.unh.edu?

The UNH T² website is constantly changing, check the site often to see what new information is available.

1. An updateable calendar where anyone can add meetings or workshops.
2. Classes, flyers, and class directions are updated often.
3. Sample public works policies on snow & ice control and training & documentation. The policies were developed by the Best Practices Committee.
4. Publications & Videos are updated regularly
5. Newsletters are updated quarterly.
6. Mutual Aid inventories and contact lists are updated as changes occur.
7. SIMS and RSMS are updated as changes occur.
8. Job postings are updated as office staff is notified.
9. New links are added and out-dated are links removed as often as office staff is notified.

Road Business

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Fax: 603-862-2364
t2.center@unh.edu
<http://www.t2.unh.edu>

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Permit No. 2
Durham NH

Calendar

*Planned UNH T² Center workshops
Spring of 2001*

*For additional information or registrations,
call the UNH T² Center or check the web-site.*

Basics of a Good Road

1 Location

Crack Sealing Project Planning

2 Locations

DrainMS

1 Location

Drainage, Drainage, Drainage

2 Locations

Incident Command System

1 Location

Gravel Road Maintenance

2 Locations

Managing Run Off

2 Locations

Municipal Garage Management

2 Locations

Rehabilitation Project Planning

2 Locations

RSMS

1 Location

SIMS

1 Location

Surface Treatments

1 Location

Tort Liability and Risk Management

1 Location

Winter Operations & Load Limits

3 Locations

Workzone Traffic Control

2 Locations