

Country Roads & City Streets

WV Local Technical Assistance Program

Winter 2005

College of Engineering & Mineral Resources

Vol. 20 No.4



PEDESTRIAN SUCCESS STORIES IN GREENBRIER COUNTY

By: Ron Eck



Entrance to *Quinwood's Knoll-n-Stroll Trail*

Public health experts generally agree that the United States is facing an epidemic of physical inactivity. While perhaps the most widely publicized result of physical inactivity has been the increased prevalence of obesity, there have been corresponding increases in cardiovascular diseases, diabetes, hypertension and related complications. The Appalachian region has consistently higher rates of physical inactivity than those of the United States as a whole.

West Virginia has even higher prevalence rates than the Appalachian region. Data indicate that over 50 percent of West Virginians are not meeting the recommended guidelines of participating in moderate physical activity for at least 30 minutes most days of the week. Walking is one easy way to engage in moderate physical activity. It has been said more people would walk if there were safe and convenient places to do so. In many West

Virginia communities, finding such places to walk can be a challenge.

Two Greenbrier County communities, Quinwood and Ronceverte, are success stories illustrating what communities can accomplish in terms of providing opportunities for walking. Each community's efforts are described briefly below. While different in their approaches and facilities, the common elements in each include ingenuity, a team effort, strong commitment on the part of those involved and perseverance. We commend both communities for their good work.

Quinwood is a community of about 450 residents in western Greenbrier County. In the late 1950's, Gino McKenzie donated over 50 acres of land to the town. Led by a retired health professional who returned to the town in which she grew up, the town was successful in obtaining physical activity funds from the Benedum



Aerial View of the Knoll-n-Stroll Trail in Quinwood



IN THIS ISSUE

Pages 1, 2, & 3
Pedestrian Success Stories in Greenbrier County

Pages 4, 5, & 6
The Truth About Sand and Salt for Winter Maintenance

Page 7
Interactive CD-Roms Available

Country Roads and City Streets is a quarterly publication of the West Virginia Local Technical Assistance Program (WV LTAP). The purpose of this newsletter is to provide information that is beneficial to highway construction and maintenance personnel.

The material and opinions contained in this newsletter are those of the West Virginia Local Technical Assistance Program, and do not necessarily reflect the views of the Federal Highway Administration or the WV Department of Transportation. Material contained in *Country Roads and City Streets* is a combination of original and borrowed material. Every effort has been made to ensure the integrity and accuracy of this material. However, the West Virginia LTAP does not assume responsibility for any incorrect material.



Foundation for a Winning Weighs Program, a colorectal cancer prevention program. The funds were also used for classes on prevention. The Benedum grant opened doors to other resources and has helped to pull people together, not only within the town itself but also with surrounding communities.

One of the efforts was the Knoll 'n Stroll trail, a 1.2-mile loop trail, built on the donated land, that circles a hill above the municipal park. A resident donated the use of a bulldozer and created the road-bed by grading an old logging road. Benedum funds were used to purchase the surfacing material. The surface consists of crusher run stone base with a sand surface. The area in and around the trail encompasses about 11 acres. There are two spurs off of the main trail that meet at a picnic shelter. Plans are in the works for additional spurs. Four benches will be installed at different locations along the trail. After 4 years and over 8,000 hours of volunteer effort, the trail opened in spring 2005. Residents report that the trail is being used from dawn to dusk. Interestingly, several women have expressed reservations about walking alone on the trail due to bears in the area. To counter these concerns, a walking group is being formed. In conjunction with the Health Sciences and Technology Academy (HSTA) club at Greenbrier West High School and WVU, a trail counter has been installed on the trail to quantify trail usage.

On the eastern side of Greenbrier County, the Town of Ronceverte has been working on several fronts to provide facilities for walking and physical activity. In November 2003, the WVU Community Design Team visited Ronceverte. One of the recommendations was to provide a walking trail in Island Park, a 20-acre park that includes a swimming pool, ball fields, amphitheater, playground equipment and picnic shelter. The Town Administrator at the time, Doug Hylton, obtained grant funding to build an asphalt walking track

adjacent to the pool. In addition, an asphalt surface trail was constructed to connect destinations within the park. With these enhancements, the park has become much more walkable.

A *Transportation Enhancements* grant was used to fund sidewalk construction along West Edgar Avenue, a residential neighborhood. Available grant funds were significantly less than the bids received for the project. However, where there is a will, there is a way. Doug and his brother-in-law personally placed 1300 linear feet of concrete sidewalk. Grant funds were used to purchase materials and pedestrian scale street lighting. The LTAP Center provided technical expertise relative to sidewalk design standards. The community continues to improve its condition with recent approval of a \$3.7 million water grant that will replace the town's aged water infrastructure and at the same time provide some new sidewalks. By ensuring walkability while building on infrastructure and downtown redevelopment, the town has also obtained grants to re-do their Main Street, re-landscape the downtown and begin construction on a three-mile-long recreation trail along a former rail bed. Most recently, the town completed the reconstruction of the entrance to the town's Riverview Cemetery. By replacing the 65 steps and a 100 foot section of sidewalk leading to the cemetery, Ronceverte has added, with little cost, the 30-acre cemetery to their walkable community program, tying in the eastern end of town to their development projects while ensuring historic preservation, tourism, and physical wellness. Each community enhancement is carefully built upon another.

Greenbrier County Photos



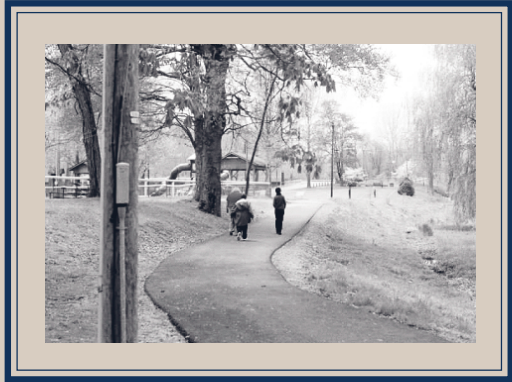
*View Along Quinwood's
Knoll-n-Stroll Trail*



*Wellness Trail in
Ronceverte's Island Park.*



*New Sidewalk and Street
Lights on West Edgar
Avenue in Ronceverte*



*Connecting Trail in
Ronceverte's Island Park*

CENTER STAFF & CONTACT INFORMATION

WV LTAP

West Virginia University

PO Box 6103

Rm. 651 and 653-B

Morgantown, WV 26506-6103

Phone: (304) 293-3031 x 2612

Fax: (304) 293-7109

Staff

Dr. Ronald Eck, P.E.

Director

(304) 293-3031 x 2627

ronald.eck@mail.wvu.edu

Michael Blankenship, P.E.

Program Manager

(304) 293-3031 x 2629

michael.blankenship@mail.wvu.edu

Kim Carr

Program Coordinator

(304) 293-3031 x 2612

kim.carr@mail.wvu.edu

Brad DiCola

Technical Assistant

(304) 293-3031 x 2662

bradley.dicola@mail.wvu.edu

Emily Walters

Public Relations Intern

(304) 293-3031 x 2662

Sherry Williams

Program Assistant

(304) 293-3031 ext. 2662

Sandy Wotring

Administrative Assistant

(304) 293-3031 ext. 2630

Bill Wyant

Senior Volunteer

wwyant@hsc.wvu.edu

THE TRUTH ABOUT SAND AND SALT FOR WINTER MAINTENANCE

By: *Donald Walker, P.E.*

Donald Walker is Professor Emeritus at the University of Wisconsin-Madison and the Director of the Wisconsin Transportation Information Center/LTAP

The truth is...that mixing sand with salt actually reduces the salt's melting ability.

The truth is...that although abrasives play an important role in snow and ice control operations throughout the U.S., they are often wasted.

Research and practice clearly indicate that abrasives can improve traction on icy or snow-covered roads. They can be a very effective treatment in environmental and temperature conditions where deicing chemicals don't work. In addition, abrasives can be used to maintain safety at hills, curves and intersections on unpaved and low volume roads. Using chemicals on unpaved roads is ineffective and damages the surface, while many low volume roads do not merit the level of service provided by chemicals.

Unfortunately, abrasives are poorly understood and often misused, resulting in wasted material and money, and reduced safety for the traveling public. The following discussion is intended to help agency managers think about their abrasive policies and practices.



Abrasives are being loaded into a truck. Photo by Emily Walters from WV LTAP's 2005 Snow and Ice Control Workshop.

How they work

First, let's be clear about how salt and abrasives work.

Salt melts snow and ice. The best uses of salt and other deicing chemicals are to prevent ice from bonding to the pavement and to aid in removing it from the pavement once it is stuck there.

Plowing, when it can be done, is by far the best winter maintenance tool. Nothing is more effective than plowing to remove snow and slush from the pavement. However, many storm conditions develop that make it difficult or impossible to prevent snow pack or ice from developing on the pavement. This is where a deicing chemical is needed if you want to quickly restore clear pavement conditions. Salt melts snow and ice so we can plow the pavement clear.

What do abrasives do? By increasing friction they provide better traction and control for vehicles. Abrasives do not melt snow and ice. An inert piece of stone or slag will not melt anything!

Furthermore, for an abrasive to actually improve traction it must remain

between the tire and the ice. It does no good when it is buried in the snow or is blown off the pavement. Research has shown it is difficult to maintain good traction with abrasives when there is any significant traffic. Vehicle traffic tends to work the abrasive into the snow and/or pick it up in the tires and blow it off the pavement. A paper by Professor

Wilford Nixon has a good discussion of the research relating to abrasives testing (1).

Do abrasives have much real value in promoting safety? Yes, because abrasives are often the only reasonable option we may have. Low temperatures or freezing rain conditions, for example, limit the effectiveness of chemicals. However, abrasives are far from efficient as a method for snow and ice control. Many agencies follow long-time practices — especially in using only a salt/abrasive mix — that don't reflect the reality of how these materials work.

Mixing salt with abrasives

First, it is true that if you are going to use abrasives in winter, you need to add some salt. All sand piles have moisture, even those in desert environments. When this moisture freezes, lumps form and that interferes with distribution.

How much salt is needed? Just enough to keep the moisture from freezing. Practice has shown that 50-100 pounds of salt per cubic yard of abrasive is sufficient. This is about 2%-4% by weight. If your abrasive is very wet, you are in a very cold environment, or your stockpile is uncovered, you may find it necessary to use 175 pounds (7%). Also, if the abrasive is dirty, the larger volume of fines will tend to collect more moisture and therefore it takes more salt to prevent freezing.

Many states regulate salt and sand storage to protect surface and ground water. In Wisconsin, any entity

storing more than 1000 pounds of bulk road salt must pile it on an impermeable pad and keep it securely covered year round. A sand mixture that is 5% salt by weight or less is exempt. Any mixture with more salt must comply.

Uncovered abrasives piles with salt are also susceptible to leaching with any significant amount of snow or rain during the winter. One study showed that 10 inches of precipitation leached out 50% of the salt. While it is difficult to keep salt/sand piles covered, doing so — with a tarp or preferably a building — would save salt and reduce leaching into the environment.

Many agencies have a tradition of mixing more than 5% salt in their abrasives. Blends of 10% to 50% can be found in use in nearly every state in the U.S. Why? The thinking goes: “If salt works well under some conditions and abrasives are helpful in others, why not mix them together for the best results?” In fact, salt and abrasives do different things and can actually oppose each other!

The following sections explore some of the common explanations for these practices and their actual effectiveness in providing safety and producing bare pavements.

1. Anchor it to the road

A common belief is that salt will anchor the sand, and/or sand will anchor the salt to the road. Actually, sand and dry salt particles are separate and are not in any way tied or anchored together. As long as they remain dry, wind and traffic will quickly move both of them off the pavement.

Some salt may become brine from moisture in the sand or from melting ice on the pavement. In theory, a small amount of moisture will help embed the sand in the surface of the snow and then refreeze to create a sandpaper effect. This is a nice picture, and it can be done, but not very often.

Research on friction on pavements treated with abrasives shows that there is little benefit when traffic is present. In general, traffic quickly carries or blows all materials off the road. If there is very much melting, it is not likely that the abrasive will float and stay on the surface. More likely it will settle, or be pounded by traffic, down into the melting snow mixture. Now it is no longer “anchored” to the surface and provides little value for traffic safety.

2. Sand will provide safety until the salt has a chance to work

People often use this approach when temperatures are too cold for salt to work. The object is to maintain traction until it warms up and the salt can go to work. This is true IF the sand stays in place and IF the salt also stays in place until it can do its job of melting. The challenge is to keep the dry salt on the road. With any volume of traffic it will either be blown off the surface or mixed too far down into the snow to be effective.

If crews do any plowing before the temperature rises, this approach is a complete waste. The salt will be plowed off before it can possibly work. Any salt that remains may turn to brine and melt some of the ice on the road. This liquid on top of the ice actually makes the surface more slippery. Then, when the air temperature remains low it will likely refreeze the water, making the road surface ice covered. This leads to more salt applications and the process is repeated, wasting materials and not improving traffic safety very much.

3. We save salt by mixing it with abrasives

Bulk salt is more costly than bulk abrasives, so the idea is to “extend” the salt by mixing it with abrasives. However, if you are using a blend to achieve clear pavements, then salt and plowing are doing the work. Very likely most of the abrasive is wasted because

WV LTAP ADVISORY BOARD

Robert Amtower
WVDOT
Burlington, WV

Kevin Burgess
FHWA
Charleston, WV

Michael DeMary
Public Works Director
Fairmont, WV

Bob Gordon
Region 9 Planning and
Development Council
Martinsburg, WV

Kathy Holtsclaw
WVDOT
Charleston, WV

Terry Hough
City Engineer &
Public Works Director
Morgantown, WV

Jack Justice
FHWA
Charleston, WV

Gary Lanham
WVDOT
Charleston, WV

Marvin Murphy
WVDOT
Charleston, WV

Pat Parsons
Asphalt Pavement Assoc.
of West Virginia
Charleston, WV

Buddy Shreve
Public Works Director
Philippi, WV

Donald Williams
WVDOT
Clarksburg, WV

Gary Winter
WV Governor’s Highway
Safety Program
Charleston, WV

blending salt and abrasives does not actually produce a different material. In fact, research has also shown that mixing sand with salt actually reduces the salt's melting ability. One study documents over 20% loss of ice melting capacity when salt is mixed with sand (2).

Spreading rates also differ between straight salt and an abrasives/salt mixture. Straight salt is usually spread at 100 - 300 pounds per lane mile. Spread rates for mixtures often run over 500 pounds per lane mile. If you are using a 3 to 1 blend by volume (sand to salt), the blend by weight is actually 20% salt (sand weight of 2700 lb/cu. yd. and salt weight of 2000 lb/cu. yd.). Spreading 500 pounds of this mixture per lane mile actually applies 100 pounds of salt per lane mile. A 50-50 blend by volume means that the salt is 43% by weight, giving a salt spread rate of 212 pounds. Because of the differences in spread rates, it may cost about the same or even more to spread an abrasive/salt mixture. Studies often show that abrasive/salt mixtures cost more than straight salt especially if any clean-up is required.

4. Sand is visible, and the public expects it

You bet! It is nice to spread something the public can see so they stop calling and complaining. You can add law enforcement to the group that likes to see sand on the road. Very likely our own operators and managers also feel the same way. Sand becomes a security blanket for everybody.

If the abrasive is really working, this approach is fine. However, there is a growing list of negative environmental concerns with abrasives. These include: air pollution from the fines, stream bed pollution impacting fish reproduction, and corrosion from the salt included with the sand. In addition,

problems with claims for windshield damage and chipped paint make the use of abrasives a source of public criticism.

Spreading abrasives mostly to be seen is very costly and not good for the environment. You are paying a high price to have sand just to look at. I doubt the public would be very supportive if they understood the situation.

5. We do not want the complication and expense of using more than one type of material

Yes, it takes more effort and training to use both straight salt and abrasives with 2%-4% salt. However, it will not cost more in the long run. In fact agencies are making this change all over the country at the state and local level. A realistic review of your total costs for spreading and cleaning up abrasives will likely show the benefits. Change is not easy, but many agencies feel it is worth the effort to make this improvement.

SUMMARY

In this day and age of new and exotic chemicals, anti-icing, RWIS, and GPS, is there a place for good old sand? Yes. If, however, your agency is using a high percentage blend of salt with abrasives, you do have an opportunity to review your practice and seek improvements.

An abrasive mixed with enough salt to freeze-proof it, has a place on unpaved roads, low volume roads, and in conditions where chemicals can not work. Straight salt can both prevent ice from bonding to the pavement and create slush which allows plows to clear the road. This mix of strategies will serve most agencies well into the future.

We owe the public nothing less.



*Abrasives have been pre-loaded on this truck.
Photo by Emily Walters from WV LTAP's 2005
Snow and Ice Control Workshop.*

References

- 1. The Use Of Abrasives In Winter Maintenance Final Report of Project TR 434**, Wilfred A. Nixon, IHR Technical Report No. 416, Iowa Institute of Hydraulic Research, University of Iowa, March 2001.
- 2. De-icing Chemicals and Abrasives: State of the Art**, J. Hode Keyser, Highway Research Record 425, p. 36-51 (1973).

This article appeared in the Summer 2005 issue of *Salt and Highway Deicing*, the Salt Institute's newsletter.

This article also appeared in the Fall 2005 issue of *CrossRoads*, a quarterly newsletter published by the Wisconsin LTAP.

Thank you to Don Walker and the Wisconsin LTAP for granting permission to reprint this article.

NOTE TO READERS:

The WV LTAP staff realize that this article specifically mentions the use of sand as an abrasive, and in WV, sand is not often used. However, the items discussed in this article can be applied to abrasives in general - not just sand.

INTERACTIVE CD-ROMS AVAILABLE

By: *Bradley DiCola*

ANALYTICAL TOOLS FOR ASSET MANAGEMENT

The LTAP Center has a new CD-ROM and accompanying booklet entitled *Analytical Tools for Asset Management* featuring a pair of tools for trade-off analysis of infrastructure assets. Published by the National Cooperative Highway Research Program, these materials are intended for use by transportation departments. The CD-ROM serves to help these agencies make decisions regarding the investment possibilities and proper management of their infrastructure assets. This resource is based upon a study that revealed most asset management programs are not maximizing their potential. This

tool is designed to be integrated with current systems in place and used as an aide in analyzing investment opportunities and decisions.

The three functional areas that this software is geared towards are: 1) policy, planning, and program development, 2) engineering (construction, operations, and maintenance), and 3) budget and finance. Please contact Brad at the WV LTAP if you are interested in borrowing this material or have additional questions. Brad can be reached via email at Bradley.DiCola@mail.wvu.edu or by calling 304-293-3031 x 2662.

ANTI-ICING / RWIS TRAINING CD

AASHTO has developed a CD-ROM to help organizations deal with their snow and ice problems during the winter season. The program covers how to best utilize the information provided in a RWIS, or Road Weather Information System, to choose the best method of snow and ice removal. The program is set up in several units such as to allow the user the freedom to study at their own pace. The program also saves where the user has completed up to, allowing for picking up and leaving off in studying as the user pleases.

The format of each of the first 6 units is the same, beginning each unit with a pre-quiz to determine the amount of knowledge the user already has. The program then goes into the course content, presenting knowledge on a variety of topics and methods in winter road maintenance. At the end of each section, there is another quiz on which the user must mark a certain amount right to move on to the next section. The course closes with a final unit where the user can use the information learned in the program to solve a series of real winter maintenance problems and determine the correct treatment method. This course can also be taught

by using a laptop and projection unit and walking students through the course material.

The program is fairly easy to use, with an extensive opening presentation that is available to walk you through use of the program and the various functions available on the main screen. There are options to listen to the presenter or use the text version, and after listening to the voice of the presenter for some duration of time, the text option was the preferred, as well as allowing the user to move through the program much quicker. There is an option to take typed notes as the presentation moves forward, which can prove useful in remembering key concepts.

Overall, the program is very simple to use, with little prior knowledge required. The program provided some good background knowledge for the complete novice, while also providing information that the experienced winter maintenance worker would find useful, practical, and applicable. No prior experience or knowledge is required in any of the areas that the program covers. To borrow this CD, contact Brad at 304-293-3031 x 2662 or at Bradley.DiCola@mail.wvu.edu.

The West Virginia LTAP Center is a part of the nationwide Local Technical Assistance Program (LTAP), which is funded by the Federal Highway Administration. The Center also receives funding from the West Virginia Department of Transportation.

Mission:

The mission of the West Virginia LTAP is to foster a safe and efficient transportation system. The LTAP Center's mandate is to improve the transportation system by improving the professional skills of those involved in highway design, construction, and maintenance, and to act as a resource for them by keeping up-to-date training libraries and constantly seeking/developing new technologies.

Overall Goal:

The Center's overall goal is to improve the transportation system by focusing on professional training, technical assistance, and information dissemination.

To achieve this goal, the WV LTAP does the following:

- Provides on-site training and demonstrations
- Publishes a quarterly newsletter
- Maintains a video, CD-Rom, and publications library
- Provides technical assistance via mail, telephone, fax, email, or site visits.



*Season's Greetings
& Best Wishes for
the New Year.*

*From:
Ron, Mike, Kim
Brad, Sherry, & Emily*

*Blackwater Falls, Davis WV
Photo by Robert Kane*

West Virginia Local Technical Assistance Program
West Virginia University
College of Engineering and Mineral Resources
Department of Civil and Environmental Engineering
PO Box 6103
Morgantown, WV 26506-6103

Non-Profit Organization
U.S. Postage Paid
Morgantown, WV
Permit No. 34

Change Service Requested

Mark your calendar for
the 2006 Roadway
Management Conference,
being held March 20 - 22,
2006 in Ocean City,
Maryland.

