Local Technical Assistance Program

The Bridge

Linking Transportation Research and Practice

Vol. 22, No. 4 May 2009

High-tech winter maintenance management

State-of-the-art tracking system yields much more than just vehicle location

By John Ryynanen, Editor, Michigan's LTAP

William Pollard, chairman of the board and former CEO of the ServiceMaster Corp., once said, "Information is a source of learning, but unless it is organized, processed, and available to the right people in a format for decision making, it is a burden, not a benefit."

Automatic Vehicle Location (AVL) systems collect, organize and communicate information about fleets of vehicles. When designed and implemented appropriately, AVL systems provide rich opportunities for understanding and learning, so good decisions can be made.

Doing More With Less

Brian Wendling, managing director of the Saginaw County Road Commission (SCRC), began researching AVL systems over four years ago. His interest was fueled by a desire to enhance his agency's capacity to understand and manage their fleet of plow trucks. When SCRC was forced to cut 40% of their supervisory staff in 2005, Wendling's desire suddenly became a need. "We had been looking into an AVL system for the enhanced operational oversight it would provide," Wendling explained. "With a reduced staff, it quickly became clear that we needed a system in order to maintain our level of service. The amount of information to manage is especially overwhelming in the winter when we have weather variables, routes to coordinate and material usage to track."

This winter marks the first for the Road Commission's fully-functional AVL system. The system, which uses off-the-shelf electronics components and a software package customized for SCRC use, tracks and communicates the status of 70 winter maintenance vehicles. "The system really shines in the heat of

battle during a snow event," Wendling said. "When the snow is coming down, and we have dozens of plows out, it's very difficult to piece together an accurate picture of what's going on. With our AVL system, everything is tracked and displayed all at once as it happens, and it's easy to understand."

Starting Small

To get where they are today, the SCRC began with a pilot project in the fall of 2007. The project involved outfitting four trucks with instrumentation, and working with a software vendor, Compass-Com Software Corp. of Centennial, Colorado, to customize and implement the software package. Instrumentation for the trucks includes four basic components:

- **GPS unit** for tracking vehicle position and for communicating with the software
- **Cellular antenna** for transmitting data
- **Hydraulic pressure switch** for indicating the status (on or off) of the salt spreader
- **Magnetic switch** for indicating the position (up or down) of the under body scraper

The Big Picture

The data that each vehicle generates is transmitted via a cellular link to the software, which is located on a file server in the

See *AVL System* on Page 4

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Michigan Tech Transportation Institute

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I have an idea . . .

My wife, kids and I have begun to prepare for gardening season. Our garden is nothing serious – just a couple hundred square feet of tilled black dirt in our back yard. Our "mud room," however, looks very serious. It's littered with bags of dirt, packs of seeds, stacks of 10-ounce Styrofoam® cups, and various other tools of the family gardening trade. The room smells earthy, like a greenhouse. Standing in it, you know it's not just an idle room. Something big is happening there.

As a family, we haven't been gardening long. Early on, we didn't spend much time preparing – we just pushed a few seeds in the ground, watered occasionally, and hoped for the best. As you can imagine, "the best" was pretty pitiful.

In the few years since, we've learned a lot about gardening. The biggest lesson: the size of the harvest in the fall is proportional to the amount of time we spend working all summer (we've also learned a bit about soccer balls and tomato plants, but that's material for a different column). Basically, we've learned how to create an environment that enables tiny, weightless seeds – useless by themselves – to germinate and grow into crunchy carrots, juicy tomatoes, heavy pumpkins, and many other incredible pieces of delicious food.

A seed sprouts only if placed in the right kind of soil and under the right combination of conditions. It grows to maturity only with the right amount of nutrients, water, temperature and light.

Ideas are like that. By itself, an idea isn't worth very much. But when planted in a healthy organizational environment, with the right combination of planning, preparation, attention to detail, and time, an idea can turn into something big, significant and valuable.

The big story in this issue is about how the Saginaw County Road Commission (SCRC) carefully nurtured an idea about vehicle tracking four years ago into a leading-edge automatic vehicle location (AVL) system today. And for SCRC, the main part of the growing season has just kicked in; they're still fertilizing, watering and expecting more to come from this single seed. Walking around the SCRC facilities, you can tell it's not an idle place. Big things are happening there.

Big things are also continuing for the Michigan Transportation Asset Management Council. Brian Sanada is the new coordinator for the council. You can learn more about Brian on the next page. The back page lists events and resources that are helping to sustain the asset management effort in Michigan.

Before I was born, the idea of a "forgiving roadside" was planted among transportation agencies in the U.S. Beginning on page six, you can read a dramatic first-hand account of how this idea is still bearing valuable fruit almost 50 years later.

Good luck with the upcoming growing season!

The Bridge

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LTAP Steering Committee

The Local Technical Assistance Program (LTAP) is a nationwide effort financed by the Federal Highway Administration and individual state departments of transportation. It intends to bridge the gap between research and practice by translating the latest state-of-the-art technology in roads, bridges, and public transportation into terms understood by local and county highway or transportation personnel.

The LTAP Steering Committee makes recommendations on, and evaluations of, the activities of the Local Technical Assistance Program based on discussions at the Technology Transfer Interchange and Advisory Committee meeting. This meeting is held annually and is open to all rural and urban agencies, and individuals concerned with the transfer of transportation technology in Michigan.

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Brian Sanada: The new point of contact for asset management in Michigan

Brian Sanada is the new asset management coordinator for the Michigan Transportation Asset Management Council. In addition to being the point of contact for all agencies dealing with asset management, he also serves as a liaison between agencies and the council, and he coordinates PASER data collection. Here's an excerpt from a recent phone and email conversation with Brian, during which he described his interests and the career path that led to him to his new position.

The Bridge: Are you originally from Michigan?

Brian Sanada: Yes. I grew up in Caro, Michigan and graduated from Caro High School in 1997.

Bridge: Where did you go to college?

Brian: I attended Delta College and Eastern Michigan University. I graduated from EMU in 2004 with a Bachelors Degree in Urban and Regional Planning.

Bridge: Since then?

Brian: Right out of college I went to work for the Northeast Michigan Council of Governments [NEMCOG] as a community and transportation planner. Then I took a job as a planner with the City of Lapeer, which is about 20 miles east of Flint. After that, I left Michigan for a short time to work for GreenbergFarrow in Chicago.

Bridge: What inspired you to become a community and transportation planner?

Brian: I like the idea of bringing people together from different walks of life to meet an end result. Every individual may not completely agree with you, but that's kind of the point. I also enjoy using technical data, like pavement condition ratings, population density and traffic counts to help make decisions. Overall, community and transportation planning was just a very attractive career choice for me.

Bridge: At what point did you get into asset management?

Brian: My first experience with asset management was fresh out of college. At NEMCOG I was responsible for providing technical assistance to local road agencies with regards to RoadSoft® and the annual collection of PASER [pavement rating] data. Working at a regional planning organization helped me see the big picture that engages all the different areas of planning. And that's really the heart of asset management. As I grow into the role of asset management coordinator at MDOT, I'm constantly looking back at that point in my career. That period was rich with experience.

Bridge: Going from an RPO to a city must have been interesting. Did you get a different view of planning at that level?

Brian: At the City of Lapeer I worked as the planning administrator within the Planning and Community Development department. In Lapeer, I got to see development from the public side. I really gained an appreciation for the processes that are necessary to a create a quality community. Steve Warren from Kent County Road Commission says, "Asset management is just good planning." I agree. When you look at quality communities, they're planned well and their assets are managed well.

Michigan Department of Transportation

Quality communities are planned well and their assets are managed well.

Brian Sanada, MDOT

Bridge: From Lapeer to Chicago. Big change?

Brian: Oh yeah. Big change. Not only that, but I also went from the public sector to the private sector. In the Fall of 2007, I accepted a position with GreenbergFarrow, a huge architecture, planning, engineering and development services firm in Chicago as a due diligence coordinator. I was responsible for managing client project development from conception to completion. It was an eye opening experience professionally to see how the private sector approaches and implements commercial development activities across the Country.

Bridge: Sounds fascinating. What brought you back to Michigan?

Brian: Chicago is a magnificent place to live, truly one of the best planned cities in the world. With that said, the "Big City" experience reinforced my desire to come back to Michigan. When the position of asset management coordinator opened up, I jumped at the chance to come home to work for MDOT and the Transportation Asset Management Council.

Bridge: You're living in Lansing now?

Brian: Yes, I'm currently living in Lansing. I'm sure if I was a life-long resident of Chicago it would be a major culture shock, but it just feels like home to me.

Bridge: Thanks for taking a few minutes to introduce yourself. Any final thoughts?

Brian: I'm excited to be here and I'm very interested in hearing from people who are putting asset management principles into practice at all levels of government. I'm a hands-on person, easy to work with and always willing to learn new techniques to effectively implement asset management in Michigan. If you see me around, feel free to come up and say hello. Let me know what you think, any suggestions you may have and then immediately email me so I don't forget!

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***AVL System* from Page 1**

SCRC main office. The data is available for viewing through a map-based interface installed on users' computers. SCRC management has full access to the system; the general public has access to an abbreviated version of the map and data on the SCRC web site.

The cell phone technology that the system uses was one of the keys to its viability for SCRC. "Until recently, communications was the bottleneck. When we first started looking into AVL systems, the communications link was too expensive and not reliable enough," Wendling said. "Today – based on cell phone technology – it's much more reliable and much less expensive." Wendling estimates that the total cost of the AVL system, including the components, installation, and software development, is approximately $2000 per truck. "We expect the per vehicle cost to drop considerably as the technology develops further and as we continue to expand and refine the system," he said.

Proving its Worth

When Wendling first discussed the AVL system with the maintenance staff, the drivers were not enthused. "They didn't like the idea of constant surveillance," he said. "But once we explained and demonstrated that employee discipline is not part of our goal for using the system, they were more willing to work with it. Admittedly, they're still not thrilled about it, but they're beginning to see the value."

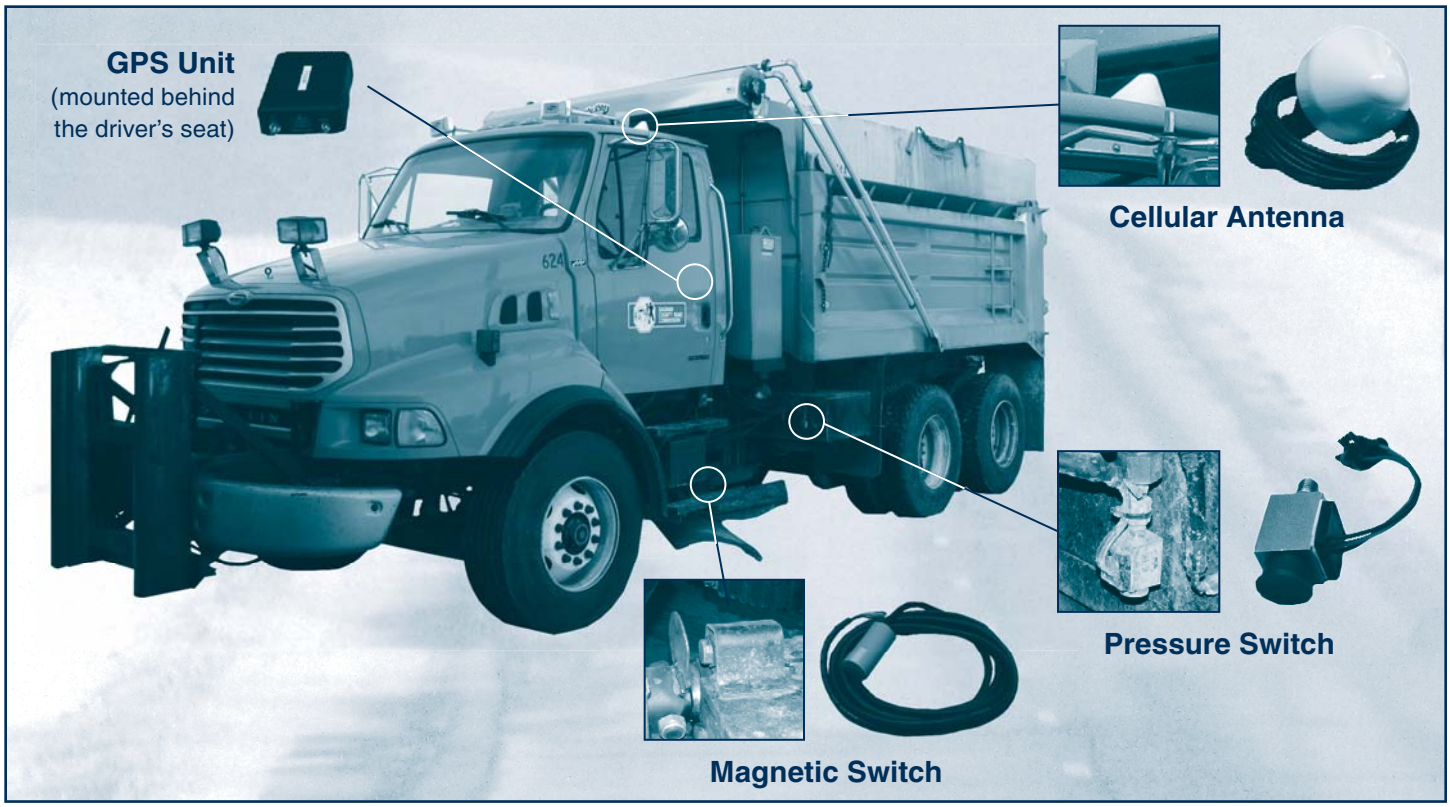
Two incidents during the pilot project helped demonstrate to the drivers that AVL technologies are a good thing. In one case, a vehicle crash was initially thought to have been caused by a lack of adequate snow removal and salting in a busy Saginaw County intersection. Upon reviewing data from the AVL system, the Road Commission determined that a truck had plowed the intersection two times just before the crash, and that salt had been spread to prevent ice from forming. The crash was attributed to driver error, not deficient plowing or improper ice control.

"The AVL system . . . provided the right information at the right time and in an understandable format so everyone involved could make the right decisions."

Brian Wendling – Saginaw County Road Commission

A second incident occurred when two pedestrians were sprayed with slush from a passing plow truck. The pedestrians contacted the Michigan State Police, claiming the plow driver had been operating at a high rate of speed. An officer from the State Police visited the SCRC offices to begin the process of filing a formal complaint. After examining the driver's route through the AVL system, the Road Commission was able to show the exact speed of the plow truck at the time and location in question. The driver was in no way operating recklessly; the pedestrians dropped their complaint.

"Both cases were uncomfortable and unfortunate for the parties involved, and the emotions generated could have created



Truck-mounted components of Saginaw County Road Commission's Automatic Vehicle Location (AVL) system.

a great deal of anxiety and trouble for our drivers and the road commission," Wendling explained. "The AVL system diffused both situations. It provided the right information at the right time and in an understandable format so everyone involved could make good decisions."

Can You See Me Now?

SCRC Maintenance Superintendent Rob Hudec appreciates the increased visibility that the system provides, both for himself and for the residents of Saginaw County. Hudec's position involves monitoring and coordinating work on over 1800 miles of road, and he often deals directly with residents. As a result, he clearly understands the impact of maintenance activities on the motoring public, and he knows how much they value transparency and accountability among public employees. "I personally like being able to see what's happening on the entire system with just a glance at my laptop, and I know our residents appreciate being able to see that work is being done," Hudec said. "Our drivers aren't completely sold on the idea of continuous monitoring, but I think they're realizing that the system's not designed to make sure we're doing our jobs, rather it's here to help all of us do our jobs better."

Practically Invisible

The necessary components of the system are installed to work seamlessly with the operation of each truck, and Road Commission mechanics can outfit a truck in about seven hours. The magnetic switch for the blade and the pressure switch for the spinner both require custom fabrication to mount them. The GPS unit is mounted behind the driver's seat in the cab. The cellular antenna is mounted on the roof.

"Early on, we had to experiment quite a bit with positioning the components and routing the wires, but we have it figured out now," SCRC Fleet and Facilities Manager Randy Emeott said. "The components have functioned well on the trucks. We haven't had a single problem with any of them."

"From my perspective, the neatest thing about the system is that the drivers don't have to do anything special to make it work. They just get in and go," he said.

More to Come

This spring, the Road Commission plans to incorporate mowers, street sweepers and graders into the AVL system. They're also working with an electronics vendor to design a GPS receiver and transmitter that will be capable of processing control commands from the office. "In terms of capabilities, we've just scratched the surface," Wendling said. "As we're using it today, the system is actually quite basic; we expect to do much more."

On the Web:

Saginaw County Road Commission
www.scrc-mi.org
CompassCom Software Corp.
www.compasscom.com
For direct links to these resources and more, go to:
www.MichiganLTAP.org/Bridge

Getting started with an AVL system

Adapted from a presentation by Brian Wendling at the 2008 County Road Association of Michigan Superintendents' Seminar

AVL systems are inherently flexible and adaptable. When designing a new system, this flexibility and ease of customization can lead to endless extra ideas, new directions and inflated expenses. Defining a scope of work to help focus development efforts is critical. The following four questions will help you begin.

1. ***Why*** do you want information from a mobile piece of equipment?

Typical reasons why an agency would collect data through an AVL system include:

- Verification of work
- Safety of the operator
- Security of the equipment
- Location of the equipment for re-routing or rescheduling

2. ***How much*** information do you want?

Data collection possibilities are almost limitless. For a plow truck, typical information includes:

- Ignition on/off
- Vehicle speed, location and direction of travel
- Spreader on/off
- Scraper up/down

3. ***What*** will you do with the information?

After you collect data, you can retrieve and format it to produce several different types of reports. Typical areas of interest for an agency include:

- Vehicle routing and miles traveled
- Work performed
- Length of time on task
- Conditions at a specific time and place

4. ***Who*** will have access to the information?

Different levels of management within a public agency require different types of information from AVL systems. Some information can also be useful to the general public and other agencies. Software permissions typically allow access for the following people:

- Supervisors
- Managers
- Staff
- General Public

A driver's first-hand experience with crashworthy devices

By Guy Benson, *Editor*, Texas Engineering Extension Service

Typical Monday morning. Taking the same route I always do. Light rain falling. Roads are slick so I slow down. Turn left off of FM 2818 North and take the uphill merge lane onto FM 60 West. I reach the top of the curve and . . . NO TRACTION! Back end of my sedan fishtails left!

Five heartbeats and it's over. I'm sitting on the access road in shock. Behind me a traffic sign lies crumpled and a crash cushion's component pieces are scattered like confetti. I check myself for injuries. No blood, nothing broken, just a throbbing knot on my lower left shin.

Several motorists stop and ask if I'm OK. A passing fireman/EMS checks me out and takes my vitals. I call my wife and call work. A College Station police officer comes and takes the official report. I call my insurance company and arrange for a tow truck.

Later, it dawns on me. I've experienced firsthand what I've heard Howard McCann, our Transportation Program Training Director, talk about – the "forgiving roadside" concept. Initiated in the late 1960s, this concept established a "clear zone," a space in which to recover safely after leaving the road. In that zone, exist "crashworthy" sign supports, crash cushions, and other vehicle-friendly innovations.

*Initiated in the late 1960s, the **forgiving roadside** concept established a **clear zone** in which to recover safely after leaving the road. In that zone, exist **crashworthy** sign supports, crash cushions, and other vehicle-friendly innovations.*

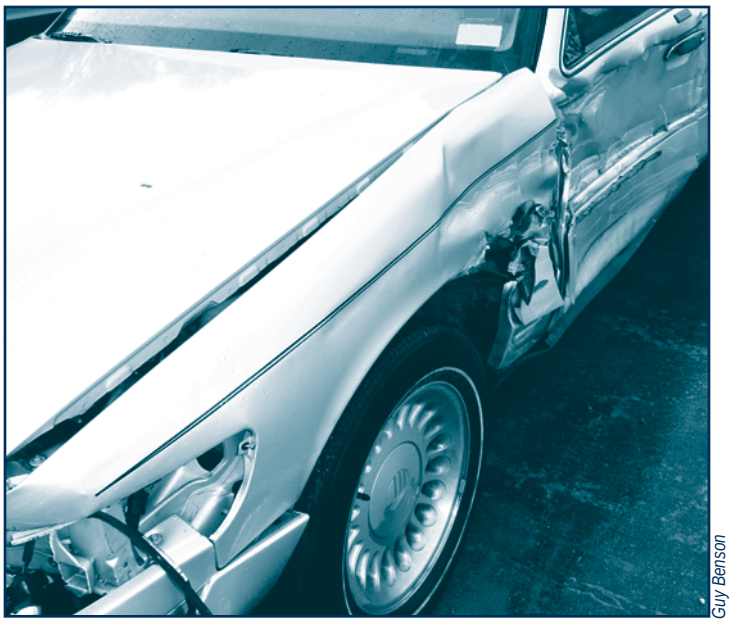
Guy Benson

The in-ground traffic sign base, left after the sign broke away in the crash.

Guy Benson

Guy Benson

Breakaway traffic sign and what remains of a crash cushion the author's car hit after skidding off the road one morning.



Guy Benson

Damage sustained in the crash by the author's four-door sedan.

How important is the forgiving roadside? Mull over this sobering statistic. Nearly 25% of all fatal crashes involve drivers leaving the road and hitting a "fixed object."[1]

When I returned to photograph the scene, it really hit home how badly things could have turned out. Instead of hitting a rigid sign that would have guillotined my car (and me), I hit a sign with breakaway bolts. That "crashworthy" feature, which allowed the sign and its supports to easily separate from its base and flip out of the way, is a cornerstone of the forgiving roadside concept.[2]

Instead of hitting an unyielding concrete abutment that would have sledge-hammered my car, I mangled a crash cushion. That cushion not only absorbed energy from my colliding car, but channelized me away from the concrete abutment. It really encouraged me to see that within a couple of days a new crash cushion had been installed.

We often joke about our list of "been there, done that" experiences. I can't say I'm proud that "crashworthy sign support" and "crash cushion" have been added to my list. However, my family and I are very grateful that the forgiving roadside concept was created and has been continually improved upon.

In my case, I firmly believe that concept prevented the adjective "fatal" from being added to the noun "crash."

1. Motor Vehicle Traffic Accidents, 2001. Texas Department of Public Safety (p30)
2. Roadside Design Guide, October 1988. American Association of State Highway and Transportation Officials (p4-1)

Guy Benson works for TEEX as an information and advertising program coordinator and is the editor of Lone Star Roads. This article originally printed in Lone Star Roads, Issue 3, 2008. Reprinted with permission.

On the Web:

For more information about crashworthy devices, go to *http://safety.fhwa.dot.gov/roadway_dept/index.htm*

For direct links to this resource and more, go to:
www.MichiganLTAP.org/Bridge

Bridging the Gap to
Better Health

A Breakfast That Wakes You Up

Dragging through your morning? Then try adding these breakfast favorites to your a.m. menu: yogurt and eggs.

This little diet tweak could help you forget you even have a snooze button, thanks to the extra dose of tyrosine – a building block for two important wake-up-your-brain chemicals.

Do You Feel Good?

Tyrosine helps make the wake-up brain chemicals dopamine and norepinephrine. "Studies show that people tend to think more quickly and feel more motivated and energetic when their brains are producing large amounts of these chemicals," writes Selene Yeager in the book *New Foods for Healing.*

In addition to eggs and yogurt, other food sources of tyrosine include almonds, chicken, avocados, bananas, and sesame seeds. Did you know? Starting your day with eggs can help you feel full longer, too.

Two More for the Road

Yeager recommends two more energy sources to help keep you sharp in the a.m.:

- **Orange juice** – The vitamin C in orange juice has been shown to help beat fatigue. Vitamin C can also help you stay slim.
- **Cream of Wheat** – This cereal contains 5 milligrams of iron, a nutrient that's essential for energy, especially in women.

RealAge®
www.RealAge.com

Creating a Masterpiece

"When you paint by numbers, the end result is guaranteed. You know what it's going to be, and it might be good, but it will never be a masterpiece. Starting with a blank canvas is the only way to get a masterpiece, but you could also blow up. So, are you going to pick the paint-by-numbers kit or the blank canvas?"

Jim Collins, author of "Good to Great," in an interview published in the April 1, 2009 Issue of Inc. Magazine

New

Asset Management

Resources

Web

On-line Introductory RoadSoft Training

This series of *RoadSoft* training sessions is intended for new users and for those who would like to gain a more solid understanding of *RoadSoft* concepts and features. This is the first time these sessions are being offered in an on-line format, which will allow users to participate from the comfort of their own computers. Sessions will run from 9:30 a.m. – 11:30 a.m. on the following dates:

- May 11 – Session 1: Training Overview/Understanding RoadSoft
- May 12 – Session 2: Using the Road Module
- May 13 – Session 3: Collecting Data / Using the LDC
- May 14 – Session 4: Managing your RoadSoft Database
- May 15 – Session 5: Intro to Safety Analysis / Using Crash Data

For more information, please visit:
www.roadsoft.org/training/web/IntroRS

Conference

Michigan Transportation Asset Management Conference

Tuesday, May 19 – East Lansing, MI

At the Michigan Transportation Asset Management Conference, you'll learn what is happening in Michigan, and you'll hear how agencies like yours are applying principles of transportation asset management in practical ways to stretch transportation dollars.

For more information, please visit:
www.MichiganLTAP.org
(click the "Michigan TAM Conference" link)

Workshop

Transportation Asset Management Workshop

Tuesday, June 2 – Brighton, MI

Wednesday, June 3 – Big Rapids, MI

This workshop will help you kick start your asset management program. It will be of interest to anyone who is responsible for making pavement management or project selection decisions and is interested in learning what an asset management program can do for their agency. Agencies that send elected officials, management personnel, engineers and maintenance personnel will benefit the most from this workshop.

For more information or to register,
please call Michigan's LTAP at 906-487-2102

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