*"Improving Alaska's quality of transportation through technology application, training, and information exchange."*

TECHNOLOGY FOR

# Alaskan Transportation

DOT Statewide Research & Technology Transfer
Local Technical Assistance Program

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**In this issue . . .**



## Evaluation of Storm Water Treatment on the Kenai Pennisula

The Kenai River supports a world-class salmon fishery and is a major recreational resource for the state of Alaska. In addition, the Kenai serves as a drainage conduit for storm water generated in the Kenai Peninsula's transportation corridors.

Storm water often contains a complex mixture of contaminants such as heavy metals (lead, copper, and chromium), particulate matter, and organic compounds—some with potentially hazardous carcinogens.

In an effort to reduce the potential impacts of storm water related pollutants on the river system, the Alaska Department of Transportation & Public Facilities (AK DOT & PF) built three integrated storm water treatment systems on the Kenai Peninsula between 1998 and 2000. Their design integrated aspects of sediment basins and constructed wetlands.

*View of the Binkley Sediment basin/constructed wetland. The structure helps protect the Kenai River from storm water run-off which may contain potentially hazardous contaminants.*

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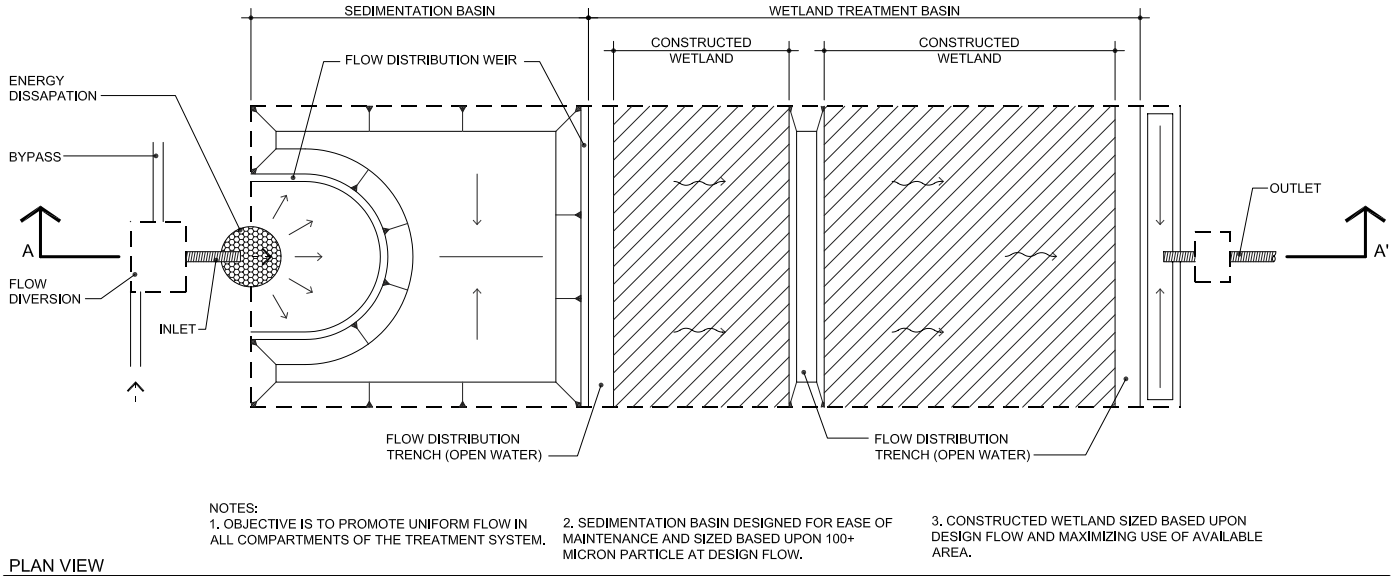
## What is a Sediment Basin?

A sediment basin is a water treatment system that slows water velocity and allows for suspended particles to fall out and be captured in the basin. Runoff from highways, parking lots, or buildings can contain potentially hazardous particles suspended in the water, which if deposited into a river or lake could pose a potential environmental hazard. A well-designed sediment basin captures these particles.

## What is a Constructed Wetland?

A constructed wetland is a man-made complex of saturated soils, aquatic plants, and animal life, designed to work as a natural wetland. Like natural wetlands, a constructed wetland creates opportunity for plant and microorganisms to consume nutrients and contaminants. Constructed wetland systems are designed to maximize removal of toxins or other potentially dangerous compounds, thus purifying the wastewater outflow to help minimize environmental impact.

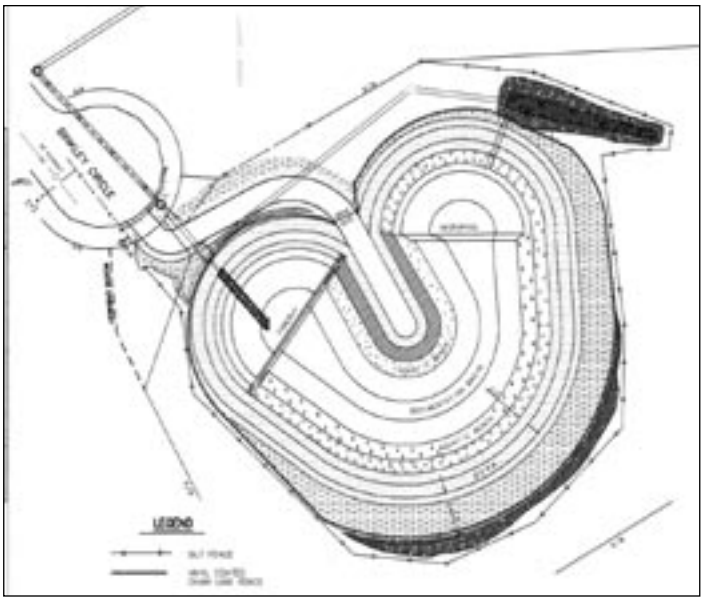
This diagram illustrates how water flows through the system and provides opportunity for containment of sediments and treatment of hazardous compounds.



## What are We Looking For?

Since AK DOT&PF lacks performance information on sediment basin/constructed wetland systems in Alaska, we decided to evaluate how well they treat storm water runoff and the pollution load generated from impervious surfaces such as roads and parking lots. Heavy metals and petroleum compounds adhered to suspended solids are the contaminants of greatest concern in runoff waters. Design engineers must characterize the storm water for its particular pollutant load so they can design the system for maximum treatment.

Past research on storm water and the pollutant load it carries has shown that a properly designed sediment basin or constructed wetland can provide significant pollutant removal of the runoff before its release to the receiving waters. The objectives and scope of this study were to determine the effectiveness of the current designs employed by AK DOT&PF in the Soldotna area of the Kenai Peninsula and to recommend improved engineering design criteria to maximize treatment and comply with applicable state and federal water quality regulations.



*Plan view of the Binkley sediment basin/constructed wetland. Vegetation is planted along the side, not allowing for ideal removal of pollutants. Also, the flow control structure doesn't extend to each bank and has a low spot, allowing a short circuit. This reduces the time storm water interacts with vegetation and allows the bulk of the water, with its pollutant load, to escape treatment.*


*This is a view looking from the inlet end of the Binkley site. The gray line in the foreground is the velocity barrier. You can see the slope of the barrier towards the center, which does not help to spread the water evenly across the cell.*

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## What Did We Do?

Researchers collected water chemistry information at various points within the systems to determine how the systems were operating. They analyzed the information to determine how well the sedimentation basin and constructed wetland components of these treatment systems worked together to reduce pollutant loading associated with storm water discharged into the Kenai River.

Researchers studied three systems on the Kenai Peninsula (Marydale, Big Eddy, and Binkley systems) by visually observing storm water flow in the immediate vicinity of each system, evaluating overall system design and construction, and collecting storm event data to determine pollutant loading entering and exiting these systems. This research effort focused exclusively on system performance during the summer and fall months, because storm water flows are uncommon during Alaska's winters.

## What Did We Learn?

Heavy metals and suspended solids are the most critical pollutants that enter these systems, and under the current effluent load our systems are removing 26 to 97 percent of total metals, 41 to 94 percent of the dissolved metals, and 80 to over 99 percent of the suspended solids. We believe this performance can be significantly improved by taking a few steps:

- The random nature of storm water runoff must be incorporated into engineering specifications to determine the proportion of runoff to be treated and the accompanying wetland space required.
- Treatment processes can be optimized by considering wetland ecology and water retention time. Proper constructed wetland design requires site-specific characterization of water volume, pollutant concentrations, and flow rates.
- Inlet and outlet structures for the sedimentation basin portion of the system must be designed to evenly distribute flow through the wetland system

*Big Eddy site looking from inlet towards the outlet. Water depth is too high. Ideal depths allow for plant life to protrude above the waterline to maximize plant and microorganism interaction during flow.*

and minimize flow velocities to maximize particle settling time.

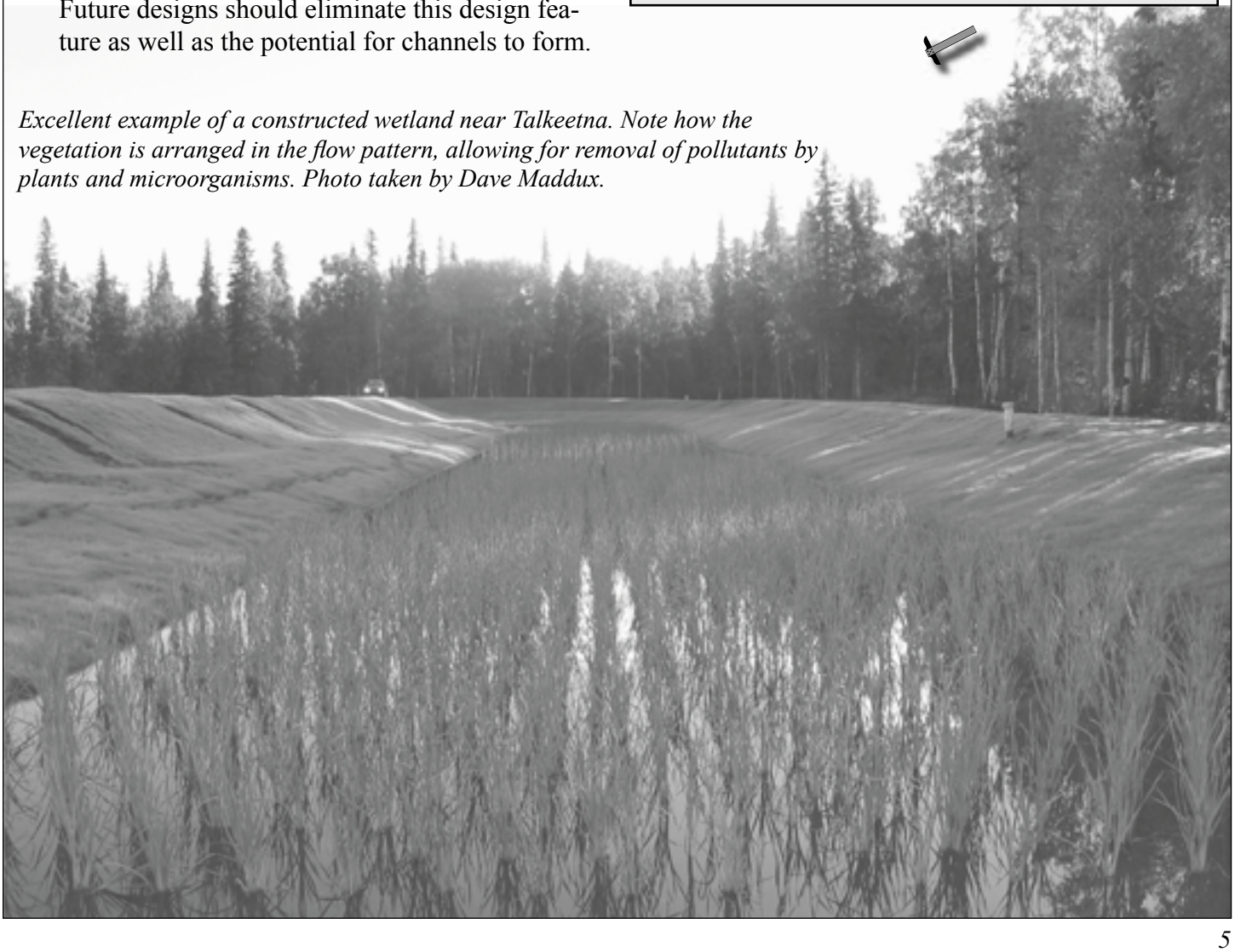
- The Marydale and Big Eddy systems as currently designed do not maximize the benefits of either the constructed wetland or the sediment basin. The Binkley system was designed primarily as a sedimentation basin with a discharge to natural wetlands.
- Some of the systems have short-circuits in the form of a meandering channel that travels from the inlet to the outlet. Short-circuits reduce the time that the storm water interacts with the wetland vegetation, thereby allowing the bulk of the water, with its pollutant load, to escape treatment. These relatively unvegetated flow channels carry most of the flow, thereby diverting the water away from the wetland vegetation and excluding the vegetation from its pollutant removal role. Future designs should eliminate this design feature as well as the potential for channels to form.

Improvements to the flow control structures, sediment basins, velocity barriers, vegetation placement, density, and water depth will significantly enhance performance particularly with regard to the removal of heavy metals.

The research report is available online at:

http://www.dot.state.ak.us/stwddes/research/assets/pdf/fhwa_ak_rd_03_06.pdf

For more information, contact Clint Adler, P.E., AKDOT&PF research engineer, at 907-451-5321 or clint_adler@dot.state.ak.us



*Excellent example of a constructed wetland near Talkeetna. Note how the vegetation is arranged in the flow pattern, allowing for removal of pollutants by plants and microorganisms. Photo taken by Dave Maddux.*

# Transit Driver Fatigue Awareness

As a professional driver, you take responsibility for your safety and the safety of others on the road. According to recent driver surveys, more than half have driven while drowsy and 27% have fallen asleep at the wheel. The National Highway Transportation Safety Council (NHSTA) estimates that 100,000 crashes each year are caused by sleepy drivers. Don't cross the line! Driving while fatigued puts us all at risk.

A recent federal highway report found that hours of driving and number of consecutive trips had little or no relationship to operator fatigue. It was concluded that time of day was a far better predictor of decreased driving performance. The number of fatigue-related collisions increased significantly around 2:00 p.m. and 2:00 a.m. Are you at risk? Public transit and commercial truck drivers, shift workers, and people with undiagnosed or untreated sleep disorders have a higher risk of driver fatigue.

### Effects of Fatigue

- Impaired reaction time, judgment and vision
- Problems with information processing and short-term memory
- Decreased performance, vigilance and attention
- Increased moodiness and aggressive behaviors
- Increased "micro sleeps", brief three to four second sleep episodes (in which a vehicle can travel 100 yards; plenty of time to cause a serious crash)

Driving drowsy is the equivalent of driving drunk. Drivers with mild to moderate untreated sleep disorders performed worse than those with a .06% blood alcohol content (BAG). On four hours of sleep, one beer can have the impact of a six-pack. Most adults need seven or eight hours of uninterrupted sleep every 24 hours. When we miss sleep we accrue "sleep debt." This adds up, so we eventually perform like we've gone without a night's sleep. The only way to repay sleep debt is to sleep.

### Drive Alert and Arrive Alive

- Repay your sleep debt/take naps/ take breaks
- Sleep in a dark, quiet environment
- Adapt to or change your work schedule—minimize shift work/split shifts/overtime/second jobs affects.

You need your rest to do your best!

For more information on driver fatigue visit the National Sleep Foundation website


From the APTA website


You can order TCRP Report 81 "Toolbox for Transit Operator Fatigue" for FREE.

### True or False?

***You can stockpile sleep on weekends.***

FALSE—Sleep is not money. You can't save it up ahead of time and you can't borrow it. But, just as with money, you can go into debt.

***The human body never adjusts to night shift work.***

TRUE—Whether you work the night shift or not, you are most likely to feel sleepy between mid night and six a.m. due to the light and dark cycles of the day (circadian rhythm). No matter how many years one works a night shift, sleeping during the day remains difficult. Shift workers should avoid caffeine during the last hour of their work days, block out noise and light at bedtime and stay away from alcohol and alerting activities before going to sleep.

***I'm a safe driver so it doesn't matter if I'm sleepy.***

FALSE—The only safe driver is an alert driver. Even the safest drivers become confused and use poor judgment when they are sleepy.

Source: Indiana Dispatch Newsletter, from the Indiana Urban Transit Assistance Program, Betsy Kachmar, Coordinator

# What is a Road Safety Audit?

A road safety audit (RSA) is a formal safety performance examination of an existing or future road or intersection by an independent audit team. Road safety audits can be used in any phase of project development from planning and preliminary engineering, to design and construction. RSAs can also be used on any sized project from minor intersection and roadway retrofits to mega-projects.

Most state DOTs have established traditional safety review processes through their high hazard identification and correction programs. However, a road safety audit and a traditional safety review are different processes. It is important to understand the difference between the road safety reviews that are commonly performed and newer road safety audits. The main differences between the two are shown below:

### Road Safety Audits

- A safety audit uses a larger (three to five person) interdisciplinary team.
- Safety audit team members are usually independent of the project.
- The field review is a necessary component of the safety audit.
- Safety audits use checklists and field reviews to examine all design features.
- Safety audits are comprehensive and attempt to consider all factors that may contribute to a crash.
- Safety audits consider the needs of pedestrians, cyclists, and large trucks as well as automobile drivers.
- Safety audits are proactive.
- They look at locations prior to the development of crash patterns to correct hazards before they happen.

### Road Safety Reviews

- A safety review uses a small (one to two person) team with design expertise.
- Safety review team members are usually involved in the design.
- Field reviews are usually not part of safety reviews.
- Safety reviews concentrate on evaluating designs based on compliance with standards.
- Safety reviews do not normally consider human factors issues.
- This includes driver error, visibility issues, etc.
- Safety reviews focus on the needs of roadway users.
- The safety review is reactive.
- Hazardous locations are identified through analysis of crash statistics or observations and corrective actions are taken.

*This is a photo of an intersection in Grand Rapids, Michigan, before a road safety audit was conducted. The 2 traffic signal heads are hung on a diagonal span of wire and only one head is over the travel lanes. There are two lanes approaching the intersection separated by a dashed white pavement marking.*

*This is the same intersection after a road safety audit was conducted. The traffic signals are now hung on a box span of wire and they are now able to be hung directly over the travel lanes. Now there are three traffic signal heads, two for the through lane and one for the left turn lane. Pavement markings now show a separate leftturn lane at the intersection.*

Photos courtesy of AAA Michigan.

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1099 14th Street, N.W., Suite 300 West
Washington, DC 20005-3438
ITE Resource Center

*http://www.roadwaysafetyaudits.org/*


# Ongoing Safety Programs

**National intersection safety agenda:** The agenda was developed at the national intersection safety workshop held at Milwaukee, WI, on November 14— 16, 2001. Also, as a part of the overall effort to enhance intersection safety awareness, FHWA developed a video, *Red Light Green Light*. The purpose of the video is to take a closer look at intersection safety and emphasize the importance of individual responsibility when it comes to making intersections safer. For more information visit the intersection safety web site at http://safety.fhwa.dot.gov/programs/intersections.htm

**Crashworthiness of Roadside Safety Hardware:** Since October 1, 1998, virtually all roadside hardware installed on the National Highway System must meet the crash evaluation criteria identified in NCHRP Report. See http://safety.fhwa.dot.gov/report350hardware. This site provides information on accepted devices and related FHWA policies.

Contact Richard Powers, 202-366-1320, for Permanent and Temporary Barriers, Terminals, Bridge Railings/Transitions, and Crash Cushions. Contact Nicholas Artimovich, 202-366-1331, for Work Zone Devices, Sign Supports, and Poles.

**Transportation Safety Information Management Systems** (TSIMS): The FHWA, FMCSA, and NHTSA are working with AASHTO to develop a software package for safety information management systems. The system will take advantage of existing analysis and data capture systems and will facilitate safety analysis data by linking different safety-related data. AASHTO and a consultant are developing a solicitation for partners to fund Phase 2, building the software package. Contact the Office of Safety Design, 202-366-9198.

**Iowa National Model:** Iowa and FHWA have collaborated with NHTSA and FMCSA to develop a model public safety information system for crash, citation, and criminal incident data collection and management.

One of the principal products is a software package (TraCS) that facilitates conversion of forms from paper to electronic, and development of new electronic forms. TraCS has been distributed for free use in over 20 states and two Canadian provinces. States that are the furthest along in deployment include Alabama, Arkansas, Delaware, Georgia, Iowa, Maryland, New York, Tennessee, and Wisconsin. Field safety engineers should approach their respective state agencies and encourage them to consider TraCS if they're looking for an electronic system. The software is available for free, allowing the state to save its resources for system and hardware needs. More information is available at http://www.dot.state.ia.us/natmodel, or contact the Office of Program Integration and Delivery, 202-366-9469.

**Road Safety Audits and Road Safety Audit Reviews:** The National Highway Institute, the training arm of the Federal Highway Administration, has updated the Road Safety Audit course. Participants in this training will learn how to improve transportation safety by applying a new, proactive approach to reduce accidents and their severity: Road Safety Audits (RSA) and Road Safety Audit Reviews (RSAR). This technique provides an examination of a roadway by an independent, qualified audit team. The RSA is a way for an agency to improve safety and to communicate to the public how they are working toward accident reductions. This course includes "hands-on" application of the training materials, including topics such as


RSA definition and history, stages and how to conduct a RSA, and legal considerations.

Students will receive a copy of *Road Safety Audits* and *Road Safety Audit Reviews Reference Manual* along with a *Participant's Workbook*. An instructor's guide is available on request. The course is available to federal, state, and local transportation personnel, as well as consultants involved in highway safety issues.

If you would like to convince your state to sign up for this course, a speaker can travel to give an overview presentation of the benefits an RSA program can provide them, as well as an overview of the RSA and RSAR course. For information on scheduling a speaker, contact Louisa Ward at 202-366-2218 or Louisa.Ward@fhwa.dot.gov.

For information on scheduling the NHI course, contact Danielle Mathis-Lee at 703-235-0534 or Danielle.mathis-lee@fhwa.dot.gov.

**Speed Management Workshops:** A series of pilot workshops on Restoring Credibility to Speed Setting: Engineering, Enforcement & Educational Issues have been carried out around the country. The workshops brought together critical engineering, enforcement, and judiciary personnel to discuss the multidisciplinary aspects of managing speed. Reports on workshops conducted in Florida, Nevada, Missouri, and Massachusetts are now available on the FHWA Speed Management Safety website, http://safety.fhwa.dot.gov/programs/speedmgnt.htm. No more stand-alone workshops are planned. However, train-the-trainer sessions and a "planning guide" for others who want to sponsor multidisciplinary speed management workshops are under development. Contact Davey Warren, 202-366-4668.

**Web-based Tool Available to Assist in Setting Realistic, Safe, and Consistent Speed Limits:** A beta version of a web-based speed zone advisor known as USLIMITS is now available at http://www.uslimits.com. The speed zone expert system was adapted from similar expert systems used by most Australian state road authorities but modified to reflect elements of speed setting philosophy used in the U.S. The expert system recommends a speed limit for a section of road based on road function, roadside development, operating speeds, road characteristics, and other factors required to determine appropriate speed limits in speed zones. The system also warns users of issues that might require further investigation and engineering judgment. USLIMITS provides a screen report and a more detailed report. USLIMITS will be of particular use to small communities and agencies that lack experienced traffic engineers. For experienced traffic engineers, it can provide a second opinion and increase confidence in speed zoning decisions. A user account is required to save projects and view the detailed speed zoning report, but anyone can trial USLIMITS by entering guest for the username and password. Contact Davey Warren, 202-366-4668.


# Resources

**FHWA Safety Website on Roadside Hardware:** This website can be accessed at http://safety.fhwa.dot.gov/reports350hardware. The website is for anyone who wants to know, at a glance, which devices have been formally accepted by FHWA for use on the National Highway System.

**Technical Advisory (T5040.35):** Contains information on the state-of-the-practice for the design and installation of shoulder rumble strips and provides guidelines for their use on appropriate rural segments of the National Highway System. This is posted at http://www.fhwa.dot.gov/legsregs/directives/techadvs.htm.

**Safety Management Self-Assessment:** This is a tool to enable states to evaluate their safety management processes. This self-assessment combines previous guidance on safety management with the seven quality principles of the Malcolm Baldridge National Award criteria. Contact Ken Epstein at 202-366-2157.

**Retroreflectivity Marketing Tools**

- *How Retroreflectivity Makes Our Roads Safer* video.
- Night Lights Marketing Tool Kit (brochure, flyer, and Q & A sheet)
- *Retroreflectivity Sheeting Identification Guide*

For additional information, please visit the FHWA retroreflectivity web site at http://safety.fhwa.dot.gov/programs/retroref.htm or contact Peter Hatzi at peter.hatzi@fhwa.dot.gov, Kenneth Opiela at kenneth.opiela@fhwa.dot.gov, or Greg Schertz at greg.schertz@fhwa.dot.gov.

**Roundabout Design:** An introductory workshop for FHWA's "Roundabouts: An Informational Guide." This course provides general information on design, operation and safety benefits of roundabouts. An overview of one and two-lane roundabout designs and operations. Methods for assessing the capacity of single and multilane roundabouts are presented and discussed. Traffic signing, marking, and lighting of roundabouts are presented. This course is available from the Resource Center's Safety and Design Team. To schedule a workshop, contact Mark Doctor, Atlanta Office at mark.doctor@fhwa.dot.gov or Fred Ranck, Olympia Fields Office at fred.ranck@fhwa.dot.gov or Patrick Hasson, Olympia Fields Office at patrick.hasson@fhwa.dot.gov.

**Prediction of the Expected Safety Performance of Rural Two-Lane Highways**: A report that documents the algorithm for predicting the safety performance of rural two-lane highways. The algorithm estimates the effect on safety performance of roadway segment parameters including lane width, shoulder width, shoulder type, horizontal curves, grades, driveway density, two-way left-turn lanes, passing lanes, and roadside design and of intersection parameters including skew angle, traffic control, exclusive left- and right-turn lanes, sight distance, and driveways. It also enables highway agencies to estimate the safety performance of existing or proposed highways and to compare the safety performance of geometric design alternatives. The algorithm forms the basis for the Crash Prediction Module of the Interactive Highway Safety Design Model (IHSDM). Please contact Michael Griffith at mike.griffith@fhwa.dot.gov or 202-493-3316 to obtain a copy of the report. A PDF version of the report can be obtained at http://www.tfhrc.gov/safety/99207.htm. For general information about IHSDM, contact Ray Krammes at ray.krammes@fhwa.dot.gov or 202-493-3312.

# Safety


**National Review of the Highway Safety Improvement Program:** This report discusses the best practices identified from a review of programs conducted in six states (Delaware, Oregon, Connecticut, Florida, Ohio, and Iowa) by a team consisting of representatives from the Office of Safety (Ken Epstein) and the field (Gary Corino and Don Neumann). This report is on the Safety web site, http://safety.fhwa.dot.gov. Contact Ken Epstein at 202-366-2157.

**The Bicycle Safety Education Resource Center:** This website can be found at http://www.bicyclinginfo.org/ee/fhwa.html.

This Resource Center provides bicycle safety education information for the following groups: preschool (under age 5), beginner (ages 5-8), young (ages 9-12), teenage (13+), adult, senior, motorists, and adults teaching children. The Resource Center consists of three parts. The first part is Database, where you can look for training materials for your intended audience. It even allows you to tailor your search and be as specific as possible. The second part is a Database Guide that identifies the training needs of the eight different audiences identified above. The third part is a Good Practices Guide that will guide you through the process of designing your own program. Hard copies of the Good Practices Guide are available. Contact Tamara Redmon at tamara.redmon@fhwa.dot.gov.

**Maintenance of Signs and Sign Supports for Local Roads and Streets (FHWA-SA-01-009):** This pamphlet is the first in a series of pamphlets intended to help the safety community train and implement small projects and programs related to or resulting in improved safety on highways, bicycle and pedestrian paths, and highway-rail crossings. The PDF version is posted on the FHWA safety web site http://safety.fhwa.dot.gov/media/brochures.htm

**The Model Minimum Uniform Crash Criteria (MMUCC):** Cited in TEA-21 as one of the factors to be considered in applications for safety improvement grants. While it is voluntary, the states are encouraged to use it when revising and updating their traffic crash reports. http://www.nhtsa.dot.gov (People Safety/ Crash Information/MMUCC). Hard copies are available; please call 202-366-2288.

**Interactive Highway Safety Design Model (IHSDM):** IHSDM is a suite of software analysis tools for explicit, quantitative evaluation of safety and operational effects of geometric design decisions during the highway design process. The 2003 public release of the IHSDM for two-lane rural highways is available for testing and evaluation purposes free of charge via download at http://www.tfhrc.gov/safety/ihsdm/ihsdm.htm. An IHSDM Help Desk (IHSDM.Support@fhwa.dot.gov or 202-493-3407) is available to provide user technical support. An IHSDM Preview CD-ROM is available, which provides an overview of the functions and capabilities of IHSDM and features an exercise for using IHSDM. A two-day IHSDM Training Course, Course Number 380071A in the NHI Course Catalog (http://nhi.fhwa.dot.gov/coursec.asp), is also available. For additional information about IHSDM, to request a Preview CD-ROM, or to schedule a training session for your agency, contact Clayton Chen, Office of Safety at 202-366-4656 or clayton.chen@fhwa.dot.gov or Ray Krammes, Office of Safety Research & Development at 202-493-3312 or ray.krammes@fhwa.dot.gov.

# Safety


**Child Safety Website:** This website provides a list of new child restraints and features, new vehicles and child safety features, tips for installing and using child safety restraints, and child seat help (fitting/inspection stations and technician contacts). http://www.nhtsa.dot.gov/people/injury/childps/

**Maintaining Traffic Sign Retroreflectivity**, Publication Number FHWA-SA-03-027, printable version available on the safety website under "What's New" and "Retroreflectivity Papers and Reports," http://safety.fhwa.dot.gov/fourthlevel/sa03027.htm

**Access Management Manual (published by TRB, 2003)**: A good access management practice can offer a great combination among operation, geometric design, and safety. The manual can be found on the Access Management website at http://www.accessmanagement.gov/index.html, or contact Kathy Facer at kathleen.facer@fhwa.dot.gov for a copy of Access Management CD Library. In addition, the hardcopy can be purchased from the TRB bookstore http://gulliver.trb.org/bookstore).

**Roadway Safety Tools for Local Agencies, NCHRP Synthesis 321:** provides practical and flexible approaches to improve safety at the local level. This publication examines tools and procedures that are practical, relatively easy to apply, and can be implemented by agencies with limited financial resources. Tools are defined as any ideas, practices, procedures, software, activities, or actions beneficial in aiding local agencies to improve the safety of their roads and streets. User-friendly appendices provide detailed information on each tool, its application, or references to additional information. NCHRP Synthesis 321 is available through the FHWA Product and Distribution Center at 301-577-0818 or by fax at 301-577-1421.

**Signalized Intersections:** Informational Guide FHWA-HRT-04-091, is a comprehensive guide that provides methods for evaluating the safety and operations of signalized intersections and tools to remedy deficiencies. The information contained in this guide is based on the latest research available. Copies may also be obtained from the FHWA Report Center by e-mail to report.center@fhwa.dot.gov or by fax to 301-577-1421, by phone to 301-577-0818 or on-line at www.tfhrc.gov/safety/intersect.htm. Contact Joe Bared, 202-493-3314.

***Restoring Credibility to Speed Setting: Engineering, Enforcement & Educational Issues*** is now available on the FHWA Speed Management Safety Website http://safety.fhwa.dot.gov/speed_manage/workshops.htm. The report summarizes the findings of workshops that brought together critical engineering, enforcement, and judiciary personnel to discuss the multidisciplinary aspects of managing speed. A planning guide for others who want to sponsor multidisciplinary speed management workshops is under development. Contact Davey Warren, 202-366-4668.

# Expanded Polystyrene (EPS) Geofoam

## Problem: Highway Capacity is Insufficient to Meet Growing Demand

Every year in the United States, traffic congestion results in 5.7 billion person-hours of delay; for each person, that delay averages 36 hours per year. In 1997, the individual cost of congestion exceeded $900 per driver, and total estimated costs were more than $72 billion in lost wages and wasted fuel. Highway congestion continues to grow as vehicle travel increases and the nation's bridges and roads deteriorate.

To help alleviate this growing congestion, capacity on the nation's highways and major roads must be expanded. In many circumstances, however, roadway embankment widening or new alignments may require construction over soft or loose soils that are incapable of supporting increased loads. Embankment construction projects must identify innovative materials and construction techniques to accelerate project schedules by reducing vertical stress on the underlying soil.

### Putting It in Perspective

- One in every five highway projects is considered "traffic sensitive."
- Two out of every five urban interstate miles are considered congested.
- Traffic delays have more than tripled in the past 20 years.
- By 2020, the nation's population is expected to grow by 16 percent, and vehicle travel is expected to increase by 42 percent.

## Solution: Get In, Get Out, and Stay Out With EPS Geofoam

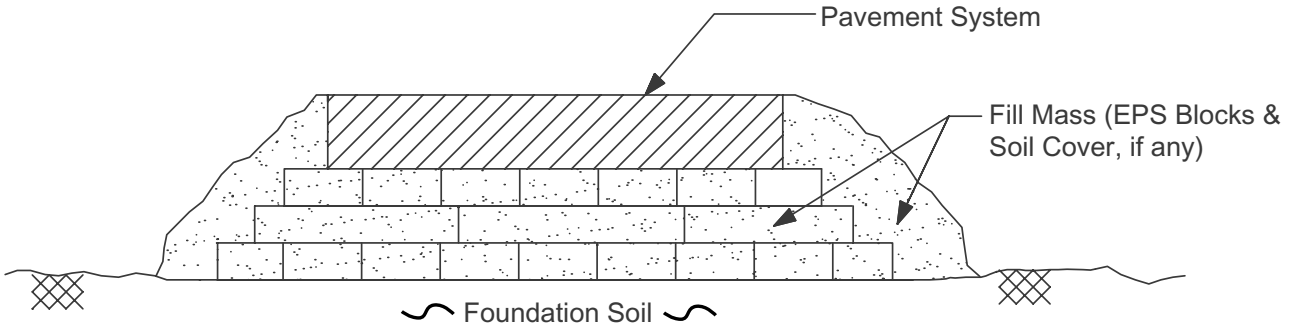
*What is EPS Geofoam?*

EPS Geofoam is a lightweight, rigid foam plastic that has been used around the world as a fill for more than 30 years. EPS Geofoam is as much as 100 times less dense than soil, while alternate lightweight fills are approximately two to tree times less dense. This extreme difference in density, compared to other materials, makes EPS Geofoam an attractive fill. Because it is a soil alternative, EPS Geofoam embankments can be covered to look like normal sloped embankments or finished to look like a wall.

*What are the advantages of EPS Geofoam for highway construction?*

EPS Geofoam can be used as an embankment fill to reduce loads on underlying soils or to build highways quickly without staged construction. EPS Geofoam has been used to repair slope failures, reduce lateral load as fill behind retaining structures, accelerate construction on fill for approach embankments, and minimize differential settlement at bridge abutments.

Because EPS Geofoam only weighs 16 to 32 kilograms per cubic meter (1–2 pounds per cubic foot), large earthmoving equipment is not required for construction. After the material is delivered to the site, blocks can be easily trimmed to size and placed by hand. In areas where right-of-way is limited, EPS Geofoam can be constructed vertically and faced, unlike most other lightweight fill alternatives. It also can be constructed in adverse weather conditions.




**Major components of an EPS-block geofoam embankment**

### Successful Applications: States' Results Demonstrate EPS Geofoam advantages

Many states have used EPS geofoam in large and small highway projects. The Texas Department of Transportation (DOT) is about to widen U.S. Interstate 10 (1-10) as it passes over an existing culvert in San Antonio, TX. In lieu of the previously designed solution to span the culvert with a drilled shaft supported by reinforced concrete slab, engineers will look to EPS Geofoam to reduce the load on the culvert. By using EPS Geofoam, engineers estimate significant time savings and a cost savings of approximately one-half the original designed solution.

After years of searching for a permanent solution to a failing slope problem on State Route 23A, the New York State DOT turned to EPS Geofoam. By replacing upper sections of the slide area, the state significantly reduced the driving forces that were causing the slide and successfully rehabilitated the roadway section.

Two large and high-profile jobs—I-15 in Utah and the Big Dig in Massachusetts—turned to EPS Geofoam to construct large embankment sections. EPS Geofoam helped the projects maintain extremely tight construction schedules that would not have allowed enough time for conventional embankment construction. Both projects illustrated the ease and speed with which EPS Geofoam can be constructed for highway embankments.

**Benefits**

- Accelerates foundation construction,which reduces project schedules.
- Saves money.
- Requires limited labor for construction.
- Exerts little to no lateral load on retaining structures.
- Can be constructed easily in limited right-of-way areas and in adverse weather conditions.

*Additional Resources*

To learn more, visit www.fhwa.dot.gov/resourcecenter/index.htm.

*For more information, contact:*

Peter Osborn, FHWA Resource Center
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# Asset Management

### Problem: Transportation Agencies Need a New Management Approach for a New Era

Since interstate system construction has been completed, the emphasis has shifted from "build it" to "make it perform." Transportation agencies are under pressure to show improvements in performance and accountability for funding decisions.

Transportation Asset Management (TAM) provides the tools and structure to set goals, identify priorities, improve processes, and measure results to demonstrate improved performance. By focusing on the performance of the transportation system, agencies will be able to increase customer satisfaction.

**Putting It in Perspective**

- The nation's highways are valued at more than $1.75 trillion.
- Nearly $130 billion is invested annually to preserve and improve the highway system
- TAM can help ensure that highway investment results in improved system performance.

# FHWA Priority Market-Ready Technologies and Innovations 2004

*What is Transportation Asset Management?*

TAM is a strategic approach that maximizes the benefits from resources used to operate, expand, and preserve the transportation infrastructure. TAM is not a software or database system, but a decisionmaking process for allocating resources in terms of user benefits. It is a way of thinking that enables agency leadership to view the big picture before deciding how to deploy resources.

*How Does it Work?*

TAM relies on tools and information to analyze tradeoffs among investment options. This decisionmaking process recognizes that transportation assets have a user aspect in addition to a physical, or engineering, dimension. The focus is on system performance rather than on how much money is spent or how many miles of roadway are improved.

## Solution: Guide Explains TAM techniques

The American Association of State Highway and Transportation Officials (AASHTO) has developed a Transportation Asset Management Guide for transportation agency leaders.

The guide explains TAM techniques and offers examples of good practice in four areas—policy development; planning and programming; program delivery; and information, analysis, and performance monitoring. The guide includes a self-assessment tool to help agencies review their asset management practices and identify opportunities for improvement.

*How can Agencies learn More About TAM?*

The Federal Highway Administration has developed a one-day National Highway Institute course to familiarize senior managers with the concepts, principles, and techniques outlined in the *Transportation Asset Management Guide*.

The course includes presentations, discussions, and exercises, including a session on completing and interpreting the results of the self-assessment tool. It offers a useful way to organize thinking about TAM issues, develop a consensus among managers on their agency's strengths and improvement areas, and structure an agenda for TAM implementation.

*Successful Applications*

Agencies are already moving toward an asset management approach. Many building blocks for TAM already exist in transportation agencies. Pavement management, bridge management, and information management systems provide the inputs necessary for TAM analysis. Most agencies have begun the transition to TAM-based thinking through performance-based management and strategic planning. The guide and training course are helping agencies build on steps they have taken toward a TAM approach.

The necessary computing power, data, and analytical tools to make TAM work are available, and agencies are using TAM to address the challenges they face in the 21st century. Agencies are making decisions involving tradeoffs among preserving what is in place, adding new capacity, improving system operations, enhancing environmental quality, improving safety, and ensuring security.

**Benefits**

- Involves a strategic way of thinking that considers long-term consequences of investments.
- Focuses on a way of doing business that is performance driven, focused on customer satisfaction, and oriented to return on investment.
- Uses new analytical tools and new ways of applying old tools to better integrate data and support decisionmaking.

*Additional Resources*

More information on TAM and the *Transportation Asset Management Guide* are available at http://asset-management.transportation.org.

Information on the NHI TAM training course is available at www.nhi.fhwa.dot.gov/coursedesc.asp?coursenum=1130.

*For more information, contact:*

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Phone:202-366-1559
E-mail: stephen.gaj@fhwa.dot.gov

# FHWA Traffic Noise Model 9, Version 2.1

## Problem: Traffic Noise Creates Headaches for Communities and Motorists

Highway traffic noise has been a federal, state, and local problem since before the first noise barrier was built in 1963. Emanating from vehicle engines, exhaust systems, and tires interacting with pavement, traffic noise affects the quality of life for nearby residents and businesses by drowning out conversations, disrupting sleep, and discouraging outdoor activities. Over the years, community and motorist concerns have fueled the push to improve noise measurement and modeling tools that help transportation agencies address the highway traffic noise problem.

### Putting It in Perspective

- Between 1997 and 2001, nationwide costs for noise barriers averaged more than $124 million a year.
- As of 2001, 44 state departments of transportation (DOT) and the Commonwealth of Puerto Rico had constructed more than 2,947 linear kilometers (1,831 linear miles) of noise barriers at a cost of more than $2.5 billion (in 2001 dollars).

*How does the FHWA TNM differ from earlier noise-prediction software?*

The FHWA TNM calculates traffic noise levels using new acoustical algorithms and newly measured emission levels for five standard vehicle types: cars, medium trucks, heavy trucks, buses, and motorcycles. Its flexible database includes more than 6,000 individual vehicle pass-by events, measured at 40 sites across the country.

The FHWA TNM models sound levels for locations with and without noise barriers. The FHWA TNM allows for analyses of noise from constant-flow and interrupted-flow traffic and determines the effects on noise levels of different pavement types, graded roadways, rows of buildings, dense vegetation, and parallel noise barriers.

*What are the potential cost savings?*

The FHWA TNM provides a 1-decibel increase in accuracy over FHWA's previous prediction model. Nationwide, noise barriers average 3.6 meters (12 feet) high. A 1-decibel improvement in traffic noise prediction accuracy could reduce the barrier height needed to control noise by 0.6 meters (2 feet), generating a 16 percent savings in noise barrier program costs, so savings could total more than $19 million a year.

## Solution: Traffic Noise Model Predicts Traffic Noise Impacts Around Highways

The Federal Highway Administration has developed the FHWA Traffic Noise Model (FHWA TNM), a state-of-the-art computer program for predicting noise levels in the vicinity of highways. It uses advances in acoustics and computer technology to improve the accuracy and ease of modeling highway traffic noise, including the design of efficient,

### Benefits

- Improves accuracy of predicting traffic noise levels.
- Helps design more efficient noise barriers.
- Reduces program costs for noise barriers.

*Additional Resources*

The FHWA TNM is being distributed by the McTrans Center at the University of Florida at a cost of $695. The FHWA TNM package includes the executable code, the User's Guide, the Technical Manual, and a CD-ROM Trainer. The FHWA TNM may be ordered from McTrans at 352-392-0378, extension 242, Monday–Friday. The fax number is 352-392-3224.

For more information, contact:

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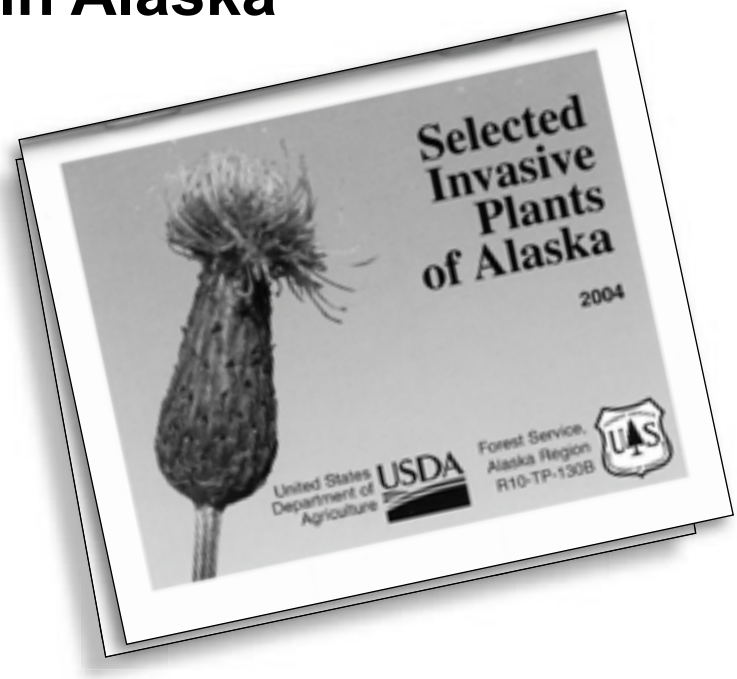
# A New Pocket Guide for Identifying Invasive Plant Species in Alaska

With great color photos and a handy size for fitting in your shirt pocket for field trips, this new book produced by USDA Forest Service and UAF Cooperative Extension Service contains some alarming facts.

When trying to identify an unknown plant, color photos often help. This new pocket guide provides a selection of invasive plants found across Alaska today. The booklet is not intended to take the place of more comprehensive reference guides, but to help those unfamiliar with these species to begin to recognize them, as the first step towards taking action.

Non-native invasive plants displace native vegetation, degrade wildlife habitat, and negatively affect human health, the economy, and the environment. Factors such as geographic isolation and harsh winters have protected Alaska from large-scale invasive plant infestations in the past. Recently, however, some of the most harmful noxious weeds of the Lower 48 states have begun to grow and spread in Alaska.

Many of the invasive plants featured in this booklet have been responsible for significant economic losses and environmental damage across North America over the past two centuries. Other species featured here (Siberian peashrub and European bird cherry) have been dependable components of Alaska's urban landscape, but were included because they have recently been observed spreading aggressively into Alaskan wildlands and natural areas.




For a copy of this booklet, contact
Linda Gavin
907-451-5320
linda_gavin@dot.state.ak.us

An on-line version is available for viewing on the website listed here:


This booklet and on-line document was produced by:

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Jamie M. Snyder
UAF Cooperative Extension Service

# Training and Meeting Calendar 2004

## March

**Traffic Control Design Specialist (TCDS)**
March 2 and 3 in Fairbanks.

**NHI 135047A: Stream Stability and Scour at Highway Bridges for Bridge Inspectors**
March 15 in Juneau.

**Air Quality Analysis**
March 21 and 22 in Fairbanks
March 24 and 25 in Anchorage.

**NHI 131050A: Asphalt Pavement Recycling Technologies**
March 22 and 23 in Anchorage
March 24 and 25 in Fairbanks.

**Construction Dewatering Seminar**
March 23 in Fairbanks.

**Scheduling for Construction Administration: Planning, Updating, and Claims Analysis**
March 23 and 24 in Juneau
March 30 and 31 in Anchorage.

## April

**NHI 310110A: Federal Aid Highway 101 (State Version)**
April 11 and 12 in Anchorage.

**NHI 137024A: Introduction to Systems Engineering for Advanced Transportation**
April 14 and 15 in Anchorage.

**Traffic Control Technician (TCT)**
April 18 in Anchorage.

**Traffic Control Supervisor (TCS)**
April 19 and 20 in Anchorage.

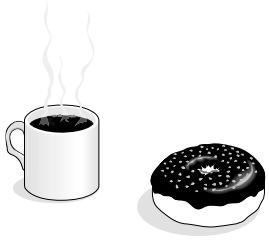
**Flagger Instructor Training (FIT)**
April 21 and 22 in Anchorage.

**NHI 135080A: Hydrologic Analysis and Modeling with WMS**
3 days during the week of April 25 in Anchorage.

**For information about T2-sponsored training, contact:**
**Dave Waldo** *at 907-451-5323, david_waldo@dot.state.ak.us*
*or*
**Simon Howell** *at 907-451-5482, simon_howell@dot.state.ak.us*
*or go to:*
*www.dot.state.ak.us*

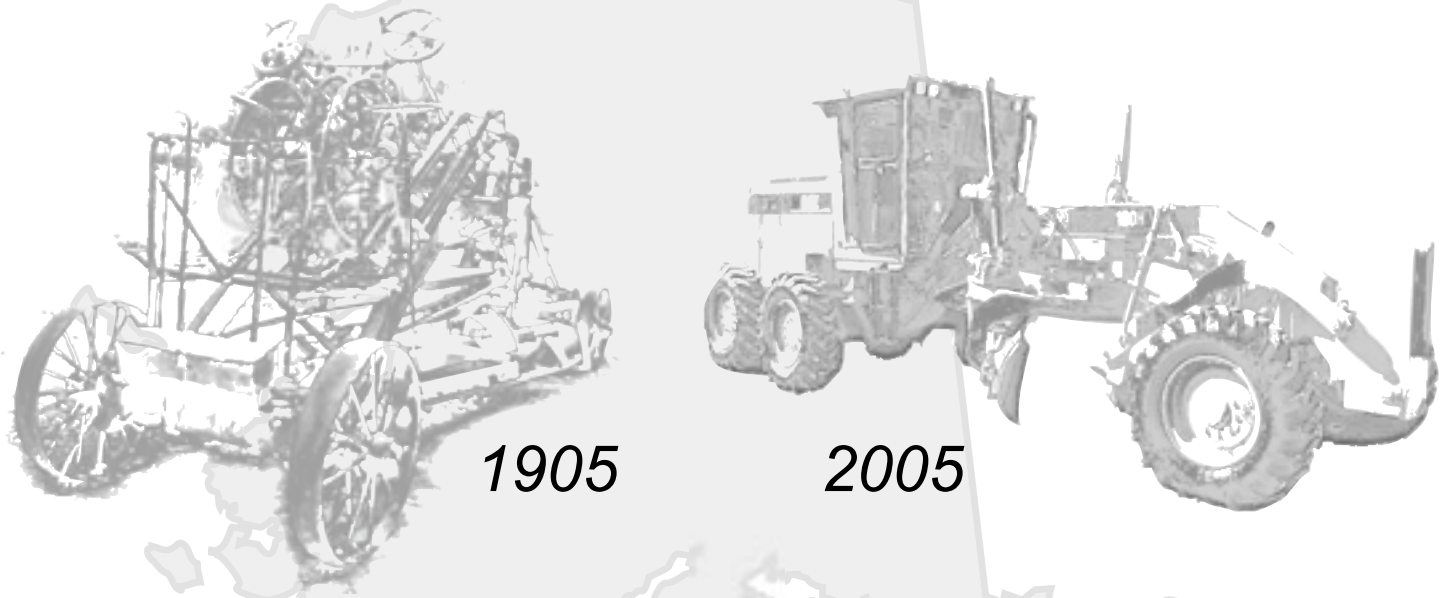
## Meetings Around Alaska

| Society | Chapter | Meeting Days | Location & Contact | |
|---|---|---|---|---|
| ASCE | Anchorage | Monthly, 3rd Tues., noon | Moose Lodge | |
| | Fairbanks | Monthly, 3rd Wed., noon | Captain Bartlett Inn | |
| | Juneau | Monthly, 2nd Wed., noon* | Breakwater Resturant | * except June–Aug. |
| ASPE | Anchorage | Monthly, 2nd Thurs., noon* | Coast International Inn | Jennifer Gibson, 343-8130 |
| | Fairbanks | Monthly, 1st Fri., noon | Captain Bartlett Inn | * except summer |
| | Juneau | Monthly, 2nd Wed., noon** | Westmark Hotel | ** except June–Aug. |
| ASPLS | Anchorage | Monthly, 3rd Tues., noon | Sourdough Mining Co. 5200 Juneau st. | |
| | Fairbanks | Monthly, 4th Tues., noon | Westmark Hotel | |
| | Mat-Su Valley | Monthly, last Wed., noon | Windbreak Cafe | George Strother, 745-9810 |
| AWRA | Northern Region | Monthly, 3rd Wed., noon | Rm 531 Duckering Bldg., University of Alaska Fairbanks | Larry Hinzman, 474-7331 |
| ICBO | Northern Chapter | Monthly, 1st Wed., noon except July and August | Zach's Sophie Station | Tom Marsh, 451-9353 |
| ITE | Anchorage | Monthly, 4th Tues., noon** | Sourdough Mining Co. | Art Johnson, 276-4245 ** except July, Nov., & Dec. |
| IRWA | Sourdough Ch. 49 | Monthly, 3rd Thurs., noon** | West Coast International Inn | |
| | Arctic Trails Ch. 71 | Monthly, 2nd Thurs., noon** | Zach's Sophie Station | |
| | Totem Ch. 59 | Monthly, 1st Wed., noon | Mike's Place, Douglas | ** except July & Dec. |
| Asphalt Pavement Alliance | Alaska | 3rd Wednesday of every other month | varies | John Lambert 267-5294 |
| PE in Government | Anchorage | Monthly, last Fri., 7 a.m. | Elmer's Restaurant | |
| Society of Women Engineers | Anchorage | Monthly, 1st Wed. 5:30 p.m. except July and August | DOWL Engineers | Julie Gaken, 269-0634 |



# A Hundred Years of Alaska Roads

By Shannon McCarthy




On January 27, 2005, nearly a hundred people joined the Department of Transportation and Public Facilities to celebrate the 100-year anniversary of President Theodore Roosevelt signing the legislation creating the Alaska Road Commission (ARC) and the Alaska Fund.

*Andrew Niemiec, AKDOT&PF Northern Region director, addresses the crowd as they celebrate the 100-year anniversary of the Alaska Road Commission.*

The celebrations, held in Fairbanks, Anchorage, and Juneau, honored the contributions of the men and women who helped build the transportation network we enjoy today. A number of original Alaska Road Commission members attended, most notably former AGC surveyor and Alaska historian Claus-M. Naske. Professor Naske shared some stories and helped cut the cake with Northern Region Director, Andrew J. Niemiec. Copies of Professor Naske's book *Paving Alaska's Trails* were on hand for budding historians.

The contributions of these early pioneers were substantial. Back in 1905, only a handful of trails existed in Alaska, none of which could accommodate year-round horse-drawn wagons. In fact, most travel in the state had to be conducted by boat along rivers or on winter trails. After a congressional visit to Alaska, U.S. representatives and senators introduced a series of legislation designed to help in the economic development of the territory by improving the transportation system.

The Alaska Road Commission identified over 475 miles of needs in the first year, far exceeding the dollars generated by the Alaska Fund. Funding was

*(continued on back page)*

## A Hundred Years of Alaska Roads *(continued from page 19)*

approved for their first project, however, which was to build a year-round wagon trail from Valdez to Fairbanks, a trail we now know as the Richardson Highway.

By the time the commission was transferred to the U.S. Department of Commerce, Division of Public Roads in 1956, the Alaska Road Commission had built over 10,000 miles of roads and had 890 employees. The Division of Public Roads was subsequently transferred to the Alaska Department of Highways at statehood in 1959. Finally, the organization was named Department of Transportation and Public Facilities when the department merged with Public Works in 1977.

*Local historian Claus-M. Naske helped Andrew Niemiec, AK DOT&PF Northern Region director, with cutting the cake during the celebration of the Alaska Road Commission's 100-year anniversary.*

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