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

T E C H N O L O G Y F O R

# Alaskan Transportation

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**In this issue . . .**



# All-Season, Studless, or Studded Tires? You Decide!

Studded tire use continues to be a controversial topic. Many states have banned studded tires and still others have restricted the kind of studs that can be used. Advocates of studded tires argue they improve winter driving due to increased vehicle traction. Opponents say they accelerate pavement wear such as rutting, costing tax payers millions, and believe any traction benefits, over newer tire technologies, are largely perceived.

In a report completed for the Washington State Transportation Center entitled An Overview of Studded and Studless Tire Traction and Safety, Robert Scheibe provided a brief history of studded tires, studless winter tires, and traction performance characteristics. We've summarized Mr. Scheibe's report by tire type and then listed the pros and cons.

## All-Season Tires

All-season tires can provide acceptable traction for winter snow and ice driving conditions, without excessively compromising dry and wet traction. Performance on ice and snow will depend on tread configuration and the materials used in their construction. They are available in many different configurations.

*Pros*

- No swapping out tires summer to winter.
- The most reasonably priced tire, available in a wide range of sizes, treads, and produced by virtually all tire manufacturers.
- Perform well on packed snow surfaces.

*Cons*

- Not good performers on icy roads, especially near the freezing mark.

## Studless Winter Tires

Studless tires contain millions of uniformly distributed microscopic pores constantly being exposed as the tread surface wears and gripping like suction cups. In addition to providing thousands of miniature biting edges, these pores help wick away the thin layer of water that often develops on top of snow-packed and icy roads, allowing the biting edges to better adhere to the surface for more traction. Virtually all tire manufacturers now make studless tires—Bridgestone Blizzaks are one such tire popular in Alaska.

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*Pros*

- Approach studded tire performance without the damaging characteristics of studs.
- Tests conducted in Alaska showed studless tire performance equal to studded tires on snow.
- During cornering on packed snow, studless tires performed better than studded tires. Performance was nearly identical on icy corners.
- Due to their softer composition, studless tires wear faster than regular tires but maintain their effectiveness much longer than studs.

*Cons*

- On ice near the freezing mark, studless tires are slightly less effective than studs; however, this represents 6% of the winter in Alaska.
- Studless tires are more expensive. In Fairbanks, a set of four studless tires is about 30–40% more expensive than a set of studded tires by the same manufacturer.
- Require regular swap out.

## Studded Tires

Studded tires were introduced in the U.S. in the early 1960s. Studded tires rely on the studs' contact with the snow and ice surface for traction. Most studs are applied to winter or all-season tire tread at an additional cost.

*Pros*

- On ice near the freezing mark studded tires perform better than any other tire; however, this represents 6% of the winter in Alaska.
- Less expensive than studless tires.

*Cons*

- Studs wear quickly on bare pavement—a common occurrence during Alaska winters. Once a stud is worn, the effectiveness on snow or ice is greatly diminished.
- Offer no advantage on snow-covered roads.
- Create costly ruts in pavement, generating dangerous driving conditions such as tramlining (disruption of directional control because of the vehicle's tendency to follow ruts).
- Heavy-weight studs, where allowed, create even greater road damage, costing taxpayers millions of dollars every year.
- Suspend particulate matter from pavement dust created from the stud.
- Require regular swap out.

## Conclusion

The precise environmental conditions under which studded tires provide a traction benefit are rare. On smooth ice near the freezing mark they are great. As the temperature drops, so does the effectiveness of studded tires.

Studless snow tires seem to offer an excellent alternative. Good on ice, great on snow, but definitely more expensive.

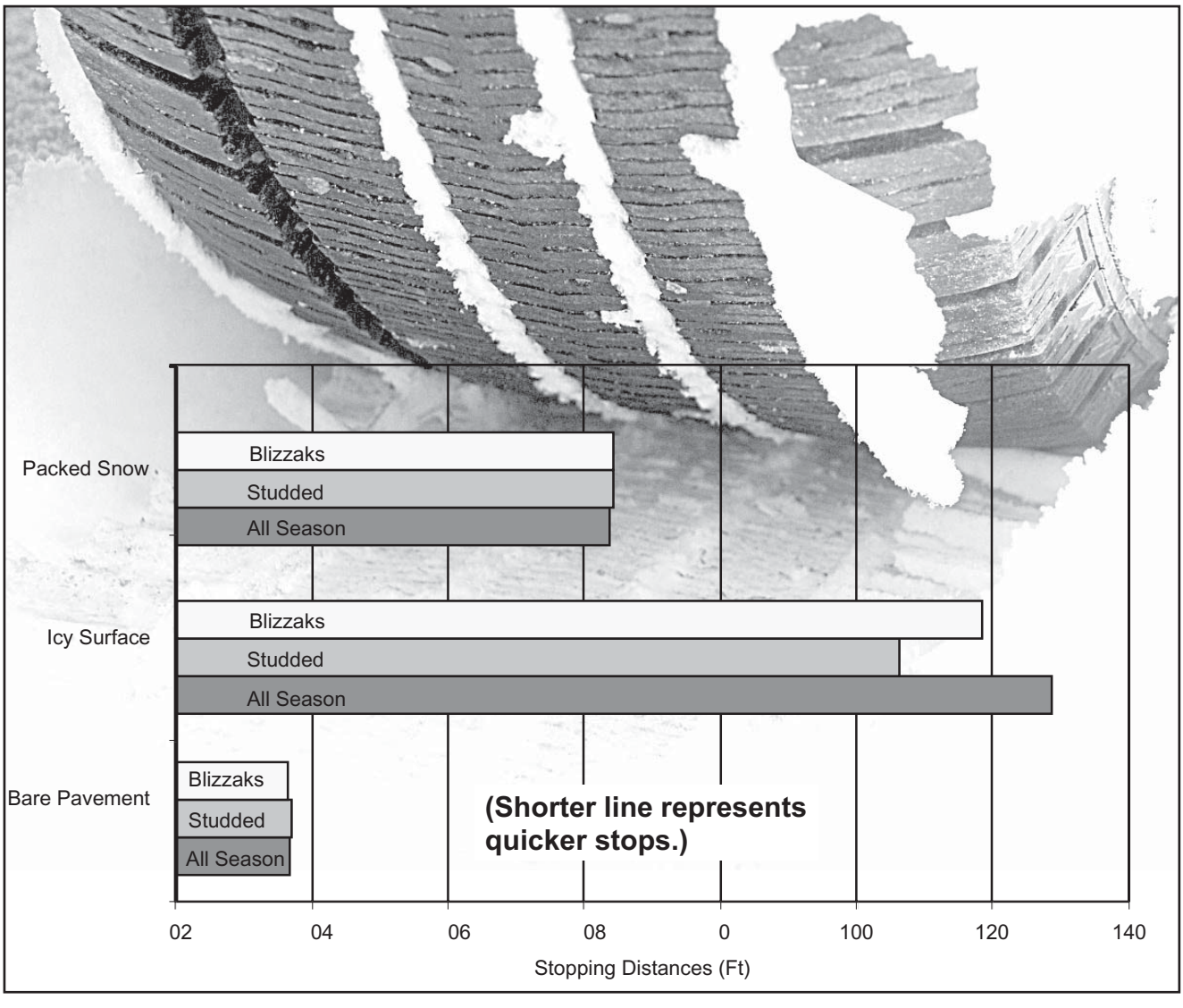
All-season tires can provide good traction on snow and ice. However, on ice near the freezing mark they perform poorly when compared to studded tires or studless winter tires.

Ultimately, the most important factor on ice and snow? You, the driver! Control on ice and snow are related more to how you drive than to tire performance. There is no substitute for knowing the capabilities of your tires or vehicle and reducing speed accordingly.

Traction performance can be characterized in many ways, including braking, acceleration, cornering, controllability, and grade climbing. Although all factors are important, the single best indicator of tire performance is braking distance and deceleration.

The chart on the next page shows stopping distances at 25 mph. They are the average of a front-wheel drive car, a rear-wheel-drive pick-up, and a rear-wheel-drive car. The test was conducted in Fairbanks at near-freezing temperatures.

All three tire types performed well on packed snow surfaces. On ice, studded tires performed only slightly better than Blizzaks. On bare pavement, studded tires performed the worst.






# America's Quest for Premium Aggregates

*Reprinted from* Better Roads, *August 2004. By Tom Kuennen.*

**As movement toward long-life asphalt and concrete pavements accelerates, attention falls on strength and configuration of aggregate particles.**

Liquid asphalt cement and Portland cement are the glue that holds a pavement together, but aggregates form the bulk of the pavement's volume and provide much of its strength.

For this reason, as the United States' road management establishment pursues long-life pavements with high performance characteristics, its emphasis has focused as much on aggregate properties, dimensions, and quality as on the binder properties of cement and liquid asphalt.

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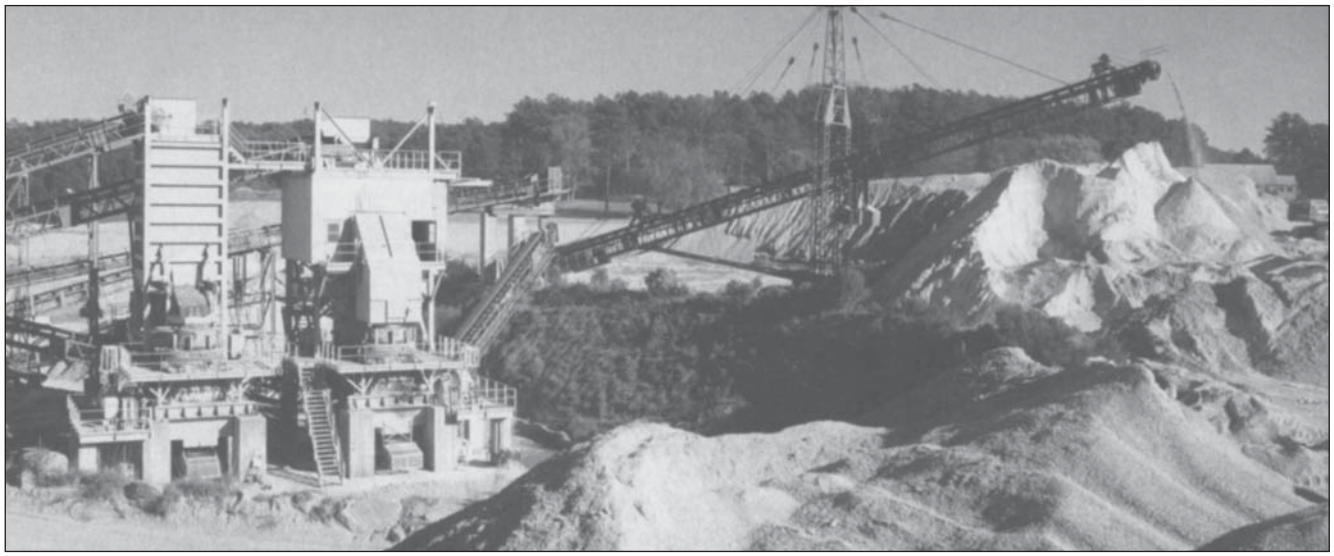

Photo courtesy of North Carolina Geological Survey

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New Superpave and high-performance concrete pavement(HPCP) mix design systems put tremendous importance on the quality of aggregates used, and premium aggregates are vital to the performance of open-graded friction courses and other special asphalt surface treatments.

### There is boosted concern for skid-resistant aggregates in surface courses.

Concurrently, highway safety concerns are increasing demand for skid-resistant aggregates that resist polishing even after long periods of time in surface courses.Even as demand for quality aggregates increases, supply issues are increasing, too.

- As public road agencies shift responsibility for aggregate specifications to the contractor, the contractor in turn is shifting more responsibility on the aggregate producer to provide consistent, more intensively processed materials—like aggregate with a particular shape and number of broken faces. This added refinement and testing boosts aggregate prices.
- If aggregate quality or type for a premium mix design like Superpave or HPCP is wanting locally, contractors are having to search far and wide for the aggregate specified, inflating the cost of construction. That's particularly true for skid-resistant aggregates used in surface or friction courses.
- While there is no shortage of aggregates per se, permitting and extracting desirable aggregates is getting vastly more difficult. Many quarries and pits are being engulfed by urban growth, and even remote sites in rural areas are being constrained by comprehensive environmental laws and regulations. Resistance to the startup of new quarries and pits—even in rural areas—is putting even more pressure on existing extraction sites.

Along with other trends in the aggregates market, there is political and market pressure to use more reclaimed asphalt pavement and recycled demolition concrete in road construction, potentially negating the benefits of select aggregate in construction. But research is under way to quantify where RAP and demolition concrete will work best in pavements and bases, and new attention is being given to the fractionation (enhanced processing) and storage of RAP to make its performance more predictable.

And test methods for aggregate characterization continue to evolve, with the most significant work being the ongoing National Cooperative Highway Research Program project 4-30A, Test Methods for Characterizing Aggregate Shape, Texture, and Angularity (see below).

### Aggregates and Pavements

Hot-mix asphalt typically consists of 94 to 96% aggregate and 4 to 6% asphalt cement, reports the National Asphalt Pavement Association. And the Portland cement Association observes that Portland cement concrete, by volume, will be composed of 60 to 75% aggregates (including sand), with 10 to 15% Portland cement, and the remainder water.

The National Stone, Sand and Gravel Association reports that, on average, every lane-mile of interstate uses 38,000 tons of aggregate, compared to an average 400 tons of aggregate used for a new home.

Coarse aggregates generally are those pieces greater than 0.19 inch, but usually between 0.375 and 1.5 inches in size. Fine aggregates are natural sand, or manufactured sand from a quarry, which pass the 0.375-inch sieve. Aggregates are graded according to their size, and a gap-graded aggregate mix—needed more and more for high-performance pavements—is one that entirely leaves out certain unwanted gradations.

Aggregate properties or characteristics include durability, resistance to skids and abrasion, propensity to absorb water (critical in freeze-thaw resistance), particle size, shape and texture, grading, and the voids they provide in a mix of aggregate.

Considering that both asphalt and concrete pavements are built on stone bases, it's clear that aggregates constitute by far the largest—and least expensive—component of road construction.

The properties of coarse and fine aggregates used in asphalt and concrete pavements and unbound base and subbase layers are very important to the performance of the pavement. Particle angularity, texture, and shape are among the aggregate characteristics with significant effects on performance. These properties vary widely with the type and source of aggregates and production processes.

Within an asphalt mix, good stone-on-stone aggregate structure within the asphalt lift serves as a skeleton that enhances pavement performance by boosting resistance to rutting and lowering internal strains that cause pavement fatigue. This kind of aggregate structure is made possible by extensive crusher processing, which creates multiple broken faces on each rock. The skeleton of the asphalt pavement lift is formed as these faces abut each other.

Existing local sources continue to be used for aggregates whenever possible. But the local availability of high-quality, inexpensive aggregates will be limited in the future as environmental and zoning laws complicate quarry placement and expansion.

## Premium Aggregates and Asphalt

Both stone matrix asphalt and Superpave mixes demand aggregates with certain essential properties, such as more angularity in the coarser fractions and clean, angular fine aggregate (see "Stone Matrix Asphalt is Catching on in the U.S.," *Better Roads*, September 2003, pp 22-27). This increased angularity in mixes will provide extended performance under increasingly heavy traffic loads.

And open-graded friction courses by definition are gap-graded, processed stone meeting strict size and face characteristics (see "Asphalt Rubber Makes Quiet Comeback," May 2004, pp. 32–43, and "A New Era for Permeable Pavements," *Better Roads*, April 2003, pp. 28-35).

But even conventional asphalt mixes will perform better with premium, processed aggregates. Premium aggregates can attenuate rutting and moisture-induced damage to hot mix asphalt. Rutting can be controlled by the use of large aggregates, with angular, rough, coarse aggregates, and angular fine aggregates. And changes in skid resistance, called polishing, can be retarded with the right choice of aggregate surface characteristics and shape qualities.

## Superpave and Premium Aggregates

Twelve years after Superpave was introduced to North America—despite a few significant holdouts—it has become the standard of the United States asphalt paving community (see "Does Superpave Have a Local Future?", July 2003, pp. 22–29), and "Asphalt's Generation of Change," from *Better Roads*, November, 2003.

Superpave is a performance-based system of specifications for designing asphalt pavements that will hold up to the traffic loadings and weathering stresses of the future. Its performance-based system promises longer-lasting pavements that are specifically designed for local temperature ranges and traffic volumes.

The Superpave system includes three major themes: an asphalt binder specification primarily for a pavement's predicted loading and local climate; a volumetric mix design and analysis system; and mix analysis tests and a performance prediction scheme. Superpave's volumetric properties include the percentage of air voids, voids in the mineral aggregate, and voids filled with asphalt.

Premium aggregates can attenuate rutting and moisture-induced damage to hot mix asphalt.

Superpave incorporates a new method for selecting and grading asphalt binders. Its performance-graded system allows for selection of a binder for specific climatic and traffic conditions. It's hoped that PG binders will result in reduced low-temperature cracking in pavements, precluding moisture percolating through cracks, thus improving pavement performance. It's also anticipated that the PG binders will boost

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resistance of pavements by providing binders that are stiffer at the high surface temperatures that the pavement will endure.

Aggregate gradation also plays a big role in Superpave, and the system introduces new aggregate selection and gradation methods as an integral part of the mix. The goal is a strong, stable aggregate structure resistant to shear, and Superpave aggregates have to meet surface requirements of coarse and fine aggregate angularity.

They also must contain a minimum of flat and elongated particles. An excess of these aggregates could result in mixes that compact with difficulty or contain aggregates that could shatter during rolling. The latter condition creates exposed rock faces that have not been covered with binder, setting the stage for stripping or raveling.

The current Superpave system describes aggregate shape using three tests: fine aggregate angularity, which is inferred from the volume of air voids in a loosely compacted aggregate sample; coarse aggregate angularity, which is inferred from the number of aggregate fractured faces; and the relative dimensions of coarse aggregates to identify flat and-elongated particles.

### Concrete and Premium Aggregates

Due to its rigidity and compressive strengths, high-performance Portland cement concrete is more forgiving than Superpave when it comes to the configuration of aggregate particles. But not so when it comes to the kind of aggregates used: alkali-silica reactivity(ASR) and related ills require careful screening of aggregate for concrete, at increased cost.

ASR is a chemical reaction that occurs between alkalis contributed primarily by cement and a reactive form of silica from reactive aggregate. Together, they can form an alkali/silica gel. Under the right conditions—in particular, enough available moisture—the gel will expand and produce stresses and damage in the concrete.

Over time, this expanding ASR gel exerts tremendous internal pressure that can lead to cracking of the concrete. This cracking can provide pathways for potentially deleterious materials such as water, sulfates and chlorides to the interior of the concrete matrix, which in turn can lead to serious durability issues such as freeze/thaw damage, sulfate attack, or steel corrosion.

Because construction aggregates are so low-priced, but so heavy, transportation costs impact their price more than any other product.

Recycled asphalt product, or RAP use can be increased in premium mixes by handling it like a premium product. Its consistency can be enhanced if it's kept in sheltered, blended RAP stockpiles (to keep moisture content low), and if it's fractionated, or reprocessed, into individual gradations.

Fractionation of RAP—a relatively new concept just now getting coordinated exposure to the industry—screens RAP, with oversize elements broken into smaller fractions and stockpiled separately. Fractionated RAP may result in more uniform mixes, in which RAP fractions can be isolated, compared to general stockpiles in which large and smaller fractions may become segregated.

"Fractionating RAP doesn't necessarily mean that we can put more RAP in a mix," said Kent R. Hansen, P.E., NAPA director of engineering. "What it may mean is that we will have more mixes where the use of RAP is allowed because we can better control the uniformity."

Perhaps more important, fractionating allows classification of RAP by its residual asphalt content, which in the right concentration will permit proportionately less liquid asphalt when reused in HMA, at great sav-

*On I-294 in Delaware, concrete damage from alkali-silica reactivity is temporarily patched with HMA. Photo courtesy of Portland Cement Association.*

ings. Fine RAP, per pound, will have more residual liquid asphalt than coarse RAP.

### Quest for Premium Aggregates

Traditionally in the United States, aggregate sales have been limited to a relatively small market area, circumscribed by hauling costs. But the quest for premium aggregates sometimes takes contractors far and wide for the one aggregate that meets spec.

Construction aggregates are the lowest priced of all mined products, but as a result, transportation costs impact their price more than any other product. "Since they are so low-priced, transportation costs from the mine to the point of use can become the major part of their cost to the consumer," said Val Tepordei, commodity specialist, U.S. Geological Survey.

### Finding Harder Aggregates

Alaska is grappling with the use of harder aggregate in surface or friction courses to reduce wear caused by studded tires.

Researchers Douglas J. Frith, P.E., and Dennis A. Morian, P.E., Quality Engineering Solutions, Inc. of Reno; Dr. Shelley M. Stoffels, P.E., Pennsylvania State University; and Dr. Steve Saboundjian, P.E., Alaska Department of Transportation & Public Facilities, said in January that Scandinavian countries found that harder aggregates have resulted in improved pavement performance.

When a soft aggregate is used in the asphalt surface on bare roads, they said at January's Transportation Research Board meeting, the high stress load between each tire stud and the surface aggregate causes binder and surface aggregate erosion, resulting in wheel path rutting.

But there's a problem with hard aggregate. "High quality aggregates are not readily available throughout Alaska," they said.

After conducting a cost effectiveness study, the researchers recommended that Alaska implement hardness specifications on roadways with volumes exceeding 5,000 ADT and other roadways showing excessive wear, and use harder aggregate requirements for pavement surface courses only.

"This will preserve market share [for local aggregate producers] for lower volume highways, and preserve the premium aggregate for use in higher volume highways," they said. "[R]emember that the harder aggregate material is only applicable to surface course paving. Other layers can continue to utilize locally available materials. The effect of this is to minimize the loss of market share experienced by local aggregate producers and minimize the increased cost to ADOT&PF."

The researchers suggested that the state work with hot-mix producers regarding the availability of harder aggregates in the Vancouver, B.C., and Pacific Northwest regions, which likely could be acquired at reasonable cost by barge. "Alaska DOT&PF should evaluate additional out-of-state aggregates to confirm [that] alternative sources are available to fill the need for material," they said.

### NCHRP Researches Aggregate Tests

In the meantime, new research by the National Cooperative Highway Research Program Project 4-30A, Test Methods for Characterizing Aggregate Shape, Texture, and Angularity, will identify test methods that will make it easier for contractors, owning agencies, and material suppliers to provide the aggregates needed for Superpave.

The $450,000 study by the Texas A&M Research Foundation began in August 2003 and is scheduled for completion in February 2005.

The research is identifying suitable test methods for measuring shape, texture, and angularity of aggregates used in asphalt and concrete pavements and in base layers. Researchers will evaluate and validate the most promising test methods for use in central and field laboratories.

Protocols for the recommended test methods would be developed for consideration and adoption by the American Association of State Highway and Transportation Officials, and a final report would be prepared that includes an implementation plan for moving the results of this research into practice.

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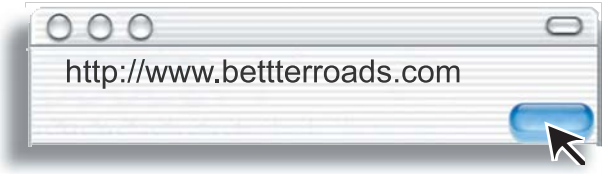


or for Aggregates Manager, visit

# Paving the Last Frontier

*By Michael Fickes*

*Reprinted by permission of National Asphalt Association. From July/August 2004 issue of* HMAT *magazine*

Alaska's private contractors and the Department of Transportation and Public Facilities have joined forces to battle the elements with better road building specifications.

Permafrost, wilderness, and a really short paving season present big challenges to Alaskan contractors.

Temperature extremes create problems for Alaska's road builders. The swings cause freeze-thaw effects rarely encountered in the continental U.S. In addition to potholes, freeze-thaw cycles produce frost heaves, a phenomenon in which moisture collects beneath the road surface during the summer, freezes in the winter and heaves up, causing large waves and cracks to form in asphalt road surfaces. In addition, more than half the roads in Alaska are built on ground with permafrost, an ice-laden soil that remains frozen year round. Usually. Sometimes, the permafrost melts, causing the pavement to sink and crack in short order.

The severe road-building environment requires near-perfect material specifications for roads, a tall order under any conditions. "There are a dozen things that can go wrong with a pavement," says John Ryer, P.E., construction group chief with the Alaska Department of Transportation and Public Facilities (DOTPF). "When you get six or seven of these things wrong at once, a pavement will fail. When you start paving below 32 degrees, three or four things are already wrong, so you had better get everything else right."

Recently, the paving industry and the DOTPF joined forces in an effort to get more of Alaska's asphalt pavement specifications right.

*"There are a dozen things that can go wrong with a pavement. When you get six or seven of these things wrong at once, a pavement will fail. When you start paving below 32 degrees, three or four things are already wrong, so you'd better get everything else right."*

## Forming a Paving Alliance

In 2001, Steve Dombrowski, quality control manager for Wilder Construction-Alaska, attended the Asphalt Pavement Conference, organized by the Asphalt Pavement Alliance in Austin, Texas. While watching the technical presentations, Dombrowski was impressed by the number of states where contractors and DOTs worked together to improve asphalt pavement performance. In Alaska, the state specified and the contractors complied.

In the fall of 2001, the Alaska DOTPF introduced a series of new specifications at its annual Alaska Asphalt Pavement Summit. "The contractors did not agree with a number of changes," says Dombrowski.

Seeking a way to inject the contractors' ideas into the specification process, Dombrowski spoke to Wilder's paving superintendent about his experience at the conference in Austin. Together, they approached Joe Perkins, commissioner of the DOTPF, and suggested the formation of an Alaska Asphalt Pavement Alliance.

*In Nome, Alaska, a contract required late-season excavation and reconstruction at a runway intersection. Cold weather set in and when temperatures warmed to +10˚F, paving began. Keeping water flowing and the crew warm was a problem.*

*Nome, Alaska, the end of the Iditarod Sled Dog Race.*

Perkins liked the idea and promised that state transportation engineers would participate in the group, present state specifications for general discussion, and support studying alternatives when contractors presented reasonable objections.

"We decided to support the alliance," says Mike San Angelo, statewide materials engineer for the DOTPF. "You can't specify quality. You have to build it. And building roads is the contractors' job. We believed an alliance would tie our personnel and specifications to the contractors who are ultimately responsible for the quality. Meetings would be forums that would give the contracting community a way to comment on what we're thinking about and what we're worried about."

About 15 people, representing a half-dozen contractors and the DOTPF, showed up at the first meeting, held in Anchorage in the winter of 2002. At that meeting the alliance decided to review existing specifications that contractors had questioned, while also marking proposed specification changes for further study.

Since then, the group has produced compromise accords on several specifications. In one case, the American Society for Testing Materials (ASTM) will consider modifying its standards in response to Alliance test results.

## Seeking a National Benchmark

In recent years, the addition of polymers to asphalt cement has promised to improve the quality of asphalt pavement. "Polymer additives can improve pavement performance in Alaska's temperature ranges," San Angelo says. "Our goal is to find a mix that will perform well from –28 degrees Centigrade to 76 degrees Centigrade."

More than 40 of the 50 states currently specify polymer modification of asphalt cements. San Angelo believes that all 50 states will soon have such specifications. All state specifications have different goals. Some states, like Alaska, hope to promote performance in environments with wide temperature swings. Others may focus on issues like traffic loading. States develop different polymer specifications for particular road requirements.

Polymer additives can improve asphalt pavement performance in four critical ways. The additives can widen the range of high and low temperatures at which asphalt will perform. In addition, additives can help reduce cracking, rutting, and fatigue, the three main problems that affect asphalt pavement performance from Alaska to Florida, along with proper mix design, structural design, and construction.

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But there are roadblocks. While it's not difficult to figure out how much polymer is needed to produce a certain level of pavement performance, it is difficult to ascertain exactly how much polymer additive has actually gone into a particular binder. Refiners jealously protect the precise contents of their blends. Determining the polymer content in a particular blend requires laboratory tests. "We're paying a lot of money for polymer modifications, and we want to be sure that the asphalt cement provided to asphalt companies (contractors) contains the specified amount of polymers," says San Angelo. "There are a number of tests for polymer-modified asphalt. Each has its own quirks and faults."

After considering the various available tests, DOTPF adopted an ASTM approved test for "toughness and tenacity" as the standard by which it would judge polymer content of asphalt roads. Introduced to Alaska five years ago, the test uses specialized test equipment to stretch a bar of cooled asphalt. A numerical result represents the toughness and tenacity of the asphalt produced by the specified polymer additive. DOTPF specifications set a minimum goal for the toughness and tenacity based on the performance expected from a road surface.

*The temperature extremes create problems for Alaska's road builders. The severe road-building environment requires near-perfect material specifications for roads.*

*"You can't specify quality. You have to build it."*

The quirk or fault with the toughness and tenacity test stems from inconsistent test results. Different labs draw different conclusions about polymer content, and the variation, called interlab variability, can be as high as 30 percent. "The contractors complained about this when we started nailing their products," San Angelo says.

Contractors argued that when their tests show a polymer content above the minimum required by the state, the state's tests may find unacceptably low content not because the content really is too low but because of the 30 percent variability inherent in the testing method.

The Alaska Alliance has begun to look for a solution to this problem by assembling a task force of contractors and DOTPF engineers. The goal is to reduce the interlab variability of results by tightening the temperature ranges at which samples undergo testing. With a more uniform testing regimen, tests of samples made from the same batch of asphalt cement should prove more consistent between labs. The approach is to conduct round-robin tests in different labs using samples made from the same batch of asphalt cement prepared under identical conditions. San Angelo hopes this approach will show an interlab variability no higher than 10 percent.

"If we get this down, we'll send our testing standards to ASTM, and they'll consider updating their standards," adds San Angelo. "If we can't, then the department will have to look at using a different test."

Alternatives include elastic recovery, in which asphalt is poured into a mold and stretched until it snaps back. The greater the elasticity, the more the asphalt snaps back, and the more likely that the polymer will produce the desired performance.

In addition to toughness and tenacity testing, the alliance is also exploring the possibility of adopting different tests for asphalt content and new tests for longitudinal joint density.

### Studying New Ideas

"The mission of the alliance is to provide quality pavements to the people of Alaska through partnering, training, education, and research," Dombrowski said. "Primarily that means improving communications between the department and the contracting community."

While DOTPF and the contractors have worked together for decades without an alliance, San Angelo believes that new asphalt science requires the closer cooperation that the alliance will foster. "There are a lot of new ideas coming down the pike," he said.

For example, San Angelo plans to ask the alliance to look at an issue he has been studying: thermal segregation or uneven cooling. Because of the short paving season and the potential for cool weather during paving, this issue is of primary interest to Alaskan road builders. During transport, material around the outside of the truck bed cools faster than the interior. At the site, the HMA goes into a paver, and if the material is not remixed, cold spots can occur in the mat.

Research with thermal cameras shows that areas covered with cooler asphalt are difficult to correctly compact and may eventually produce potholes. "We

can illustrate the problem in an Alliance presentation and start talking about how to mitigate it," San Angelo said.

In the end, San Angelo sees the alliance as a tool that will enable DOTPF engineers to work with contractors to smooth the way for the application of new techniques and better roads.

### Pavers Barge Into Iliamna Airport

While the new Alaska Asphalt Pavement Alliance studies and tweaks specifications, asphalt contractors must also deal with a larger problem: the Alaskan wilderness.

Last year, for example, Wilder Construction paved a gravel runway at Iliamna Airport about 200 miles west of Anchorage, on the state's southern coast. The climate at Iliamna was not a problem. But logistics were. Iliamna Airport lies across Cook Inlet, just north of Iliamna Lake, between two massive National Park preserves. Roads in and out of the region are scarce, and asphalt plants are nonexistent.

Wilder had to build a temporary plant to produce asphalt for the project. The project required transporting asphalt cement, aggregate (crushed aggregate on site, from local pit), and equipment from Anchorage to the airport. Wilder moved asphalt cement, a rock crusher, an asphalt plant, three asphalt rollers, five loaders, two road graders, a water truck, and two dirt compactors.

The company trucked the materials and equipment to Homer, a small town located at the tip of a peninsula stretching 100 miles south of Anchorage into the Gulf of Alaska. A barge moved the supplies about 80 miles west across the Cook Inlet to Williamsport. Trucks met the barges and continued the move by road across a mountain to Pedro Bay on the shore of Iliamna Lake. Another barge finished with a 37-mile trip across the lake to Newhalen, where the airport is located.

Several major obstacles had to be cleared, including dredging in Williamsport, three weeks of repairs on the road over the Alaska Range, and reinforcing the bridge across the Iliamna River to accommodate much heavier loads. In addition, Wilder had to coordinate the barge trips with the ocean tides. Wilder's transportation experts had to use nearly every available tide between June and October to successfully complete the 41 barge trips.

Wilder placed about 62,000 tons of asphalt and used 135,500 tons of crushed aggregate in the project. In addition to the airport construction, Wilder paved 13.5 miles of roads around the Iliamna area.



# Dispute Resolution Guidance for Environmental Streamlining

**Problem: Disputes that arise during the transportation development process can cause delays.**

As a transportation project moves through the project development and environmental review phases, conflicts may arise among the various federal and state agencies involved in the process. The time and resources required to resolve these conflicts can add significant costs to the project and prevent it from being completed in a timely manner.

*Why do Disputes Occur?*

Disputes may arise over competing interests, such as conservation versus development; different needs, such as mobility and air quality; and the range of influences under which the project is carried out, such as political, statutory, and philosophical. Competing priorities of resource impacts, mitigation, and desired outcomes come into play.

*What Types of Disputes Occur?*

Information disputes that can cause delays commonly involve disagreements on lack of data, data interpretation, underlying planning assumptions, and agency jurisdiction. Disputes also can be related to insufficient agency resources, an agency's failure to fulfill a commitment, conflicts over various agencies'

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missions and mandates, and interpretation of terms used in the planning and review process.

*Putting It in Perspective*

The Federal Highway Administration's (FHWA) National Dispute Resolution System includes:

- Dispute resolution guidance, *Collaborative Problem Solving: Better and Streamlined Outcomes for All.*
- U.S. Department of Transportation (USDOT) National Procedures for Elevating Highway and Transit Environmental Disputes (USDOT Order 5611.1A).
- Roster of qualified neutrals experienced in the transportation development process.
- Facilitated interagency discussion workshops to improve transportation project development and environmental review through collaborative problem solving.

## Solution: Dispute Resolution Guidance Offers Framework for Managing Conflict

FHWA worked with the U.S. Institute for Environmental Conflict Resolution, federal transportation and resource agencies, and state departments of transportation to develop a guidance document, *Collaborative Problem Solving: Better and Streamlined Outcomes for All.*

*What is the Guidance Designed to Do?*

This guidance is designed to assist agencies as they plan transportation projects. It presents strategies for managing conflict and identifying issues that may arise during project development and environmental process reviews under the National Environmental Policy Act (NEPA) and related laws.

The guidance, one element of FHWA's national dispute resolution system, is not an absolute prescription but a source of problem-solving options. It can help agencies implement a coordinated environmental review process that streamlines unnecessary delays for highway and transit project consultation.

*What Strategies Does the Guidance Cover?*

The document outlines strategies for environmental streamlining and dispute resolution and recommends several guiding principles:

- Engage all relevant agency representatives early, actively, and continually in collaborative problem solving during transportation planning and project review processes.
- Improve negotiation and problem-solving skills of agency staff through training and coaching.
- Attempt to resolve disagreements at the earliest stage possible and at the lowest appropriate organizational level.
- Seek resolution first by focusing on how to meet agency interests and needs in the context of existing laws and regulations.
- Take advantage of experienced facilitators and mediators to help agencies design conflict management processes and resolve challenging disputes.
- Make effective use of high-level authorities as appropriate for negotiating impasses or resolving high-level issues.
- Educate each other regarding each agency's legal authorities, and structure collaborative processes to respect those authorities.

## Successful Applications: States use Environmental Guidance to Streamline Processes

Florida has adopted a strategy for incorporating environmental factors into its long-range planning process, the Efficient Transportation Decision Making (ETDM) Process. The ETDM process will link land use, transportation, and environmental resource planning through early and continuous agency, general public, and Native American involvement in planning, project development, and environmental decisions. The process will take advantage of the Florida geographic data library (containing more than 400 data fields) and will include exchange of plans, programs, data, and information, including electronic comments.

ETDM will replace sequential agency actions with concurrent agency actions and public involvement.

Oregon is defining a level of environmental review during planning that allows regulatory and resource agencies to provide input at various key points in the NEPA process. This is known as CETAS, or the Collaborative Environmental and Transportation Agreement for Streamlining.

Indiana developed streamlined environmental procedures to bring the NEPA process into early transportation planning and decisionmaking. The procedures include initiating major planning corridor studies as

*(continued on back page)*

# Improved Decisionmaking Using Geographic Information Systems

**Problem: Integrating geographic information into the transportation decisionmaking process can be difficult.**

Transportation planners must incorporate a wide diversity of information into the planning process; however, this information often takes time to collect, is not centralized, and is not easily presentable. An accessible information tool would be very helpful in the planning, scoping, permitting, and evaluating processes associated with transportation decisionmaking.

*Putting It in Perspective*

By using GIS to bring together information more efficiently, transportation planners are in a better position to review, analyze, and understand the problems they are addressing. This efficiency can save time and money, and a better understanding of information can lead to improved decisionmaking.

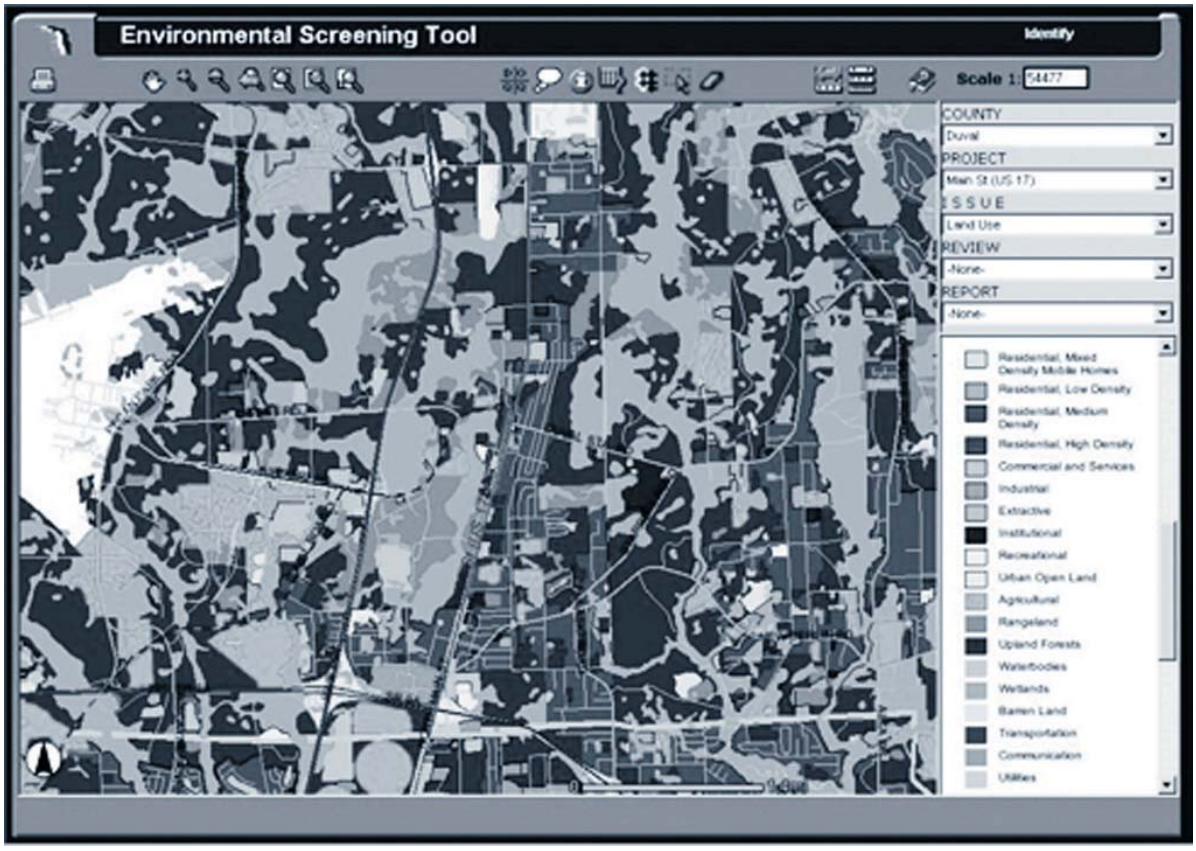
**Solution: Geographic information systems (GIS) can inform transportation planning.**

*What is GIS?*

GIS is a system of computer hardware and software that collects, stores, analyzes, and disseminates information about areas of the earth. While GIS often helps create maps, GIS can also maximize the quality and use of spatial data analysis to help answer questions of where, how far, how many, what size, and within what area.

*Why is GIS Useful?*

GIS can offer significant advantages over conventional computer programs. It allows geographers to collate and analyze information much easier than is possible with traditional research techniques. GIS technology is a general tool that can be used across a wide range of transportation applications. It allows




*A screenshot of Florida DOT's Environmental Screening Tool, which allows viewers to see where proposed transportation projects will be located with respect to nearby land uses and environmentally sensitive areas.*

staff to visualize the spatial relationships among any geographically referenced features (such as clusters of highway crashes and roadway characteristics). It facilitates integration of different databases based on geographic proximity (for example, GIS technology can identify the total population residing within a metropolitan planning area, but outside the urbanized area). It also helps transportation staff present findings to policymakers and the general public using visually attractive and understandable thematic maps.

### States get Results from GIS

The Florida Department of Transportation's (DOT) Efficient Transportation Decision Making (ETDM) process links land use, transportation, and environmental resource planning initiatives by actively involving agencies and the community. ETDM identifies critical issues early in the planning phase to reduce conflicts among permitting agencies. The process uses state-of-the-art technologies, including GIS and Web-based communication tools, to allow team members to communicate more effectively. Technologies such as these will improve decisionmaking and may significantly reduce the time, effort, and cost required to implement transportation plans while helping to protect human and natural environments.

The Indiana DOT, in association with the Indiana Geological Survey, compiled a GIS application for long-range planning and to help develop projects under the National Environmental Policy Act. The application includes more than 170 different geospatial data layers, ranging from environmental resources to socioeconomic, historical, and geologic feature data. Data originally was selected from several state and federal agencies and was edited and formatted. This application was first used in southwestern Indiana to help complete a Tier 1 environmental impact statement for the U.S. Interstate 69 project. The data coordination effort was so effective that a statewide GIS expansion has been completed. The Indiana GIS application will streamline future project development and reduce staff workload and fiscal demands.

Washington State and Washington State DOT have become national leaders in developing innovative methods to share geographic data. One such method is the Environmental GIS Workbench, managed by the Washington State DOT's Environmental Information Program (EIP). The Environmental GIS Workbench is a custom-built application that provides access to a broad range of statewide environmental and natural resource management data. The EIP supports the GIS application by coordinating with numerous federal, state, and local agencies to ensure that datasets are updated continuously and remain accurate. The increased availability of information has reduced decision review time, while EIP-centralized system control maintains and improves data accuracy. The digitized data layers are available as ArcView™ readable files and may easily be downloaded, overlaid, and manipulated.

### Benefits

- Encourages partnership anddata sharing.
- Identifies potential problems early in the planning process.
- Focuses on key technical issues.
- Provides agencies and communities with access to quality data.
- Improves feedback with summary reports and maps.

### Additional Resources

The Federal Highway Administration recently updated its National Highway Institute training course, "Applying Spatial Data Technologies to Transportation." To learn more about Florida's ETDM, visit www.dot.state.fl.us/emo. Additional information about Indiana's GIS application is available at http://igs.indiana.edu/arcims/index.html. For more information about Washington state's Environmental GIS Workbench, visit www.wsdot.wa.gov/environment/eao/envinfo/egwbhome.htm

*For more information, contact:*

Mark Sarmiento, FHWA Office of Interstate and Border Planning: Phone: 202-366-4828; E-mail: mark.sarmiento@fhwa.dot.gov.

# Remote Imaging in Confined Spaces: Culvert and Down-hole Applications

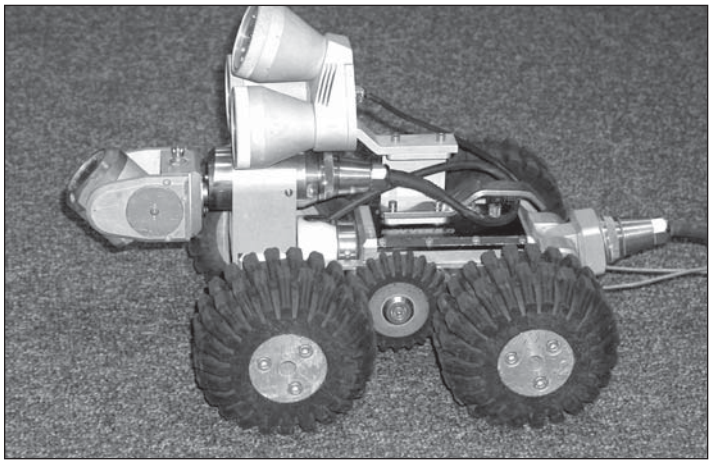
*Amit Armstrong, Ph.D., P.E., Technology Deployment Engineer*

## Why?

During a typical highway design and construction process, the need to assess the condition of existing culverts, cross-drains, and under-drains was the primary reason for acquiring the Rovver® 600 robotic remote imaging tool. This assessment is especially important for the small-diameter pipes located under high fills and retaining walls that cannot be inspected manually. Use of this tool has allowed our highway engineers to make fact based decisions about either replacing these pipes or accurately identifying the locations for rehabilitation using trenchless technologies. The geotechnical engineers have used the down-hole capabilities of this tool for verification of newly installed slope stability measuring devices, as well as condition assessments of existing installations. The ability to position the camera into confined, normally inaccessible or unsafe areas will allow our construction inspectors to verify structural reinforcement spacing, placing, and clearances for quality assurance and quality control purposes. The ability to push the camera into openings as small as two inches allows for the inspection of most in-place drainage systems and naturally occurring features. During the design process, the data collected once can be shared with all of the primary stakeholders many times throughout the project life-cycle.

## The Rovver 600

The Rovver® 600, manufactured by Everest VIT, Inc., is a self-propelled remotely operated motorized crawler. The versatile and modular component design provides capability to inspect inside pipes with diameters ranging from 2 to 36 inches. The Rovver can be outfitted with either an axial camera head for down-hole and push pole applications or with a pan or tilt camera head using a fully articulating manually focused low-lux lens for larger pipes. Both these lenses will provide digital video and digital still images. The camera heads can operate independently of the Rovver crawler assembly. Both of these camera heads contain an embedded ring of LEDs around the perimeter of the lens to provide lighting.



## The Rovver Applications

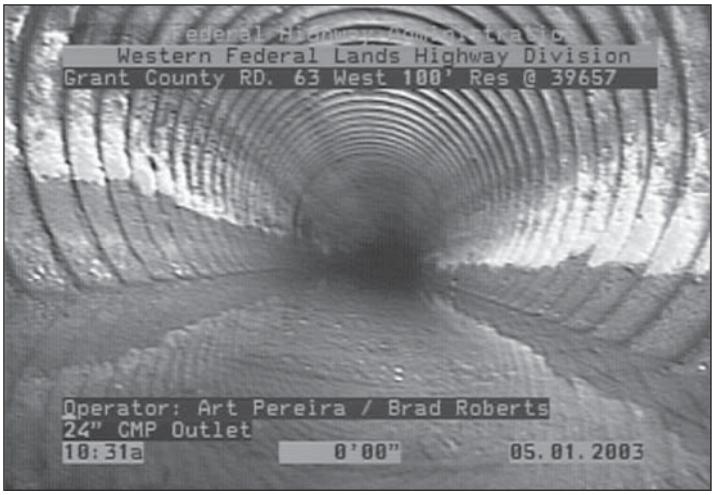
Rovver was used to assess the condition of all major poured-in-place box culverts, installed by the Civilian Conservation Coprps in the 1930's, at Alder Camp Road in the Redwood National Park in California. Ryan Tyler, project manager with the Federal Highway Administration, realized the benefit of using the Rovver:

"The ability to actively view the drainage structures on the Alder Camp affords us the ability to make fact based decisions, which significantly mitigated the risk of our decisions. Our clients, the National Park Service, also took part in this effort, which added support and buy-in for the hydraulic recommendations at these sites, and strengthened our overall team."

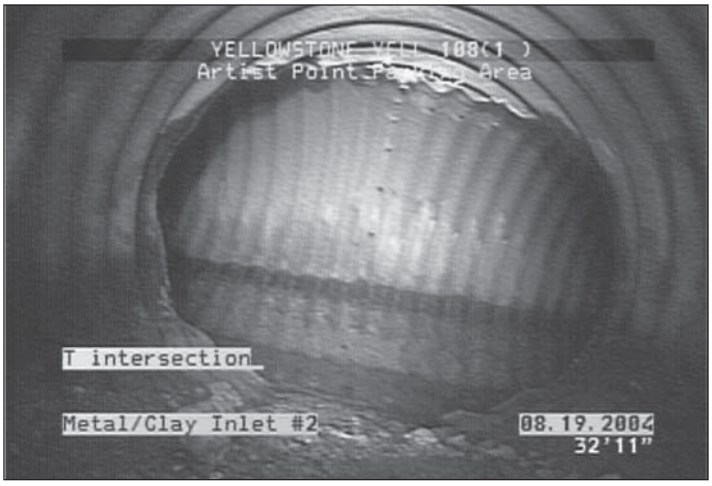
"Although the use of the Rovver increased PE costs, that amount is minute compared to the potential associated construction costs reflecting unknown conditions of in situ structures (in the case of Alder Camp Road)."

The use of Rovver tremendously helped the project team in their overall hydraulic analysis, condition assessment of the existing structures in order to accurately determine the appropriate treatment/rehabilitation efforts required. It was determined that a number of the box culverts did not require replacement as initially estimated, resulting in significant savings.

The Rovver was also used to assess the condition of a 24-inch culvert on the Swamp Creek East project




*Culvert image showing general condition of corrugated metal pipe (CMP)*




*Culvert image showing a T-intersection in CMP*


*Culvert image showing the collapsed circular wood pipe*

located near Libby, Montana. The inlet of the pipe was dry while the outlet was producing a steady stream of water. Richard B. Jackson, geotechnical engineer with Montana DOT, was aware that the culvert is being fed by collector pipes that ran parallel to the highway.


*Pendant control unit*

However, the exact location and number of collector pipes, as well as the overall condition of the entire spring collection system was not apparent to Montana DOT engineers. After using Rovver to collect data, Richard Jackson stated:

"The information provided by the robotic camera will be invaluable in the design of the roadway embankment and culvert. A decision has to be made as to whether we extend the existing culvert or build a new culvert and spring collection system."

"It is estimated that the information obtained by the robotic camera has a 'value added' of up to $100,000. This value added is derived from being able to better design the culvert which will help avoid costly change orders and claims during construction."

## The Rovver Availability

The Rovver is available for use, free of charge, to any state, county, or city transportation department as part of the Technology Deployment Program of Western Federal Lands Highway Division(WFLHD) in Vancouver, WA. The Rovver can be requested through your local LTAP/TTP center or directly through WFLHD (Amit Armstrong, 360-619-7668) Email: amit.armstrong@fhwa.dot.gov.

## Rovver Specifications

- Depth Rating: 1 bar (14.7 psi)–Equivalent to water depth of 10 m (33 ft)
- Temperature Rating: 32°-150° Fahrenheit
- Power Supply: AC inverter connection to inspection vehicle battery
- Video Format: MiniDV tapes

# TransWrite™ Interactive Training CD Available to Alaskan Transportation Professionals Free

TransWrite is writing that works for transportation professionals. Developed by Disk Dreamers and the Murawski Group, this interactive training CD will improve your writing skills. Whatever you write, from e-mails to technical reports, you can polish your style with TransWrite.

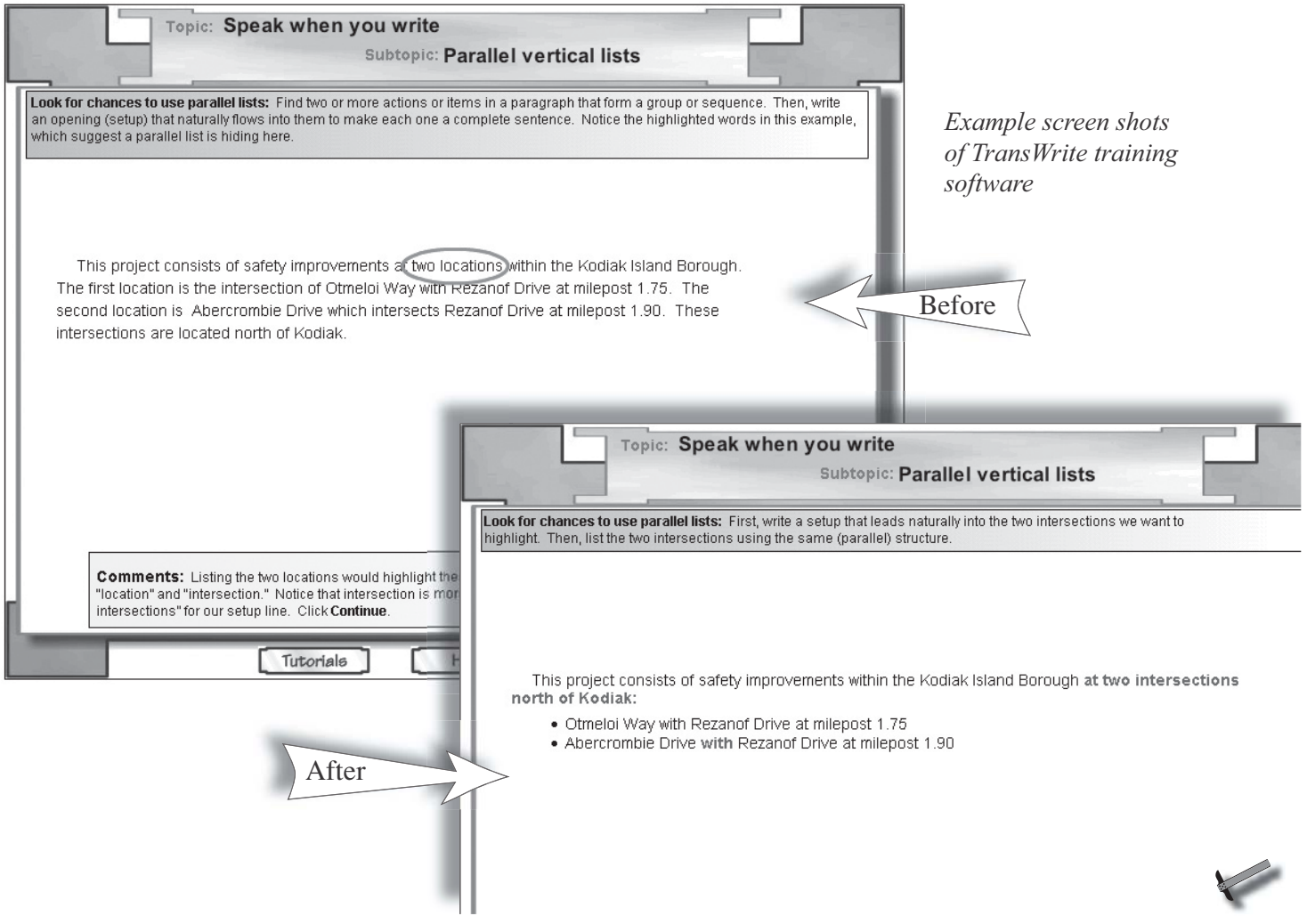
### Why Use Concise Writing techniques?

- Concise writing reduces document length by 10 to 50%, saving time and resources.
- Clear and concise contracts, reports, and specifications can reduce potential contract disputes.
- TransWrite is not composition 101 or creative writing; rather, it emphasizes clarity, economy, and quick access to ideas for better, faster decision making.

### What Style Techniques Does TransWrite Teach?

- Establish your purpose and audience
- Highlight key ideas for better access to your writing
- Arrange key ideas in common patterns
- Write plainly the way you speak
- Edit for conciseness

For your free copy of TransWrite contact
Linda Gavin 907-451-5320
linda_gavin@dot.state.ak.us
Dave Waldo 907-451-5323
david_waldo@dot.state.ak.us




*Example screen shots of TransWrite training software*

# Training and Meeting Calendar 2004

## November

**Road Safety Analysis Program (RSAP).**
November 4 and 18 in Fairbanks.

**Scheduling for Construction Administration: Planning, Updating, and Claims Analysis.**
November 3/4 in Anchorage
November 16/17 in Fairbanks.

**NHI 310111A: Conducting Reviews that Get Results.**
November 8/9 in Juneau.

**NEPA and Transportation Decision Making.**
November 16-18 in Anchorage.

**Title VI of the Civil Rights Act of 1964.**
November 17 in Anchorage,
November 18 in Fairbanks,
November 19 in Juneau.

**New Developments in Emergency Traffic Control: MUTCD Section 6I-Incident Management - What it May Mean for You.**
November 17, ATSSA Webucation Seminar (WWW).

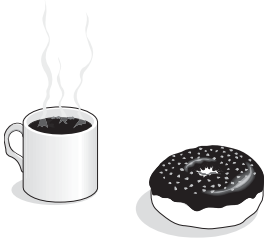
**Construction Cost Engineering.**
November 18/19 in Anchorage,
see December for Fairbanks schedule.

## December

**Alaska Flexible Pavement Design Overview.**
December 1 in Anchorage.

**Construction Cost Engineering.**
December 9/10 in Fairbanks.
see November for Anchorage schedule.

**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 |

# Bringing Back the Alaska Salmon Pack was Not a Sure Thing in 1907

*by Russell Mitchell*

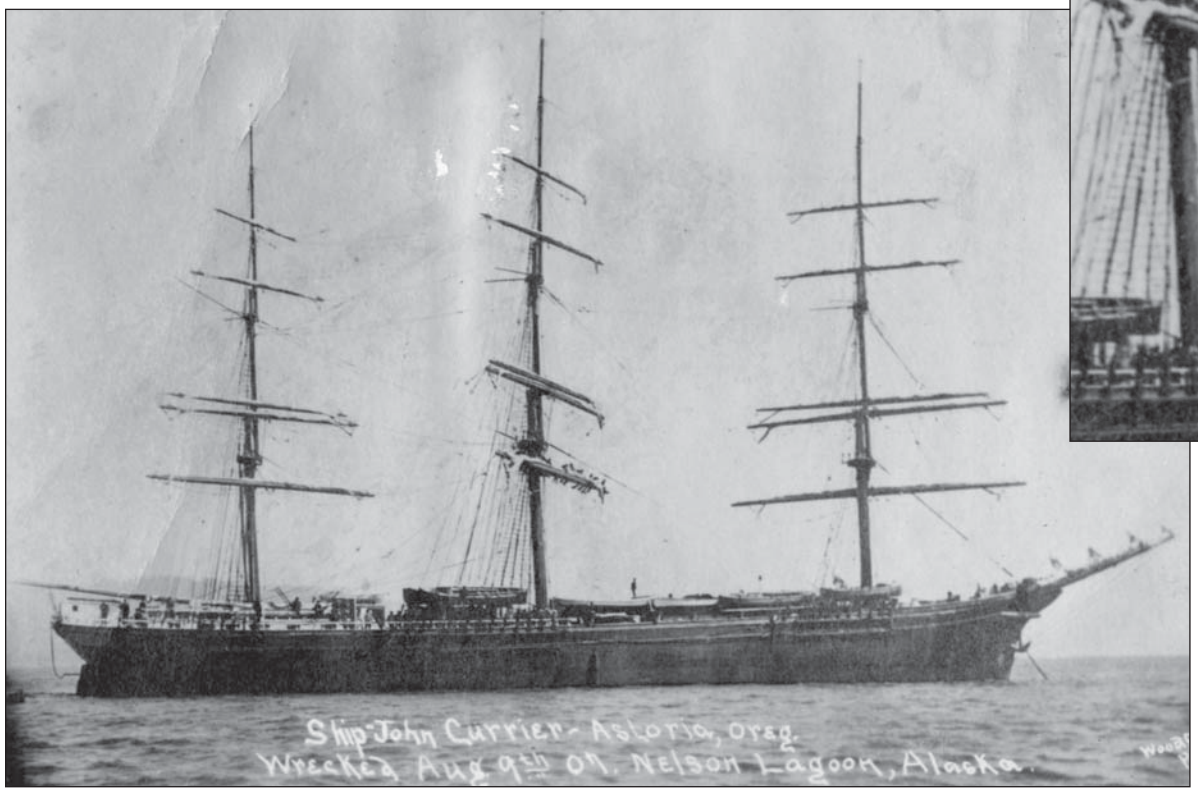
His favorite meal until the day he died was split pea soup, but he hated pickles. You see, my grandfather Oscar Lundgren claimed those two things were all there was to eat after leaving a foundering ship only to be marooned for a month on the Alaska Peninsula.

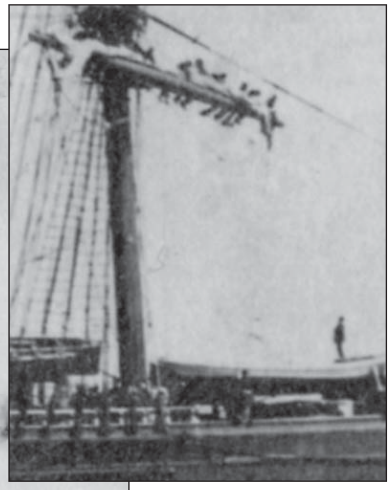
That vessel was the full-rigged ship *John Currier,* and it was driven ashore during a Bristol Bay fog August 9, 1907, while leaving Nelson's Lagoon with the season's salmon pack. It was stranded on a sandbar in fog and later broke up in a southwest gale.

There were 230 fishermen and cannery workers and the family of Capt. Murchison in the party.

The story is told by contemporary news accounts:

"According to Capt. Murchison, the *Currier* was driven ashore on August 9th by a fierce gaile that came up during a fog. Before the Commander could make out his bearing his ship had been piled up on the rocks. The crew and the passengers were gotten off safely, and the following morning when the fog lifted the crew took off all the ship's stores and the baggage of the passengers and crew. It was estimated thirty days supplies were on hand, but Capt. Murchison given command of the party by tacit understanding, ordered everybody on two meals a day. No warning was given, but it was thoroughly understood anyone stealing supplies would be shot. As a result there was no pilfering. Ten days after the party landed on a coast so bleak and barren that there was neither shelter nor food supplies, the *Currier* dashed herself to pieces on the rocks. From that time until the revenue cutter *McCullock* appeared, Sept. 11, not a ship hove in sight. Immediately after landing, two members of the crew were sent away with an Indian guide to seek help, and this company intended to set out again just as the revenue cutter *McCullock* appeared on Sept. 11th. The *McCullock* transferred her passengers to the *Thetis* which brought them to Seattle, Washington, Sept. 24. The rescue came just in time—provisions were getting low."



*Some of the many sailors required to sail a full-rigged ship can be seen working on the mainsail yard of the* John Currier *in this detail above.*

*A rare photograph of the full-rigged ship* John Currier *at Astoria, Oregon, before it was lost in Nelson's Lagoon, Bristol Bay, Alaska, in 1907. Full-rigged ships were fairly unusual in the Alaska service. Most of the large ships in use were barques or barquentines because they used fewer crew and were cheaper to operate. Photo and history of her father Oscar Lundgren courtesy of Elizabeth Mitchell. Also thanks to Craig Forrest at Tech Connect in Homer.*

*(continued from page 12)*

environmental assessments (EA's), thus engaging resource agencies in the developing purpose and need and in screening preliminary alternatives. If the project involves significant impacts, a Notice of Intent is issued to develop an environmental impact statement (EIS). EIS project development then begins where EA project development ended, ensuring a seamless decisionmaking process. This streamlined process will eliminate duplication of effort between planning and NEPA studies, resulting in more efficient decisions.

## Benefits

- Prevents unnecessary delays in developing transportation projects.
- Encourages collaborative decisionmaking and coordination among agencies.
- Resolves disputes early in the process.
- Builds trust and respect among agencies.

## Additional Resources

*Collaborative Problem Solving: Better and Streamlined Outcomes for All* is available at:


*For more information, contact:*

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• scroll down to Research & Tech

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