



Alaskan Transportation

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Alaska Transportation Week

by Gerald Rafson, PE, T2 Center
acting Director,

The Alaska Transportation Week Conference was held March 2-4, 1998 in Anchorage. The conference theme was Quality in Transportation Construction. Sessions highlighting the theme included presentations on innovative Contracting Methods and Constructibility Review by Ken Leuterbert, Florida DOT, Lauren Garduno, Texas DOT, and Stuart Anderson, Texas Transportation Institute. These nationally recognized professionals generated lively discussion on how these concepts are currently being applied, and their

future potential in Alaska. Copies of the program handouts are available from the Alaska T2 Library.

Conference participants included a variety of individuals representing construction contractors, consultants and government. Presentations and panel discussions with Alaska Department of Transportation and Public Facilities representatives, the Federal Highway Administration, the Federal Aviation Administration and the Associated General Contractors of Alaska generated confidence that issues and concerns raised would be

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AISES National Conference

The American Indian Science and Engineering Society (AISES) University of Alaska Anchorage and University of Alaska Fairbanks Chapters attended the 19th Annual National Conference in November 1997 held in Houston Texas.

AISES is a nonprofit organization which provides opportunities for Alaskan Natives and American Indians to pursue studies in science, engineering, technology, and other academic areas. When these students graduate they will be prepared to as-

sume roles as Native leaders to manage and develop their lands and resources.

The conference sponsored a career fair with businesses and organizations interested in speaking with students about job and internship possibilities. Guest speakers covered topics involving the importance of culture and education today, especially among American Indians and Natives. Among the ceremonies and workshops delegates attended were

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Stop

by John F. Kelly, Chairman and Chief Executive Officer,
Alaska Airlines

Although this article describes a Seattle-area work zone flagger, it is a positive example of a good attitude and performance in a work zone situation. May we all learn from “Rockin’ Robert.”

He smiles. I mean really smiles. You know that ear-to-ear kind. He dances. He smiles, sings, dances, and waves you by, all with the kind of flair typically reserved for a head of state. Yet you’ve never met the man, and he’s never met you.

That’s Bob Gray- or “Rockin’ Robert”, as we call him. Bob’s a construction flagger on a project here in Seattle along Pacific Highway South, and he’s had a profound impact on all of us who work along that busy stretch of road. In fact, Bob has actually made it fun to get stuck in traffic these past few months. Well, maybe not fun, but as good as it can get under the circumstances.

Stop. Go. Stop. Construction projects are irritating- and this project has been a daily interruption for some of us. But when you get to where Bob is artfully guiding the traffic flow, his great, big, warm smile and charming manner simply melt the tension away. All is right with the world again.

Bob’s the best I’ve ever seen. Someone who is not only unique to his job, but also as a human being. His zest for life is so strong it gives others that same zest. He’s had such an impact on me that at an officer meeting one day I suggested that we give him something in exchange for all he has given-spiritually- to us. My suggestion was that we “catch him doing something right” and reward him with free tickets to travel anywhere we fly in North America.

There was unanimous agreement. So we developed a scheme to get him in and then surprise him, just as he surprised us by being so caring. But what I didn’t realize was that it wasn’t just me-literally everyone in our office felt the same way about Bob. So when the

word got around that we were going to recognize him, I was amazed to see that hundreds of our employees from our sister carrier Horizon, located just across the street-had gathered to honor Rockin’ Robert.

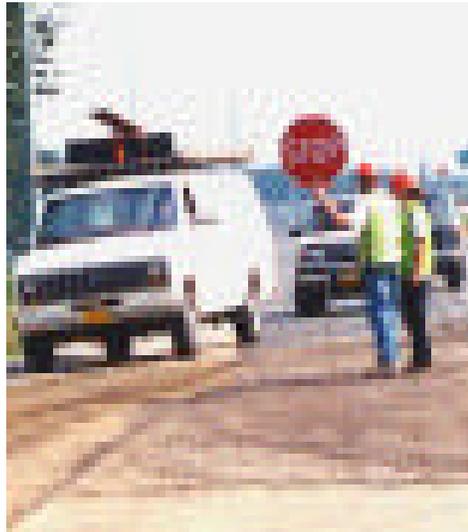
And honor him they did. As I led him to where the employees were waiting, they greeted him with heartfelt cheering and a standing ovation. Bob was moved-stunned, perhaps. We presented him with the tickets, served cake and coffee, and in general had a party. One of our employees presented him with a poem she had written about him, and we also gave him a card signed by employees who identified themselves not with their names, but with the make and model of their cars.

The driver of a white Toyota wrote, “Thanks for all the smiles and waves.” Another noted, “Never stop waving.” The owner of a blue Camry wrote, “You make me smile everyday.” Everyone wanted to be sure Bob understood just how touched they were by him. Bob’s response? “My mother always told us you want people to love you. You can’t make everybody happy, but you can sure try. When I’m out there and smile and wave at people, they look back and smile and wave and it’s just like looking at a reflection in the mirror. There’s a lot of love out there.” Now that’s a positive attitude.

The next day, Anna Gordon, one of our employees, sent me an e-mail that said, in part: “It was a great reminder how important it is to let people know when they make a difference.” So true. And the fact of the matter is that everyone can make a difference, everyone. All it takes is attitude. Bob’s got it, but the good

news is that it’s contagious. Anna went on to encourage me to write this editorial to not only make those points, but also to remind us all about how much you get back when you take the time to say thanks. Thanks, Bob, from all of us. You’re truly an inspiration.

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*Two Alaska flaggers on the Chena Pump/
Geist Road interchange.*

Signs Get No Respect

by Tom Ackerly, Roads Director Kenai Peninsula Borough

Signs are everywhere. They help us find our way, explain what is expected or even, on occasion, save lives. So here's the question: "Why is it that signs get no respect?"

Sign sophistication in Alaska is a recent phenomenon. It was not too long ago that signs in many places were nonexistent and directions were given by reference to local landmarks and other approaches, or the location is described as "next to that recent road kill". Throughout Alaska, the old and new approaches to signage are common. One might find reflective signs or changeable electronic traffic message boards. The handmade sign or that important landmark rock is still around, though.

Vandalism, thievery, and destruction create serious safety and economic concerns. Last summer in the state of Florida, three young people were found guilty of uprooting a traffic sign at a busy intersection. An 8-ton truck drove through the uncontrolled intersection, killing three teenagers. They were convicted of manslaughter in the death of the three 18-year-olds.

Signs are costly. One stop sign, including the post, the anchor, the rivets, and the labor to install it, exceeds \$100. Other signs such as stop ahead, curve, speed limit, and street signs have similar price tags. In the Kenai Borough alone, there are 1,520 roadways in the Road Service



Above: Stop sign in Kenai Borough damaged by bullets.

Area (RSA). Some require more than one sign; some require none. The number required is astounding to think about, or to actually get out there on the road and count.

Sign costs are threefold: 1. replacement of the damaged or stolen sign; 2. potential for emergency services vehicles arriving too late to save a life or reduce property damage; and 3. accidents and legal costs involving poor or missing signage.

Municipalities have problems primarily with spray painting and graffiti vandalism rather than thievery. In rural areas, shooting at signs is a serious problem. We found a sign with over 300 bullet holes in it. The value of the ammunition shot at the sign would exceed \$250. Some of the bullets were shot in the direction of a house.

Kenai Borough found that the street signs most often stolen are feminine or unique street names. To meet the demand for these signs, the RSA offers to have any non-offensive sign made for \$20. The bottom line is that, when sign replacement is required, the road users lose something else: snow plowing, summer grading, or culvert repair.

Legal issues surrounding signs vary greatly. American society, with its legal approach to problem solving, has even touched the sign world. In Alaska there have been, and are currently, cases involving the lack of a sign. For example, a person operating a vehicle might sue the government because a sign was missing, stolen, or vandalized.

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Above: Hole left from a stolen sign.
Below: Vandalized directional arrow in Kenai Borough.



Flashing Stop/Slow Paddles

by John O. Hibbs, PE, Kentucky LTAP Center
 Much of the field experience has been completed in Kentucky, but information is included from a wider point of view.

The job of flagging traffic remains one of the most difficult, dangerous, and unappreciated jobs of work zone traffic control. It is becoming more and more difficult as drivers have so many more distractions such as busier schedules, cellular phones, elaborate music systems, quieter cars, and simply more and more vehicles. The number of maintenance operations continues to grow as roads get older. Without question, the danger is there.

The number of accidents and fatalities in work areas has continued to grow over the last 15-20 years, while the total number of highway deaths has been declining. Unfortunately, too many managers consider the flagging job to be one that anyone, even the newest person in the work crew, can do with little or no training. All of this, coupled with flagging being a boring operation during many periods of the day, leads to added danger for the flagger, the work crew, and all users of the highway.

For all of the above reasons, SHRP is developing and promoting the use of flashing lights on the stop/slow paddle to help get the attention of inattentive drivers.

In the fall of 1995, Leland Smithson, Maintenance Engineer for the Iowa DOT, presented a paper at the 1995 American Association of State Highway and Transportation Officials (AASHTO) maintenance committee meeting in Roanoke, Virginia. Smithson's report showed 23 states adopting the device out of the 34 states that had tried it. This is the best success story among the SHRP safety devices. Since Smithson's report, it is likely

that more states have now adopted the device. The stop/slow paddle with lights has not been widely adopted in Kentucky, but a variety of agencies are now using it on a limited basis. These users include contractors, utility companies, city government, county government, and the state DOT maintenance crews.

An evaluation of the Kentucky use was completed by the Kentucky Transportation Center, University of Kentucky, for the Kentucky DOT. Thirty-five different paddles were purchased and distributed on a loan basis to all branches of government and some branches loaned their equipment for special contractor work such as nighttime operations.

Findings from the study and recommendations by the author are summarized as follows:

- Nearly total acceptance of the flashing stop/slow paddle was voiced by the workers regarding the aid in stopping traffic. In comparison to other models, some did not like the model with the 24-inch face and the large battery to power the lights. The only observed traffic operational problem



Suppliers of Flashing Stop/Slow Paddles shown in the photo are (left to right): Columbia Safety Sign, SGT Enterprises, Medifax, A/C Enterprise, Brittney Safety Signs, Action West, and Deltonics (formerly Graham/Migletz).

occurred with the halogen light model that has the automatic shut-off after six flashes. A high-speed driver started to stop and then continued to pass the flagger after slowing to about 30 mph. When asked why he did not come to a complete stop, the driver responded that he thought it was all right to proceed when the lights stopped flashing. Consequently, flaggers using this device have been instructed to hold the switch down until the first car is completely stopped. Some problems were experienced with the Columbia model in keeping the batteries from falling to the lower part of the handle.

It is difficult to make a recommendation about par-

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ticular models or brands in a published article of this nature; however, the more expensive models with the stronger construction materials, generally had better reflective sheeting such as diamond grade, were preferred by the workers, and the equipment survived the trip to and from the job in better condition than the less expensive models.

The Kentucky report recommends:

- “For extended use, it is recommended that a modified Graham/Migletz (halogen model with cover) be purchased. The modification involves removing the automatic device that activates a cycle of six alternating flashes and replacing it with a push-button switch that keeps the lights on while held and turns the lights off when released. This change will save battery life, keep the flagger from having to look at the lights to determine if they are flashing, and avoid the potential misinterpretation which was previously described.

For occasional use, it is recommended that an equal number of the Columbia and Action West paddles be purchased. Both should include sign covers. The light on the Columbia paddle has been rated as slightly brighter than the other strobe devices while the construction of the Action West appears to be more rigorous. The order should specify a design for the Columbia paddle which will address the problem noted with the batteries. Both units should have a push-button switch which activates the lights when pushed with the lights going off when it is released.”

- The *Manual on Uniform Traffic Control Devices* (MUTCD) should include some wording about the use of a flashing stop/slow paddle to discourage flaggers from turning the lights on at the beginning of the operations and leaving them in the flashing mode for long periods. This will cause excessive use of the batteries

but, more importantly, it will diminish the effectiveness or uniqueness of the lights. If drivers become accustomed to seeing the flashing lights, the lights will soon become unnoticed as many of the other work zone signs that are normally displayed with a flagging operation.

- The MUTCD should specify that all flashing stop/slow paddles have a switch of the “push-button” type requiring the operator to hold the switch down while the lights are flashing. When released, the lights should go off. This will discourage overuse of the lights and let the operator know if the lights are on or off without having to look at the paddle face.

- The MUTCD should clearly state that flashing lights are proper for the sign’s “stop” side only. Some models still flash on both sides. Use of the lights on the “slow” side could reduce the effectiveness of the stop side.

- Experience indicates that the halogen light model and the newest model on the market (SJG manufactured in South Carolina) is too bright for nighttime operations. Both models were used on an evaluation basis during the early opening of the Cumberland Gap Tunnel at the Kentucky/Tennessee crossing. The tunnel was opened before construction was complete and several flagging operations occurred during nighttime and in the darkness of the tunnel. Several drivers complained about being blinded by the bright lights of the stop/slow paddles. When this information was passed back to the SJG model supplier, a new version was introduced that is equipped with a dimmer switch, similar to the operations of a flashing arrow board. No complaints were received about any of the strobe light models and the tunnel project crew used all of the models during the early months of the tunnel opening. The MUTCD should address the potential of some flashing stop/slow paddles being too bright for nighttime operations. Perhaps a word of caution about using the brighter lights at night will be sufficient.

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Citizens showing interest in the malicious destruction of signage can reduce most of these issues. When driving, take notice of vandals, get a license number and description of the perpetrators, and give local law enforcement officials a call. Take notice of missing or unreadable signs and report them to the Department of Transportation & Public Facilities or to the municipality that has jurisdiction.

One final thought: Let’s band together to encourage and educate everyone concerning the importance of a proactive sign program. An active program will pay dividends for the public through safety and economic issues, and for the agencies, it will reduce or stabilize a portion of the budget.

Signing off...

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All known suppliers of the SHRP flashing stop/slow paddles are:

<u>Description of Device</u>	<u>Company</u>	<u>Approx. Cost</u>
Flashing Stop/Slow Paddle Formerly distributed by Graham/Migletz(Halogen Lights)	Deltonics, Inc. 4003 Bloomington Rd RR #4 Ontario, Canada L4A7X5 Bob or Svend DeBruyn Ph (905) 640-1216	\$400
Flashing Stop/Slow Paddle (Strobe Light)	Columbia Safety Sign Corporation Woodland, WA 98674 (206) 225-7688 John Valdez	\$95
Flashing Stop/Slow Paddle (Strobe Lights)	A/C Enterprise(Strobe Lights) Vancouver, WA 98661 (206) 695-4050 Monte Arehart	\$175
Flashing Stop/Slow Paddle (Strobe Lights)	Medifax, Inc., La Center, WA 98629 (206) 263-3076 Jack Neighbors	\$99 Paddle \$16 Stand
Flashing Stop/Slow Paddle (12 Volt Bulbs)	Brittney Safety Signs, Inc Phoenix, AZ 85019 (602) 973-7118 Ed McDonald	24" Paddle \$250
Flashing Stop/Slow Paddle (Strobe Lights)	Action West, Kelso, WA 98626 (206)577-9150 Michael Williams	18" \$149 24" \$165
Flashing Stop/Slow Paddle (9-Volt Bulbs)	SJG Enterprises, Inc., 1655-A Savannah Hwy Suite #110 Charleston SC 29407 (803) 769-7446 Scott Glover	18" \$350

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Interagency Cooperation

Information for this article was provided by Christy Darden, Environmental Engineer at Western Federal Lands Highway Division.

Walden Point Road, located on the Annette Island Reserve within the Metlakatla Indian Community in Alaska, is a unique example of a complex project that required close communication across a wide variety of agencies. Unique aspects of this project include the involvement of the Department of Defense, the combination of both road and ferry transportation, the type of public involvement, and the location of the project on Alaska's only Indian Reservation.

Annette Island is located at the southern tip of the Alexander Archipelago of southeastern Alaska, and is part of the "Inland Passage" between the Clarence and Revillagigedo Straits. Annette Island is situated 18 air miles southwest of Ketchikan near the U.S./Canadian border. The island itself is 20 miles long and 12 miles wide, surrounded by islands that are part of the Tongass National Forest.

The community of Metlakatla, which translated means “calm channel”, was founded in 1887 by Reverend William Duncan and a band of Tsimpshian Indians searching for religious freedom. Father Duncan negotiated with President Grover Cleveland to secure a safe haven for the tribe. The Tsimpshians selected Annette Island because of its sheltered bay, gently sloping beaches, and nearby waterfall. On August 7, 1887, Father Duncan and 823 Tsimpshians celebrated the birth of their new community, a tradition that has carried forward to this day.

Four years later in 1891, the U.S. Congress officially recognized Metlakatla as a federal Indian Reservation. Today, Metlakatla is home to 1,600 residents. The community is serviced for most of the year the Alaska Marine Highway System services the community once or twice a week, with more frequent service provided during the summer. The community is accessible by airplane, but high costs and inclement winter weather limit the extent of air travel. An all-ferry route was initially considered to meet transportation needs, but would be too expensive and impractical to operate from Metlakatla to Ketchikan, especially during the winter months. A combination of 13 miles of road along the northwest side of the island to Walden Point, and then a 3-mile ferry run to the city of Saxman emerged as the preferred solution. Although the Alaska Department of Transportation & Public Facilities (ADOT&PF) has long recognized the road/ferry solution as a solution, funds were not available due to other demands of the existing highway system.

Now, because of a joint effort between ADOT&PF, the Bureau of Indian Affairs (BIA), Metlakatla Indian Community (MIC), Department of Defense (DOD), and the Federal Highway Administration (FHWA), the concept can become a reality.

The FHWA will take the lead on project design and has already begun preliminary work with aerial photography and soil, geotechnical, and topographic surveys. The FHWA will also provide information for the environmental process and design detail for permits as needed, ensuring that environmental commitments are incorporated into the final document.

The DOD will incorporate the project as part of their Innovative Readiness Training (IRT) program. The IRT program assists communities with special needs and provides medical and engineering services that in turn provide military personnel with realistic training opportunities. The military will provide the necessary equipment, and personnel to carry out construction activities. Approximately 150 military personnel will set up camp to perform crushing operations during the summer of 1997. Roughly 300 workers will construct the project during the summers of 1998-2000. A final round of 150 workers will complete the project during the summer of 2001. Because so many agencies, groups, and issues are involved in this project, all target dates are tentative. Maintenance funds for the project will be provided by the BIA and carried out by the community of Metlakatla. The FHWA may administer contracts for the construction of permanent bridges, major culverts, and asphalt.

The public involvement process began in early 1996 and will continue throughout the project. Public involvement includes a series of community workshops and call-in interviews on local television and radio.

The BIA is the lead agency responsible for the environmental process and will manage overall project development, including a cultural resource survey within the project corridor. The ADOT&PF will prepare the environmental assessment and address resource studies needed to meet environmental requirements.

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Available from the Library...

Available is “Case Studies: New Strategies for Improving the Nation’s Highways by Implementing SHRP Research.” It contains case studies for the Superpave system, long-term pavement performance, snow and ice control, work zone safety, concrete and structures.

The T2 Library has the FHWA Federal Lands Highway video “Emergency Relief for Federally Owned Roads- When Disaster Strikes” available for loan. It is 21 minutes long.

Don’t forget to check out “Pavement Notebook for FHWA Engineers.” It includes current policy and information on pavements.

Yukon's White River Bridge

by Eric Gibson, PE, Manager, Bridges & Technical Programs Government of the Yukon

The White River Bridge constructed on the Alaska Highway at KM 1882 in Yukon, Canada as part of the Shakwak Project, was completed in October 1997 at a cost of \$7.25 million (Can.). The new bridge replaces the previous steel truss bridge constructed in 1944 during the original construction of the Alaska Highway. Topographical constraints on the new highway alignment required the building of a new bridge.

The bridge location is in a relatively high seismic zone and a remote area subject to extremely low temperatures. Snag, Yukon, about 40 km north of the bridge site, holds the dubious distinction of the record coldest temperature recorded in North America: negative 65 degrees Celsius on February 3, 1947. The combination of large seismic movements, extremely cold temperatures, and remote location present a particular difficulty in the selection of a reliable and virtually maintenance free bearing.

The bearing eventually selected by bridge designers Buckland and Taylor is an isolation bearing by Earthquake Protection Systems of California and is a Friction Pendulum Bearing. Its use in bridges is relatively new. Building applications in the seismic retrofit of the U.S. Court of Appeals in San Francisco (256 bearings) and a project in Greece involving natural gas tanks on

Revithoussa (430 bearings) used the bearings. It is

also being considered for the seismic retrofit of the San Francisco Oakland Bay Bridge.

The bearing requires no maintenance, its properties are unaffected by cold temperatures, and has no reliance in mechanical systems or material properties for operation.

Essentially, the superstructure of the bridge floats on the bearings attached to the pier and abutments. In the event of an earthquake, the substructure displaces horizontally while the deck rides up on the curved surface of the bearings. The weight of the substructure and the curved surface absorbs the effect of the earthquake. The superstructure self-centers onto the substructure without requiring bearing resetting when the earthquake stops.

Specifications require testing of one bearing from each of the three pier and six abutment friction pendulum bearings. Testing was performed at temperatures from negative 48 degrees Celsius to 39 degrees Celsius.

Other challenges faced in the construction of the bridge included rigid environmental constraints on working in the river, flood condition, tight schedules, and the remote location.

Concrete work for the substructure occurred during one of the coldest winters in recent times. A heated building with underfloor heating was used for the storage of concrete aggregates. Aggregate was stored in the building for three days prior to its use to bring the aggregate temperature above freezing. Mix water was heated before addition to the concrete mix. The pour location was

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Above: Erecting the first steel girder of the new White River bridge.

Right: Photo of the new White River Bridge with the old bridge in the foreground.



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“Wake Up and Smell the Opportunities,” “Community Based Education Model,” and “Gila River Indian Community: Developing Tribal Technology Infrastructures for Education and Community Building.”

The conference offered many benefits and employment opportunities. At the conference, students met new



Above: UAF AISES representatives who attended the national conference..

Below: UAA AISES representatives who attended the conference.



faces, friends, and new challenges that took them to a higher level. Shane Derendoff, a senior in Computer Science at UAF says, “This year’s National Conference was much more beneficial than the one I’ve attended before. This time around I knew what I wanted to get out of the conference.”

Two UAF students received scholarships while at the conference: Mark Blair, a graduate student in Anthropology and Resource Management, and Shane Derendoff.



Above: Performer for one of the traditional native ceremonies during the conference.

Blair was also elected to be one of the two National Representatives to sit as a nonvoting member on the Board of Directors.

The delegates who attended the conference were Laverne Anagick, UAF, Sasha Atuk, UAF, Mark Blair, UAF, Harry Buchea, UAA, Shane Derendoff, UAF, Kim Ivie, UAF, Aaron Kasgnoc, UAF, Thomas Llanos, UAA, Kymberley Mandregan, UAA, Stephan Rearden, UAF, Samantha Smith, UAF, and Viola Stepetin, UAA.

The AISES 20th anniversary will be marked by the next National Conference. It will be held in Denver, Colorado December 3-6, 1998.

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completely enclosed with insulated tarpaulins and heating was applied for the period of curing. In contrast to the cold temperature conditions for the substructure, the contractor elected to pour the concrete deck during the night to take advantage of the cooler temperatures as well as the long daylight hours of the summer. The contractor poured the deck in three sections with each pour about 10 to 12 hours in duration.

Continuous two span steel girder with composite reinforced concrete deck and two reinforced concrete settlement spans make the total bridge length 200 m.

The substructure consists of reinforced concrete abutments with a single reinforced concrete river pier. The foundation for the bridge consists of large diameter concrete filled steel pipe piles.

The steel girders were fabricated in the interior of British Columbia, transported to the coast by rail for shipping by barge to Anchorage, Alaska, then by rail the Fairbanks, and finally by road to the bridge site. The three lines of girder were fabricated in five sections per girder and spliced in site after erection. The steel was erected onto towers constructed off the river ice.

Storage Menu

by Nelson Clark

An essential part of any computer system is storage. All computers have some way to store and retrieve information; it can be in the form of floppy disks, hard drives, optical drives, or tape backups. Without these storage devices, you would be limited to have as much information as memory you have installed on your computer. Most storage devices use magnetic media, this will probably change in years to come and we will be seeing higher capacity storage and faster access times on these new storage devices.

The most used storage device is the floppy drive; this device keeps relatively small amounts of information on a single floppy disk. They are usually 3 ½ inch disks or 5 ¼ inch disks (the later one being less used). Most systems also have a hard drive. These drives usually have multiple disks called platters and are sealed against environmental elements. Capacity ranges from 20 Megs (first widely used hard drives) to well over 5 Gigs. They are also much faster than floppy disks and less prone to error.

Many systems today also have optical disks; the most common of them is the CD-ROM drive. This drive reads information from a small 5 ¼ inch plastic disk with a laser. Although these drives are read only, some systems have CD-R drives that can also write on these disks. These disks can only be written on once and only on special media. A new kind of optical disk is being introduced, the DVD (which supposedly does not stand for Digital Video Disk). This new disk will be able to store up to 16 times more information than a standard CD-ROM disk, which holds 650 Megs of data.

Another widely used media is the tape; this system is mostly used to store information for later retrieval or for system backups in case of major crashes. This is usually a slow access system since information cannot be accessed randomly like on disks.

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FHWA Ruling on NCHRP-350 May Change Face of Work Zones

Proposal would require work-zone traffic control devices meet test standards for crashworthiness by October 1998; traffic control industry evaluates procedures, ramifications

Four years ago, the National Cooperative Highway Research Program published Report 350, *Recommended Procedures for the Safety Performance Evaluation of Highway Features*. Based on this report, the Federal Highway Administration (FHWA) established a Final Rule requiring all new National Highway System projects use devices meeting the NCHRP-350 requirements for crashworthiness. For the first time, FHWA is proposing that work-zone traffic control devices must be accepted as crashworthy.

The ruling is expected to go into effect October 1, 1998. Currently, acceptable temporary concrete barrier designs may continue in use until Oct. 1, 2002, before they are subject to Report 350 criteria.

"In 1991, Congress directed us to adopt performance evaluation standards that accommodate vans, minivans, pickup trucks, and four-wheel drive vehicles," said Nick Artimovich, FHWA highway engineer. "The FHWA adopted Report 350 because it incorporated the latest in crash test guidance, as well as answered the charge from

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Congress to test with vehicles in the ‘small truck’ category. We are now proposing implementation of the guidance, and work-zone devices are part of it.”

Although the ruling has been on the books since 1993, little action has been taken by manufacturers to prepare for the pending change. With the compliance deadline looming, questions about what the ruling really means have started popping up.

“One of the first questions we had was who will be responsible for obtaining a device’s acceptance,” said Henry Ross, chair of the American Traffic Safety Services Association NCHRP-350 Task Force. Ross is vice president of sales and marketing at WLI Industries, Villa Park, IL, a company that makes barricades, signs, and warning lights. “If you use a plastic drum from one manufacturer and attach a warning light from the other, who is responsible for getting the complete device tested? The drum manufacturer, the light manufacturer, or the traffic control company? It can get very complicated.”

Ruling creates widespread effects

The ramifications of this ruling are far reaching. State and local transportation departments would have to ensure their NHS projects comply with the new ruling or risk losing federal funds for a given project.

Road contractors would need to use devices that comply with the ruling or risk losing the project. Traffic control companies would need proof their devices are FHWA accepted to win projects. And traffic control device manufacturers will need to show that their devices are crashworthy to obtain sales.

Prior to Report 350, NCHRP had published a 1980 report (Report 230), Recommended Procedures for the Safety Performance Evaluation of Highway Safety Appearances in the US and many other parts of the world.

One of the most significant changes in Report 350 is the expansion of test procedures. A wider range of highway safety features, including work-zone traffic control devices and truck-mounted attenuators, are included.

In addition to expanding the scope of crash testing, NCHRP Report 350 offers several other updates:

- Metrics (SI units) replace customary U.S. units of measurement. Hard conversions were used, altering the mass, speeds, and testing tolerances. For example, tests previously specified for 60 mph (97 km/h) are now specified at 100 km/h.
- The basic test vehicles are an 820 kg automobile

and a ¾ ton pickup truck to reflect the fact that approximately 25% of all passenger vehicles in U.S. roads are in the “light truck” category, and the percentage is growing.

- Single-unit cargo trucks (8,000 kg), and tractor-trailer vehicles (36,000 kg) are included for testing to meet higher performance levels.
- Six test levels for various classes of roadside safety features are established, with a variety of optional tests to provide the basis for safety evaluations to support more or less stringent performance criteria.
- Guidelines for selecting a critical impact point for crash tests on redirecting-type safety hardware have been added.
- Information on enhanced occupant risk measurement techniques is included, with guidelines for device installation and test instrumentation.
- Levels for two of the three basic evaluation criteria categories were altered to reflect recent research findings.
- State-of-the-art testing methods and technologies, such as surrogate test vehicles and computer simulations, are incorporated into the procedures.
- Optional side impact testing is included.

Four acceptance categories developed

To assist companies in meeting the new guidelines, FHWA recently released guidelines establishing four categories for determining the level of effort needed to demonstrate a work zone device’s crashworthiness. “We recognize the varied character of work zone traffic control devices,” said Artimovich. “As a result, three categories are being established for evaluating crashworthiness, along with a fourth category for trailer mounted arrow and message signs.”

Commonly used small, lightweight channeling and delineating devices. These are devices that have been in common use for many years and are known to be crashworthy by crash testing of similar devices.

This category includes plastic or rubber cones and tubular markers, flexible delineator posts, and single-piece plastic drums without lights, batteries, signs, or other attachments. If ballast is used, it must be at ground level in accordance with the manufacturer’s instructions.

To be included in this category, there must be virtually no potential for the device to penetrate windshields, cause tire damage, or have a significant effect in the

continued at Ruling on page 12

control of an impacting vehicle.

A request for acceptance does not need to be submitted for devices in this category: if the device meets a specification for which crashworthiness has been validated by crash or surrogate testing; or the device is accepted based on crash test experience with similar devices. Simplified testing showing a device poses no risk to impacting vehicle occupants may be used to support the manufacturer's certification.

The simplified testing must include a written report by an independent, impartial observer, videotape documentation, and a means, other than the test vehicle's speedometer, for determining the vehicle speed at time of impact.

"There has already been quite a lot of testing of work zone devices, but this information isn't general knowledge. FHWA has compiled results from numerous tests and will be using a memorandum that finds many work zone devices acceptable for use without the need for additional testing," said Artimovich.

Potentially hazardous devices that produce no significant vehicle velocity change. Devices in this category may be substantial enough to penetrate a windshield or injure a worker, or they may cause vehicle instability when driven over if they become lodged under a vehicle. Testing to determine crashworthiness is required. However, devices weighing 45 kg or less may qualify for reduced testing requirements.

This category includes barricades, portable sign supports, intrusion detectors and alarms, and drums, vertical panels, or cones with lights.

"One of the biggest concerns ATSSA has is the possibility that all traffic control companies will need to get their devices crash tested," said Ross. "We have many small companies in our industry and the costs of crash testing one or more devices could have a tremendous impact on them."

To address these concerns, the FHWA includes a statement that a certain class of device (wood/metal barricades, for example) could be moved into Category 1 once sufficient testing is done to determine that the class of device is crashworthy.

Potentially hazardous devices that cause significant vehicle velocity change. Hardware expected to cause significant velocity changes to impacting vehicles must be tested to the full requirements of Report 350.

Barriers, fixed sign supports, crash cushions, and other work zone devices not meeting the definitions of the first two categories are included here.

Individual letters of acceptance will be issued by FHWA for crashworthy devices in this category.

Trailer mounted attenuators. There are several work zone devices that significantly increase the safety of traffic operations, but could cause great harm during an impact. These devices, usually trailer mounted, include area lighting supports, flashing arrow panels, temporary traffic signals, and changeable message signs.

Even though accident experience to date show that crashes with these devices are rare, FHWA believes they should be made crashworthy. Devices in this category should meet the recommended acceptance guidelines in Report 350 if they are to be used, unshielded, in the clear zone on the NHS. "However, we recognize the fact that current designs would most likely not meet Report 350's requirements for crashworthiness," said Artimovich. "And because we believe the current designs of these devices provide a net benefit to motorists, we have extended the compliance deadline to 2002 to give manufacturers time to develop crashworthy features."

A work zone's changing face

Depending on the outcome of crash testing for various devices, America's work zones could look very different in the near future. Devices the industry currently takes for granted could become obsolete, with new devices developed to meet the FHWA requirements.

"Imagine what will happen if traditional wood and metal barricades don't pass the test," said Ross. "Or if drums without lights were acceptable but drums with lights weren't. This ruling has the potential to significantly change the way we address work zone traffic control."

Reprinted with permission from Roads & Bridges, July 1997.

In Alaska...

Kurt Smith, Southeast Regional Traffic Engineer, says the his department will need a list of acceptable devices from FHWA before implementation of the NCHRP 350 work zone requirements. It is unlikely that a list will be available before October 1, so an extension to October 1999 has been requested.

Calculation Pitfalls

The following discussion is based in the comments of Richard McConnell, P.E.

When performing engineering calculations, converting technical texts or reprogramming software in metric units, be especially careful to avoid the following types of errors:

- Casually rounding converted numbers. The usual tendency in converting from inch-pound to metric units is to be overly precise. But when dealing with engineering calculations, precision is a virtue. Casual rounding can result in significant errors. Round carefully.
- Using the wrong decimal prefix. It is easy to substitute N/m² for kN/m² or kPa for MPa, thereby changing numerical values by multiples of 1000. Check the decimal prefix.
- Using the wrong empirical coefficients in equations. Empirical coefficients are based on the measurement units in the balance of the equation. Make sure empirical coefficients match the measurement units used.

An example is the equation $v=c(2.17-3)(p)0.25$, where v is velocity in ft/s, e is provided and dimen-

sionless, p is pressure in lb/ft², and c is 78.2, the coefficient provided.

When $v=m/s$ and:

P is in kgf/cm, c becomes 160.4;

P is provided in N/cm, c becomes 90.6;

P is provided in kPa (kN/m), c becomes 51.

All three values for c are correct for the units used. Note, however, that the first value for c is based on kgf/cm² (sometimes written simply as kg/cm²), an obsolete kilogram-force still found in some texts but internationally deprecated (see ASTM E380, ASTM E621, ANSI/IEEE 268, and Federal Standard 376B). The pascal (Pa), as used to derive the third value for c , is the proper unit of measure for pressure and stress. But, regardless of the units used, the point is that the value for c must match the other units in the equation.

Reprinted with permission from the Construction Metrication Council Web site, <http://www.nibs.org>, January 9, 1998.

Metric Facts: Force

How much force will it take to get up to speed? What force will be exerted on the foundation? The metric answers to these questions are expressed in newtons (N).

The newton is defined as the force that when applied to a free mass of 1 kilogram (kg), will impart an acceleration of 1 meter per second (kg m/s²). One of the many advantages of metric is that it uses a different unit for mass (kg) than it uses for force (N), thus reducing the mass-force-weight confusion.

The customary unit for force is the poundal and the conversion is 7.233 poundals per newton. On the earth at sea level, a mass of one kilogram will produce a force on its support of 9.806 newtons.

Problem:

A crane on the earth at sea level lifts a mass of 500 kilograms. What force in newtons is imposed on the crane?

Solution:

$$500 \text{ kg} \times (9.806 \text{ N/kg}) = 4903 \text{ N}$$

Reprinted with permission from the Construction Metrication Council Web site, <http://www.nibs.org>, January 9, 1998.

State Materials Engineer Tony Barter

Tony Barter originally came to Alaska in 1968 when his father came to work on the Nike Hercules missile program at Fort Richardson. Rather than leave with his father in 1971, Barter decided to graduate from high school in Alaska. He moved in with his best friend and got a job pumping gas. It was through his friend that Barter began his career with the Alaska Department of Transportation & Public Facilities (ADOT&PF).

Barter started at the bottom. "I started out as a WG59 and no clue," Barter said. "I knew I could stand around and watch other people work so they made me an inspector taking tickets for John Stoddard in Eagle River." The department contacted him each year and offered him a summer job until he graduated from the University of Texas at El Paso in 1976 with a BS in Civil Engineering. Upon graduation, he was accepted into the Engineer-In-Training program. Barter said, "This has been one of my highlights of being with the ADOT&PF. It gave me the opportunity to travel between the regions and see different management approaches for accomplishing work. The key aspect I picked up on was to provide a caring attitude and strong communication skills."

Since then, Barter's career included Aviation Design, where he developed designs for air carrier and rural airports, seaplane ramps, feasibility studies, and managed a field construction project. He moved to Design. As Project Manager for highway design and development, he supervised two in-house design squads and multiple consulting firms. As Chief of Traffic Safety Utilities he supervised several engineers and assistants. One project he managed during this time was a complex airport seismic retrofit of the Anchorage International auto bridge and redecking of the running surface.

As State Materials Engineer his emphasis is strong communication and interaction with the regions and supervisory involvement for timeliness and quality products.

Barter keeps busy with a variety of specialty projects to keep up with changing legislation and requirements. Current projects include the development of a materials testing technician qualification program in response to federal requirements, and initiating an airport pavement management system in agreement with a FAA requirement.

The qualification program provides improved quality in the transportation products we provide. The program is set up to ensure that individuals involved in testing have demonstrated abilities to engage in quality control and quality assurance by meeting an acceptable level of performance. The program provides highly skilled and knowledgeable materials sampling and testing technicians. Having qualified technicians promotes uniformity and consistency in testing. Since this requirement affects all states, Alaska joined with Oregon, Washington, Idaho, and the Western Federal Lands Division of FHWA, as part of the Northwest Alliance for Quality Transportation Construction (NAQTC), to develop the guidelines of the qualification program.

To develop a pavement management system for paved airports, Barter is currently looking for a consultant to develop baseline information such as structural sections, airport layout plans, maintenance activities and pavement condition indexes. Once this task is completed he will be able to provide optimization runs for prioritizing expenditures on paved airports.

Barter's interests aren't limited to engineering. He is on the Board of Directors for Arctic Gymnastics, Hilltop Youth Ski Area, and Gold Striker Soccer. He enjoys hunting trips to Fairbanks for moose and South Dakota for pheasants. He enjoys woodworking and fishing, as well as traveling with his family and attending Brandon and Julie's sporting events.



Good-bye!



We wanted to wish Matt Reckard farewell. He ended his time as the head of DOT&PF Research in April. He decided to take it easy for a while. He has been instrumental in T2 since Fall of 1997, when T2 was put under Research during reorganization.

T2 would like to say good-bye to Clyde Stoltzfus, Special Assistant to the Commissioner. Clyde opted to seek the greener pastures of the family farm after 11 years with the department. Clyde was an invaluable resource for T2 and the AASHTO TRAC program.

We would also like to welcome Billy Connor to Research. He has taken over as acting Research Manager since Reckard's departure.

Date	Event	Sponsor/Contact	Location
July 26-29	LTAP 1998 National Meeting	National Association of Transportation Technology Transfer Centers, LTAP centers in FHWA Region 8 Utah T2 Center @ 1-800-822-8878	Salt Lake City, Utah Doubletree Hotel
July 28-29	How to Integrate Technology-Assisted Learning into Government Training and Knowledge Transfer Programs	http://www.icpc.com , or call 1-800-882-8684	Washington D.C. Sheraton City Centre
August 2-5	12th Equipment Management Workshop	Transportation Research Board Committee on Maintenance Equipment	Austin, Texas Omni Austin Hotel Southpark
August 4-6	IMSA Traffic Signal Level I Traffic Signs and Markings Level I Certification Seminar	Mississippi T2 Center, Emmanuel Okafor or Lois Moore (601) 968-2339 or fax: (601) 973-3703	Jackson, Mississippi Universities Center
September 16-17	Utility Coordinating Councils Joint Staff Meeting	Oregon Utility Notification Center, Frank Planton @ fax (503) 293-0826	Seaside, Oregon Seaside Convention Center
November 6-10	AASHTO Annual Meeting	Hannah Whitney @ (202) 484-2902	Boston, Massachusetts
Winter 1998-1999	NHI # 14205 Documenting NEPA and Transportation Decision Making*	Alaska T2 Center/ ITE Jim Bennett @ (907) 451-5322	Anchorage, Alaska
Winter	NHI#13446 Identifying and Controlling Erosion and Sediment*	Alaska T2 Center/ ITE Jim Bennett @ (907) 451-5322	Anchorage, Alaska
Winter	NHI# 13108 Techniques for Pavement Rehabilitation*	Alaska T2 Center/ ITE Jim Bennett @ (907) 451-5322	Juneau, Alaska
Winter	NHI# 13027 Urban Drainage Design*	Alaska T2 Center/ ITE Jim Bennett @ (907) 451-5322	Anchorage, Alaska
Winter	FHWA Demo Project # 115 Probabilistic Cycle Cost	Alaska T2 Center/ ITE Jim Bennett @ (907) 451-5322	Anchorage, Alaska Juneau, Alaska
May 23-27, 1999	Seventh Annual International Conference on Low-Volume Roads	Transportation Research Board	Baton Rouge, Louisiana Louisiana State University
November 11-14 1999	Second International Symposium on Asphalt Emulsion Technology <i>*tentative</i>	Asphalt Emulsion Manufacturers Association, @ (410) 267-0023 fax: (410) 267-7546, e-mail: krissoff@compuserve.com	Washington, D.C. Omni Shoreham Hotel

Meetings Around Alaska

Society	Chapter	Meeting Days	Location
ASCE	Anchorage	Monthly, 3rd Tues., noon	Northern Lights Inn
	Fairbanks	Monthly, 3rd Wed., noon	Captain Bartlett Inn
	Juneau	Monthly, 2nd Wed., noon*	Westmark Juneau Hotel * except June-August
ASPE	Anchorage	Monthly, 2nd Thurs., noon	West Coast International Inn
	Fairbanks	Monthly, 1st Fri., noon	Captain Bartlett Inn
	Juneau	Monthly, 2nd Wed., noon*	Westmark Juneau Hotel * except in June-August
ASPLS	Anchorage	Monthly, 3rd Tues., noon	Executive Cafeteria, Federal Building
	Fairbanks	Monthly, 4th Tues., noon	Ethel's Sunset Inn
	Mat-Su Valley	Monthly, last Wed., noon	Windbreak Café; George Strother, 745-9810
ITE	Anchorage	Monthly, 4th Thurs., noon	Sourdough Mining Company
IRWA	Sourdough Ch. 49	Monthly, 3rd Thurs., noon**	West Coast International Inn **except July & Dec.
	Arctic Trails Ch.71	Monthly, 2nd Thurs., noon#	Last Frontier Club #except July & Dec.
	Totem Ch. 59	Monthly, 1st Wed., noon	Mike's Place, Douglas
ICBO	Northern Chapter	Monthly, 1st Wed., noon	Zach's Sophie Station
AWRA	Northern Region	Monthly, 3rd Wed., noon Brown Bag Lunch	Room 531 Duckering Bldg., University of Alaska Fairbanks Larry Hinzman, 474-7331
PE in Government	Anchorage	Monthly, last Fri, 7am	Elmer's Restaurant

New Pump Intake Screen Keeps Fish Off the Road

by Sharon McLeod-Everette, Director, T2 Center

The information for this story is based on an interview with Eric Gerke, Environmental, Department of Transportation & Public Facilities..

Pulling water from nearby streams and lakes into a tanker truck, then spraying it on the road is a common method used by maintenance crews to hold down dust on many of Alaska's gravel roads, and by contractors during road construction projects. Water is a very effective means of controlling dust; however, pumping from natural streams and lakes with strong pumps coupled with either a large screening device or no screening device presents a problem. Many natural streams and lakes are fish habitat, and those fish get sucked into the tanker truck and then sprayed on the road.

Early pump intake screen devices and water intake structures used by the Department of Transportation and Public Facilities and other contractors were heavy, in the 250-pound range, measuring about three feet by three feet. It took two people to place one into the water source or to transpose it as well as retrieve it later. Since one person was often the typical size of the crew charged with watering the road, the pump intake screen frequently got neglected.

In 1995, DOT&PF's Dalton Highway Maintenance and Operations Section, the Environmental Section, and the Alaska Department of Fish and Game, Habitat and Restoration Division began a two-year cooperative effort to develop alternatives to the traditional heavy, awkward box water intake structure. DOT&PF M&O workers Dwight Stuller, Sam Schuyler, and Wyatt Wickens, Eric Gerke from Environmental, and ADF&G biologist Mac MacLean pooled their ideas and resources. Because both agencies are charged with protecting fisheries resources in a means consistent with the requirements of Alaska Statute 16.05.870, DOT&PF and ADF&G became primary stakeholders in the project. The Department of Natural Resources, which regulates and monitors water use, became an additional stakeholder with a spin-off of the project to identify

each location water was drawn from. Location identification was achieved using Global Positioning System data, United States Geological Survey maps, and a computer database designed using Microsoft Access.

Following a literature review, ADF&G developed five different maximum screen mesh sizes and approach water velocity. Criteria included a variety of fish species and life stages, ranging from newly-hatched whitefish to adult salmon, whitefish Dolly Varden. Using the screen mesh sizes and water velocity information, DOT&PF and ADF&G forces went to work in 1996 on a prototype. They modified a design by Clemson University called "The Clemson Beaver Pond Leveler," which they learned about through the library at DOT&PF's Alaska Transportation Technology Transfer Center.

That initial 1996 prototype, tested at the Fairbanks International Airport float pond, was refined a few times, making it lighter, more streamlined, and more maneuverable.

When a bridge piling inspection in the Fairbanks area required pumping water from a river, a screened pump intake structure was needed on extremely short notice. None were located in Fairbanks, so a few M&O people put their heads together, using the draft of the prototype as a basis. Since a few of the Dalton Highway crews had

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continued from Intake page 16

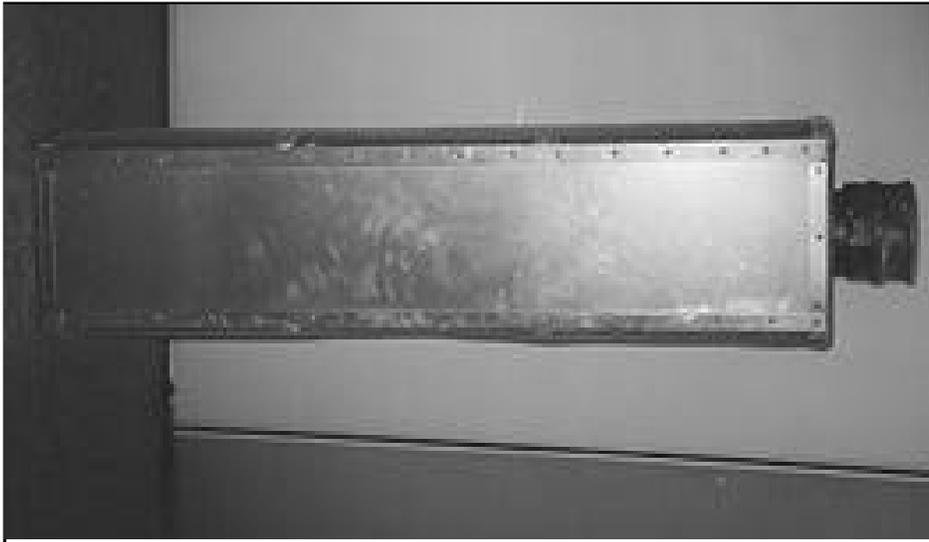
experimented with the screen intakes by drilling holes in spent artillery shells left over from shooting down avalanches, M&O knew that cylindrical shape and hole pattern worked. Paul Taggard, M&O Buildings, retrieved an exhaust shield he remembered seeing on a wrecked 18-wheeler in DOT&PF's yard. That exhaust shield was used for the immediate inspection situation, and along with the artillery shells, provided fodder for what ultimately became the current prototype.

The current prototype is reminiscent of a New England lobster trap, with a device similar to a muzzle brake on a rifle located in the center, right down the middle. It's about four feet tall, a foot in diameter, has a toboggan-type bottom so it doesn't dig into the bottom when it's pulled out of the water source, and weighs from 25 to 45 pounds, depending on the mesh size and other com-

ponents. While the core (the muzzle brake) in the first prototypes were metal, which required cutting holes with a welding torch, current thinking is that a PVC core would be lighter and could be cut on-site with a reciprocal saw, rather than in a welding shop. Other critical notes: you do need durable screen material, preferably 1/4 inch, zinc coated. The operator can also hook a chain to the pump screen intake, leaving it attached so the intake can be pulled out of the water with a vehicle. Then, the intake can be chained down and locked when it's being stored.

The Alaska pump screen intake prototype has the ability to pump 1,000 gallons per minute with a six inch intake and 500 to 600 gallons per minute with a four inch intake. Even with that rate of pumping, it's difficult to tell at the screen intake end that any pumping activity is actually taking place. Estimated cost using all metal materials is roughly \$500 to \$600 per unit, including both parts and labor. As mass-production becomes possible, as lighter and less costly materials are used, and if PVC pipe is used in the core, costs should go down.

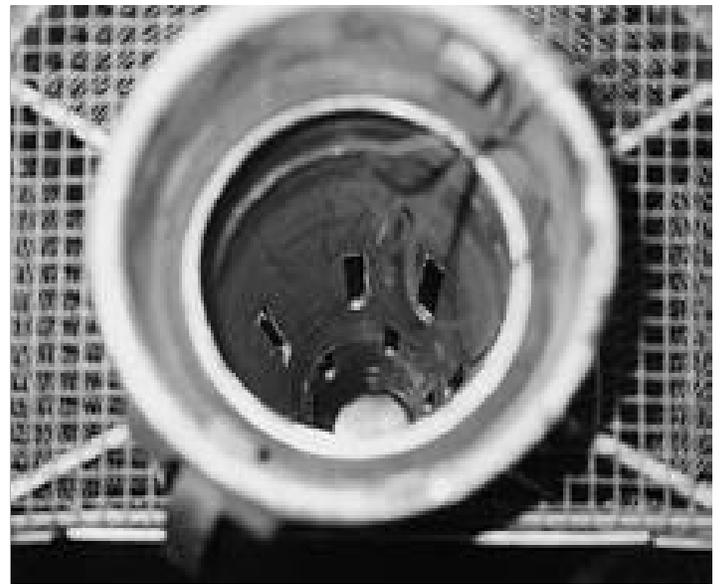
A report produced by ADF&G and DOT&PF will be available by summer 1998. For more information, call the Northern Region DOT&PF Environmental Section at (907) 451-5289.



Left: The device is light. Eric Gerke holds the intake with his thumbs.

Top: View of the bottom of the pump screen intake.

Right: View looking down inside the pump screen intake.



New Fish Passage Research

by Michael D. Travis, PE, Travis Environmental Consulting

Providing adequate passage for upstream migrating fish can pose significant engineering and environmental challenges to road designers. Since 1984, the Alaska Department of Transportation and Public Facilities (DOT&PF) and the Federal Highway Administration (FHWA) have invested heavily in defining the parameters of fish passage. Working in conjunction with the University of Alaska Fairbanks (UAF) and the Alaska Department of Fish and Game (ADF&G), investigators analyzed the efficiency of existing culverts to pass upstream migrating Arctic grayling. Researchers from UAF utilized the data generated from these studies to create a software program called "FISHPASS".

FISHPASS requires the engineer to input a proposed culvert's slope, length, diameter, placement within the stream bed, and inlet design. Other parameters used are the anticipated discharge and size of the design fish. The program anticipates the power and energy requirements of slow swimming fish to negotiate the proposed structure. FISHPASS prompts the user to consider design modifications if the power and energy requirements exceed the design fish's capabilities.

Where grayling is the design fish species, ADF&G accepts the FISHPASS methodology for designing fish passage structures. However, the central and southeast ADF&G Habitat Divisions are concerned that the program does not accurately quantify passage requirements for juvenile Coho and Chinook salmon. This concern often generates heated debates between road designers and ADF&G biologists. Thus, the DOT&PF has launched

another program to study the fish passage requirements of juvenile salmon.

During the early years of their lives, Coho and Chinook salmon feed and live in freshwater streams. An incorrectly designed or perched culvert structure can prevent these fish from utilizing an entire watershed. Increased mortality can arise from increased predation as the fish pool behind culverts and from decreased food availability.

The research team for the new fish passage work consists of representatives from UAF, ADF&G, and DOT&PF. The objective of this research is to document actual swimming performance of juvenile Coho and Chinook salmon through culverts. The researchers will use the resulting data to either substantiate the existing model or lay the foundation for modifying it. They will also coordinate with the State of Washington, which is studying related aspects of juvenile salmon passage.

During the next two years, the team will study streams in southeastern and southcentral Alaska. They will concentrate on high gradient streams that contain juvenile salmon and are intersected by the State highway system. The team will capture juveniles upstream of the culverts by using baited traps. They will also use an underwater video camera to observe swimming behavior. Concurrently, the researchers will record detailed velocity profiles within the culverts.

The team will issue their final report by December of 1998. By early 1999, the researchers will hold a training seminar in Anchorage and Juneau. For more information about this project, please contact Billy Connor at 451-5479.

Materials...

Several publications are available on a first-come, first-served basis from the T2 Center. You can get a free copy of the following materials by contacting the center.

"Fundamentals of Culvert Design for Passage of Weak-Swimming Fish" FHWA-AK-RD-90-10, presents design procedures and criteria for retrofitting existing culverts to pass upstream-migrating, weak-swimming fish.

"Pavement Maintenance Effectiveness/Innovative Materials Workshop- Participants Handbook," deals with pavement maintenance effectiveness, current research trends, pcc joint resealing, pcc partial-depth spall repair, ac crack treatment, and ac pothole repair.

"Stream Stability and Scour at Highway Bridges, Bridge Inspector's Module-Participant Notebook," covers stream stability, bridge scour concepts, countermeasures and inspection.

New Publications Available for Loan

Place a check by the publications that you want to borrow.

- ___ 1997 TRB Distinguished Lecture, TRR 1594, Transportation Research Board National Research Council, 1997
- ___ A Review of Sintering in Seasonal Snow
- ___ Advanced Transportation Management Systems & Transportation System Management, TRR 1603, Transportation Research Board National Research Council
- ___ Aggregate Tests For Hot Mix Asphalt, TR Circular 479
- ___ Analysis of Linear and Monoclonal River Wave Solutions, CRREL Special Report 98-1, Department of the Army
- ___ Analyses Relating to pavement Material Characterizations & their Effects on Pavement Performance, FHWA-RD-97-085,
- ___ Asphalt Binders & Binder Specifications, TRR 1586, Transportation Research Board National Research Council
- ___ Assessing the Economic Impact of Transportation Projects, Circular 477, Transportation Research Board National Research Council
- ___ Building Transit Ridership, TCRP Report 27, Transportation Research Board National Research Council
- ___ Building Better Roads: Iowa's Contribution to Highway Engineering 1904-1974, Iowa
- ___ Common characteristics of Good & Poorly Performing PCC Pavements, FHWA-RD-97-131, US DOT / FHWA
- ___ Composites for Infrastructure - A Guide for Civil Engineers
- ___ Concrete Pavement Rehabilitation, T2, SE Region D&C, Statewide Materials Juneau, Headquarters Bridge D&C, Northern Region D&C, Central Reg. D&C, City of Fairbanks, City of Anchorage
- ___ Construction Flexible Pavements, Bridges, Quality, & Management, TRR 1575, Transportation Research Board National Research Council
- ___ Design of Pavement Structures Part II, - Rigid Pavement Design & Rigid Pavement Joint Design, AASHTO, American Assoc. of State Highway & Transportation Officials
- ___ Determining Soil Volumetric Moisture Content Using Time Domain Reflectometry, FHWA-RD-97-139, US DOT / FHWA
- ___ Development of Training Material for Highway Construction Personnel, SNI International Resources, Inc.

- ___ Dynamic Effects of Pile Installations on Adjacent Structures, NCHRP synthesis 253, Transportation Research Board National Research Council

- ___ Emergency Preparedness for Transit Terrorism, TCRP Synthesis 27, Transportation Research Board National Research Council

- ___ Environmental Issues in Transportation, TRR 1601, Transportation Research Board National Research Council

- ___ Exhaust emissions from road traffic - description of driving patterns by means of simulation models, 272-1997, Swedish National Road & Transportation Research Institute

- ___ Expansion Joints

- ___ Factors Influencing Ice Conveyance at River Confluences, CRREL Special Report 97-34, Dept. of the Army

- ___ Fatigue Design of Modular Bridge

- ___ Fatigue Design of Modular Bridge Expansion joints, NCHRP Report 402, Transportation Research Board National Research Council

- ___ Ferry Transportation Planning & Operations, TRR 1608, Transportation Research Board National Research Council

- ___ FHWA Scanning Report on Traffic Management & Traveler Information Systems, FHWA-PL-98-010, US DOT / FHWA

- ___ Frost Resistance of Cover & Liner Materials of Landfills & Hazardous Waste Sites, Special Report 97-29, CRREL

- ___ Geometric Design & its effects on Operations

- ___ Highway Safety Data: Costs, Quality, & Strategies for Improvement, Final Report, FHWA-RD-96-192, US DOT / FHWA

- ___ Intelligent Transportation Systems (ITS) Projects Book (January 1998), FHWA-JPO-98-012, US DOT / FHWA

- ___ Lead-Based Paint Removal for Steel Highway Bridges, NCHRP Synthesis 251, Transportation Research Board National Research Council

- ___ Level of Service Assessment for congested Freeway Sections in North Carolina

- ___ Longitudinal Joints: Problems and Solutions, Quality Improvement Series 121, National Asphalt Pavement Association

- ___ Methods for Increasing Live Load Capacity of Existing Highway Bridges, NCHRP Synthesis 249, Transportation Research Board National Research Council
- ___ Monitoring of Rutting & Roughness of the Elliot Highway, INE/TRC 97.10 AK-RD-98-06, Transportation Research Center, US DOT / FHWA
- ___ Pavements & Structures Monitoring, Pavement Instrumentation, & Drainage systems Evaluation, TRR 1596, Transportation Research Board National Research Council
- ___ Pedestrian & Bicycle Research 1997, TRR 1578, Transportation Research Board National Research Council
- ___ Penndot-New Book List - Snow Removal & Ice Control Tech.
- ___ Polymer Modified Waterproofing & Pavement System for the Hoga Kusten Bridge in Sweden, 282-1997, Swedish National Road & Transportation Research
- ___ Public Transit 1997 Planning, Management, Marketing & New Technology, TRR 1604, Transportation Research Board National Research Council
- ___ Purdue University - Sixth International Purdue Conference on Concrete Pavement Design & Materials for High Performance vol.1-2-3, Purdue University
- ___ Quantification of Shape, Angularity, & Surface Texture of Base Course Materials, CRREL Special Report 98-1, Dept. of the Army
- ___ Quantifying Congestion Vol.1, NCHRP 398
- ___ Rehabilitation Performance Trends: Early Observations from Long-Term Pavement Performance (LTPP) Specific Pavement Studies (SPS), FHWA-RD-97-099, US DOT / FHWA
- ___ Roadside Safety Features & Other General Design Issues, TRR 1599, Transportation Research Board National Research Council
- ___ Soil Moisture Determinations Using Capacitance Probe Methodology, CRREL Special Report 98-2, Dept. of the Army
- ___ Strategies to Assist Local Transportation Agencies in Becoming Mobility Managers, TCRP Report 21, Transportation Research Board National Research Council
- ___ Summary of Progress, NCHRP, National Cooperative Highway Research Program, December 31, 1997
- ___ Superpave Construction Guidelines, Special Report 180, National Asphalt Pavement Association
- ___ Traffic Flow Issues & Analysis, TRR 1591, Transportation Research Board National Research Council
- ___ Transportation Finance for the 21st Century, Conference Proceedings 15, Transportation Research Board National Research Council
- ___ Transportation Forecasting & Travel Behavior, TRR 1607, Transportation Research Board National Research Council

1997 TRB Distinguished Lecture, Transportation Research Record No. 1594. This report covers the papers included on the program of the 76th Annual Meeting of the Transportation Research Board in January 1997 as well as peer reviewed papers.

Bicycle and Pedestrian Design: Issues and Findings, Alaska Section ITE Technical Committee Report. This report covers issues concerning the latest existing design guidelines and issues facing bicycle and pedestrian design. It includes a list of issues, reports to inform key policy makers on current findings, and abstracts generated by a Transportation Research Board Information Search.

Devices and Technology to Improve Flagger/Worker Safety, Research Report 2963-1F, Nada D. Trout and Gerald L. Ullman. This Texas Transportation Institute report identifies new work zone traffic control (WZTC) techniques and devices used throughout the country to improve worker safety. Ten devices were reviewed, including five from the Strategic Highway Research Program.

Evaluation and Guidelines for Drainable Bases, Research Project 0-1456, Vivek Tandan, Ph.D., Miguel Picornell, Ph.D., and Soheil Nazarian, Ph.D., PE. This report completed for the Texas Department of Transportation describes the characterization of base materials being commonly used throughout the state of Texas. Stiffness and strength based on the resilient modulus and the static strength of compacted specimens is included. The results indicate that cement stabilized gravel is the best material to achieve high stiffness and strength while minimizing water retention capacity of the compacted base.

Evaluation of Airport Subsurface Materials, CRREL Special Report 97-13, Vincent C. Janoo, Robert Eaton, and Lynette Barna. This report covers findings on 11 subsurface materials specified by the Federal Aviation Administration that were examined to determine their susceptibility to frost heave and thaw weakening. All but two were found to be frost-susceptible under the U.S.

Army Corps of Engineers criterion and the Asphalt Institute criteria.

Evaluation of Gardner Creek Air Ducts, Report No. FHWA-AK-RD-91-08, Alan Braley, Billy Connor, Matthew Reckard, and John Zarling. This final report by the Alaska Department of Transportation and Public Facilities covers the use of air ducts under the sideslope of roadways over permafrost to offer potential reductions in thaw under the sideslope. The air ducts proved successful.

Evaluation of Repair Procedures for Web Gap Fatigue Damage, Research Report 1360-1, Peter B. Keating, Scott D. Wilson, and Terry L. Kohutek. This Texas Transportation Institute report investigates repair procedures for fatigue damage in the web gap of steel highway bridges, including drilling holes at crack tips, flame-cutting holes to remove extensively cracked regions, and gouging and rewelding.

Evaluation of Sign Substrates for Use with Plastic Drums, Research Report 2924-3F, King K. Mac, Roger Bligh, and Wanda L. Menges. This Texas Transportation Institute report covers a study on the evaluation of various substrates for use with plastic drums. The objectives included: (1) identify sign substrates for use with plastic drums, including sign substrates that are currently in use and new sign substrates that could potentially be used with plastic drums, particularly sign substrates made from recycled materials; (2) evaluate the selected sign substrates for safety performance when used with plastic drums; and (3) analyze the test results and recommend sign substrates for use with plastic drums.

Evaluation of South Dakota Department of Transportation's Shoulder Surfacing on New Construction, Study SD95-04, Abbas A. Butt, Ph.D., PE, Samuel H. Carpenter, Ph.D., PE, Ali A. Selim, Ph.D., PE, Kathryn A. Zimmerman, PE. This report summarizes the evaluation of SDDOT's shoulder surfacing on new construction and the shoulder design procedures adopted by other state departments of transportation.

Monitoring of Rutting and Roughness of the Elliot Highway, Report No. INE/TRC 97.10 AK-RD-98-06, Lufti Raad. This Alaska Department of Transportation and Public Facilities report includes the effects of lifting load restrictions during spring-thaw on damage to Alaskan roads as it impacts road maintenance costs.

Pavement Marking Materials: Assessing Environment-Friendly Performance, NCHRP Report 392, Anthony L. Andrady. This Transportation Research Board report covers the development of a semiquantitative process for measuring the engineering performance, including the impact of volatile organic compounds; and the health concerns, including hazardous air pollutants, of various classes of conventional pavement marking materials used for highway stripes.

Pavements and Structures Monitoring, Pavement Instrumentation, and Drainage Systems Evaluation, Transportation Research Record No. 1596. This report covers papers that were peer reviewed by the Transportation Research Board on investigations of instruments and methods that can be used to monitor characteristics and the response of pavements and structures to live loads and environmental factors; results of instrumented pavement sections in the United States and abroad; and assessments of techniques for evaluating subsurface pavement drainage systems.

Physical Processes and Natural Attenuation Alternatives for Remediation of White Phosphorus Contamination, Eagle Flats, Fort Richardson, Alaska, CRREL Report 96-13, Daniel E. Lawson, Lewis E. Hunter, and Susan R. Bigl. This report describes the results of investigations into the role of tidal flat physical systems in the natural attenuation of white phosphorus contamination in Eagle River Flats on Fort Richardson, Alaska.

Ripping Frozen Ground with Attachment for Dozers, CRREL Special Report 97-14, Paul V. Sellmann and Dale R. Hill. This report looks at a simple ripper attachment for use on the blade of a dozer to determine if the easily installed tool could provide some ripping capability when machines with rear-mounted rippers are not available.

River Ice Data Instrumentation, CRREL Report 97-2, Roger L. Kay and Kathleen D. White. This report covers the identification and ranking of the field measurements needed during winter conditions and the instrumentation required to make the measurements.

Site Remediation via Dispersion by Chemical Reaction (DCR), CRREL Special Report 97-18, Giles M. Marion, James R. Payne, and Gurdarshan S. Brar. This report covers three studies evaluating the DCR process to remediate 1) hydrocarbons at Eareckson Air Force Station on Shemya in the Aleutians, 2) pesticide-contaminated soils from Rocky Mt. Arsenal, and 3) heavy-metal contaminated soils from a former zinc smelter at Palmerton, Pennsylvania.

FHWA Study of South African Pavement and Other Highway Technologies and Practices, George Belancio, Stephen Gaj, Newton Jackson, Donald Lucas, Samuel A. Carradine, Jr., John Hallin, Carolyn Jordan, Raymond Zink, and American Trade Initiatives, Inc. This report summarizes the findings of a U.S. scanning tour to study the Republic of South Africa's pavement and related technologies.

Trenchless Installation of Conduits Beneath Roadways, NCHRP Synthesis 242, Tom Iseley, Ph.D., PE, and Sanjiv B. Gokhale, Ph.D., PE. This report describes the current state of the practice of using trenchless technology for installing conduits beneath the roadways.

The Use of the Superpave PG Grading System for Selecting Asphalt Binders for Seal Coats, Research Report 1367-2F, William E. Elmore, Thomas W. Kennedy, Mansour Solaimanian, and Robert McGennis. This Texas Department of Transportation report summarizes the analysis and evaluation of the use of PG-graded asphalt for seal coats.

Use of Waste Toner in Asphaltic Concrete, Research Report 3933-1F, Mansour Solaimanian, Thomas W. Kennedy, and Robert B. McGennis. This Texas Department of Transportation and University of Texas at Austin report investigates the feasibility and potential benefits of utilizing waste toner in hot-mix asphalt concrete.

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addressed by the proper agencies.

Bo Brownfield, ADOT&PF's Deputy Commissioner for Operations, and Steve Moreno, FHWA Alaska Division Administrator, attended the conference in its entirety. They addressed numerous questions at the conference and familiarized themselves with many other issues that require future attention.

As a result of discussions spawned at the conference, both the state and FHWA will look at the interpretation of new Disadvantaged and Minority Business Enterprises contracting regulations. The FAA also pledged to review problems with its prequalified list and its system of listing contracts on the Internet. The rewrite of ADOT&PF's Standard Specifications is likely to see some changes to allow implementation of some of the innovative contracting methods presented at the conference.

Participants indicated Tom Brigham, ADOT&PF's Director of Statewide Planning luncheon talk on the state's Transportation Improvement Program was informative and well received. An overview of the new Federal Highway Bill (in House-Senate Conference as of this writing) by Clyde Stotzfus, ADOT&PF Special Assistant to the Commissioner shed light on future transportation funding.

Much of the final day was devoted to new asphalt specifications, including polymer modifiers and Superpave specifications. Among the issues discussed were the cost of new asphalt plants needed to produce the new mixtures, problems during laydown with the higher temperatures involved, use of cutting agents to reduce sticking to tools and rollers, and meeting EPA air quality standards.

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