Statewide Research Development & Technology Transfer
FFY 2005 & 2006 Annual Report

Alaska Department of Transportation & Public Facilities
Statewide Design & Engineering Services Division
2301 Peger Road
Fairbanks, AK 99709-5399

www.dot.state.ak.us/stwddes/research/index.shtml
(907) 451-5320
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Introduction

The Department of Transportation and Public Facilities Research Development and Technology Transfer Program (RDT2) is funded through the Federal Highway Administration's State Planning and Research Program, Local Technical Assistance Program, Surface Transportation Program, and State matching funds.

Research staff conducts and oversees research projects on behalf of the department. Through the research staff, the department also maintains reciprocal activity with the national and international transportation research community to obtain research findings that may have application in Alaska. Research results go to appropriate department staff, local agencies, and the public through publications, training, and other means. Research staff also actively work to implement research findings.

The RTT program includes the department’s Local Technical Assistance Program (LTAP), also known as the Technology Transfer (T2), and the Border Technology Exchange Program (BTEP). While these programs are also funded by FHWA, they focus on technology transfer to local governments and the Yukon Territory.

The LTAP program also manages the National Highway Institute (NHI) training program which provides federal and state matching funds to sponsor technical training for department employees.

RTT program goals:

- Improve procedures, techniques, materials, and equipment used by the department to plan, design, construct, operate, and maintain state transportation systems and facilities.
- Ensure the improved procedures, techniques, materials, and equipment are implemented within the department and in local communities.
- Advance safety.
- Use state and federal resources efficiently.
- Ensure that transportation systems are constructed and operated with minimal adverse effect on the environment.
- Promote construction, maintenance, and operation of facilities at the lowest life cycle cost.
- Promote effective and economic management of the department's capital investments.

Nearly all department research reports and current research projects can be found by going to http://www.dot.state.ak.us:

1. select scroll box “Program, Plans, Projects”
2. double-click on “Research & Tech”
3. under Research & T2 select "Resources (Libraries)” and follow the search instructions.

DOT&PF’s research reports are also found in the Transportation Research Information System (TRIS). Their searchable web address:

http://ntl.bts.gov/tris/. They can also be found by going to http://ntl.bts.gov.

Hard copies available upon request
Research Development and Technology Transfer Staff

Clint Adler, P.E., Research Engineer .................................................... 451-5321
Jim Elieff, P.E., Research Manager ...................................................... 451-5479
Simon Howell, Training Specialist ....................................................... 451-5284
Steve Saboundjian, P.E., Implementation Engineer .............................. 451-5322
Patty Smith, Administrative Clerk ....................................................... 451-5320
Dave Waldo, LTAP Manager ............................................................... 451-5323
Fax ........................................................................................................ 451-5340

Research Advisory Board

Voting Members
Robin Taylor, Deputy Commissioner of Marine Operations AMHS ... 465-3902
Gary Hogins, P.E., Chief Engineer, Design & Engineering Services, Chair .......................................................... 465-6958
John Falvey, Deputy Commissioner of Aviation .................................. 465-0724
John MacKinnon, Deputy Commissioner of Highways & PF .............. 465-3900
Andrew Niemiec, P.E., Northern Region Director ............................. 451-2211
Jeff Ottesen, Division of Program Development ................................. 465-6971
Malcolm Menzies, Southeast Region Director .................................... 465-1763
Gorden Keith, Central Region Director ............................................. 269-0555
Peter Forsling, P.E., FHWA ................................................................. 586-7427

Non-Voting Members
Jim Elieff, P.E., Secretary ................................................................. 451-5479
## Research Reports added to RTT Library 2005—July 2006

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<th>Title</th>
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<td>Loftus Road Extension Project—Final Report</td>
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<td>Analysis of an efficient Fish Barrier Assessment Protocol for Highway Culverts</td>
<td>FHWA-AK-RD-05-02</td>
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<td>Development and Validation of Urban Rutting Models</td>
<td>FHWA-AK-RD-04-02</td>
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<td>Materials Application Rates for Dense-Graded Asphalt Surface Treatment Using High Float Emulsion</td>
<td>FHWA-AK-RD-05-03</td>
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<td>Floating Rubber Fender Testing</td>
<td>FHWA-AK-RD-05-06</td>
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<td>Synthesis of Practice for Rapid Wetland Assessment in Alaska</td>
<td>FHWA-AK-RD-05-09</td>
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<td>Above Ground Actuated Yellow Crosswalk Lights at Uncontrolled Pedestrian Crossings</td>
<td>FHWA-AK-RD-06-01</td>
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<td>Evaluation of Reinforced Soil Slopes Constructed on the 2003 Kwethluk Airport Relocation Project</td>
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<td>Performance of the Beaver Creek section of the Alaska Highway</td>
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<td>Analysis and Design of Wire Mesh/Cable Net Slope Protection—Research Report</td>
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<td>Analysis and Design of Wire Mesh/Cable Net Slope Protection—Design Guidelines</td>
<td>WA-RD-612.2</td>
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<td>Research on the Upstream Passage of Juvenile Salmon through Culverts</td>
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<td>Animal Vehicle Crash Mitigation Using Advanced Technology, Phase I.</td>
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*Available on-line: [www.dot.state.ak.us/stwddes/research/search_lib.html](http://www.dot.state.ak.us/stwddes/research/search_lib.html)*
Objectives

- Project Selection: Models/modifications that might be considered
- Project Management: Highest value/best use of our two Research Engineers
- Research Implementation: Core Curriculum development and implementation strategies for research

Peer Exchange Team Observations

From discussions with research staff and customers, and through review of research procedures used in Alaska and the other states participating in this Peer Exchange, the Peer Exchange Team recorded a number of observations that could potentially be used in their respective organizations.

General Observations

- Alaska’s Research & Technology Transfer staff members are well respected within the Department and recognized as a valuable resource. Duties include identifying research needs, performing research, managing research projects, providing technical assistance, conducting training, and facilitating technology transfer.
- The process of research, development and technology transfer is a valuable, but underused resource that can broadly address the agency’s mission and objectives, including policy research as well as traditional engineering-related topics.
- The creation of the Alaska University Transportation Center, with its financial matching capabilities, presents a tremendous opportunity to extend Alaska’s research program, to leverage research investments, and to help fulfill the Governor’s vision of advancing education in Alaska.

- Opportunities to supplement or leverage Alaska’s research funding, which now consist almost exclusively of State Planning & Research funds, include University Transportation Center match, grants or cost-sharing from other federal agencies such as the Federal Aviation Administration or the US Geological Service, pooled fund studies, and using operational units’ funding for some activities.

Marketing

A recurring topic in discussions with research customers was the level of awareness of research topics and the research management process in the Department. The Peer Exchange Team observed that:

- Marketing can create awareness of available research services, the research management process, operational units’ role in the research process, and the potential payoff of research.
- Executive-level involvement, such as that of Alaska’s Research Advisory Board, represents a core of influential proponents for research.
Peer Exchange—continued

- Managers of operational units in the departments offered several suggestions for promoting research awareness at executive and working levels, including:
  - research staff attending regularly scheduled meetings of peer groups (for example, design, materials, or planning) to inform them about research services and projects and to learn about potential research needs;
  - conducting focus group meetings with operational units for the specific purpose of identifying their research needs;
  - publishing brief (possibly 2-page) summaries of completed research projects;
  - including an overview of research and library services in the new employee orientation;
  - conducting joint meetings between Department staff and university researchers;
  - improving web page visibility and content;
  - creating posters to inform Department staff of research services.

Project Selection

Discussions centered on the process—including selection criteria—used to identify research needs and to choose which projects to perform. The Peer Exchange Team observed that:

- Alaska’s currently identified research needs significantly exceed available funding and staffing resources.
- Current project selection criteria—which include size of project, statewide significance, and duration and appear to favor short term, low cost, statewide projects—may limit the ability to address important research projects, constrain project scope, limit implementation potential, and increase the workload of the research staff.
- Managers of operational units expressed the need for regularly scheduled Research Advisory Board meetings, whether annually or more frequently (possibly in conjunction with other meetings like the monthly Commissioner’s meeting).
- To avoid the busy summer construction season and to better coordinate with universities’ academic years, making project selections in spring might be preferable.
- Montana and South Dakota employ a two-stage project selection process, in which their research advisory boards initially screen projects based on one-page project suggestions and later make final decisions based on detailed project definitions.
- Consultant or University Transportation Center staff can possibly be used to help review and vet research suggestions.
- Alaska’s less formal research processes, like the Rapid Response Program, Innovative Features Program, and the Experimental Features Program, provide excellent mechanisms for documenting and sharing the performance of innovative construction and maintenance techniques.
- Technical experts and those who suggest research projects value the feedback research staff offers following Research Advisory Board meetings.
Peer Exchange—continued

Project Management

Discussions focused on the technical and administrative aspects of managing active research projects with available staff.

- Active involvement of technical staff throughout the research process—from needs identification through implementation—could improve awareness, strengthen project definition, increase the likelihood of successful implementation, and share workload.

- including the research requestor, potential implementers, and representatives of affected external groups on Technical Advisory Committees can be very productive and enhance implementation.

- Videoconferencing, which has been successfully used by others to enable participation in research projects, could be especially useful in Alaska, where travel distances are great and staff time is at a premium.

- To make best use of time available from research staff, some project management functions could be outsourced—for example to a University Transportation Center or through contracts with experienced, retired Department employees—or by assigning certain research management functions to research administrative staff.

- Streamlining the contracting process by using standard contract terms and format, obtaining assistance from the Department’s contracts office, and establishing a master agreement with the University Transportation Center can reduce the workload of the research staff.

- Establishing an integrated research project database can reduce the administrative burden of tracking progress, reporting status, and updating the national Research in Progress system.

Some states use the same database to automatically generate research project web pages.

Technology Transfer & Implementation

Discussions addressed the need and means for moving research into practice.

- Managers of operational units strongly emphasized the need for implementation, not just research.

- Likelihood of successful implementation is increased when the project is designed and budgeted at the outset to develop products (such as specifications, drawings, standards, and methods) that are fully ready to use in normal practice.

- Successful implementation requires a systematic process to clearly define what is to be done, who is responsible, what time frame should be achieved, and what resources are needed. A process by which technical committees consider researchers’ findings and formally recommend implementation actions to executive management can provide this definition.

- Alaska’s well-designed Research & Technology Transfer newsletter could be used to more effectively raise awareness of completed research in the Department by increasing hard-copy and electronic circulation, specifically highlighting active and completed research projects, including a concise digest of contents, providing links to project web pages, and annually listing completed projects.
Peer Exchange—Planned Action

Project Identification & Selection

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Planned Actions</th>
</tr>
</thead>
</table>
| Communication | 1. Advertise our program to all functions and levels in the Department.  
• Expand Web page.  
• Use Newsletter to promote research services.  
• Attend regularly scheduled meetings in subject areas  
• Cultivate & foster relationships with University Transportation Centers.  
2. Pursue video conferencing. |
| Project Selection Criteria | Revisit criteria with Advisory Board to ensure:  
• greater focus on need objectives vs. time and cost.  
• Equitable consideration for Regional and statewide policy concerns. |
| Involvement of Subject Matter Experts | • Encourage participation in AASHTO and TRB activities/committees.  
• Arrange focus meetings to identify research needs with staff. |
| Methods | • Implement a 2-stage research need vetting process. |
| Funding | • Create budget line item to secure UTC match  
• Investigate alternate funding for NCHRP, TRB, and AASHTO Program dues. |

Project Management

Research Engineer Duties | Focus on highest value duties:  
• Aid Department staff in identifying & preparing research needs.  
• Secure appropriate expertise and research providers. |
Peer Exchange—Planned Action

<table>
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<tr>
<th>Business Operations</th>
<th>1. Modify roles of subject matter experts</th>
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<tbody>
<tr>
<td></td>
<td>• First stage vetting</td>
</tr>
<tr>
<td></td>
<td>• Second stage scoping</td>
</tr>
<tr>
<td>2. Project Technical advisory panel selection</td>
<td>Use available services in the department to our advantage</td>
</tr>
<tr>
<td></td>
<td>• Contracting &amp; procurement services.</td>
</tr>
<tr>
<td>3. Secure consultant services to support the Research Program.</td>
<td>Project management</td>
</tr>
<tr>
<td></td>
<td>• Administration of Experimental/Innovative Features.</td>
</tr>
<tr>
<td>4. Secure master agreement with the UTCs that uses a simple work order for procurement of research services.</td>
<td>Encourage UTCs to provide project management skills for their projects.</td>
</tr>
<tr>
<td></td>
<td>• Reassign duties within all Research &amp; T2 staff levels to perform routine information updates.</td>
</tr>
<tr>
<td>5. Department’s Web server.</td>
<td>Find an effective research project management/status/tracking system.</td>
</tr>
</tbody>
</table>

Implementation & Technology Transfer

| Commitment | • Require fully engaged technical advisory committee with an overall objective-based focus on all research projects. |
|            | • For each research project, require the technical advisory committee to develop a formal implementation plan on completion of the research. |
| High-Value Programs | • Re-energize the Experimental Features and Innovative Features Programs. |
| Communication | • Use our newsletter and web pages to showcase completed research throughout the department. |
|             | • Provide a product based on completed research—specification, method, policy, program etc. |
# Research Work Program Budget

<table>
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<tr>
<th>AKSAS</th>
<th>Work Item</th>
<th>FFY06 Project Funding</th>
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## Projects Funded During Past Two Years

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Expected Research Focus Areas Based on Current Need

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Grand Total 62                       5,160,000
Process Used to Identify/Select Research Projects

**IDEA**

**New Research Needs Statement**
- Problem description
- Why DOT needs to solve
- Implementation plan
- Why innovate
- Funding source

**Research Engineer’s Review**
- Refine research needs
- Filter using existing sources that may answer research need
- Categorize by subject

**Subject Matter Experts Review/Prioritize Needs**
- Planning/ITS
- Preconstruction/design
- Traffic & safety
- Bridges/structures
- Hydraulics/hydrology
- Materials/geotech
- Maintenance & operations

SOME ARE REJECTED

**Annual Research Advisory Board Meeting**
- Subject matter expert present needs
- May be rejected for number of reasons
- Surviving needs are scored
- Projects are approved based on score
- Budget constrains projects approved

**RESEARCH PROGRAM**
**TRB Dues**

**Estimated Completion Date**: Project is renewed annually

**Estimated Cost FY 03**: $86,000

**Project Manager**: Jim Elieff

**Project Description**

The Transportation Research Board (TRB) is a unit of the National Research Council under the National Academy of Sciences. This program

- promotes the publication of transportation research results
- hosts annual meetings each January in Washington, D.C., for research presentations and discussions
- sponsors committees of researchers active in specific fields
- distributes Transportation Research Records and other publications to all member states

This project funds Alaska’s annual contribution for support of the Transportation Research Board. It enables Alaska to receive distributions of all TRB publications, with individual copies of each to all interested personnel in the department. It also provides for unlimited literature search services through the Transportation Research Information Services (TRIS) and listings of abstracts on any transportation-related topic at no additional cost to the state. Finally, it provides travel cost reimbursements to all TRB committee chairmen in return for their services at annual committee meetings and free registration for all DOT&PF employees who attend TRB’s annual meetings.

No personnel costs are involved in this project account. This account provides the mechanism for paying the annual billing for these services. The TRB executive board finalizes billing amounts for this program in January, and state participation agreements are sent out by TRB in March.

The Transportation Research Information Services database is a computerized information file maintained and operated by the TRB. It is sponsored by FHWA, the Federal Transit Administration, the National Highway Traffic Safety Administration, U.S. Department of Transportation, the fifty state highway and transportation departments, the District of Columbia, Puerto Rico, American Automobile Manufacturers Association, National Asphalt Pavement Association, U.S. Army Corps of Engineers, and Association of Railroads. TRIS covers both U.S. and international research. It contains information on various modes and aspects of transportation, including planning, design, finance, construction, maintenance, equipment, traffic, operations, management, marketing, and other topics. TRIS contains more than 400,000 abstracts of completed research and research in progress.

Services available from TRIS include literature searches, topical searches, and publications: Transit Research Abstracts, Highway Safety Literature, and the quarterly Highway Research Abstracts.

The research staff enters information about the department’s active and completed research into TRIS, as required by 23 CFR 420.207(a)(4).

**Available Project Reports**

All completed DOT&PF Research reports are available through TRB, as are all research reports from other state highway agencies and from the international community.
NCHRP Program Support

Estimated Completion Date: Project is renewed annually

Estimated Cost: $380,000

Project Manager: Jim Elieff

Project Description

The DOT&PF supports and participates in the National Cooperative Highway Research Program (NCHRP), a joint program of AASHTO and FHWA. The Transportation Research Board (TRB) administers the program. NCHRP, established in 1962, provides a program of systematic, well-designed applied research. Program funding comes entirely from contributions from state transportation agencies. FHWA recommends contributions of 5.5% of each state’s planning and research program (SPR) allocation of federal highway funds. NCHRP contributions do not require the 20% in state matching funds common to other SPR-funded research activities.

NCHRP projects are developed each year. NCHRP solicits ideas for research projects of a national scale from state representatives. State representatives prioritize projects through a voting process. The AASHTO standing Committee on Research (SCOR) selects the final projects. Next, NCHRP solicits interest from national experts in the project area to participate in project panels. The panels develop project statements, solicit proposals, and select research agencies to perform the work. Finally, the participating states vote to select the projects that will be completed with the available funds. The DOT&PF research manager is responsible for coordinating NCHRP project submissions and panel participation.

Available Project Reports

All reports are available through the Transportation Research Board or the Keith B. Mather Library at University of Alaska Fairbanks.
Experimental Study on Seismic Retrofit Techniques for Cap Beams, Columns, and their Connections of Highway Bridges

Project Number: T2-03-02
Estimated Completion Date: 9/30/06
Estimated Cost: $110,000
Project Manager: Steve Saboundjian
Technical Advisory Committee:
- Elmer Marx, Bridge Design

Problem Statement
Due to the effect of ice impact on columns, most bridges in Alaska were designed with improper seismic design considerations. Therefore, the columns are often stronger than the cap beams and may fail without warning during a strong earthquake. A recent investigation indicated that there is a high propensity for excessive damage of bridge joints if hit by a major earthquake.

The application of the proposed study will lead to retrofit schemes that will be both efficient and economically competitive. The proposed schemes will address the following requirements; (1) it is rather easy and simple to implement in the field, (2) traffic disruptions are maintained at minimum levels, and (3) it is durable.

Research Objectives
(1) to experimentally investigate the shear and flexural capacity of cap beams and their corresponding columns that are typical in the states of Missouri and Alaska,
(2) to study the cyclic behavior of beam-column joints, and
(3) to develop effective retrofit techniques for the seismic upgrading of the cap beams, columns, and their connections.

Project Status
The contracted research team completed design, construction, retrofitting, testing and data analysis for test unit 1; partially completed design, construction, retrofitting, testing, and data analysis for test unit 2. Project is on schedule. Anticipated future work: purchase of materials for retrofit of test unit 2; complete retrofit, testing and data analysis of test unit 2.

Available Reports
- Final draft report submitted and being reviewed by the AK DOT & PF Bridge Section
Influence of Low Temperatures on the Ductility of Bridge Structures in High Seismic Regions

Project Number: T2-05-01

Cost: $105,000

Project Manager: Clint Adler

Technical Advisory Committee: Elmer Marx, Bridge Design

Problem Statement:
There are no known seismic tests on reinforced concrete structures at low (wintertime) temperatures. Some studies on materials have indicated that the ductility of reinforcing steel is reduced at lower temperatures. The temperature and exposure duration at which that occurs, and the magnitude of the reduction are unknown.

Some state DOTs use ductile detailing and capacity design principals to ensure the safety of the bridges during earthquakes and assume that the design ductility capacity for structural components in bridges is unaffected by temperature. However no supporting research exists to verify this assumption.

Research Objectives:
Assess the influence of low temperatures on the ductility of reinforced concrete structures in seismically active regions.

The proposed research will do one of two things:

(1) Validate the assumption that the ductility of structural members as currently detailed is sufficient at low temperatures for expected seismic demands or,

(2) Provide recommendations for changes to design details and methodology if it is found that the ductility is significantly reduced.

Project Status:
Under contract to North Carolina State University. Researchers are constructing full-scale structural members for destructive testing in a cold room facility.

Available Reports:
Final report expected July, 2007
Alaska Bridge Design Synthesis

**Project Number:** T2-06-06  
**Cost:** $350,000  
**Project Manager:** Clint Adler  
**Technical Advisory Committee:** Richard Pratt, Chief Bridge Engineer

**Problem Statement:**
The Alaska Department of Transportation & Public Facilities (AKDOT&PF) has not systematically compiled, evaluated, and published formal and comprehensive technical and policy guidelines for bridge engineering processes and procedures in Alaska. Alaska’s bridge engineers need comprehensive supporting technical and policy analyses and/or research to help them collectively apply consistent bridge engineering standards, specifications, and procedures that are cost effective, and integrated into AKDOT&PF’s bridge design, construction, inspection, and maintenance practices.

**Research Objectives:**
The objectives of this research are to identify, develop, and define consistent policies, procedures, standards, and guidelines for engineering, construction, inspection, and maintenance of bridges in Alaska. At a minimum this will include:

1. identification of opportunities to clarify and improve existing engineering specifications, guidelines, and standards for bridge design in Alaska consistent with AKDOT&PF’s goals and policies and AASHTO LRFD specifications;

2. identification of recommended updates and/or improvements to related AKDOT&PF’s bridge engineering policies and standards: and

**Project Status:**
Under contract to Roy Jorgensen Associates, Inc.

**Available Reports:**
Final report expected January, 2007
Yukon River Bridge Decking Research

Project Number: T2-06-10

Cost: $60,000

Project Manager: Clint Adler

Technical Advisory Committee: Jake Allen, Northern Region Design

Problem Statement:

The Yukon River Bridge is a two-lane highway bridge on the Dalton Highway or “Haul Road” carrying heavy industrial and highway traffic serving the North Slope oil fields. The superstructure consists of two closed steel box girders supporting an orthotropic steel deck. The bridge was built in the early 1970’s and has featured a timber wearing surface which has been replaced several times. The bridge has six spans, each on a 6% grade for a total length of 2200 feet and experiences temperature fluctuations from -70 degrees F. to 115 degrees F. Because of the steep grade and poor friction, trucks typically use tire chains in winter months which as caused accelerated deterioration of the deck surface.

Research Objectives:

The objective of the research is to identify, by comparative evaluation, the best choice of wearing surface that is durable and light weight. It must have sufficient traction, and have the structural ability to accommodate the level of flexural strains that will exist at the interface between the steel deck and wearing surface.

Project Status:

Researchers have identified potential decking materials for testing and will begin physical testing during the Fall/Winter of 2006.

Available Reports:

Effectiveness of Paving on Airborne Particulate Matter in Kotzebue, Alaska
(Research Response Program)

Federal Project Number: RT-0002(143)
Research Project Number: T2-02-03
Estimated Completion Date: December, 2006
Cost: $1,900,000
Project Manager: Clint Adler

Principal Investigator:
• Gerry Guay, Air Quality Monitoring Program, Alaska Department of Environmental Conservation (AKDEC)

Problem Statement
The Alaska Department of Transportation & Public Facilities AKDOT&PF does not have quantitative information on the impact of paving silt-based gravel roads in rural Alaska and its effectiveness in reducing the levels of airborne particulate matter (PM).

Kotzebue, one of the larger cities in northwest Alaska, has undergone a steady population growth over the past 20 years. This growth has resulted in a vast expansion in the local road network. This demand for new roads led to a substantial increase in the number of unpaved road surfaces as well as an increase in vehicular traffic and airborne particulate matter. This elevation in the level of particulate air pollution is causing Kotzebue residents to experience an increase in respiratory illnesses. "When the air becomes dusty, the number of health problems and hospital visits increase".

Research Objectives
The objective of this project is to determine if paving a portion of Kotzebue’s dirt roads will be effective in reducing the levels of particulate emissions from the road surface due to vehicle traffic and winds. The project will also assess the overall reduction in the concentration of airborne particulate matter in Kotzebue. The goal of this project is to demonstrate a minimum emissions reduction of 65 - 75 % in the vicinity of the road surface and an overall reduction of particulate levels in Kotzebue of 10-20%.

Project Status
AKDEC installed air monitors and collected air particulate data during the Summer and Fall of 2002, 2003, and 2004. AKDOT&PF will paved streets during the summer of 2005 and AKDEC will monitor air quality through the Summer and Fall of 2006.

Available Reports
• Interim report available from Project Manager
• Final at project end
Environmental

Development of a Rapid Wetland Assessment Model for Alaska.
Phase I: Synthesis of Practice for Rapid Wetland Assessment in Alaska

Project Number: T2-04-03
Completion Date: 7/30/05
Cost: $30,000
Project Manager: Clint Adler

Technical Advisory Committee:
- Bill Ballard, AKDOT&PF Statewide Environmental Coordinator
- Carol Sanner - AKDOT&PF Liaison to the U.S. Army Corps of Engineers
- Jim Powell - AK Department of Environmental Conservation
- Robert (Mac) McLean, AK Department of Natural Resources, Office of Habitat Management & Permitting
- Phil North - U.S. Environmental Protection Agency
- Leonard Corin, Bill Pearson, Jerry Tande - U.S. Fish & Wildlife Service
- Jeanne Hanson – U.S. National Oceanic & Atmospheric Administration, National Marine Fisheries Service
- Edrie Vinson – AK Division Federal Highway Administration

Problem Statement
Many Alaska Department of Transportation & Public Facilities (AKDOT&PF) projects involve unavoidable impacts to wetlands due to Alaska’s unique climate and ecosystems. To satisfy requirements of state and federal environmental laws and policies, and to ensure environmentally responsible transportation planning and decision-making, AKDOT&PF must assess the functions and values of wetlands potentially affected by transportation project alternatives.

No single or standard method exists for assessing wetlands specifically throughout Alaska. Lack of a standardized wetland assessment method for highway projects in Alaska has resulted in inefficient environmental reviews. Objective, consistent, and effort-efficient functional assessment techniques that reflect Alaska’s varied climates and ecosystems are needed. AKDOT&PF needs guidance for development of rapid wetland functional assessment procedure for Alaska’s transportation projects.

Research Objectives:
- Develop and present a synthesis of rapid wetland functional assessment practices potentially applicable to Alaska.
- Identify data and information needs necessary to develop an Alaskan statewide rapid wetland functional assessment protocol
- Present recommendations for the development of an Alaskan rapid wetland functional assessment protocol applicable statewide.

Project Status
Phase I: Completed.

An additional $60,000 is available for Phase II: Develop Rapid Wetland Assessment Model for Alaska.

Available Reports
Design Manual for Air Cooled Embankments (ACE)

Project Number: T2-02-05
Estimated Completion Date: 6/30/07
Estimated Cost: $60,000
Project Manager: Steve Saboundjian
Technical Advisory Committee:
- Steve Saboundjian
- Billy Connor

Problem Statement
Roadway embankments constructed in areas of warm permafrost (interior Alaska) experience high rates of failure due to thaw-induced settlement of the foundation soils. The problem is most pronounced beneath the embankment shoulders where additional snow cover in winter (due to snow plowing operations) and hot dry conditions during summer conspire to produce mean annual surface temperatures that are several degrees higher than their pre-construction values. Thaw settlement beneath embankment shoulders often causes side-slope instability and the formation of large longitudinal cracks in the asphalt pavement surface with consequent maintenance requirements.

To reduce maintenance costs and improve roadway safety, a new type of thermal treatment that uses an open highly porous rock cover on the shoulder side slope is being investigated. Modeling studies and field measurements will be used to understand the thermal behavior of these ventilated shoulder features and formulate design procedures.

Research Objectives
The aim of this study is to produce a design manual to be used by DOT&PF and private contractors. Data generated with advanced models will be combined with field measurements and synthesized into a set of design guidelines. These guidelines will be incorporated into the design manual.

Project Status
UAF collected field measurements during the last year. Analysis is in progress.

Available Reports
Bed Material Retention for Buried Invert Culverts

**Project Number:** T2-02-08

**Estimated Completion Date:** 12/31/05

**Cost:** $60,000

**Project Manager:** Clint Adler

**Technical Advisory Committee:**
- Mark Miles, Statewide Hydraulic Engineer
- Researchers investigating culvert scour phenomena.

**Problem Statement**

ADOT&PF hydraulic engineers lack design criteria for providing and installing stable bed material in fish passage culverts. A common permit stipulation for buried invert culverts is that the bed material within the culvert barrel remains stable up to the 50-year design flood. This should also include the stability of the streambed material near the culvert inlet and outlet. Existing design methods and criteria do not address streambed material stability in a buried culvert.

Additionally, existing gradation specifications allow sub-bed flow during low flow conditions which may preclude fish passage.

**Research Objectives**

Provide reference hydraulic parameters and bed material properties useful to:
- Hydraulic engineers in designing and installing stable bed material that allows for fish passage in culverts.

**Project Status**

Hydraulic flume study underway with Utah State University.

**Available Reports**

- Interim: n/a
- Final at project end
Design of Pipe Attachments for Precast Culvert Headwalls

Project Number: T2-03-04
Estimated Completion Date: 9/30/05
Estimated Cost: $30,000
Project Manager: Clint Adler
Technical Advisory Committee:
- Regional Hydraulic Engineers

Project Status
Completed. AKDOT&PF Bridge section developed standard design details for culverts up to 5 feet in diameter. Additional study may be necessary for larger pipes. The Technical Advisory Committee is reviewing options for further study.

Available Reports
No report available. Standard drawings are available.

Problem Statement
Little engineering guidance is available to help engineers determine the most effective and economic method for attaching culvert pipe to precast concrete headwalls. Arched pipe culverts have been especially challenging. Considerable engineering effort is expended each year in the review and design of proposed headwall attachment methods. Additionally, field construction has been problematic due to nonstandard and varying methods. Long term performance information is also lacking.

Research Objectives
Determine which attachment designs are optimal in terms of cost, constructability, environmental impact, and performance and develop standard design drawings and specifications for statewide use.
Vegetated Rip Rap Survey and Assessment

**Project Number:** T2-05-05

**Cost:** $20,000

**Project Manager:** Clint Adler

**Technical Advisory Committee:** AK Dept. of Natural Resources, Plant Materials Center and AKDOT&PF Statewide and Regional Hydraulic Engineers

**Problem Statement:**
Factors that promote healthy and thriving vegetation on riprap streambank revetments in Alaska are not well understood. Evidence suggests that riprap can be successfully vegetated, especially in coastal Alaskan climates, however, vegetated riprap designs have not been systematically evaluated. Highway design and construction engineers require quantitative limits on the parameters that govern successful riprap revegetation in order to design and build riprap revetments that successfully incorporate vegetation and support and promote successful revegetation on a sustainable basis.

AKDOT&PF engineers commonly use riprap to stabilize streambanks at roadways and bridges. Natural resource agencies prefer the use of vegetation on stream banks to provide and enhance fish habitat. A potential solution is to produce a hybrid revetment system using rock to stabilize the stream in concert with vegetation to provide/enhance fish habitat. Recent research indicates that vegetation on rip rap can thrive if care is taken to construct environments that enable and encourage vegetated growth. Appropriate environments are eco-region and site specific.

**Research Objectives:**
It is expected that his study will identify:
- hydraulic, biological, and ecological parameters that encourage successful vegetation of riprap on streambanks
- design criteria for successful vegetation
- circumstances where riprap must be artificially vegetated vs. naturally vegetated

**Project Status:**
Draft report is available and undergoing internal review.

**Available Reports:**
Pending.
Evaluation of Avalanche Detection/Warning Device

Project Number: T2-03-05
Completion Date: 9/30/05
Cost: $26,000
Project Manager: Clint Adler

Technical Advisory Committee:
- Terry Onslow, Central Region M&O

Problem Statement
Recent advances in acoustic sensor technology promise increased reliability in detecting snow avalanches. To be effective, researchers must use the equipment to identify unique acoustic and seismic characteristics of avalanches. This avalanche “fingerprinting” has not yet been successfully done in Alaska and is critical to the development of reliable avalanche detection and warning system(s).

Problem Objectives
The goal of this project is to identify
- unique or characteristic seismic and/or acoustic signatures of avalanches including pre-release symptoms as well as signatures of avalanches in motion,
- reliability of avalanche detection using seismic and acoustic sensors, and feasibility of development of warning and/or road closure systems.

Project Status
Project terminated

Available Reports
In 2003, researchers installed sensors and communication equipment in avalanche running zones near Girdwood, Alaska. Due to sensor and communication failures during the 2003-2004 winter season, no data is available to date.
Mitigation of Drifting Snow at Trans Alaska Pipeline Crossings

Project Number: T2-03-07

Estimated Completion Date: 6/30/07

Estimated Cost: $25,000

Project Manager: Clint Adler

Technical Advisory Committee:

- Dwight Stuller, AKDOT&PF Northern Region M&O
- Stephen Sorensen, P.E. Alyeska Pipeline Service Company
- Coleen Ackiss, P.E., AKDOT&PF Northern Region Traffic & Safety

Problem Statement

Where the trans-Alaska crude oil pipeline crosses the Dalton Highway on Alaska’s windy Arctic tundra, there are sections of high guardrail designed to protect the pipeline from errant industrial truck traffic. These guardrails are perfect windbreaks that cause the chronic formation of traffic-blocking snowdrifts in the highway. Removal of these drifts is a constant and expensive maintenance task because the relentless arctic wind forms new snowdrifts within hours after plowing.

Problem Objectives

The purpose of this project is to identify cost-effective drift mitigation options and/or safety treatments for these problem areas.

Project Status

AKDOT&PF research and traffic engineers have identified geometric and safety deficiencies with these guardrails and have had preliminary discussions on potential mitigation options with Alyeska Pipeline Service Company. Researchers will prepare a report that identifies all of the maintenance and safety issues and makes recommendations for mitigation as appropriate.

Available Reports

- Interim: n/a
- Final at project end
Richardson Highway Vegetation Survey and Assessment

**Project Number:** T2-05-03

**Cost:** $20,000

**Project Manager:** Clint Adler

**Technical Advisory Committee:** AK Dept. of Natural Resources, Plant Materials Center and AKDOT&PF Statewide Integrated Vegetation Management Coordinator.

**Problem Statement:**

AK DOT&PF wishes to develop an integrated right-of-way vegetation management plan for highway rights-of-way but lacks detailed information on vegetation species composition and distribution along Alaskan roadsides. This information is necessary to assess potential vegetation management techniques and form a basis for development of cost effective, integrated roadside vegetation management plans.

**Research Objectives:**

This study will identify:

- plant communities, distributions, and compositions along the Richardson highway
- extent of non-native invasive, and undesirable plants along the Richardson highway.
- extent of woody vegetation along the Richardson highway
- strategies for economic, and environmentally sustainable vegetation control tailored to specific stretches of the Richardson highway.

**Project Status:**

Survey underway during Summer, 2006.

**Available Reports:**

Report Expected Fall, 2006
Floating Donut Rubber Fender Testing

**Project Number:** T2-03-09  
**Estimated Completion Date:** project complete  
**Estimated Cost:** $50,000  
**Project Manager:** Steve Saboundjian  
**Technical Advisory Committee:**  
- Kirk Miller, ADOT&PF Marine Design Engineer

**Problem Statement**

ADOT&PF intends to use an existing floating rubber fender in a unique manner to accommodate Alaska’s Fast Ferries. In order to do this, several parameters must be established including inner pipe thicknesses, sleeve materials, and stiffness. If DOT&PF develops a set of specifications without the benefit of testing, it runs the risk of premature failure as a result of improper specification parameters. Our designers are unclear about what to specify. Testing will provide us with the necessary data to properly design fenders. Alaska Marine Highway System (AMHS) vessels are unique. It is doubtful a fender manufacturer will conduct independent testing for our particular application since the number of fenders sold would not be financially attractive.

**Research Objectives**

This study will fabricate and lab-test AMHS vessel specific floating rubber fenders to be used in the new fast ferry terminal improvements. Load and deformation data will be obtained to understand the long-term load capacity and durability of these all-tide moorage fenders. Lab tests will determine allowable loads and related energy absorption when these fenders are berthed against the vessel’s sponson. The purpose is to establish design and performance criteria that can be applied to the specific needs of the AMHS ferry vessels and allow DOT&PF designers to tailor the product to the intended application.

**Project Status**

All testing and data analysis complete. Expecting final report from Marine Highways.

**Available Reports**


![Floating Donut Rubber Fender Testing](image_url)
Use of Modified Asphalts

Project Number: T2-02-18
Estimated Completion Date: 9/30/06
Estimated Cost: $40,000
Project Manager: Steve Saboundjian

Technical Advisory Committee:
- Steve Saboundjian
- Billy Connor

Problem Statement
Fatigue transfer functions for conventional asphalt concrete mixes have been developed and are being used in flexible pavement design both in Alaska and elsewhere. However no such functions exist for polymer modified asphalt (PMA) mixes. It is well known that PMA mixes enhance fatigue performance, however this enhancement needs to be quantified. This project will collect from the three regions of the state typical aggregates and binders (conventional and PMA) and evaluate their fatigue resistance using laboratory flexural fatigue beam tests. Fatigue equations will be developed for all mixes.

Research Objectives
The goal of this project is to develop fatigue transfer functions for Alaskan conventional and PMA mixes in order to use them in flexible pavement design.

Project Status
The Transportation Research Center at UAF is carrying out the project. After producing lab-compacted specimens for testing, fatigue testing was performed at different temperatures. Modeling and analysis are underway.

Available Reports
- Interim: literature review and mix design information
- UAF preparing final draft
Development and Validation of Urban Rutting Models

Problem Statement

Rutting of asphalt pavements is a primary mode of distress for our urban roadways. The combined effect of permanent deformation and studded-tire wear creates hazardous driving conditions. In the past, the DOT&PF collected rut depth measurements on high-speed, high-volume roads (e.g. Seward and Glenn Hwys.) and developed models and curves to relate rut depth to number of vehicle passes (i.e. studded tire applications). This was done for SMA (stone mastic asphalt) and Type 2 mixes in the Anchorage area.

Research Objectives

In this study, it is proposed to develop models and curves to relate rut depth versus studded tire applications for different mix types for urban roads (especially in Anchorage and Juneau) where vehicle speed is lower and driving habits are different (e.g. frequent change of lane). The model and curves to be developed in this study would help predict the number of vehicle passes to reach the maximum acceptable amount of rutting and consequently pavement life. This will enable us to adequately program pavement rehabilitation and to determine which sections should be candidates for rehabilitation and when.
High-Float Surfacing for Gravel Roads

Project Number: T2-01-21
Completion Date: Completed
Estimated Cost: $50,000
Project Manager: Steve Saboundjian

Problem Statement
High-float (HF) surfacing is increasingly being used to surface gravel roads in Alaska. Various material sources and gradations have been used to construct HF jobs with varying success. Specifications have been modified to produce a more durable product. However, many questions remain unanswered. These pertain to:

- Aggregate gradation, maximum size, amount of fines, moisture content, rate of application, compatibility with the high float used.
- HF emulsion specifications: minimum and/or maximum limit values
- Ambient and base temperatures and the cut-off date for paving in different regions of the state.
- Optimal distances between HF distributor, aggregate spreader and compaction equipment.
- Traffic control and speed after application of the surface treatment.
- Aggregate sweeping intensity and frequency.

Research Objectives
This project aims at collecting information related to the variables enumerated above from past, present and near-future projects. This information will be used to determine the optimal materials and construction conditions for a successful and durable high-float surface treatment.

Project Status
Complete

Available Reports
Evaluation of Alternate Embankment Construction Methods

Project Number: T2-03-11
Estimated Completion Date: 12/31/06
Estimated Cost: $25,000
Project Manager: Steve Saboundjian

Technical Advisory Committee:
- Billy Connor

Problem Statement
In a number of Bush communities and remote locations of Alaska, the construction season is short and fill material is hard to come by. The cost of fill material is so high that only a few projects can be accomplished within budget every year. In addition, claims associated with pit failure are numerous. An alternative material method of constructing airport and roadway fill needs to be determined.

Research Objectives
The objective of this study is to evaluate the available embankment construction materials/methods. Candidate materials include lightweight aggregates, insulation, EPS foam (extruded polystyrene systems)

Project Status
A literature review was carried out and will be summarized in a final report.

Available Reports
- Interim: n/a
- Final at project end
Theoretical Density Determination with Nuclear Gauge

Project Number: T2-03-12
Estimated Completion Date: 12/31/06
Estimated Cost: $15,000
Project Manager: Steve Saboundjian
Technical Advisory Committee:
  • Steve Saboundjian
  • Zeke Yankee

Problem Statement

The Proctor and Vibratory standard methods for determining the degree of field compaction for soils and aggregates require obtaining a field sample (by digging the compacted layer) for screening/sieving. This is done to correct the values obtained from these tests.

Field materials technicians in the Southeast Region observed that a simple calculation could replace this time-consuming procedure. The same was observed for asphalt mixes. It is speculated that by knowing the coarse aggregate specific gravity, the percent voids and air void ratio (through nuclear densometer), one can calculate the maximum density of the material, and subsequently its percent compaction.

Research Objectives

The objective of this study is to check the validity, applicability and limits of the simple method described above. This will be achieved by compiling and organizing the data collected by the Southeast technicians for soils, aggregates and asphalt mixes; applying the simple calculation method to obtain maximum density values; then comparing these values to those obtained by using the standard tests. Values from projects in other regions could also be analyzed to check the universality of the suggested method.

Project Status

Field testing data is being analyzed in order to compare to proposed model.

Available Reports

• Interim: n/a
• Final at project end
Evaluation of LiDAR as a Data Acquisition Technique in Alaska (Research Response Program)

Federal Project Number: T2-02-16
Completion Date: Completed
Estimated Cost: $20,000
Project Manager: Clint Adler
Technical Advisory Committee: Scott Sexton, Northern Region Right-of-Way
Principal Investigator: Clint Adler

Problem Statement
LiDAR (Light Direction and Ranging) is a relatively new airborne survey technique. It may be of great benefit to the Alaska Department of Transportation and Public Facilities in collecting terrain data for use in road design. It’s not known how well a LiDAR will perform in obtaining ground terrain data in Alaska due to the following factors:

- Errors propagated by the Global Positioning System (GPS) at this latitude
- Effect of ground cover – i.e. trees, brush, grass.
- Variations in the gravitational field which have not been well researched in Alaska
- Computer algorithms of the LiDAR system.

Besides potential systematic errors, an evaluation must be made of the practical aspects of processing the huge amounts of data generated, the amount of on the ground field checking required, and the specifics of how the data should be delivered to reduce error in the data. If the parameters of LiDAR data acquisition can be determined, potentially large cost savings and time savings could result, especially in the design of long rural projects.

Research Objectives
This study is expected to resolve the following questions on LiDAR:

- The horizontal and vertical accuracy of the LiDAR system in typical applications.
- The ability of LiDAR to model terrain which is steep or forested.
- The reliability of computer algorithms used in data processing.
- The ability of the data processing software to output data in more dense or less dense patterns depending on the users preference for detail in certain areas.
- How well AKDOT/PF computers can process the finished DTM - files can be quite large.
- As the LiDAR system does not collect breaklines, how well these breaklines can be inferred by the computer algorithm, the data density or with the aid of aerial photos.
- The effect of latitude on the GPS readings.
- What post flight checks of the system should be required to be performed before the airplane leaves the area.
- The ability of the system to adjust the final DTM given additional independent ground survey data.
- The cost effectiveness of LiDAR vs. traditional DTMs.

Project Status
Complete. In-house staff conducted a cursory analysis.

Available Reports
Unpublished
Aggregate Abrasion Using the Nordic Ball Mill Test

Project Number: T2-04-01
Estimated Completion Date: 12/31/07
Estimated Cost: $65,000
Project Manager: Steve Saboundjian

Technical Advisory Committee:
- Materials sections of the three Regions

Problem statement
Aggregate durability, hardness and abrasion resistance can be measured using tests such as the Degradation Value test (Deg), the Los Angeles test (LA) and the Nordic Ball Mill test (NB). However the repeatability and reproducibility of the Deg test have been questionable. In addition, when compared to the NB test, the Deg and LA tests do not seem to distinguish among varying levels of aggregate wear susceptibility. Therefore there was a need to study the NB test results in comparison to the conventional Deg and LA results, and to assess its repeatability and reproducibility.

Objectives
The objective are to test aggregates from different projects, from the three regions of the state using the Nordic Ball Mill test, then compare results to the conventional test results (i.e. Deg and LA). Repeatability and reproducibility of the Nordic test will be assessed. Maximum Nordic abrasion specification values will be established for the different aggregate materials depending on their location in a pavement structure (wearing, binder or base course), and the traffic level (AADT).
**Use of Rubber in Hot Mix Asphalt to Reduce Rutting**

**Project Number:** T2-04-02

**Estimated Completion Date:** 12/31/06

**Estimated cost:** $60,000

**Project Manager:** Steve Saboundjian

**Technical Advisory Committee:**
- Newt Bingham
- Bruce Brunette

**Problem Statement**

A review of pavement performance indicates that the life of Alaskan pavements is typically less than 6 years. Northern European and Alaskan research indicates that the use of “hard” aggregates in an HMA (low Nordic Abrasion values) improves the studded tire wear resistance of the pavement. Initial results of recent Alaskan research using the Swedish Prall test device shows promise that the use of crumb rubber modifier (CRM) in the HMA may also lead to improved surface wear resistance of the pavement. In this case, a granulated CRM was added to the aggregate.

**Research Objectives**

The objective of this research project is to further evaluate the use of asphalt rubber in Alaskan asphalt mixes for high volume roads. In particular:

- Refine and optimize the design of asphalt concrete made with rubberized asphalt cement and crumb rubber added as substitute aggregate.

- Capture the knowledge of others that use asphalt rubber mixes successfully; a thorough review of existing specifications will be performed.

**Project Status**

Laboratory mix designs were performed to study the effects of varying rubber and asphalt contents on mix properties.

**Available Reports**

At project end
Characteristics of Asphalt Treated Base Course Material

**Project number:** T2-06-09

**Estimated Completion Date:** 12/31/07

**Estimated cost:** $75,000

**Project Manager:** Steve Saboundjian

**Technical Advisory Committee:**

Steve Saboundjian

**Problem Statement:**

The Alaska Flexible Pavement Design Manual and the statewide policy on stabilized base course stipulate the use of stabilized layers for the majority of roadway pavements. The inclusion of asphalt (either hot or in the form of emulsion) is one of the options mentioned to construct asphalt treated bases (ATBs). The problem is the lack of engineering characteristics/properties for typical AK base materials. For pavement design purposes, there is a need to properly characterize these materials to understand the effects of temperature and asphalt content on ATB behavior.

**Research Objectives:**

The objectives are to determine the stiffness, fatigue and permanent deformation characteristics of Alaskan asphalt treated base course material. Design equations for fatigue and permanent deformation will be developed from laboratory and field tests.

**Project Status:**

PDA in May 06.

**Available Reports:**

- Interim/Progress report: n/a
- Final Report: at end of project.
Enhancing Estimating Procedures

Project Number: T2-01-13
Cost: $200,000
Est. Completion Date: 12/30/06
Project Manager: Clint Adler
Technical Advisory Committee: N/A

Problem Statement
DOT&PF has collected data from bid packages for many years. While each region has written software to use the data, none of the regions believe the data is used to its full potential. A review of department needs indicated a two-fold problem: there are no standards to assure the estimates required for each project phase (planning, preconstruction, and construction) are accurate, and various methodologies are used.

By centralizing the data and analysis, the data could be used to better prepare an engineer’s estimate and to assist Construction in estimating the cost of change orders.

Research Objectives
Centralize the historical data collection and analysis from completed bid packages.

Develop a common software to standardize engineers’ estimate preparation during the design phase and when estimating change order costs during the construction phase.

Project Status
Consultant developed new software

Available Reports
Research product is software and accompanying documentation
Workflow Optimization for AK DOT&PF

Project number: T2-06-01

Estimated Completion Date: 12/31/06

Estimated cost: $60,000

Project Manager: Clint Adler

Technical Advisory Committee:
- Jeff Currey, NR
- Burke Barton, SE
- Gerry Welsh, CR

Problem Statement:
ADOT&PF's work production begins when a project is established. Drawings, plans and data are shared between Planning, Surveying, Right-of-way, Pre-design, Bridge Design, Materials, Design, Construction and Maintenance & Operations during the development of a project. Because different software is often used for specific tasks, the products are not always compatible from one task to the next. This imposes inefficiencies on the development process and in some extreme cases loss of data. Workflow optimization and better use of available technology could save considerable costs and time throughout the development process.

Research Objectives:
The objective of this research is to evaluate currently existing ADOT&PF workflow, by identifying, documenting and reporting similarity, disparity and bottlenecks in the flow.

In particular, the tasks to be completed are as follows:
- Identify workflow similarities, disparities, problems, barriers, gaps, chokepoints and bottlenecks in the three ADOT&PF Regions, by conducting a comprehensive review of current software utilization in the three Regions.
- Evaluate the efficiency of the current ADOT&PF workflow (how/what are the types and formats of information being transferred between various sections).
- Identify potential vendor(s) that might visit ADOT&PF with the aim of pinpointing areas of change and how to proceed with these changes.
- Provide justification for any recommendation for ADOT&PF workflow change.
- Produce a report that summarizes the findings.

Project Status:
TAC members and the contractor (Dye M.G.) conducted a kick-off meeting. Contractor submitted a revised work plan. Study is in progress.

Available Reports:
- Interim/Progress report: end of summer'06.
- Final Report: at end of project.
Evaluation of Lighted Crosswalks

Project Number: T2-03-15
Completion Date: Completed
Estimated Cost: $30,000
Project Manager: Clint Adler
Technical Advisory Committee:
- Kurt Smith, Statewide Traffic Engineer
- Jill Sullivan, Statewide Intelligent Transportation Systems Coordinator

Problem Statement
Available evidence shows that in-road crosswalk warning lights increase pedestrian safety at uncontrolled pedestrian crossings, however they are susceptible to snow plow damage and winter maintenance and operations. Above-ground, pedestrian activated yellow crosswalk lighting systems promise increased pedestrian safety and decreased maintenance at uncontrolled crosswalks in Alaska. However, AKDOT&PF lacks conclusive data on the effectiveness and economics of such treatments.

Research Objectives
The purpose of this project is to determine whether above-ground warning systems are as effective as in-road lights at uncontrolled pedestrian crosswalks in increasing pedestrian safety at uncontrolled crosswalks. Researchers intend to evaluate the effectiveness of above-ground, pedestrian activated yellow crosswalk treatment systems in terms of improved driver awareness and system operational costs. AKDOT&PF intends to identify the system(s) for Alaska that maximize pedestrian safety and minimizes maintenance costs. Ultimately, the research will support the development of engineering criteria and warrants for including such systems into projects.

Project Status
Complete

Available Reports
Report number: FHWA-RD-06-01, "Above-Ground Actuated Yellow Crosswalk Lights at Uncontrolled Pedestrian Crossings"
Evaluation of Detectable Warnings in Alaska (Research Response Program)

Project Number: T2-02-22
Completion Date: 6/05
Cost: $20,000
Project Manager: Clint Adler
Technical Advisory Committee:
- Kurt Smith, State Traffic Engineer

Problem Statement
AKDOT&PF does not have quantitative information on the performance of detectable warnings in cold weather climates.
Visually challenged pedestrians require cues to differentiate between pedestrian ways and vehicle pathways. The Americans with Disabilities Act Accessible Guideline (ADAAG) has required installation of detectable warnings in these areas since July 26, 2001.

Research Objectives
The objective for this project is to evaluate performance of various detectable warning systems in cold climatic conditions. The goal of this project is to recommend product configurations and suitable performance standards for detectable warning systems in Alaska.

Project Status
Completed.

Available Reports
- Unpublished report available from project manager
Pooled Fund Studies Program

Coordinator: Clint Adler

Program Description

The department may participate in pooled fund studies, in which resources from several states or other government agencies, universities, and/or industry sources are combined to support a single research effort. Contributions to such cooperative studies, if they have been approved by the FHWA as part of their national or regional Pooled Fund Study Program, are 100% federally funded. As such, they do not require the 20% in state matching funds common to other SPR-funded research activities. Proposals for participation in Pooled Fund Studies must come to DOT&PF’s research advisory board for approval. The research manager coordinates nominations for Pooled Fund Studies.

Problem Statements are at:

http://www.pooledfund.org/.
POOLED FUND STUDIES

Aurora Program

Project Number: FHWA Proj. No. SPR-3(042)

Lead Agency: Iowa Department of Transportation

Established: 1996

Estimated Completion Date: Ongoing project.

AKDOT&PF Contribution: Funding from AKDOT&PF Intelligent Transportation System Program.

AKDOT&PF Technical Contact: Jack Stickel, Terry Onslow

Research Objectives

Aurora is an international program collaborative research, development and deployment in the field of road and weather information systems (RWIS), serving the interest and needs of public agencies. The Aurora vision is to deploy RWIS to integrate state-of-the-art road and weather forecasting technologies with coordinated, multi-agency weather monitoring infrastructures. It is hoped this will facilitate advanced road conditions and weather monitoring and forecasting capabilities for efficient highway maintenance, and provision of real-time information to travelers.

Status

Study is ongoing and will continue for the foreseeable future. Members contribute funds annually; propose research projects on RWIS-related projects (Road Weather Information Systems); manage contracts for the research; and prepare reports/submit results for publication. One of Aurora's goals is to provide guidelines for RWIS implementation and usage. Refer to http://www.aurora-program.org/for project updates.
Strength and Deformation Analysis of MSE Walls at Working Loads

Project Number: FHWA Proj. No. SPR-3(072)

Lead Agency: Washington State Department of Transportation

Established: 2000

Estimated Completion Date: 12/31/04.

AKDOT&PF Contribution: $20,000

AKDOT&PF Technical Contact: Keith Korri, State Foundation Engineer

Research Objectives

Develop a design procedure for the internal stability of Mechanically Stabilized Earth (MSE) walls, especially those reinforced with fabrics. The high cost of overly conservative designs can be avoided. The researchers anticipate that the amount of soil reinforcement needed for geosynthetic MSE walls can be reduced by a factor of two or more, and it may be possible to reduce reinforcement needs for steel MSE walls as well through better definition of the true factor of safety for internal stability.

Status

Research team is actively building and testing the walls with good backfill.
Wiremesh and Cablemesh Slope Protection

**Project Number:** FHWA Proj. No. SPR-3(077)

**Lead Agency:** Washington State Department of Transportation

**Established:** March, 2000

**Estimated Completion Date:** 12/31/2004.

**AKDOT&PF Contribution:** $10,000

**AKDOT&PF Technical Contact:** Dave Stanley

**Research Objectives**

Draped wiremesh and cablemesh slope protection has been utilized by states for many years to control rockfall. The initial design and specifications for these draped wiremesh slope protection systems were developed using empirical methods by WSDOT in the late 1950's for slopes that were generally less than 75 feet in height. Over the years the draped wiremesh slope protection designs have been modified by other states so that nationwide we now have a large number of design variations, none of which have been quantified.

**Status**

**Pavement Marking Life Cycle**

**Project Number:** FHWA Proj. No. SPR-3(094)

**Lead State:** Utah Department of Transportation

**Estimated Completion Date:** 12/31/06

**AKDOT&PF Contribution:** $20,000

**Project Technical Contact:**
- Clint Adler

**Problem Statement**

Utah Department of Transportation (UDOT) is managing this pooled fund research study that is leveraging resources from nine state departments of transportation and the Federal Highway Administration. UDOT hired B.C. Traffic Inc. of Woodbury Minnesota to (1) collect, compile and analyze pavement marking retroreflectivity data, and (2) use that data to develop service life performance curves of retroreflectivity vs. time for selected durable pavement marking materials.

Participating states collected retroreflectivity data from 2002 through 2005. Researchers are analyzing the data and preparing the final report.

**Available Reports**
- Interim: n/a
- Final at project end

**Research Objectives**

The objective of this study is to develop service life performance curves of retroreflectivity vs. time for selected durable pavement marking materials based upon data collected periodically on various highways in nine states.

**Project Status**
Fish Passage Capability through Modified Culverts: Flume Research Study

Project Number: FHWA Proj. No. SPR-3(096)

Lead State: Washington State Department of Transportation

Estimated Completion Date: 12/30/06

AKDOT&PF Contribution: $120,000

AKDOT&PF Technical Contact: Mark Miles & Clint Adler

AK Department of Natural Resources, Office of Habitat Management & Permitting
Technical Contact: Mac McLean

Problem Statement

Hydraulic Engineers use swimming capability criteria developed specifically for arctic grayling to determine stream discharges for use in designing culverts for fish passage. While this application is certainly appropriate where Arctic grayling exist, blind application of designs developed for grayling results in potentially inappropriate designs for other species. Juvenile salmon are a species of great concern – especially throughout the Pacific Northwest. Unfortunately, quantitative swimming capability information that engineers can use to design culverts is not available for young salmon and steelhead trout.

Research Objectives

We know that young salmonids use the boundary layer along the culvert walls to pass through culverts, however, flow velocity data near the culvert walls at various barrel slopes and flows is lacking. Also, the complex hydraulics at culvert inlets and outlets present potential barriers to fish passage. This researchers will:

- Increase quantitative information on how water velocities in culverts affect fish passage (especially juvenile salmon).
- Develop better engineering criteria for passing juvenile salmonids and other species through culverts.
- Provide information necessary to optimize economic culvert designs for fish passage.

Project Status

The study has funded the construction of a culvert flume adjacent to the Skookumchuck fish hatchery near Tenino, WA. The flume is capable of testing 40 foot long culverts up to 6 feet in diameter. The research contractor (Battelle’s Pacific Northwest Laboratory) has performed a suite of hydraulic and fish passage tests and released a report.

Available Reports

- Final: WA-RD 644.1 "Research on the Upstream Passage of Juvenile Salmon through Culverts: Retrofit Baffles"
POOLED FUND STUDIES

Animal-Vehicle Crash Mitigation Using Advanced Technologies

Project Number: FHWA Proj. No. SPR-3(076) and TPF-5(082)

Lead State: Oregon Department of Transportation

Established: 4/30/99
Completion Date: 6/30/06
AKDOT&PF Contribution: $50,000
AKDOT&PF Technical Contact: Clint Adler, Jill Sullivan & Scott Thomas

Problem Statement

According to 1994 AKDOT&PF Research, about 500 moose-vehicle collisions (MVCs) occur on Alaskan roadways annually, amounting to >20% of all motor vehicle accidents that occur on rural roads. Drivers may become desensitized to static moose crossing signs. Few quantified studies exist on the effectiveness of technologies to detect roadside animals that then warn drivers dynamically of wildlife near the road.

Research Objectives

This project demonstrates and evaluates the effectiveness, costs, and benefits of some advanced technologies for warning drivers of the presence of animals near roadways.

A final report and personal presentation summarizing system costs, measured benefits, issues and limitations will be given to contributing agencies. This information can be used by Alaska DOT&PF to determine appropriate application of this technology.

Status

Phase I (System Demonstration) Complete. Vendors installed experimental radio detection system in Montana in the Fall of 2002. The Western Transportation Institute is under contract to monitor and evaluate the system. Preliminary results indicate that the very expensive Montana system is functioning but has required several field modifications.

Available Reports

Final: ANIMAL VEHICLE CRASH MITIGATION USING ADVANCED TECHNOLOGY, PHASE I
Pavement Subgrade Performance Study

Project Number: FHWA Proj. No. SPR-2 (208)

Lead State: New York; work conducted at CRREL, New Hampshire

Established: 02/01

Estimated Completion Date: 1/31/07

AKDOT&PF Contribution: $10,000

AKDOT&PF Technical Contact: Steve Saboundjian

Research Objectives

The objectives of the study are to develop an improved mechanistic subgrade failure criterion for pavements and to evaluate the effect of environment (seasonal variability) on resilient material properties.

Status


Effects of Multiple Freeze-Thaw Cycles vs Deep Frost Penetration on Pavement Performance

Project Number: Pooled Fund Study No. TPF-5 (013)

Lead State: Pennsylvania Department of Transportation

Established: 3/4/03

Estimated Completion: 9/30/06

Status: See http://www.pooledfund.org/projectdetails.asp?id=2&status=6

AKDOT&PF Contribution: $20,000

Computer-based Self-operating Training System on Anti-icing/Road Weather Information

Project Number: FHWA Proj. No. TPF-5 (009) and SPR-3 (104)

Lead State: Iowa Department of Transportation

Established: 12/00

Status: See: http://www.pooledfund.org/projectdetails.asp?id=4&status=6

AKDOT&PF Contribution: $30,000 from AKDOT&PF Intelligent Transportation Systems Program and Maintenance & Operations

AKDOT&PF Technical Contact: Frank
Richards, Statewide M&O

Research Objectives

Anti-icing and road weather information systems (AI/RWIS) are relatively new tools that improve the efficiency of winter storm maintenance and, as a result, improve highway safety.

Because these are new concepts, standard training programs for all levels of AI/RWIS users are not yet available. This project will coordinate and leverage several individual training and educational initiatives into one consistent training program for AI/RWIS.

Status

Development of the customized software training packages started in the fall of 2001 and are nearing completion. A beta customization has been delivered to Alaska. See the website for the Snow and Ice Pooled Fund Cooperative Program. www.sicop.net

Western Alliance for Quality Transportation Construction (WAQTC)

Project Number: FHWA Proj. No. TPF-5(064)

Lead State: Alaska Department of Transportation & Public Facilities

Established: December, 2002

Estimated Completion Date: 2007

AKDOT&PF Contribution: $80,000

AKDOT&PF Technical Contact: Michael SanAngelo, P.E., Statewide Materials Engineer

Background

In the mid 1990's, several western state and federal highway agencies recognized the need to have qualified materials test technicians and laboratories conducting acceptance testing on materials purchased and incorporated into transportation facilities. This loose organization of highway agencies formed the Northwest Alliance for Quality Transportation Construction (NAQTC), which produced five technician-training and qualification modules for use within their organizations. Since materials testing procedures vary little from state to state, the NAQTC determined that all highway agencies in the western United States would benefit from a united effort. The NAQTC invited all WASHTO states to join their organization. Eventually, 7 additional state highway agencies joined the NAQTC to form the Western Alliance for Quality Transportation Construction or WAQTC.

The WAQTC is actively seeking to expand beyond the current member agencies consisting of state departments of transportation and FHWA agencies: Alaska, Arizona, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and FHWA Western & Central Federal Lands Highway Departments are currently members. The WAQTC is dedicated to improving the quality of transportation products and services through a comprehensive Technician Training and Qualification Program (TTQP).

Research Objectives

To support the development and refinement of a training and qualification program for construction inspection and materials testing technicians by the Western Alliance for Quality Transportation Construction (WAQTC), a cooperative technology transfer effort of multiple western states and FHWA.

Status

AKDOT&PF is beginning work on the study.
Long-Term Maintenance of Load and Resistance Factor Design Specifications

Project Number: FHWA Proj. No. TPF-5(068)
Lead State: Iowa Department of Transportation
Established: 2002
Estimated Completion Date: 2006
AKDOT&PF Contribution: $20,000
AKDOT&PF Technical Contact: Elmer Marx, Bridge Design Section

Background: In cooperation with AASHTO the FHWA has proposed that by 2007 all of the states utilizing the “Standard Specification for Highway Bridges” move to the LRFD method. As the LRFD Specifications are put into use by the states and others, there will be a need for technical and editorial corrections, clarifications, and potential additions resulting from practice and research studies.

Objectives
The objective of this project is to provide timely assistance to the AASHTO Highway Subcommittee on Bridges and Structures in implementing, revising, and refining the AASHTO Bridge Load Resistance Factor documents.

Status
Ongoing. Quarterly progress report published at:
www.pooledfund.org

Portable Non-Intrusive Technologies

Project Number: FHWA Proj. No. TPF-5(073)
Lead State: Minnesota Department of Transportation
Established: 2002
Estimated Completion Date: September, 2005

AKDOT&PF Contribution: $20,000
AKDOT&PF Technical Contact: Mary Ann Dierckman, Planning/Traffic

Background
Many metropolitan areas have high volume roadways that make the placement of conventional detectors not only difficult, but also unsafe for personnel. Non-intrusive technologies offer an alternative to conventional traffic data collectors, such as road tubes, by detecting traffic above or to the side of the roadway. A Non-Intrusive Traffic Detection System (PNITDS) can monitor traffic on multi-lane, high volume facilities without exposing personnel to traffic.

Objectives
The primary goal of this project is to provide data collection practitioners with a cost-effective design of a PNITDS and an independent assessment of a variety of detection technologies.

Researchers will design, build, and evaluate a pole-mounted PNITDS capable of detecting traffic in multiple lanes under various conditions without exposing personnel to traffic. Both the sensors and the portable concept itself will be assessed for their ability to perform temporary data collection functions.

Status
**Electronic Appraisal Development Study – Phase 1**

Project Number: FHWA Proj. No. TPF-5(087)

Lead State: Texas Department of Transportation

Established: 2003

Estimated Completion Date: August, 2006

AKDOT&PF Contribution: $10,000

AKDOT&PF Technical Contact: Rick Kauzlarich, AKDOT&PF Southeast Region Right-of-Way Chief

Objectives

Develop and deliver a "How To" manual of instruction for the electronic transmittal of Real Estate appraisal documents (appraisals, data books, and review appraiser reports). The manual should describe alternative options for implementation, listing pros and cons to each alternative, with recommendations for each participating state agency regarding respective hardware and software requirements.

Status

Project Nearing Completion. See: http://www.pooledfund.org/projectdetails.asp?id=309&status=6

**Problem Statement:**

Many state DOT's have sponsored research on roadside safety issues that include crash testing of features in accordance with FHWA adopted standards (NCHRP Report 350). Many of the research and functional problems are common to more than one state and so there is efficiency and cost effectiveness in pooling resources to conduct certain crash tests.

**Research Objectives:**

To establish an ongoing roadside safety research program that will meet the research and functional needs of participating states in a cost-effective and timely manner.

**Project Status:**

The advisory panel has selected several topics for study. See: http://www.pooledfund.org/projectdetails.asp?id=345&status=4

**Available Reports:**

Several reports are available.

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**Roadside Safety Research Program**

Project Number: TPF-5(114)

Lead State: WSDOT

Estimated Completion Date: Ongoing.

AKDOT&PF Contribution: $60,000

AKDOT&PF Technical Contacts: Kurt Smith, Statewide Traffic & Safety Engineer and Elmer Marx, Senior Bridge Engineer.
Structural Acoustic Analysis of Piles

Project Number: TPF-5(140)

Lead Agency: Federal Highway Administration

Estimated Completion Date: To be determined.

AKDOT&PF Contribution: $50,000

AKDOT&PF Technical Contacts: Clint Adler, Research Engineer.

Problem Statement:

Bridges, ferry terminals, and other structures constructed over water commonly have driven pile foundations. Driving piles in water may produce intense underwater sound that can negatively impact aquatic animals. State DOT’s, harbor districts and others must be able to reasonably predict the acoustical properties of sound generated by a project to forecast and mitigate the possible impacts to aquatic animals.

There is little scientific knowledge on noise characteristics produced in relation to variables in pile driving such as pile material, pile shape, hammer characteristics and so on. Understanding the acoustical properties of pile driving will help government and private entities select the proper materials and methods and noise reduction strategies for pile driving to economically ensure proper structural integrity while minimizing the adverse impacts of underwater noise.

Research Objectives:

1. To investigate how modifications in pile materials, pile shape, hammer characteristics, the nature of the substratum into which the pile is driven, water depth, the depth to which the pile is driven into the substratum, the load-bearing objective of the pile and other variables influence the properties of noise generated during pile driving.

2. To develop and validate acoustical source models of pile driving based on pile materials, pile shape, hammer characteristics and other variables.

3. To develop and validate sound field models of the effects of sound attenuation systems on the sound field close to piles. This includes defining the limits of the near field for different physical conditions (that is, size and shape of pile, depth of water, wavelengths of interest).

4. Develop guidance for DOT’s and other entities to select appropriate materials, methods and noise reduction strategies for pile driving projects.

5. To identify additional ranked research topics necessary to address regulatory or other concerns as necessary to adequately address practical application solutions.

Project Status:

The advisory panel is scoping the study (July 2006).

Available Reports:

See: [http://www.pooledfund.org/projectdetails.asp?id=369&status=4](http://www.pooledfund.org/projectdetails.asp?id=369&status=4) for current information
Experimental Features Program

Project Coordinator: Clint Adler

Program Description

This program enables federal highway construction funds to be used for promising but unproven materials, methods, and techniques where such use of federal funds would not normally be allowed. Statewide Research coordinates with the Federal Highway Administration’s Experimental Features in Construction Program, which encourages innovations in state highway design and construction. The program provides federal funds for new and unproven features. Funding for each experimental feature is included in the construction project; usually, the feature is designated in the bid schedule as a separate bid item. Funding for monitoring the feature comes from the Experimental Features Program, not from construction dollars. If the experimental feature fails, repair or replacement costs are also eligible for federal aid funds.

There are essentially two criteria for an innovation to qualify as an experimental feature.

- It must have potential benefits for DOT&PF or the public.
- Use of the feature must be followed up with an evaluation of its success, along with recommendations for its use in the future. Experimental features can be a new process or technique for using conventional materials and equipment.

The Department supports use of this program to encourage innovation in highway construction in general, and specifically as a means for full scale demonstrations of concepts developed in the research program. Costs of experimental features and evaluations of those features are typically paid for with construction funding.

Statewide Research staff assist Department staff in developing evaluation plans, coordinate program activities with the FHWA, fund evaluation activities that extend beyond the construction phase of a project, and compile and disseminate results.
Experimental Features Program

**AK 01-02 Design, Simulation, and Monitoring of Ventilated Shoulder Design Features for the Loftus Road Extension**

STP-0002(90) Intersection of Geist and Loftus Road to Tanana Loop, Fairbanks, See also research project # T2-02-04: Eliminating Longitudinal Cracking

**Purpose:** evaluate the effectiveness of insulation, thermosyphons, and Air Cooled Embankments and bridge abutments, in Alaska’s interior region of discontinuous permafrost.

**Anticipated benefits:** Demonstration of new technologies for stabilizing permafrost beneath
Technology Transfer Program Support

**Project Number:** 01-06  
**Completion Date:** 12/31/05  
**Program Budget:** $350,000  
**Project Manager:** Dave Waldo

**Program Description**

The Local Technical Assistance Program (LTAP) is Alaska’s transportation training and information outreach for state and local governments.

LTAP is a national network of centers funded by FHWA. Each LTAP center adapts its program to address the unique challenges faced by the customers it serves. LTAP provides local agencies with a variety of tools:

- Training events
- Technology Transfer resources
- Personalized technical assistance

**Required Work Products**

Alaska’s annual work plan and budget tasks include:

- publish a quarterly newsletter;
- serve as a clearinghouse for local transportation agencies to obtain publications, video tapes, and other technology resource documents, such as manuals and field guides;
- maintain a comprehensive, up-to-date mailing list of rural and local officials having transportation responsibilities;
- conduct at least 10 training courses per year for local transportation agencies;
- provide information on new and existing technology; and
- perform an annual self-evaluation.

**Advisory Board**

Alaska Technology Transfer’s advisory board provides guidance and program evaluation. The Board is comprised of representatives in state, local, and federal agencies from across Alaska and Canada.

- *Jim Elieff*, Research Manager, DOT& PF  
- *Chris Haigh*, City Engineer, City of Fairbank  
- *Jack Fullerton*, Central Region Maintenance Chief, DOT&PF  
- *Gordon Pauls*, Yukon Government Transportation  
- *Trent Mackey*, Service Area Engineer, Fairbanks North Star Borough  
- *Joe Buck*, Public Works Director, Juneau City and Borough  
- *Lee Coop*, Assistant Traffic Engineer, Municipality of Anchorage  
- *Keith Rountree* Public Works Director, Mat-Su Borough  
- *Keith Kornelis*, Public Works Director, Kenai Peninsula Borough  
- *Peter Forsling*, Structures/Research Engineer, FHWA
Local Technical Assistance Program—Technology Transfer 2005

During 2005, Alaska LTAP offered thirty training events in fifty-seven training sessions, in many locations around Alaska. This resulted in 1367 employees trained from DOT&PF, local government, and other transportation agencies.

Completed training:
- Aviation Land & Sea Survival
- Flagger Instructor
- Grader Operator
- Traffic Control Technician
- Traffic Control Supervisor
- Culvert Design
- Maintenance Management
- Roundabout Design
- Stream Stability & Scour at Bridge Crossings
- Airport Construction, Design, & Maintenance Considerations
- Interactive Highway Design Model
- Alternative Contracting
- Asphalt Pavement Technologies
- Construction Dewatering
- Context Sensitive Solutions
- Contract Administration
- Cumulative Effects Assessment
- Effective Sediment & Erosion Control
- FB Pier
- Contract Admin Core Curriculum
- Functional Assessment of Wetlands
- Environmental Justice
- Hydrologic Analysis & Modeling
- Intro to Systems Engineering
- NEPA and Transportation Decision Making 2
- Value Engineering Workshop
- Section 106 – Historic Preservation
- Scheduling for Construction
- Negotiations
- Operator Certification Program

Other Activities:
- Produced four quarterly newsletters
- Continually update the training web page with new training and registrations; update the Research page with new reports
- LTAP/T2 Publication Library continues to be managed by Mather Library at the Geophysical Institute. Collection continues to expand.
- Video, CD-Rom, software, and research publications available through online catalog with most publications downloadable in .pdf format – on going update and cataloging of new acquisitions
- Participated in UAF Career Expo with booth highlighting engineering career opportunities
- Assisted in set-up of booth at Tanana Valley State Fair with the transportation theme.
- Co-sponsored the Alaska Summer Research Academy. A residential camp for high school students - provided transportation engineering related activities
- Continued Management the Operator Certification and Evaluation Program for statewide DOT M&O. The goal is to evaluate operators on graders, loaders, dozers, plow trucks, and blowers to reduce cost to damage equipment and improve safety.
- Continued work on converting our materials testing training (WAQTC-TTQP) to computer based modules to reduce training cost and maximize employee time.
- Collected data for core curriculum project within all three regions
During 2004, Alaska LTAP offered thirty-two training events in seventy-five training sessions, in many locations around Alaska. This resulted in 1576 participants trained from DOT&PF, local government, and other transportation agencies.

**Completed training:**
- Fall Protection—Bridge
- Fall Protection-Construction
- Grader Operator
- Traffic Control Technician
- Traffic Control Supervisor
- Alaska Flexible Pavement Design
- Highway Traffic Noise
- Intro to Condition Acquisition & Reporting
- Maintaining Safe Roadsides
- Pedestrian Facility Design
- Bicycle Facility Design
- Road Safety Audits
- Road Safety Analysis Program
- Synchro Simms/Traffic I & II
- Design– Build Contracting
- Context Sensitive Solutions
- Construction Cost Engineering
- Access Management Location and Design
- Highway Specifications and Review
- HMA Construction
- HMA Evaluation and Rehab
- NEPA and Transportation Discoing Making
- Functional Assessment of Wetlands
- Conducting Reviews that Get Results
- Scheduling for Construction
- Alaska Engineering & ITS
- Trenchless Pipe Rehab
- Copper River Consent Decree
- Civil Rights Title VI/DBE
- Alaska State Accounting System
- Alaska Summer Research Academy
- Writing that Works

**Other Activities:**
- Co-sponsored the Alaska Summer Research Academy. A residential camp for high school students. This year the student team created a conceptual design for a walking path around the Fairbanks Pioneers’ Home.
- Participated in the creation of a statewide safety manual for Alaska DOT & PF.
- Managing the Operator Certification and Evaluation Program for statewide DOT M&O. The goal is to evaluate operators on graders, loaders, dozers, plow trucks, and blowers to reduce cost to damage equipment and improve safety.
- T2 is taking the lead on converting our materials testing training (WAQTC-TTQP) to computer based modules to reduce training cost and maximize employee time.
- Produced four quarterly newsletters
- Continually update the training web page with new training and registrations; update the Research page with new reports
- LTAP/T2 Publication Library continues to be managed by Mather Library at the Geophysical Institute. Collection continues to expand.
- Video, CD-Rom, software, and research publications available through online catalog with most publications downloadable in .pdf format – on going update and cataloging of new acquisitions
- Participated in UAF Career Expo with booth highlighting engineering career opportunities
- Assisted in set-up of booth at Tanana Valley State Fair with the transportation theme.
National Highway Institute (NHI)

Project Number: 01-06
Completion Date: 12/31/05
Program Budget: $350,000
Project Manager: Dave Waldo

Program Description

NHI is FHWA’s technical training organization and outreach program to state highway agencies. NHI administers training programs reaching over 15,000 state highway agency people each year. It also works with approximately 550 universities nationwide to administer educational programs that attract students to the field of transportation. States receive technical training produced by NHI and taught by NHI contract instructors or FHWA employees. States receive a certain allocation of their annual budget to provide education and training activities under the NHI umbrella.

NHI funding provides AK DOT & PF transportation related education programs to improve the quality of the state’s highway system by

- enhancing economic growth
- improving public safety and quality of life.
- promoting environmental stewardship.

This is accomplished by applying new technologies to the planning, design, construction, maintenance and rehabilitation of Alaska’s transportation infrastructure.

NHI provides technical training in the following areas:

- Structures
- Materials, Pavements, and Base Design
- Geotechnical
- Design and Traffic Operations
- Construction and Maintenance
- Hydraulics
- Intelligent Transportation Systems
- Real Estate
- Environmental
- Statewide Planning
- Civil Rights
- Highway Safety

NHI Training at Alaska DOT&PF

Alaska DOT&PF Research and Technology Transfer houses several training programs and has opted to make all training open to all of its customers rather than limiting participants to training according to program. Because class participants come from local government, DOT&PF, and consultants and contractors, we leverage training dollars by combining funds. NHI and LTAP fund a pro-rata share of the annual training budget based on participant status.

Program Status

For a list of training presented to date, including 2003 and 2005 (see previous pages)

Alaska DOT & PF Research & Technology Transfer manages several training programs open to all transportation customers and funded through appropriate sources on a pro-rata bases. Result:

- Leverages funding
- Avoids duplication of service
- Provides a forum for communication between cities and boroughs, DOT & PF, consultants, and contractors.
Border Technology Exchange Program (BTEP)

Project Number: 01-06
Estimated Completion Date: 12/31/05
(Report reflects through fiscal year)
Estimated Cost: $15,000
Project Manager: Dave Waldo

Project Description
The Border Technology Exchange Program, or BTEP, is an initiative of FHWA’s International Programs Branch. It came about because the North American Free Trade Agreement (NAFTA), which expanded potential for trade with border countries, did not address the transportation infrastructure impacts of increased trade. NAFTA also failed to address the aspects of new working relationships required to advance transportation projects and systems under a free trade environment. FHWA designed BTEP to enhance and expand binational working relationships and to create the opportunity for transportation officials to improve the planning, design, construction, and operation of land transportation facilities.

Project Objectives
In Alaska, the BTEP exchange is with the Yukon Government Transportation in Canada. BTEP formalizes and funds several unofficial information exchanges on design, construction, and mitigation techniques for

- asphalts.
- permafrost issues.
- new structure designs.
- other cold region engineering problems.

BTEP provides the opportunity to expand the transportation knowledge base of both countries. Since Alaska DOT&PF and the YGT both work with cold regions engineering problems, both have similar design, construction, and maintenance difficulties and should share problems, solutions, and successes.

Activities in 2005
- BTEP funds Gordon Pauls’ participation at LTAP advisory board meeting.
- Delivery of Traffic control in Work Zones & Maintaining Safe Roadsides in Whitehorse by DOT staff.
- Culvert Design course in Whitehouse
- Gravel Road Maintenance Class - NW Territories
- DOT&PF staff attended the Yukon Transportation Maintenance annual conference in Whitehorse.
- Provide materials, publications, CDs, videos as requested to Canadian Transportation workers.