



**Alaska Department of Transportation
& Public Facilities**

**Statewide Design & Engineering Services Division
Statewide Research & Technology Transfer
2301 Peger Road
Fairbanks, Alaska 99709-5399**

**Statewide Research and
Technology Transfer Program
FFY2001 Annual Progress Report**

October 2001

Report No. FHWA-AK-RD-01-07

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Introduction

The Department of Transportation and Public Facilities' Research and Technology Transfer Program (RTT) is funded through the Federal Highway Administration's (FHWA) State Planning and Research Program (SPR), Local Technical Assistance Program (LTAP), Surface Transportation Program (STP), 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 staff provide research results to appropriate department staff, local agencies, and the public through publications, training, and other means. Research staff also help to implement research findings.

The RTT program includes the department's LTAP, also known as the Technology Transfer (T2) Program, 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 in Canada.

Finally, the RTT program includes the American Association of State Highway Transportation Officials Transportation and Civil Engineering (AASHTO TRAC) program, the National Highway Institute (NHI) training program, and the Technology Applications Program (TAP). AASHTO TRAC is an outreach to schools, aiming to interest students in engineering career. The NHI training program provides federal and state matching funds to sponsor technical training for department employees, local government workers, and the private sector involved in transportation projects. TAP includes training and seminars provided by FHWA via Demonstration Projects,

Application Projects, Test and Evaluation Projects, and Special Projects. The RTT staff may undertake work using additional state funds or funds from other agencies, such as the Alaska Science and Technology Foundation, should they become available.

The goals of the RTT program are to:

- ◆ 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;
- ◆ construct, maintain, and operate facilities at the lowest life cycle cost; and
- ◆ protect 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>:

- rest the cursor on "World of DOT&PF"
- rest the cursor on "Programs"
- double-click on "Research & Technology"
- click on "RTT Library" and follow the search instructions

DOT&PF's research reports are also found in the Transportation Research Information System (TRIS). Their searchable web address is <http://ntl.bts.gov/tris/>. They can also be found by going to <http://ntl.bts.gov>.

Research Puts New Contracting Procedures On Line

Research and Technology Transfer (RTT) overhauled the procurement process for professional research services over the past year and implemented World Wide Web-based Requests for Proposals (RFPs). Research project RFPs are now found at <http://www.dot.state.ak.us>. The online RFPs have links to *Information and Instructions for Preparing Research Proposals*, which

- ◆ has requirements for preparing and submitting RFPs, and
- ◆ describes the contracting procedures.

This new, online process applies only to research projects eligible for State Planning and Research funds.

Alaska law excludes acquiring research-related equipment and services from its procurement regulations. To avoid potential conflicts of interest and abuse, we needed to implement a fair and objective process to hire research contractors. Also, because research work is unique and innovative by nature, we found procurements to be hindered by the awkward and often inappropriate traditional professional service

procurement process, which works well for work products that conform to common professional practices and specifications. However, the process is ill suited to innovative, developmental, or experimental work. Research project managers require greater flexibility and authority to accommodate and respond quickly to dynamic research needs.

These new research contracting procedures are a product that is based on the experience collected by the National Cooperative Highway Research Program (NCHRP). We developed our procedures from two of NCHRP's guidance documents:

1. *Procedural Manual for Agencies Conducting Research in the National Cooperative Highway Research Program*, and
2. *Information and Instructions for Preparing Proposals*.

NCHRP developed these documents from its many years of expertise in administering a national applied research program. Both documents are available at <http://www4.trb.org/trb/crp.nsf>.

FFY 01/02 Research Work Program

PART A: ADMINISTRATION, TECHNOLOGY TRANSFER AND CONTINUING PROGRAMS

| Project Number | Work Item | FFY 01 Amount | FFY 02 Amount | Increase or (Decrease) This Revision | Total FFY01-02 Amount | Estimated Completion Date | Page |
|-------------------------------------|---------------------------------------|---------------|---------------|--------------------------------------|-----------------------|---------------------------|------|
| 01-01 | Research Administration | 326,000 | 450,000 | | 776,000 | ongoing | 8 |
| 01-02 | Implementation of Completed Research | 60,000 | 25,000 | | 85,000 | ongoing | 11 |
| 01-03 | Research Response Program | 100,000 | 100,000 | | 200,000 | ongoing | 12 |
| 01-04 | Pooled Fund Studies | 15,000 | 40,000 | | 55,000 | ongoing | 13 |
| 01-05 | Experimental Features Evaluations | 13,000 | 10,000 | | 23,000 | ongoing | 14 |
| 01-08 | AASHTO TRAC | 20,000 | 40,000 | | 60,000 | ongoing | 58 |
| | AASHTO DUES | | 10,000 | | 10,000 | ongoing | |
| 01-06 | TRB Dues * | 80,000 | 88,000 | | 168,000 | ongoing | 9 |
| | NCHRP Program Support * | 371,822 | 372,000 | | 743,822 | ongoing | 10 |
| | Border Technology Exchange Program* | 25,000 | | | 25,000 | ongoing | 60 |
| | Native LTAP** | 0 | 0 | | | ongoing | |
| | Technology Transfer Program Support** | 230,000 | | | 230,000 | ongoing | 52 |
| Part A Totals | | \$1,240,822 | \$1,135,000 | \$0 | \$2,375,822 | | |
| Federal Funds in Part A | | \$1,019,022 | \$992,000 | \$0 | \$2,011,022 | | |
| State Funds in Part A | | \$221,800 | \$143,000 | \$0 | \$364,800 | | |
| * 100% FHWA funds | | | | | | | |
| ** 50% FHWA funds, 50% BIA funds | | | | | | | |
| *** 90% FHWA funds, 10% state match | | | | | | | |

PART B: COMPLETION OF EXISTING STUDIES

| Project Number | Work Item | FFY 01 Amount | FFY 02 Amount | Increase or (Decrease) This Revision | Total FFY 01-02 Amount | Estimated Completion Date | Page |
|--------------------------------|--|---------------|---------------|--------------------------------------|------------------------|---------------------------|------|
| 01-26 | Gravel to Pavement Roads | 39,399 | | | 39,399 | 7/31/02 | 31 |
| 01-27 | Reducing Thermal Segregation | 10,852 | | | 10,852 | 9/31/02 | 41 |
| 01-28 | Enhancing Estimating Procedures | 100,000 | | | 100,000 | 9/31/02 | 26 |
| 01-29 | Design Discharge for Fish Passage | 58,945 | | | 58,945 | | 22 |
| 01-30 | Using Geophysical Methods in Pits | 60,000 | | | 60,000 | 9/31/02 | 48 |
| 01-31 | Eliminating Longitudinal Cracking | 40,000 | | | 40,000 | | 25 |
| 01-32 | Pavement Marking Materials | 18,212 | | | 18,212 | 9/31/02 | 39 |
| 01-33 | Best Management for Snow Storage Areas | 29,392 | 25,000 | | 54,392 | 9/31/03 | 19 |
| 01-34 | High Temperature of Alaskan Asphalts | 8,015 | | | 8,015 | 9/31/02 | 33 |
| 01-35 | Implementation of Successful Asphalt Mix Designs | 9,054 | | | 9,054 | 9/31/02 | 35 |
| 01-37 | Magnet Warning & Guidance System | 40,451 | | | 40,451 | 9/31/04 | 36 |
| 01-38 | Applications of GPS & Vehicle Detection | 37,829 | | | 37,829 | 9/31/02 | 18 |
| 01-39 | Alaska Soil Stabilization Manual/Stabilized Sandy Gravel | 31,880 | | | 31,880 | 12/31/01 | 17 |
| 01-40 | Polymer Modified Asphalt Emissions | 16,926 | | | 16,926 | 9/31/01 | 40 |
| | Evaluation of Remote Control Equipment | | 10,000 | | | | 29 |
| | Snowplow Survivability of Guardrails | | | | | | 44 |
| Part B Totals | | \$500,955 | | \$0 | \$500,955 | | |
| Federal Funds in Part B | | \$400,764 | | \$0 | \$400,764 | | |
| State Funds in Part B | | \$100,191 | | \$0 | \$100,191 | | |

PART C: NEW STUDIES

| Project Number | Work Item | FFY 01 Amount | FFY 02 Amount | Increase or (Decrease) this revision | Total FFY 01-02 Amount | Estimated Completion Date | Page |
|--------------------------------|---|---------------|---------------|--------------------------------------|------------------------|---------------------------|------|
| 01-07 | Cost Benefit Analysis of Financing Construction Projects | 50,000 | | | 50,000 | 6/1/01 | 20 |
| 01-09 | Pavement Enhancement to Eliminate Spring-thaw Load Restrictions | 50,000 | | | 50,000 | 9/31/03 | 38 |
| 01-10 | Optimization of MgCl use | 100,000 | | | 100,000 | 9/31/03 | 37 |
| 01-11 | Evaluation of Safety and Effectiveness of Rumble Strips in Alaska | 30,000 | | | 30,000 | 9/31/02 | 30 |
| 01-12 | Evaluation of Live Load Distribution Factor in Alaska Decked Bulb-tee Girders | 75,000 | | | 75,000 | 9/31/03 | 27 |
| 01-13 | Evaluation of Overheight Warning Devices | 25,000 | | | 25,000 | 9/31/02 | 28 |
| 01-14 | Reliability of Power Sources for Remote Weather Observation Systems | 25,000 | | | 25,000 | 9/31/02 | 42 |
| 01-15 | Development of Rapid Assessment Protocol for Highway Culverts | 100,000 | | | 100,000 | 9/31/02 | |
| 01-16 | Impact of Ice Forces on Streambank Protection | 50,000 | | | 50,000 | 9/31/02 | 34 |
| 01-17 | Cost Effectiveness of Hard Aggregate Sources | 20,000 | | | 20,000 | 9/31/02 | |
| 01-18 | High Float Surfacing for Gravel Roads | 50,000 | | | 50,000 | 9/31/03 | 32 |
| 01-19 | Updating DOT&PF Geotech Procedures | 25,000 | | | 25,000 | 9/31/02 | 47 |
| 01-20 | Rock-Fall Model Applicability | 20,000 | | | 20,000 | 9/31/02 | 43 |
| 01-21 | Cost-effective Rut Repair Methods | 15,000 | | | 15,000 | 12/31/01 | 21 |
| 01-22 | Vetch Control within State ROW | 10,000 | | | 10,000 | 9/31/02 | 50 |
| 01-23 | Water Drainage from Thaw Basins | 50,000 | | | 50,000 | 9/31/03 | 51 |
| 01-24 | Development and Validation of Urban Rutting Models | 75,000 | | | 75,000 | 9/31/03 | 23 |
| 01-25 | Alternative Avalanche Ammunition (Pooled Fund) | 30,000 | | | 30,000 | 9/31/02 | |
| | Pavement Marking Life Cycle (Pooled Fund) | 20,000 | | | 20,000 | 9/31/03 | |
| | AASHTO Product Evaluation (Pooled Fund) | 5,000 | | | 5,000 | 9/31/02 | |
| Part C Totals | | \$825,000 | \$0 | \$0 | \$825,000 | | |
| Federal Funds in Part C | | \$660,000 | \$0 | \$0 | \$660,000 | | |
| State Funds in Part C | | \$165,000 | \$0 | \$0 | \$165,000 | | |

| | | | | |
|---|-------------|-------------|-----|-------------|
| Work Plan Total (Parts A, B & C) | \$2,566,777 | \$1,135,000 | \$0 | \$3,701,777 |
| Federal Funds in Parts A, B & C | \$2,079,786 | \$992,000 | \$0 | \$3,071,786 |
| State Funds in Parts A, B & C | \$486,991 | \$143,000 | \$0 | \$629,991 |

Research and Technology Transfer Staff

| | |
|--|--------------|
| Clint Adler, P.E., Research Engineer | 451-5321 |
| Billy Connor, P.E., Research Manager | 451-5479 |
| Linda Gavin, Administrative Clerk | 451-5320 |
| Simon Howell, Training Specialist | 451-5284 |
| Sharon McLeod-Everette, SR/WA, LTAP Manager | 451-5323 |
| Steve Saboundjian, P.E., Implementation Engineer | 451-5322 |
| Fax | 451-5340 |

Research Advisory Board

Voting Members

| | |
|--|----------|
| Thomas Brigham, Statewide Planning Director | 465-4070 |
| Boyd Brownfield, P.E., Deputy Commissioner | 465-6973 |
| George Capacci, Director, Southeast Ferry Operations | 465-3959 |
| Tamar diFranco, P.E., Deputy Director, Design & Engineering Services (through April 2001) | 465-6956 |
| Robert Doll, Director, Southeast Region | 465-1763 |
| Michael Downing, P.E., Chief Engineer, Design & Engineering Services, Chair | 465-6948 |
| David Eberle, P.E., Director, Southcentral Region | 269-0780 |
| Gary Hayden, P.E., Southeast Operations Director | 465-1774 |
| Frank Richards, P.E., Statewide Maintenance Engineer | 465-3906 |
| Ralph Swarthout, P.E., Northern Region Director | 451-2211 |

Non-Voting Members

| | |
|-------------------------------------|----------|
| Billy Connor, P.E., Secretary | 451-5479 |
| Aaron Weston, P.E., FHWA | 586-7427 |

Research Administration

Project Number: 01-01

Project Manager: Billy Connor

Cost: FY01 \$326,000

Completion Date: Project is renewed annually

The budget for Research Administration is based on the anticipated cost of operating the research program. This account provides for:

- ◆ research staff salary and travel not directly related to projects,
- ◆ developing the research program by soliciting research needs statements and selecting projects,
- ◆ travel for the Research Advisory Board to attend board meetings,
- ◆ early project development, and
- ◆ miscellaneous expenses such as supplies, office equipment and related maintenance contracts, etc.

TRB Dues

Project Number: 01-06
Estimated Completion Date: Project is renewed annually
Estimated Cost: \$80,000
Project Manager: Billy Connor



Project Description

The Transportation Research Board (TRB) is a unit of the National Research Council under the National Academy of Sciences. It 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; and prints and 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.

NCHRP Program Support

Project Number: 01-06
Estimated Completion Date: Project is renewed annually
Estimated Cost: \$371,822
Project Manager: Billy Connor

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 in a two-stage, two-year process. In the first stage, NCHRP solicits ideas for research projects of a national scale from state representatives. In stage two, these projects are condensed and refined from over 100 first-stage projects to 50 or more second-stage 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.

Implementation of Completed Research

Project Number: 01-02
Estimated Completion Date: Project is renewed annually
Estimated Cost: \$60,000
Project Manager: Billy Connor

Project Description

The Research and Technology Transfer staff work to remain informed of research outside of the department. They disseminate this information within the department and recommend implementation of others' research as warranted. An implementation engineer coordinates DOT&PF's efforts to implement research results.

The implementation engineer also coordinates implementation of research results from

- ◆ experimental features built as part of construction projects;
- ◆ projects conducted by other state of Alaska agencies or local governments;
- ◆ projects conducted by other states, federal agencies, or foreign governments; and
- ◆ projects conducted by the private sector, provided all copyright and patent laws are followed.

Implementation activities must be considered from the inception of a project. Potential users of research results should be identified, contacted, and considered for appointment as technical advisors. Potential users should be involved throughout the project. A variety of methods to promote the use of research results need to be identified for each project. These could include but are not limited to briefings, short demonstrations, a traveling road show, a video or CD-ROM, and training.

Project Objectives

The main goal of DOT&PF's research program is that successful research results be implemented or incorporated into standard practice.

Project Status

Ongoing

Available Project Reports

None

Research Response Program

Project Number: 01-03
 Estimated Completion Date: Project is renewed annually
 Estimated Cost: \$100,000
 Project Manager: Billy Connor

Project Description

Throughout the year, research ideas arise that require immediate response because of an urgent need or to handle activities that don't require a full-blown research project. Research Response pays annual dues for two national programs:

- ◆ AASHTO National Partnership for Highway Quality, and

- ◆ AASHTO National Transportation Product Evaluation Program (NTPEP).

In addition to funding the projects listed below, Research Response covers time and travel charges, and vehicle expenses associated with project administration.

| Projects | Start | Finish | Project Manager | Funding |
|--|------------|-----------|------------------------|-----------------|
| Stone Mastic Asphalt Workshop | 4/01 | 4/01 | Dave Stanley | \$5,197 |
| KnowledgeTech DOT&PF Training Survey | 4/10 | 9/01 | Simon Howell | \$12,000 |
| Asphalt Surface Treatment Guide | 11/00 | 10/01 | Sharon McLeod-Everette | \$21,200 |
| AASHTO Field Manager Northern Region Construction Pilot Program | 6/01 | est. 6/03 | John Pfeffer | \$11,050 |
| Northern Dame Construction Contract for Traffic Control During LTPP Review | 6/01 | 6/01 | Steve Saboundjian | \$5,000 |
| Welding & Fabrication for Insulated Asphalt Dump Truck—Northern Region | spring '99 | 9/02 | Ron Reitano | \$3,245 |
| | | | | Total: \$57,692 |

Available Project Reports

Interim: None

Final: Occasionally, a short report may be done if the project warrants. Two projects produced reports:

- ◆ *KnowledgeTech DOT&PF Training Survey*
- ◆ *Asphalt Surface Treatment Guide, FHWA-AK-RD-01-03*

Pooled Fund Studies

Project Number: 01-04
 Estimated Completion Date: Project is renewed annually
 Estimated Cost: FY01 \$15,000; FY00 \$74,000; FY99 \$30,000
 Project Manager: Steve Saboundjian



Project 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. Description and statement are at www.tfhr.gov/////site/active.htm.

Dues Paid From Pooled Fund Studies Project

- ◆ AASHTO's National Transportation Product Evaluation Program \$5,000

Current Pooled Fund Studies

| Project | Lead State | Funding | Established | Estimated Completion Date |
|---|-------------------|----------|-------------|---------------------------|
| Pavement Marking Life Cycle, SPR-3 (094) | Utah DOT | \$20,000 | | spring '04 |
| Alternative Avalanche Ammunition, SPR-3 (102) | Utah DOT | \$30,000 | | |
| Development of Advanced Rotary Plow (ARO) for Snow Removal Operations, SPR-3 (091) | California | \$10,000 | 5/15/01 | 5/14/03 |
| Pavement Subgrade Performance Study, SPR-2 (208) | New York | \$10,000 | 02/01 | 02/04 |
| Wiremesh and Cablemesh Slope Protection, SPR-3 (077) | Washington | \$10,000 | 5/12/99 | 12/31/01 |
| Strength and Deformation of Mechanically Stabilized Earth Walls, SPR-3 (072) | Washington | \$20,000 | 7/1/00 | 12/31/02 |
| Computer-based Self-operating Training System on Anti-icing/Road Weather Information, TPF-5 (009) and SPR-3 (104) | Iowa | \$30,000 | 12/00 | 2/04 |
| HPMS Computer-based training, SPR-2 (202) | | | 7/99 | 7/01 |
| Fish Passage Capability Through Modified Culverts: Flume Research Study, SPR-3 (096) | see Project 01-29 | | | |
| Asphalt Pavement Damage Related to Tire Pressure, SPR-3 (088) | | | | |

Experimental Features Evaluations

Project Number: 01-05
Estimated Completion Date: ongoing
Estimated Cost: \$23,00
Project Manager: Clint Adler

Project Description

This program allows us to use federal highway construction funds 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 to monitor 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. First, it must have potential benefits for DOT&PF or the public. Second, use of the feature must be followed with an evaluation of its success, along with recommendations for its use in the future. Experimental features can be a new process or a technique for using conventional materials and equipment.

The department supports 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.

Statewide Research staff assist department staff to develop 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.

Active Projects

- ◆ *AK 98-01. Steel Bridge Deck Surfacing Materials, STP-065-2(9) Yukon River Bridge Re-Deck*
Purpose: Evaluate the effectiveness of the concrete-filled grating as an improved wearing surface on the bridge deck.
Anticipated benefits: Improve the safety of the bridge deck and reduce maintenance costs.
- ◆ *AK 99-01. Vegetated Slope Stabilization Comparison Test, IM-OA1-5(9) Glenn Highway, Moose Creek to Sutton*
Purpose: Evaluate the effectiveness of several revegetation techniques on a cut slope in the project to determine which treatment method will best improve slope stabilization in a cost-effective manner.
Anticipated benefits: Improve the state's permanent slope stabilization specifications and practices and reduce maintenance costs associated with slope stabilization failures.
- ◆ *AK 99-02. Evaluation of Bridge Deck Waterproofing Membrane Under a High Float Surface Treatment, STP-080(29) Elliott Highway, Eureka to Baker Creek*
Purpose: Evaluate the effectiveness of placing a high float surface treatment over a bridge deck waterproofing membrane.
Anticipated benefits: Protect the reinforcing steel in the prestressed concrete girders (critical in a rural area where the traditional hot asphalt concrete overlay is not available);

provide a safe driving surface on the bridge deck; and reduce maintenance costs associated with rural bridge deck driving surface failures.

- ◆ *AK 99-03. Rockfall Barrier Mitigation Using Steel Bin Walls and Reinforced Concrete, I-OA4-4(5) Parks Highway, Nenana Canyon Erosion*

Purpose: Evaluate the effectiveness of placing movable rockfall barrier sections along the slide area.

Anticipated benefits: Protect the passing traffic and the roadway structure and provide a safe means for the maintenance personnel to remove the slide debris.

- ◆ *AK 01-01. 3M Inc. Magnetic Tape Lane Awareness System, STP-071-1(62) MP 14-26 Richardson Highway (Thompson Pass). See also research project number 01-37, Magnetic Snowplow Guidance System*

Purpose: Evaluate the effectiveness of the 3M Magnetic Tape Lane Awareness System in Alaska's coastal mountain passes.

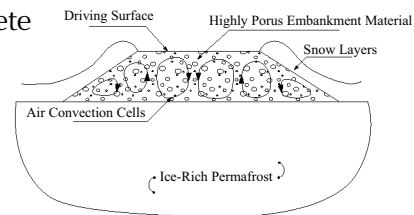
Anticipated benefits: Reduce guardrail damage, increase safety for snowplow operators and motorists.



Air-Cooled Embankment Design

Project Number: 95-08
Estimated Cost: \$20,000
Completion Date: 9/30/01
Project Manager: Steve Saboundjian

Project Established: 1994
Percent Complete: Complete



Project Description

Using an Air-Cooled Embankment (ACE) to remove heat from the roadway during the winter months has proven effective both theoretically and in the laboratory. This project evaluates an ACE Experimental Feature built as part of a new alignment of Chena Ridge Road in Fairbanks in 1996. The construction required the ACE to be built in the fall or winter to minimize thawing of the permafrost beneath the roadway.

The ACE uses coarse rock to create a convection cell. The warm ground (about -2°C) heats air, which rises to the cold surface of the road, where it is cooled. The cold air then falls to the bottom of the ACE, completing the cycle.

Project Objectives

- ◆ Halt or significantly retard the thaw of unstable permafrost beneath the roadway.
- ◆ Increase the life span of Alaska roads in permafrost-susceptible areas.

Project Status

The contractor built the ACE in the fall of 1996, except for the base course and paving, which they completed the next summer. Instrumentation was completed in the fall of 1996 and data recording began that November.

The research consisted of temperature monitoring and evaluating the air-cooled embankment performance for three years after construction. There was some breakdown of the rock during air-cooled embankment construction, generating some finer material that probably reduces permeability below anticipated values. A small percentage of the thermistors malfunctioned. However, the air cooled embankment functioned

effectively and largely as planned to chill subsoils in winter.

The University of Alaska Fairbanks, the research contractor, submitted the final report in September 2001. The conclusion is that the air cooled embankment effectively maintains a frozen subgrade beneath the embankment.

- ◆ Data collected from the test embankment between December 1996 and December 2000 indicates that convective cooling takes place within the test embankment during winter months.
- ◆ Analysis and plots also indicate that mean annual temperatures ranged from 27 to 30°F in the lower portion of the air cooled embankment.

Available Project Reports

- Goering, D. J. *Air Convection Embankment Experimental Feature Design Phase 1*. Report No. FHWA-AK-RD-98-01 (INE/TRC 97.06), Federal Highway Administration, Washington, DC, 1997.
- Goering, D. J. *Parks/Chena Ridge Air Convection Embankment Performance Report: Dec. 1996 to Sept. 1998*. Report No. INE/TRC 99.06, Institute of Northern Engineering, University of Alaska Fairbanks, September 1998.
- Goering, D. J. *Parks/Chena Ridge Air Convection Embankment Performance Report: Oct. 1998 to Sept. 1999*. Report No. INE/TRC 00.01 (FHWA-AK-RD-99-04), Institute of Northern Engineering, University of Alaska Fairbanks, September 1999.
- Goering, D. J. *Parks/Chena Ridge Air Convection Embankment Experimental Feature. Phase II Final Report: Oct. 1999 to Sept. 2000*. Report No. FHWA-AK-RD-01-02 (INE/TRC 02.01), Federal Highway Administration, Washington, DC, 2001.

Alaska Soil Stabilization Manual

Project Number: 00-11
Estimated Cost: \$20,000
Est. Completion Date: 3/02
Project Manager: Steve Saboundjian

Project Established: 10/99
Percent Complete: 95%

This project incorporates previous project 99-16, Stabilized Sandy Gravel Surfacing in Cold Climates, established 10/98. We merged the projects because of their similar scopes.

Project Description

This manual would be an ideal designer's tool for evaluating options and costs of soil stabilization, particularly in areas of Alaska where only poor-quality aggregates are readily available. Barging in the base course and surfacing materials can elevate costs to more than \$100 per cubic yard. There are instances where locally available materials, properly stabilized, might be obtained at 75% or less of the imported cost. In less extreme cases, a mildly degradable base course might benefit from adding a small dose of stabilizer to achieve a much longer pavement design life—at a nominal cost.

Project Objectives

- ◆ Review the existing voluminous body of literature.
- ◆ Distill the literature review into a compendium of methods most applicable for treating Alaska materials.
- ◆ Compile the data into a definitive soil stabilization reference and a design guide. The reference will provide quick access to stabilization types, mix design methods to determine the correct amount of stabilizer, and techniques useful for common Alaska materials.
- ◆ Researchers envision the manual to include summaries, tables, and graphical devices such as decision trees.

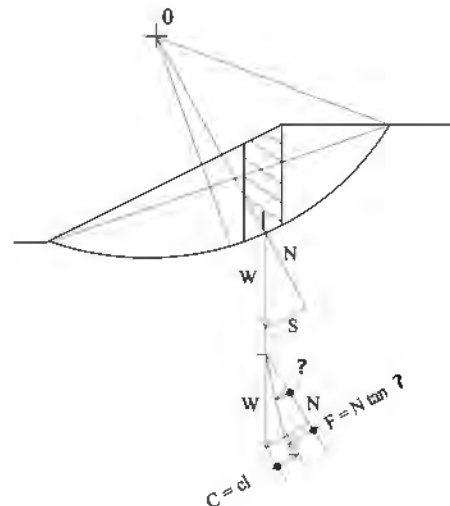
Project Status

Research contracted with Gary Hicks, professor emeritus of Oregon State University, to develop the manual. In December 2000, he submitted an interim report detailing current and past practices with soil stabilization in Alaska. In October 2001, he submitted a draft design guide for ADOT&PF review. In November 2001, he will hold one-day training workshops in the three regions for ADOT&PF staff.

Available Project Reports

Interim: Gary Hicks, *Evaluation of Soil Stabilization Practices in Alaska: Phase I: Interim Report*, Report No: FHWA-AK-RD-01-06A, December 2000.

Final: Gary Hicks, *Alaska Soil Stabilization Design Guide*, December 2001



Applications of GPS and Vehicle Detection

Project Number: 00-06
Estimated Cost: \$37,829
Est. Completion Date: 9/30/02
Project Manager: Simon Howell

Project Established: 10/99
Percent Complete: 55%

Project Description

Maintenance operations performed during winter months are inherently dangerous to maintenance equipment operators and the motoring public. In Alaska's northern latitudes, workers perform these operations mostly in the dark and under low visibility conditions. Blowing and drifting snow can obscure obstacles and reduce visibility even further, creating a high potential for accidents. In some instances, conditions reduce visibility to such a degree that snow removal operations are postponed. This delay is often more costly in time and effort.

Furthermore, during limited or zero visibility conditions, operators who are familiar with the area frequently navigate by using scarce visual cues and sometimes by feel. Operating under these conditions—plus monitoring the application of sand and gravel, communicating with a dispatcher, and keeping the vehicle in the roadway while avoiding obstacles—can bring about extreme driver stress and fatigue.

Technology exists to mitigate these highway maintenance problems. Global Positioning Systems (GPS) with integrated communications and moving map technology can display valuable reference information for the operator and the base station: automatic reporting of vehicle location information to a base station along with the vehicle's speed, time, and status.

Collision Avoidance Radar Systems (CARS) offer additional safeguards. They can detect buried obstacles in the field of view, calculate closure speed, and provide audible and visual warnings.



Project Objectives

- ◆ Expose Maintenance and Operations supervisors and operators to existing technologies that increase situational awareness and safety.
- ◆ Provide the operator with a vehicle positioning system capable of automatic reporting and moving map display.
- ◆ Evaluate the safety and productivity benefits against the cost to employ this technology.

Project Status

We outfitted a snowplow in Anchorage with the GPS for winter 2000. However, the distance was too great to allow us to effectively evaluate the technology. The GPS is now reinstalled in a Fairbanks snowplow. We will continue evaluation during winter 2001/2002.

We also modified the project, dropping CARS because the vendor had previous commitments and couldn't meet the project schedule.

Available Project Reports

Interim:
Final:

Best Management Practice for Snow Storage Areas

Project Number: 01-33
Estimated Cost: \$50,000
Est. Completion Date: 9/02
Project Manager: Clint Adler

Project Established: 10/99
Percent Complete: 10%

This project incorporates information from project 99-12, Best Management Practices for Snow Storage Areas. Project 99-12 is closed.

Project Description

Alaska DOT&PF often stores snow removed from roads and highways in central storage areas (road-related snow storage areas) where it can melt in the spring and summer. Regulatory agencies require or may soon require best management practices (BMPs) for handling and treating the melt water from these facilities before it enters the environment.

We lack comprehensive information necessary to efficiently and systematically select economical best management practices (BMPs) for road-related centralized snow storage areas. This has led to a potentially inappropriate focus on single technologies for statewide application. With respect to road-related snow storage areas, we lack specific information on:

- ◆ performance requirements for runoff treatment in the various water quality management jurisdictions and climatological regions of Alaska,
- ◆ potentially applicable technologies / BMPs that are used successfully in other locations and jurisdictions,
- ◆ the applicability of available technologies / BMPs to DOT&PF,
- ◆ the cost-effectiveness of various potentially applicable BMPs for DOT&PF, and
- ◆ research / development needs for BMPs for DOT&PF.

Project Objectives

- ◆ Explore the technical, economic, and regulatory feasibility of oceanside snow disposal (i.e. pushing snow into marine outfall areas),

- ◆ use the results of this study to focus future efforts on identifying and designing BMPs for road-related snow storage areas throughout Alaska, and
- ◆ develop and present:
 1. a synthesis of current, economic best management practices potentially applicable to road-related snow storage areas in Alaska;
 2. a concise guide to select and develop economical BMPs;
 3. recommendations for future research where information to identify and develop promising, economical BMPs is lacking;
 4. a list of impediments to successful development and/or implementation of potential economic BMPs.

Project Status

We advertised a Request for Proposals on the web, and are negotiating with a prospective contractor.

Available Reports

None to date



Cost Benefit Analysis of Financing Construction Projects

Project Number: 01-07
Estimated Cost: \$50,000
Est. Completion Date: Complete
Project Manager: Clint Adler

Project Established: 10/00
Percent Complete: 100%

Project Description

DOT&PF is responsible for Alaska's transportation infrastructure. Even though federal funding of highway projects has been increasing, we face formidable challenges as we seek to satisfy growing public demand for highway construction within the constraints placed by annual state appropriations of limited available funds.

The federal government has authorized states to use several financial methods that can help speed up the process on transportation projects involving federal funding. Under the National Highway System Designation Act of 1995 and the Transportation Equity Act for the 21st Century (TEA-21), states may finance highway construction by issuing bonds secured by future federal revenue streams. These bonds are known as grant anticipation revenue vehicles, or GARVEE bonds. Any project contained in a state's State Transportation Improvement Program (STIP) is eligible for bond funding.

This study examined the costs and benefits of GARVEE bonding for a proposed \$425 million set of projects. It examined:

- ◆ the budgetary impacts to the State of Alaska of GARVEE bonding versus pay-as-you-go construction funding;

- ◆ the economic costs and benefits to the State of Alaska and the public users of highways of the GARVEE approach compared to the pay-as-you-go approach under the STIP; and
- ◆ the economic impacts to Alaska communities of highway construction in general.

Project Objectives

The objective of this research study was to create a concise and comprehensive analysis of the costs and benefits of highway construction projects in Alaska, with the ultimate aim of helping DOT&PF make solidly informed choices as it strives to meet Alaska's highway construction needs.

Project Status

Complete.

Available Project Reports

Rogers, B. et. al. *Cost Benefit Analysis of Construction Projects*. Report No. FHWA-AK-RD-00-06, Alaska Department of Transportation & Public Facilities, Juneau, AK, March 2001.

Cost-Effective Rut Repair Methods

Project Number: 01-41
Estimated Cost: \$15,000
Est. Completion Date: 12/31/01
Project Manager: Steve Saboundjian

Project Established: 10/00
Percent Complete: 95%

Project Description

Rutting of asphalt concrete pavements is a common problem in urban Alaska. Rutting can become severe enough that water is actually collected and channeled parallel to the centerline for a considerable distance. These “troughs” become long enough to cause drastic loss of vehicle control. With rutting deeper than one inch, the driver actually has to use considerable steering effort, since the vehicle tends to wander in and out of the wheelpaths.

DOT&PF spends an estimated \$5 million annually on rut repairs, an average of \$1,650 per paved mile per year. Current budget concerns coupled with the need to retain safety and driver satisfaction require continued, constant attention to rut repairs—but with an emphasis on minimizing costs. There are various methods and techniques to repair ruts. However, the economics and cost-effectiveness to repair such damage require special emphasis.

Project Objectives

- Comb existing literature (from transportation agencies and contractor resources).
- Determine the most cost-effective rut repair methods and materials that can be adapted for DOT&PF use.
- Achieve the objectives of this research through the following tasks:
 1. Collect information on cost-effective rut repair methods that are applicable for use by the DOT&PF. Do a general form of literature search, i.e., collect information from available sources as opposed to conducting field and/or laboratory studies.



2. Develop a synthesis of rut repair options by extracting practical, state-of-the-practice methods from collected information.
3. Provide recommendations about the most practical and cost-effective rut repair techniques for use in Alaska.

Project Status

DOT&PF has already reviewed the draft report submitted by the contractor, Elieff Consulting Group. The final report, due October 2001, will provide a catalog of cost-effective rut repair methods, applicable to Alaska, representing the state-of-the-practice. The report will contain information to allow comparisons between the different methods based on economics, materials, and construction methodology.

Available reports

Interim report: Elieff Consulting Group, *Cost-Effective Rut Repair Methods: A Literature Review*, Report No. FHWA-AK-RD-01-04, September 2001.

Design Discharge for Fish Passage Culverts (Pooled Fund)

Project Number: 01-29
Estimated Cost: \$60,000
Est. Completion Date: 9/30/02
Project Manager: Clint Adler

Project Established: 10/99
Percent Complete: 0%

Project Description

The Alaska Department of Fish and Game uses criteria specifically for Arctic grayling to determine stream discharges that hydraulic engineers then use to design 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. This can be both costly and inefficient.

We know that juvenile salmon use the boundary layer along the culvert walls to pass through the culvert. Unfortunately, few people understand the relationship between fish passage and flow velocities near culvert walls. Culvert inlets represent a major barrier to fish passage. Researchers will investigate methods to remove this barrier.

We anticipate conducting this project jointly with other states experiencing similar situations with regard to fish passage and water velocities.

Project Objectives

- ◆ Better understand how inlet and culvert velocities affect swimming of specific fish species.
- ◆ Develop reasonable criteria to determine design discharges to more closely match geography and fish species.
- ◆ Culvert installations that are neither over- nor under-designed.

Project Status

Discussions with the states of Oregon and Washington are ongoing to develop a joint pooled fund project. We anticipate building a flume capable of testing culverts to determine flow characteristics and swimming capabilities of juvenile salmonids at the culvert walls and at the inlet and outlet of the pipe.

Available Project Reports

Interim: n/a
Final: At project end

Development and Validation of Urban Rutting Models

Project Number: 01-50
Estimated Cost: \$55,000
Est. Completion Date: 10/31/04
Project Manager: Steve Saboundjian

Project Established: 10/00
Percent Complete: 20%

Project Description

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 Highways) and developed models and curves to relate rut depth to number of vehicle passes (i.e. studded tire applications). This was done for stone mastic asphalt and Type 2 mixes in the Anchorage area.

This study proposes to develop mathematical 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 lane changes). The model and curves to be developed in this study would help predict (1) the number of vehicle passes to reach the maximum acceptable amount

of rutting and (2) pavement life. Predicting rutting and pavement life will let us determine which road sections are candidates for rehabilitation and when, thus allowing us to adequately program pavement rehabilitation.

Project Objectives

- ◆ Develop regional rutting models that can pinpoint the variables that cause urban rutting.
- ◆ Determine how much studded tire wear contributes to the overall deformation for a given area.
- ◆ Modify studded-tire use and policy to minimize rut formation.
- ◆ Decrease maintenance spending.

Project Status

Statewide Materials is handling this in-house project, which started in fall 2001 and should be complete by fall 2004.



Development and Verification of an Efficient Fish Barrier Assessment Protocol for Highway Culverts

Project Number: 01-14
Estimated Cost: \$100,000
Est. Completion Date: 9/30/02
Project Manager: Clint Adler

Project Established: 10/00
Percent Complete: 50%

Project Description

In Alaska, highway culverts may be restricting fish passage in many watersheds. DOT&PF currently owns an unknown number of culverts that may restrict or prohibit fish passage. Beginning in 2001, DOT&PF established an annual project to retrofit or replace culverts that block or impair fish passage. However, DOT&PF and the Alaska Department of Fish & Game (ADF&G) do not have a comprehensive culvert inventory and fish barrier assessment protocol to efficiently prioritize and program fish barrier mitigation.

Because DOT&PF appropriates limited resources for culvert retrofits and replacements annually, DOT&PF and ADF&G must economically and accurately assign priorities for culvert retrofits or replacements in order to mitigate the most egregious problems first. Efficient resource appropriation, fish barrier mitigation, and habitat restoration are only possible with an accurate culvert inventory and a streamlined culvert assessment and prioritization protocol.

Project Objectives

DOT&PF and ADF&G expect to develop and verify a streamlined version of a culvert assessment protocol that the United States Forest Service (USFS) developed as part of their road condition survey for Alaska's Tongass National Forest. A streamlined culvert assessment protocol will give the state agencies the ability to:

1. rapidly collect sufficient data to use in identifying culverts that pose fish passage barriers,
2. efficiently use computer software such as FishXing that will assist engineers and habitat

biologists to design and assess culverts for fish passage, and

3. prioritize replacement of problem culverts according to the degree of harm that the culvert poses to fish populations and/or availability of upstream habitat.

ADF&G and DOT&PF believe that these goals can be achieved within the following scope of the research effort:

1. modify the culvert assessment portion of the USFS road condition survey,
2. verify the modified culvert assessment protocol for use with fish passage assessment computer software such as USFS's FishXing (<http://www.stream.fs.fed.us/fishxing/>),
3. verify the modified protocol to use in prioritizing culvert replacement/reconfiguration, and
4. develop and test a prioritization routine based on the efficient protocol.

Project Status

During the summer of 2001, DOT&PF and ADF&G collected stream data. ADF&G is currently compiling that data and will pass it on to DOT&PF hydraulic engineers in early November 2001. DOT&PF hydraulic engineers and ADF&G biologists will then use the data to jointly validate the streamlined assessment protocol and to develop a mechanism to prioritize replacing or retrofit of problem culverts.

Available Project Reports

Interim: n/a
Final: At project end

Eliminating Longitudinal Cracking

Project Number: 00-08
Estimated Cost: \$40,000
Est. Completion Date: 9/30/02
Project Manager: Steve Saboundjian

Project Established: 10/99
Percent Complete: 35%

Project Description

Many interior Alaska roads are constructed in regions of warm permafrost and experience a significant rate of failure due to longitudinal cracking. Longitudinal cracking occurs because the permafrost thaws at an accelerated rate at the south slopes of the embankment. The thawing results from high mean temperatures on the side-slope. Two sources cause the higher mean temperatures:

1. thick snow layers in winter because of snow clearing operations, and
 2. relatively high summer temperatures.
- Foundation soils subsiding beneath the side-slopes causes road shoulders to rotate, creating longitudinal cracking. Deep cracks in the pavement surface result in hazardous driving conditions and frequent maintenance.

This research examines a new technique to cool embankment side slopes, with the goal of avoiding accelerated thaw and longitudinal cracking. The technique involves using a layer of poorly graded aggregate with low fines content and very high permeability. High permeability will allow ambient air to circulate through the shoulder of the embankment during winter, thus providing an enhanced cooling effect. The technique is similar to ACE described under project 95-08, page 16.

Project Objectives

- ◆ offer a cost-effective method to avoid longitudinal cracking,
- ◆ improve safety, and
- ◆ reduce maintenance.



Project Status

The contractor, the University of Alaska Fairbanks, performed analytical simulations to study the effect of different embankment configurations and geometries on temperature variation over time within the system. We will include the most promising configurations in an actual construction project as an experimental feature and monitor them. The Loftus Road extension project in Fairbanks, the new UAF entrance at Geist Road, will be used for this purpose. Loftus Road should be under construction next summer.

Available Project Reports

Interim: Expected in November 2001.
Final: Expected in 2002 at the end of the project.

Enhancing Estimating Procedures

Project Number: 00-04
Estimated Cost: \$100,000
Est. Completion Date: 9/30/02
Project Manager: Billy Connor

Project Established: 10/99
Percent Complete: 50%

Project Description

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.

Project 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.

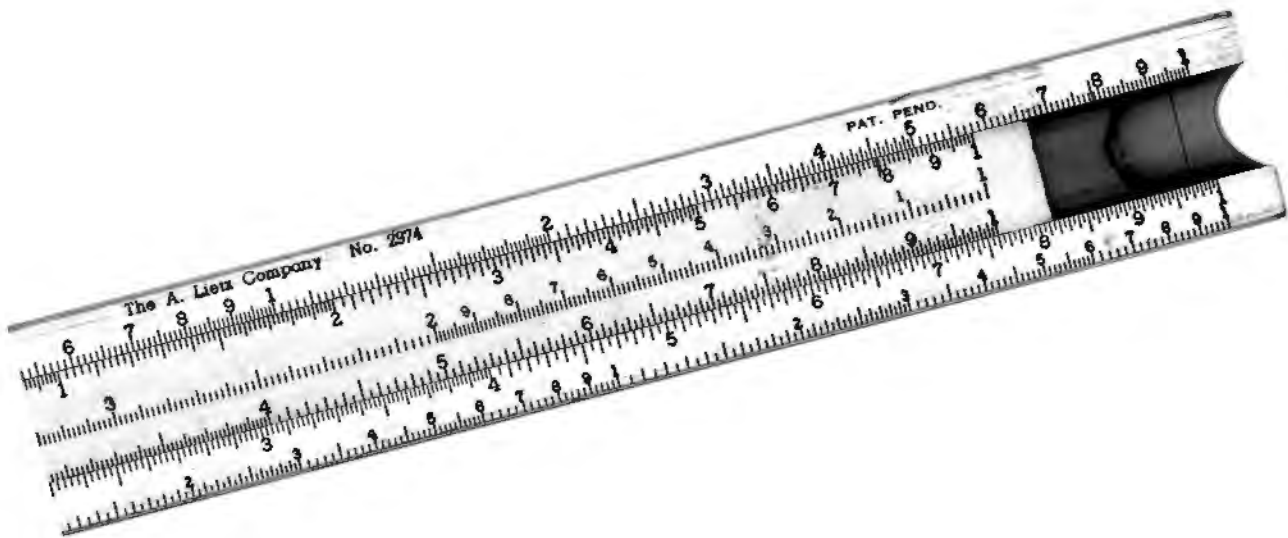
Project Status

We executed a contract with Elieff and Associates to rewrite the current BidTabs program.

Available Project Reports

Interim: n/a

Final: Anticipated at the end of the project; expect a software product.



Evaluation of Live Load Distribution Factor in Alaska Decked Bulb-Tee Bridge Girders

Project Number: 01-12
Estimated Cost: \$75,000
Est. Completion Date: 9/30/03
Project Manager: Clint Adler

Project Established: 10/00
Percent Complete: 0%



Project Description

DOT&PF commonly uses the Alaska decked bulb-tee girder for its bridges. We design bridges in conformance with AASHTO Bridge Design Specifications. DOT&PF's current bridge design practice is to use the AASHTO multiple lane live load distribution factors (DF) for both single and multiple loaded lane configurations. The result has been that the theoretical load carrying capacity of bridges constructed with Alaska decked bulb-tee girders is lower than that for other types of bridges.

Although the AASHTO specifications provide a method for calculating live load distribution factors for multiple-loaded lanes, there is no comparable method prescribed for calculating single-lane live load DFs. We need single-lane DFs to perform bridge load ratings—the evaluation of live load carrying capacity of an existing bridge. The multiple-lane DF will overestimate the live load carried by a girder due to single-lane loading, reducing the allowable live load carried by the bridge.

The AASHTO code recommends using the “lever rule”—a method of determining the live load carried by a single girder, assuming that the deck acts as a simply supported span between girders. Using the lever rule results in two problems for DOT&PF:

1. The lever rule is invalid for Alaska decked bulb-tee girders. The deck formed by these girders has a longitudinal joint midway between adjacent girders. This longitudinal

joint acts in a manner similar to a hinge. If we use the lever rule, the assumption of hinges over the girders would result in an instability in the system.

2. The lever rule method may be overly conservative for analyzing Alaska decked bulb-tee girders. The consequence of the conservative method is that the “operating” or maximum bridge live load capacity is reduced.

Project Objectives

- ◆ Produce an accurate analysis method to calculate the single lane DF for Alaska Decked Bulb-Tee bridge girders;
- ◆ Incorporate the new single lane DF, resulting in a more accurate determination of a decked bulb-tee girder bridge live load capacity;
- ◆ Improve bridge safety; and
- ◆ Potentially increase the bridge's live load capacity.

Project Status

We advertised a Request for Proposals on the web. Proposals were due October 15, 2001.

Available Project Reports

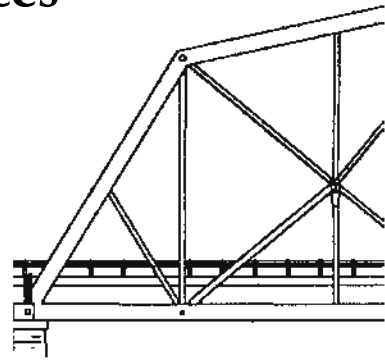
Interim: n/a

Final: At project end

Evaluation of Overheight Warning Devices

Project Number: 01-13
Estimated Cost: \$25,000
Est. Completion Date: 9/30/02
Project Manager: Clint Adler

Project Established: 10/99
Percent Complete: 25%



Project Description

Overheight loads strike bridges throughout Alaska, especially in the Anchorage bowl and along the Glenn Highway. DOT&PF wants to identify potential mitigation options. Unfortunately, little information regarding potential solutions currently exists, especially about measures of effectiveness and costs.

We currently do not know how existing and promising new technologies will perform under Alaska weather conditions such as wind, cold, snow, fog, and low sun angles. These conditions have interfered with and failed devices used in other states under similar, if not less challenging, conditions.

Project Objectives

- ◆ provide us with a comprehensive synthesis of the state-of-the-practice in oversize vehicle warning devices to help us develop a new methodology to reduce these vehicle collisions with bridges.

- ◆ The study will:
 1. Identify state-of-the-practice in oversize vehicle warning devices and approaches to reduce oversize vehicle collisions with bridges.
 2. Synthesize existing performance measures for oversize vehicle warning devices.
 3. Analyze additional available data to further assess the performance characteristics for oversize vehicle warning devices.
 4. Create a tabulation of the state-of-the-practice solutions, their performance, and their costs.

Project Status

University researchers have begun a literature review and are beginning a survey of other state DOTs. A final report is due in mid February 2002.

Available Project Reports

Interim: n/a
Final: At project end

Evaluation of Remote Control Equipment

Project Number: 01-xx
Estimated Cost: \$10,000
Est. Completion Date: 9/30/02
Project Manager: Clint Adler

Project Established: 10/99
Percent Complete: 25%

This project began under project 00-12, Evaluation of Remote Control Equipment. See FFY 2000 Annual Program Report. Equipment was purchased under 00-12 and is being evaluated under 01-xx.

Project Description

DOT&PF will evaluate Teleoperated and Automated Maintenance Equipment Robotics (TAMER) remote control equipment for avalanche cleanup operations. Department maintenance crews will put the remote-controlled loader to the test during Alaska avalanche cleanup operations at Thompson Pass, near Valdez. Here, snowfalls frequently exceed 14 meters (45 feet). The resulting avalanches frequently close the Richardson Highway. There are merely six hours of daylight during the darkest of the winter months, which means cleanup activities happen during times of very low visibility.

Researchers will share results from this study with Alaska and other state maintenance crews who perform work in avalanche areas. Ideally, the information gathered will guide future winter maintenance equipment procurement and operation decisions.

Project Objectives

- ◆ Define and quantify any process and safety improvements achieved by employing the TAMER on avalanche cleanup operations in Alaska.
- ◆ Quantify the reduction in road closure time and reduced worker exposure to hazardous conditions that result from using the TAMER technology.
- ◆ Document ways to optimize remote-controlled avalanche cleanup operations under conditions of extreme cold and extended hours of darkness.

Project Status

The department retrofitted a single 2000 Case 921C loader with the TAMER equipment during the summer of 2001. Department maintenance workers and equipment operators will evaluate the equipment during the upcoming winter.

Available Project Reports

None to date.



Evaluation of Safety and Effectiveness of Rumble Strips in Alaska

Project Number: 01-11
Estimated Cost: \$30,000
Est. Completion Date: 9/30/02
Project Manager: Clint Adler

Project Established: 10/00
Percent Complete: 85%

Project Description

DOT&PF lacked quantitative information on effective designs and configurations for rumble strips in Alaska. While available information suggests that rumble strips significantly reduce run-off-the-road accidents and enhance lane delineation, national and state standards for rumble strip application and configuration either do not exist or do not address safety and environmental issues comprehensively. In particular, quantitative information on external noise impacts and effects on motorists in Alaska conditions is largely unavailable. Designers must often gather this information from widely dispersed sources that generally lack application criteria and information on potential adverse effects in Alaska conditions.

Project Objectives

The objectives of this study are to

- ◆ generally document ongoing national research and Alaska's experience with rumble strips,
- ◆ form the basis of design and installation policy for the DOT&PF, and
- ◆ identify future research needs.

Alaska has installed several rumble strip configurations, including milled, rolled, shoulder, centerline, continuous, and discontinuous rumble strips with various widths and spacing. The study aims to characterize Alaska's experiences with these rumble strips in terms of four main topics:

1. *Effectiveness*—includes the amount of vibration and noise and the ability to perform well in adverse weather conditions.

2. *Adverse Effects on the Traveling Public*—includes impacts to motorists and bicyclists.
3. *Adverse Effects on the DOT&PF*—includes potential impacts to maintenance operations.
4. *Adverse Effects on the Environment*—includes undesirable generation of noise and solid waste.

Project Status

Research staff gathered data and conducted field observations during the first half of 2001, and presented preliminary findings to DOT&PF traffic engineers. Based on this and the research of other states, DOT&PF issued an interim rumble strip policy.

Available Project Reports

Interim: Interim Rumble Strip Policy. (see <http://safety.fhwa.dot.gov/programs/rumble.htm>)

Final: Research staff will prepare a project report during the first quarter of 2002.



Gravel to Pavement Roads

Project Number: 01-26
Estimated Cost: \$40,000
Est. Completion Date: 7/31/02
Project Manager: Clint Adler

Project Established: 10/00
Percent Complete: 25%

This project incorporates the previous \$88,000 project 00-02, Gravel to Pavement Roads Impact.

Project Description

DOT&PF prefers to pave gravel roads to reduce long-term maintenance costs and minimize environmental impacts from dust and runoff. DOT&PF has little documentation on the socioeconomic and environmental impacts of paving gravel roads.

We have been unable to respond comprehensively to questions on the direct and indirect effects of paving gravel roads on traffic, tourism, and land use. The inability to adequately address these questions has significantly affected several projects, causing project delays.

As the department increasingly pursues paving gravel roads to reduce maintenance costs and improve drivability, the public, special interest groups, and agencies will continue to ask what the direct and indirect socioeconomic impacts of these projects are. Projects will continue to be delayed or threatened until we can respond adequately to these concerns. In addition, the Federal Highway Administration (FHWA) recently (June 1999) indicated that the continued lack of documentation on the effects of paving gravel roads will not be acceptable.

Project Objectives

We want general qualitative and quantitative documentation of expected direct and indirect socioeconomic and environmental impacts and cost effectiveness of paving gravel roads in Alaska. The research results will present this information in a format that can be readily incorporated into project environmental documents. We will use the study results to document project needs and impacts during project development.

The study will:

1. Explore expected primary, secondary, and cumulative impacts on
 - ◆ traffic volume and speed,
 - ◆ community cohesion,
 - ◆ mobility,
 - ◆ safety,
 - ◆ accessibility,
 - ◆ relocation of people and business,
 - ◆ employment,
 - ◆ community facilities,
 - ◆ land use,
 - ◆ property values, and
 - ◆ land development.
2. Explore cost effectiveness of paving gravel roads in light of the socioeconomic and environmental impacts, mitigation of expected adverse impacts, and ongoing maintenance.
3. Attempt to quantify the potential user response to improved roadways. Environmental impacts of paving gravel roads will include expected potential impacts on aesthetics, air and water quality, noise, wildlife, and fragile ecosystems.

Project Status

We executed a research contract in September 2001. The contractor should have results early in 2002.

Available Project Reports

None to date.

High-Float Surfacing for Gravel Roads

Project Number: 01-28
Estimated Cost: \$50,000
Est. Completion Date: 12/31/02
Project Manager: Steve Saboundjian

Project Established: 10/00
Percent Complete: 50%

Project Description

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

- ◆ the aggregate gradation, maximum size, amount of fines, moisture content, rate of application, and compatibility with the high-float used;
- ◆ high-float emulsion specifications: minimum and/or maximum limit values;
- ◆ ambient and base temperatures and the cutoff date for paving in different regions of the state;
- ◆ optimal distances between the high-float distributor, aggregate spreader, and compaction equipment;
- ◆ traffic control and speed after the surface treatment is applied; and
- ◆ aggregate sweeping intensity and frequency.

Project Objectives

- ◆ Collect information related to the variables enumerated above from past, present, and near-future projects.
- ◆ Use this information to determine the optimal materials and construction conditions for a successful and durable high-float surface treatment.

Project Status

We reviewed past high-float project files to extract information related to the variables mentioned above. We are now monitoring these

projects to document their performance over time. Also, we visited a number of construction projects this spring and summer to witness the paving and monitor the finished surface.

We attempted to develop a test in the laboratory (the board test) that duplicates the surface being placed in the field. Preliminary indications show that the test can be used to predict the initial performance of the treatment in the field (especially aggregate retention and its compatibility with the high-float used). This test might replace the current controversial coatability test as a routine test.



High Temperatures of Alaska Asphalt Pavements

Project Number: 99-13
Estimated Cost: \$10,000
Est. Completion Date: 9/30/02
Project Manager: Steve Saboundjian

Project Established: 10/98
Percent Complete: 70%

Project Description

Under a previous research study, DOT&PF developed a database of air temperatures around the state to investigate the effects of low temperatures on polymer AC pavements. High temperature data still needs to be processed to develop mathematical relationships between air and pavement surface temperatures. The Superpave design system, developed as part of the SHRP asphalt research program, requires that these high-end temperatures be known to satisfy given performance requirements. Processing of the existing high-temperature data will allow the design engineer to confidently specify the correct Superpave asphalt binder, which will lead to improved pavement performance and reduced maintenance costs.

Project Objectives

- ◆ Develop design pavement surface temperatures on the high end to satisfy the Superpave design method requirements for developing accurate asphalt binder specifications.
- ◆ Process existing computer database files for high temperatures, plotting air and pavement temperatures for approximately 20 sites around the state.
- ◆ Use the mathematical relationships between air and pavement surface temperatures to derive the design pavement temperatures.



Project Status

DOT&PF Highway Data Management shifted recently to a new database system and language. The air and pavement temperature data being collected should be compatible with this new database system. Once the required modifications and transition are complete, the data files will be used to extract high temperature data and develop air/pavement high temperature correlations.

Available Project Reports

Interim: n/a
Final: At project end

Impact of Ice Forces on Stream Bank Protection

Project Number: 01-16
Estimated Cost: \$50,000
Est. Completion Date: 9/30/02
Project Manager: Clint Adler

Project Established: 10/00
Percent Complete: 25%

Project Description

DOT&PF commonly protects stream banks by placing rock riprap on stream banks in the vicinity of roads and bridges. The FHWA manual, HEC-11, "Design of Riprap Revetment," is the primary design guide. The HEC-11 procedure considers four factors:

1. the imposed tractive stress of the water flow,
2. the riprap material critical shear stress,
3. the bank inclination angle, and
4. the specific gravity of the riprap material.

The procedure defines a "stability factor" (SF) as the ratio of the resistive shear force to the imposed tractive force.

Given the channel velocity and bank angle, hydraulic engineers use the primary design equation to calculate a nominal diameter (D_{50}) for the riprap material size. They adjust this D_{50} value with two correction factors that account for the specific gravity and stability of the rock.

HEC-11 makes only brief mention of ice damage consideration (Sec. 1.3, 4.1.1.1 and 4.1.3). It states that riprap designers do not generally need to consider ice forces, but if they judge them to be a problem, they can use an increased stability factor (SF). In the case of historical ice problems, the procedure recommends a SF of 1.2 to 1.5. The "normal" SF is 1.2. By comparison, gradually and rapidly varied flow and channel bends may raise the value to 2.0 and 1.7 respectively. HEC-11 equates ice impact with floating debris impact and also states that, in general, ice forces are not a problem and "...riprap sized to resist flow events will also resist ice forces."

DOT&PF has found that this rudimentary consideration of ice forces has not worked for Alaska streams and believes that riprap designs should consider other forces such as:

- ◆ anchor ice rafting and moving rocks,
- ◆ raft ice impact damage,
- ◆ raft ice pushup onto shore,
- ◆ ice jams causing velocity increase,
- ◆ rock encasement by ice with reduction of specific gravity, and
- ◆ increased longitudinal effective tractive force imposed by stream ice cover.

Project Objectives

- ◆ Develop a consistent procedure to determine how to adjust the HEC-11 stability factor to allow for ice forces on stream bank protection.
- ◆ Specify the riprap size with a greater degree of confidence and to potentially reduce the amount of material that stable stream banks require.
- ◆ Expand the HEC-11 procedure only to allow for the presence of river ice. The hydraulic engineer or designer will still need to develop the flow, channel, and ice information.

Project Status

We executed a research contract in September 2001. The contractor should have results early in April or May 2002.

Available Project Reports

Interim: n/a
Final: At project end

Implementation of Successful Asphalt Mix Designs

Project Number: 99-15

Estimated Cost: \$20,000

Est. Completion Date: 12/31/02

Project Manager: Steve Saboundjian

Project Established: 10/98

Percent Complete: 80%

Project Description

DOT&PF currently makes high-cost asphalt paving decisions based on short-term contractor risk analysis during the project bidding phase. These decisions often result in less than optimum asphalt performance and in occasional pavement failures. There is a need to compile a library of past asphalt mix designs and if possible, correlate them to pavement performance attributes. The successful mix designs for a given route or locale could then be used to define future project specifications. Correlating mix designs with performance would allow the pavement engineers to implement the most cost-effective asphalt aggregate gradations.

Project Objectives

- ◆ Determine and recommend which pavement aggregate gradations will result in the most successful pavement for each locality.
- ◆ Implement the most cost-effective asphalt aggregate gradations.

- ◆ End up with higher quality pavement, a more uniform bidding platform, and lower maintenance costs.

Project Status

We obtained historical asphalt mix designs, then correlated the mix designs to existing pavement performance data and material source location. We identified four candidate aggregate gradations. Using these gradations, the DOT&PF Materials Lab completed Marshall mix designs and obtained pertinent mix data. Results will be included in a final report.

Available Project Reports

Interim:

Final: At project end

Magnet Warning and Guidance System

Project Number: 01-37
Estimated Cost: \$40,000
Est. Completion Date: 9/30/04
Project Manager: Clint Adler

Project Established: 10/99
Percent Complete: 50%

Project Description

Today, snowplow operators, with the limited visibility caused by winter conditions, often don't know their exact location in the roadway. They have to drive at speeds great enough to effectively remove snow, while remaining alert for roadside obstacles and obstructions. Low visibility and the absence of distinct cues that delineate the road decrease the snowplow's speed and efficiency. Some of Alaska's mountain passes receive more than 14 meters (45 feet) of annual snowfall and suffer whiteout conditions.

Consequently, snowplow operators use the guardrail for guidance by riding with the snowplow blade snugged up against the guardrail. That practice takes more time to clear the snow from the roadway and wreaks expensive havoc on the guardrail. Maintenance and Operations forces have to replace a lot of guardrail each summer, only to ruin it again over the course of the winter.

One new intelligent transportation system product is a magnetic guidance system (MGS) for vehicles. The MGS is a series of magnetic markers or magnetic strips that serve as a roadway reference, plus vehicle-borne sensing and processing units that obtain information from the roadway magnetic reference.

The department installed a MGS from 3M Inc. (3M Lane Awareness System) in a road rehabilitation project in Thompson Pass on the Richardson Highway near Valdez. Thompson Pass has guardrail, some of the highest snowfall in the state, blowing conditions, and low visibility.

This project began under project 00-01, Magnet Warning and Guidance System, using round magnetic markers. These didn't work in our pavement template, so we changed to strips and continued the research under this project with remaining rolled-over funds and some new funding.

Project Objectives

- ◆ Evaluate the 3M Lane Awareness System in an Alaska coastal mountain pass. The magnetic guidance system should help the operator stay on track, avoid the guardrail, and not veer into the oncoming traffic lanes.
- ◆ Safe guidance for snowplows moving up and down a winding mountain pass.
- ◆ Reduce snowplow damage to guardrail.

Project Status

DOT&PF installed magnetic tape in three lanes (two climbing and one descending) of the Richardson Highway in Thompson Pass and is currently retrofitting two Freightliner and two Rotary snowplows with the magnetic sensing and operator interface equipment. Department maintenance personnel will evaluate the Lane Awareness System during the 2001–2002 winter season.

Available Project Reports

None to date.

Optimization of Magnesium Chloride Use

Project Number: 01-10
Estimated Cost: \$100,000
Est. Completion Date: 9/30/03
Project Manager: Clint Adler

Project Established: 10/00
Percent Complete: 10%

Project Description

DOT&PF uses liquid magnesium chloride (MgCl) and other chemicals to maintain roads in a bare and wet condition. The timing of application and the application rate of deicing and anti-icing chemicals are largely determined by subjective judgment in response to many dynamic variables. Increased road maintenance needs, in conjunction with stable or declining maintenance budgets, emphasize the need to optimize the cost effectiveness of anti-icing and deicing. We believe that using subjective judgment, complemented with road weather information systems (RWIS) and other intelligent transportation systems (ITS), may lead to the most cost effective use of anti-icing and deicing chemicals.

Project Objectives

- ◆ Explore the use of RWIS and ITS technologies in optimizing the use of anti-icing and de-icing chemicals in Alaska's coastal, maritime climates,

- ◆ Expand on the use of global positioning systems (GPS) and various vehicle-mounted road condition sensors to enhance anti-icing and deicing decision-making.
- ◆ Help maintenance crews make better decisions on the timing and quantity of chemical application.

Project Status

During the upcoming winter months, Research and Maintenance staff will identify equipment and will retrofit chemical spreaders with GPS and road condition sensors. Preliminary findings should be ready by April 2002. Alaska is still deploying RWIS sites, which are not likely to contribute meaningfully to this research effort until the winter of 2002–2003.

Available Project Reports

Interim: n/a
Final: At project end

Pavement Enhancement to Eliminate Spring-Thaw Load Restrictions

Project Number: 01-01
Estimated Cost: \$50,000
Est. Completion Date: 9/30/03
Project Manager: Steve Saboundjian

Project Established: 10/00
Percent Complete: 10%

Project Description

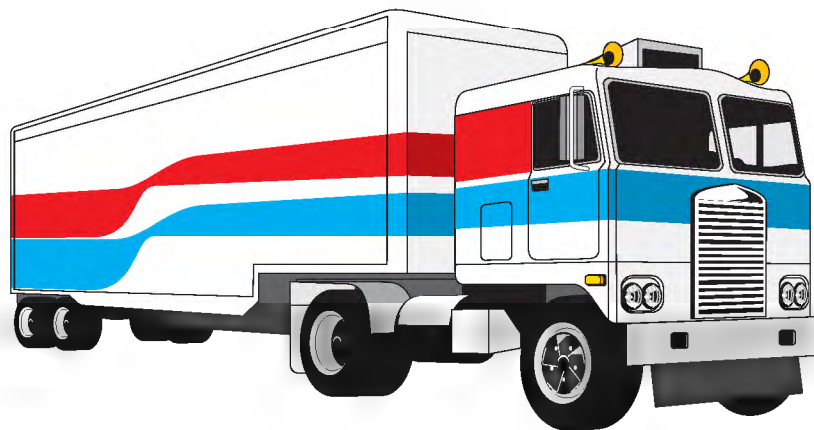
Current springtime load-restriction policy and practice results in waiting to implement load restrictions until it has warmed up and the pavement has started to thaw. The required public notices before implementing load restrictions encourages trucks to haul as much freight as possible during this period when the pavement is at its weakest and most vulnerable condition. The risk of damaging pavements due to the timing of load-restriction implementation is a concern. Currently, load restrictions are needed for part of the road system. For example, about 50 miles of the Parks Highway are most vulnerable to spring-thaw damage. By reinforcing these pavement sections, load restrictions will be eliminated altogether and maintenance costs will be minimized. Also, the cost of freight transportation would decrease and result in savings to the public. The question is: is it cheaper to beef up the road or do load restrictions?

Project Objectives

- Study the cost-effectiveness of building pavements that do not require load restrictions.
- Establish whether existing pavements through stabilized bases and/or thicker layers will be able to enhance the load-bearing capacity of these pavements during the spring-thaw season.

Project Status

A request for proposals is being prepared and will be reviewed by the Statewide Materials pavement engineers and the regional maintenance engineers.



Pavement Marking Materials

Project Numbers: 96-6 and 01-32
Estimated Cost: \$100,000/\$20,000
Est. Completion Date: 9/30/02
Project Manager: Clint Adler

Project Established: 10/95
Percent Complete: 90%

Project Description

The project evaluates pavement marking materials for durability, reflectivity, and cost effectiveness. The evaluation includes exploring the effectiveness and economy of materials applied under maintenance activities and new construction.

We installed durable striping materials on two test decks and evaluated several materials as they wear on various Alaska roads. Materials of interest include Methyl Methacrylate (MMA) in extruded and sprayed applications, various thermoplastics in torch-down applications, and water-based acrylic paint.

Project Objectives

- ◆ Provide performance information for use in the development of department policy for traffic markings and possibly a warranty specification.
- ◆ Guide the selection of more durable and cost-effective pavement marking materials to reduce maintenance costs and improve roadway safety.

Project Status

The Research Section released an interim report in March 2000. The durable stripes on the two test decks haven't worn away as quickly as researchers originally anticipated. Research has focused on quantitative retroreflectivity data and qualitative durability observations.

So far, we've learned that:

- ◆ Durable pavement markings are far superior to paint in terms of maintaining retroreflectivity and presence over the course of an Alaska winter.



- ◆ Retroreflectivity of the durable pavement markings decreases rapidly in the first year in heavy traffic areas. In these areas retroreflectivity has decreased to less than 100 millicandellas after two years. The dramatic losses in retroreflectivity are likely due to studded tires and snowplows.
- ◆ Durable pavement markings are cost-effective for high volume roads.
- ◆ Durable pavement markings are probably not cost-effective for low-volume roads paved with bituminous surface treatments or high float surfacing, because the paint may well out-last the road surface.

Based on the research findings, the department developed an interim pavement marking selection matrix.

Available Project Reports

Interim: Bennett, J. and Connor, B. *Selection of Pavement Marking Materials*. Report No. FHWA-AK-RD-00-01, Alaska Department of Transportation & Public Facilities, Juneau, AK, March 2000.

Final: Research staff will prepare a project report during the first quarter of 2002.

Polymer Modified Asphalt Emissions from Alaska Hot Plants

Project Number: 99-14

Estimated Cost: \$20,000

Est. Completion Date: 3/31/01

Project Manager: Steve Saboundjian

Project Established: 10/98

Percent Complete: 100%

Project Description

We know that polymer modified asphalt (PMA) is cost effective for controlling asphalt rutting, cracking, and premature aging. However, the Clean Air Act has brought increased scrutiny of asphalt plant emissions by EPA and DEC. Several AGC paving contractors state that their asphalt plants cannot meet air quality emissions requirements when manufacturing PMA. A recent laboratory study indicates that emissions may be a function of elevated PMA mixing temperatures, the type of polymer used, and/or the amount of volatiles in the base asphalts. The department will not be able to continue the beneficial use of PMAs if the asphalt plant emissions cannot be brought into compliance.

Project Findings

The contractor submitted the final report in March 2001. They did a questionnaire and a literature study, collecting information from private contractors regarding the emissions produced when using polymer-modified asphalt pavements in cold regions. The aim was to investigate factors such as equipment, method of mixing asphalt and aggregate, fuel used to heat aggregate, and the materials used that might be causing the emission problems.

Questionnaire responders did not have specific problems related to emissions. However,

one responder reported increased emissions with increased mixing temperatures. Another contractor using proprietary blends reported no increased emissions with temperatures. Responders used dryer drum plants (older than 10 years) and some modified plants to reduce emissions. The asphalt is mixed with aggregate through superheated air in the drum. The most commonly used fuel is diesel #2. Materials used included base asphalts AC-5 and AC-2.5, SBS and crumb rubber modifiers, and proprietary blends. There was not enough data to determine if any specific material or heating fuel causes excessive emissions.

The authors made the following recommendations to reduce emissions:

- ◆ Avoid spraying the asphalt onto the aggregate through the superheated air in the drum by modifying the plant or using a batch plant.
- ◆ Use preblended proprietary polymer-modified asphalts or conduct a product development program to reduce emissions.
- ◆ Do not exceed indicated ideal mixing temperatures.

Available Project Report

Zubeck, H., and Bethard, T. *Polymer-Modified Asphalt Emissions from Alaska Hot Plants*, Report No. FHWA-AK-RD-00-07, March 2001.

Reducing Thermal Segregation

Project Number: 00-03
Estimated Cost: \$100,000
Est. Completion Date: 12/31/01
Project Manager: Billy Connor

Project Established: 01/99
Percent Complete: 80%

Project Description

Thermal segregation reduces pavement life in various ways. One of the better known ways is inconsistent compaction. Uncompacted pavement results in rutting, raveling, and fatigue cracking. Other ways include hot mix temperatures that are either too hot or too cold, placing loads from the hot plant improperly into the haul truck box, allowing the windrow of dumped hot mix to get too long in front of the paver, and allowing the hot mix to stay in the dump box too long.

Until recently, it has been difficult to measure thermal segregation because the measuring and identification technology didn't exist. Also, from outward appearances, thermal segregation mimics conventional segregation, so everyone involved in the paving process has misunderstood segregation problems. Recent work with an infrared camera (also called a thermal camera) in Alaska, Louisiana, Texas, Washington, and other states is showing the severity of thermal segregation.

Project Objectives

- ◆ Educate department personnel and contractors about thermal segregation and help them reduce the problem.
- ◆ Correct problems that we didn't know about by learning where thermal segregation is likely to occur and what its causes are.

We think that education about thermal segregation, combined with the department's existing Quality Level Assurance (QLA) specification, will be enough to reduce thermal segregation in Alaska.



Project Status

Alaska DOT&PF now has an infrared camera, which looks much like a video camera, that shows where heat loss occurs. Accompanying software translates the information acquired pictorially into graphs and plots of temperatures. The software will convert a colored shot of the paving mat (the colors depict varying temperatures across the mat) behind the paver into a graphic with specific temperatures noted numerically across the picture.

Researchers visited nine projects in 2000 and ten more in 2001, covering all three regions. Initially, most of the projects showed thermal segregation. As contractors become familiar with thermal segregation and its causes, we see a reduction in thermal segregation. The most common cause of thermal segregation is allowing too much asphalt to be placed in windrows in front of the laydown machine. We suggest that we limit the length of the windrow to one truck.

We also found that areas showing thermal segregation also fail density testing. This causes premature pavement failure, which translates into contractors losing money on their construction contracts under the QLA specification.

Available Project Reports

Interim: n/a

Final:

Reliability of Power Sources for Remote Weather Observation Systems

Project Number: 01-14
Estimated Cost: \$25,000
Est. Completion Date: 9/30/02
Project Manager: Clint Adler

Project Established: 10/00
Percent Complete: 10%

Project Description

Providing cost effective and reliable electrical power to operate remote avalanche-monitoring road weather information system (RWIS) sites along coastal mountain ranges in Alaska is a significant challenge. DOT&PF's past attempts to establish remote, coastal alpine RWIS sites that harness solar and wind power in conjunction with battery storage have failed. The power demands of sensor heating elements, when combined with the very short winter daylight periods and rime ice formation on the wind foils and solar panels, reduced power output below what was necessary to recharge batteries. Various engine-driven power systems and thermal electric generators fueled by diesel or propane can provide reliable energy but require very large capital investments. They also have high annual operating costs attributed to on-site maintenance and fuel delivery by helicopter.

Recent developments in power source technologies promise greater reliability, yet remain untested and unproven in coastal, Alaska alpine environments. We don't know if we can develop and deploy these new power source technologies cost effectively.

Project Objectives

The goals of this study are to:

1. Identify a cost-effective power generation system for remote, alpine RWIS sites that will provide reliable operation on a one-year or longer maintenance cycle in coastal Alaska alpine environments.
2. Identify barriers to cost-effective implementation and suggest techniques or additional research to overcome implementation barriers.

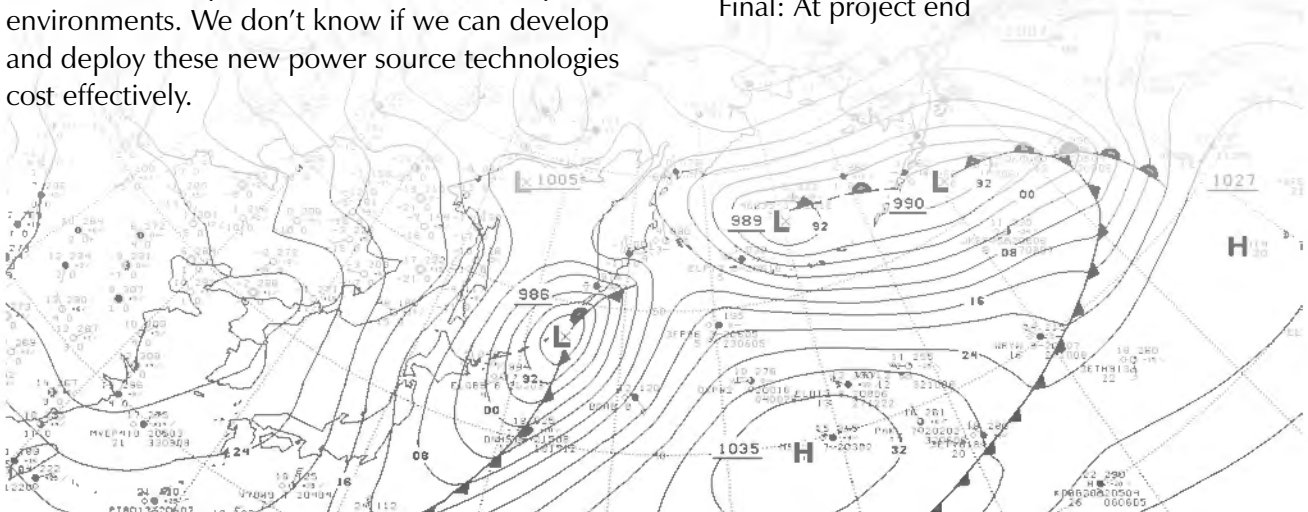
Project Status

We are working to identify and test a promising power source at a coastal RWIS site in the Chugach Mountains near Valdez. We hope to install the experimental equipment during the winter of 2001–2002.

Available Project Reports

Interim: n/a

Final: At project end



Rock Fall Model Applicability

Project Number: 01-40
Estimated Cost: \$20,000
Est. Completion Date: 12/31/01
Project Manager: Steve Saboundjian

Project Established: 10/00
Percent Complete: 35%



Project Description

Rock falling onto our roads is a continuing problem for Maintenance forces and the travelling public. The cost to remove rock from the roadway and to stabilize slopes is a significant part of the maintenance budget. The cost of rock excavation and stabilization is also a major component of our construction contracts.

Research into the applicability of new hazard assessment methods and management systems for Alaska conditions should provide direction for prudent designs. This should result in reduced costs of claims and better design, construction, and maintenance of our slopes. Present rock slope design practices within DOT&PF vary from region to region and do not adequately address rockfall hazard mitigation. Adopting and using a statewide rock slope design methodology will reduce the rockfall hazard and will avoid costs associated with rockfall related accidents.

A regional pooled-fund study regarding rockfalls produced the *Rockfall Catchment Area Design Manual and Research Report (RCAD)*. The study focuses on technical aspects of rockfall, ditch designs, and other factors. The question is: can and should DOT&PF adopt (with or without adaptation) the RCAD model into our design and management of rock slopes?

Project Objectives

The main objectives of this project are:

- ◆ Evaluate the RCAD method as a tool to design rock slopes.
- ◆ Evaluate the potential to use the RCAD method for DOT&PF projects.
- ◆ Decide whether to adopt RCAD as a design method.
- ◆ Determine whether additional research is needed to establish a comprehensive suite of rock slope design methods.

Project Status

Central Region Materials section is performing this in-house project. The principal investigator reviewed the draft final report and design manual, then distributed it to the reviewers for their evaluation and comments.

Snowplow Survivability of Guardrails

Project Number: 01-10
Estimated Cost: \$200,000
Est. Completion Date: 9/30/03
Project Manager: Billy Connor

Project Established: 10/99
Percent Complete: 65%

Project Description

Throughout Alaska's road system, there are damaged sections of guardrail. FHWA has asked Alaska DOT&PF to fix these problems. The department must choose guardrail components that are both FHWA-acceptable and robust enough to withstand normal maintenance wintertime operations. Properly selected components will save millions of dollars over the years. Many new terminals will be installed each year, so the results of this study are critical and needed soon.

Researchers will evaluate new guardrail end section components that are currently installed, or that will be installed as part of this project, along roads in heavy-snow areas of Alaska. It is important to determine how well various components withstand loads generated during actual snow plowing and blowing operations. High pressures generated when snow is pushed against rail sections and terminals (not direct plow-to-guardrail contact) destroy guardrail components.

For example, one of the newer FHWA-approved end sections appears not to hold up well during snow plowing. The SRT-350 was designated in 1995 as one of only two acceptable two-beam terminals (more have been added since then), and many were installed in Alaska. The SRT-350s have not held up well; many reportedly were damaged as snowplows pushed snow against them. All SRT-350s recently installed in Turnagain Pass were damaged after a single winter.



Project Objectives

- ◆ Find the sturdiest and most robust product.
- ◆ Determine if guardrail end sections can be made more visible to plow operators.

Project Status

A review of the guardrail end section damage indicates all of the damage was due to plow contact with the rail. While maintenance personnel indicated that there were cases where the damage was due to snow forces while plowing, the investigators could not find any cases to prove this statement. We sent a survey to northern tier states asking about their experience. The only state to indicate a problem with damage due to snow forces was Washington. An effort is ongoing to identify which end terminals are most appropriate for Alaska.

Available Project Reports

Interim: FHWA-AK-RD-00-04
Final:

Stabilized Base Under Asphalt Surface

Project Number: 97-15

Estimated Cost: \$5,000

Est. Completion Date: 12/31/01

Project Manager: Steve Saboundjian

Project Established: 10/96

Percent Complete: 80%

Project Description

The department wants to stabilize poor-quality subgrade materials. We added a proprietary organic stabilizing agent, EMC2, a product of Soil Stabilization Co., Inc., to poor-quality subgrade materials in an area where better materials aren't reasonably available.

The stabilized subbase test section abuts a normally constructed control section. Except for rotomilling EMC2 into the top of subbase, workers constructed the test and control sections using the same methods and materials. The sections will be monitored for four years by visually assessing the pavement performance and collecting falling weight deflectometer deflection data.

Project Objectives

- ◆ Determine the structural capacity of the pavement structure in terms of equivalent single axle loads to failure.
- ◆ Determine if using a low-cost soil-stabilizing additive will improve the structural performance of a roadway with an asphalt surface treatment.

Project Status

The researcher needs to write the report. The construction project, including the test area, was completed in 1996. An April 23, 1997, visual inspection of the research site showed like-new condition, except for one thermal crack.

According to the analysis of deflection data taken in spring 1997, the EMC2 section appears to be a problem. The initial prognosis for the EMC2 section was for relatively early failure. However, it is too early to tell if the substantial structural differences within the research sections translate into visually observable performance differences. The EMC2 may have actually softened the subbase structure. It is also possible that the control section contains undisturbed sublayers of asphalt concrete, which could act as subgrade reinforcement, actually strengthening the section. This theory could be explored by drilling exploratory holes at the site. It is possible that future findings may change this initial analysis.

Available Project Reports

Interim: n/a

Final: At project end

Stabilized Sandy Gravel Surfacing in Cold Climates

Project Number: 99-16
Estimated Cost: \$40,000
Est. Completion Date:
Project Manager: Steve Saboundjian

Project Established: 10/98
Percent Complete: 100%

This project is now closed. Due to similar scopes, this research was merged with project 00-11, Alaska Soil Stabilization Manual.

Project Description

This project investigates the feasibility of using on-site gravelly materials together with a combination of stabilization products and closely controlled moisture contents. This will provide local-source surfacing on large rural construction projects in cold climates.

Rural areas have limited on-site sources of either marginally clean sand and gravel or only silt. These on-site materials lack either the fines or coarse aggregates suitable for surface material. Thus, many rural construction projects incur high surfacing costs due to the expense of barging materials in. Successful warmer-climate work to stabilize these types of soils by using various products on the market indicates that similar success could be achieved in cold weather.

Cold-climate projects already constructed have used some of these materials, but we have not

evaluated the performance. Visits to these projects will analyze site surfacing materials performance such as material strength properties, moisture content, and other relevant properties.

Project Objectives

- ◆ Develop recommended techniques to improve cold-climate stabilization.

Project Status

Research signed a contract with Gary Hicks, professor emeritus at Oregon State University.

Available Project Reports

Interim: At project midpoint

Final: See project 00-11, Alaska Soil Stabilization Manual (page 17)

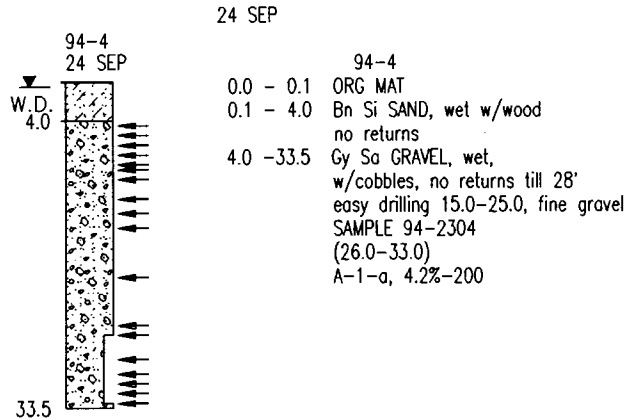
Updating DOT&PF's Geotechnical Procedures

Project Number: 01-38
Estimated Cost: \$25,000
Est. Completion Date: 4/31/02
Project Manager: Steve Saboundjian

Project Established: 10/00
Percent Complete: 35%

Project Description

DOT&PF presently uses its own geotechnical procedures manual. The latest version (1993) of the manual is seven years old. The manual is outdated and there are now significant departures from standard procedures noted in the 1993 manual. Procedures and references for procedures have changed. The geotechnical community has made advances in exploration methods, testing, and evaluation of geotechnical conditions. This project is intended to update the geotechnical manual. This will result in more efficient investigations and analysis of geotechnical conditions. It will also reduce the risk of incurring some construction claims.



Project Objectives

- Bring our geotechnical procedures up to present day industry standards.

Project Status

Central Region Materials Section is writing a workplan for this project.

Using Geophysical Methods in Pits

Project Number: 00-07

Estimated Cost: \$60,000

Est. Completion Date: 9/30/02

Project Manager: Steve Saboundjian

Project Established: 10/99

Percent Complete: 35%

Project Description

Today, Alaska DOT&PF uses seismic methods to determine the volume of usable materials in a potential borrow source. Geologists estimate the volume of usable material by interpreting drill logs taken throughout the area. However, experience shows that estimated volumes differ significantly from available materials when the subsurface geology is complex. There is a critical need to further evaluate and develop the seismic method and to develop methods that extrapolate the geology from a drill log to the surrounding area to better define material type(s) and volume in a pit.

Geophysical methods can quickly and accurately extrapolate the geology from drill logs to nearby areas within a borrow source. The accuracy in determining material volume should increase, and the number of test drill holes needed to define borrow source volume should decrease.

Researchers will correlate three primary techniques with the geology from drill logs in a potential borrow source area and use those

techniques to (1) estimate the subsurface geology in the surrounding area and (2) predict the volume of usable material. Seismic wave refraction, ground penetrating radar, and three types of ground resistivity geophysical measurements will be used in the correlation.

Project Objectives

- ◆ Achieve better-defined borrow source material types and more accurate volume estimates.
- ◆ Reduce the time and expense involved to establish borrow sources.

Project Status

Geologists in the Northern and Central Region Materials Sections are reviewing the recently drafted request for proposals.

Available Project Reports

Interim: At project midpoint

Final: At project end

Verification of Roughness Coefficients

Project Number: 00-09
Estimated Cost: \$88,000
Est. Completion Date: 9/30/02
Project Manager: Clint Adler

Project Established: 10/99
Percent Complete: 85%

Project Description

This project continues the work done under 99-19, Stream Flow Modeling. Both projects are aimed at figuring out flood heights and the volume of water during spring runoff and flood conditions. The end result of high velocity and volume is that culverts and bridges wash out, or so much scour happens that eventually culvert and bridge installations have to be restabilized. The idea is to prevent or reduce washouts and scour in the first place. Roughness coefficients were developed in Lower '48, mostly in the southeastern United States, where there are few large cross-sections of steeper streams to observe. Alaska has cascading-flow and boulder-cobble streams, particularly in the southeast and southcentral areas, as well as on the Dalton Highway up to Atigun Pass. To date, Alaska designers have had to extrapolate roughness coefficients from the Lower '48 data, and experience shows that doing so isn't sufficient to protect our culverts and bridges.

Developing and improving Alaska's roads means designing bridges or culverts for our many stream crossings. There is very limited hydrologic data to use for hydraulics, which means that designers typically have to estimate streamflow and scour computations. A critical parameter for modeling flood flows is channel roughness. Accurately knowing roughness (friction) coefficients will improve streamflow modeling.

Southeast Alaska presented good research opportunities this past year, with higher than normal stream flows. This allowed stream flow modeling researchers to do some calibration and verification of channel roughness.

Previous Related Projects

Stream Flow Modeling, 99-19
Estimated Completion Date: 09/30/02
Estimated Cost: \$88,000
Project Manager: Billy Connor

Project Objectives

- ◆ Derive better flood heights and stream volumes.
- ◆ Design more cost-effective bridges and culverts based on being better able to predict what the water flow will do, especially during spring runoff and flood conditions.
- ◆ For new construction, we will be able to put bridges and culverts in places with reduced scour.
- ◆ Ideally, we'll be able to greatly reduce the number of washouts that occur, especially in the mountainous areas of the state.

Project Status

The United States Geological Survey (USGS) collected a great deal of hydrologic data on numerous Alaska streams. Southeast Alaska produced valuable data, with higher than normal stream flows. This allowed stream flow modeling researchers to perform calibration and verification of channel roughness.

Initial results from stream flow modeling indicate that we need higher estimates of roughness coefficients on steep Alaska streams. Researchers are finding that current, nationally published roughness coefficients tend to lead designers to underestimate roughness and underestimate flood heights on many of Alaska's mountain streams.

Available Project Reports

None. Much of the hydrologic data gathered has been published on the USGS Alaska District Internet site (<http://www-water-ak.usgs.gov/>).

Vetch Control Within State Right of Way

Project Number: 01-22
Estimated Cost: \$10,000
Est. Completion Date: 9/30/02
Project Manager: Clint Adler

Project Established: 10/00
Percent Complete: 50%

Project Description

Vetch is an aggressive member of the Legume family and a noxious weed in Alaska. Vetch has spread beyond the boundaries of the farm fields. It has invaded state and local road rights-of way throughout the state, often smothering other vegetation.

DOT&PF lacks information on the nature, extent, and consequences of vetch invasions—especially in road rights-of-way throughout Alaska. Without this information, we don't know if and how the invasion of vetch in Alaska road rights-of-way will compromise landscaping, erosion control, aesthetics, and safety objectives. DOT&PF expends significant funds and effort on erosion control measures, landscaping, and revegetation in road rights-of-way. The lack of information on vetch invasions and control in Alaska threatens to compromise the success, efficiency, and economics of such efforts.

Controlling vetch may be important as DOT&PF prepares to expend funds to landscape highways throughout Alaska. Public sentiment has not favored our use of chemical pesticides. If we determine that vetch control is necessary, we likely must identify and use nonchemical control measures. Currently, we do not actively control vetch species in our rights-of-way.

Project Objectives

- ◆ Define the general nature and extent of the vetch problem in Alaska.
- ◆ Determine the specific species, their life histories, noxious characteristics, and

geographical extent in Alaska's road rights-of-ways.

- ◆ Establish whether, when, and where there may be a need for control measures in road rights-of-way.

If available information suggests that control measures may be necessary, we want suggestions for

- ◆ potential environmentally friendly (nonchemical) control strategies to use in landscaped road rights-of-way, and
- ◆ developing education/outreach programs for adjoining landowners.

We believe that the study team can accomplish these goals within the scope of a literature search, site surveys, and interviews with staffs of appropriate agencies.

Project Status

During the fall and winter of 2001, state researchers will gather and analyze data. Final reporting is due in late June 2002.

Available Project Reports

Interim: n/a
Final: At project end



Water Drainage from Thaw Basins

Project Number: 01-47
Estimated Cost: \$50,000
Est. Completion Date: 12/31/03
Project Manager: Steve Saboundjian

Project Established: 10/99
Percent Complete: 10%

Project Description

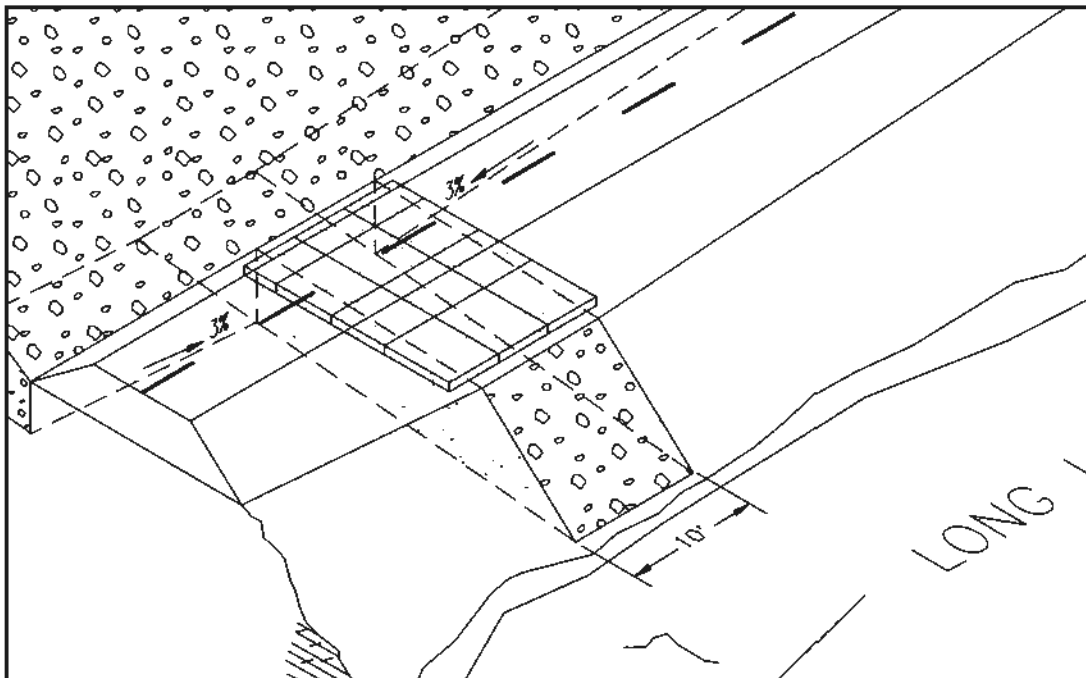
Embankment construction on top of frozen soil disturbs the ground thermal regime and results in water accumulating below the embankment toes, producing thaw basins. This triggers side-slope instability and embankment settlement. Water should therefore be diverted and removed from below the embankment in order to maintain the integrity of the earth structure. The project will explore the possibility of using, for instance, gravel columns, geosynthetics, or an innovative ditch construction method. The project will also develop criteria for use by DOT&PF engineers. The final product of this research will be in the form of drainage-related design criteria that will be added to our current embankment design criteria.

Project Objectives

- ◆ Find innovative technique(s) to divert and remove accumulated water at embankment toes.
- ◆ Reduce embankment maintenance costs.
- ◆ Increase safety for the travelling public by eliminating wide-open longitudinal cracks that now occur along the embankments.

Project Status

Northern Region geotechnical engineers are preparing a request for proposals. The geotech engineers will also review the RFP responses.



Technology Transfer Program Support

Project Number: 01-06
Completion Date: 12/31/01
CY00 Program Budget: \$230,000/CY01 Program Budget: \$230,000
Project Manager: Sharon McLeod-Everette

Program Description

The Local Technical Assistance Program (LTAP) is Alaska DOT&PF's training and information outreach for local governments.

LTAP is a national effort of FHWA. It is designed to serve local units of general purpose and tribal government. FHWA's national goal is to improve access to new highway, road, and street information and technology for local and tribal governments. LTAP is designed to be flexible, and varies from state to state so that respective transportation needs can be met in the most efficient, cost effective, and responsive manner. As a national group and with FHWA's input, the LTAP Centers chose the following as their mission statement: "The national Local Technical Assistance Program mission is to foster a safe, efficient, environmentally sound transportation system by improving skills and knowledge of local transportation providers through training, technical assistance, and technology transfer."

Under LTAP, there are 57 Technology Transfer (T2) Centers established (one in each state, one in Puerto Rico, and six for American Indian tribal governments) to provide training and technical assistance. Alaska LTAP/T2 no longer receives FHWA funds to provide service to Alaska Natives.

Many centers are contracted to universities to operate, while others are operated by the state highway agency. The education and technical assistance activities are accomplished via training and workshops, information dissemination, and technical assistance. The *LTAP Handbook* further defines LTAP operations, goals, and objectives.

Required Work Products

Annual workplan 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.

Alaska Advisory Board Members

| | |
|--|--------------|
| Billy Connor, Research Manager, DOT&PF, Chair | 451-5479 |
| Larry Crouder, City Engineer, City of Fairbanks | 459-6741 |
| Jacob Kagak, Municipal Services Director, North Slope Borough | 852-2611 |
| Chris Kepler, Central Region Maintenance Chief, DOT&PF | 269-0767 |
| Bruce Fulcher, Geotechnical Services Manager, Yukon Government Transportation | 867-633-7950 |
| Trent Mackey, Service Area Engineer, Fairbanks North Star Borough | 459-1218 |
| Ernie Mueller, Public Works Director, Juneau City and Borough | 780-6888 |
| David Mumford, Municipal Traffic Engineer, Municipality of Anch. (through Aug. 2001) | 343-8411 |
| Lee Coop, Assistant Traffic Engineer, Municipality of Anchorage (began Sept. 2001) | 343-8479 |
| Aaron Weston, Research/Technology Transfer Engineer, FHWA..... | 586-7427 |
| Jim Swing, Public Works Director, Mat-Su Borough | 745-9801 |
| Ken Vaughan, Roads Engineer, United States Forest Service | 586-7958 |
| Keith Kornelis, Kenai Peninsula Borough | 283-7535 |

Local Technical Assistance Program—Technology Transfer Calendar Year 2000

During CY00, Alaska LTAP offered 58 training sessions, some being multiple presentations in many locations around Alaska, including the western coast from St. Mary's to Kotzebue. A Management Training pilot program for DOT&PF occurred in Fairbanks and was successful enough that we presented a second program in Anchorage later in the year. Based on employee reception of the program, and incorporating suggestions from evaluations, future sessions are forthcoming.

CY 2000 Training

- ◆ Geotechnical Integrator Training
- ◆ Advanced Highway Capacity Analysis
- ◆ NHI 13212 Soils and Foundation Workshop
- ◆ NHI 13132 Hot Mix Asphalt Construction
- ◆ NHI 13619 Intelligent Transportation Systems Software
- ◆ NHI 13613 Using the Intelligent Transportation System Architecture for Deployment—Public Sector
- ◆ NHI 38060 Work Zone Traffic Control for Maintenance Operations on Rural Highways
- ◆ NHI 35005 Highway Program Financing
- ◆ ASCE: Construction Project Administration and Claims Avoidance
- ◆ ATSSA Traffic Control Supervisor
- ◆ ATSSA Traffic Control Technician
- ◆ IRWA 501 Relocation Assistance
- ◆ IRWA 502 Business Relocation
- ◆ Northwestern University: Traffic Signal Workshop—Traffic Actuated Control
- ◆ Intermediate Grader Operator
- ◆ Basic Grader Operator
- ◆ Finish Grader Operator
- ◆ Asphalt Laydown Workshop
- ◆ Structural Welding for Bridge Maintenance Crews
- ◆ Permafrost Workshop
- ◆ National Transit Institute: Coordinating Transportation and Land Use
- ◆ Systematic Development of Informed Consent Plus
- ◆ Cold Regions Engineering Research Workshop
- ◆ Permafrost Workshop
- ◆ Trenchless Pipe Rehabilitation Technologies
- ◆ Air Quality Training
- ◆ Writing Training
- ◆ Manager's Briefing for Writing
- ◆ Management Training in Anchorage and Fairbanks
- ◆ Satellite Downlink: Streamlining NEPA and the Planning Process

continued . . .

Other activities:

- ◆ Via BTEP, coordinated presentation of NHI 38060, Work Zone Traffic Control for Maintenance Operations on Rural Highways for Yukon Government Transportation in Whitehorse. The instructor obtained the Canadian version of the MUTCD and customized the class.
- ◆ Produced four quarterly newsletters, all of which are posted on the web. Contracted out layout and editing for the entire year, with positive results.
- ◆ Web page is updated continually to reflect scheduled activities, and registrations occur either by fax from those with no web access, and on-line from those with web access.
- ◆ Held the LTAP advisory board meeting in October.
- ◆ The Mather Library catalogued roughly two thirds of the publications and anticipated completion early 2001. We entered the second year of a five-year contract with them for managing the LTAP Publication library.
- ◆ Provided promotional materials for the fairs in Palmer and Fairbanks.
- ◆ Organized DOT&PF's participation at the University of Alaska Fairbanks' Career Fair.
- ◆ Assisted Headquarters with scheduling participation at career fairs at universities and colleges in the Pacific Northwest,
- ◆ Did a short presentation on LTAP for the Northern Region Construction Manager's meeting,
- ◆ Assisted Headquarters to analyze department-wide training.
- ◆ Helped sections in DOT&PF to schedule meetings, short classes, and conferences.
- ◆ Did a presentation at the BIA Provider's Conference about LTAP and on Grader Operator training.



Local Technical Assistance Program—Technology Transfer Calendar Year 2001

So far during CY01, Alaska LTAP has offered forty-six training sessions, some being multiple presentations in many locations around Alaska. This resulted in 984 DOT&PF, local government, and other-affiliations employees being trained.

Five presentations of DOT&PF's Management Training have occurred so far, with 68 employees participating. Each presentation consists of eight different training sessions over a multiweek period.

Completed training:

- ◆ Writing Skills Workshop
- ◆ NHI 13401 Writing Highway Construction Specifications
- ◆ NHI 13239 Module 9: Earthquake Engineering
- ◆ NHI 13144 Hot Mix Asphalt Production Facilities
- ◆ NHI 13145 Hot Mix Asphalt Materials, Characteristics, and Control
- ◆ NHI 13053 Bridge Inspection Refresher
- ◆ NHI 137020 ITS Procurement
- ◆ NHI 380060 Work Zone Traffic Control for Maintenance Operations on Rural Highways
- ◆ NHI 137003 ITS Public Private/Partnerships
- ◆ Effective Negotiating I
- ◆ Human Factors Workshop
- ◆ Older Driver's Workshop
- ◆ Writing Skills Workshop
- ◆ Rock Slope Stability Workshop
- ◆ Stone Mastic Asphalt Workshop
- ◆ Fall Protection Training
- ◆ Demonstration Project 105—Advanced Transportation Management Technologies
- ◆ ATSSA Traffic Control Technician
- ◆ ATSSA Traffic Control Supervisor
- ◆ e-Learning: Communications, Customer Service, Operations
- ◆ Preservation of Asphalt Pavements
- ◆ FHWA's Environmental Justice/Title VI Workshop
- ◆ FHWA's Air Quality Conformity Workshop
- ◆ APBP ADA Training
- ◆ NHI 361020 Alaska Native Employment Partnership
- ◆ FHWA Contract Administration Core Curriculum Course
- ◆ Soil Stabilization Workshop
- ◆ NHI 137001 ITS Awareness Seminar

Scheduled training:

- ◆ IECA—Phase II: How to Select, Install, and Inspect Construction Site Erosion and Sediment Control BMPs for NPDES Storm Water Permit Compliance (sponsored by IECA—we are coordinating statewide registration)
- ◆ Effective Negotiating I
- ◆ Effective Negotiating II

continued . . .

- ◆ Snow and Ice
- ◆ Snow Fence
- ◆ NHI 137001 ITS Awareness
- ◆ Selecting and Designing Pavements for Alaska

Other Activities:

- ◆ Helped the state's ADA Coordinator's Office advertise ADA Training
- ◆ Participated with a booth on highway work zone safety at the Air, Land, & Sea Safety Expo in Juneau
- ◆ Provided materials for Central and Northern Region participation at State fairs in Palmer and Fairbanks
- ◆ Coordinated DOT&PF participation at UAF's Spring Career Fair
- ◆ Secured Julia Triplehorn to do a presentation on the LTAP/T2 Library for the Northern Region M&O Foreman's meeting on November 27, 2001; also helped them find a dynamic presenter on leadership skill and development
- ◆ Worked with Construction and M&O and safety officers to decipher DOT&PF's role/liability associated with Mining Safety and Health Administration requirements
- ◆ Contracted for a training needs survey for DOT&PF
- ◆ Produced three quarterly newsletters; the fourth will be produced by December 31; continued to contract for editing and layout services
- ◆ Met with FHWA's national BTEP representative in Juneau
- ◆ Continually update the training web page with new training and registrations; update the Research page with new reports; nearly finished with segue to DOT&PF's new web design
- ◆ Did two presentations at the LTAP National Conference and International Symposium: International Exchange: BTEP between Alaska and Canada, and Work Force Issues—Hiring Employees
- ◆ LTAP/T2 Publication Library continues to be managed by Mather Library at the Geophysical Institute. Activity: 94 items loaned, 1,871 new items cataloged, 10, 231 physical items with barcodes, stored in 481 lineal feet
- ◆ Video/CD/Software Library resides in LTAP.
- ◆ Hosted the combined LTAP Region 9 and 10 Regional Meeting; physical participants included Idaho, Nevada, California, Hawaii, and the national FHWA LTAP representative; Oregon sent a report



National Highway Institute

Completion Date: 12/31/01
CY00 Program Funding: \$324,700
CY01 Program Funding: \$473,199
Project Manager: Sharon McLeod-Everette

Program Description

NHI is FHWA's technical training organization and outreach program to state highway agencies. Created in 1970 by federal legislation, 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. In the past, that funding has come as a percentage allocation from interstate and primary construction funds, or from state planning and research funds.

NHI presents training based on requests by the state highway agency, depending on availability of instructors. The NHI program provides training for DOT&PF employees who are federal-aid eligible; that is, employees who are working on projects funded by FHWA.

NHI provides technical training in the following areas:

- ◆ Civil Rights
- ◆ Hydraulics
- ◆ Planning Structures
- ◆ Traffic Engineering
- ◆ Environment
- ◆ Geotechnics
- ◆ Pavements
- ◆ Safety
- ◆ Construction and Maintenance
- ◆ Design and Traffic Operations
- ◆ U.S. Transportation Policy

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 funds a pro-rata share of the annual training budget.

Program Status

For a list of training presented to date, including CY00 and 01, see the LTAP section.

AASHTO TRAC

Project Number: 01-08
Estimated Completion Date: 9/30/01
Estimated Cost: \$20,000
Project Manager: Sharon McLeod-Everette



Program Description

AASHTO TRAC (Transportation Research Activities Center) is a science, social science, and math education program designed to inspire high school and junior high school students to consider a career in engineering. It is hands-on, interactive, and has students solving real-world problems, connecting them to the working world of transportation. State highway agency engineers partner with classroom teachers to bring real-life, everyday examples of engineering to the students.

Schools receive a computer, a manual, and a suitcase of peripheral devices such as sound meters and force probes, as well as other software and materials for different exercises. Bridge Builder and Sim City are two types of software provided.

A large group of organizations worked together to fund and develop the TRAC Program. Some of the partners are: American Association of State Highway Transportation Officials (AASHTO), Federal Highway Administration, American Road and Transportation Builders Association, American Society of Civil Engineers, Associated General Contractors, National Asphalt Paving Association, National Society of Professional Engineers, the Institute of Transportation Engineers, as well as other national engineering groups.

Participating state Departments of Transportation fund national TRAC Program operations through annual membership fees set by AASHTO. Possible DOT activities include: hosting programs in participating schools, recruiting mentors and providing training for the engineers and others mentoring in the classroom, providing AASHTO TRAC module technical training for the participating teachers, and assuring the necessary computers and other peripheral tools and supplies are available.

Alaska DOT&PF's TRAC Program

Alaska DOT&PF came on line with TRAC in 1996. DOT&PF worked with Department of Education to identify schools and teachers to participate in the program, and we jointly developed a five-year plan. Initially, TRAC National had a goal of adding new schools each year, but revised that three years ago when they realized that more schools did not equal better service. Alaska DOT&PF patterned our activities after theirs. The original goal of adding five new schools each year became adding a new school or two, plus beefing up already participating schools with equipment.

Program Status

Twenty computers are located in participating schools:

- ◆ Anchorage area: East Anchorage School Within A School, Chugiak;

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- ◆ Fairbanks area: West Valley*, Howard Luke Alternative School, North Pole, Randy Smith Middle School;
 - ◆ Juneau area: Juneau-Douglas*
 - ◆ Rural areas: Nome Public School and Anvil Mountain Science Academy, Noorvik, Bethel, Barrow, Glennallen, and Homer*
- *These schools have more than one computer for participating students.

Teachers tell us that TRAC is having an impact in the classroom. Homer won an international bridge-building contest at the end of its first year with TRAC, and reports that students have now gone on to college to pursue a career in engineering, based on the hands-on application provided by the TRAC program. Also, teachers at Glennallen High School and at West Valley in Fairbanks indicate that students are expressing an interest in pursuing an engineering curriculum during college.

Teacher/new school training, which usually occurs each year in early winter, won't occur until we assess where we want to program to go in Alaska. Tate Jackson, the national AASHTO TRAC manager/national trainer came to Fairbanks in August 2001 to discuss what Alaska wants to do and what the national program is doing.

The Future

The National TRAC manager advises us that AASHTO TRAC continues to be revised and updated. It is no longer computer-dependent. Many of the exercises can be done with calculators, so it's easier to involve numbers of students. Revisions and changes follow.

- ◆ A group of teachers and engineers rewrote the entire instructor and student course manuals to provide more user-friendly exercises.
- ◆ The program continues to offer computers, but has added Texas Instruments calculators so all students in a given classroom can participate in activities.
- ◆ The program moved away from Bridge Builder to Model Smart, which allows for testing bridge components as bridge models are being built. The teacher/engineer group wrote fourteen new bridge-building exercises for Model Smart.
- ◆ TRAC moved away from the multipurpose Lab Interface Program. TRAC went with Lab Pro, which works with IBM, Mac, and with calculators.

Border Technology Exchange Program

Project Number: 01-06
Estimated Completion Date: 09/30/01
Estimated Cost: \$25,000
Project Manager: Gary Hogins/Research—T2

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 (YGT) in the Yukon Territory. BTEP formalizes and funds several unofficial ongoing activities, such as sharing design, construction, and/or mitigation techniques on a variety of pavements and asphalts, permafrost, and new structures designs, as well as forming new, long-term activities. 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.

Project Status

- ◆ BTEP funded Bruce Fulcher's participation at the 2001 National LTAP Conference and International Symposium to present a session on International Exchange with Alaska via the BTEP
- ◆ BTEP funds Bruce Fulcher's participation at LTAP advisory board meetings
- ◆ Funded Bruce Fulcher's trip to meet with FHWA's BTEP representative and Alaska DOT&PF staff in Juneau
- ◆ Alaska DOT&PF staff attended the Yukon Transportation Maintenance annual conference in Whitehorse
- ◆ Canadians attended the AASHTO Subcommittee on Maintenance annual meeting in Alaska
- ◆ YGT representative provided a presentation on High Float Emulsion application in Fairbanks
- ◆ YGT personnel attended a Fish Passage Design for Culverts workshop in Ketchikan

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- ◆ Alaska provided data from a road roughness and pavement rutting survey that was done on the Canadian part of the Alaska Highway, Haines Road, and South Klondike Highway—this was completed while the rating vehicle traveled from Haines, Skagway, and Fairbanks, and included a full GPS survey of the roadway
- ◆ Exchanged deicing salt specifications
- ◆ Coordinated spring weight restriction applications on the connecting Taylor Highway and Top of the World Highway
- ◆ Alaska contracted with YGT to supply crushed gravel from Canadian sources near the border for use on Alaska highway projects
- ◆ LTAP presented NHI 38060, Work Zone Traffic Control for Maintenance Operations on Rural Highways, in Whitehorse. There were 38 attendees, and the class led to development of a new signing manual for work zone operations in the Yukon.

Available Project Reports

None

