Times They Are A Changin

We are Judged by the Public

- Smooth ride
- Rutting
- Potholes
- Noise

Public Preceptions

- It's their right to have good roads
- There's plenty of money for roads
- The government will pay for them
- Roads should last forever
- Construction shouldn't affect the traveler
- The state is inept
- Contractors are crooks
Reality Check
- Roads are a product of public funding
- Highway funding is insufficient
- The average life of a road is about the same as a car
- The cost/ sq. yd. is also about the same
- The state has some of the best transportation professionals
- Contractors take pride in their work

Legislative Pressures
- Construction Money Means Jobs at Home
- Pressure to Improve Roads at Home
- Project Oriented
- No Tax Increases
- Roll Back Fuel Costs

Industry Reality
- Less Money
- Increasing Construction Costs
- Greater Public Demands
- Stricter Environmental Demands
- Aging Infrastructure
- Aging Workforce
**Bottom Line**

- Don’t Expect More Money
- Expect Pressure to Improve Performance With Fewer Resources
- Expect Demands on Roads to Increase
  - Alaska increased from 4.3 billion VMT in 1997 to 4.9 billion in 2002 a 14% increase in 5 years
- Expect Costs toContinue to Rise
- Expect Environmental Costs to Increase

**Better Management a Must**

- Improve Designs, Construction and Maintenance Techniques
- Asset Management
  - Pavement Management
  - Maintenance Management
  - Pavement Preservation

**Take Advantage of Innovation**

- Better Control of Materials
- Reduce Construction Costs
- Increased Pavement Life
Use of the Micro-Deval Test for Assessing Alaska Aggregates

- Tests for properly characterizing aggregate durability are critical
- Investigate whether the Micro-Deval test can be a better alternative to the current abrasion and degradation tests

Micro-Deval Tester

- Recommended for its relation to "toughness and abrasion resistance" (NCHRP study)
- Showed a very high potential in evaluating aggregate durability with higher precision and accuracy (Virginia DOT)
- A rapid, simple test, not "technician sensitive"
Characterization of Asphalt Treated Base Course Material

- AKFPO and statewide policy stipulate the use of stabilized layers for the majority of roadway pavements
- Problem - lack of engineering characteristics for typical Alaskan base materials
- Need - proper characterization to better understand the effects of temperature and asphalt content on ATB behavior

Testing Setup

Findings

- ATBs exhibited stress state dependent properties
- $M_R$ of ATBs increased with a decrease of temperature.
- Lower binder content produced higher $M_R$ of HATB down to 2.5% residual binder content.
- FATB reached the highest $M_R$.
- Northern region ATBs had lowest $M_R$ among three regions.
- Equations were developed to predict the $M_R$ of HATB and FATB.
Impact of Fines Content on Resilient Modulus Reduction of Base Courses during Thawing

- Base course saturation and weakening - reflected by reductions in the resilient properties
- Excess fines content will cause springtime softening
- Critical excess fines content with different aggregate sources, gradations, and moisture contents

Frost Heave Test Setup

Findings

- A two to three order of magnitude increase in the strength of all materials at subfreezing temperatures
- Significant loss of stiffness occurs upon thawing of most soils tested
- Fines content and moisture content co-affect the resilient moduli of D-1 materials before and after the freeze-thaw cycle
- Under high initial moisture content there is not big difference of resilient moduli before and after the freeze-thaw cycle with the increase of fines content.
Financial Impact of Fines in the Unbound Pavement Layers

- Determine the critical excess fines content (i.e., threshold fines content) allowed in the unbound base course.
- Determine the situations when AKDOT&PF can relax stabilized base policies and/or reduce costs by allowing more fines in base layers for highway construction.
- Through further investigating the impact of fines content when frozen under different temperature gradients and with limited water access.

WMA for Alaskan Conditions

Constructability and Binder PG

<table>
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<th>Saturat. (%)</th>
<th>Mixing Temp (°C)</th>
<th>Viscosity (Pa.s)</th>
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<table>
<thead>
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<th>Saturat. (%)</th>
<th>Compaction Temp (°C)</th>
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<td></td>
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<tr>
<td>0</td>
<td>140 – 155</td>
<td>115</td>
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<tr>
<td>1.5</td>
<td>140 – 155</td>
<td>115</td>
</tr>
<tr>
<td>3.0</td>
<td>140 – 155</td>
<td>115</td>
</tr>
</tbody>
</table>
Findings

- Benefits of WMAs using Sasobit reduced mixing and compaction temperatures
- Increased dynamic modulus with the increase of Sasobit content
- Improved workability and rutting resistance
- Insignificant effect on moisture susceptibility
- Slightly degraded resistance to low temperature cracking

Verification of JMF for Alaskan HMA

- How the quality of HMA is assured is a critical issue
- Variability is inevitable
- Investigate how the properties of HMA mixtures vary due to mixture production
- To verify the HMA JMF, and evaluate how well contractors meet the requirements of mix designs
Sample Collection and Tests

- Four scenarios for production of HMA specimens
  - Lab mixed and lab compacted
  - Field mixed and field compacted
  - Field mixed and lab compacted
  - Field cores
- Volumetrics, aggregate gradation and asphalt content
- Performance tests
  - SPT
  - IDT

Preliminary Results

Dynamic Modulus (AIA Project)

Inclusion of LCCA in AKFPD Software

- to create a single software package capable of executing the economic cost analysis and structural analysis functions
Graphic User Interfaces

SPT (AMPT later)

During Test

After Test
Characterization of Alaskan HMA Mixtures with the SPT

**Problems**
- Mechanistic flexible pavement design requires accurate characterization of paving materials
- Resilient modulus ($M_R$) can not characterize HMA over temperature and loading frequencies
- Need correlations between SPTs results and HMA performance for typical Alaskan HMA mixtures

**Objectives**
- Establish a catalog of $|E^*|$ for typical Alaskan HMA
- Evaluate the correlations between SPTs results and HMA performance
- Validate the prediction models of the $|E^*|$ for local HMA

Field Evaluation of Crack Sealing of AC Pavements in Alaska

- The AKDOT&PF has promoted routine sealing of cracks in AC pavements for many years.
- Certain cracks (including map/grid cracks) may sometimes be ignored, i.e., left completely unsealed, for the life of the pavement with no negative effects.
- It is economically wise,
  - If possible, to delineate areas of the State where such sealing is (or is not) necessary.
  - To study repair treatments for major transverse cracks to see what does and doesn’t work — and where.
Objectives

- studying current crack sealing practices and materials coupled with field examination of various maintenance methods
- defining areas of Alaska where common sealing and light patching methods are best used or avoided
- forming recommendations aiming at saving a significant portion of M&O funds now spent on crack sealing and minor patching

Pavement Preservation

- A Partnership Between DOT&PF, CalTrans, Chico State and AUTC
- Objectives
  - Develop a Catalog of Preservation Techniques Which Work in Alaska
  - Determine When to Apply Preservation Techniques
  - Integrate Information into Pavement Management and Asset Management

Typical Pavement Preservation

- Thin Overlays
- Seal Coats
- Crack Sealing when Appropriate
- Mill and Fill
In Summary

- We Must Work Together
- To Increase Pavement Life
- Reduce Costs
- Improve Performance

Further Information...

Jenny Liu, Ph.D., P.E.
Associate Professor
Dept. of Civil and Environmental Engineering
Alaska University Transportation Center
University of Alaska Fairbanks
jliu6@alaska.edu
(907) 474-5764