Evaluation of Precut Transverse Cracks for an AC Pavement in Interior Alaska

Jenny Liu and Sheng Zhao
University of Alaska Fairbanks
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Problem Statement

Design of field sections

Field survey results and analysis

Preliminary conclusions
Problem Statement

- Thermal cracks are perhaps the most noticeable form of crack-related damage in asphalt pavement in cold climates.
- Previous experience in Alaska and other northern states demonstrated that using precut technique to reduce thermal cracks is promising.
- A systematic approach has not been developed to implement application of precutting in AC pavements.
- Development of a precutting technology needs to consider:
  - new pavements placed on new embankments.
  - new pavements placed on existing embankments—the latter having already developed thermal cracking in the sub-pavement aggregate.
Field Sections

- Moose creek project
  - Data was collected in June, 2016
  - Previous data was collected in 2013 and 2014

- Healy project
  - Data was collected in June, 2016
  - Previous data was collected in 2015

- Phillips Field Road
  - 32 years old
  - Single evaluation was conducted in June 2016
  - Scheduled to be milled in summer 2016
# Moose Creek Project Design

<table>
<thead>
<tr>
<th>Section No.</th>
<th>Section Type</th>
<th>Precut Spacing (ft)</th>
<th>Precut Depth (in)</th>
<th>Precut Depth Ratio</th>
<th>Pavement Structure</th>
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<td>1.5</td>
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Note: Precut depth ratio is the ratio of precut depth over the thickness of AC layer.
## Healy Project Design

<table>
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<th>Section Type</th>
<th>Precut Spacing (ft)</th>
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<td>Pavement Structure IV</td>
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Pavements structure V is the strongest, most sound structure for the road followed by II, IV, III and I.
Field Evaluation

- Document the crack amount (the same with previous monitoring)
- Label the crack severity
- Measure the crack width
- Document if precuts are active
- Document each crack on the survey sheet and will keep it for the record
- Number the point of interest (cracks, special surrounding environment, precuts, other pavement deterioration, etc.) and take photos
Field Evaluation
Moose Creek Project Survey Results

![Bar chart showing survey results for different sections.](chart.png)
Healy Project Survey Results

Survey in 2015
Survey in 2016

Natural Crack Spacing (ft)

Sections

Type II Control
Type II S, 25-ft, 2-in
Type III Control
Type III S, 25-ft, 2-in
Type IV Control
Type IV S, 25-ft, 0.625-in
Type IV S, 25-ft, 1.25-in
Type IV S, 35-ft, 2-in
Type V Control
Type V S, 25-ft, 2-in
Type V S, 35-ft, 2-in
Crack Filling Observed on One Section

- “Cut on existing cracks” section with 1.5 in cut depth from Moose Creek project was maintained with crack filling
More Observations

Active Precut

Non-active Precut
Precut Sections vs. Control Sections

Moose Creek (2013), Pavement Structure I

Natural Crack Spacing (ft)

Precut Depth (in)

0.5 1 1.5

25 ft Precut Spacing
40 ft Precut Spacing
Control

Moose Creek (2014), Pavement Structure I

Natural Crack Spacing (ft)

Precut Depth (in)

0.5 1 1.5

Moose Creek (2016), Pavement Structure I

Natural Crack Spacing (ft)

Precut Depth (in)

0.5 1 1.5

25 ft Precut Spacing
40 ft Precut Spacing
Control
Precut Sections vs. Control Sections

Healy (2015), Pavement Structure II

Healy (2015), Pavement Structure III

Healy (2015), Pavement Structure IV

Healy (2015), Pavement Structure V
Using the 2016 survey results and holding the precut depth ratio at 3/4
Effect of Precut Depth

Using the 2016 survey results from structure I and IV sections.
Effect of Pavement Structure

- Using the 2016 survey results and holding the precut depth ratio at 3/4
Phillips Field Road Survey Results

- Many longitudinal cracks were observed
- Many block cracks
- Only 7 transverse cracks were observed, including 2 low severity cracks
- 13 out of 23 precuts were active
- Many potholes were observed when longitudinal cracks meet precuts
- 32 years old, but its general driving condition was found to be pretty good. All the cracks seemed not to deteriorate the pavement condition in a significant level
Philip Field Road Observations

Block Cracks

Longitudinal Cracks
Philip Field Road Observations

Non-active precut

Active precut
Philip Field Road Observations

Potholes
Summary

- Field monitoring status
  - moose creek project, 3 times in 4 years (2013, 2014, 2016)
  - Healy project, 2 times in 2 years (2015, 2016)
- Philip field road, single evaluation 32 years after its construction
- The survey recordings are well documented in text and pictures
Preliminary Conclusions

- Precutting treatment appears promising to control natural thermal cracks.
- Shorter precut spacing and strong pavement structure look promising in crack control according to preliminary results. There may have an optimum precut depth that produces the best crack reduction effect.
- These findings were based on preliminary results from relatively short time periods.
- Continuing evaluation and monitoring of test sections and cost effectiveness analysis are needed to recommend an effective design methodology and construction practice for Alaska and cold areas of other northern states.
Thank you