Bonded CRCP Overlay of a Distressed Jointed Concrete

Southeastern States Pavement Association 2018 Conference

October 25, 2018
Charleston, West Virginia

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Texas Tech University
Presentation Overview

- US 75 Project in Paris District
- Pre-Overlay Evaluations
- Design and Construction
- Performance Evaluations
- Summary & Future Plans
Acknowledgement

• Noel Paramanantham, Paris District Engineer, TxDOT
• Andy Naranjo, Construction Division, TxDOT
• Wade Blackmon, Paris District, TxDOT
• Texas Tech Research Team
TxDOT Rigid Pavement Lane Miles

Fiscal Year

PMIS Lane Miles

CRCP

JCP


10,270 10,467
11,171
11,771
12,345
13,109
13,388
13,779
13,572
13,969
13,540

4,445 4,346 4,264 4,098 3,989 3,895 3,948 3,823 3,727 3,681 3,649

TxDOT PMIS
“Good” or Better Distress Scores
(PMIS Distress Score 80 or above)

<table>
<thead>
<tr>
<th>Pavement Type</th>
<th>Percentage of Lane Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>91.30%</td>
</tr>
<tr>
<td>ACP</td>
<td>6.85%</td>
</tr>
<tr>
<td>CRCP</td>
<td>1.85%</td>
</tr>
</tbody>
</table>

Legend:
- FY 2013
- FY 2014
- FY 2015
- FY 2016

TxDOT PMIS
“Good” or Better Ride Scores
(PMIS Ride Score 3.0 or above)

Percentage of Lane Miles

<table>
<thead>
<tr>
<th>Pavement Type</th>
<th>FY 2013</th>
<th>FY 2014</th>
<th>FY 2015</th>
<th>FY 2016</th>
</tr>
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TxDOT PMIS
US 75 Project in Paris District
US 75 Project

- Mainlanes: 10” JPCP + 6” Flexbase + LTS
- Shoulders: 1” ACP + 8” Flexbase
- Built in 1984
- Shoulders: In 1998, 10” JPCP + 6” Flexbase
- ADT in 1984 ~ 11,000, projected 20 yr ADT ~ 16,200
- ADT in 2010: 51,000 & projected 20 yr ADT ~ 71,000
US 75 Project

• Since 2002, Paris District spent around $500K to $1 million on slab repairs on US 75 per year.
• Project No. 5-4893 “Pilot Implementation of CRCP Overlay on Jointed Concrete Pavement”
• Funding for this implementation project was $500K.
• 0.5-mile section in the worst condition
Pre-Overlay Evaluations
US75 - South – Start at Exit 64
Deflections @ 9,000 lbs [mil]
Design & Construction

• Design:
  o O/L slab thickness: 7-in
  o Longitudinal steel: 0.78 %

• Construction:
  o Concrete: Class P concrete
  o Inside lane: May 21, 2010
  o Outside lane: June 21, 2010
CRCP O/L Design Standard

Pavement Layout

The spacing between longitudinal steel bars will be 8 inches throughout the width of the pavement, except that the spacing is 4 inches (for 8" either side of joint) near the longitudinal construction joint.

Joint Sealing Material Method A or B

#6 Longitudinal Bar

#6 Transverse Bar

3" Saw Cut Depth

Longitudinal Contraction Joint Section Y-Y

Multi Piece Tie Bar

2" Min. Clear

#6 Longitudinal Bar

#6 Transverse Bar

Detail Sheet Sheet 1 of 2

Texas Department of Transportation © 2009

PROJECT NO. 6182-92-001

STATE DIST. COUNTY

TEXAS 01 GRAYSON

CONTRACT. CTY. JOB HIGHWAY

6/30 30 00 155

22
CRCP O/L Design Standard – Transition Area
Milling transition sections
Cold Milling
Installing hook bars
Reinforcement in the transition area
Placing Geo-textiles at joint
Installing rebars(2)
Longitudinal steel spacing
Surface Cleaning
Placing Concrete(1)
Placing Concrete(2)
Curing
Longitudinal joint sawcut
Placing wet mats(1)
Placing wet mats(2)
Completed CRCP BCO
Performance Evaluation

- Inside lane: perfect
- Outside lane: distresses at some joints
Distress in the Outside Lane

<table>
<thead>
<tr>
<th>Joint #</th>
<th>Frequency [N]</th>
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<tbody>
<tr>
<td>0-20</td>
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<tr>
<td>21-40</td>
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<tr>
<td>41-60</td>
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<td>61-80</td>
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<td>81-100</td>
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<tr>
<td>101-120</td>
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Number of Distress [N]

- Distress in the Outside Lane
Summary & Future Plans

- Annual Maintenance on US 75: $1.0 Million
- Various Lane Closures: Average 3 months
- Cost of Maintenance for next 20 years without inflation: $20 Million
- Road User Cost due to lane closures at current ADT and projected ADT for 20 years: over $70 M
- Overlaying with 7” Concrete Overlay for this project limits is ~ $30 M
Summary & Future Plans

- Annual Maintenance on US 75: $1.0 Million
- Various Lane Closures: Average 3 months
- Cost of Maintenance for next 20 years without inflation: $20 Million
- Road User Cost due to lane closures at current ADT and projected ADT for 20 years: over $70 M
- Overlaying with 7” Concrete Overlay for this project limits is ~ $30 M
Summary & Future Plans

- CRCP Overlay will be placed on US 75 and other deteriorated jointed concrete pavement projects.
- Other design modifications will be tried and its behavior will be monitored under new implementation project.
Thank you.

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