To: Keith Roberts
From: Jack A. Elston
Subject: Pavement Design Approval
Date: September 7, 2021

Route: I-270
Section: 60B-1, 60-1WRS-4
County: Madison
Limits: From Chain of Rocks Bridge over the Mississippi River to the Chain of Rocks Canal Bridge

We have reviewed the pavement design for the above referenced project which was most recently submitted on September 3, 2021. The project will replace the Chain of Rocks Bridge over the Mississippi River with dual structures with four lanes and the capacity for future six-lanes. On the Illinois side of the bridge, approximately 3,700 feet of I-270 will be replaced and approximately 3,400 feet will be widened. The new cross-section will provide four lanes with the capacity for future six-lanes to match the structures.

Due to the high traffic factor, this has been considered a special design and continuously reinforced concrete pavement the only option considered. The design resulted in a CRC thickness of 11.75” but 12” was selected to match the existing pavement on the east end of the project which is being widened.

In summary, the approved pavement design is as follows:

**I-270 – Pavement Replacement and Widening**

- 12” CRCP w/ tied 12” Shoulders
- 4” HMA Stabilized Subbase
- 12” Subbase Granular Material, Type A

If you have any questions, please contact Mike Brand at (217) 782-7651.
To: Jack Elston  
Attn.: Michael Brand

From: Keith Roberts  
By: Kirk H. Brown

Subject: Pavement Design Review – Special Design

Date: September 3, 2021

FAI Route 270 (I-270)
Section 60B-1, 60-1WRS-4
Madison County

Bridge Replacement over Mississippi River and Widening of I-270 from Mississippi River to Chain of Rocks Canal Bridge

This project consists of constructing pavement for future six lanes of I-270 between the new structure over the Mississippi River (referred throughout the pavement design as Chain of Rocks Bridge) and the recently built structure over the Chain of Rocks Canal. The existing corridor consists of two 12-foot lanes, 10-foot outside shoulders, and an inside shoulder that varies between 4 & 10-foot in each direction. An additional 12-foot travel lane will be constructed for future capacity but will be used as additional shoulder width when constructed. The alignment and profile will be adjusted to accommodate the new Chain of Rocks Bridge. Due to the adjusted alignment and profile, a little more than half of the existing pavement will be rendered unusable in the proposed condition.

Project Information
- Total length of pavement reconstruction/widening is approximately 7,100 feet
- Approximate areas
  - Pavement: 39,046 square yards
  - Shoulder: 33,535 square yards
- The adjacent pavement structure to the east is to remain in-place, was constructed with the Chain of Rocks Canal Bridge in 2013-14. This pavement structure consists of:
  - 12 inches CRC Pavement (CRCP)
  - 4 inches stabilized subbase
  - 12 inches subbase granular material type A
- The subgrade support ratio (SSR) for this location is “poor”

The District is requesting this to be considered a Special Design since the Traffic Factor is greater than 60 (61.97). A CRCP was the only design determined for this reason. Also, a LCCA was not performed for this reason. The IDOT
Mechanistic Pavement Design spreadsheet was used to determine the CRCP thickness. The thickness was calculated as 11 ¾ inches.

Although the Mechanistic Design calculates the CRCP at 11 ¾ inches, the District recommends using a thickness of 12 inches to be consistent with the existing adjacent pavement constructed in 2013-14.

The recommended pavement design is:

- **CRCP Design:**
  - PCC Pavement, 12 inches
  - PCC Shoulders, 12 inches
  - HMA Stabilized Subbase, 4 inches
  - Subbase granular material type A, 12 inches

The slab will be between the new Chain of Rocks Bridge and the Chain of Rocks Canal Bridge. There is approximately 3400’ of existing CRCP west of the Chain of Rocks Canal Bridge to be re-used. The length of the proposed CRCP slab is approximately 3500’. Since this section of CRCP is longer than 2,000’, a lug system is to be used. A wide-flange beam terminal may be used in place of a lug system. The overall width of both directions of traffic and barrier median is approximately 120’. With a Concrete Barrier, Double Face with Monolithic PCC Base proposed between each direction of travel, the width of the tied pavement in each direction should be less than 60’ (59’).

If you have any questions or need further information, please contact Rob Harbaugh at 618-346-3195.

RDH/S:\Squad_6\Pavement Design Reviews\04 - Madison County\I-270; Mississippi to CORC\I-270; Mississippi to CORC memo to BDE.docx
To: Tiffany Brase

From: Gwen Lagemann

Subject: Traffic Data Request

Date: April 18, 2017

Location: FAI 270 (I-270)
Section 60-(1,2,3,4)WRS-1
Madison County
Job No. P-98-009-17

The traffic data for the above location is as follows:

If you have any questions, or require additional data, please contact Dan Muskopf @ (x3154).

Dkm
EXISTING F.A.I. ROUTE 270
F.A.I. 270 EX STA 845+81.49 TO STA 869+43.00

EXISTING F.A.I. ROUTE 270
F.A.I. 270 EX STA 869+43.00 TO STA 891+94.85

EXISTING LEGEND

A  EXISTING PORTLAND CEMENT CONCRETE PAVEMENT
B  EXISTING STABILIZED SUBBASE
C  EXISTING SHOULDER
D  EXISTING CONCRETE BARRIER DOUBLE FACE 42" HEIGHT
E  EXISTING GUARDRAIL

PROPOSED LEGEND

1 CONTINUOUSLY REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT 12"
2 STABILIZED SUBBASE - (HMA) 4"
3 SUBBASE GRANULAR MATERIAL, TYPE A 12"
4 PORTLAND CEMENT CONCRETE SHOULDER 12"
5 PIPE UNDER DRAINS, TYPE 1 6"
6 CONCRETE BARRIER, DOUBLE FACE, 44" HEIGHT (WITH MONOLITHIC PCC BASE)
7 STEEL PLATE BEAM GUARDRAIL, TYPE A 6' POSTS
8 GUARDRAIL REFLECTORS, TYPE A
9 BARRIER WALL REFLECTORS, TYPE C
EXISTING F.A.I. ROUTE 270
F.A.I. 270 EX Q STA 899+38.39 TO STA 905+17.58

EXISTING F.A.I. ROUTE 270
F.A.I. 270 EX Q STA 905+17.58 TO STA 911+18.89

EXISTING LEGEND

PROPOSED LEGEND

A) EXISTING PORTLAND CEMENT CONCRETE PAVEMENT  
B) EXISTING STABILIZED SUBBASE  
C) EXISTING SHOULDER  
D) EXISTING CONCRETE BARRIER DOUBLE FACE 42" HEIGHT  
E) EXISTING GUARDRAIL

2) CONTINUOUSLY REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT 12"  
3) STABILIZED SUBBASE - (HMA) 4"  
4) SUBBASE GRANULAR MATERIAL, TYPE A 12"  
5) PORTLAND CEMENT CONCRETE SHOULDERS 12"  
6) PIPE UNDER DRAINS, TYPE 1 6"

7) CONCRETE BARRIER, DOUBLE FACE, 44" HEIGHT (WITH MONOLITHIC PCC BASE)  
8) STEEL PLATE BEAM GUARDRAIL, TYPE A 6' POSTS  
9) GUARDRAIL REFLECTORS, TYPE A  
10) BARRIER WALL REFLECTORS, TYPE C

STATE OF ILLINOIS  
DEPARTMENT OF TRANSPORTATION  
FAI-270  
EXISTING TYPICAL SECTIONS
PROPOSED F.A.I. ROUTE 270
EB F.A.I. 270 STA 1779+78.40 TO STA 1784+08.73

** EB VARIES 6'-10' ? STA 1785+74.53 TO STA 1788+74.29
** WB VARIES 6'-10' ? STA 2784+08.73 TO STA 2786+56.72
** EB VARIES 12'-0' ? STA 1785+74.53 TO STA 1788+74.29
** WB VARIES 12'-0' ? STA 2784+08.73 TO STA 2786+56.72
EB F.A.I. 270 ? STA 1784+08.73 TO STA 1788+74.29

EXISTING LEGEND
D E A B C 7 8

PROPOSED LEGEND
4 5 1 2 3

EXISTING SHOULDER
EXISTING GUARDRAIL
EXISTING PORTLAND CEMENT CONCRETE PAVEMENT
EXISTING STABILIZED SUBBASE
EXISTING CONCRETE BARRIER DOUBLE FACE 42" HEIGHT
EXISTING GUARDRAIL

4 CONTINUOUSLY REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT 12"
2 STABILIZED SUBBASE - (HMA) 4"
3 SUBBASE GRANULAR MATERIAL, TYPE A 12"
4 PORTLAND CEMENT CONCRETE SHOULDERS 12"
5 PIPE UNDER DRAINS, TYPE I. 6"
6 CONCRETE BARRIER, DOUBLE FACE, 44" HEIGHT (WITH MONOLITHIC PCC BASE)
2 STEEL PLATE BEAM GUARDRAIL, TYPE A 6' POSTS
8 GUARDRAIL REFLECTORS, TYPE A
9 BARRIER WALL REFLECTORS, TYPE C

NOTES
FINAL ROADWAY PLANS ARE DESIGNED FOR THE ULTIMATE 6-LANE CONFIGURATION IN ANTICIPATION OF PROJECT APPROVAL OF CURRENT 6-LANE STUDY FOR I-270 PRIOR TO PS&E.

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PROPOSED TYPICAL SECTIONS
FM-270

PLOT SCALE = 5.0000 ' / in.
PLOT DATE = 9/2/2021
DATE DESIGNED = DEC 31
CHECKED = DEC 31
DRAWN = DEC 31
REVISED = DEC 31
PROPOSED F.A.I. ROUTE 270

**I-270 EB** STA 1871+39.74 TO STA 1884+80.02

*RE-USE EXISTING SHOULDER E A I. STA 1871+39.74 TO STA 1884+80.02*

**I-270** STA 1869+73.48 TO STA 1872+73.99

*RE-USE EXISTING SHOULDER E A I. STA 1869+73.48 TO STA 1872+73.99*

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EXISTING LEGEND

- **A)** EXISTING PORTLAND CEMENT CONCRETE PAVEMENT
- **B)** EXISTING STABILIZED SUBBASE
- **C)** EXISTING SHOULDER
- **D)** EXISTING CONCRETE BARRIER DOUBLE FACE 42" HEIGHT
- **E)** EXISTING GUARDRAIL

PROPOSED LEGEND

- **1)** CONTINUOUSLY REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT 12"
- **2)** STABILIZED SUBBASE - (HMA) 4"
- **3)** SUBBASE GRANULAR MATERIAL, TYPE A 12"
- **4)** PORTLAND CEMENT CONCRETE SHOULDERS 12"
- **5)** PIPE UNDER DRAINS, TYPE 1.6"
- **6)** CONCRETE BARRIER, DOUBLE FACE, 44" HEIGHT (WITH MONOLITHIC PCC BASE)
- **7)** STEEL PLATE BEAM GUARDRAIL, TYPE A 6' POSTS
- **8)** GUARDRAIL REFLECTORS, TYPE A
- **9)** BARRIER WALL REFLECTORS, TYPE C

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NOTES

FINAL ROADWAY PLANS ARE DESIGNED FOR THE ULTIMATE 6-LANE CONFIGURATION IN ANTICIPATION OF PROJECT APPROVAL OF CURRENT 6-LANE STUDY FOR I-270 PRIOR TO PS&E.
**PROPOSED F.A.I. ROUTE 270**

**EB F.A.I. 270**
- STA: 1891+96.63 TO STA 1899+38.39
- **LEFT SHOULDER** STA 1891+96.63 TO STA 1899+38.39
- EB F.A.I. 270 **? STA 1899+38.39 TO STA 1905+17.58

**PROPOSED F.A.I. ROUTE 270**
- STA: 1899+38.39 TO STA 1905+17.58

**EXISTING LEGEND**
- (A) EXISTING PORTLAND CEMENT CONCRETE PAVEMENT
- (B) EXISTING STABILIZED SUBBASE
- (C) EXISTING SHOULDER
- (D) EXISTING CONCRETE BARRIER DOUBLE FACE 42' HEIGHT
- (E) EXISTING GUARDRAIL

**PROPOSED LEGEND**
- 1 CONTINUOUSLY REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT 12'
- 2 STABILIZED SUBBASE - (HMA) 4'
- 3 SUBBASE GRANULAR MATERIAL, TYPE A 12'
- 4 PORTLAND CEMENT CONCRETE SHOULDERS 12'
- 5 PIPE UNDER DRAINS, TYPE 1. 6'
- 6 CONCRETE BARRIER, DOUBLE FACE, 44' HEIGHT (WITH MONOLITHIC PCC BASE)
- 7 STEEL PLATE BEAM GUARDRAIL, TYPE A 6' POSTS
- 8 GUARDRAIL REFLECTORS, TYPE A
- 9 BARRIER WALL REFLECTORS, TYPE C

**NOTES**
- FINAL ROADWAY PLANS ARE DESIGNED FOR THE ULTIMATE 6-LANE CONFIGURATION IN ANTICIPATION OF PROJECT APPROVAL OF CURRENT 6-LANE STUDY FOR I-270 PRIOR TO PS&E.
PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

<table>
<thead>
<tr>
<th>Route: FAI 270 (I-270)</th>
<th>Comments:</th>
</tr>
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<tbody>
<tr>
<td>Section: 60B-1, 60-1WRS-4</td>
<td>Design Date:</td>
</tr>
<tr>
<td>County: Madison</td>
<td>Modify Date:</td>
</tr>
<tr>
<td>Location: from Mississippi River to CORC Bridge</td>
<td>Current: 51,500 2015</td>
</tr>
<tr>
<td>Facility Type: Interstate or Freeway</td>
<td>Future: 69,000 2045</td>
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</tbody>
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# of Lanes = 4

Road Class: I

Subgrade Support Rating (SSR): Poor

Construction Year: 2023

Design Period (DP) = 20 years

Struct. Design ADT = 62,000 (2033)

TRAFFIC FACTOR CALCULATION

<table>
<thead>
<tr>
<th>FLEXIBLE PAVEMENT</th>
<th>RIGID PAVEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cpv = 0.15</td>
<td>Cpv = 0.15</td>
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<tr>
<td>Csu = 132.5</td>
<td>Csu = 143.81</td>
</tr>
<tr>
<td>Cmu = 482.53</td>
<td>Cmu = 696.42</td>
</tr>
</tbody>
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TF flexible (Actual) = 43.34 (Actual ADT) 7.11

TF rigid (Actual) = 61.97 (Actual ADT)

TF rigid (Min) = 10.05 (Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

<table>
<thead>
<tr>
<th>Full-Depth HMA Pavement</th>
<th>JPC Pavement</th>
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</thead>
<tbody>
<tr>
<td>Use TF flexible = 43.34</td>
<td>Use TF rigid = 61.97</td>
</tr>
</tbody>
</table>

PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.O)

HMA Mixture Temp. = 79.5 deg. F (Fig. 54-5.C)

HMA Overlay Design Thickness = 14.50 in. (Fig. 54-5.U)

Limiting Strain Criterion Thickness = 11.50 in. (Fig. 54-5.V)

Use HMA Overlay Thickness = 11.50 inches

CRCP Thickness = 11.75 inches (Fig. 54-4.M)

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

<table>
<thead>
<tr>
<th>HMA Pavement Over Rubblized PCC</th>
<th>Unbonded Concrete Overlay</th>
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</thead>
<tbody>
<tr>
<td>Use TF flexible = 43.34</td>
<td>Review 54-4.03 for limitations and special considerations.</td>
</tr>
</tbody>
</table>

HMA Overlay Design Thickness = 14.50 in. (Fig. 54-5.U)

Limiting Strain Criterion Thickness = 11.50 in. (Fig. 54-5.V)

Use HMA Overlay Thickness = 11.50 inches

CRCP Thickness = 10.73 inches

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

<table>
<thead>
<tr>
<th>Class I Roads</th>
<th>Class II Roads</th>
<th>Class III Roads</th>
<th>Class IV Roads</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 lanes or more</td>
<td>2 lanes with ADT &gt; 2000</td>
<td>2 Lanes</td>
<td>2 Lanes</td>
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<tr>
<td>Part of a future 4 lanes or more</td>
<td>One-way Street with ADT &lt;= 3500</td>
<td>(ADT 750 -2000)</td>
<td>(ADT &lt; 750)</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Facility Type</th>
<th>PV</th>
<th>SU</th>
<th>MU</th>
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</thead>
<tbody>
<tr>
<td>Interstate or Freeway</td>
<td>0</td>
<td>500</td>
<td>1500</td>
</tr>
<tr>
<td>Other Marked State Route</td>
<td>0</td>
<td>250</td>
<td>750</td>
</tr>
<tr>
<td>Unmarked State Route</td>
<td>No Min</td>
<td>No Min</td>
<td>No Min</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Traffic Factor ESAL Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
</tr>
<tr>
<td>Csu</td>
</tr>
<tr>
<td>I</td>
</tr>
<tr>
<td>II</td>
</tr>
<tr>
<td>III</td>
</tr>
<tr>
<td>IV</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
</tr>
<tr>
<td>Number of Lanes</td>
</tr>
<tr>
<td>1 Lane Ramp</td>
</tr>
<tr>
<td>2 or 3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>6 or more</td>
</tr>
</tbody>
</table>

Class Table for One-Way Streets

<table>
<thead>
<tr>
<th>Class</th>
<th>ADT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 3500</td>
<td>II</td>
</tr>
<tr>
<td>&gt;3500</td>
<td>I</td>
</tr>
</tbody>
</table>

Class Table for 2 or 3 lanes

<table>
<thead>
<tr>
<th>Class</th>
<th>ADT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 749</td>
<td>IV</td>
</tr>
<tr>
<td>750 - 2000</td>
<td>III</td>
</tr>
<tr>
<td>&gt;2000</td>
<td>II</td>
</tr>
</tbody>
</table>