We have reviewed the pavement design for the above referenced project which was submitted on December 2, 2021. The project involves reconstruction and a portion of widening and resurfacing of US Route 52 to provide two thru-lanes in each direction with a striped median and left turn lanes at the intersection with Laraway Road.

We concur this is a special design due high-stress induced by the number of MU’s in the design lane and a life-cycle cost analysis is not required. We also concur with the district’s selection of a mechanistically designed full-depth HMA pavement.

In summary, the approved pavement designs are:

**US 52 – Reconstruction and Widening**
13.5” Full Depth HMA w/ HMA Shoulders
12” Agg Subgrade Improvement

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

From:  Jose A. Dominguez  
By:  Ojas Patel

Subject:  Pavement Analysis*

Date:  December 2, 2021

*Route:  US Route 52
Limits:  at Laraway Road
Section:  20-000138-43-CH
Current target:  08CY22

County:  Will
Contract No.:  Local Roads
Job No.:  N/A

We have completed the pavement analysis for the above captioned location. Review by the Central Office is required since the total pavement area for reconstruction and widening exceeds 4,750 Square Yards. The following is the scope of the project:

Local Roads project includes reconstruction and a portion of widening and resurfacing of US Route 52 to include two through lanes in each direction with striped median and left turn lanes at the intersection of US Route 52 and Laraway Road.

A 20-year pavement analysis was performed for the above roadway. This intersection is a “High Stress” location since the design lane MU ADT exceeds 200 vehicles. As such, this pavement design will be classified as a “Special Design” per BDE Figure 54-1.A. A mechanistic-flexible pavement design is recommended for consistency and ease of future maintenance as the surrounding roadway network is full depth HMA. Our recommendation is as follows:

US 52
Reconstruction7 (Sta. 288+22 to 310+30)
HMA Shoulder
13 ½" Full Depth HMA
   2" Polymerized HMA Surface Course, SMA 9.5, Mix “F”, N801
   2 ¼” Polymerized HMA Binder Course, IL-19.0, N902
   9 ¼” HMA Base Course, IL-19.0, N903
12” Aggregate Subgrade Improvement6
US 52
Widening (Sta. 310+30 to 321+18)
HMA Shoulder
13 ½” Full Depth HMA
   1 ¾” Polymerized HMA Surface Course, SMA 9.5, Mix “F”, N80
   ⅜” Polymerized HMA Binder Course, IL-4.75, N50
   11” HMA Base Course, IL-19.0, N90
12” Aggregate Subgrade Improvement

Pavement Resurfacing
Cold Milling of HMA Pavement
2 ½” minimum (more if necessary)
   1 ¾” Polymerized HMA Surface Course, SMA 9.5, Mix “F”, N80
   ⅜” Polymerized HMA Binder Course, IL-4.75, N50

1 Designer Note 1: Use pay item 40605026, POLYMERIZED HOT-MIX ASPHALT SURFACE COURSE, SMA, 9.5, Mix “F”, N80 paid for in tons.

2 Designer Note 2: Use pay item 40603240, POLYMERIZED HMA BINDER COURSE, IL-19.0, N90 paid for in tons.

3 Designer Note 3: Use pay item 35501321, HOT-MIX ASPHALT BASE COURSE, 9 ¼”, paid for in square yards.

4 Designer Note 4: Use pay item 40603200, POLYMERIZED HMA BINDER COURSE, IL-4.75, N50 paid for in tons.

5 Designer Note 5: For widening of six feet or less use pay item 35600720 HOT-MIX ASPHALT BASE COURSE WIDENING, 11” paid for in square yards. For widening of greater than six feet use pay item 35501328 HOT-MIX ASPHALT BASE COURSE, 11” paid for in square yards.

6 Designer Note 6: Use pay item 30300112, AGGREGATE SUBGRADE IMPROVEMENT, 12”, paid in square yards.

7 Designer Note 7: Refer to the District One, Bureau of Materials’ “Hot-Mix Asphalt – Mix Selection” tables to determine the corresponding HMA mix table requirements for the plans.

If you have any questions or need additional information, please contact Ojas Patel, Pavement Design Engineer, at (847)705-4550.

By: Jose A. Dominguez, P.E.
Project Support Engineer
Location Map

Proposed Improvement

US Route 52 (Manhattan Rd)
EXISTING TYPICAL SECTION

LARAWAY ROAD

STA. 23+16.92 TO STA. 36+50

STA. 36+50 TO STA. 54+00

LARAWAY ROAD

EXISTING TYPICAL SECTION

LARAWAY ROAD

STA. 54+00 TO STA. 62+50

LARAWAY ROAD

EXISTING TYPICAL SECTION

LARAWAY ROAD

STA. 62+50 TO STA. 72+00

EXISTING LEGEND

A

EXISTING HMA PAVEMENT (12" AND VARIES)

B

EXISTING HMA SHOULDER

C

EXISTING AGGREGATE SHOULDER

D

EXISTING AGGREGATE BASE

E

EXISTING COMBINATION CURB & GUTTER

F

EXISTING RUMBLE STRIP

G

EXISTING COMBINATION CURB AND GUTTER, TYPE B-5.24

PRELIMINARY
PROPOSED TYPICAL SECTION

US ROUTE 52

STA. 310+30 TO STA. 321+18.05

NOTES

1. NB LANE 2 TAPES FROM STA. 311+47.33 TO 6’ AT STA. 311+47.33
   FROM STA. 317+47.33 TO STA. 318+05 FULLY RECONSTRUCT THE
   OUTSIDE 2’ OF NB LANE 1.

PROPOSED LEGEND

1. TBD
2. TBD
3. TBD
4. TBD
5. TBD
6. TBD
7. TBD
8. TBD
9. TBD
10. TBD
11. TBD
12. TBD

12.0’
9’ TO 0’
VARIES
12.0’
9’ TO 0’
VARIES
12.0’
1.5%
1.5%
1.5%
1.5%
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PR_US52_CL - Plan 1 [Sheet]


FILE NAME: MODEL:

CHICAGO, IL 60606
225 WEST WASHINGTON STREET 12TH FLOOR
CONSULTING ENGINEERS & PLANNERS

PRELIMINARY
PROPOSED ROADWAY LEGEND

1. US ROUTE 52
   TBD
2. US ROUTE 52
   TBD
3. US ROUTE 52
   TBD
4. US ROUTE 52
   TBD
5. US ROUTE 52
   TBD
6. US ROUTE 52
   TBD
7. US ROUTE 52
   TBD
8. US ROUTE 52
   TBD
9. US ROUTE 52
   TBD
10. US ROUTE 52
    TBD
11. US ROUTE 52
    TBD
12. US ROUTE 52
    TBD
13. US ROUTE 52
    TBD

SCALE: 1"=20'
PROJECT AND TRAFFIC INPUTS

Route: US 52 Comments: US 52 at Laraway Rd
Section: 20-000138-43-CH BLRS project improving the intersection
County: Will Design Date: 11/12/2021 ONP <-- BY ADT Year
Location: at Laraway Road Modify Date: <-- BY Current: 13,600 2013
Facility Type Other Marked State Route Future: 29,000 2040
# of Lanes = 4

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv = 0.15
Csu = 132.5
Cmu = 482.53

TF flexible (Actual) = 16.37 (Actual ADT)
TF flexible (Min) = 3.56 (Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv = 0.15
Csu = 143.81
Cmu = 696.42

TF rigid (Actual) = 22.82 (Actual ADT)
TF rigid (Min) = 5.02 (Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible = 16.37
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.O)
HMA Mixture Temp. = 75.5 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (EMHA) = 680 ksi (Fig. 54-5.D)
Design HMA Strain (E(hma)) = 54 (Fig. 54-5.E)
Full Depth HMA Design Thickness = 13.50 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 15.00 in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness = 13.50 inches

CRCP Thickness = 10.00 inches (Fig. 54-4.M)

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Pavement Over Rubblized PCC

Use TF flexible = 16.37
HMA Overlay Design Thickness = 10.75 in. (Fig. 54-5.U)
Limiting Strain Criterion Thickness = in. (Fig. 54-5.V)
Use HMA Overlay Thickness = 999.00 inches

JPCP Thickness = NA inches

CONTACT RESEARCH FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

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<thead>
<tr>
<th>Class</th>
<th>Required ADT</th>
<th>Description</th>
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<tbody>
<tr>
<td>I</td>
<td>0 - 749</td>
<td>2 or 3 lanes (not future 4 lane &amp; not one-way street)</td>
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<tr>
<td>II</td>
<td>&gt;750</td>
<td>4 or more lanes (not future 4 lane &amp; not one-way street)</td>
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Traffic Factor ESAL Coefficients

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<thead>
<tr>
<th>Class</th>
<th>Csu</th>
<th>Cmu</th>
<th>Csu</th>
<th>Cmu</th>
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<tr>
<td>I</td>
<td>143.81</td>
<td>696.42</td>
<td>132.50</td>
<td>482.53</td>
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<tr>
<td>II</td>
<td>135.78</td>
<td>567.21</td>
<td>112.06</td>
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<td>III</td>
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<td>562.47</td>
<td>109.14</td>
<td>384.35</td>
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<tr>
<td>IV</td>
<td>129.58</td>
<td>562.47</td>
<td>109.14</td>
<td>384.35</td>
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Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)

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<th>P</th>
<th>S</th>
<th>M</th>
<th>P</th>
<th>S</th>
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<tr>
<td>1 Lane Ramp</td>
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<td>50%</td>
<td>50%</td>
<td>50%</td>
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<tr>
<td>4</td>
<td>32%</td>
<td>45%</td>
<td>45%</td>
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<td>45%</td>
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<tr>
<td>6 or more</td>
<td>20%</td>
<td>40%</td>
<td>40%</td>
<td>8%</td>
<td>37%</td>
<td>37%</td>
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Rural Urban

Min. Str. Design Traffic (Fig 54-2.C)
Facility Type PV SU MU
Interstate or Freeway 0 500 1500
Other Marked State Route 0 250 750
Unmarked State Route No Min No Min No Min

Class Table for One-Way Streets

Class Table for 2 or 3 lanes

ADT | Class |
<table>
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<td>0 - 3500</td>
<td>II</td>
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<td>&gt;3500</td>
<td>I</td>
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ADT | Class |
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<td>III</td>
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<tr>
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<td>II</td>
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ADT | Class |
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ADT | Class |
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ADT | P   | S   | M   |
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