



# Illinois Department of Transportation

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To: Kensil Garnett                      Attn: District Four  
From: John D. Baranzelli  
Subject: Pavement Design  
Date: April 27, 2015

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A handwritten signature in black ink, appearing to read 'J.D. Baranzelli', enclosed in a circular scribble.

FAS Route 1388 (IL 8)  
Section (Z-1VB)BR-2  
Peoria County  
Over the BNSF RR

We have reviewed the pavement selection for the above captioned section, which was submitted with by email dated March 12, 2015. The project will replace the structure over the railroad. The project is less than 2 lane-miles and is not subject to alternate bidding. The LCCA was within 10%, and required action by the Pavement Selection Committee. The flexible design was more economical by 7.2%. The Committee concurred with the district's request to use the flexible design. The approved pavement design is as follows:

US 150 (Pavement Reconstruction)

- 10.25 inches of HMA Pavement with HMA Shoulders
  - 2 inches of Polymerized HMA Surface Course, Mix "E", N50
  - 2.25 inches of Polymerized HMA Top Binder Course, IL-12.5, N50
  - 6 inches of HMA Lower Binder Course, IL-19.0, N50
- 12 inches of Aggregate Subgrade Improvement

If you have any questions, please contact Paul Niedernhofer at (217) 524-1651.

**Niedernhofer, Paul R**

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**From:** Maushard, Christopher E  
**Sent:** Thursday, March 12, 2015 9:42 AM  
**To:** Niedernhofer, Paul R  
**Cc:** Dotson, Richard J; Horst, Kevin J  
**Subject:** Pavement Design for IL Route 8 at Edwards in Peoria County

Paul –

Shown attached is a pavement design for new pavement on IL 8 at Edwards for the reconstruction of the IL structure over the BNSF Railroad.

The design is for a total of 6400 sy of new pavement. The recommendation is for Full-Depth HMA pavement, 10 ¼” total thickness based on LCCA. This project doesn’t meet the 2 lane mile minimum requirement for alternate bid.

Please review and pass to the Statewide Pavement Selection Committee for their review and recommendation. If you have any questions please let me know.

Thanks.



Christopher Maushard, P.E.  
-Project Engineer-  
Region 3 District 4  
Program Development  
309-671-3453  
[Christopher.Maushard@illinois.gov](mailto:Christopher.Maushard@illinois.gov)

 Please consider the environment before printing this e-mail.

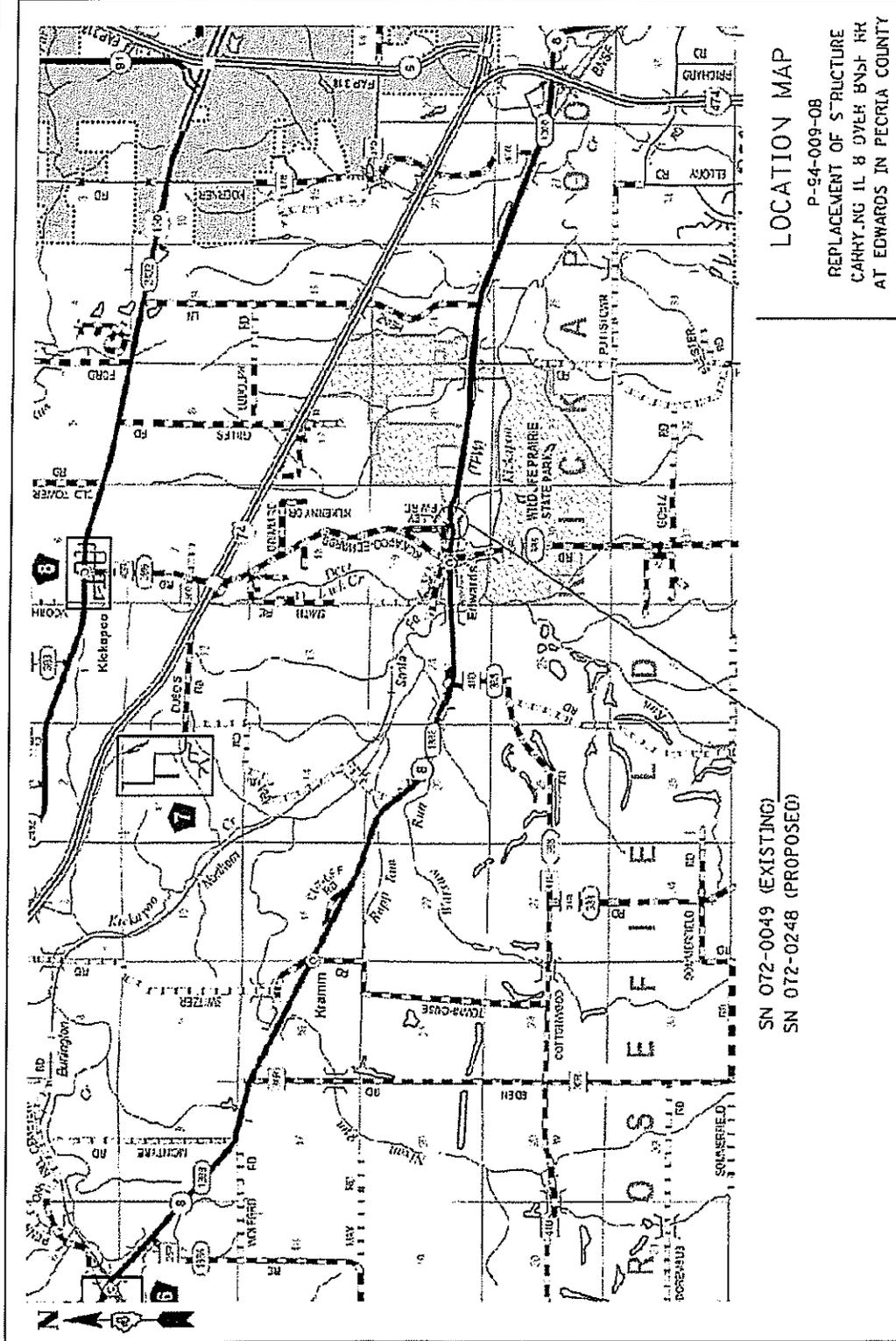
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## Results and Recommendations

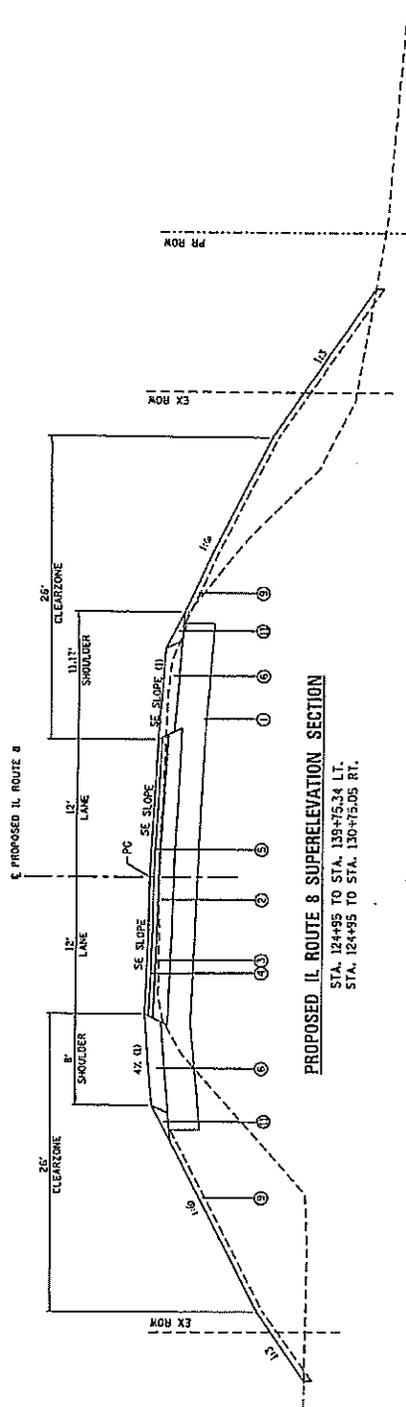
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The proposed improvement consists of the replacement of structure carrying IL8 over BNSF RR with road reconstruction prior and after the structure. The project is 2,400 feet approximately 6,400 square yards of new pavement from station 58+00 to 82+00. Results from the life cycle cost analysis indicate that the annual cost per mile for 9" Jointed PCC Pavement is \$87,346 and \$81,674 for 10.25" Full Depth HMA Pavement. The difference between the two comes out to 6.9%. Considering both the annual cost per mile and the estimated initial construction costs, the District recommends using 10.25" Full Depth HMA Pavement: POLYMERIZED HOT-MIX ASPHALT SURFACE COURSE MIX "E" N50 2", POLYMERIZED HOT-MIX ASPHALT BINDER COURSE IL-12.5 N50 2.25", HOT-MIX ASPHALT BINDER COURSE IL-19.0 N50 6" and AGGREGATE SUBGRADE IMPROVEMENT 12".

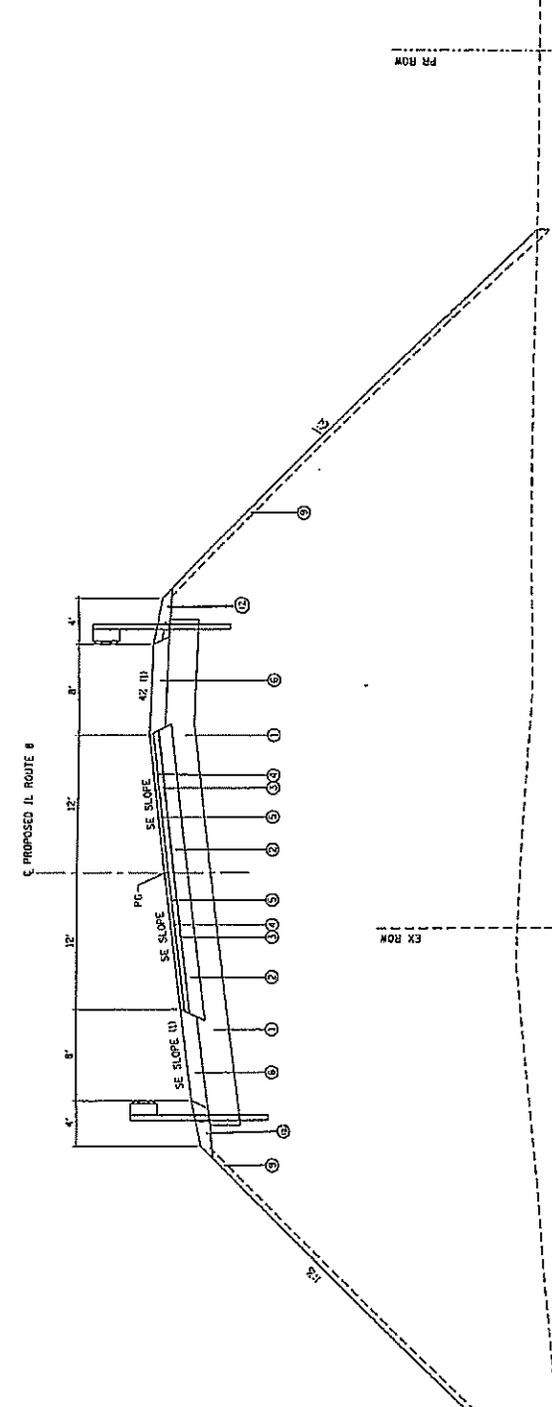
*- Does not meet the 2 lane wide minimum for alternate bid cm*



LOCATION MAP  
 P-94-009-08  
 REPLACEMENT OF STRUCTURE  
 CARRYING IL 8 OVER BNSF RR  
 AT EDWARDS IN PEORIA COUNTY



**PROPOSED IL ROUTE 8 SUPERELEVATION SECTION**  
 STA. 124+95 TO STA. 130+75.34 LT.  
 STA. 130+75.05 TO STA. 134+95 RT.



**PROPOSED IL ROUTE 8 SUPERELEVATION SECTION**  
 STA. 134+95 TO STA. 140+98.24 LT.  
 STA. 140+98.24 TO STA. 130+75.05 RT.

- (1) IF SUPER ELEVATION SLOPE EXCEEDS 4% THEN THE SHOULDER SLOPE SHALL BE ADJUSTED AS FOLLOWS.
- HIGH SIDE: VARY THE SHOULDER SLOPE TO MAINTAIN A 5% SLOPE BREAKOVER.
- LOW SIDE: SHOULDER SLOPE SHALL MATCH SUPERELEVATION SLOPE.
- (2) SEE PLAN AND PROFILE SHEETS FOR DITCH PROFILE.

- LEGEND**
- ① PR AGG SUBGRADE IMPR 12"
  - ② PR LOWER LIFT HMA BC IL-19.0 ASD 6"
  - ③ PR TOP LIFT F HMA BC IL19.5 ASD 2.25"
  - ④ PR BITUMINOUS PRIME COAT
  - ⑤ PR P HMA 5C "E" MED 2"
  - ⑥ PR HMA SHOULDERS
  - ⑦ PR AGG SHOULDERS TYPE B
  - ⑧ PR COMBINATION CURB & GUTTER, TYPE B-6.24
  - ⑨ TOPSOIL FURNISHED AND PLACED, 4"
  - ⑩ PR INCIDENTAL HMA SURFACING
  - ⑪ PR AGG WEDGE SHOULDER, TYPE B
  - ⑫ GUARDRAIL AGGREGATE EROSION CONTROL

|                              |          |      |             |       |                  |         |                    |              |
|------------------------------|----------|------|-------------|-------|------------------|---------|--------------------|--------------|
| FILE NAME                    | DESIGNED | DATE | SCALE 1"=3' | SHEET | TYPICAL SECTIONS | SECTION | COUNTY             | TOTAL SHEETS |
| STATE OF ILLINOIS            | REVISION |      |             | OF    | ILLINOIS ROUTE 8 | 1383    | COVINGTON          | 28           |
| DEPARTMENT OF TRANSPORTATION | REVISED  |      |             |       |                  | 1383    | CONTRACT NO. 03173 |              |
|                              | CREATED  |      |             |       |                  |         | RELEASED AS PER    |              |
|                              | REVISED  |      |             |       |                  |         |                    |              |

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: **FAS 1388 (IL 8)**      Comments: \_\_\_\_\_  
 Section: **(Z-1VB)BR-2**  
 County: **Peoria**      Design Date: **12/23/2014**      AAD      <-- BY  
 Location: **IL 8 OVER BNSF RR AT EDWARDS**      Modify Date: \_\_\_\_\_      <-- BY

|          |       |      |
|----------|-------|------|
| Current: | ADT   | Year |
| Future:  | ADT   | Year |
|          | 2,400 | 2013 |
|          | 3,078 | 2038 |

Facility Type: **Other Marked State Route**

# of Lanes = **2 or 3**  
 Part of future 4 lanes or more? **No**  
 One Way Street? **No**  
 Road Class: **II**

Subgrade Support Rating (SSR): **Poor**  
 Construction Year: **2018**  
 Design Period (DP) = **20** years

| Structural Design Traffic |             |            |                       |
|---------------------------|-------------|------------|-----------------------|
|                           | Minimum ADT | Actual ADT | Actual % of Total ADT |
| PV =                      | 0           | 2,672      | 95.2%                 |
| SU =                      | 250         | 118        | 4.2%                  |
| MU =                      | 750         | 17         | 0.6%                  |
| Struct. Design ADT =      | 2,807       |            | (2028)                |

| % of ADT in Design Lane |     |
|-------------------------|-----|
| P =                     | 50% |
| S =                     | 50% |
| M =                     | 50% |

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv = 0.15  
 Csu = **112.06**  
 Cmu = **385.44**  
 TF flexible (Actual) = 0.20 (Actual ADT)  
 TF flexible (Min) = 3.17 (Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv = 0.15  
 Csu = **135.78**  
 Cmu = **567.21**  
 TF rigid (Actual) = 0.26 (Actual ADT)  
 TF rigid (Min) = 4.59 (Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

| Full-Depth HMA Pavement  | JPC Pavement                                      |
|--|---|
| Use TF flexible = 3.17   | Use TF rigid = 4.59                               |
| PG Grade Lower Binder Lifts = <b>PG 64-22</b> (Fig. 53-4.R)            | Edge Support = <b>Tied</b> Shoulder or C.&G.      |
| HMA Mixture Temp. = <b>76.5</b> deg. F (Fig. 54-5.C)                   | <b>Rigid Pavt Thick. = 9.00 in. (Fig. 54-4.E)</b> |
| Design HMA Mixture Modulus (E <sub>HMA</sub> ) = 650 ksi (Fig. 54-5.D) |   |
| Design HMA Strain (ε <sub>HMA</sub> ) = 86 (Fig. 54-5.E)               |   |
| Full Depth HMA Design Thickness = 10.25 in. (Fig. 54-5.F)              |   |
| Limiting Strain Criterion Thickness = <b>15.25</b> in. (Fig. 54-5.I)   |   |
| <b>Use Full-Depth HMA Thickness = 10.25 inches</b>                     |   |
|  | <b>CRCP Pavement</b>                              |
|  | Use TF rigid = 4.59                               |
|  | IBR value = <b>3</b>                              |
|  | <b>CRCP Thickness = 7.75 in. (Fig. 54-4.N)</b>    |

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

| HMA Overlay of Rubblized PCC   | Unbonded Concrete Overlay                                  |
|--|--|
| Use TF flexible = 3.17   | Review 54-4.03 for limitations and special considerations. |
| HMA Overlay Design Thickness = 7.50 in. (Fig. 54-5.U)                |  |
| Limiting Strain Criterion Thickness = <b>11.00</b> in. (Fig. 54-5.V) |  |
| <b>Use HMA Overlay Thickness = 7.50 inches</b>                       | <b>JPCP Thickness = NA inches</b>                          |

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

| Class I Roads  | Class II Roads   | Class III Roads            | Class IV Roads         |
|--|--|----------------------------|------------------------|
| 4 lanes or more<br>Part of a future 4 lanes or more<br>One-way Streets with ADT > 3500 | 2 lanes with ADT > 2000<br>One way Street with ADT <= 3500 | 2 Lanes<br>(ADT 750 -2000) | 2 Lanes<br>(ADT < 750) |

| Facility Type            | Min. Str. Design Traffic (Fig 54-2.C) |        |        |
|--------------------------|---------------------------------------|--------|--------|
|                          | 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 |       |
|---------------------------------|-------|
| ADT                             | Class |
| 0 - 3500                        | II    |
| >3501                           | I     |

| Class | Traffic Factor ESAL Coefficients |        |                        |        |
|-------|----------------------------------|--------|------------------------|--------|
|       | Rigid (Fig. 54-4.C)              |        | Flexible (Fig. 54-5.B) |        |
|       | Csu                              | Cmu    | Csu                    | Cmu    |
| I     | 143.81                           | 696.42 | 132.50                 | 482.53 |
| II    | 135.78                           | 567.21 | 112.06                 | 385.44 |
| III   | 129.58                           | 562.47 | 109.14                 | 384.35 |
| IV    | 129.58                           | 562.47 | 109.14                 | 384.35 |

| Class Table for 2 or 3 lanes (not future 4 lane & not one-way street) |       |
|---|-------|
| ADT   | Class |
| 0 - 749   | IV    |
| 750 - 2000  | III   |
| >2000   | II    |

| Number of Lanes | Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B) |      |      |       |      |      |
|-----------------|--|------|------|-------|------|------|
|                 | Rural  |      |      | Urban |      |      |
|                 | P  | S    | M    | P     | S    | M    |
| 1 Lane Ramp     | 100%   | 100% | 100% | 100%  | 100% | 100% |
| 2 or 3          | 50%  | 50%  | 50%  | 50%   | 50%  | 50%  |
| 4               | 32%  | 45%  | 45%  | 32%   | 45%  | 45%  |
| 6 or more       | 20%  | 40%  | 40%  | 8%    | 37%  | 37%  |

# LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

## FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE SECTION COUNTY LOCATION  
 FAS 1388 (IL 8)  
 (Z-1VB)BR-2  
 Peoria  
 IL 8 OVER BNSF RR AT EDWARDS

FACILITY TYPE NON-INTERSTATE

PROJECT LENGTH 2400 FT ==> 0.45 Miles  
 # OF CENTERLINES 1 CL  
 # OF LANES 2 LANES  
 # OF EDGES 2 EP  
 LANE WIDTH - AVERAGE 12 FT  
 SHOULDER WIDTH HMA Left 8 FT  
 HMA Right 8 FT  
 Total Width of Paved Shoulders 16 FT

PAVEMENT THICKNESS (FLEXIBLE) 10.25 IN 15.25 IN MAX  
 SHOULDER THICKNESS 8.00 IN Standard Design  
 POLICY OVERLAY THICKNESS 2.25 IN

| FLEX PAVEMENT | TRAFFIC FACTORS | MINIMUM | ACTUAL | USE  |
|---------------|-----------------|---------|--------|------|
|               |                 | 3.17    | 0.20   | 3.17 |

Read Me!

| HMA COST PER TON      | UNIT PRICE    |
|-----------------------|---------------|
| HMA SURFACE           | \$99.87 / TON |
| HMA TOP BINDER        | \$99.64 / TON |
| HMA LOWER BINDER      | \$85.72 / TON |
| HMA BINDER (LEVELING) | \$85.00 / TON |
| HMA SHOULDER          | \$74.23 / TON |

### INITIAL COSTS

| ITEM                            | THICKNESS     | 100% QUANTITY | UNIT   | UNIT PRICE       | COST        |
|---------------------------------|---------------|---------------|--------|------------------|-------------|
| HMA PAVEMENT (FULL-DEPTH)       | (10.25")      | 6,400         | SQ YD  | \$54.34 / SQ YD  | \$0         |
| HMA SURFACE COURSE              | (2.00")       | 722           | TONS   | \$99.87 / TON    | \$72,084 ~  |
| HMA TOP BINDER COURSE           | (2.25")       | 824           | TONS   | \$99.64 / TON    | \$82,093 ~  |
| HMA LOWER BINDER COURSE         | (6.00")       | 2,259         | TONS   | \$85.72 / TON    | \$193,613 ~ |
| HMA SHOULDER                    | (8.00")       | 1,911         | TONS   | \$74.23 / TON    | \$141,888 ~ |
| CURB & GUTTER                   |               | 0             | LIN FT | \$30.00 / LIN FT | \$0         |
| SUBBASE GRAN MATL TY C (TONS)   |               | 177           | TONS   | \$21.14 / TON    | \$3,742     |
| IMPROVED SUBGRADE:              | Modified Soil | 11,389        | SQ YD  | \$16.44 / SQ YD  | \$187,235   |
| Reserved For User Supplied Item |               | 0             | UNITS  | \$0.00 / UNITS   | \$0         |
| Reserved For User Supplied Item |               | 0             | UNITS  | \$0.00 / UNITS   | \$0         |
| PAVEMENT REMOVAL                |               | 6,400         | SQ YD  | \$0.00 / SQ YD   | \$0         |
| SHOULDER REMOVAL                |               | 4,267         | SQ YD  | \$0.00 / SQ YD   | \$0         |

Note: \* Denotes User Supplied Quantity  
 FLEXIBLE CONSTRUCTION INITIAL COST \$680,655  
 FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE \$61,073

### MAINTENANCE COSTS:

| ITEM   | THICKNESS | MATERIAL            | UNIT COST               |
|--|-----------|---------------------|-------------------------|
| ROUTINE MAINTENANCE ACTIVITY   |           |                     | \$0.00 LANE-MILE / YEAR |
| HMA OVERLAY PVMT SURF  | (2.00")   | Surface Mix         | \$11.26 / SQ YD         |
| HMA OVERLAY PVMT   | (2.25")   | Surface Mix         | \$12.05 / SQ YD         |
| HMA SURFACE MIX  | (1.50")   | Surface Mix         | \$8.43 / SQ YD          |
| HMA BINDER MIX   | (0.75")   | Leveling Binder Mix | \$3.62 / SQ YD          |
| HMA OVERLAY SHLD (Year 30)   | (2.25")   | Shoulder Mix        | \$9.35 / SQ YD          |
| HMA OVERLAY SHLD   | (2.00")   | Shoulder Mix        | \$8.31 / SQ YD          |
| MILLING (2.00 IN)  |           |                     | \$3.00 / SQ YD          |
| PARTIAL DEPTH PVMT PATCH (Mill & Fill Surf)                                |           | Surface Mix         | \$81.19 / SQ YD         |
| PARTIAL DEPTH SHLD PATCH (Mill & Fill Surf)                                |           | Shoulder Mix        | \$78.31 / SQ YD         |
| PARTIAL DEPTH PVMT PATCH (Mill & Fill +2.00")                              |           | Leveling Binder Mix | \$79.52 / SQ YD         |
| PARTIAL DEPTH SHLD PATCH (Mill & Fill +2.00")                              |           | Shoulder Mix        | \$78.31 / SQ YD         |
| LONGITUDINAL SHOULDER JOINT ROUT & SEAL                                    |           |                     | \$2.00 / LIN FT         |
| CENTERLINE JOINT ROUT & SEAL   |           |                     | \$2.00 / LIN FT         |
| RANDOM / THERMAL CRACK ROUT & SEAL (100% Rehab = 110.00' / Station / Lane) |           |                     | \$2.00 / LIN FT         |

FLEXIBLE TOTAL LIFE-CYCLE COST \$910,249  
 FLEXIBLE TOTAL ANNUAL COST PER MILE \$81,674

FULL-DEPTH HMA PAVEMENT  
HMA OVERLAY OF RUBBLIZED PCC PAVEMENT  
Figure 54-7.C  
STANDARD DESIGN

| MAINTENANCE COSTS:            | ITEM                          | %                            | QUANTITY                         | UNIT            | UNIT COST     | COST                        | PRESENT WORTH |
|-------------------------------|-------------------------------|------------------------------|----------------------------------|-----------------|---------------|-----------------------------|---------------|
| <b>YEAR 5</b>                 |                               |                              |                                  |                 |               |                             |               |
|                               | LONG SHLD JT R&S              | 100.00%                      | 4,800                            | LIN FT          | \$2.00        | \$9,600                     |               |
|                               | CNTR LINE JOINT R&S           | 100.00%                      | 2,400                            | LIN FT          | \$2.00        | \$4,800                     |               |
|                               | RNDM / THRM CRACK R&S         | 50.00%                       | 2,640                            | LIN FT          | \$2.00        | \$5,280                     |               |
|                               | PD PVMT PATCH M&F SURF        | 0.10%                        | 6                                | SQ YD           | \$81.19       | \$487                       |               |
|                               |                               | PWF <sub>n</sub> = 0.8626    |                                  |                 | PW = 0.8626 X | \$20,167                    | \$17,396      |
| <b>YEAR 10</b>                |                               |                              |                                  |                 |               |                             |               |
|                               | LONG SHLD JT R&S              | 100.00%                      | 4,800                            | LIN FT          | \$2.00        | \$9,600                     |               |
|                               | CNTR LINE JOINT R&S           | 100.00%                      | 2,400                            | LIN FT          | \$2.00        | \$4,800                     |               |
|                               | RNDM / THRM CRACK R&S         | 50.00%                       | 2,640                            | LIN FT          | \$2.00        | \$5,280                     |               |
|                               | PD PVMT PATCH M&F SURF        | 0.50%                        | 32                               | SQ YD           | \$81.19       | \$2,598                     |               |
|                               |                               | PWF <sub>n</sub> = 0.7441    |                                  |                 | PW = 0.7441 X | \$22,278                    | \$16,577      |
| <b>YEAR 15</b>                |                               |                              |                                  |                 |               |                             |               |
|                               | MILL PVMT & SHLD 2.00"        | 100.00%                      | 10,667                           | SQ YD           | \$3.00        | \$32,001                    |               |
|                               | PD PVMT PATCH M&F ADD'L 2.00" | 1.00%                        | 64                               | SQ YD           | \$79.52       | \$5,089                     |               |
|                               | HMA OVERLAY PVMT 2.00"        | 100.00%                      | 6,400                            | SQ YD           | \$11.26       | \$72,084                    |               |
|                               | HMA OVERLAY SHLD 2.00 "       | 100.00%                      | 4,267                            | SQ YD           | \$8.31        | \$35,472                    |               |
|                               |                               | PWF <sub>n</sub> = 0.6419    |                                  |                 | PW = 0.6419 X | \$144,646                   | \$92,843      |
| <b>YEAR 20</b>                |                               |                              |                                  |                 |               |                             |               |
|                               | LONG SHLD JT R&S              | 100.00%                      | 4,800                            | LIN FT          | \$2.00        | \$9,600                     |               |
|                               | CNTR LINE JOINT R&S           | 100.00%                      | 2,400                            | LIN FT          | \$2.00        | \$4,800                     |               |
|                               | RNDM / THRM CRACK R&S         | 50.00%                       | 2,640                            | LIN FT          | \$2.00        | \$5,280                     |               |
|                               | PD PVMT PATCH M&F SURF        | 0.10%                        | 6                                | SQ YD           | \$81.19       | \$487                       |               |
|                               |                               | PWF <sub>n</sub> = 0.5537    |                                  |                 | PW = 0.5537 X | \$20,167                    | \$11,166      |
| <b>YEAR 25</b>                |                               |                              |                                  |                 |               |                             |               |
|                               | LONG SHLD JT R&S              | 100.00%                      | 4,800                            | LIN FT          | \$2.00        | \$9,600                     |               |
|                               | CNTR LINE JOINT R&S           | 100.00%                      | 2,400                            | LIN FT          | \$2.00        | \$4,800                     |               |
|                               | RNDM / THRM CRACK R&S         | 50.00%                       | 2,640                            | LIN FT          | \$2.00        | \$5,280                     |               |
|                               | PD PVMT PATCH M&F SURF        | 0.50%                        | 32                               | SQ YD           | \$81.19       | \$2,598                     |               |
|                               |                               | PWF <sub>n</sub> = 0.4776    |                                  |                 | PW = 0.4776 X | \$22,278                    | \$10,640      |
| <b>HMA SD</b>                 |                               |                              |                                  |                 |               |                             |               |
| <b>YEAR 30 NON-INTERSTATE</b> |                               |                              |                                  |                 |               |                             |               |
|                               | MILL PVMT & SHLD 2.00"        | 100.00%                      | 10,667                           | SQ YD           | \$3.00        | \$32,001                    |               |
|                               | PD PVMT PATCH M&F ADD'L 2.00" | 2.00%                        | 128                              | SQ YD           | \$79.52       | \$10,179                    |               |
|                               | PD SHLD PATCH M&F ADD'L 2.00" | 1.00%                        | 43                               | SQ YD           | \$78.31       | \$3,367                     |               |
|                               | HMA OVERLAY PVMT 2.25 "       | 100.00%                      | 6,400                            | SQ YD           | \$12.05       | \$77,115                    |               |
|                               | HMA OVERLAY SHLD 2.25 "       | 100.00%                      | 4,267                            | SQ YD           | \$9.35        | \$39,906                    |               |
|                               |                               | PWF <sub>n</sub> = 0.4120    |                                  |                 | PW = 0.4120 X | \$162,568                   | \$66,976      |
| <b>YEAR 35</b>                |                               |                              |                                  |                 |               |                             |               |
|                               | LONG SHLD JT R&S              | 100.00%                      | 4,800                            | LIN FT          | \$2.00        | \$9,600                     |               |
|                               | CNTR LINE JOINT R&S           | 100.00%                      | 2,400                            | LIN FT          | \$2.00        | \$4,800                     |               |
|                               | RNDM / THRM CRACK R&S         | 50.00%                       | 2,640                            | LIN FT          | \$2.00        | \$5,280                     |               |
|                               | PD PVMT PATCH M&F SURF        | 0.10%                        | 6                                | SQ YD           | \$81.19       | \$487                       |               |
|                               |                               | PWF <sub>n</sub> = 0.3554    |                                  |                 | PW = 0.3554 X | \$20,167                    | \$7,167       |
| <b>YEAR 40</b>                |                               |                              |                                  |                 |               |                             |               |
|                               | LONG SHLD JT R&S              | 100.00%                      | 4,800                            | LIN FT          | \$2.00        | \$9,600                     |               |
|                               | CNTR LINE JOINT R&S           | 100.00%                      | 2,400                            | LIN FT          | \$2.00        | \$4,800                     |               |
|                               | RNDM / THRM CRACK R&S         | 50.00%                       | 2,640                            | LIN FT          | \$2.00        | \$5,280                     |               |
|                               | PD PVMT PATCH M&F SURF        | 0.50%                        | 32                               | SQ YD           | \$81.19       | \$2,598                     |               |
|                               |                               | PWF <sub>n</sub> = 0.3066    |                                  |                 | PW = 0.3066 X | \$22,278                    | \$6,829       |
|                               |                               |                              |                                  |                 |               |                             | \$229,594     |
| ROUTINE MAINTENANCE ACTIVITY  |                               |                              |                                  | 0.91 Lane Miles | 0.00          | \$0                         | \$0           |
|                               |                               |                              |                                  |                 |               | MAINTENANCE LIFE-CYCLE COST | \$229,594     |
| 45                            | YEAR LIFE CYCLE               | CRF <sub>n</sub> = 0.0407852 | MAINTENANCE ANNUAL COST PER MILE |                 |               |                             | \$20,601      |

**PCC PAVEMENT**

**JPCP**

ROUTE **FAS 1388 (IL 8)**  
 SECTION **(Z-1VB)BR-2**  
 COUNTY **Peoria**  
 LOCATION **IL 8 OVER BNSF RR AT EDWARDS**

FACILITY TYPE **NON-INTERSTATE**

PROJECT LENGTH **2400 FT ==> 0.45 Miles**  
 # OF CENTERLINES **1 CL**  
 # OF LANES **2 LANES**  
 # OF EDGES **2 EP**  
 LANE WIDTH - AVERAGE **12 FT**  
 SHOULDER WIDTH **PCC Left 8 FT**  
                           **PCC Right 8 FT**  
                           **Total Width of Paved Shoulders 16 FT**

PAVEMENT THICKNESS (RIGID) **JPCP 9.00 IN TIED SHLD**  
 SHOULDER THICKNESS **9.00 IN**

POLICY OVERLAY THICKNESS **2.50 IN**

| RIGID PAVEMENT                 | TRAFFIC FACTORS  | MINIMUM              | ACTUAL      | USE         |
|--------------------------------|------------------|----------------------|-------------|-------------|
|                                |                  | <b>4.59</b>          | <b>0.26</b> | <b>4.59</b> |
| Worksheet Construction Type is | New Construction | The Pavement Type is |             | JPCP        |

**INITIAL COSTS**

| ITEM                            | THICKNESS                     | 100% QUANTITY UNIT | UNIT PRICE      | COST      |
|---------------------------------|-------------------------------|--------------------|-----------------|-----------|
| JPC PAVEMENT                    | ( 9.00" )                     | 6,400 SQ YD        | \$56.39 /SQ YD  | \$360,896 |
| PAVEMENT REINFORCEMENT          |                               | 0 SQ YD            | \$22.00 /SQ YD  | \$0       |
| STABILIZED SUBBASE              | ( 4.00" )                     | 7,200 SQ YD        | \$18.52 /SQ YD  | \$133,344 |
| PCC SHOULDERS                   | ( 9.00" to 9.00" )            | 4,267 SQ YD        | \$39.73 /SQ YD  | \$169,528 |
| CURB & GUTTER                   |                               | 0 LIN FT           | \$30.00 /LIN FT | \$0       |
| SUBBASE GRAN MATL TY C          | ( ~ 1.80" )                   | 521 TONS           | \$16.77 /TON    | \$8,737   |
| IMPROVED SUBGRADE:              | Modified Soil (1.50" - 4.50") | 10,933 SQ YD       | \$15.86 /SQ YD  | \$173,397 |
| Reserved For User Supplied Item |                               | 0 UNITS            | \$0.00 /UNITS   | \$0       |
| Reserved For User Supplied Item |                               | 0 UNITS            | \$0.00 /UNITS   | \$0       |
| PAVEMENT REMOVAL                |                               | 6,400 SQ YD        | \$0.00 /SQ YD   | \$0       |
| SHOULDER REMOVAL                |                               | 4,267 SQ YD        | \$0.00 /SQ YD   | \$0       |

Note: \* Denotes User Supplied Quantity  
 RIGID CONSTRUCTION INITIAL COST **\$845,902**  
 RIGID CONSTRUCTION ANNUAL COST PER MILE **\$75,901**

**MAINTENANCE COSTS:**

| ITEM   | THICKNESS                               | MATERIAL         | UNIT COST                       |
|--|---|------------------|---------------------------------|
| ROUTINE MAINTENANCE ACTIVITY                     |   |                  | <b>\$0.00 /LANE-MILE / YEAR</b> |
| HMA POLICY OVERLAY                               | ( 2.50" )                               |                  | <b>\$13.26 /SQ YD</b>           |
| HMA POLICY OVERLAY PVMT                          | ( 2.50" )                               |                  | <b>\$8.43 /SQ YD</b>            |
| HMA SURFACE MIX                                  | ( 1.50" )                               | Surface Mix      | <b>\$4.83 /SQ YD</b>            |
| HMA BINDER MIX                                   | ( 1.00" )                               | aling Binder Mix | <b>\$4.83 /SQ YD</b>            |
| HMA POLICY OVERLAY SHLD                          | ( 2.50" )                               | Shoulder Mix     | <b>\$10.39 /SQ YD</b>           |
| CLASS A PAVEMENT PATCHING                        |   |                  | <b>\$195.00 /SQ YD</b>          |
| CLASS B PAVEMENT PATCHING                        |   |                  | <b>\$150.00 /SQ YD</b>          |
| CLASS C SHOULDER PATCHING                        |   |                  | <b>\$145.00 /SQ YD</b>          |
| PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)  |   | Surface Mix      | <b>\$78.39 /SQ YD</b>           |
| PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50") |   | Surface Mix      | <b>\$83.98 /SQ YD</b>           |
| LONGITUDINAL SHOULDER JOINT ROUT & SEAL          |   |                  | <b>\$2.00 /LIN FT</b>           |
| CENTERLINE JOINT ROUT & SEAL                     |   |                  | <b>\$2.00 /LIN FT</b>           |
| REFLECTIVE TRANSVERSE CRACK ROUT & SEAL          |   |                  | <b>\$2.00 /LIN FT</b>           |
| RANDOM CRACK ROUT & SEAL                         | (100% Rehab = 100.00' / Station / Lane) |                  | <b>\$2.00 /LIN FT</b>           |

RIGID TOTAL LIFE-CYCLE COST **\$975,405**  
 RIGID TOTAL ANNUAL COST PER MILE **\$87,521**

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE

04/21/15

JOINTED PLAIN CONCRETE PAVEMENT  
UNBONDED JOINTED PLAIN CONCRETE OVERLAY  
Figure 54-7.A

| MAINTENANCE COSTS: | ITEM                            | %                | QUANTITY | UNIT       | UNIT COST     | COST      | PRESENT WORTH                             |
|--------------------|---------------------------------|------------------|----------|------------|---------------|-----------|---|
| <b>YEAR 10</b>     |                                 |                  |          |            |               |           |   |
|                    | PAVEMENT PATCH CLASS B          | 0.10%            | 6        | SQ YD      | \$150.00      | \$900     |   |
|                    |                                 | PWFn = 0.7441    |          |            | PW = 0.7441 X | \$900     | \$670                                     |
| <b>YEAR 15</b>     |                                 |                  |          |            |               |           |   |
|                    | PAVEMENT PATCH CLASS B          | 0.20%            | 13       | SQ YD      | \$150.00      | \$1,950   |   |
|                    |                                 | PWFn = 0.6419    |          |            | PW = 0.6419 X | \$1,950   | \$1,252                                   |
| <b>YEAR 20</b>     |                                 |                  |          |            |               |           |   |
|                    | PAVEMENT PATCH CLASS B          | 2.00%            | 128      | SQ YD      | \$150.00      | \$19,200  |   |
|                    | SHOULDER PATCH CLASS C          | 0.50%            | 21       | SQ YD      | \$145.00      | \$3,045   |   |
|                    | LONGITUDINAL SHLD JT R&S        | 100.00%          | 4,800    | LIN FT     | \$2.00        | \$9,600   |   |
|                    | CENTERLINE JT R&S               | 100.00%          | 2,400    | LIN FT     | \$2.00        | \$4,800   |   |
|                    |                                 | PWFn = 0.5537    |          |            | PW = 0.5537 X | \$36,645  | \$20,289                                  |
| <b>YEAR 25</b>     |                                 |                  |          |            |               |           |   |
|                    | PAVEMENT PATCH CLASS B          | 3.00%            | 192      | SQ YD      | \$150.00      | \$28,800  |   |
|                    | SHOULDER PATCH CLASS C          | 1.00%            | 43       | SQ YD      | \$145.00      | \$6,235   |   |
|                    |                                 | PWFn = 0.4776    |          |            | PW = 0.4776 X | \$35,035  | \$16,733                                  |
| <b>YEAR 30</b>     |                                 |                  |          |            |               |           |   |
|                    | NON-INTERSTATE                  |                  |          |            |               |           |   |
|                    | PAVEMENT PATCH CLASS B          | 4.00%            | 256      | SQ YD      | \$150.00      | \$38,400  |   |
|                    | SHOULDER PATCH CLASS C          | 1.50%            | 64       | SQ YD      | \$145.00      | \$9,280   |   |
|                    | HMA POLICY OVERLAY 2.5" (PVMT)  | 100.00%          | 6,400    | SQ YD      | \$13.26       | \$84,857  |   |
|                    | HMA POLICY OVERLAY 2.5" (SHLD)  | 100.00%          | 4,267    | SQ YD      | \$10.39       | \$44,340  |   |
|                    |                                 | PWFn = 0.4120    |          |            | PW = 0.4120 X | \$176,877 | \$72,871                                  |
| <b>YEAR 35</b>     |                                 |                  |          |            |               |           |   |
|                    | NON-INTERSTATE                  |                  |          |            |               |           |   |
|                    | LONGITUDINAL SHLD JT R&S        | 100.00%          | 4,800    | LIN FT     | \$2.00        | \$9,600   |   |
|                    | CENTERLINE JT R&S               | 100.00%          | 2,400    | LIN FT     | \$2.00        | \$4,800   |   |
|                    | RANDOM CRACK R&S                | 50.00%           | 2,400    | LIN FT     | \$2.00        | \$4,800   |   |
|                    | REFLECTIVE TRANSVERSE CRACK R&S | 40.00%           | 1,536    | LIN FT     | \$2.00        | \$3,072   |   |
|                    | PD PVMT PATCH M&F HMA 2.50"     | 0.10%            | 6        | SQ YD      | \$83.98       | \$504     |   |
|                    |                                 | PWFn = 0.3554    |          |            | PW = 0.3554 X | \$22,776  | \$8,094                                   |
| <b>YEAR 40</b>     |                                 |                  |          |            |               |           |   |
|                    | NON-INTERSTATE                  |                  |          |            |               |           |   |
|                    | PAVEMENT PATCH CLASS B          | 0.50%            | 32       | SQ YD      | \$150.00      | \$4,800   |   |
|                    | LONGITUDINAL SHLD JT R&S        | 100.00%          | 4,800    | LIN FT     | \$2.00        | \$9,600   |   |
|                    | CENTERLINE JT R&S               | 100.00%          | 2,400    | LIN FT     | \$2.00        | \$4,800   |   |
|                    | REFLECTIVE TRANSVERSE CRACK R&S | 60.00%           | 2,304    | LIN FT     | \$2.00        | \$4,608   |   |
|                    | RANDOM CRACK R&S                | 50.00%           | 2,400    | LIN FT     | \$2.00        | \$4,800   |   |
|                    | PD PVMT PATCH M&F HMA 2.50"     | 0.50%            | 32       | SQ YD      | \$83.98       | \$2,687   |   |
|                    |                                 | PWFn = 0.3066    |          |            | PW = 0.3066 X | \$31,295  | \$9,594                                   |
|                    |                                 |                  |          |            |               |           | \$129,503                                 |
|                    | ROUTINE MAINTENANCE ACTIVITY    |                  | 0.91     | Lane Miles | \$0.00        | \$0       | \$0                                       |
|                    |                                 |                  |          |            |               |           | MAINTENANCE LIFE-CYCLE COST \$129,503     |
| 45                 | YEAR LIFE CYCLE                 | CRFn = 0.0407852 |          |            |               |           | MAINTENANCE ANNUAL COST PER MILE \$11,620 |

## LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 12/29/14 11:13 AM

|              |                 |                      | JPCP      | HMA       |
|--------------|-----------------|----------------------|-----------|-----------|
| CONSTRUCTION | INITIAL COST    | PRESENT WORTH        | \$845,902 | \$680,655 |
|              |                 | ANNUAL COST PER MILE | \$75,901  | \$61,073  |
| MAINTENANCE  | LIFE-CYCLE COST | PRESENT WORTH        | \$129,503 | \$229,594 |
|              |                 | ANNUAL COST PER MILE | \$11,620  | \$20,601  |
| TOTAL        | LIFE-CYCLE COST | PRESENT WORTH        | \$975,405 | \$910,249 |
|              |                 | ANNUAL COST PER MILE | \$87,521  | \$81,674  |

## LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

|                                    |                   |      |          |      |
|------------------------------------|-------------------|------|----------|------|
| LOWEST COST OPTION                 | =====>            | HMA  | \$81,674 |      |
| OTHER OPTIONS (LOWEST TO HIGHEST): | TYPE / PERCENTAGE | JPCP | \$87,521 | 7.2% |