

US 150 (Bloomington Road)

10.5" Full-Depth HMA Pavement with HMA Shoulders

12" Improved Subgrade

Midwest Court

7.5" PCC Pavement with Tied Curb & Gutter

12" Improved Subgrade

If you have any questions, please contact Mike Brand at (217) 782-7651.

Pavement Design

F.A.I. 57 (I-57) and F.A.I. 74 (I-74) Interchange Reconstruction

Contract 1: 70B98
Section (10-34HB)BR-1
US 150 over I-57

Champaign, IL
Champaign County



June 2017

Prepared For:



**Illinois Department
of Transportation**

Region 3 – District 5

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I. Introduction

This project is located at the Interstate 57 (I-57) & Interstate 74 (I-74) interchange on the northwest side of the City of Champaign, located in the central portion of Champaign County (see **Exhibit 1: Location Map**). The proposed scope of work includes the reconstruction of the I-74 & I-57 interchange and replacement of the existing full cloverleaf interchange with a semi-directional interchange with two directional flyovers, two loops, and four outer ramps.

The proposed improvements include pavement reconstruction and lane additions in each direction on I-74 from Duncan Road to North Prospect Avenue, pavement reconstruction of I-57 from the Norfolk Southern Railroad to Olympian Drive with accommodations for future lane additions to the inside, I-57 & I-74 ramp reconfiguration and pavement construction of eight new ramps, pavement reconstruction at three grade separation roadway approaches along Mattis Avenue and U.S. 150 (Bloomington Road), pavement reconstruction of two ramp terminals at I-57 & Olympian Drive, pavement reconstruction of two ramp terminals at I-74 & Prospect Avenue, and pavement reconstruction along Midwest Court (see **Exhibit 2: Project Overview**).

This project is currently planned to be completed under four separate construction contracts. The current contracts anticipated are:

- Contract 1 - 70B98: U.S. 150 (Bloomington Road) over I-57 roadway pavement and grade separation structure – Section (10-34HB)BR-1
- Contract 2 - 70B38: Mattis Avenue over I-57 & I-74 roadway pavements and grade separation structures – Section (10-34HB-3)BR&(10-5-1HB)BR-1
- Contract 3 - 70B99: I-57 & I-74 interchange ramp roadway pavements and structures (except Ramps A & H) – Section (10-34-1)HBK
- Contract 4 - 70C01: I-57 & I-74 roadway pavements and structures and all remaining ramp roadway pavements – Section (10-34HB-3)BR&(10-5-1HB)BR-1

II. Pavement Design and Life-Cycle Cost Analysis

The IDOT Mechanistic Pavement Design and Life-Cycle Cost Analysis (LCCA) spreadsheet (Rev. 09/05/2013) was utilized to determine the proposed pavement materials, thicknesses, and costs included herein. Standard equivalency factors for SU and MU vehicles were used to assume the mix of fully loaded, partially loaded, and empty vehicles for calculation of the traffic factors. The structural design traffic is shown for each roadway in **Exhibit 5: Traffic Data**. Full-depth pavement designs were performed for Contract 1 for the following roadways:

- US 150 over I-57
- Midwest Court

Pavement and shoulder removal costs were not included in the LCCA since they are required for all feasible designs. The rigid pavement design for US 150 over I-57 includes a 4" stabilized subbase in accordance with BDE Section 54-4.01(h)-2 and BDE Figure 54-4.D. A 4" stabilized subbase is not required for Midwest Court. 12" aggregate subgrade improvements are proposed for all roadways. These subgrade improvements satisfy the requirements in BDE Section 54-4.01(h)-1 and the recommendations in the Roadway Geotechnical Report. See **Exhibit 4: Roadway Geotechnical Report**.

A. U.S. 150 over I-57

The grade separation and roadway approaches for U.S. 150 (Bloomington Road) over I-57 are proposed to be single 12' lanes in each direction with 8' paved shoulders along both edges of pavement. See **Exhibit 3: Proposed Typical Sections**. The total roadway approach length for U.S. 150 full depth pavement reconstruction is 367 feet.

Full depth shoulders are recommended for U.S. 150 to accommodate staged construction for this project and future maintenance and reconstruction activities per BDE Section 34-2.02(c).

The Mechanistic Pavement Design and Life-Cycle Cost Analysis for U.S. 150 with full depth shoulders is summarized below. See **Exhibit 6: Mechanistic Pavement Design and Life-Cycle Cost Analysis** for detailed calculations.

US 150 over I-57 Pavement Design & LCCA

| | Traffic Factor | Depth (in) | Initial Cost | Life-Cycle Cost |
|------|-----------------------|-------------------|---------------------|------------------------|
| HMA | 3.17 | 10.50 | \$92,346 | \$129,066 |
| JPCP | 4.59 | 9.00 | \$104,885 | \$131,132 |

The results of the Life-Cycle Cost Analysis indicate that HMA is the lowest cost option compared to JPCP by 1.6%.

Although the LCCA did not result in one design being more than 10% cheaper than the other, the alternate pavement bidding process should not be considered for this roadway. The improvement along U.S. 150 is less than two lane-miles, so it does not meet BDE Section 54-1.04(a) criteria to be considered for alternate bidding. Also, the adjoining pavement surface on either end of the proposed improvement is HMA, so a rigid pavement structure for this short section of roadway is not recommended.

The recommended pavement design for U.S. 150 is a flexible pavement with a thickness of 10.5 inches and full depth HMA shoulders:

Lane Pavement

- HMA Pavement (Full-Depth), 10.5"
 - Polymerized HMA Surface Course, Mix "D", N70, 2" (IL-9.5, SBS PG 64-28)
 - Polymerized HMA Binder Course, IL-19.0, N70, 2.25" (SBS PG 64-28)
 - HMA Binder Course, IL-19.0, N70, 6.25" (PG 64-22)
- Subbase Granular Material Type A, 12"

Shoulder Pavement

- HMA Shoulders, 10.5"
 - HMA Surface Course, Mix "C", N50, 2" (PG 64-22)
 - HMA Binder Course, IL-19.0, N50, 8.5" (PG 64-22)
- Subbase Granular Material Type A, 12"

B. Midwest Court

The cul-de-sac and a small portion of roadway at Midwest Court are proposed to be reconstructed with single 15' lanes in each direction and B-6.18 combination concrete curb and gutter along both edges of pavement. See **Exhibit 3: Proposed Typical Sections**. The total roadway approach length for Midwest Court is approximately 200 feet.

The Mechanistic Pavement Design and Life-Cycle Cost Analysis for Midwest Court is summarized below. See **Exhibit 6: Mechanistic Pavement Design and Life-Cycle Cost Analysis** for detailed calculations.

| Midwest Court | | | | |
|----------------------|-----------------------|-------------------|---------------------|------------------------|
| | Traffic Factor | Depth (in) | Initial Cost | Life-Cycle Cost |
| HMA | 0.50 | 7.50 | \$42,355 | \$59,728 |
| JPCP | 0.28 | 7.50 | \$45,976 | \$60,281 |

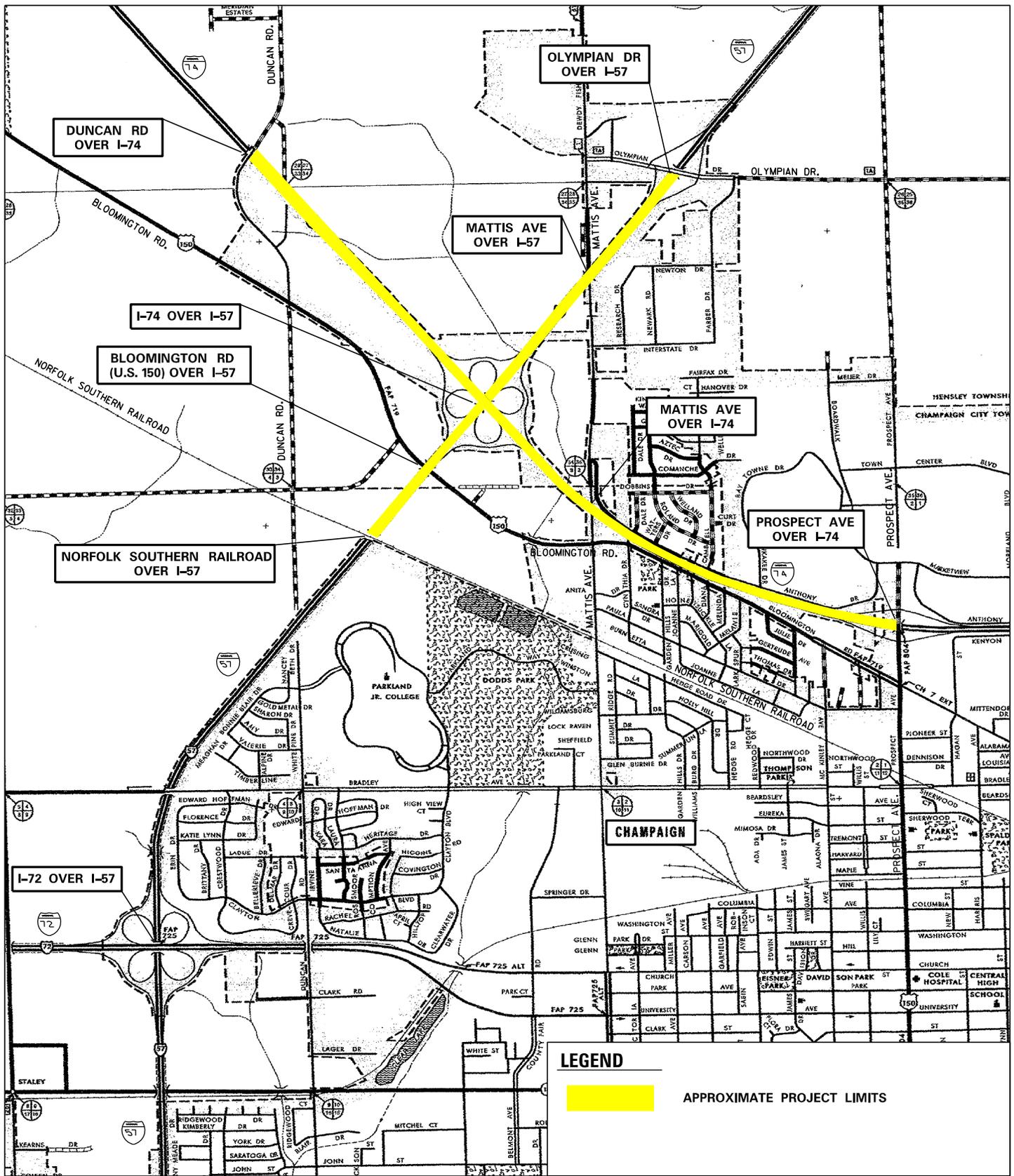
The results of the Life-Cycle Cost Analysis indicate that HMA is the lowest cost option compared to JPCP by 0.9%.

Although the LCCA did not result in one design being more than 10% cheaper than the other, the alternate pavement bidding process should not be considered for this roadway. The improvement along Midwest Court is less than two lane-miles, so it does not meet BDE Section 54-1.04(a) criteria to be considered for alternate bidding. Also, the existing Midwest Court pavement is PCC, so flexible pavement structure for this short section of roadway is not recommended.

The recommended pavement design for Midwest Court is a rigid pavement with a thickness of 7.5 inches:

Lane Pavement

- PCC Pavement (Jointed), 7.5"
- Subbase Granular Material Type A, 12"
- Tied Concrete Curb and Gutter



DUNCAN RD
OVER I-74

OLYMPIAN DR
OVER I-57

I-74 OVER I-57

BLOOMINGTON RD
(U.S. 150) OVER I-57

MATTIS AVE
OVER I-57

MATTIS AVE
OVER I-74

NORFOLK SOUTHERN RAILROAD
OVER I-57

PROSPECT AVE
OVER I-74

I-72 OVER I-57

LEGEND



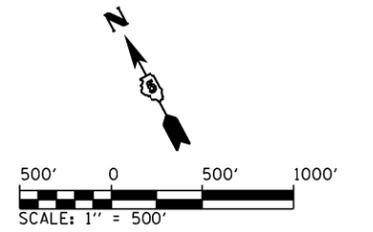
APPROXIMATE PROJECT LIMITS

SITE MAP

I-57 & I-74 INTERCHANGE
IDOT - DISTRICT 5
CHAMPAIGN COUNTY
CHAMPAIGN, IL



SCALE: 1" = 2,400'



| | | | |
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| | | DATE - | REVISED - |

**STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION**

**I-57 & I-74 INTERCHANGE RECONSTRUCTION
PROJECT OVERVIEW**

| F.A. RTÉ. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---------------------------|---------|-----------|--------------|-----------|
| | | CHAMPAIGN | | |
| CONTRACT NO. 70897 | | | | |
| ILLINOIS FED. AID PROJECT | | | | |

SHEET 1 OF 1 SHEETS STA. TO STA.

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

| | | | | |
|--|--|----------------------------------|-------------|---------------------------|
| Route: US 150 over I-57 | Comments: | | | |
| Section: (10-34HB)BR-1 | Design Date: 03/07/2017 | CMT | <-- BY | |
| County: Champaign | Modify Date: | | <-- BY | |
| Location: Champaign, IL | | | ADT | Year |
| | | | Current: | 9,300 2020 |
| | | | Future: | 12,100 2040 |
| 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: 2020 | | | |
| | Design Period (DP) = 20 years | | | |
| | | Structural Design Traffic | | |
| | | Minimum ADT | Actual ADT | Actual % of Total ADT |
| PV = | 0 | 9,801 | 91.6% | P = 50% |
| SU = | 250 | 567 | 5.3% | S = 50% |
| MU = | 750 | 332 | 3.1% | M = 50% |
| | Struct. Design ADT = | 10,700 | (2030) | |

TRAFFIC FACTOR CALCULATION

| | | | |
|--------------------------|----------------------------|-----------------------|----------------------------|
| FLEXIBLE PAVEMENT | | RIGID PAVEMENT | |
| Cpv = | 0.15 | Cpv = | 0.15 |
| Csu = | 112.06 | Csu = | 135.78 |
| Cmu = | 385.44 | Cmu = | 567.21 |
| TF flexible (Actual) = | 1.93 (Actual ADT) | TF rigid (Actual) = | 2.67 (Actual ADT) |
| TF flexible (Min) = | 3.17 (Min ADT Fig. 54-2.C) | 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 = | PG 64-22 (Fig. 53-4.R) | Edge Support = | Tied Shoulder or C.&G. |
| HMA Mixture Temp. = | 77.5 deg. F (Fig. 54-5.C) | Rigid Pavt Thick. = | 9.00 in. (Fig. 54-4.E) |
| Design HMA Mixture Modulus (E _{HMA}) = | 620 ksi (Fig. 54-5.D) | | |
| Design HMA Strain (ε _{HMA}) = | 86 (Fig. 54-5.E) | CRC Pavement | |
| Full Depth HMA Design Thickness = | 10.50 in. (Fig. 54-5.F) | Use TF rigid = | 4.59 |
| Limiting Strain Criterion Thickness = | 15.75 in. (Fig. 54-5.I) | IBR value = | 3 |
| Use Full-Depth HMA Thickness = | 10.50 inches | CRCP Thickness = | 7.75 in. (Fig. 54-4.N) |

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 = | 999.00 in. (Fig. 54-5.V) | JPCP Thickness = | NA inches |

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 Part of a future 4 lanes or more One-way Streets with ADT > 3500 | 2 lanes with ADT > 2000 One way Street with ADT <= 3500 | 2 Lanes (ADT 750 -2000) | 2 Lanes (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% |

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE US 150 over I-57
 SECTION (10-34HB)BR-1
 COUNTY Champaign
 LOCATION Champaign, IL

FACILITY TYPE NON-INTERSTATE

PROJECT LENGTH 367 FT ==> 0.07 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) 10.50 IN 15.75 IN MAX
 SHOULDER THICKNESS 10.50 IN HMA_SD Standard Design
 POLICY OVERLAY THICKNESS 2.25 IN

FLEX PAVEMENT TRAFFIC FACTORS MINIMUM ACTUAL USE
 3.17 1.93 3.17

Read Me!

HMA COST PER TON UNIT PRICE
 HMA SURFACE \$95.00 / TON
 HMA TOP BINDER \$95.00 / TON
 HMA LOWER BINDER \$80.00 / TON
 HMA BINDER (LEVELING) \$85.00 / TON
 HMA SHOULDER \$81.90 / TON

| INITIAL COSTS ITEM | THICKNESS | 100% QUANTITY | UNIT | UNIT PRICE | COST |
|---------------------------------|------------------------|---------------|-------------|------------------|------------|
| HMA PAVEMENT (FULL-DEPTH) | (10.50") | 979 | 979 SQ YD | \$52.38 / SQ YD | \$51,260 ~ |
| HMA SURFACE COURSE | (2.00") | 1.0069 | 110 TONS | \$95.00 / TON | \$0 |
| HMA TOP BINDER COURSE | (2.25") | 1.0217 | 126 TONS | \$95.00 / TON | \$0 |
| HMA LOWER BINDER COURSE | (6.25") | 1.0512 | 360 TONS | \$80.00 / TON | \$0 |
| HMA SHOULDER | (10.50") | 652 | 384 TONS | \$81.90 / TON | \$31,420 ~ |
| CURB & GUTTER | | | 0 LIN FT | \$30.00 / LIN FT | \$0 |
| SUBBASE GRAN MATL TY C (TONS) | | | 0 TONS | \$25.00 / TON | \$0 |
| IMPROVED SUBGRADE: | Aggregate Width = 42.7 | 1,743 | 1,743 SQ YD | \$0.00 / SQ YD | \$0 |
| Reserved For User Supplied Item | | | 0 UNITS | \$0.00 / UNITS | \$0 |
| Reserved For User Supplied Item | | | 0 UNITS | \$0.00 / UNITS | \$0 |
| PAVEMENT REMOVAL | | | 979 SQ YD | \$0.00 / SQ YD | \$0 |
| SHOULDER REMOVAL | | | 652 SQ YD | \$0.00 / SQ YD | \$0 |

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION \$82,680
 FLEXIBLE CONSTRUCTION \$48,514

| MAINTENANCE COSTS: ITEM | THICKNESS | MATERIAL | T | UNIT COST |
|------------------------------|-----------------------|----------|--------------------|-------------------------|
| ROUTINE MAINTENANCE ACTIVITY | | | | \$0.00 LANE-MILE / YEAR |
| HMA OVERLAY PVMT SURF | (2.00") | 1.0069 | Surface M 2.00 | \$10.71 / SQ YD |
| HMA OVERLAY PVMT | (2.25") | 1.0078 | 2.25 | \$11.64 / SQ YD |
| HMA SURFACE MIX | (1.50") | 1.0052 | Surface M 1.50 | \$8.02 / SQ YD |
| HMA BINDER MIX | (0.75") | 1.0130 | Leveling Binc 0.75 | \$3.62 / SQ YD |
| HMA OVERLAY SHLD (Year 30) | (2.25") | | Shoulder 2.25 | \$10.32 / SQ YD |
| HMA OVERLAY SHLD | (2.00") | | Shoulder 2.00 | \$9.17 / SQ YD |
| MILLING (2.00 IN) | | | 2.00 | \$3.00 / SQ YD |
| PARTIAL DEPTH PVMT PATCH | (Mill & Fill Surf) | | Surface M 2.00 | \$80.64 / SQ YD |
| PARTIAL DEPTH SHLD PATCH | (Mill & Fill Surf) | | Shoulder 2.00 | \$79.17 / SQ YD |
| PARTIAL DEPTH PVMT PATCH | (Mill & Fill +2.00 ") | | Leveling Binc 2.00 | \$79.52 / SQ YD |
| PARTIAL DEPTH SHLD PATCH | (Mill & Fill +2.00 ") | | Shoulder 2.00 | \$79.17 / SQ YD |

LONGITUDINAL SHOULDER JOINT ROUT & SEAL
CENTERLINE JOINT ROUT & SEAL
RANDOM / THERMAL CRACK ROUT & SEAL

\$2.00 / LIN FT
\$2.00 / LIN FT
(100% Ref) \$2.00 / LIN FT

FLEXIBLE TOTAL LIFE \$117,959
FLEXIBLE TOTAL ANN \$69,215

PCC PAVEMENT

JPCP

ROUTE US 150 over I-57
 SECTION (10-34HB)BR-1
 COUNTY Champaign
 LOCATION Champaign, IL

FACILITY TYPE NON-INTERSTATE

PROJECT LENGTH 367 FT ==> 0.07 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
 4.59 2.67 4.59
 Worksheet Construction Type is Reconstruction The Pavement Type is JPCP

| INITIAL COSTS ITEM | THICKNESS | 100% QUA UNIT | UNIT PRICE | COST |
|---|------------------------|---------------|------------------|----------|
| JPC PAVEMENT | (9.00") | 979 SQ YD | \$50.00 / SQ YD | \$48,950 |
| PAVEMENT REINFORCEMENT | | 0 SQ YD | \$22.00 / SQ YD | \$0 |
| STABILIZED SUBBASE | (4.00") | 979 SQ YD | \$19.00 / SQ YD | \$18,601 |
| PCC SHOULDERS | (9.00" to 9.00") | 652 SQ YD | \$40.00 / SQ YD | \$26,080 |
| CURB & GUTTER | | 0 LIN FT | \$30.00 / LIN FT | \$0 |
| SUBBASE GRAN MATL TY C | (~ 2.85") | 0 TONS * | \$25.00 / TON | \$0 |
| IMPROVED SUBGRADE: | Aggregate Width = 41.0 | 1,672 SQ YD | \$0.00 / SQ YD | \$0 |
| Stabilized Subbase for Full Depth Shoulders | | 693 SQ YD * | \$19.00 / SQ YD | \$13,163 |
| Reserved For User Supplied Item | | 0 UNITS | \$0.00 / UNITS | \$0 |
| PAVEMENT REMOVAL | | 979 SQ YD | \$0.00 / SQ YD | \$0 |
| SHOULDER REMOVAL | | 652 SQ YD | \$0.00 / SQ YD | \$0 |

Note: * Denotes User Supplied Quantity
 RIGID CONSTRUCTION \$106,794
 RIGID CONSTRUCTION \$62,664

| MAINTENANCE COSTS: ITEM | THICKNESS | MATERIAL T | UNIT COST |
|--|-----------|-------------------------|---------------------------|
| ROUTINE MAINTENANCE ACTIVITY | | | \$0.00 / LANE-MILE / YEAR |
| HMA POLICY OVERLAY | (2.50") | 2.50 | |
| HMA POLICY OVERLAY PVMT | (2.50") | 1.0087 | \$12.85 / SQ YD |
| HMA SURFACE MIX | (1.50") | 1.0052 Surface M | \$8.02 / SQ YD |
| HMA BINDER MIX | (1.00") | 1.0139 Leveling Binc | \$4.83 / SQ YD |
| HMA POLICY OVERLAY SHLD | (2.50") | Shoulder | \$11.47 / SQ YD |
| CLASS A PAVEMENT PATCHING | | | \$300.00 / SQ YD |
| CLASS B PAVEMENT PATCHING | | | \$275.00 / SQ YD |
| CLASS C SHOULDER PATCHING | | | \$145.00 / SQ YD |
| PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf) | | Surface M 1.50 | \$77.98 / SQ YD |
| PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50") | | Surface M 2.50 | \$83.30 / SQ YD |
| LONGITUDINAL SHOULDER JOINT ROUT & SEAL | | | \$2.00 / LIN FT |
| CENTERLINE JOINT ROUT & SEAL | | | \$2.00 / LIN FT |
| REFLECTIVE TRANSVERSE CRACK ROUT & SEAL | | | \$2.00 / LIN FT |
| RANDOM CRACK ROUT & SEAL | | (100% Rehab = 100.00' / | \$2.00 / LIN FT |

RIGID TOTAL LIFE-C \$132,327
 RIGID TOTAL ANNUAL \$77,646

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Re: #####

| | | JPCP | HMA |
|--------------|-----------------|---------------------|-----------|
| CONSTRUCTION | INITIAL COST | PRESENT ' \$106,794 | \$82,680 |
| | | ANNUAL C' \$62,664 | \$48,514 |
| MAINTENANCE | LIFE-CYCLE COST | PRESENT ' \$25,533 | \$35,279 |
| | | ANNUAL C' \$14,982 | \$20,701 |
| TOTAL | LIFE-CYCLE COST | PRESENT ' \$132,327 | \$117,959 |
| | | ANNUAL C' \$77,646 | \$69,215 |

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

| | | | |
|------------------------------------|---------------|----------|-------|
| LOWEST COST OPTION | =====HMA | \$69,215 | |
| OTHER OPTIONS (LOWEST TO HIGHEST): | TYPE / PEJPCP | \$77,646 | 12.2% |

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

| MAINTENANCE ITEM | % | QUANTITY | UNIT | UNIT COST | COST | PRESENT WORTH |
|-------------------------------|------------------|----------|------------|-----------|-------------|---------------|
| YEAR 5 | | | | | | |
| LONG SHLD JT R&S | 100.00% | 734 | LIN FT | \$2.00 | \$1,468 | |
| CNTR LINE JOINT R&S | 100.00% | 367 | LIN FT | \$2.00 | \$734 | |
| RNDM / THRM CRACK R&S | 50.00% | 404 | LIN FT | \$2.00 | \$808 | |
| PD PVMT PATCH M&F SURF | 0.10% | 1 | SQ YD | \$80.64 | \$81 | |
| PWFn = | 0.8626 | | PW = | 0.8626 X | \$3,091 | \$2,666 |
| YEAR 10 | | | | | | |
| LONG SHLD JT R&S | 100.00% | 734 | LIN FT | \$2.00 | \$1,468 | |
| CNTR LINE JOINT R&S | 100.00% | 367 | LIN FT | \$2.00 | \$734 | |
| RNDM / THRM CRACK R&S | 50.00% | 404 | LIN FT | \$2.00 | \$808 | |
| PD PVMT PATCH M&F SURF | 0.50% | 5 | SQ YD | \$80.64 | \$403 | |
| PWFn = | 0.7441 | | PW = | 0.7441 X | \$3,413 | \$2,540 |
| YEAR 15 | | | | | | |
| MILL PVMT & SHLD 2.00" | 100.00% | 1,631 | SQ YD | \$3.00 | \$4,893 | |
| PD PVMT PATCH M&F ADD'L 2.00" | 1.00% | 10 | SQ YD | \$79.52 | \$795 | |
| HMA OVERLAY PVMT 2.00" | 100.00% | 979 | SQ YD | \$10.71 | \$10,485 | |
| HMA OVERLAY SHLD 2.00 " | 100.00% | 652 | SQ YD | \$9.17 | \$5,985 | |
| PWFn = | 0.6419 | | PW = | 0.6419 X | \$22,158 | \$14,222 |
| YEAR 20 | | | | | | |
| LONG SHLD JT R&S | 100.00% | 734 | LIN FT | \$2.00 | \$1,468 | |
| CNTR LINE JOINT R&S | 100.00% | 367 | LIN FT | \$2.00 | \$734 | |
| RNDM / THRM CRACK R&S | 50.00% | 404 | LIN FT | \$2.00 | \$808 | |
| PD PVMT PATCH M&F SURF | 0.10% | 1 | SQ YD | \$80.64 | \$81 | |
| PWFn = | 0.5537 | | PW = | 0.5537 X | \$3,091 | \$1,711 |
| YEAR 25 | | | | | | |
| LONG SHLD JT R&S | 100.00% | 734 | LIN FT | \$2.00 | \$1,468 | |
| CNTR LINE JOINT R&S | 100.00% | 367 | LIN FT | \$2.00 | \$734 | |
| RNDM / THRM CRACK R&S | 50.00% | 404 | LIN FT | \$2.00 | \$808 | |
| PD PVMT PATCH M&F SURF | 0.50% | 5 | SQ YD | \$80.64 | \$403 | |
| PWFn = | 0.4776 | | PW = | 0.4776 X | \$3,413 | \$1,630 |
| HMA_SD | | | | | | |
| YEAR 30 NON-INTERSTATE | | | | | | |
| MILL PVMT & SHLD 2.00" | 100.00% | 1,631 | SQ YD | \$3.00 | \$4,893 | |
| PD PVMT PATCH M&F ADD'L 2.00" | 2.00% | 20 | SQ YD | \$79.52 | \$1,590 | |
| PD SHLD PATCH M&F ADD'L 2.00" | 1.00% | 7 | SQ YD | \$79.17 | \$554 | |
| HMA OVERLAY PVMT 2.25 " | 100.00% | 979 | SQ YD | \$11.64 | \$11,390 | |
| HMA OVERLAY SHLD 2.25 " | 100.00% | 652 | SQ YD | \$10.32 | \$6,733 | |
| PWFn = | 0.4120 | | PW = | 0.4120 X | \$25,160 | \$10,366 |
| YEAR 35 | | | | | | |
| LONG SHLD JT R&S | 100.00% | 734 | LIN FT | \$2.00 | \$1,468 | |
| CNTR LINE JOINT R&S | 100.00% | 367 | LIN FT | \$2.00 | \$734 | |
| RNDM / THRM CRACK R&S | 50.00% | 404 | LIN FT | \$2.00 | \$808 | |
| PD PVMT PATCH M&F SURF | 0.10% | 1 | SQ YD | \$80.64 | \$81 | |
| PWFn = | 0.3554 | | PW = | 0.3554 X | \$3,091 | \$1,098 |
| YEAR 40 | | | | | | |
| LONG SHLD JT R&S | 100.00% | 734 | LIN FT | \$2.00 | \$1,468 | |
| CNTR LINE JOINT R&S | 100.00% | 367 | LIN FT | \$2.00 | \$734 | |
| RNDM / THRM CRACK R&S | 50.00% | 404 | LIN FT | \$2.00 | \$808 | |
| PD PVMT PATCH M&F SURF | 0.50% | 5 | SQ YD | \$80.64 | \$403 | |
| PWFn = | 0.3066 | | PW = | 0.3066 X | \$3,413 | \$1,046 |
| | | | | | | \$35,279 |
| ROUTINE MAINTENANCE ACTIVITY | | 0.14 | Lane Miles | 0.00 | \$0 | \$0 |
| 45 YEAR LIFE CYCLE | CRFn = 0.0407852 | | | | MAINTENANCE | \$35,279 |
| | | | | | MAINTENANCE | \$20,701 |

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

| MAINTENANCE ITEM | % | QUANTITY | UNIT | UNIT COST | COST | PRESENT WORTH |
|---------------------------------|------------------------------|----------|------------|-----------|-------------|---------------|
| YEAR 10 | | | | | | |
| PAVEMENT PATCH CLASS B | 0.10% | 1 | SQ YD | \$275.00 | \$275 | |
| PWF _n = | 0.7441 | | PW = | 0.7441 X | \$275 | \$205 |
| YEAR 15 | | | | | | |
| PAVEMENT PATCH CLASS B | 0.20% | 2 | SQ YD | \$275.00 | \$550 | |
| PWF _n = | 0.6419 | | PW = | 0.6419 X | \$550 | \$353 |
| YEAR 20 | | | | | | |
| PAVEMENT PATCH CLASS B | 2.00% | 20 | SQ YD | \$275.00 | \$5,500 | |
| SHOULDER PATCH CLASS C | 0.50% | 3 | SQ YD | \$145.00 | \$435 | |
| LONGITUDINAL SHLD JT R&S | 100.00% | 734 | LIN FT | \$2.00 | \$1,468 | |
| CENTERLINE JT R&S | 100.00% | 367 | LIN FT | \$2.00 | \$734 | |
| PWF _n = | 0.5537 | | PW = | 0.5537 X | \$8,137 | \$4,505 |
| YEAR 25 | | | | | | |
| PAVEMENT PATCH CLASS B | 3.00% | 29 | SQ YD | \$275.00 | \$7,975 | |
| SHOULDER PATCH CLASS C | 1.00% | 7 | SQ YD | \$145.00 | \$1,015 | |
| PWF _n = | 0.4776 | | PW = | 0.4776 X | \$8,990 | \$4,294 |
| YEAR 30 | | | | | | |
| NON-INTERSTATE | | | | | | |
| PAVEMENT PATCH CLASS B | 4.00% | 39 | SQ YD | \$275.00 | \$10,725 | |
| SHOULDER PATCH CLASS C | 1.50% | 10 | SQ YD | \$145.00 | \$1,450 | |
| HMA POLICY OVERLAY 2.5" (PVMT) | 100.00% | 979 | SQ YD | \$12.85 | \$12,574 | |
| HMA POLICY OVERLAY 2.5" (SHLD) | 100.00% | 652 | SQ YD | \$11.47 | \$7,481 | |
| PWF _n = | 0.4120 | | PW = | 0.4120 X | \$32,230 | \$13,278 |
| YEAR 35 | | | | | | |
| NON-INTERSTATE | | | | | | |
| LONGITUDINAL SHLD JT R&S | 100.00% | 734 | LIN FT | \$2.00 | \$1,468 | |
| CENTERLINE JT R&S | 100.00% | 367 | LIN FT | \$2.00 | \$734 | |
| RANDOM CRACK R&S | 50.00% | 367 | LIN FT | \$2.00 | \$734 | |
| REFLECTIVE TRANSVERSE CRACK R&S | 40.00% | 230 | LIN FT | \$2.00 | \$460 | |
| PD PVMT PATCH M&F HMA 2.50" | 0.10% | 1 | SQ YD | \$83.30 | \$83 | |
| PWF _n = | 0.3554 | | PW = | 0.3554 X | \$3,479 | \$1,236 |
| YEAR 40 | | | | | | |
| NON-INTERSTATE | | | | | | |
| PAVEMENT PATCH CLASS B | 0.50% | 5 | SQ YD | \$275.00 | \$1,375 | |
| LONGITUDINAL SHLD JT R&S | 100.00% | 734 | LIN FT | \$2.00 | \$1,468 | |
| CENTERLINE JT R&S | 100.00% | 367 | LIN FT | \$2.00 | \$734 | |
| REFLECTIVE TRANSVERSE CRACK R&S | 60.00% | 346 | LIN FT | \$2.00 | \$692 | |
| RANDOM CRACK R&S | 50.00% | 367 | LIN FT | \$2.00 | \$734 | |
| PD PVMT PATCH M&F HMA 2.50" | 0.50% | 5 | SQ YD | \$83.30 | \$417 | |
| PWF _n = | 0.3066 | | PW = | 0.3066 X | \$5,420 | \$1,662 |
| | | | | | | \$25,533 |
| ROUTINE MAINTENANCE ACTIVITY | | 0.14 | Lane Miles | \$0.00 | \$0 | \$0 |
| 45 YEAR LIFE CYCLE | CRF _n = 0.0407852 | | | | MAINTENANCE | \$25,533 |
| | | | | | MAINTENANCE | \$14,982 |

Standard Pavement Slope = -0.01563 FT/FT
 Standard Shoulder Slope = -0.04167 FT/FT
 Tied PCC Shoulder Outside Edge Thickness = 9.00 IN
 Standard Stabilized Subbase Thickness = 4.00 IN
 Standard Pavement Subbase Outhang = 0.00 FT
 Standard Shoulder Subbase Outhang = 6.00 IN
 Outside Edge ShldT = 9.00 IN
 <=== (See Dark Orange Color in Diagrams Below)
 <=== (See Dark Orange Color in Diagrams Below)
 <=== (See Yellow Color in Diagrams Below)

Standard Foreslope = 4 :1 FT/FT
 Standard Wedge = 1 :1 FT/FT
 (PCC Pavement) Shoulder Wedge = 0.0001 :1 FT/FT

Standard Surface & Binder SW = 2.01600 TONS / CU YD ==> 112.0 LB per SQYD IN
 Standard Shoulder Subbase SW = 2.05000 TONS / CU YD ==> 113.9 LB per SQYD IN

Standard Surface Thickness = 2.00 IN

HMA Surface (New Pavement) 2.00 IN
 HMA Top Binder Course 2.25 IN
 HMA Lower Binder Course 6.25 IN

HMA Policy Overlay for LSCD 2.00 IN

Interstate HMA Policy Overlay 3.75 IN
 Surface 1.50 IN
 Top Binder Mix 2.25 IN

Over HMA Over PCC
 Non-Interstate HMA Policy Overlay 2.25 IN 2.50 IN
 Surface 1.50 IN 1.50 IN
 Leveling Binder Mix 0.75 IN 1.00 IN

WorkSheet Setting
 Standard Design

Thermal / Random Crack Route & Seal 110 FT / Sta / Lane
 Random Crack Route & Seal 100 FT / Sta / Lane
 Patching: Additional Labor Cost = \$67.00 / SQ YD

| | | | | | | |
|----------------|---------------------|---------|---------|---------|---------------------|----------------|
| HMA_SD | HMA Policy Overlay | 2.25 IN | 2.50 IN | 2.00 IN | HMA Policy Overlay | HMA_LSCD |
| NON-INTERSTATE | Surface | 1.50 IN | 1.50 IN | 2.00 IN | Surface | NON-INTERSTATE |
| | Leveling Binder Mix | 0.75 IN | 1.00 IN | 0.00 IN | Leveling Binder Mix | |

Mirror
 LSC Design

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

| | | | |
|--|--|----------------------------------|---------------------------------|
| Route: Midwest Court | Comments: | | |
| Section: (10-34HB-3)BR&(10-5-1HB)BR-1 | Design Date: 03/07/2017 | CMT | <-- BY |
| County: Champaign | Modify Date: | | <-- BY |
| Location: Champaign, IL | | | ADT Year |
| | | | Current: 750 2020 |
| | | | Future: 750 2040 |
| Facility Type: Unmarked State Route | # of Lanes = 2 or 3 | Structural Design Traffic | |
| Part of future 4 lanes or more ? No | One Way Street ? No | | |
| Road Class: III | Subgrade Support Rating (SSR): Poor | Minimum ADT | Actual ADT |
| Construction Year: 2020 | Design Period (DP) = 20 years | Actual % of Total ADT | % of ADT in Design Lane |
| | | PV = No Min | 660 88.0% |
| | | SU = No Min | 53 7.0% |
| | | MU = No Min | 38 5.0% |
| | | Struct. Design ADT = 750 | (2030) |

| TRAFFIC FACTOR CALCULATION | | | |
|--|--|---|---------------------------------------|
| FLEXIBLE PAVEMENT | | RIGID PAVEMENT | |
| Cpv = 0.15 | Csu = 109.14 | Cpv = 0.15 | Csu = 129.58 |
| Cmu = 384.35 | TF flexible (Actual) = 0.20 (Actual ADT) | Cmu = 562.47 | TF rigid (Actual) = 0.28 (Actual ADT) |
| TF flexible (Min) = No Min (Min ADT Fig. 54-2.C) | | TF rigid (Min) = No Min (Min ADT Fig. 54-2.C) | |

| NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS | | | |
|---|-----------------------|---|-------------------|
| Full-Depth HMA Pavement | | JPC Pavement | |
| Use TF flexible = 0.50 | Per BDE 54-5.01(i)-1g | Use TF rigid = 0.28 | |
| PG Grade Lower Binder Lifts = PG 64-22 | (Fig. 53-4.R) | Edge Support = Tied | Shoulder or C.&G. |
| HMA Mixture Temp. = 77.5 | deg. F (Fig. 54-5.C) | Rigid Pavt Thick. = 7.50 in. (Fig. 54-4.E) | |
| Design HMA Mixture Modulus (E _{HMA}) = 620 | ksi (Fig. 54-5.D) | | |
| Design HMA Strain (ε _{HMA}) = 147 | (Fig. 54-5.E) | CRC Pavement | |
| Full Depth HMA Design Thickness = 7.50 in. | (Fig. 54-5.F) | Use TF rigid = 0.28 | |
| Limiting Strain Criterion Thickness = 15.75 | in. (Fig. 54-5.I) | IBR value = 3 | |
| Use Full-Depth HMA Thickness = 7.50 inches | | CRCP Thickness = 5.00 in. (Fig. 54-4.N) | |
| TF MUST BE > 60 FOR CRCP | | | |

| RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS | | | |
|--|-------------------|--|--|
| HMA Overlay of Rubblized PCC | | Unbonded Concrete Overlay | |
| Use TF flexible = 0.50 | | Review 54-4.03 for limitations and special considerations. | |
| HMA Overlay Design Thickness = 5.00 in. | (Fig. 54-5.U) | | |
| Limiting Strain Criterion Thickness = 999.00 | in. (Fig. 54-5.V) | | |
| Use HMA Overlay Thickness = 999.00 inches | | JPCP Thickness = NA inches | |
| 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 | | 2 lanes with ADT > 2000 | | 2 Lanes | | 2 Lanes | | |
| Part of a future 4 lanes or more | | One way Street with ADT <= 3500 | | (ADT 750 -2000) | | (ADT < 750) | | |
| One-way Streets with ADT > 3500 | | | | | | | | |
| Facility Type | | Min. Str. Design Traffic (Fig 54-2.C) | | | | Class Table for One-Way Streets | | |
| | | PV | SU | MU | ADT | | Class | |
| Interstate or Freeway | | 0 | 500 | 1500 | 0 - 3500 | | II | |
| Other Marked State Route | | 0 | 250 | 750 | >3501 | | I | |
| Unmarked State Route | | No Min | No Min | No Min | | | | |
| Class | | Traffic Factor ESAL Coefficients | | | | Class Table for 2 or 3 lanes (not future 4 lane & not one-way street) | | |
| | | Rigid (Fig. 54-4.C) | | Flexible (Fig. 54-5.B) | | ADT | | Class |
| | | Csu | Cmu | Csu | Cmu | 0 - 749 | | IV |
| I | | 143.81 | 696.42 | 132.50 | 482.53 | 750 - 2000 | | III |
| II | | 135.78 | 567.21 | 112.06 | 385.44 | >2000 | | II |
| III | | 129.58 | 562.47 | 109.14 | 384.35 | | | |
| IV | | 129.58 | 562.47 | 109.14 | 384.35 | | | |
| Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B) | | | | | | | | |
| Number of Lanes | | 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% | |

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE Midwest Court
 SECTION (10-34HB-3)BR&(10-5-1HB)BR-1
 COUNTY Champaign
 LOCATION Champaign, IL

FACILITY TYPE NON-INTERSTATE

PROJECT LENGTH 200 FT ==> 0.04 Miles
 # OF CENTERLINES 1 CL
 # OF LANES 2 LANES
 # OF EDGES 2 EP
 LANE WIDTH - AVERAGE 15 FT
 SHOULDER WIDTH HMA Left 0 FT
 HMA Right 0 FT
 Total Width of Paved Shoulders 0 FT

PAVEMENT THICKNESS (FLEXIBLE) 7.50 IN 15.75 IN MAX
 SHOULDER THICKNESS 7.50 IN HMA_SD Standard Design
 POLICY OVERLAY THICKNESS 2.25 IN

FLEX PAVEMENT TRAFFIC FACTORS MINIMUM ACTUAL USE
 No Min 0.20 0.20

HMA COST PER TON UNIT PRICE Read Me!
 HMA SURFACE \$95.00 / TON
 HMA TOP BINDER \$95.00 / TON
 HMA LOWER BINDER \$80.00 / TON
 HMA BINDER (LEVELING) \$85.00 / TON
 HMA SHOULDER \$82.67 / TON

| INITIAL COSTS ITEM | THICKNESS | 100% QUAI | UNIT | UNIT PRICE | COST |
|---------------------------------|------------------------|-----------|--------------|------------------|------------|
| HMA PAVEMENT (FULL-DEPTH) | (7.50") | 667 | 667 SQ YD | \$37.91 / SQ YD | \$25,275 ~ |
| HMA SURFACE COURSE | (2.00") | 1.0056 | 75 TONS | \$95.00 / TON | \$0 |
| HMA TOP BINDER COURSE | (2.25") | 1.0174 | 85 TONS | \$95.00 / TON | \$0 |
| HMA LOWER BINDER COURSE | (3.25") | 1.0326 | 125 TONS | \$80.00 / TON | \$0 |
| HMA SHOULDER | (7.50") | 0 | 0 TONS | \$82.67 / TON | \$0 ~ |
| CURB & GUTTER | | | 450 LIN FT * | \$30.00 / LIN FT | \$13,500 |
| SUBBASE GRAN MATL TY C (TONS) | | | 0 TONS | \$25.00 / TON | \$0 |
| IMPROVED SUBGRADE: | Aggregate Width = 32.3 | | 717 SQ YD | \$0.00 / SQ YD | \$0 |
| Reserved For User Supplied Item | | | 0 UNITS | \$0.00 / UNITS | \$0 |
| Reserved For User Supplied Item | | | 0 UNITS | \$0.00 / UNITS | \$0 |
| PAVEMENT REMOVAL | | | 667 SQ YD | \$0.00 / SQ YD | \$0 |
| SHOULDER REMOVAL | | | 0 SQ YD | \$0.00 / SQ YD | \$0 |

Note: * Denotes User Supplied Quantity
 FLEXIBLE CONSTRUCT \$38,775
 FLEXIBLE CONSTRUCT \$41,750

| MAINTENANCE COSTS: ITEM | THICKNESS | MATERIAL | T | UNIT COST |
|------------------------------|-----------------------|----------|--------------------|-------------------------|
| ROUTINE MAINTENANCE ACTIVITY | | | | \$0.00 LANE-MILE / YEAR |
| HMA OVERLAY PVMT SURF | (2.00") | 1.0056 | Surface M 2.00 | \$10.70 / SQ YD |
| HMA OVERLAY PVMT | (2.25") | 1.0063 | 2.25 | \$11.62 / SQ YD |
| HMA SURFACE MIX | (1.50") | 1.0042 | Surface M 1.50 | \$8.01 / SQ YD |
| HMA BINDER MIX | (0.75") | 1.0104 | Leveling Binc 0.75 | \$3.61 / SQ YD |
| HMA OVERLAY SHLD (Year 30) | (2.25") | | Shoulder 2.25 | \$10.42 / SQ YD |
| HMA OVERLAY SHLD | (2.00") | | Shoulder 2.00 | \$9.26 / SQ YD |
| MILLING (2.00 IN) | | | 2.00 | \$3.00 / SQ YD |
| PARTIAL DEPTH PVMT PATCH | (Mill & Fill Surf) | | Surface M 2.00 | \$80.64 / SQ YD |
| PARTIAL DEPTH SHLD PATCH | (Mill & Fill Surf) | | Shoulder 2.00 | \$79.26 / SQ YD |
| PARTIAL DEPTH PVMT PATCH | (Mill & Fill +2.00 ") | | Leveling Binc 2.00 | \$79.52 / SQ YD |
| PARTIAL DEPTH SHLD PATCH | (Mill & Fill +2.00 ") | | Shoulder 2.00 | \$79.26 / 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% Ref | \$2.00 / LIN FT |

| | |
|---------------------|----------|
| FLEXIBLE TOTAL LIFE | \$55,363 |
| FLEXIBLE TOTAL ANN | \$59,611 |

PCC PAVEMENT

JPCP

ROUTE Midwest Court
 SECTION (10-34HB-3)BR&(10-5-1HB)BR-1
 COUNTY Champaign
 LOCATION Champaign, IL

FACILITY TYPE NON-INTERSTATE

PROJECT LENGTH 200 FT ==> 0.04 Miles
 # OF CENTERLINES 1 CL
 # OF LANES 2 LANES
 # OF EDGES 2 EP
 LANE WIDTH - AVERAGE 15 FT
 SHOULDER WIDTH PCC Left 0 FT
 PCC Right 0 FT
 Total Width of Paved Shoulders 0 FT

PAVEMENT THICKNESS (RIGID) JPCP 7.50 IN TIED SHLD
 SHOULDER THICKNESS 7.50 IN

POLICY OVERLAY THICKNESS 2.50 IN

RIGID PAVEMENT TRAFFIC FACTORS MINIMUM ACTUAL USE
 No Min 0.28 0.28
 Worksheet Construction Type is Reconstruction The Pavement Type is JPCP

| INITIAL COSTS ITEM | THICKNESS | 100% QUA UNIT | UNIT PRICE | COST |
|---------------------------------|------------------------|---------------|------------------|----------|
| JPC PAVEMENT | (7.50") | 667 SQ YD | \$50.00 / SQ YD | \$33,350 |
| PAVEMENT REINFORCEMENT | | 0 SQ YD | \$22.00 / SQ YD | \$0 |
| STABILIZED SUBBASE | (4.00") | 0 SQ YD * | \$19.00 / SQ YD | \$0 |
| PCC SHOULDERS | (7.50" to 7.50") | 0 SQ YD | \$40.00 / SQ YD | \$0 |
| CURB & GUTTER | | 450 LIN FT * | \$30.00 / LIN FT | \$13,500 |
| SUBBASE GRAN MATL TY C | (~ 0.00") | 0 TONS | \$25.00 / TON | \$0 |
| IMPROVED SUBGRADE: | Aggregate Width = 31.0 | 689 SQ YD | \$0.00 / SQ YD | \$0 |
| Reserved For User Supplied Item | | 0 UNITS | \$0.00 / UNITS | \$0 |
| Reserved For User Supplied Item | | 0 UNITS | \$0.00 / UNITS | \$0 |
| PAVEMENT REMOVAL | | 667 SQ YD | \$0.00 / SQ YD | \$0 |
| SHOULDER REMOVAL | | 0 SQ YD | \$0.00 / SQ YD | \$0 |

Note: * Denotes User Supplied Quantity
 RIGID CONSTRUCTION \$46,850
 RIGID CONSTRUCTION \$50,445

| MAINTENANCE COSTS: ITEM | THICKNESS | MATERIAL T | UNIT COST |
|--|-----------|---------------------------|---------------------------|
| ROUTINE MAINTENANCE ACTIVITY | | | \$0.00 / LANE-MILE / YEAR |
| HMA POLICY OVERLAY | (2.50") | 2.50 | |
| HMA POLICY OVERLAY PVMT | (2.50") | 1.0069 2.50 | \$12.83 / SQ YD |
| HMA SURFACE MIX | (1.50") | 1.0042 Surface M 1.50 | \$8.01 / SQ YD |
| HMA BINDER MIX | (1.00") | 1.0111 Leveling Binc 1.00 | \$4.81 / SQ YD |
| HMA POLICY OVERLAY SHLD | (2.50") | Shoulder 2.50 | \$11.57 / SQ YD |
| CLASS A PAVEMENT PATCHING | | | \$300.00 / SQ YD |
| CLASS B PAVEMENT PATCHING | | | \$275.00 / SQ YD |
| CLASS C SHOULDER PATCHING | | | \$145.00 / SQ YD |
| PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf) | | Surface M 1.50 | \$77.98 / SQ YD |
| PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50") | | Surface M 2.50 | \$83.30 / SQ YD |
| LONGITUDINAL SHOULDER JOINT ROUT & SEAL | | | \$2.00 / LIN FT |
| CENTERLINE JOINT ROUT & SEAL | | | \$2.00 / LIN FT |
| REFLECTIVE TRANSVERSE CRACK ROUT & SEAL | | | \$2.00 / LIN FT |
| RANDOM CRACK ROUT & SEAL | | (100% Rehab = 100.00' / | \$2.00 / LIN FT |

RIGID TOTAL LIFE-C \$60,758
 RIGID TOTAL ANNUAL \$65,420

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Re: #####

| | | JPCP | HMA |
|--------------|-----------------|--------------------|----------|
| CONSTRUCTION | INITIAL COST | PRESENT ' \$46,850 | \$38,775 |
| | | ANNUAL C' \$50,445 | \$41,750 |
| MAINTENANCE | LIFE-CYCLE COST | PRESENT ' \$13,908 | \$16,588 |
| | | ANNUAL C' \$14,975 | \$17,861 |
| TOTAL | LIFE-CYCLE COST | PRESENT ' \$60,758 | \$55,363 |
| | | ANNUAL C' \$65,420 | \$59,611 |

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

| | | | |
|------------------------------------|---------------|----------|------|
| LOWEST COST OPTION | =====HMA | \$59,611 | |
| OTHER OPTIONS (LOWEST TO HIGHEST): | TYPE / PEJPCP | \$65,420 | 9.7% |

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

| MAINTENANCE ITEM | % | QUANTITY | UNIT | UNIT COST | COST | PRESENT WORTH |
|-------------------------------|------------------|----------|------------|-----------|-------------|---------------|
| YEAR 5 | | | | | | |
| LONG SHLD JT R&S | 100.00% | 400 | LIN FT | \$2.00 | \$800 | |
| CNTR LINE JOINT R&S | 100.00% | 200 | LIN FT | \$2.00 | \$400 | |
| RNDM / THRM CRACK R&S | 50.00% | 220 | LIN FT | \$2.00 | \$440 | |
| PD PVMT PATCH M&F SURF | 0.10% | 1 | SQ YD | \$80.64 | \$81 | |
| PWFn = | 0.8626 | | PW = | 0.8626 X | \$1,721 | \$1,485 |
| YEAR 10 | | | | | | |
| LONG SHLD JT R&S | 100.00% | 400 | LIN FT | \$2.00 | \$800 | |
| CNTR LINE JOINT R&S | 100.00% | 200 | LIN FT | \$2.00 | \$400 | |
| RNDM / THRM CRACK R&S | 50.00% | 220 | LIN FT | \$2.00 | \$440 | |
| PD PVMT PATCH M&F SURF | 0.50% | 3 | SQ YD | \$80.64 | \$242 | |
| PWFn = | 0.7441 | | PW = | 0.7441 X | \$1,882 | \$1,400 |
| YEAR 15 | | | | | | |
| MILL PVMT & SHLD 2.00" | 100.00% | 667 | SQ YD | \$3.00 | \$2,001 | |
| PD PVMT PATCH M&F ADD'L 2.00" | 1.00% | 7 | SQ YD | \$79.52 | \$557 | |
| HMA OVERLAY PVMT 2.00" | 100.00% | 667 | SQ YD | \$10.70 | \$7,133 | |
| HMA OVERLAY SHLD 2.00 " | 100.00% | 0 | SQ YD | \$9.26 | \$0 | |
| PWFn = | 0.6419 | | PW = | 0.6419 X | \$9,691 | \$6,220 |
| YEAR 20 | | | | | | |
| LONG SHLD JT R&S | 100.00% | 400 | LIN FT | \$2.00 | \$800 | |
| CNTR LINE JOINT R&S | 100.00% | 200 | LIN FT | \$2.00 | \$400 | |
| RNDM / THRM CRACK R&S | 50.00% | 220 | LIN FT | \$2.00 | \$440 | |
| PD PVMT PATCH M&F SURF | 0.10% | 1 | SQ YD | \$80.64 | \$81 | |
| PWFn = | 0.5537 | | PW = | 0.5537 X | \$1,721 | \$953 |
| YEAR 25 | | | | | | |
| LONG SHLD JT R&S | 100.00% | 400 | LIN FT | \$2.00 | \$800 | |
| CNTR LINE JOINT R&S | 100.00% | 200 | LIN FT | \$2.00 | \$400 | |
| RNDM / THRM CRACK R&S | 50.00% | 220 | LIN FT | \$2.00 | \$440 | |
| PD PVMT PATCH M&F SURF | 0.50% | 3 | SQ YD | \$80.64 | \$242 | |
| PWFn = | 0.4776 | | PW = | 0.4776 X | \$1,882 | \$899 |
| YEAR 30 | | | | | | |
| NON-INTERSTATE | | | | | | |
| MILL PVMT & SHLD 2.00" | 100.00% | 667 | SQ YD | \$3.00 | \$2,001 | |
| PD PVMT PATCH M&F ADD'L 2.00" | 2.00% | 13 | SQ YD | \$79.52 | \$1,034 | |
| PD SHLD PATCH M&F ADD'L 2.00" | 1.00% | 0 | SQ YD | \$79.26 | \$0 | |
| HMA OVERLAY PVMT 2.25 " | 100.00% | 667 | SQ YD | \$11.62 | \$7,747 | |
| HMA OVERLAY SHLD 2.25 " | 100.00% | 0 | SQ YD | \$10.42 | \$0 | |
| PWFn = | 0.4120 | | PW = | 0.4120 X | \$10,782 | \$4,442 |
| YEAR 35 | | | | | | |
| LONG SHLD JT R&S | 100.00% | 400 | LIN FT | \$2.00 | \$800 | |
| CNTR LINE JOINT R&S | 100.00% | 200 | LIN FT | \$2.00 | \$400 | |
| RNDM / THRM CRACK R&S | 50.00% | 220 | LIN FT | \$2.00 | \$440 | |
| PD PVMT PATCH M&F SURF | 0.10% | 1 | SQ YD | \$80.64 | \$81 | |
| PWFn = | 0.3554 | | PW = | 0.3554 X | \$1,721 | \$612 |
| YEAR 40 | | | | | | |
| LONG SHLD JT R&S | 100.00% | 400 | LIN FT | \$2.00 | \$800 | |
| CNTR LINE JOINT R&S | 100.00% | 200 | LIN FT | \$2.00 | \$400 | |
| RNDM / THRM CRACK R&S | 50.00% | 220 | LIN FT | \$2.00 | \$440 | |
| PD PVMT PATCH M&F SURF | 0.50% | 3 | SQ YD | \$80.64 | \$242 | |
| PWFn = | 0.3066 | | PW = | 0.3066 X | \$1,882 | \$577 |
| | | | | | | \$16,588 |
| ROUTINE MAINTENANCE ACTIVITY | | 0.08 | Lane Miles | 0.00 | \$0 | \$0 |
| 45 YEAR LIFE CYCLE | CRFn = 0.0407852 | | | | MAINTENANCE | \$16,588 |
| | | | | | MAINTENANCE | \$17,861 |

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

| MAINTENANCE ITEM | % | QUANTITY | UNIT | UNIT COST | COST | PRESENT WORTH |
|---------------------------------|------------------------------|----------|------------|-----------|-------------|---------------|
| YEAR 10 | | | | | | |
| PAVEMENT PATCH CLASS B | 0.10% | 1 | SQ YD | \$275.00 | \$275 | |
| PWF _n = | 0.7441 | | PW = | 0.7441 X | \$275 | \$205 |
| YEAR 15 | | | | | | |
| PAVEMENT PATCH CLASS B | 0.20% | 1 | SQ YD | \$275.00 | \$275 | |
| PWF _n = | 0.6419 | | PW = | 0.6419 X | \$275 | \$177 |
| YEAR 20 | | | | | | |
| PAVEMENT PATCH CLASS B | 2.00% | 13 | SQ YD | \$275.00 | \$3,575 | |
| SHOULDER PATCH CLASS C | 0.50% | 0 | SQ YD | \$145.00 | \$0 | |
| LONGITUDINAL SHLD JT R&S | 100.00% | 400 | LIN FT | \$2.00 | \$800 | |
| CENTERLINE JT R&S | 100.00% | 200 | LIN FT | \$2.00 | \$400 | |
| PWF _n = | 0.5537 | | PW = | 0.5537 X | \$4,775 | \$2,644 |
| YEAR 25 | | | | | | |
| PAVEMENT PATCH CLASS B | 3.00% | 20 | SQ YD | \$275.00 | \$5,500 | |
| SHOULDER PATCH CLASS C | 1.00% | 0 | SQ YD | \$145.00 | \$0 | |
| PWF _n = | 0.4776 | | PW = | 0.4776 X | \$5,500 | \$2,627 |
| YEAR 30 | | | | | | |
| NON-INTERSTATE | | | | | | |
| PAVEMENT PATCH CLASS B | 4.00% | 27 | SQ YD | \$275.00 | \$7,425 | |
| SHOULDER PATCH CLASS C | 1.50% | 0 | SQ YD | \$145.00 | \$0 | |
| HMA POLICY OVERLAY 2.5" (PVMT) | 100.00% | 667 | SQ YD | \$12.83 | \$8,551 | |
| HMA POLICY OVERLAY 2.5" (SHLD) | 100.00% | 0 | SQ YD | \$11.57 | \$0 | |
| PWF _n = | 0.4120 | | PW = | 0.4120 X | \$15,976 | \$6,582 |
| YEAR 35 | | | | | | |
| NON-INTERSTATE | | | | | | |
| LONGITUDINAL SHLD JT R&S | 100.00% | 400 | LIN FT | \$2.00 | \$800 | |
| CENTERLINE JT R&S | 100.00% | 200 | LIN FT | \$2.00 | \$400 | |
| RANDOM CRACK R&S | 50.00% | 200 | LIN FT | \$2.00 | \$400 | |
| REFLECTIVE TRANSVERSE CRACK R&S | 40.00% | 156 | LIN FT | \$2.00 | \$312 | |
| PD PVMT PATCH M&F HMA 2.50" | 0.10% | 1 | SQ YD | \$83.30 | \$83 | |
| PWF _n = | 0.3554 | | PW = | 0.3554 X | \$1,995 | \$709 |
| YEAR 40 | | | | | | |
| NON-INTERSTATE | | | | | | |
| PAVEMENT PATCH CLASS B | 0.50% | 3 | SQ YD | \$275.00 | \$825 | |
| LONGITUDINAL SHLD JT R&S | 100.00% | 400 | LIN FT | \$2.00 | \$800 | |
| CENTERLINE JT R&S | 100.00% | 200 | LIN FT | \$2.00 | \$400 | |
| REFLECTIVE TRANSVERSE CRACK R&S | 60.00% | 234 | LIN FT | \$2.00 | \$468 | |
| RANDOM CRACK R&S | 50.00% | 200 | LIN FT | \$2.00 | \$400 | |
| PD PVMT PATCH M&F HMA 2.50" | 0.50% | 3 | SQ YD | \$83.30 | \$250 | |
| PWF _n = | 0.3066 | | PW = | 0.3066 X | \$3,143 | \$964 |
| | | | | | | \$13,908 |
| ROUTINE MAINTENANCE ACTIVITY | | 0.08 | Lane Miles | \$0.00 | \$0 | \$0 |
| 45 YEAR LIFE CYCLE | CRF _n = 0.0407852 | | | | MAINTENANCE | \$13,908 |
| | | | | | MAINTENANCE | \$14,975 |

Standard Pavement Slope = -0.01563 FT/FT
 Standard Shoulder Slope = -0.04167 FT/FT
 Tied PCC Shoulder Outside Edge Thickness = 7.50 IN
 Standard Stabilized Subbase Thickness = 4.00 IN
 Standard Pavement Subbase Outhang = 1.50 FT
 Standard Shoulder Subbase Outhang = 6.00 IN
 Outside Edge ShldT = 7.50 IN
 <=== (See Dark Orange Color in Diagrams Below)
 <=== (See Dark Orange Color in Diagrams Below)
 <=== (See Yellow Color in Diagrams Below)

Standard Foreslope = 6 :1 FT/FT
 Standard Wedge = 1 :1 FT/FT
 (PCC Pavement) Shoulder Wedge = 0.0001 :1 FT/FT

Standard Surface & Binder SW = 2.01600 TONS / CU YD ==> 112.0 LB per SQYD IN
 Standard Shoulder Subbase SW = 2.05000 TONS / CU YD ==> 113.9 LB per SQYD IN

Standard Surface Thickness = 2.00 IN

HMA Surface (New Pavement) 2.00 IN
 HMA Top Binder Course 2.25 IN
 HMA Lower Binder Course 3.25 IN

HMA Policy Overlay for LSCD 2.00 IN

Interstate HMA Policy Overlay 3.75 IN
 Surface 1.50 IN
 Top Binder Mix 2.25 IN

Over HMA Over PCC
 Non-Interstate HMA Policy Overlay 2.25 IN 2.50 IN
 Surface 1.50 IN 1.50 IN
 Leveling Binder Mix 0.75 IN 1.00 IN

WorkSheet Setting
 Standard Design

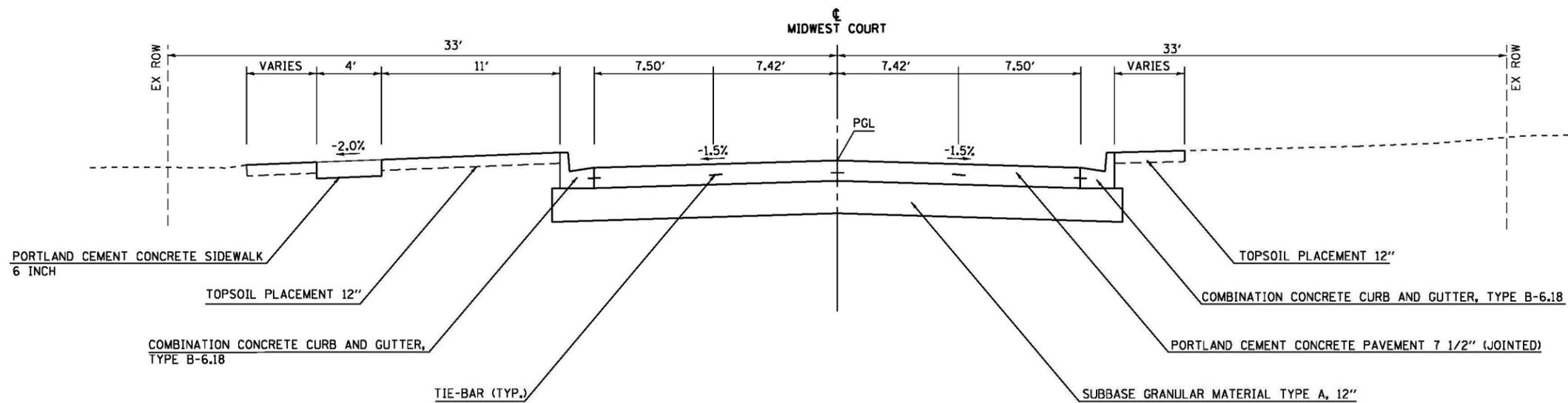
HMA_SD
 NON-INTERSTATE

HMA Policy Overlay 2.25 IN 2.50 IN 2.00 IN
 Surface 1.50 IN 1.50 IN 2.00 IN
 Leveling Binder Mix 0.75 IN 1.00 IN 0.00 IN

Thermal / Random Crack Route & Seal 110 FT / Sta / Lane
 Random Crack Route & Seal 100 FT / Sta / Lane
 Patching: Additional Labor Cost = \$67.00 / SQ YD

Mirror
 LSC Design

HMA_POLICY_OVERLAY
 HMA_LSCD
 NON-INTERSTATE



PROPOSED TYPICAL SECTION MIDWEST COURT

| | | | | | | | | | | | | | | |
|--|-------------------------------|------------|-----------|---|--|-------|----|--------|----------------|---------|---------------------------|-----------------|--------------------|---|
| FILE NAME = D570898-sh1-Typicals_Proposed.dgn | USER NAME = bamej | DESIGNED - | REVISED - | STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION | PROPOSED TYPICAL SECTIONS MIDWEST COURT AND RAMPS A & B | | | | F.A.I. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. | |
| Default | PLOT SCALE = 100.0000' / 1in. | DRAWN - | REVISED - | | SCALE: N.T.S. | SHEET | OF | SHEETS | STA. | TO STA. | 57 | (10-34HB)BR-1 | CHAMPAIGN | X |
| | PLOT DATE = 7/15/2016 | CHECKED - | REVISED - | | | | | | | | | | | |
| | | DATE - | REVISED - | | | | | | | | | | | |
| | | | | | | | | | | | ILLINOIS FED. AID PROJECT | | CONTRACT NO. 70B98 | |