Illinois Department of Transportation

To:	Kensil A. Garnett	Attn: Karen Dvorsky	
From:	Jack Elston	By: Michael Brand	MDB
Subject:	Pavement Design Approval		
Date:	April 25, 2018		

Route:	US 150	Job No.:	D-94-028-13
Section:	(15B)BR	Contract No.:	68B46
County:	Peoria and Tazewell	Target Letting:	
Limits:	at the McClugage Bridge (Peoria/East Peoria)		

On April 24, 2018, the Pavement Selection Committee met to review the pavement design for the above referenced project which was submitted on March 7, 2018. The scope of the project involves replacement of the Eastbound McClugage bridge over the Illinois River and reconstruction/widening of various small sections of US 150, IL 29, and IL 116 to accommodate the new alignment of the structure.

A total of six separate pavement locations were designed and analyzed based upon existing abutting pavement types, constructability, first cost comparisons, and life cycle cost comparisons as applicable.

Location 1 – 950' of Eastbound US 150, West of the bridge:
This location involves both pavement widening greater than 6' and some pavement replacement; therefore, designs for Mechanistic - Full Depth HMA, Modified AASHTO - Flexible, and Composite Pavement were performed and analyzed on a first cost basis.

The Pavement Selection Committee agreed the composite design, although not the least expensive option, was the preferred pavement type due to the construction staging at this location. Using a composite design will allow the PCC base pavement to be placed in the stage constructed locations over three different construction seasons. The final HMA overlay will then be placed during the final construction season to provide continuity of the roadway surface between the widened, new, and existing pavement.

In summary the pavement design selected for this location is:

- 2.5" HMA Overlay
- 8.5" PCC Pavement
- 12" Aggregate Subgrade

Location 2 – 300' of Northbound IL 29, West of the bridge:
This location involves variable width widening (1' – 12'); therefore, designs for Mechanistic - Full Depth HMA, Modified AASHTO - Flexible, and Composite Pavement were performed and analyzed on a first cost basis.

The Pavement Selection Committee agreed the composite design was the preferred pavement type due to the construction staging at this location and it also happened to be the least expensive. Using a composite design will allow the PCC base course widening to be placed in construction Season 3. The final HMA overlay will then be placed during the final construction season to provide continuity of the roadway surface.

In summary the pavement design selected for this location is:

2.5" HMA Overlay
8.5" PCC Base Course Widening
12" Aggregate Subgrade

Location 3 – 500' of Entrance Ramp E (NB IL 29 to EB US 150) and 760' of Northbound IL 29 where Ramp E departs IL 29:
This location involves pavement reconstruction and the staging will allow the pavement to be placed entirely in Season 3. Therefore, mechanistic designs for Full Depth HMA and PCC were performed and analyzed on a life cycle cost basis.

The Pavement Selection Committee agreed PCC was the preferred pavement type for this location even though it was not the least expensive. Two main issues were discussed:

First, the location of the new ramp, gore and runout area is at a transition location between composite pavement to the South and PCC pavement to the North on existing IL 29. Both pavements will remain in place; however, most of the new pavement will be located adjacent to the existing PCC.

Second, the new ramp pavement is only about 500' long. This length does not provide any economics for using an HMA paving train. Also, when this ramp pavement is constructed, the connection to the bridge on-ramp that the roadway leads up to may or may not be constructed. Whether the bridge is constructed or not, an HMA paver would have to back down the grade, as would the material trucks and rollers. To achieve the final pavement thickness, this sequence would occur at least 3 times. This would lead not only to additional time and constructability issues but also could lead to damage of the HMA.

In summary the pavement design selected for this location is:

9.5" PCC Pavement
12" Aggregate Subgrade

Location 4 – 800' of Eastbound US 150, East of the bridge:
This location involves new pavement construction; therefore, mechanistic designs for Full Depth HMA and PCC were performed and analyzed on a life cycle cost basis. The construction sequencing was not a factor and the life cycle cost analysis showed the full-depth HMA option was 21.2% less expensive.

In summary, the pavement design selected for this location is:

10.75" Full-Depth HMA
12" Aggregate Subgrade

Location 5 – 2300' of Ramp SW (EB US 150 to SB IL 116), East of the bridge:
This location involves new pavement construction; therefore, mechanistic designs for Full Depth HMA and PCC were performed and analyzed on a life cycle cost basis. The construction sequencing was not a factor and the life cycle cost analysis showed the full-depth HMA option was 16.7% less expensive.

In summary, the pavement design selected for this location is:

10.75" Full-Depth HMA
12" Aggregate Subgrade

Location 6 – 2500' of Southbound IL 116, East of the bridge:
This location involves the addition of a 3rd Southbound lane on IL 116 and some radius improvements at the Marina Lake intersection. Mechanistic designs for Full Depth HMA and PCC were performed and analyzed on a life cycle cost basis. The construction sequencing was not a factor and the life cycle cost analysis showed the PCC option was 9.8% less expensive. Since the options were within 10%, the Pavement Selection Committee discussed this location and selected full-depth HMA to match the existing pavement on IL 116 and to provide continuity with Locations 4 and 5.

In summary, the pavement design selected for this location is:

10.75" Full-Depth HMA
12" Aggregate Subgrade

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

Illinois Department of Transportation

Memorandum

To:	Jack Elston, Bureau of Design & Environment Attn. Mike Brand
From:	Kensil A. Garnett
Subject:	**Pavement Design (Contract No. 68B46)**
Date:	March 7, 2018

BUREAU OF PROGRAM DEVELOPMENT
STUDIES & PLANS – PHASE II
FAP Route 317 (US 150)
Section (15B)BR
Location: Construction of the structure carrying eastbound US 150 (McClugage Bridge) over the Illinois River
Peoria and Tazewell Counties
Contract No. 68B46
Job No. D-94-028-13
Catalog No. 034923-00D

Attached for approval are the pavement designs for construction of the structure carrying eastbound US Route 150 (McClugage Bridge) over the Illinois River in Peoria and Tazewell Counties. Pavement designs for this project are required at the US 150/IL 29 interchange in Peoria, US 150/IL 116 interchange in Tazewell County and southbound IL Route 116 in Tazewell County.

A total of six (6) locations were analyzed and pavement designs developed for each based on abutting pavement types to remain, constructability, first cost comparison or life cycle cost comparison. From the pavement type and thicknesses developed, a total of three (3) pavement types and thicknesses are recommended for the project as follows:

Composite Pavement

A composite pavement design of 11.00" is recommended at Locations 1 and 2 (Note that all locations are shown in Exhibit 1 of the Report).

The pavement type and thicknesses will consist of the following:

- Polymerized HMA Surface Course 1.50"
- Polymerized HMA Leveling Binder 1.00"
- PCC Base Course 8.50"

Mechanistic Flexible Pavement

A mechanistic flexible pavement design of 10.75" is recommended at Locations 4, 5 and 6. These are the locations of the eastbound US 150 pavement, SW Ramp and southbound IL Route 116 lane addition in Tazewell County.

The pavement type and thicknesses will consist of the following:

- Polymerized HMA Surface Course 2.00"
- Polymerized HMA Binder Course 2.25"
- HMA Binder Course (Lower Binder) 6.50"

Mechanistic Rigid Pavement

A mechanistic rigid pavement design of 9.50" is recommended at Location 3. This is the location of the proposed Ramp E, gore and transition area in Peoria.

The pavement type and thicknesses will consist of the following:

- PCC Pavement 9.50" (Jointed)

Subgrade

It is recommended to use a 12" subbase granular material at all locations.

Shoulders

It is recommended to use 8.00" hot-mix asphalt shoulders at the locations of composite and mechanistic flexible pavements. It is recommended to use 9.50" Portland cement concrete shoulders at Location 3 which is mechanistic rigid pavement.

The methodology used, assumptions made, analysis, results and recommendations are provided in a write-up of each in the Report. Supporting documentation for the design recommendations is given in each of the six (6) Location sections of the Report.

This project is scheduled for the March 8, 2019 letting. The PS&E submittal is December 14, 2018.

Please review the attached Report and approve or provide any comments you may have. If you have any questions, please contact Mr. Chris Maushard of our office at (309) 671-3453.

Kensil A Garnett (KSD)

Kensil A. Garnett, P.E.
Region Three Engineer

CEM:tdp

Attachment (Report/Exhibit)

cc: Project File (C. Maushard)
Project Engineer (C. Maushard)

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Illinois Department of Transportation
Region 3 District 4

FAS 317 (US 150)
Section [15B;(102-1)BR]BR
Reconstruction of the eastbound US 150 (McClugage Bridge) structure
Peoria and Tazewell Counties
Contract No. 68B46

PAVEMENT DESIGN

Prepared By:
Christopher Maushard
Project Engineer

March 2018

FAP 317 (US 150)
Section [15B;(102-1)BR]BR
Peoria and Tazewell Counties
Contract No. 68B46

Executive Summary

Description

Pavement designs were prepared for the proposed roadway improvements that will accompany the reconstruction of the eastbound US 150 (McClugage Bridge) structure that spans the Illinois River in Peoria and Tazewell Counties (See Location Map). The construction of this project is expected to be performed through the 2019-2023 construction seasons.

The pavement designs were performed at six (6) Locations within the project limits at areas within the eastbound US 150 pavement, US 150/IL Route 29 interchange in Peoria, proposed SW Ramp in Tazewell County and southbound IL Route 116 in Tazewell County (See Exhibit 1). A summary of the Locations is given as follows:

- Location 1 – Eastbound US 150 Station 2097+58 to 2107+04 in Peoria
- Location 2 – IL Route 29 Station 604+58 to 607+45 in Peoria
- Location 3 – Eastbound US 150 Ramp E Station 1500+00 to 1505+00 and IL Route 29 Station 607+45 to 615+10 in Peoria
- Location 4 – Eastbound US 150 Station 2169+63 to 2177+55 in Tazewell County
- Location 5 – Ramp SW Station 10+79 to 33+94 in Tazewell County
- Location 6 – IL Route 116 SB Lane Addition Station 186+04 to 211+12 in Tazewell County

The pavement designs are required to accommodate geometric improvements to the interchanges, new alignment of the proposed structure and lane additions to enhance capacity and traffic progression.

Analysis

Each Location was analyzed according to the improvements that are required for the project. The Design Methodology Flowchart in Figure 54-1.A was used to determine each pavement analysis. Pavement widening or new construction/reconstruction are the criteria that was used according to the improvements proposed at each Location. Once each pavement analysis was complete, a review of the proposed construction staging was used to determine which season(s) the pavements construction was to be completed. That determination was also factored into the decision for the recommended pavement type and thickness.

Results

The results of the analysis show the pavement design and thickness for each Location given as follows:

- Location 1 – Composite Pavement with a total pavement thickness of 10.75".
- Location 2 – Composite Pavement with a total pavement thickness of 11.00".
- Location 3 – Mechanistic Rigid with a total pavement thickness of 8.75".
- Location 4 – Mechanistic Flexible with a total pavement thickness of 10.50".
- Location 5 – Mechanistic Flexible with a total pavement thickness of 10.00".
- Location 6 – Mechanistic Flexible with a total pavement thickness of 10.75".

Recommendation

To aid in the Phase III estimating, administration and construction of the project, it is proposed to specify three (3) pavement types for the project which are given as follows:

Composite Pavement

A composite pavement design of 11.00" is recommended at Locations 1 and 2.

The pavement type and thicknesses will consist of the following:
- Polymerized HMA Surface Course 1.50"
- Polymerized HMA Leveling Binder 1.00"
- PCC Base Course 8.50"

Mechanistic Flexible Pavement

A mechanistic flexible pavement design of 10.75" is recommended at Locations 4, 5 and 6. These are the Locations of the eastbound US 150 pavement, SW Ramp and southbound IL Route 116 lane addition in Tazewell County.

The pavement type and thicknesses will consist of the following:
- Polymerized HMA Surface Course 2.00"
- Polymerized HMA Binder Course (Upper) 2.25"
- HMA Binder Course (Lower Binder) 6.50"

Mechanistic Rigid Pavement

A mechanistic rigid pavement design of 9.50" is recommended at Location 3. This is the location of the proposed Ramp E, gore and transition area in Peoria.

The pavement type and thicknesses will consist of the following:
- PCC Pavement 9.50" (Jointed)

Subgrade

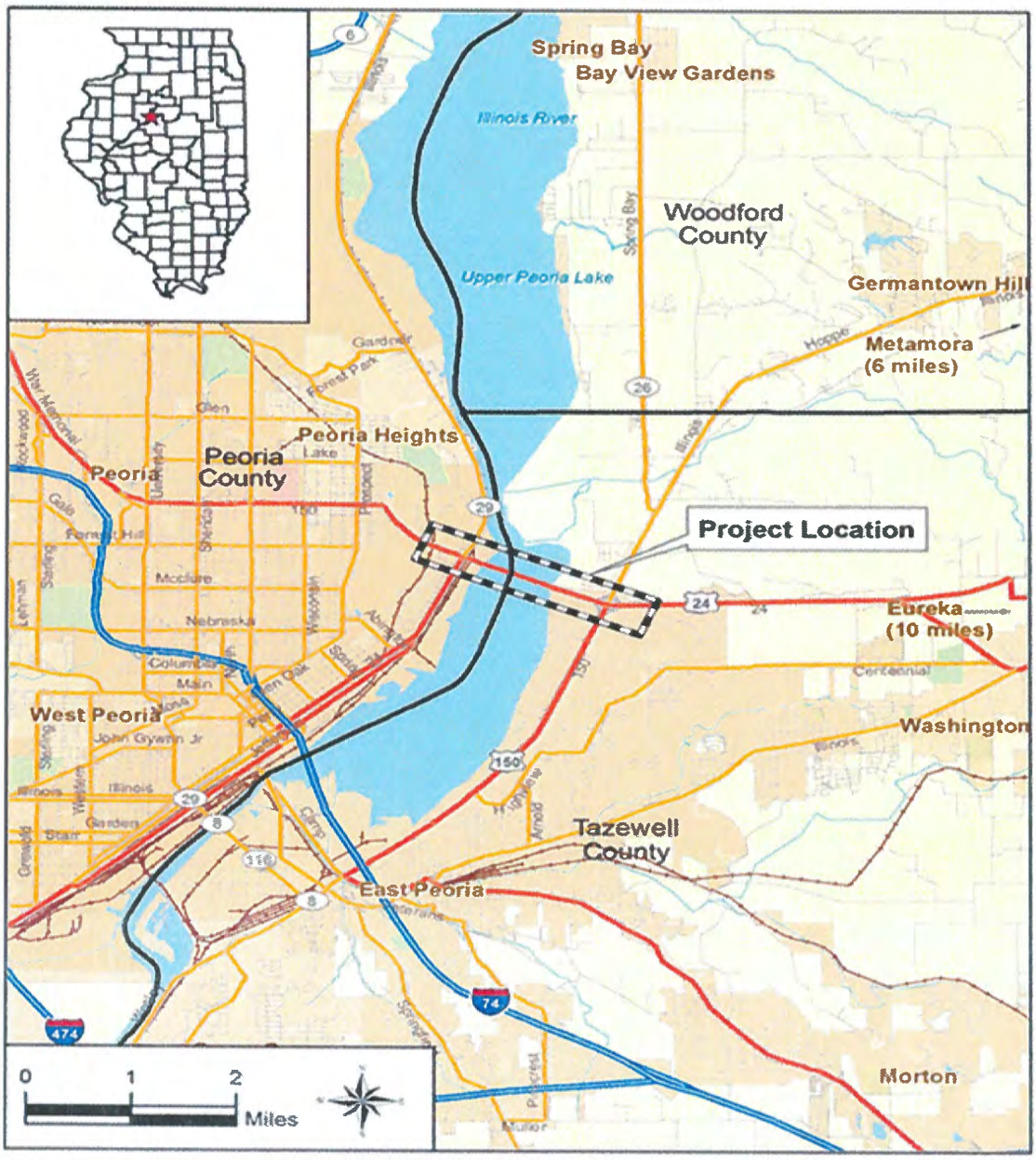
It is recommended to use 12" subbase granular material at all Locations.

Shoulders

It is recommended to use 8.00" hot mix asphalt shoulders at the Locations of composite and mechanistic flexible pavements. It is recommended to use 9.50" portland cement concrete shoulders at Location 3 which is mechanistic rigid pavement.

Project Description

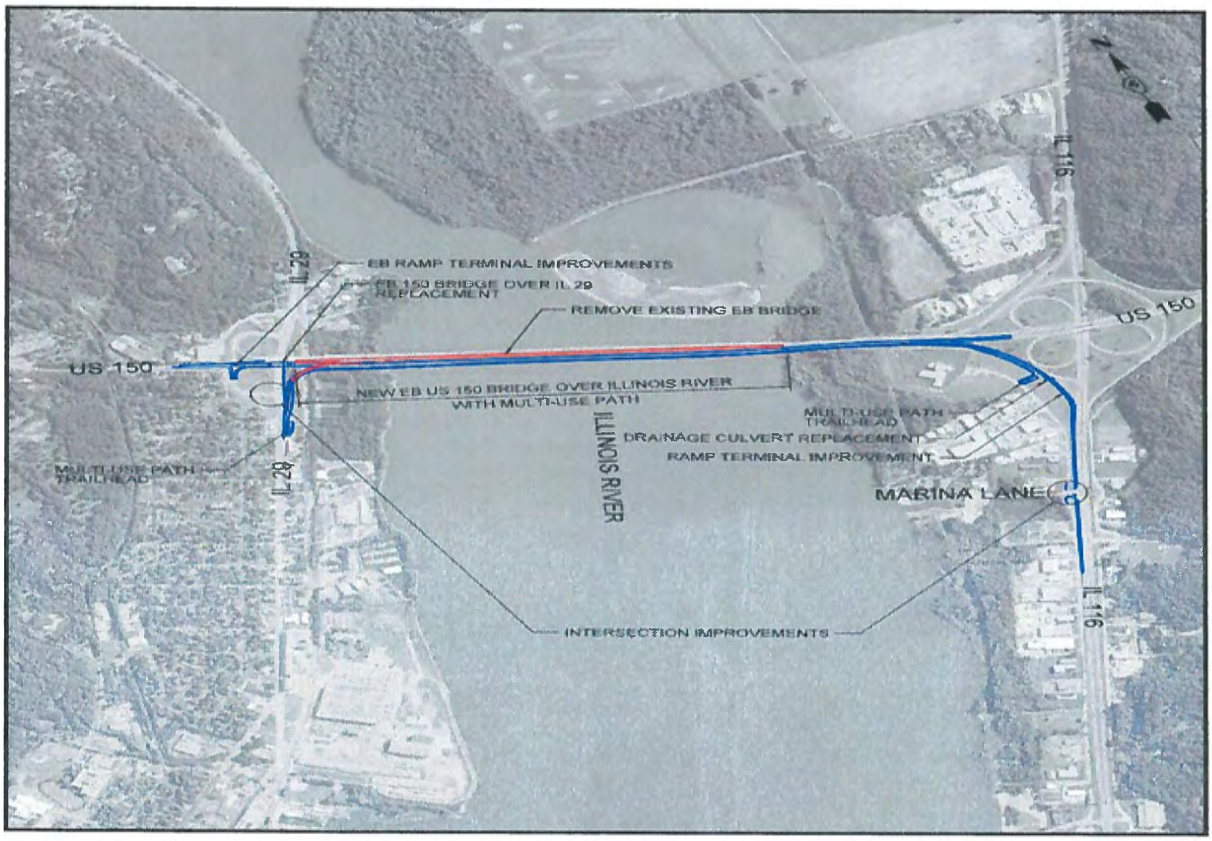
This project is located along the Illinois River beginning in the City of Peoria at the west terminus of the project and extending east into Tazewell County, Illinois. The project is within the jurisdictions of the City of Peoria and the City of East Peoria. (See Project Location Map). The project will provide roadway and bridge improvements to the US 150/IL Route 29 interchange in Peoria, Eastbound US 150 (McClugage Bridge) structure that spans the Illinois River, US 150/IL Route 116 interchange in Tazewell County and southbound IL Route 116 from the US 150/IL Route 116 interchange to south of Centennial Drive in Tazewell County. The total project length on eastbound US 150 is approximately 1.8 miles.



Project Improvements

Following is a listing of the proposed improvements for the project:

- Remove the existing 70 year old thru-truss structure and piers (existing eastbound McClugage Bridge).
- Replace the existing eastbound McClugage Bridge with a new eastbound US 150 mainspan and approach span bridges over the Illinois River.
- Reconstruct portions of existing eastbound US 150 and eastbound ramps at the US 150/IL 29 interchange in Peoria.
- Remove the existing ramp that carries eastbound US 150 traffic to southbound IL Route 116 in Tazewell County and replace with a new ramp (SW IL 116 Ramp)
- Addition of a third lane on southbound IL Route 116 at the location of the new SW IL 116 Ramp that will extend south through the Marina Lane intersection and Centennial Drive intersection and taper back into a two lane section south of Centennial Drive.
- Addition of a multi-use path on the bridge structure and trail connections to the path at both the east and west connections to the bridge.
- Proposed improvements to the roadway lighting, pedestrian crossings, and traffic signals.
- Improved width of the navigational channel in the Illinois River for commercial barge traffic.
- Drainage improvements.



Analysis

Pavement designs are required for the existing pavement sections affected by the new alignment of the proposed eastbound McClugage Bridge. Each pavement section is defined in Exhibit 1 with a layout of each area provided on plan sheets shown in Exhibit 2. A total of six (6) pavement sections (Locations) have been designed for pavement type and thickness based on the projected Average Dailey Traffic (ADT), Single Unit (SU), and Multiple Unit (MU) traffic. Additional considerations such as staged construction and pavement constructability have been factored into each design to determine the pavement type and thickness that is recommended for each Location.

Data

The ADT, SU, MU traffic counts were obtained from actual counts taken from the districts traffic counts coordinator. Each count was projected to a 2042 traffic count based on the growth rate of each roadway that was established in the approved Interchange Design Studies. The projected counts were then used for calculating the traffic factors and pavement thicknesses. The existing and projected counts for each roadway are shown in Exhibit 3. Additional information for the total square yards of new pavement at each of the six (6) Locations is shown in Exhibit 4. A summary of the construction occurring in each construction season is shown in Exhibit 5.

Following is a list of assumptions made for the pavement designs:

- All roadways are Class I facilities
- All roadways assume a POOR subgrade
- All roadways are classified as Other Arterial
- Design Period = 20 years
- Estimated Construction Year is 2022
- Structural Design Year is 2032
- For mainline US 150 and IL Route 116: Per Section 54-2.2(2), Use two-way ADT for multilane facilities when calculating the structural design traffic distribution factors as shown in Fig. 54-2.B.

Results

The results of the analysis of the six (6) Locations are shown individually in each Location section of the report. Discussion of each Location along with the pavement analysis and proposed typical section is given. A summary of each Location is given as follows:

- Location 1 - Eastbound US 150 Station 2097+58 to 2107+04 in Peoria.
  This Location will be a combination of pavement widening greater than 6 feet along with a section of the existing US 150 pavement that will be removed and replaced. As a result, this Location was analyzed as pavement widening greater than 6 feet. Pavement

analysis of Mechanistic Flexible, Modified AASHTO Flexible and Composite Pavement were performed. The results of the first cost analysis show that the Mechanistic Flexible option had the lowest first cost. Given the small sections of pavement of various lengths and widths constructed through various stages and seasons of construction, the Composite Pavement design is recommended for this location. **The calculated pavement thickness for this Location is 10.75".**

- Location 2 – IL Route 29 Station 604+58 to 607+45 in Peoria.
  This Location was analyzed as pavement widening greater than 6 feet because of its variable pavement widening (0' to 12'). Pavement analysis of Mechanistic Flexible, Modified AASHTO Flexible and Composite Pavement were performed. The results of the first cost analysis show that the Composite Pavement option had the lowest first cost. Given the variable width of pavement the Composite Pavement design is recommended for this location. **The calculated pavement thickness for this Location is 11.00".**

- Location 3 – Eastbound US 150 Ramp E (Northbound IL Route 29 to Eastbound US 150) Station 1500+00 to 1505+00 and IL Route 29 Station 607+45 to 615+10 in Peoria.
  This Location was analyzed as new construction/reconstruction. Both Mechanistic Rigid and Mechanistic Flexible pavement analysis with life cycle cost analysis were performed. The results of the life cycle cost analysis show that the Mechanistic Flexible pavement has the lowest annual cost per mile. Given the constraints discussed in the Pavement Design Location Summary (See Pavement Design Locations – Location 3) it is proposed to use the Mechanistic Rigid pavement option for this location. **The calculated pavement thickness for this Location is 8.75".**

- Location 4 – Eastbound US 150 Station 2169+63 to 2177+55 in Tazewell County.
  This Location was analyzed as new construction/reconstruction. Both Mechanistic Rigid and Mechanistic Flexible pavement analysis with life cycle cost analysis were performed. The results of the life cycle cost analysis show that the Mechanistic Flexible pavement has the lowest annual cost per mile and is recommended for this location. **The calculated pavement thickness for this Location is 10.50".**

- Location 5 – Ramp SW (EB US 150 to SB IL 116) Station 10+79 to 33+94 in Tazewell County.
  This Location was analyzed as new construction/reconstruction. Both Mechanistic Rigid and Mechanistic Flexible pavement analysis with life cycle cost analysis were performed. The results of the life cycle cost analysis show that the Mechanistic Flexible pavement has the lowest annual cost per mile and is recommended for this location. **The calculated pavement thickness for this Location is 10.00".**

- Location 6 – IL Route 116 SB Lane Addition Station 186+04 to 211+12 in Tazewell County.
  This Location was analyzed as new construction/reconstruction for the lane addition. Both Mechanistic Rigid and Mechanistic Flexible pavement analysis with life cycle cost

analysis were performed. The results of the life cycle cost analysis show that the Mechanistic Rigid pavement has the lowest annual cost per mile. Given that the existing pavement for this section of IL Route 116 is hot mix asphalt and the new SW Ramp pavement is proposed to be full depth hot mix asphalt, the recommendation is the Mechanistic Flexible pavement option for this location. **The calculated pavement thickness for this Location is 10.75".**

Recommendation for the Project

Various pavement types and thicknesses have been determined at each Location. To simplify the Phase III estimating, administration and construction of the project, it is proposed to specify three (3) pavement types and thicknesses for the project.

Composite Pavement

A composite pavement design of 11.00" is recommended at Locations 1 and 2. The pavement type and thicknesses will consist of the following:

- Polymerized HMA Surface Course 1.50"
- Polymerized HMA Leveling Binder 1.00"
- PCC Base Course 8.50"

Mechanistic Flexible Pavement

A mechanistic flexible pavement design of 10.75" is recommended at Locations 4, 5 and 6. These are the Locations of the mainline pavement of eastbound US 150 and southbound IL Route 116 lane addition in Tazewell County. The pavement type and thicknesses will consist of the following:

- Polymerized HMA Surface Course 2.00"
- Polymerized HMA Binder Course (Upper) 2.25"
- HMA Binder Course (Lower Binder) 6.50"

Mechanistic Rigid Pavement

A mechanistic rigid pavement design of 9.50" is recommended at Location 3. This is the location of the proposed Ramp E, gore and transition area in Peoria.

The pavement type and thicknesses will consist of the following:
- PCC Pavement 9.50" (Jointed)

Subgrade

It is recommended to use 12" subbase granular material at all Locations.

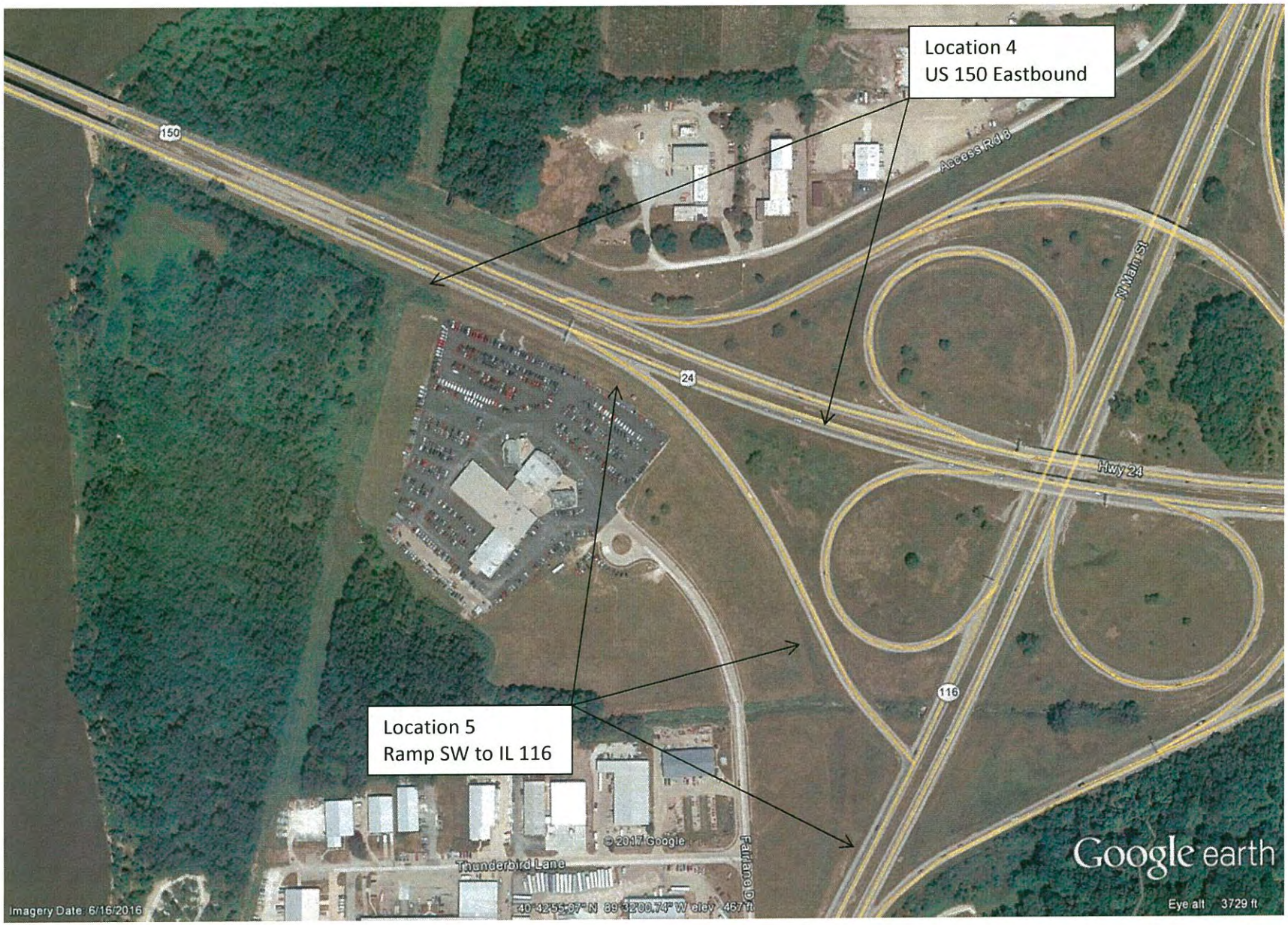
Shoulders

It is recommended to use 8.00" hot mix asphalt shoulders at the Locations of composite and mechanistic flexible pavements. It is recommended to use 9.50" portland cement concrete shoulders at Location 3 which is mechanistic rigid pavement.

EXHIBIT 1 – PAVEMENT SECTION LOCATIONS

US 150/IL 29 Pavement Design
Location Map

Exhibit 1



US 150/IL 116 Pavement Design
Location Map

Exhibit 1

IL 116 Southbound Pavement Design
Location Map

Exhibit 1

FAP 317 (US 150)
Section [15B;(102-1)BR]BR
Peoria and Tazewell Counties
Contract No. 68B46
Addendum A

Unit Price Weighted Average Executive Summary

Description

This addendum accompanies the original Pavement Design Report submitted to the Statewide Pavement Selection Committee for review and approval on March 7, 2018. In the original analysis of that Report, unique unit costs were developed for each pay item at each of the six (6) Locations where separate pavement designs were developed. The unique unit costs were developed from the quantities associated with each pay item at each Location. Each Location was then analyzed independently of the others for either first cost or life cycle cost.

In a subsequent discussion it was decided that this approach, although an acceptable method to perform the first cost or life cycle cost analysis at each Location, would not represent a real-world situation in which one unit cost would be bid for each respective pay item by the Contractor for the entire project. Given that, it was decided to perform an overall weighted average for each pay item and associated individual unit cost prices from each Location. In doing so, this would provide an accurate representation of what could be expected for unit price bids for each pay item. This single project unit cost for each pay item was then applied to first cost or life cycle cost analysis at each Location.

To reiterate, the six (6) Locations where pavement designs were developed in the original Report are given as follows:

- Location 1 – Eastbound US 150 Station 2097+58 to 2107+04 in Peoria
- Location 2 – IL Route 29 Station 604+58 to 607+45 in Peoria
- Location 3 – Eastbound US 150 Ramp E Station 1500+00 to 1505+00 and IL Route 29 Station 607+45 to 615+10 in Peoria
- Location 4 – Eastbound US 150 Station 2169+63 to 2177+55 in Tazewell County
- Location 5 – Ramp SW Station 10+79 to 33+94 in Tazewell County
- Location 6 – IL Route 116 SB Lane Addition Station 186+04 to 211+12 in Tazewell County

Analysis

Shown attached is a Pay Item Unit Cost Weighted Average Summary spreadsheet that shows each pay item used in the original pavement design analysis along with the total quantity of each and the weighted unit price of each. Along with this Summary, first cost or life cycle cost were developed at each Location based on the method of pavement analysis that was completed for each Location (See Pavement Design Report). The results of either the first cost or life cycle cost analysis are also given in each Location section attached.

Results

The results of the weighted average analysis show the pavement design and thickness for each Location remain as originally reported in the Pavement Design Report. Those are given as follows:

- Location 1 – Composite Pavement with a total pavement thickness of 10.75".
- Location 2 – Composite Pavement with a total pavement thickness of 11.00".
- Location 3 – Mechanistic Rigid with a total pavement thickness of 8.75".
- Location 4 – Mechanistic Flexible with a total pavement thickness of 10.50".
- Location 5 – Mechanistic Flexible with a total pavement thickness of 10.00".
- Location 6 – Mechanistic Flexible with a total pavement thickness of 10.75".

Recommendation

The Recommendation for the pavement types and thicknesses will likewise remain the same as those reported in the original Pavement Design Report. It is proposed to specify three (3) pavement types for the project which are given as follows:

Composite Pavement

A composite pavement design of 11.00" is recommended at Locations 1 and 2.

The pavement type and thicknesses will consist of the following:
- Polymerized HMA Surface Course 1.50"
- Polymerized HMA Leveling Binder 1.00"
- PCC Base Course 8.50"

Mechanistic Flexible Pavement

A mechanistic flexible pavement design of 10.75" is recommended at Locations 4, 5 and 6. These are the Locations of the eastbound US 150 pavement, SW Ramp and southbound IL Route 116 lane addition in Tazewell County.

The pavement type and thicknesses will consist of the following:
- Polymerized HMA Surface Course 2.00"
- Polymerized HMA Binder Course (Upper) 2.25"
- HMA Binder Course (Lower Binder) 6.50"

Mechanistic Rigid Pavement

A mechanistic rigid pavement design of 9.50" is recommended at Location 3. This is the location of the proposed Ramp E, gore and transition area in Peoria.

The pavement type and thicknesses will consist of the following:
- PCC Pavement 9.50" (Jointed)

Subgrade

It is recommended to use 12" subbase granular material at all Locations.

Shoulders

It is recommended to use 8.00" hot mix asphalt shoulders at the Locations of composite and mechanistic flexible pavements. It is recommended to use 9.50" portland cement concrete shoulders at Location 3 which is mechanistic rigid pavement.

Pay Item Unit Cost Weighted Average Summary

					Composite Pavement Location 1		Composite Pavement Location 2		Mechanistic PCC Location 3		Mechanistic HMA Location 4		Mechanistic HMA Location 5		Mechanistic HMA Location 6	
Pay Code	Pay Item	Unit	Total Quantity	**Wtd Unit Price**	Quantity	Unit Price	Quantity	Unit Price	Quantity	Unit Price	Quantity	Unit Price	Quantity	Unit Price	Quantity	Unit Price
40603540	Poly HMA SC, Mix D, N70	Ton	2,026	**$111.57**	396	$116.59	24	$350.05			831	$104.40	461	$110.77	314	$107.19
40600837	Poly HMA LB, MM, N70	Ton	280	**$155.97**	264	$136.85	16	$471.49								
40603208	Poly HMA Binder, IL 9.5, N70	Ton	1,806	**$103.91**							935	$102.18	518	$107.06	353	$103.86
40603085	HMA Binder Cse, IL 19.0, N70	Ton	4,943	**$93.58**							2597	$90.68	1325	$89.73	1021	$105.96
48203100	HMA Shoulders	Ton	4,859	**$81.18**							2023	$80.84	1986	$78.21	850	$88.94
35300305	PCC Base Course 8.25"	Sq. Yard	4,710	**$46.53**	4710	$46.53										
35300310	PCC Base Course 8.50"	Sq. Yard	280	**$58.31**			280	$58.31								
42000316	PCC Pavement 8.75" (Jointed)	Sq. Yard	5,340	**$50.92**					907	$74.87			4433	$46.02		
42000401	PCC Pavement 9.00" (Jointed)	Sq. Yard	10,223	**$59.67**							7419	$59.28			2804	$60.71
48300300	PCC Shoulders 8.00"	Sq. Yard	6,414	**$54.25**							4516	$54.13			1898	$54.55
48300315	PCC Shoulders 8.75"	Sq. Yard	658	**$74.60**					658	$74.60						
31200100	Stabilized Subbase 4"	Sq. Yard	27,576	**$20.13**					1582	$25.75	12185	$19.99	8817	$19.72	4992	$19.42
31100100	Subbase Gran Mat'l, Ty A	Ton	18,321	**$25.38**					1095	$35.42	8164	$24.25	5846	$23.83	3216	$27.65
31101900	Subbase Gran Mat'l, Ty C	Ton	1,447	**$25.50**							644	$25.56	505	$24.69	298	$26.72

LOCATION 1

Location 1 First Cost Analysis (Weighted Average Unit Prices)					
Location 1	Thickness	Unit	Quantity	Unit Cost	Cost
Mechanistic: Flexible					
40603540 Polymerized HMA Surface Course, Mix "D", N70	2.00"	Ton	528	$111.57	$58,908.96
40603208 Polymerized HMA Binder Course, IL 9.5, N70 (Upper Binder)	2.25"	Ton	593	$103.91	$61,618.63
40603085 HMA Binder Course, IL 19.0, N70 (Lower Binder)	6.25"	Ton	1649	$93.58	$154,313.42
Total					**$274,841.01**
Modified AASHTO: Flexible					
40603540 Polymerized HMA Surface Course, Mix "D", N70	2.00"	Ton	528	$111.57	$58,908.96
40603208 Polymerized HMA Binder Course, IL 9.5, N70 (Upper Binder)	2.25"	Ton	593	$103.91	$61,618.63
40603085 HMA Binder Course, IL 19.0, N70 (Lower Binder)	6.25"	Ton	1649	$93.58	$154,313.42
31101200 Subbase Granular Material, Type B 4"	4.00"	SY	4710	$6.36	$29,955.60
Total					**$304,796.61**
Composite Design					
40603540 Polymerized HMA Surface Course, Mix "D", N70	1.50"	Ton	396	$111.57	$44,181.72
40600837 Polymerized HMA Leveling Binder (Machine Method), N70	1.00"	Ton	264	$155.97	$41,176.08
35300305 PCC Base Course 8.25"	8.25"	SY	4710	$46.53	$219,156.30
Total					**$304,514.10**

*Composite Pavement Design is Recommended at this Location

LOCATION 2

Location 2 First Cost Analysis (Weighted Average Unit Prices)					
Location 2	Thickness	Unit	Quantity	Unit Cost	Cost
Mechanistic: Flexible					
40603540 Polymerized HMA Surface Course, Mix "D", N70	2.00"	Ton	31	$111.57	$3,458.67
40603208 Polymerized HMA Binder Course, IL 9.5, N70 (Upper Binder)	2.25"	Ton	35	$103.91	$3,636.85
40603085 HMA Binder Course, IL 19.0, N70 (Lower Binder)	6.25"	Ton	98	$93.58	$9,170.84
Total					**$16,266.36**
Modified AASHTO: Flexible					
40603540 Polymerized HMA Surface Course, Mix "D", N70	2.00"	Ton	31	$111.57	$3,458.67
40603208 Polymerized HMA Binder Course, IL 9.5, N70 (Upper Binder)	2.25"	Ton	35	$103.91	$3,636.85
40603085 HMA Binder Course, IL 19.0, N70 (Lower Binder)	7.00"	Ton	110	$93.58	$10,293.80
31101200 Subbase Granular Material, Type B 4"	4.00"	SY	280	$27.08	$7,582.40
Total					**$24,971.72**
Composite Design					
40603540 Polymerized HMA Surface Course, Mix "D", N70	1.50"	Ton	24	$111.57	$2,677.68
40600837 Polymerized HMA Leveling Binder (Machine Method), N70	1.00"	Ton	16	$155.97	$2,495.52
35300310 PCC Base Course 8.50"	8.50"	SY	280	$58.31	$16,326.80
Total					**$21,500.00**

Composite Pavement Design is Recommended at this Location

LOCATION 3

Location 3 First Cost (Weighted Average Unit Prices)					
Location 3	Thickness	Unit	Quantity	Unit Cost	Cost
Mechanistic: Flexible					
40603540 Polymerized HMA Surface Course, Mix "D", N70	2.00"	Ton	102	$111.57	$11,380.14
40603208 Polymerized HMA Binder Course, IL 9.5, N70 (Upper Binder)	2.25"	Ton	114	$103.91	$11,845.74
40603085 HMA Binder Course, IL 19.0, N70 (Lower Binder)	5.75"	Ton	292	$93.58	$27,325.36
48203100 HMA Shoulders	8.00"	Ton	295	$81.18	$23,948.10
31101900 Subbase Granular Material, Type C	Var.	Ton	75	$25.50	$1,912.50
31100100 Subbase Granular Material, Type A	12.00"	Ton	1070	$25.38	$27,156.60
Total					**$103,568.44**
Mechanistic: Rigid					
42000316 PCC Pavement 8 3/4" (Jointed)	8.75"	SY	907	$50.92	$46,184.44
48300315 PCC Shoulders 8 3/4"	8.75"	SY	658	$74.60	$49,086.80
31200100 Stabilized Subbase 4"	4.00"	SY	1582	$20.13	$31,845.66
31100100 Subbase Granular Material, Type A	12.00"	Ton	1095	$25.38	$27,791.10
Total					**$154,908.00**

*Mechanistic Rigid Design is Recommended at this Location

BDE 5401 Template (Rev. 09/05/2013) **IDOT MECHANISTIC PAVEMENT DESIGN** Printed: 04/16/2018

Location 3

PROJECT AND TRAFFIC INPUTS (Enter Data in Gray Shaded Cells)

Route: FAP 317 (US 150) Comments: Ramp E (Northbound IL Route 29 to Eastbound US 150) Station 1500+00 to 1505+62
Section: 15B(BR)
County: Peoria and Tazewell Design Date: 01/05/2018 CEM <-- BY
Location: Illinois River in Peoria Modify Date: <-- BY

	ADT	Year
Current:	3,447	2014
Future:	3,953	2042

Facility Type: Other Marked State Route ** Ramp Design Fig. 54-1.B **
# of Lanes = 1 Lane Ramp Crossroad? Other Marked State Route
# of Lanes = 4

Road Class: I

Subgrade Support Rating (SSR): Poor
Construction Year: 2022
Design Period (DP) = 20 years

	Structural Design Traffic			
	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	3,650	96.8%	P = 100%
SU =	250	94	2.5%	S = 100%
MU =	750	28	0.8%	M = 100%

Struct. Design ADT = 3,772 (2032)

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT		RAMP DESIGN MIN	
Cpv =	0.15	0.15	32%
Csu =	132.5	112.06	45%
Cmu =	482.53	385.44	45%
TF flexible (Actual) =	0.53	(Actual ADT)	2.85
TF flexible (Min) =	2.85	(Min ADT Fig. 54-2.C)	

RIGID PAVEMENT		RAMP DESIGN MIN	
Cpv =	0.15	0.15	32%
Csu =	143.81	135.78	45%
Cmu =	696.42	567.21	45%
TF rigid (Actual) =	0.68	(Actual ADT)	4.13
TF rigid (Min) =	4.13	(Min ADT Fig. 54-2.C)	

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible = 2.85
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)
Goto Map — HMA Mixture Temp. = 76.5 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 650 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 89 (Fig. 54-5.E)
Goto Map — Full Depth HMA Design Thickness = 10.00 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 15.50 in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness = 10.00 inches

JPC Pavement

Use TF rigid = 4.13
Edge Support = Tied Shoulder or C.&G.
Rigid Pavt Thick. = 8.75 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 4.13
IBR value = 3
CRCP Thickness = 7.75 in. (Fig. 54-4.M)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible = 2.85
Goto Map — HMA Overlay Design Thickness = 7.25 in. (Fig. 54-5.U)
Limiting Strain Criterion Thickness = 11.00 in. (Fig. 54-5.V)
Use HMA Overlay Thickness = 7.25 inches

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

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)

	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	0	250	750

* Use marked route minimums for unmarked routes (Fig. 54-1.B)

Class Table for One-Way Streets	
ADT	Class
0 - 3500	II
>3501	I

	Traffic Factor ESAL Coefficients			
	Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)	
Class	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

	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)					
	Rural			Urban		
Number of Lanes	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%

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LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE			**FAP 317 (US 150)**	
SECTION			**Section 15B(BR)**	
COUNTY			**Peoria and Tazewell Counties**	
LOCATION			**Ramp E (NB IL Route 29 to EB US 150)**	
FACILITY TYPE			**NON-INTERSTATE**	
PROJECT LENGTH			**592** FT = = >	0.11 Miles
# OF CENTERLINES			**1** CL	
# OF LANES			**1** LANES	
# OF EDGES			**2** EP	
LANE WIDTH - AVERAGE			**16** FT	
SHOULDER WIDTH	HMA	Left	**4** FT	
	HMA	Right	**6** FT	
	Total Width of Paved Shoulders		**10** FT	
PAVEMENT THICKNESS (FLEXIBLE)			**10.00** IN	15.50 IN MAX
SHOULDER THICKNESS			**8.00** IN	HMA SD **Standard Design**
POLICY OVERLAY THICKNESS			**2.25** IN	

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	2.85	0.53	2.85

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	**$111.57** / TON
HMA TOP BINDER	**$103.91** / TON
HMA LOWER BINDER	**$93.58** / TON
HMA BINDER (LEVELING)	**$0.00** / TON
HMA SHOULDER	**$81.18** / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE	COST	
HMA PAVEMENT (FULL-DEPTH)	(10.00")	907	SQ YD	*	**$58.51** / SQ YD	$0	
HMA SURFACE COURSE	(2.00")	102	TONS	*	**$111.57** / TON	$11,380	~
HMA TOP BINDER COURSE	(2.25")	114	TONS	*	**$103.91** / TON	$11,846	~
HMA LOWER BINDER COURSE	(5.75")	292	TONS	*	**$93.58** / TON	$27,325	~
HMA SHOULDER	(8.00")	295	TONS	*	**$81.18** / TON	$23,948	~
CURB & GUTTER		0	LIN FT	*	**$0.00** / LIN FT	$0	
SUBBASE GRAN MATL TY C (TONS)		75	TONS	*	**$25.50** / TON	$1,913	
IMPROVED SUBGRADE:	Modified Soil	0	SQ YD	*	**$0.00** / SQ YD	$0	
Subbase Granular Material, Type A		1,070	Ton	*	**$25.38** / Ton	$27,157	
Reserved For User Supplied Item		0	UNITS	*	**$0.00** / UNITS	$0	
PAVEMENT REMOVAL		0	SQ YD	*	**$0.00** / SQ YD	$0	
SHOULDER REMOVAL		0	SQ YD	*	**$0.00** / SQ YD	$0	

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$103,569
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$37,674

MAINTENANCE COSTS:

ITEM		THICKNESS	MATERIAL		UNIT COST	
ROUTINE MAINTENANCE ACTIVITY					**$0.00**	LANE-MILE / YEAR
HMA OVERLAY PVMT SURF		(2.00")	Surface Mix	2.00	**$111.57** / TON	
HMA OVERLAY PVMT		(2.25")		2.25	**$74.09** / TON	
HMA SURFACE MIX		(1.50")	Surface Mix	1.50	**$111.57** / TON	
HMA BINDER MIX		(0.75")	Leveling Binder Mix	0.75	**$0.00** / TON	
HMA OVERLAY SHLD	(Year 30)	(2.25")	Shoulder Mix	2.25	**$81.18** / TON	
HMA OVERLAY SHLD		(2.00")	Shoulder Mix	2.00	**$81.18** / TON	
MILLING (2.00 IN)				2.00	**$3.00** / SQ YD	
PARTIAL DEPTH PVMT PATCH		(Mill & Fill Surf)	Surface Mix	2.00	**$82.50** / SQ YD	
PARTIAL DEPTH SHLD PATCH		(Mill & Fill Surf)	Shoulder Mix	2.00	**$79.09** / SQ YD	
PARTIAL DEPTH PVMT PATCH		(Mill & Fill +2.00 ")	Leveling Binder Mix	2.00	**$70.00** / SQ YD	
PARTIAL DEPTH SHLD PATCH		(Mill & Fill +2.00 ")	Shoulder Mix	2.00	**$79.09** / 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	$141,814
FLEXIBLE TOTAL ANNUAL COST PER MILE	$51,586

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
YEAR 5								
	LONG SHLD JT R&S	100.00%	1,184	LIN FT	$2.00		$2,368	
	CNTR LINE JOINT R&S	100.00%	592	LIN FT	$2.00		$1,184	
	RNDM / THRM CRACK R&S	50.00%	326	LIN FT	$2.00		$652	
	PD PVMT PATCH M&F SURF	0.10%	1	SQ YD	$82.50		$82	
	PWFn =	0.8626		PW =	0.8626	X	$4,286	$3,697
YEAR 10								
	LONG SHLD JT R&S	100.00%	1,184	LIN FT	$2.00		$2,368	
	CNTR LINE JOINT R&S	100.00%	592	LIN FT	$2.00		$1,184	
	RNDM / THRM CRACK R&S	50.00%	326	LIN FT	$2.00		$652	
	PD PVMT PATCH M&F SURF	0.50%	5	SQ YD	$82.50		$412	
	PWFn =	0.7441		PW =	0.7441	X	$4,616	$3,435
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	1,565	SQ YD	$3.00		$4,695	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	9	SQ YD	$70.00		$630	
	HMA OVERLAY PVMT 2.00"	100.00%	103	TON	$111.57		$11,452	
	HMA OVERLAY SHLD 2.00 "	100.00%	74	TON	$81.18		$5,987	
	PWFn =	0.6419		PW =	0.6419	X	$22,764	$14,611
YEAR 20								
	LONG SHLD JT R&S	100.00%	1,184	LIN FT	$2.00		$2,368	
	CNTR LINE JOINT R&S	100.00%	592	LIN FT	$2.00		$1,184	
	RNDM / THRM CRACK R&S	50.00%	326	LIN FT	$2.00		$652	
	PD PVMT PATCH M&F SURF	0.10%	1	SQ YD	$82.50		$82	
	PWFn =	0.5537		PW =	0.5537	X	$4,286	$2,373
YEAR 25								
	LONG SHLD JT R&S	100.00%	1,184	LIN FT	$2.00		$2,368	
	CNTR LINE JOINT R&S	100.00%	592	LIN FT	$2.00		$1,184	
	RNDM / THRM CRACK R&S	50.00%	326	LIN FT	$2.00		$652	
	PD PVMT PATCH M&F SURF	0.50%	5	SQ YD	$82.50		$412	
	PWFn =	0.4776		PW =	0.4776	X	$4,616	$2,205
	HMA_SD							
YEAR 30	NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	1,565	SQ YD	$3.00		$4,695	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	18	SQ YD	$70.00		$1,260	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	7	SQ YD	$79.09		$554	
	HMA OVERLAY PVMT 2.25 "	100.00%	116	TON	$74.09		$8,567	
	HMA OVERLAY SHLD 2.25 "	100.00%	83	TON	$81.18		$6,735	
	PWFn =	0.4120		PW =	0.4120	X	$21,811	$8,986
YEAR 35								
	LONG SHLD JT R&S	100.00%	1,184	LIN FT	$2.00		$2,368	
	CNTR LINE JOINT R&S	100.00%	592	LIN FT	$2.00		$1,184	
	RNDM / THRM CRACK R&S	50.00%	326	LIN FT	$2.00		$652	
	PD PVMT PATCH M&F SURF	0.10%	1	SQ YD	$82.50		$82	
	PWFn =	0.3554		PW =	0.3554	X	$4,286	$1,523
YEAR 40								
	LONG SHLD JT R&S	100.00%	1,184	LIN FT	$2.00		$2,368	
	CNTR LINE JOINT R&S	100.00%	592	LIN FT	$2.00		$1,184	
	RNDM / THRM CRACK R&S	50.00%	326	LIN FT	$2.00		$652	
	PD PVMT PATCH M&F SURF	0.50%	5	SQ YD	$82.50		$412	
	PWFn =	0.3066		PW =	0.3066	X	$4,616	$1,415
								$38,245
	ROUTINE MAINTENANCE ACTIVITY		0.11	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$38,245
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$13,912

PCC PAVEMENT

JPCP

ROUTE	**FAP 317 (US 150)**
SECTION	**Section 15B(BR)**
COUNTY	**Peoria and Tazewell Counties**
LOCATION	**Ramp E (NB IL Route 29 to EB US 150)**
FACILITY TYPE	**NON-INTERSTATE**

PROJECT LENGTH			**592**	FT = = >	0.11 Miles
# OF CENTERLINES			**1**	CL	
# OF LANES			**1**	LANES	
# OF EDGES			**2**	EP	
LANE WIDTH - AVERAGE			**16**	FT	
SHOULDER WIDTH	PCC	Left	**4**	FT	
	PCC	Right	**6**	FT	
	Total Width of Paved Shoulders		**10**	FT	

PAVEMENT THICKNESS (RIGID)	**JPCP**	**8.75**	IN	TIED SHLD
SHOULDER THICKNESS		**8.75**	IN	
POLICY OVERLAY THICKNESS		**2.50**	IN	

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	4.13	**0.68**	**4.13**
Worksheet Construction Type is New Construction		**The Pavement Type is**	**JPCP**

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE		COST
JPC PAVEMENT	(8.75")	907	SQ YD	*	**$50.92**	/ SQ YD	$46,184
PAVEMENT REINFORCEMENT		0	SQ YD	*	**$0.00**	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	1,582	SQ YD	*	**$20.13**	/ SQ YD	$31,846
PCC SHOULDERS		658	SQ YD	*	**$74.60**	/ SQ YD	$49,087
CURB & GUTTER		0	LIN FT	*	**$0.00**	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(~ 1.80")	0	TONS	*	**$0.00**	/ TON	$0
IMPROVED SUBGRADE:	Modified Soil Width = 0.0'	0	SQ YD	*	**$0.00**	/ SQ YD	$0
Subbase Granular Material, Type A		1,095	**Ton**	*	**$25.38**	/ Ton	$27,791
Reserved For User Supplied Item		0	**UNITS**	*	**$0.00**	/ UNITS	$0
PAVEMENT REMOVAL		0	SQ YD	*	**$0.00**	/ SQ YD	$0
SHOULDER REMOVAL		0	SQ YD	*	**$0.00**	/ SQ YD	$0

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$154,908
RIGID CONSTRUCTION ANNUAL COST PER MILE	$56,349

MAINTENANCE COSTS:

ITEM	THICKNESS		MATERIAL		UNIT COST	
ROUTINE MAINTENANCE ACTIVITY					**$0.00**	/ LANE-MILE / YEAR
HMA POLICY OVERLAY	(2.50")			2.50		
HMA POLICY OVERLAY PVMT	(2.50")	1.0150		2.50	**$9.45**	/ SQ YD
HMA SURFACE MIX	(1.50")	1.0075	Surface Mix	1.50	**$9.45**	/ SQ YD
HMA BINDER MIX	(1.00")	1.0200	eling Binder Mix	1.00	**$0.00**	/ SQ YD
HMA POLICY OVERLAY SHLD	(2.50")		Shoulder Mix	2.50	**$11.37**	/ SQ YD
CLASS A PAVEMENT PATCHING					**$195.00**	/ SQ YD
CLASS B PAVEMENT PATCHING					**$150.00**	/ SQ YD
CLASS C SHOULDER PATCHING					**$145.00**	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)			Surface Mix	1.50	**$79.37**	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")			Surface Mix	2.50	**$85.62**	/ 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' / Station / Lane)				**$2.00**	/ LIN FT

RIGID TOTAL LIFE-CYCLE COST	$174,311
RIGID TOTAL ANNUAL COST PER MILE	$63,407

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

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST		COST	PRESENT WORTH
YEAR 10								
	PAVEMENT PATCH CLASS B	0.10%	1	SQ YD	$150.00		$150	
	PWFn =	0.7441		PW =	0.7441	X	$150	$112
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	2	SQ YD	$150.00		$300	
	PWFn =	0.6419		PW =	0.6419	X	$300	$193
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	18	SQ YD	$150.00		$2,700	
	SHOULDER PATCH CLASS C	0.50%	3	SQ YD	$145.00		$435	
	LONGITUDINAL SHLD JT R&S	100.00%	1,184	LIN FT	$2.00		$2,368	
	CENTERLINE JT R&S	100.00%	592	LIN FT	$2.00		$1,184	
	PWFn =	0.5537		PW =	0.5537	X	$6,687	$3,702
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	27	SQ YD	$150.00		$4,050	
	SHOULDER PATCH CLASS C	1.00%	7	SQ YD	$145.00		$1,015	
	PWFn =	0.4776		PW =	0.4776	X	$5,065	$2,419
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	36	SQ YD	$150.00		$5,400	
	SHOULDER PATCH CLASS C	1.50%	10	SQ YD	$145.00		$1,450	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	907	SQ YD	$9.45		$8,567	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	658	SQ YD	$11.37		$7,484	
	PWFn =	0.4120		PW =	0.4120	X	$22,901	$9,435
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	1,184	LIN FT	$2.00		$2,368	
	CENTERLINE JT R&S	100.00%	592	LIN FT	$2.00		$1,184	
	RANDOM CRACK R&S	50.00%	296	LIN FT	$2.00		$592	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	250	LIN FT	$2.00		$500	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	1	SQ YD	$85.62		$86	
	PWFn =	0.3554		PW =	0.3554	X	$4,730	$1,681
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	5	SQ YD	$150.00		$750	
	LONGITUDINAL SHLD JT R&S	100.00%	1,184	LIN FT	$2.00		$2,368	
	CENTERLINE JT R&S	100.00%	592	LIN FT	$2.00		$1,184	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	374	LIN FT	$2.00		$748	
	RANDOM CRACK R&S	50.00%	296	LIN FT	$2.00		$592	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	5	SQ YD	$85.62		$428	
	PWFn =	0.3066		PW =	0.3066	X	$6,070	$1,861
								$19,403
	ROUTINE MAINTENANCE ACTIVITY		0.11	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$19,403
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$7,058

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : **1/22/18 1:33 PM**

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$154,908	$103,569
		ANNUAL COST PER MILE	$56,349	$37,674
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$19,403	$38,245
		ANNUAL COST PER MILE	$7,058	$13,912
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$174,311	$141,814
		ANNUAL COST PER MILE	$63,407	$51,586

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**HMA**	**$51,586**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**JPCP**	$63,407	22.9%

S:\GEN\EXCEL\Studies & Plans\Maushard\PTB 169-028 McClugage Bridge\Pavement Design\Weighted Average Computations\[McClugage Mech Pavt Des Ramp E

LOCATION 4

Location 4 First Cost Comparison (Weighted Average Unit Prices)					
Location 4	Thickness	Unit	Quantity	Unit Cost	Cost
Mechanistic: Flexible					
40603540 Polymerized HMA Surface Course, Mix "D", N70	2.00"	Ton	831	$111.57	$92,714.67
40603208 Polymerized HMA Binder Course, IL 9.5, N70 (Upper Binder)	2.25"	Ton	935	$103.91	$97,155.85
40603085 HMA Binder Course, IL 19.0, N70 (Lower Binder)	6.25"	Ton	2597	$93.58	$243,027.26
48203100 HMA Shoulders	8.00"	Ton	2023	$81.18	$164,227.14
31101900 Subbase Granular Material, Type C	Var.	Ton	644	$25.50	$16,422.00
31100100 Subbase Granular Material, Type A	12.00"	Ton	8164	$25.38	$207,202.32
Total					**$820,749.24**
Mechanistic: Rigid					
42000401 PCC Pavement 9" (Jointed)	9.00"	SY	7419	$59.67	$442,691.73
48300300 PCC Shoulders 8"	8.00"	SY	4516	$54.25	$244,993.00
31200100 Stabilized Subbase 4"	4.00"	SY	12,185	$20.13	$245,284.05
31101900 Subbase Granular Material, Type C	Var.	Ton	257	$25.50	$6,553.50
31100100 Subbase Granular Material, Type A	12.00"	Ton	8522	$25.38	$216,288.36
Total					**$1,155,810.64**

*Mechanistic Flexible Design is Recommended at this Location

BDE 5401 Template (Rev. 09/05/2013)

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 04/16/2018

Location 4

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: FAP 317 (US 150)
Section: 15B(BR)
County: Peoria and Tazewell
Location: Illinois River in Peoria

Comments: Eastbound US 150 in Tazewell County
Design Date: 01/10/2018 CEM <-- BY
Modify Date: <-- BY

	ADT	Year
Current:	42,885	2014
Future:	43,005	2042

Facility Type: Other Marked State Route
# of Lanes = 4
Road Class: I
Subgrade Support Rating (SSR): Poor
Construction Year: 2022
Design Period (DP) = 20 years

	Structural Design Traffic			
	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	41,824	97.4%	P = 32%
SU =	250	816	1.9%	S = 45%
MU =	750	322	0.8%	M = 45%
Struct. Design ADT =		42,962	(2032)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT			RIGID PAVEMENT		
Cpv =	0.15		Cpv =	0.15	
Csu =	132.5		Csu =	143.81	
Cmu =	482.53		Cmu =	696.42	
TF flexible (Actual) =	2.41	(Actual ADT)	TF rigid (Actual) =	3.12	(Actual ADT)
TF flexible (Min) =	3.56	(Min ADT Fig. 54-2.C)	TF rigid (Min) =	5.02	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible = 3.56
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)
Goto Map
HMA Mixture Temp. = 76.5 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 650 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 84 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 10.50 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 15.50 in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 10.50 inches

JPC Pavement

Use TF rigid = 5.02
Edge Support = Tied Shoulder or C.&G.

Rigid Pavt Thick. = 9.00 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 5.02
IBR value = 3

CRCP Thickness = 8.00 in. (Fig. 54-4.M)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible = 3.56
HMA Overlay Design Thickness = 7.75 in. (Fig. 54-5.U)
Goto Map
Limiting Strain Criterion Thickness = 11.00 in. (Fig. 54-5.V)

Use HMA Overlay Thickness = 7.75 inches

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

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)

	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	
ADT	Class
0 - 3500	II
>3501	I

	Traffic Factor ESAL Coefficients			
	Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)	
Class	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

	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)					
	Rural			Urban		
Number of Lanes	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%

Location 4

BDE 5401 Template (Rev. 09/05/2013) Printed: 04/16/2018

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE			**FAP 317 (US 150)**	
SECTION			**Section 15B(BR)**	
COUNTY			**Peoria and Tazewell Counties**	
LOCATION			**Eastbound US 150 in Tazewell County**	
FACILITY TYPE			**NON-INTERSTATE**	
PROJECT LENGTH			**2202** FT = = >	0.42 Miles
# OF CENTERLINES			**1** CL	
# OF LANES			**3** LANES	
# OF EDGES			**2** EP	
LANE WIDTH - AVERAGE			**12** FT	
SHOULDER WIDTH	HMA	Left	**10** FT	
	HMA	Right	**10** FT	
	Total Width of Paved Shoulders		**20** FT	
PAVEMENT THICKNESS (FLEXIBLE)			**10.50** IN	15.50 IN MAX
SHOULDER THICKNESS			**8.00** IN	**Standard Design**
POLICY OVERLAY THICKNESS			**2.25** IN	

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	3.56	2.41	3.56

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	**$111.57** / TON
HMA TOP BINDER	**$103.91** / TON
HMA LOWER BINDER	**$93.58** / TON
HMA BINDER (LEVELING)	**$0.00** / TON
HMA SHOULDER	**$81.18** / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE		COST	
HMA PAVEMENT (FULL-DEPTH)	(10.50")	8,808	SQ YD	*	**$59.71**	/ SQ YD	$0	
HMA SURFACE COURSE	(2.00")	831	TONS	*	**$111.57**	/ TON	$92,715	~
HMA TOP BINDER COURSE	(2.25")	935	TONS	*	**$103.91**	/ TON	$97,156	~
HMA LOWER BINDER COURSE	(6.25")	2,597	TONS	*	**$93.58**	/ TON	$243,027	~
HMA SHOULDER	(8.00")	2,023	TONS	*	**$81.18**	/ TON	$164,227	~
CURB & GUTTER		0	LIN FT	*	**$0.00**	/ LIN FT	$0	
SUBBASE GRAN MATL TY C (TONS)		644	TONS	*	**$25.50**	/ TON	$16,422	
IMPROVED SUBGRADE:	Modified Soil	0	SQ YD	*	**$0.00**	/ SQ YD	$0	
Subbase Granular Material, Type A		8,164	Ton	*	**$25.38**	/ Ton	$207,202	
Reserved For User Supplied Item		0	UNITS	*	**$0.00**	/ UNITS	$0	
PAVEMENT REMOVAL		0	SQ YD	*	**$0.00**	/ SQ YD	$0	
SHOULDER REMOVAL		0	SQ YD	*	**$0.00**	/ SQ YD	$0	

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$820,749
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$80,266

MAINTENANCE COSTS:

ITEM		THICKNESS	MATERIAL		UNIT COST	
ROUTINE MAINTENANCE ACTIVITY					**$0.00**	LANE-MILE / YEAR
HMA OVERLAY PVMT SURF		(2.00")	Surface Mix		**$111.57**	/ TON
HMA OVERLAY PVMT		(2.25")			**$74.25**	/ TON
HMA SURFACE MIX		(1.50")	Surface Mix		**$111.57**	/ TON
HMA BINDER MIX		(0.75")	eling Binder Mix		**$0.00**	/ TON
HMA OVERLAY SHLD	(Year 30)	(2.25")	Shoulder Mix		**$81.18**	/ TON
HMA OVERLAY SHLD		(2.00")	Shoulder Mix		**$81.18**	/ TON
MILLING (2.00 IN)					**$3.00**	/ SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill Surf)	Surface Mix		**$82.50**	/ SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill Surf)	Shoulder Mix		**$79.09**	/ SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill +2.00 ")	Leveling Binder Mix		**$70.00**	/ SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill +2.00 ")	Shoulder Mix		**$79.09**	/ 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	$1,098,289
FLEXIBLE TOTAL ANNUAL COST PER MILE	$107,408

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
YEAR 5								
	LONG SHLD JT R&S	100.00%	4,404	LIN FT	$2.00		$8,808	
	CNTR LINE JOINT R&S	100.00%	2,202	LIN FT	$2.00		$4,404	
	RNDM / THRM CRACK R&S	50.00%	3,633	LIN FT	$2.00		$7,266	
	PD PVMT PATCH M&F SURF	0.10%	9	SQ YD	$82.50		$742	
	PWFn =	0.8626		PW =	0.8626	X	$21,220	$18,305
YEAR 10								
	LONG SHLD JT R&S	100.00%	4,404	LIN FT	$2.00		$8,808	
	CNTR LINE JOINT R&S	100.00%	2,202	LIN FT	$2.00		$4,404	
	RNDM / THRM CRACK R&S	50.00%	3,633	LIN FT	$2.00		$7,266	
	PD PVMT PATCH M&F SURF	0.50%	44	SQ YD	$82.50		$3,630	
	PWFn =	0.7441		PW =	0.7441	X	$24,108	$17,939
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	13,324	SQ YD	$3.00		$39,972	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	88	SQ YD	$70.00		$6,160	
	HMA OVERLAY PVMT 2.00"	100.00%	991	TON	$111.57		$110,573	
	HMA OVERLAY SHLD 2.00 "	100.00%	506	TON	$81.18		$41,057	
	PWFn =	0.6419		PW =	0.6419	X	$197,762	$126,936
YEAR 20								
	LONG SHLD JT R&S	100.00%	4,404	LIN FT	$2.00		$8,808	
	CNTR LINE JOINT R&S	100.00%	2,202	LIN FT	$2.00		$4,404	
	RNDM / THRM CRACK R&S	50.00%	3,633	LIN FT	$2.00		$7,266	
	PD PVMT PATCH M&F SURF	0.10%	9	SQ YD	$82.50		$742	
	PWFn =	0.5537		PW =	0.5537	X	$21,220	$11,749
YEAR 25								
	LONG SHLD JT R&S	100.00%	4,404	LIN FT	$2.00		$8,808	
	CNTR LINE JOINT R&S	100.00%	2,202	LIN FT	$2.00		$4,404	
	RNDM / THRM CRACK R&S	50.00%	3,633	LIN FT	$2.00		$7,266	
	PD PVMT PATCH M&F SURF	0.50%	44	SQ YD	$82.50		$3,630	
	PWFn =	0.4776		PW =	0.4776	X	$24,108	$11,514
	HMA_SD							
YEAR 30	NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	13,324	SQ YD	$3.00		$39,972	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	176	SQ YD	$70.00		$12,320	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	45	SQ YD	$79.09		$3,559	
	HMA OVERLAY PVMT 2.25 "	100.00%	1,116	TON	$74.25		$82,834	
	HMA OVERLAY SHLD 2.25 "	100.00%	569	TON	$81.18		$46,189	
	PWFn =	0.4120		PW =	0.4120	X	$184,874	$76,166
YEAR 35								
	LONG SHLD JT R&S	100.00%	4,404	LIN FT	$2.00		$8,808	
	CNTR LINE JOINT R&S	100.00%	2,202	LIN FT	$2.00		$4,404	
	RNDM / THRM CRACK R&S	50.00%	3,633	LIN FT	$2.00		$7,266	
	PD PVMT PATCH M&F SURF	0.10%	9	SQ YD	$82.50		$742	
	PWFn =	0.3554		PW =	0.3554	X	$21,220	$7,541
YEAR 40								
	LONG SHLD JT R&S	100.00%	4,404	LIN FT	$2.00		$8,808	
	CNTR LINE JOINT R&S	100.00%	2,202	LIN FT	$2.00		$4,404	
	RNDM / THRM CRACK R&S	50.00%	3,633	LIN FT	$2.00		$7,266	
	PD PVMT PATCH M&F SURF	0.50%	44	SQ YD	$82.50		$3,630	
	PWFn =	0.3066		PW =	0.3066	X	$24,108	$7,390
								$277,540
	ROUTINE MAINTENANCE ACTIVITY		1.25	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$277,540
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$27,142

PCC PAVEMENT

JPCP

ROUTE			**FAP 317 (US 150)**		
SECTION			**Section 15B(BR)**		
COUNTY			**Peoria and Tazewell Counties**		
LOCATION			**Eastbound US 150 in Tazewell County**		
FACILITY TYPE			**NON-INTERSTATE**		
PROJECT LENGTH			**2202** FT	= = >	0.42 Miles
# OF CENTERLINES			**1** CL		
# OF LANES			**3** LANES		
# OF EDGES			**2** EP		
LANE WIDTH - AVERAGE			**12** FT		
SHOULDER WIDTH	PCC	Left	**10** FT		
	PCC	Right	**10** FT		
	Total Width of Paved Shoulders		**20** FT		
PAVEMENT THICKNESS (RIGID)		**JPCP**	**9.00** IN		TIED SHLD
SHOULDER THICKNESS			**8.00** IN		
POLICY OVERLAY THICKNESS			**2.50** IN		

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	5.02	**3.12**	**5.02**
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")	7,419	SQ YD	*	**$59.67**	/ SQ YD	$442,692
PAVEMENT REINFORCEMENT		0	SQ YD	*	**$0.00**	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	12,185	SQ YD	*	**$20.13**	/ SQ YD	$245,284
PCC SHOULDERS		4,516	SQ YD	*	**$54.25**	/ SQ YD	$244,993
CURB & GUTTER		0	LIN FT	*	**$0.00**	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(~ 2.50")	257	TONS	*	**$25.50**	/ TON	$6,554
IMPROVED SUBGRADE:	Modified Soil Width = 0.0'	0	SQ YD	*	**$0.00**	/ SQ YD	$0
Subbase Granular Material, Type A		8,522	**Ton**	*	**$25.38**	/ Ton	$216,288
Reserved For User Supplied Item		0	**UNITS**	*	**$0.00**	/ UNITS	$0
PAVEMENT REMOVAL		0	SQ YD	*	**$0.00**	/ SQ YD	$0
SHOULDER REMOVAL		0	SQ YD	*	**$0.00**	/ SQ YD	$0

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$1,155,811
RIGID CONSTRUCTION ANNUAL COST PER MILE	$113,033

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL		UNIT COST	
ROUTINE MAINTENANCE ACTIVITY				**$0.00**	/ LANE-MILE / YEAR
HMA POLICY OVERLAY	(2.50")		2.50		
HMA POLICY OVERLAY PVMT	(2.50")	1.00050	2.50	**$9.40**	/ SQ YD
HMA SURFACE MIX	(1.50")	1.00030	Surface Mix 1.50	**$9.40**	/ SQ YD
HMA BINDER MIX	(1.00")	1.00020	Leveling Binder Mix 1.00	**$0.00**	/ SQ YD
HMA POLICY OVERLAY SHLD	(2.50")		Shoulder Mix 2.50	**$11.37**	/ SQ YD
CLASS A PAVEMENT PATCHING				**$195.00**	/ SQ YD
CLASS B PAVEMENT PATCHING				**$150.00**	/ SQ YD
CLASS C SHOULDER PATCHING				**$145.00**	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)			Surface Mix 1.50	**$79.37**	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")			Surface Mix 2.50	**$85.62**	/ 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' / Station / Lane)			**$2.00**	/ LIN FT

RIGID TOTAL LIFE-CYCLE COST	$1,295,723
RIGID TOTAL ANNUAL COST PER MILE	$126,716

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

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST		COST	PRESENT WORTH
YEAR 10								
	PAVEMENT PATCH CLASS B	0.10%	7	SQ YD	$150.00		$1,050	
	PWFn =	0.7441		PW =	0.7441	X	$1,050	$781
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	15	SQ YD	$150.00		$2,250	
	PWFn =	0.6419		PW =	0.6419	X	$2,250	$1,444
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	148	SQ YD	$150.00		$22,200	
	SHOULDER PATCH CLASS C	0.50%	23	SQ YD	$145.00		$3,335	
	LONGITUDINAL SHLD JT R&S	100.00%	4,404	LIN FT	$2.00		$8,808	
	CENTERLINE JT R&S	100.00%	2,202	LIN FT	$2.00		$4,404	
	PWFn =	0.5537		PW =	0.5537	X	$38,747	$21,453
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	223	SQ YD	$150.00		$33,450	
	SHOULDER PATCH CLASS C	1.00%	45	SQ YD	$145.00		$6,525	
	PWFn =	0.4776		PW =	0.4776	X	$39,975	$19,092
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	297	SQ YD	$150.00		$44,550	
	SHOULDER PATCH CLASS C	1.50%	68	SQ YD	$145.00		$9,860	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	8,808	SQ YD	$9.40		$82,834	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	4,516	SQ YD	$11.37		$51,321	
	PWFn =	0.4120		PW =	0.4120	X	$188,565	$77,686
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	4,404	LIN FT	$2.00		$8,808	
	CENTERLINE JT R&S	100.00%	2,202	LIN FT	$2.00		$4,404	
	RANDOM CRACK R&S	50.00%	3,303	LIN FT	$2.00		$6,606	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	2,117	LIN FT	$2.00		$4,234	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	7	SQ YD	$85.62		$599	
	PWFn =	0.3554		PW =	0.3554	X	$24,651	$8,761
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	37	SQ YD	$150.00		$5,550	
	LONGITUDINAL SHLD JT R&S	100.00%	4,404	LIN FT	$2.00		$8,808	
	CENTERLINE JT R&S	100.00%	2,202	LIN FT	$2.00		$4,404	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	3,175	LIN FT	$2.00		$6,350	
	RANDOM CRACK R&S	50.00%	3,303	LIN FT	$2.00		$6,606	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	37	SQ YD	$85.62		$3,168	
	PWFn =	0.3066		PW =	0.3066	X	$34,886	$10,695
								$139,912
	ROUTINE MAINTENANCE ACTIVITY		1.25	Lane Miles	$0.00		$0	$0
							MAINTENANCE LIFE-CYCLE COST	$139,912
45	YEAR LIFE CYCLE	CRFn = 0.0407852					MAINTENANCE ANNUAL COST PER MILE	$13,683

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 9/5/13 9:40 AM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$1,155,811	$820,749
		ANNUAL COST PER MILE	$113,033	$80,266
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$139,912	$277,540
		ANNUAL COST PER MILE	$13,683	$27,142
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$1,295,723	$1,098,289
		ANNUAL COST PER MILE	$126,716	$107,408

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**HMA**	**$107,408**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**JPCP**	$126,716	18.0%

S:\GEN\EXCEL\Studies & Plans\Maushard\PTB 169-028 McClugage Bridge\Pavement Design\[McClugage Mech Pavt Des EP Mainline Rev 041618.xlsm]LifeCycleC

LOCATION 5

Location 5 First Cost Comparison (Weighted Average Unit Price)					
Location 5	Thickness	Unit	Quantity	Unit Cost	Cost
Mechanistic: Flexible					
40603540 Polymerized HMA Surface Course, Mix "D", N70	2.00"	Ton	461	$111.57	$51,433.77
40603208 Polymerized HMA Binder Course, IL 9.5, N70 (Upper Binder)	2.25"	Ton	518	$103.91	$53,825.38
40603085 HMA Binder Course, IL 19.0, N70 (Lower Binder)	5.75"	Ton	1,325	$93.58	$123,993.50
48203100 HMA Shoulders	8.00"	Ton	1,986	$81.18	$161,223.48
31101900 Subbase Granular Material, Type C	Var.	Ton	505	$25.50	$12,877.50
31100100 Subbase Granular Material, Type A	12.00"	Ton	5,846	$25.38	$148,371.48
Total					**$551,725.11**
Mechanistic: Rigid					
42000316 PCC Pavement 8.75" (Jointed)	8.75"	SY	4,114	$50.92	$209,484.88
48300300 PCC Shoulders 8"	8.00"	SY	4,433	$54.25	$240,490.25
31200100 Stabilized Subbase 4"	4.00"	SY	8,817	$20.13	$177,486.21
31101900 Subbase Granular Material, Type C	Var.	Ton	190	$25.50	$4,845.00
31100100 Subbase Granular Material, Type A	12.00"	Ton	6,216	$25.38	$157,762.08
Total					**$790,068.42**

*Mechanistic Flexible Design is Recommended at this Location

BDE 5401 Template (Rev. 09/05/2013)

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 04/17/2018

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: FAP 317 (US 150)
Section: 15B(BR)
County: Peoria and Tazewell
Location: IL 116 Interchange in Tazewell County
Facility Type: Other Marked State Route
# of Lanes = 1 Lane Ramp
Road Class: I
Subgrade Support Rating (SSR): Poor
Construction Year: 2022
Design Period (DP) = 20 years

Comments: Proposed SW Ramp from EB US 150 to SB IL 116
Design Date: 12/12/2017 CEM
Modify Date:
** Ramp Design Fig. 54-1.B **
Crossroad? Other Marked State Route
# of Lanes = 4

<-- BY
<-- BY

	ADT	Year
Current:	4,622	2015
Future:	5,922	2042

	Structural Design Traffic			
	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	5,109	93.9%	P = 100%
SU =	250	212	3.9%	S = 100%
MU =	750	120	2.2%	M = 100%
Struct. Design ADT =		5,441	(2032)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT		RAMP DESIGN MIN	
Cpv =	0.15	0.15	32%
Csu =	132.5	112.06	45%
Cmu =	482.53	385.44	45%
TF flexible (Actual) =	1.73	(Actual ADT)	2.85
TF flexible (Min) =	2.85	(Min ADT Fig. 54-2.C)	

RIGID PAVEMENT		RAMP DESIGN MIN	
Cpv =	0.15	0.15	32%
Csu =	143.81	135.78	45%
Cmu =	696.42	567.21	45%
TF rigid (Actual) =	2.29	(Actual ADT)	4.13
TF rigid (Min) =	4.13	(Min ADT Fig. 54-2.C)	

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Goto Map

Use TF flexible =	2.85	
PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)
HMA Mixture Temp. =	76.4	deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) =	650	ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) =	89	(Fig. 54-5.E)
Full Depth HMA Design Thickness =	10.00	in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness =	15.31	in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness =	**10.00**	**inches**

JPC Pavement

Use TF rigid =	4.13	
Edge Support =	Tied	Shoulder or C.&G.
Rigid Pavt Thick. =	**8.75**	**in. (Fig. 54-4.E)**

CRC Pavement

Use TF rigid =	4.13	
IBR value =	3	
CRCP Thickness =	**7.75**	**in. (Fig. 54-4.M)**

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Goto Map

Use TF flexible =	2.85	
HMA Overlay Design Thickness =	7.25	in. (Fig. 54-5.U)
Limiting Strain Criterion Thickness =	11.00	in. (Fig. 54-5.V)
Use HMA Overlay Thickness =	**7.25**	**inches**

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

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)

	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	0	250	750

* Use marked route minimums for unmarked routes (Fig. 54-1.B)

Class Table for One-Way Streets	
ADT	Class
0 - 3500	II
>3501	I

	Traffic Factor ESAL Coefficients			
	Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)	
Class	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

	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)					
	Rural			Urban		
Number of Lanes	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%

BDE 5401 Template (Rev. 09/05/2013) Printed: 04/17/2018

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE	FAP 317 (US 150)
SECTION	Section 15B(BR)
COUNTY	Peoria and Tazewell Counties
LOCATION	SW Ramp in Tazewell County
FACILITY TYPE	NON-INTERSTATE

PROJECT LENGTH			2315 FT = = >	0.44 Miles
# OF CENTERLINES			1 CL	
# OF LANES			1 LANES	
# OF EDGES			2 EP	
LANE WIDTH - AVERAGE			16 FT	
SHOULDER WIDTH	HMA	Left	6 FT	
	HMA	Right	8 FT	
	Total Width of Paved Shoulders		14 FT	

PAVEMENT THICKNESS (FLEXIBLE)	10.00 IN	15.31 IN MAX
SHOULDER THICKNESS	8.00 IN	HMA SD Standard Design
POLICY OVERLAY THICKNESS	2.25 IN	

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	2.85	1.73	2.85

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$111.57 / TON
HMA TOP BINDER	$103.91 / TON
HMA LOWER BINDER	$93.58 / TON
HMA BINDER (LEVELING)	$0.00 / TON
HMA SHOULDER	$81.18 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE		COST	
HMA PAVEMENT (FULL-DEPTH)	(10.00")	4,116	SQ YD	*	$0.00	/ SQ YD	$0	
HMA SURFACE COURSE	(2.00")	461	TONS	*	$111.57	/ TON	$51,434	~
HMA TOP BINDER COURSE	(2.25")	518	TONS	*	$103.91	/ TON	$53,825	~
HMA LOWER BINDER COURSE	(5.75")	1,325	TONS	*	$93.58	/ TON	$123,994	~
HMA SHOULDER	(8.00")	1,986	TONS	*	$81.18	/ TON	$161,223	~
CURB & GUTTER		0	LIN FT	*	$0.00	/ LIN FT	$0	
SUBBASE GRAN MATL TY C (TONS)		505	TONS	*	$25.50	/ TON	$12,878	
IMPROVED SUBGRADE:	Modified Soil	0	SQ YD	*	$0.00	/ SQ YD	$0	
Subbase Granular Material Type A		5,846	TON	*	$25.38	/ TON	$148,371	
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0	
PAVEMENT REMOVAL		4,116	SQ YD		$0.00	/ SQ YD	$0	
SHOULDER REMOVAL		3,601	SQ YD		$0.00	/ SQ YD	$0	

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$551,725
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$51,323

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL		UNIT COST	
ROUTINE MAINTENANCE ACTIVITY				$0.00	LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	Surface Mix		$12.63	/ SQ YD
HMA OVERLAY PVMT	(2.25")			$9.45	/ SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix		$9.45	/ SQ YD
HMA BINDER MIX	(0.75")	Leveling Binder Mix		$0.00	/ SQ YD
HMA OVERLAY SHLD (Year 30)	(2.25")	Shoulder Mix		$10.23	/ SQ YD
HMA OVERLAY SHLD	(2.00")	Shoulder Mix		$9.09	/ SQ YD
MILLING (2.00 IN)				$3.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill Surf)	Surface Mix		$82.50	/ SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)	Shoulder Mix		$79.09	/ SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill +2.00 ")	Leveling Binder Mix		$70.00	/ SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ")	Shoulder Mix		$79.09	/ 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	$735,783
FLEXIBLE TOTAL ANNUAL COST PER MILE	$68,444

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
YEAR 5								
	LONG SHLD JT R&S	100.00%	4,630	LIN FT	$2.00		$9,260	
	CNTR LINE JOINT R&S	100.00%	2,315	LIN FT	$2.00		$4,630	
	RNDM / THRM CRACK R&S	50.00%	1,273	LIN FT	$2.00		$2,546	
	PD PVMT PATCH M&F SURF	0.10%	4	SQ YD	$82.50		$330	
	PWFn =	0.8626		PW =	0.8626	X	$16,766	$14,462
YEAR 10								
	LONG SHLD JT R&S	100.00%	4,630	LIN FT	$2.00		$9,260	
	CNTR LINE JOINT R&S	100.00%	2,315	LIN FT	$2.00		$4,630	
	RNDM / THRM CRACK R&S	50.00%	1,273	LIN FT	$2.00		$2,546	
	PD PVMT PATCH M&F SURF	0.50%	21	SQ YD	$82.50		$1,732	
	PWFn =	0.7441		PW =	0.7441	X	$18,168	$13,519
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	8,549	SQ YD	$3.00		$25,647	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	41	SQ YD	$70.00		$2,870	
	HMA OVERLAY PVMT 2.00"	100.00%	4,116	SQ YD	$12.63		$51,963	
	HMA OVERLAY SHLD 2.00 "	100.00%	4,433	SQ YD	$9.09		$40,306	
	PWFn =	0.6419		PW =	0.6419	X	$120,786	$77,528
YEAR 20								
	LONG SHLD JT R&S	100.00%	4,630	LIN FT	$2.00		$9,260	
	CNTR LINE JOINT R&S	100.00%	2,315	LIN FT	$2.00		$4,630	
	RNDM / THRM CRACK R&S	50.00%	1,273	LIN FT	$2.00		$2,546	
	PD PVMT PATCH M&F SURF	0.10%	4	SQ YD	$82.50		$330	
	PWFn =	0.5537		PW =	0.5537	X	$16,766	$9,283
YEAR 25								
	LONG SHLD JT R&S	100.00%	4,630	LIN FT	$2.00		$9,260	
	CNTR LINE JOINT R&S	100.00%	2,315	LIN FT	$2.00		$4,630	
	RNDM / THRM CRACK R&S	50.00%	1,273	LIN FT	$2.00		$2,546	
	PD PVMT PATCH M&F SURF	0.50%	21	SQ YD	$82.50		$1,732	
	PWFn =	0.4776		PW =	0.4776	X	$18,168	$8,677
	HMA_SD							
YEAR 30	NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	8,549	SQ YD	$3.00		$25,647	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	82	SQ YD	$70.00		$5,740	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	44	SQ YD	$79.09		$3,480	
	HMA OVERLAY PVMT 2.25 "	100.00%	4,116	SQ YD	$9.45		$38,872	
	HMA OVERLAY SHLD 2.25 "	100.00%	4,433	SQ YD	$10.23		$45,344	
	PWFn =	0.4120		PW =	0.4120	X	$119,083	$49,061
YEAR 35								
	LONG SHLD JT R&S	100.00%	4,630	LIN FT	$2.00		$9,260	
	CNTR LINE JOINT R&S	100.00%	2,315	LIN FT	$2.00		$4,630	
	RNDM / THRM CRACK R&S	50.00%	1,273	LIN FT	$2.00		$2,546	
	PD PVMT PATCH M&F SURF	0.10%	4	SQ YD	$82.50		$330	
	PWFn =	0.3554		PW =	0.3554	X	$16,766	$5,958
YEAR 40								
	LONG SHLD JT R&S	100.00%	4,630	LIN FT	$2.00		$9,260	
	CNTR LINE JOINT R&S	100.00%	2,315	LIN FT	$2.00		$4,630	
	RNDM / THRM CRACK R&S	50.00%	1,273	LIN FT	$2.00		$2,546	
	PD PVMT PATCH M&F SURF	0.50%	21	SQ YD	$82.50		$1,732	
	PWFn =	0.3066		PW =	0.3066	X	$18,168	$5,570
								$184,058
	ROUTINE MAINTENANCE ACTIVITY		0.44	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$184,058
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$17,121

PCC PAVEMENT

JPCP

ROUTE	**FAP 317 (US 150)**
SECTION	**Section 15B(BR)**
COUNTY	**Peoria and Tazewell Counties**
LOCATION	**SW Ramp in Tazewell County**
FACILITY TYPE	**NON-INTERSTATE**

PROJECT LENGTH			**2315** FT	= = >	0.44 Miles
# OF CENTERLINES			**1** CL		
# OF LANES			**1** LANES		
# OF EDGES			**2** EP		
LANE WIDTH - AVERAGE			**16** FT		
SHOULDER WIDTH	PCC	Left	**6** FT		
	PCC	Right	**8** FT		
	Total Width of Paved Shoulders		**14** FT		

PAVEMENT THICKNESS (RIGID)	**JPCP**	**8.75** IN	TIED SHLD
SHOULDER THICKNESS		**8.00** IN	

POLICY OVERLAY THICKNESS **2.50** IN

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	4.13	**2.29**	**4.13**
Worksheet Construction Type is New Construction		**The Pavement Type is**	**JPCP**

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE		COST
JPC PAVEMENT	(8.75")	4,114	SQ YD	*	**$50.92**	/ SQ YD	$209,485
PAVEMENT REINFORCEMENT		0	SQ YD		**$0.00**	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	8,817	SQ YD	*	**$20.13**	/ SQ YD	$177,486
PCC SHOULDERS		4,433	SQ YD	*	**$54.25**	/ SQ YD	$240,490
CURB & GUTTER		0	LIN FT		**$0.00**	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(2.50")	190	TONS	*	**$25.50**	/ TON	$4,845
IMPROVED SUBGRADE:	Modified Soil Width = 0.0'	0	SQ YD	*	**$0.00**	/ SQ YD	$0
Subbase Granular Material Type A		6,216	**TON**	*	**$25.38**	/ TON	$157,762
Reserved For User Supplied Item		0	**UNITS**	*	**$0.00**	/ UNITS	$0
PAVEMENT REMOVAL		0	SQ YD	*	**$0.00**	/ SQ YD	$0
SHOULDER REMOVAL		0	SQ YD	*	**$0.00**	/ SQ YD	$0

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$790,068
RIGID CONSTRUCTION ANNUAL COST PER MILE	$73,494

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")	1.0150		2.50	**$9.45**	/ SQ YD
HMA SURFACE MIX	(1.50")	1.0075	Surface Mix	1.50	**$9.45**	/ SQ YD
HMA BINDER MIX	(1.00")	1.0200	Leveling Binder Mix	1.00	**$0.00**	/ SQ YD
HMA POLICY OVERLAY SHLD	(2.50")		Shoulder Mix	2.50	**$11.37**	/ SQ YD
CLASS A PAVEMENT PATCHING					**$195.00**	/ SQ YD
CLASS B PAVEMENT PATCHING					**$150.00**	/ SQ YD
CLASS C SHOULDER PATCHING					**$145.00**	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)			Surface Mix	1.50	**$79.37**	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")			Surface Mix	2.50	**$85.62**	/ 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' / Station / Lane)				**$2.00**	/ LIN FT

RIGID TOTAL LIFE-CYCLE COST	$884,294
RIGID TOTAL ANNUAL COST PER MILE	$82,259

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

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 10							
	PAVEMENT PATCH CLASS B	0.10%	4	SQ YD	$150.00	$600	
	PWFn =	0.7441		PW =	0.7441 X	$600	$446
YEAR 15							
	PAVEMENT PATCH CLASS B	0.20%	8	SQ YD	$150.00	$1,200	
	PWFn =	0.6419		PW =	0.6419 X	$1,200	$770
YEAR 20							
	PAVEMENT PATCH CLASS B	2.00%	82	SQ YD	$150.00	$12,300	
	SHOULDER PATCH CLASS C	0.50%	22	SQ YD	$145.00	$3,190	
	LONGITUDINAL SHLD JT R&S	100.00%	4,630	LIN FT	$2.00	$9,260	
	CENTERLINE JT R&S	100.00%	2,315	LIN FT	$2.00	$4,630	
	PWFn =	0.5537		PW =	0.5537 X	$29,380	$16,267
YEAR 25							
	PAVEMENT PATCH CLASS B	3.00%	123	SQ YD	$150.00	$18,450	
	SHOULDER PATCH CLASS C	1.00%	44	SQ YD	$145.00	$6,380	
	PWFn =	0.4776		PW =	0.4776 X	$24,830	$11,859
YEAR 30	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	4.00%	165	SQ YD	$150.00	$24,750	
	SHOULDER PATCH CLASS C	1.50%	66	SQ YD	$145.00	$9,570	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	4,116	SQ YD	$9.45	$38,872	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	4,433	SQ YD	$11.37	$50,382	
	PWFn =	0.4120		PW =	0.4120 X	$123,574	$50,911
YEAR 35	NON-INTERSTATE						
	LONGITUDINAL SHLD JT R&S	100.00%	4,630	LIN FT	$2.00	$9,260	
	CENTERLINE JT R&S	100.00%	2,315	LIN FT	$2.00	$4,630	
	RANDOM CRACK R&S	50.00%	1,158	LIN FT	$2.00	$2,316	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	986	LIN FT	$2.00	$1,972	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	4	SQ YD	$85.62	$342	
	PWFn =	0.3554		PW =	0.3554 X	$18,520	$6,582
YEAR 40	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	0.50%	21	SQ YD	$150.00	$3,150	
	LONGITUDINAL SHLD JT R&S	100.00%	4,630	LIN FT	$2.00	$9,260	
	CENTERLINE JT R&S	100.00%	2,315	LIN FT	$2.00	$4,630	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	1,478	LIN FT	$2.00	$2,956	
	RANDOM CRACK R&S	50.00%	1,158	LIN FT	$2.00	$2,316	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	21	SQ YD	$85.62	$1,798	
	PWFn =	0.3066		PW =	0.3066 X	$24,110	$7,391
							$94,226
	ROUTINE MAINTENANCE ACTIVITY		0.44	Lane Miles	$0.00	$0	$0
					MAINTENANCE LIFE-CYCLE COST		$94,226
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE		$8,765

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : **9/5/13 9:40 AM**

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$790,068	$551,725
		ANNUAL COST PER MILE	$73,494	$51,323
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$94,226	$184,058
		ANNUAL COST PER MILE	$8,765	$17,121
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$884,294	$735,783
		ANNUAL COST PER MILE	$82,259	$68,444

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**HMA**	**$68,444**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**JPCP**	$82,259	20.2%

S:\GEN\EXCEL\Studies & Plans\Maushard\PTB 169-028 McClugage Bridge\Pavement Design\[McClugage Mech Pavt Des SW Ramp Rev 041718.xlsm]LifeCycleCos

LOCATION 6

Location 6 First Cost Comparison (Weighted Average Unit Prices)					
Location 6	Thickness	Unit	Quantity	Unit Cost	Cost
Mechanistic: Flexible					
40603540 Polymerized HMA Surface Course, Mix "D", N70	2.00"	Ton	314	$111.57	$35,032.98
40603208 Polymerized HMA Binder Course, IL 9.5, N70 (Upper Binder)	2.25"	Ton	353	$103.91	$36,680.23
40603085 HMA Binder Course, IL 19.0, N70 (Lower Binder)	6.50"	Ton	1,021	$93.58	$95,545.18
48203100 HMA Shoulders	8.00"	Ton	850	$81.18	$69,003.00
31101900 Subbase Granular Material, Type C	Var.	Ton	298	$25.50	$7,599.00
31100100 Subbase Granular Material, Type A	12.00"	Ton	3,216	$25.38	$81,622.08
Total					**$325,482.47**
Mechanistic: Rigid					
42000401 PCC Pavement 9" (Jointed)	9.00"	SY	2,804	$59.67	$167,314.68
48300300 PCC Shoulders 8"	8.00"	SY	1,898	$54.25	$102,966.50
31200100 Stabilized Subbase 4"	4.00"	SY	4,992	$20.13	$100,488.96
31101900 Subbase Granular Material, Type C	Var.	Ton	108	$25.50	$2,754.00
31100100 Subbase Granular Material, Type A	12.00"	Ton	3,599	$25.38	$91,342.62
Total					**$464,866.76**

*Mechanistic Flexible Design is Recommended at this Location

BDE 5401 Template (Rev. 09/05/2013)

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 04/17/2018

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: FAP 317 (US 150)
Section: 15B(BR)
County: Peoria and Tazewell
Location: Illinois River in Peoria

Comments: Southbound IL 116 Lane Addition in Tazewell County
Design Date: 01/20/2018 CEM
Modify Date:

	<-- BY	ADT	Year
Current:		4,622	2015
Future:		5,922	2042

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: I

Subgrade Support Rating (SSR): Poor
Construction Year: 2022
Design Period (DP) = 20 years

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	5,111	94.0%	P = 50%
SU =	250	212	3.9%	S = 50%
MU =	750	117	2.2%	M = 50%
Struct. Design ADT =		5,441	(2032)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT			RIGID PAVEMENT		
Cpv =	0.15		Cpv =	0.15	
Csu =	132.5		Csu =	143.81	
Cmu =	482.53		Cmu =	696.42	
TF flexible (Actual) =	0.85	(Actual ADT)	TF rigid (Actual) =	1.13	(Actual ADT)
TF flexible (Min) =	3.95	(Min ADT Fig. 54-2.C)	TF rigid (Min) =	5.58	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible = 3.95
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)
Goto Map
HMA Mixture Temp. = 76.5 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 650 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 81 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 10.75 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 15.50 in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 10.75 inches

JPC Pavement

Use TF rigid = 5.58
Edge Support = Tied Shoulder or C.&G.

Rigid Pavt Thick. = 9.00 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 5.58
IBR value = 3

CRCP Thickness = 8.25 in. (Fig. 54-4.M)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible = 3.95
HMA Overlay Design Thickness = 8.00 in. (Fig. 54-5.U)
Goto Map
Limiting Strain Criterion Thickness = 11.00 in. (Fig. 54-5.V)

Use HMA Overlay Thickness = 8.00 inches

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

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) Csu	Cmu	Flexible (Fig. 54-5.B) 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 P	S	M	Urban 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%

BDE 5401 Template (Rev. 09/05/2013) Printed: 04/17/2018

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE			FAP 317 (US 150)		
SECTION			Section 15B(BR)		
COUNTY			Peoria and Tazewell Counties		
LOCATION			Southbound IL Route 116 in Tazewell County		
FACILITY TYPE			NON-INTERSTATE		
PROJECT LENGTH			2508 FT	= = >	0.48 Miles
# OF CENTERLINES			1 CL		
# OF LANES			3 LANES		
# OF EDGES			2 EP		
LANE WIDTH - AVERAGE			12 FT		
SHOULDER WIDTH	HMA	Left	0 FT		
	HMA	Right	6 FT		
	Total Width of Paved Shoulders		6 FT		
PAVEMENT THICKNESS (FLEXIBLE)			10.75 IN		15.50 IN MAX
SHOULDER THICKNESS			8.00 IN		Standard Design
POLICY OVERLAY THICKNESS			2.25 IN		

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	3.95	0.85	3.95

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$111.57 / TON
HMA TOP BINDER	$103.91 / TON
HMA LOWER BINDER	$93.58 / TON
HMA BINDER (LEVELING)	$0.00 / TON
HMA SHOULDER	$81.18 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE		COST	
HMA PAVEMENT (FULL-DEPTH)	(10.75")	10,032	SQ YD	*	$0.00	/ SQ YD	$0	
HMA SURFACE COURSE	(2.00")	314	TONS	*	$111.57	/ TON	$35,033	~
HMA TOP BINDER COURSE	(2.25")	353	TONS	*	$103.91	/ TON	$36,680	~
HMA LOWER BINDER COURSE	(6.50")	1,021	TONS	*	$93.58	/ TON	$95,545	~
HMA SHOULDER	(8.00")	850	TONS	*	$81.18	/ TON	$69,003	~
CURB & GUTTER		0	LIN FT	*	$0.00	/ LIN FT	$0	
SUBBASE GRAN MATL TY C (TONS)		298	TONS	*	$25.50	/ TON	$7,599	
IMPROVED SUBGRADE:	Modified Soil	0	SQ YD	*	$0.00	/ SQ YD	$0	
Subbase Granular Material, Type A		3,216	Ton	*	$25.38	/ Ton	$81,622	
Reserved For User Supplied Item		0	UNITS	*	$0.00	/ UNITS	$0	
PAVEMENT REMOVAL		0	SQ YD	*	$0.00	/ SQ YD	$0	
SHOULDER REMOVAL		0	SQ YD	*	$0.00	/ SQ YD	$0	

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST $325,482

FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE $27,947

MAINTENANCE COSTS:

ITEM		THICKNESS	MATERIAL		UNIT COST	
ROUTINE MAINTENANCE ACTIVITY					$0.00	LANE-MILE / YEAR
HMA OVERLAY PVMT SURF		(2.00")	Surface Mix	2.00	$111.57	/ TON
HMA OVERLAY PVMT		(2.25")		2.25	$74.25	/ TON
HMA SURFACE MIX		(1.50")	Surface Mix	1.50	$111.57	/ TON
HMA BINDER MIX		(0.75")	Leveling Binder Mix	0.75	$0.00	/ TON
HMA OVERLAY SHLD	(Year 30)	(2.25")	Shoulder Mix	2.25	$81.18	/ TON
HMA OVERLAY SHLD		(2.00")	Shoulder Mix	2.00	$81.18	/ TON
MILLING (2.00 IN)				2.00	$3.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill Surf)	Surface Mix	2.00	$82.50	/ SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill Surf)	Shoulder Mix	2.00	$79.09	/ SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill +2.00 ")	Leveling Binder Mix	2.00	$70.00	/ SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill +2.00 ")	Shoulder Mix	2.00	$79.09	/ 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 $597,612

FLEXIBLE TOTAL ANNUAL COST PER MILE $51,313

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
YEAR 5								
	LONG SHLD JT R&S	100.00%	5,016	LIN FT	$2.00		$10,032	
	CNTR LINE JOINT R&S	100.00%	2,508	LIN FT	$2.00		$5,016	
	RNDM / THRM CRACK R&S	50.00%	4,138	LIN FT	$2.00		$8,276	
	PD PVMT PATCH M&F SURF	0.10%	10	SQ YD	$82.50		$825	
	PWFn =	0.8626		PW =	0.8626	X	$24,149	$20,831
YEAR 10								
	LONG SHLD JT R&S	100.00%	5,016	LIN FT	$2.00		$10,032	
	CNTR LINE JOINT R&S	100.00%	2,508	LIN FT	$2.00		$5,016	
	RNDM / THRM CRACK R&S	50.00%	4,138	LIN FT	$2.00		$8,276	
	PD PVMT PATCH M&F SURF	0.50%	50	SQ YD	$82.50		$4,125	
	PWFn =	0.7441		PW =	0.7441	X	$27,449	$20,425
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	11,929	SQ YD	$3.00		$35,787	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	100	SQ YD	$70.00		$7,000	
	HMA OVERLAY PVMT 2.00"	100.00%	1,129	TON	$111.57		$125,939	
	HMA OVERLAY SHLD 2.00 "	100.00%	213	TON	$81.18		$17,251	
	PWFn =	0.6419		PW =	0.6419	X	$185,977	$119,372
YEAR 20								
	LONG SHLD JT R&S	100.00%	5,016	LIN FT	$2.00		$10,032	
	CNTR LINE JOINT R&S	100.00%	2,508	LIN FT	$2.00		$5,016	
	RNDM / THRM CRACK R&S	50.00%	4,138	LIN FT	$2.00		$8,276	
	PD PVMT PATCH M&F SURF	0.10%	10	SQ YD	$82.50		$825	
	PWFn =	0.5537		PW =	0.5537	X	$24,149	$13,371
YEAR 25								
	LONG SHLD JT R&S	100.00%	5,016	LIN FT	$2.00		$10,032	
	CNTR LINE JOINT R&S	100.00%	2,508	LIN FT	$2.00		$5,016	
	RNDM / THRM CRACK R&S	50.00%	4,138	LIN FT	$2.00		$8,276	
	PD PVMT PATCH M&F SURF	0.50%	50	SQ YD	$82.50		$4,125	
	PWFn =	0.4776		PW =	0.4776	X	$27,449	$13,110
	HMA_SD							
YEAR 30	NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	11,929	SQ YD	$3.00		$35,787	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	201	SQ YD	$70.00		$14,070	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	19	SQ YD	$79.09		$1,503	
	HMA OVERLAY PVMT 2.25 "	100.00%	1,271	TON	$74.25		$94,345	
	HMA OVERLAY SHLD 2.25 "	100.00%	239	TON	$81.18		$19,407	
	PWFn =	0.4120		PW =	0.4120	X	$165,112	$68,024
YEAR 35								
	LONG SHLD JT R&S	100.00%	5,016	LIN FT	$2.00		$10,032	
	CNTR LINE JOINT R&S	100.00%	2,508	LIN FT	$2.00		$5,016	
	RNDM / THRM CRACK R&S	50.00%	4,138	LIN FT	$2.00		$8,276	
	PD PVMT PATCH M&F SURF	0.10%	10	SQ YD	$82.50		$825	
	PWFn =	0.3554		PW =	0.3554	X	$24,149	$8,582
YEAR 40								
	LONG SHLD JT R&S	100.00%	5,016	LIN FT	$2.00		$10,032	
	CNTR LINE JOINT R&S	100.00%	2,508	LIN FT	$2.00		$5,016	
	RNDM / THRM CRACK R&S	50.00%	4,138	LIN FT	$2.00		$8,276	
	PD PVMT PATCH M&F SURF	0.50%	50	SQ YD	$82.50		$4,125	
	PWFn =	0.3066		PW =	0.3066	X	$27,449	$8,415
								$272,130
	ROUTINE MAINTENANCE ACTIVITY		1.43	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$272,130
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$23,366

PCC PAVEMENT

JPCP

ROUTE	**FAP 317 (US 150)**
SECTION	**Section 15B(BR)**
COUNTY	**Peoria and Tazewell Counties**
LOCATION	**Southbound IL Route 116 in Tazewell County**
FACILITY TYPE	**NON-INTERSTATE**

PROJECT LENGTH			**2508** FT = = >	0.48 Miles
# OF CENTERLINES			**1** CL	
# OF LANES			**3** LANES	
# OF EDGES			**2** EP	
LANE WIDTH - AVERAGE			**12** FT	
SHOULDER WIDTH	PCC	Left	**0** FT	
	PCC	Right	**6** FT	
	Total Width of Paved Shoulders		**6** FT	

PAVEMENT THICKNESS (RIGID)	**JPCP**	**9.00** IN	TIED SHLD
SHOULDER THICKNESS		**8.00** IN	

POLICY OVERLAY THICKNESS **2.50** IN

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	5.58	**1.13**	**5.58**
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")	2,804	SQ YD	*	**$59.67**	/ SQ YD	$167,315
PAVEMENT REINFORCEMENT		0	SQ YD	*	**$0.00**	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	4,992	SQ YD	*	**$20.13**	/ SQ YD	$100,489
PCC SHOULDERS		1,898	SQ YD	*	**$54.25**	/ SQ YD	$102,967
CURB & GUTTER		0	LIN FT	*	**$0.00**	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(~ 2.29")	108	TONS	*	**$25.50**	/ TON	$2,754
IMPROVED SUBGRADE:	Modified Soil Width = 0.0'	0	SQ YD	*	**$0.00**	/ SQ YD	$0
Subbase Granular Material, Type A		3,599	**Ton**	*	**$25.38**	/ Ton	$91,343
Reserved For User Supplied Item		0	**UNITS**	*	**$0.00**	/ UNITS	$0
PAVEMENT REMOVAL		0	SQ YD	*	**$0.00**	/ SQ YD	$0
SHOULDER REMOVAL		0	SQ YD	*	**$0.00**	/ SQ YD	$0

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$464,868
RIGID CONSTRUCTION ANNUAL COST PER MILE	$39,915

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")	1.0000	2.50	**$9.40**	/ SQ YD
HMA SURFACE MIX	(1.50")	1.0000	Surface Mix 1.50	**$9.40**	/ SQ YD
HMA BINDER MIX	(1.00")	1.0000	ding Binder Mix 1.00	**$0.00**	/ SQ YD
HMA POLICY OVERLAY SHLD	(2.50")		Shoulder Mix 2.50	**$11.37**	/ SQ YD
CLASS A PAVEMENT PATCHING				**$195.00**	/ SQ YD
CLASS B PAVEMENT PATCHING				**$150.00**	/ SQ YD
CLASS C SHOULDER PATCHING				**$145.00**	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface Mix	1.50	**$79.37**	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	2.50	**$85.62**	/ 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' / Station / Lane)			**$2.00**	/ LIN FT

RIGID TOTAL LIFE-CYCLE COST	$563,131
RIGID TOTAL ANNUAL COST PER MILE	$48,352

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 04/17/18

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

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 10							
	PAVEMENT PATCH CLASS B	0.10%	3	SQ YD	$150.00	$450	
	PWFn =	0.7441		PW =	0.7441 X	$450	$335
YEAR 15							
	PAVEMENT PATCH CLASS B	0.20%	6	SQ YD	$150.00	$900	
	PWFn =	0.6419		PW =	0.6419 X	$900	$578
YEAR 20							
	PAVEMENT PATCH CLASS B	2.00%	56	SQ YD	$150.00	$8,400	
	SHOULDER PATCH CLASS C	0.50%	9	SQ YD	$145.00	$1,305	
	LONGITUDINAL SHLD JT R&S	100.00%	5,016	LIN FT	$2.00	$10,032	
	CENTERLINE JT R&S	100.00%	2,508	LIN FT	$2.00	$5,016	
	PWFn =	0.5537		PW =	0.5537 X	$24,753	$13,705
YEAR 25							
	PAVEMENT PATCH CLASS B	3.00%	84	SQ YD	$150.00	$12,600	
	SHOULDER PATCH CLASS C	1.00%	19	SQ YD	$145.00	$2,755	
	PWFn =	0.4776		PW =	0.4776 X	$15,355	$7,334
YEAR 30	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	4.00%	112	SQ YD	$150.00	$16,800	
	SHOULDER PATCH CLASS C	1.50%	28	SQ YD	$145.00	$4,060	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	10,032	SQ YD	$9.40	$94,345	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	1,897	SQ YD	$11.37	$21,563	
	PWFn =	0.4120		PW =	0.4120 X	$136,768	$56,347
YEAR 35	NON-INTERSTATE						
	LONGITUDINAL SHLD JT R&S	100.00%	5,016	LIN FT	$2.00	$10,032	
	CENTERLINE JT R&S	100.00%	2,508	LIN FT	$2.00	$5,016	
	RANDOM CRACK R&S	50.00%	3,762	LIN FT	$2.00	$7,524	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	2,405	LIN FT	$2.00	$4,810	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	3	SQ YD	$85.62	$257	
	PWFn =	0.3554		PW =	0.3554 X	$27,639	$9,822
YEAR 40	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	0.50%	14	SQ YD	$150.00	$2,100	
	LONGITUDINAL SHLD JT R&S	100.00%	5,016	LIN FT	$2.00	$10,032	
	CENTERLINE JT R&S	100.00%	2,508	LIN FT	$2.00	$5,016	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	3,607	LIN FT	$2.00	$7,214	
	RANDOM CRACK R&S	50.00%	3,762	LIN FT	$2.00	$7,524	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	14	SQ YD	$85.62	$1,199	
	PWFn =	0.3066		PW =	0.3066 X	$33,085	$10,142
							$98,263
	ROUTINE MAINTENANCE ACTIVITY		1.43	Lane Miles	$0.00	$0	$0
					MAINTENANCE LIFE-CYCLE COST		$98,263
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE		$8,437

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : **9/5/13 9:40 AM**

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$464,868	$325,482
		ANNUAL COST PER MILE	$39,915	$27,947
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$98,263	$272,130
		ANNUAL COST PER MILE	$8,437	$23,366
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$563,131	$597,612
		ANNUAL COST PER MILE	$48,352	$51,313

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**JPCP**	**$48,352**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**HMA**	**$51,313**	6.1%

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