



User: Todd Peschke

Edit Pavement Design General Information

* Project ID:	2788-01-00	* Designer's Name:	Todd Peschke
* Design Name:	Section #1	* Design Date:	01/12/2015
* Roadway Name:	Waukesha Bypass	* Type:	State ▼
* Project Termini:	(STH 59 to IH 94)	* Status:	Draft ▼
* Highway Name:	Waukesha Bypass		
* Region:	SE ▼		
* County:	Waukesha ▼ Select ▼		
Comments:	Section #1: Waukesha Bypass, STH 59 to Northview Road - Sta 100+52 to Sta 340+50		

Last Updated date and Time: 01/13/2015 12:42:04 PM

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User: Todd Peschke

Pavement Design Details			
Project ID:	2788-01-00	Design Name:	Section #1
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)
		Designer:	Todd Peschke
		Design Date:	01/12/2015
		County:	Waukesha

Soil Parameters

*Design Group Index (DGI):	12	▼
*Subgrade Improvement:	☒ Yes ☐ No	
*Subgrade Soil Support Value(SSV):	4.7	▼
*Subgrade Modulus of Subgrade Reaction(k):	375	▼
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Pavement Design Details

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Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)	County:	Waukesha
		Designer:	Todd Peschke		

Traffic Parameters

*Construction Year: 2017

*Construction Year AADT: 19400

*Directional Factor(DF): 0.5

*Design Year: 2037

*Design Year AADT: 24900

*Lane Distribution Factor(LDF): 0.9

Truck Classification	% of AADT
2D	2.2
3SU	0.7
2S-1,-2	4.6
3S-2	0.8
2-S1-2	0.0
Total % Truck Traffic	8.3

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Pavement Design Details

Project ID:	2788-01-00	Design Name:	Section #1	Design Date:	01/12/2015
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)	County:	Waukesha
		Designer:	Todd Peschke		

Concrete Pavement Design

Truck Type	% of AADT	DLT	# of Trucks	ESAL Load Factor	ESALs
2D	2.2	9,968	219	0.3	66
3SU	0.7	9,968	70	1.2	84
2S-1,-2	4.6	9,968	459	0.6	275
3S-2	0.8	9,968	80	1.6	128
2-S1-2	0.0	9,968	0	2.1	0

Design Lane Daily ESALs: 552

Design Lane Total Life ESALs: 4,031,056

Rounded to: 4,100,000

Soil Parameters

Subgrade Improvement Flag selected: Yes

k : 375

Design Calculation

Calculated Pavement Thickness:

8.1

Pavement Thickness(ALT# 1):

8.0 ☒

Pavement Thickness(ALT# 2):

0.0 ☒[Back](#)[Next](#)Direct questions to the [WisDOT Computer Help Desk](#) 1-800-362-3050

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Pavement Design Details

Project ID:	2788-01-00	Design Name:	Section #1	Design Date:	01/12/2015
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)	County:	Waukesha
		Designer:	Todd Peschke		

HMA Pavement Design

Truck Type	% of AADT	DLT	# of Trucks	ESAL Load Factor	ESALs
2D	2.2	9,968	219	0.3	66
3SU	0.7	9,968	70	0.8	56
2S-1,-2	4.6	9,968	459	0.5	229
3S-2	0.8	9,968	80	0.9	72
2-S1-2	0.0	9,968	0	2.0	0

Design Lane Daily ESALs: 423

Design Lane Total Life ESALs: 3,087,900

Rounded to: 3,100,000

Soil Parameters

DGI : 12

Subgrade Improvement Flag selected: Yes

SSV : 4.7

Design Calculation

Calculated Required SN:

4.45

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Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)
		Designer:	Todd Peschke
		Design Date:	01/12/2015
		County:	Waukesha

HMA ALT#1 Layer Thickness Design

									Add Layer	Delete Layer
Layers	Existing Pavement	Uppermost Base Agg.	Other	Material Type	Unit Type	Layer Coefficient	Thickness in.	Structural Number		
1	☐	☐	☐	HMA Pavement Type E-10	-----	0.44	7.0	3.08		
2	☐	☒	☐	Base Aggregate Dense 1 1/4-inch	-----	0.1	14.0	1.4		

Note: You can add only 10 layers (including 'Other' layers)

No. of Layers: 2 No. of Other Layers: 0 Total SN: 4.48
Required SN: 4.45

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Note 1. If the structural design includes a granular subbase, then the layer can only contribute a maximum of 10% of the required SN (see FDM 14-10-5.8), regardless of the material's strength coefficient or the thickness of the layer.

2. If the project involves subgrade improvement, the associated quantity and cost of the material can be accounted for and included in the LCCA by adding the material as a layer and setting the respective layer coefficient to 0.0 so that it isn't given additional credit in the structural design.

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User: Todd Peschke

Pavement Design Details			
Project ID:	2788-01-00	Design Name:	Section #1
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)
		Designer:	Todd Peschke
		Design Date:	01/12/2015
		County:	Waukesha

HMA ALT#2 Layer Thickness Design

								Add Layer	Delete Layer
Layers	Existing Pavement	Uppermost Base Agg.	Other	Material Type	Unit Type	Layer Coefficient	Thickness in.	Structural Number	
1	☐	☐	☐	HMA Pavement Type E-10 ☒	-----	0.44	8.75	3.85	
2	☐	☒	☐	Base Aggregate Dense 1 1/4-inch ☒	-----	0.1	6.0	0.6	

Note: You can add only 10 layers (including 'Other' layers)

No. of Layers: 2 No. of Other Layers: 0 Total SN: 4.45
Required SN: 4.45

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Note 1. If the structural design includes a granular subbase, then the layer can only contribute a maximum of 10% of the required SN (see FDM 14-10-5.8), regardless of the material's strength coefficient or the thickness of the layer.

2. If the project involves subgrade improvement, the associated quantity and cost of the material can be accounted for and included in the LCCA by adding the material as a layer and setting the respective layer coefficient to 0.0 so that it isn't given additional credit in the structural design.

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Pavement Design Details

Project ID:	2788-01-00	Design Name:	Section #1	Design Date:	01/12/2015
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)	County:	Waukesha
		Designer:	Todd Peschke		

LCCA

* Project Type: ☒ Urban ☐ Rural

* LCCA Length: Miles

No. of HMA Alternatives: 4

* Select HMA Alternatives to include in LCCA: ☒ HMA Alt# 1 ☒ HMA Alt# 2 ☐ HMA Alt# 3 ☐ HMA Alt# 4

No. of Concrete Alternatives: 1

* Select Concrete Alternatives to include in LCCA: ☒ Concrete Alt# 1

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Pavement Design Details

Project ID:	2788-01-00	Design Name:	Section #1	Design Date:	01/12/2015
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)	County:	Waukesha
		Designer:	Todd Peschke		

Concrete Alt#1 Urban Cross Section

*Roadway Width: *% of Project Length for new Curb & Gutter:

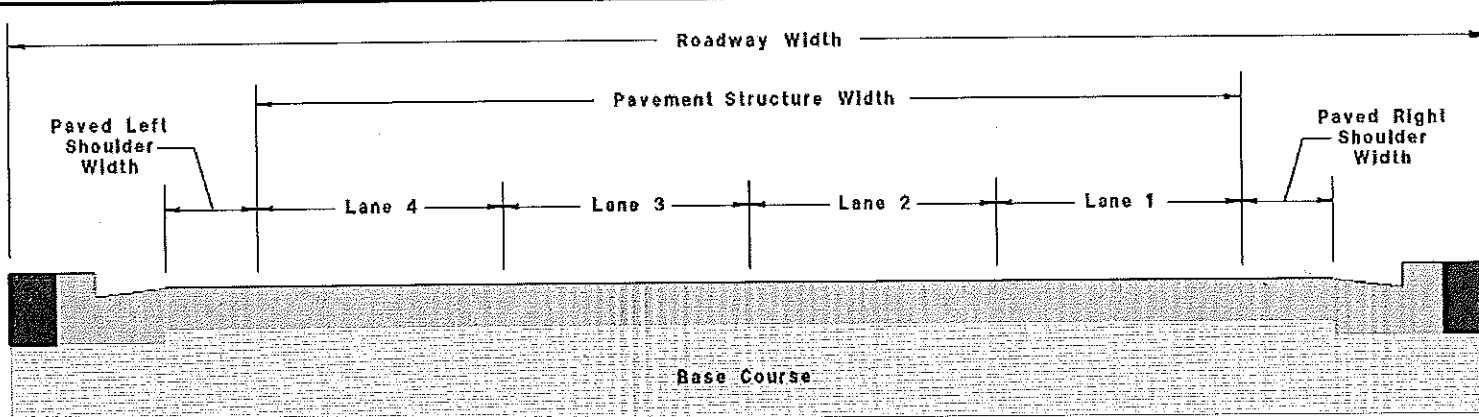
*Paved Left Shoulder Width: *Paved Right Shoulder Width:

*Number of Travel Lanes :

Lane 1 Width : Lane 2 Width :

Number of Center/Shared Lanes :

Pavement Structure Width:

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EXHIBIT #151

**Concrete Alt#1 Quantities**

Layers	Bid Item No	Bid Item Desc	Units	Quantity
1	415.0080	Concrete Pavement, 8 inch	SY	127,846.4

Additional Initial Construction Quantities:

Bid Item No	Bid Item Desc	Units	Quantity
415.0080	Concrete Pavement, 8 inch (Shoulders)	SY	63,923.2
601.0409	Concrete Curb & Gutter 30-Inch Type A	LF	47,942.4

Other Quantities:

Other Description	Unit	Quantity
	Sel v	0.0
	Sel v	0.0
	Sel v	0.0

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Concrete Alternative - Maintenance & Rehabilitation Summary - Alt #1

						Add	Delete
Year	Type of Work	Activity	Service Life	Cost per Lane Mile	Calculate		
0	Initial Construction		25				
8	Concrete Maintenance	1st Cycle		\$4000.0			
16	Concrete Maintenance	2nd Cycle		\$8000.0			
25	Concrete Rehabilitation	Concrete Repair & Grind	8		Calculate		
28	Concrete Maintenance	1st Cycle		\$4000.0			
31	Concrete Maintenance	2nd Cycle		\$8000.0			
33	Concrete Rehabilitation	Concrete Repair & HMA Overlay	15		Calculate		
38	Concrete Maintenance	1st Cycle		\$2000.0			
43	Concrete Maintenance	2nd Cycle		\$2500.0			
48	Concrete Rehabilitation	Mill, Concrete Repair & HMA	15		Calculate		
53	Concrete Maintenance	1st Cycle		\$2000.0			
58	Concrete Maintenance	2nd Cycle		\$2500.0			
63							
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User: Todd Peschke

Concrete Repair & Grind

% of Surface Area to be Repaired: Grind Limits: ☐

Item	Units	Quantity
Concrete Pavement Repair	SY	6,400
Drilled Dowel Bars	EACH	12,800
Sawing Concrete	LF	28,800
Concrete Pavement Continuous Diamond Grinding	SY	191,769.6
	☐ ☒	0.0

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Concrete Repair & HMA Overlay

% of Surface Area to be Repaired: 5.0

Removing Concrete Surface Partial Depth Limits: None

Overlay Limits: Pavement Structure and Shoulders

Type	HMA Mix Type	Thickness	Asphaltic Material(PG)	% Asphalt in Mix	# of Tack Coat Layers	Tack Coat Coverage GAL/SY
Overlay	HMA Pavement Type E-10	4.0	Asphaltic Material PG64-28	5.5	2	0.025

Calculate

Item	Units	Quantity
Base Patching Concrete	SY	6,400
Drilled Dowel Bars	EACH	12,800
Sawing Concrete	LF	28,800
Removing Concrete Surface Partial Depth	SF	0
HMA Pavement Type E-10	TON	42,956.4
Asphaltic Material PG64-28	TON	2,362.6
Tack Coat(Pavement Structure)	GAL	9,588.5
Base Aggregate Dense 3/4-Inch(Shoulder Gravel)	TON	0
		0.0

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Mill, Concrete Repair & HMA Overlay

Milling Limits: Milling Depth: (in)% of Surface Area to be Repaired: Removing Concrete Surface Partial Depth Limits: Overlay Limits:

Type	HMA Mix Type	Thickness	Asphaltic Material(PG)	% Asphalt in Mix	# of Tack Coat Layers	Tack Coat Coverage GAL/SY
Overlay	HMA Pavement Type E-10	4.0	Asphaltic Material PG64-28	5.5	2	0.025

Item	Units	Quantity
Removing Asphaltic Surface Milling	SY	191,769.6
Base Patching Concrete	SY	6,400
Drilled Dowel Bars	EACH	12,800
Sawing Concrete	LF	28,800
Removing Concrete Surface Partial Depth	SF	0
HMA Pavement Type E-10	TON	42,956.4
Asphaltic Material PG64-28	TON	2,362.6
Tack Coat(Pavement Structure)	GAL	9,588.5
Base Aggregate Dense 3/4-inch(Shoulder Gravel)	TON	0
		0.0

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HMA Alt#1 Description

Layers	Existing Pavement	Material Type	Thickness in.	Unit Weight lbs/SY/in	%AC	PG	# of Tack Coat Layers	Tack Coat Coverage Gal/SY
1	N	HMA Pavement Type E-10	7.0	112.0	5.5	Asphaltic Material PG64-28 ☒	2	0.025
2	N	Base Aggregate Dense 1 1/4-inch	14.0	2.0	----	----	-----	-----

Shoulders

Material Type	Thickness in.	%AC	PG	# of Tack Coat Layers	Tack Coat Coverage Gal/SY
HMA Pavement Type E-10 ☒	7.0	5.5	Asphaltic Material PG64-28 ☒	2	0.025

Additional Construction Process

Add Construction Process

Delete Construction Process

Layers	Other	Process Description	% of LCCA Length Requiring Process	Existing Pavement Width ft.	% of Surface Area Requiring Repair	# of Stations
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HMA Alt#2 Description

Layers	Existing Pavement	Material Type	Thickness in.	Unit Weight lbs/SY/in	%AC	PG	# of Tack Coat Layers	Tack Coat Coverage Gal/SY
1	N	HMA Pavement Type E-10	8.75	112.0	5.5	Asphaltic Material PG64-28	2	0.025
2	N	Base Aggregate Dense 1 1/4-inch	6.0	2.0	-----	-----	-----	-----

Shoulders

Material Type	Thickness in.	%AC	PG	# of Tack Coat Layers	Tack Coat Coverage Gal/SY
HMA Pavement Type E-10	8.75	5.5	Asphaltic Material PG64-28	2	0.025

Additional Construction Process

Add Construction Process

Delete Construction Process

Layers	Other	Process Description	% of LCCA Length Requiring Process	Existing Pavement Width ft.	% of Surface Area Requiring Repair	# of Stations
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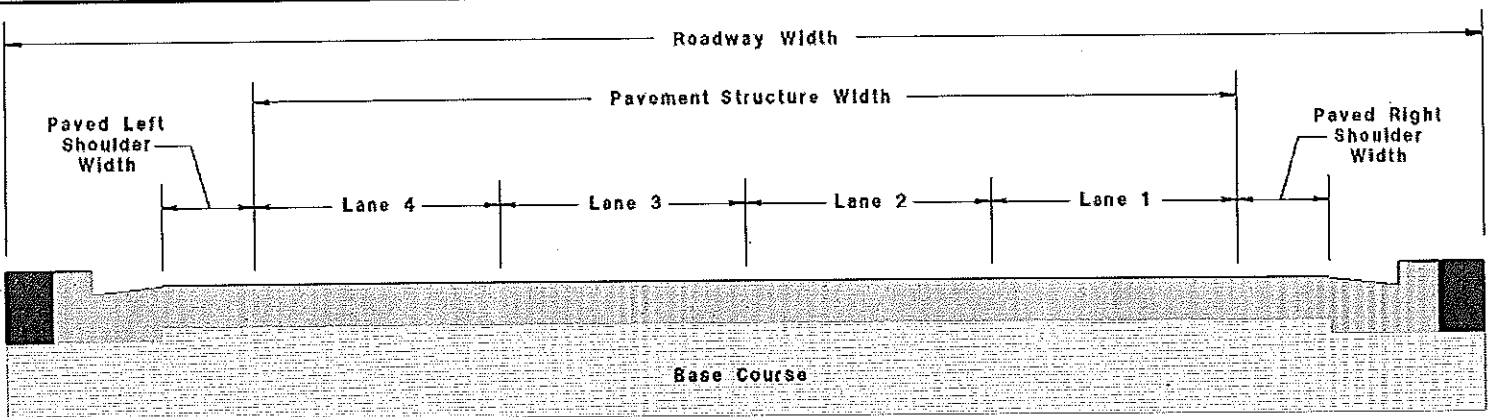


User: Todd Peschke

Pavement Design Details			
Project ID:	2788-01-00	Design Name:	Section #1
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)
		Designer:	Todd Peschke
		Design Date:	01/12/2015
		County:	Waukesha

HMA Alt#1 Urban Cross Section

*Roadway Width:	43	* % of Project Length for new Curb & Gutter:	50
*Paved Left Shoulder Width:	4	*Paved Right Shoulder Width:	8
*Number of Travel Lanes :	2 ☐		
Lane 1 Width :	12.0	Lane 2 Width :	12.0
Number of Center/Shared Lanes :	0 ☐		
Pavement Structure Width:	24		
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EXHIBIT #159

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User: Todd Peschke

Pavement Design Details

Project ID:	2788-01-00	Design Name:	Section #1	Design Date:	01/12/2015
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)	County:	Waukesha
		Designer:	Todd Peschke		

HMA Alt#2 Urban Cross Section

*Roadway Width: * % of Project Length for new Curb & Gutter:

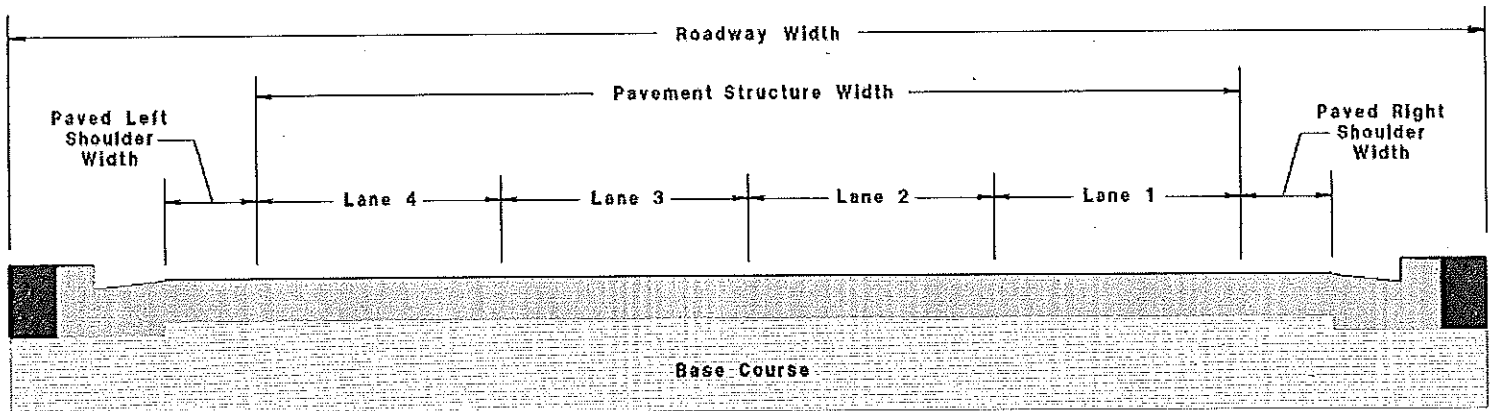
*Paved Left Shoulder Width: *Paved Right Shoulder Width:

*Number of Travel Lanes :

Lane 1 Width : Lane 2 Width :

Number of Center/Shared Lanes :

Pavement Structure Width:

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HMA Alt#1 Quantities

Layers	Bid Item No	Bid Item Desc	Units	Quantity
1	460.1110	HMA Pavement Type E-10	TON	50,115.8
	455.0120	Asphaltic Material PG64-28	TON	2,756.4
	455.0605	Tack Coat	GAL	6,392.3
2	305.0120	Base Aggregate Dense 1 1/4-inch	TON	180,227.9

Additional Initial Construction Quantities :

Bid Item No	Bid Item Desc	Units	Quantity
460.1110	HMA Pavement Type E-10 (Shoulders)	TON	25,057.9
455.0120	Asphaltic Material PG64-28 (Shoulders)	TON	1,378.2
455.0605	Tack Coat (Shoulders)	GAL	3,196.2
601.0411	Concrete Curb & Gutter 30-Inch Type D	LF	47,942.4

Other Quantities :

Other Description	Unit	Quantity
	Sele ☐	0.0
	Sele ☐	0.0
	Sele ☐	0.0

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HMA Alt#2 Quantities

Layers	Bid Item No	Bid Item Desc	Units	Quantity
1	460.1110	HMA Pavement Type E-10	TON	62,644.7
	455.0120	Asphaltic Material PG64-28	TON	3,445.5
	455.0605	Tack Coat	GAL	6,392.3
2	305.0120	Base Aggregate Dense 1 1/4-inch	TON	82,049.6

Additional Initial Construction Quantities :

Bid Item No	Bid Item Desc	Units	Quantity
460.1110	HMA Pavement Type E-10 (Shoulders)	TON	31,322.4
455.0120	Asphaltic Material PG64-28 (Shoulders)	TON	1,722.7
455.0605	Tack Coat (Shoulders)	GAL	3,196.2
601.0411	Concrete Curb & Gutter 30-Inch Type D	LF	47,942.4

Other Quantities :

Other Description	Unit	Quantity
	Sele ☒	0.0
	Sele ☒	0.0
	Sele ☒	0.0

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HMA Alternative - Maintenance & Rehabilitation Summary - Alt #1

Year	Type of Work	Activity	Service Life	Cost per Lane Mile	Calculate
0	Initial Construction - ☐		18		
6	HMA Maintenance	1st Cycle		\$2000.0	
12	HMA Maintenance	2nd Cycle		\$2500.0	
18	HMA Rehabilitation	Mill & HMA Overlay ☐	12		Calculate
22	HMA Maintenance	1st Cycle		\$2000.0	
26	HMA Maintenance	2nd Cycle		\$2500.0	
30	HMA Rehabilitation	Mill & HMA Overlay ☐	12		Calculate
34	HMA Maintenance	1st Cycle		\$2000.0	
38	HMA Maintenance	2nd Cycle		\$2500.0	
42	HMA Rehabilitation	Mill & HMA Overlay ☐	12		Calculate
46	HMA Maintenance	1st Cycle		\$2000.0	
50	HMA Maintenance	2nd Cycle		\$2500.0	

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Mill & HMA Overlay

Milling Limits: Milling Depth: (in)Overlay Limits:

Type	HMA Mix Type	Thickness	Asphaltic Material(PG)	% Asphalt in Mix	# of Tack Coat Layers	Tack Coat Coverage GAL/SY
Overlay	HMA Pavement Type E-10	4.0	Asphaltic Material PG64-28	5.5	2	0.025

Calculate

Item	Units	Quantity
Removing Asphaltic Surface Milling	SY	191,769.6
HMA Pavement Type E-10	TON	42,956.4
Asphaltic Material PG64-28	TON	2,362.6
Tack Coat(Pavement Structure)	GAL	9,588.5
Base Aggregate Dense 3/4-inch(Shoulder Gravel)	TON	0
	0.0	

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Mill & HMA Overlay

Milling Limits: Milling Depth: (in)Overlay Limits:

Type	HMA Mix Type	Thickness	Asphaltic Material(PG)	% Asphalt in Mix	# of Tack Coat Layers	Tack Coat Coverage GAL/SY
Overlay	HMA Pavement Type E-10	4.0	Asphaltic Material PG64-28	5.5	2	0.025

Calculate

Item	Units	Quantity
Removing Asphaltic Surface Milling	SY	191,769.6
HMA Pavement Type E-10	TON	42,956.4
Asphaltic Material PG64-28	TON	2,362.6
Tack Coat(Pavement Structure)	GAL	9,588.5
Base Aggregate Dense 3/4-inch(Shoulder Gravel)	TON	0
	☒	0.0

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Mill & HMA Overlay

Milling Limits: Milling Depth: (in)Overlay Limits:

Type	HMA Mix Type	Thickness	Asphaltic Material(PG)	% Asphalt in Mix	# of Tack Coat Layers	Tack Coat Coverage GAL/SY
Overlay	HMA Pavement Type E-10	4.0	Asphaltic Material PG64-28	5.5	2	0.025

Calculate

Item	Units	Quantity
Removing Asphaltic Surface Milling	SY	191,769.6
HMA Pavement Type E-10	TON	42,956.4
Asphaltic Material PG64-28	TON	2,362.6
Tack Coat(Pavement Structure)	GAL	9,588.5
Base Aggregate Dense 3/4-inch(Shoulder Gravel)	TON	0
	0.0	

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HMA Alternative - Maintenance & Rehabilitation Summary - Alt #2

Year	Type of Work	Activity	Service Life	Cost per Lane Mile	Calculate
0	Initial Construction - v		18		
6	HMA Maintenance	1st Cycle		\$2000.0	
12	HMA Maintenance	2nd Cycle		\$2500.0	
18	HMA Rehabilitation	Mill & HMA Overlay v	12		Calculate
22	HMA Maintenance	1st Cycle		\$2000.0	
26	HMA Maintenance	2nd Cycle		\$2500.0	
30	HMA Rehabilitation	Mill & HMA Overlay v	12		Calculate
34	HMA Maintenance	1st Cycle		\$2000.0	
38	HMA Maintenance	2nd Cycle		\$2500.0	
42	HMA Rehabilitation	Mill & HMA Overlay v	12		Calculate
46	HMA Maintenance	1st Cycle		\$2000.0	
50	HMA Maintenance	2nd Cycle		\$2500.0	
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Mill & HMA Overlay

Milling Limits: Milling Depth: (in)Overlay Limits:

Type	HMA Mix Type	Thickness	Asphaltic Material(PG)	% Asphalt in Mix	# of Tack Coat Layers	Tack Coat Coverage GAL/SY
Overlay	HMA Pavement Type E-10	4.0	Asphaltic Material PG64-28	5.5	2	0.025

Calculate

Item	Units	Quantity
Removing Asphaltic Surface Milling	SY	191,769.6
HMA Pavement Type E-10	TON	42,956.4
Asphaltic Material PG64-28	TON	2,362.6
Tack Coat(Pavement Structure)	GAL	9,588.5
Base Aggregate Dense 3/4-inch(Shoulder Gravel)	TON	0
	0.0	

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Version A

**Mill & HMA Overlay**Milling Limits: Milling Depth: (in)Overlay Limits:

Type	HMA Mix Type	Thickness	Asphaltic Material(PG)	% Asphalt in Mix	# of Tack Coat Layers	Tack Coat Coverage GAL/SY
Overlay	HMA Pavement Type E-10	4.0	Asphaltic Material PG64-28	5.5	2	0.025

Item	Units	Quantity
Removing Asphaltic Surface Milling	SY	191,769.6
HMA Pavement Type E-10	TON	42,956.4
Asphaltic Material PG64-28	TON	2,362.6
Tack Coat(Pavement Structure)	GAL	9,588.5
Base Aggregate Dense 3/4-inch(Shoulder Gravel)	TON	0
	☒	0.0

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Version A



Mill & HMA Overlay

Milling Limits: ☒ Milling Depth: (in)Overlay Limits: ☒

Type	HMA Mix Type	Thickness	Asphaltic Material(PG)	% Asphalt in Mix	# of Tack Coat Layers	Tack Coat Coverage GAL/SY
Overlay	HMA Pavement Type E-10 ☒	4.0	Asphaltic Material PG64-28 ☒	5.5	2	0.025

Item	Units	Quantity
Removing Asphaltic Surface Milling	SY	191,769.6
HMA Pavement Type E-10	TON	42,956.4
Asphaltic Material PG64-28	TON	2,362.6
Tack Coat(Pavement Structure)	GAL	9,588.5
Base Aggregate Dense 3/4-inch(Shoulder Gravel)	TON	0
	☒	0.0

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HMA Bid Items

Bid Item Desc	Bid Item No	Units	Unit Cost
Asphaltic Material PG64-28	455.0120	TON	136.51
Tack Coat	455.0605	GAL	3.18
HMA Pavement Type E-10	460.1110	TON	54.92
Concrete Curb & Gutter 30-inch Type D	601.0411	LF	10.92

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User: Todd Peschke

Concrete Bid Items

Bid Item Desc	Bid Item No	Units	Unit Cost
Base Patching Concrete	390.0303	SY	48.45
Concrete Pavement, 8 inch	415.0080	SY	32.7
Drilled Dowel Bars	416.0620	EACH	11.53
Concrete Pavement Repair	416.1710	SY	77.33
Concrete Pavement Continuous Diamond Grinding	420.1000	SY	4.88
Concrete Curb & Gutter 30-inch Type A	601.0409	LF	12.81
Sawing Concrete	690.0250	LF	2.33

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WISCONSIN DEPARTMENT OF TRANSPORTATION**Doing Business**[WisPave Home](#) | [File](#) | [Design](#) | [LCCA](#) | [Exit](#)

User: Todd Peschke

Base Course Bid Items

Bid Item Desc	Bid Item No	Units	Unit Cost
Base Aggregate Dense 1 1/4-inch	305.0120	TON	10.61

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Remove Pavement Bid Items

Bid Item Desc	Bid Item No	Units	Unit Cost
Removing Asphaltic Surface Milling	204.0120	SY	2.03

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Costs For All Alternatives

Concrete Alt#1

Initial Construction Costs

Bid Item Desc	Bid Item No	Units	Costs
Concrete Pavement, 8 inch	415.0080	SY	\$4,180,577.28
Concrete Pavement, 8 inch (Shoulders)	415.0080	SY	\$2,090,288.64
Concrete Curb & Gutter 30-inch Type A	601.0409	LF	\$614,142.14
		Total:	\$6,885,008.00

Rehab#1

Bid Item Desc	Bid Item No	Units	Costs
Drilled Dowel Bars	416.0620	EACH	\$147,584.00
Concrete Pavement Continuous Diamond Grinding	420.1000	SY	\$935,835.65
Concrete Pavement Repair	416.1710	SY	\$494,912.00
Sawing Concrete	690.0250	LF	\$67,104.00
		Total:	\$1,645,435.00

Rehab#2

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material PG64-28	455.0120	TON	\$322,518.53
Tack Coat	455.0605	GAL	\$30,491.43
HMA Pavement Type E-10	460.1110	TON	\$2,359,165.49
Base Patching	390.0303	SY	\$310,080.00

EXHIBIT #175

Concrete			
Drilled Dowel Bars	416.0620	EACH	\$147,584.00
Sawing Concrete	690.0250	LF	\$67,104.00
		Total:	\$3,236,943.00

Rehab#3

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material PG64-28	455.0120	TON	\$322,518.53
Tack Coat	455.0605	GAL	\$30,491.43
HMA Pavement Type E-10	460.1110	TON	\$2,359,165.49
Base Patching Concrete	390.0303	SY	\$310,080.00
Drilled Dowel Bars	416.0620	EACH	\$147,584.00
Sawing Concrete	690.0250	LF	\$67,104.00
Removing Asphaltic Surface Milling	204.0120	SY	\$389,292.29
		Total:	\$3,626,235.00

Maintenance Costs

Maintenance Cycle	Cost per Lane Mile	Total Cycle Cost
1	\$4,000.00	\$72,640.00
2	\$8,000.00	\$145,280.00
3	\$4,000.00	\$72,640.00
4	\$8,000.00	\$145,280.00
5	\$2,000.00	\$36,320.00
6	\$2,500.00	\$45,400.00
7	\$2,000.00	\$36,320.00
8	\$2,500.00	\$45,400.00
Total:		\$599,280.00

HMA Alt#1**Initial Construction Costs**

Bid Item Desc	Bid Item No	Units	Costs
EXHIBIT #176			

Asphaltic Material PG64-28	455.0120	TON	\$376,276.16
Tack Coat	455.0605	GAL	\$20,327.51
HMA Pavement Type E-10	460.1110	TON	\$2,752,359.74
Base Aggregate Dense 1 1/4-inch	305.0120	TON	\$1,912,218.02
Asphaltic Material PG64-28 (Shoulders)	455.0120	TON	\$188,138.08
Tack Coat (Shoulders)	455.0605	GAL	\$10,163.92
HMA Pavement Type E-10 (Shoulders)	460.1110	TON	\$1,376,179.87
Concrete Curb & Gutter 30-inch Type D	601.0411	LF	\$523,531.01
		Total:	\$7,159,194.00

Rehab#1

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material PG64-28	455.0120	TON	\$322,518.53
Tack Coat	455.0605	GAL	\$30,491.43
HMA Pavement Type E-10	460.1110	TON	\$2,359,165.49
Removing Asphaltic Surface Milling	204.0120	SY	\$389,292.29
		Total:	\$3,101,467.00

Rehab#2

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material PG64-28	455.0120	TON	\$322,518.53
Tack Coat	455.0605	GAL	\$30,491.43
HMA Pavement Type E-10	460.1110	TON	\$2,359,165.49

EXHIBIT #177

Removing Asphaltic Surface Milling	204.0120	SY	\$389,292.29
		Total:	\$3,101,467.00

Rehab#3

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material PG64-28	455.0120	TON	\$322,518.53
Tack Coat	455.0605	GAL	\$30,491.43
HMA Pavement Type E-10	460.1110	TON	\$2,359,165.49
Removing Asphaltic Surface Milling	204.0120	SY	\$389,292.29
		Total:	\$3,101,467.00

Maintenance Costs

Maintenance Cycle	Cost per Lane Mile	Total Cycle Cost
1	\$2,000.00	\$36,320.00
2	\$2,500.00	\$45,400.00
3	\$2,000.00	\$36,320.00
4	\$2,500.00	\$45,400.00
5	\$2,000.00	\$36,320.00
6	\$2,500.00	\$45,400.00
7	\$2,000.00	\$36,320.00
8	\$2,500.00	\$45,400.00
Total:		\$326,880.00

HMA Alt#2**Initial Construction Costs**

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material PG64-28	455.0120	TON	\$470,345.20
Tack Coat	455.0605	GAL	\$20,327.51
HMA Pavement Type E-10	460.1110	TON	\$3,440,446.92
Base Aggregate Dense 1 1/4-inch	305.0120	TON	\$870,546.26

EXHIBIT #178

Asphaltic Material PG64-28 (Shoulders)	455.0120	TON	\$235,165.78
Tack Coat (Shoulders)	455.0605	GAL	\$10,163.92
HMA Pavement Type E-10 (Shoulders)	460.1110	TON	\$1,720,226.21
Concrete Curb & Gutter 30-inch Type D	601.0411	LF	\$523,531.01
Total:			\$7,290,752.00

Rehab#1

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material PG64-28	455.0120	TON	\$322,518.53
Tack Coat	455.0605	GAL	\$30,491.43
HMA Pavement Type E-10	460.1110	TON	\$2,359,165.49
Removing Asphaltic Surface Milling	204.0120	SY	\$389,292.29
Total:			\$3,101,467.00

Rehab#2

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material PG64-28	455.0120	TON	\$322,518.53
Tack Coat	455.0605	GAL	\$30,491.43
HMA Pavement Type E-10	460.1110	TON	\$2,359,165.49
Removing Asphaltic Surface Milling	204.0120	SY	\$389,292.29
Total:			\$3,101,467.00

Rehab#3

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material PG64-28	455.0120	TON	\$322,518.53

EXHIBIT #179

Tack Coat	455.0605	GAL	\$30,491.43
HMA Pavement Type E-10	460.1110	TON	\$2,359,165.49
Removing Asphaltic Surface Milling	204.0120	SY	\$389,292.29
		Total:	\$3,101,467.00

Maintenance Costs

Maintenance Cycle	Cost per Lane Mile	Total Cycle Cost
1	\$2,000.00	\$36,320.00
2	\$2,500.00	\$45,400.00
3	\$2,000.00	\$36,320.00
4	\$2,500.00	\$45,400.00
5	\$2,000.00	\$36,320.00
6	\$2,500.00	\$45,400.00
7	\$2,000.00	\$36,320.00
8	\$2,500.00	\$45,400.00
Total:		\$326,880.00

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LIFE CYCLE COST ANALYSIS RESULTS

Current Year: 2015

Project Length: 9.08 Miles

Construction Year: 2017

Analysis Basis: LCCA Length

Analysis Period: 50 yrs

Discount Rate(%): 5

Present Worth Costs

	Concrete Alt#1	HMA Alt#1	HMA Alt#2
Initial Construction Costs	\$6,244,905.27	\$6,493,600.28	\$6,612,927.72
Maintenance Costs	\$165,930.33	\$90,158.46	\$90,158.46
Rehabilitation Costs	\$1,343,774.85	\$2,182,245.38	\$2,182,245.38
Rehabilitation Salvage Value	(\$248,579.08)	(\$81,771.59)	(\$81,771.59)
Total Facility Costs	\$7,506,031.36	\$8,684,232.52	\$8,803,559.96
	+ 0.00%	+ 15.70%	+ 17.29%

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Version A



User: Todd Peschke

Edit Pavement Design General Information

* Project ID:	2788-01-00	* Designer's Name:	Todd Peschke
* Design Name:	Section #2	* Design Date:	01/12/2015
* Roadway Name:	Waukesha Bypass	* Type:	State v
* Project Termini:	(STH 59 to IH 94)	* Status:	Draft v
* Highway Name:	Waukesha Bypass		
* Region:	SE v		
* County:	Waukesha v Select v		
Comments:	Section #2: Waukesha Bypass, Northview Road to IH-94 - Sta 340+50 to 373+12		

Last Updated date and Time: 01/13/2015 12:48:22 PM

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Pavement Design Details			
Project ID:	2788-01-00	Design Name:	Section #2
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)
		Designer:	Todd Peschke
		Design Date:	01/12/2015
		County:	Waukesha

Soil Parameters

*Design Group Index (DGI):	12	▼
*Subgrade Improvement:	☒ Yes	☐ No
*Subgrade Soil Support Value(SSV):	4.7	▼
*Subgrade Modulus of Subgrade Reaction(k):	375	▼
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Pavement Design Details

Project ID:	2788-01-00	Design Name:	Section #2	Design Date:	01/12/2015
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)	County:	Waukesha
		Designer:	Todd Peschke		

Traffic Parameters

*Construction Year:	2017	*Design Year:	2037
*Construction Year AADT:	21200	*Design Year AADT:	26800
*Directional Factor(DF):	0.5 v	*Lane Distribution Factor(LDF):	0.9 v

Truck Classification	% of AADT
2D	2.2
3SU	0.7
2S-1,-2	4.6
3S-2	0.8
2-S1-2	0.0
Total % Truck Traffic	8.3

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User: Todd Peschke

Pavement Design Details					
Project ID:	2788-01-00	Design Name:	Section #2	Design Date:	01/12/2015
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)	County:	Waukesha
		Designer:	Todd Peschke		

Concrete Pavement Design

Truck Type	% of AADT	DLT	# of Trucks	ESAL Load Factor	ESALs
2D	2.2	10,800	238	0.3	71
3SU	0.7	10,800	76	1.2	91
2S-1,-2	4.6	10,800	497	0.6	298
3S-2	0.8	10,800	86	1.6	138
2-S1-2	0.0	10,800	0	2.1	0

Design Lane Daily ESALs: 598

Design Lane Total Life ESALs: 4,367,736

Rounded to: 4,400,000

Soil Parameters

Subgrade Improvement Flag selected: Yes

k : 375

Design Calculation

Calculated Pavement Thickness:

8.2

Pavement Thickness(ALT# 1):

8.0 ☐

Pavement Thickness(ALT# 2):

0.0 ☐[Back](#)[Next](#)Direct questions to the [WisDOT Computer Help Desk](#) 1-800-362-3050

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WISCONSIN DEPARTMENT OF TRANSPORTATION

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User: Todd Peschke

Pavement Design Details					
Project ID:	2788-01-00	Design Name:	Section #2	Design Date:	01/12/2015
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)	County:	Waukesha
		Designer:	Todd Peschke		

HMA Pavement Design

Truck Type	% of AADT	DLT	# of Trucks	ESAL Load Factor	ESALs
2D	2.2	10,800	238	0.3	71
3SU	0.7	10,800	76	0.8	60
2S-1,-2	4.6	10,800	497	0.5	248
3S-2	0.8	10,800	86	0.9	78
2-S1-2	0.0	10,800	0	2.0	0

Design Lane Daily ESALs: 457

Design Lane Total Life ESALs: 3,336,100

Rounded to: 3,400,000

Soil Parameters

DGI : 12

Subgrade Improvement Flag selected: Yes

SSV : 4.7

Design Calculation

Calculated Required SN:

4.5

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Pavement Design Details			
Project ID:	2788-01-00	Design Name:	Section #2
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)
		Designer:	Todd Peschke
		Design Date:	01/12/2015
		County:	Waukesha

HMA ALT#1 Layer Thickness Design

								Add Layer	Delete Layer
Layers	Existing Pavement	Uppermost Base Agg.	Other	Material Type	Unit Type	Layer Coefficient	Thickness in.	Structural Number	
1	☐	☐	☐	HMA Pavement Type E-10 ☒	-----	0.44	7.0	3.08	
2	☐	☒	☐	Base Aggregate Dense 1 1/4-inch ☒	-----	0.1	14.0	1.4	

Note: You can add only 10 layers (including 'Other' layers)

No. of Layers: 2 No. of Other Layers: 0 Total SN: 4.48
Required SN: 4.5

Back: Next Alternative: LCCA

Note 1. If the structural design includes a granular subbase, then the layer can only contribute a maximum of 10% of the required SN (see FDM 14-10-5.8), regardless of the material's strength coefficient or the thickness of the layer.

2. If the project involves subgrade improvement, the associated quantity and cost of the material can be accounted for and included in the LCCA by adding the material as a layer and setting the respective layer coefficient to 0.0 so that it isn't given additional credit in the structural design.

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User: Todd Peschke

Pavement Design Details			
Project ID:	2788-01-00	Design Name:	Section #2
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)
		Designer:	Todd Peschke
		Design Date:	01/12/2015
		County:	Waukesha

HMA ALT#2 Layer Thickness Design

							Add Layer	Delete Layer
Layers	Existing Pavement	Uppermost Base Agg.	Other	Material Type	Unit Type	Layer Coefficient	Thickness in.	Structural Number
1	☐	☐	☐	HMA Pavement Type E-10 ☒	-----	0.44	9.0	3.96
2	☐	☒	☐	Base Aggregate Dense 1 1/4-inch ☒	-----	0.1	6.0	0.6

Note: You can add only 10 layers (including 'Other' layers)

No. of Layers: 2 No. of Other Layers: 0 Total SN: 4.56
Required SN: 4.5

Back Next Alternative LCCA

Note 1. If the structural design includes a granular subbase, then the layer can only contribute a maximum of 10% of the required SN (see FDM 14-10-5.8), regardless of the material's strength coefficient or the thickness of the layer.

2. If the project involves subgrade improvement, the associated quantity and cost of the material can be accounted for and included in the LCCA by adding the material as a layer and setting the respective layer coefficient to 0.0 so that it isn't given additional credit in the structural design.

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Pavement Design Details			
Project ID:	2788-01-00	Design Name:	Section #2
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)
		Designer:	Todd Peschke
		Design Date:	01/12/2015
		County:	Waukesha

LCCA

- * Project Type: ☒ Urban ☐ Rural
- * LCCA Length: Miles
- No. of HMA Alternatives: 4
- * Select HMA Alternatives to include in LCCA: ☒ HMA Alt# 1 ☒ HMA Alt# 2 ☐ HMA Alt# 3 ☐ HMA Alt# 4
- No. of Concrete Alternatives: 1
- * Select Concrete Alternatives to include in LCCA: ☒ Concrete Alt# 1

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Version A

WISCONSIN DEPARTMENT OF TRANSPORTATION

Doing Business

WisPave Home | File | Design | LCCA | Exit



User: Todd Peschke

Pavement Design Details

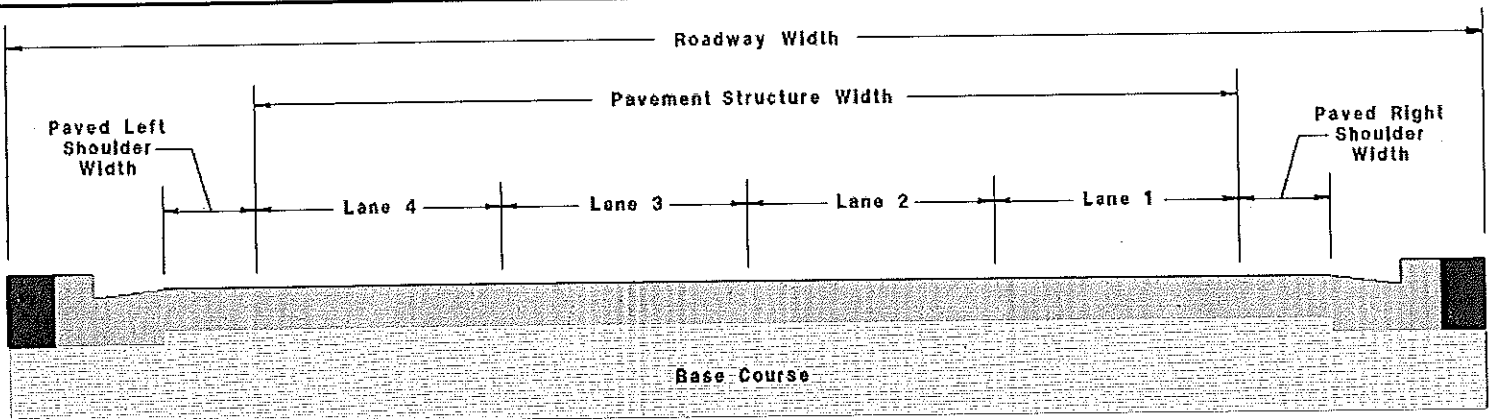
Project ID:	2788-01-00	Design Name:	Section #2	Design Date:	01/12/2015
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)	County:	Waukesha
		Designer:	Todd Peschke		

Concrete Alt#1 Urban Cross Section

*Roadway Width:	35	*% of Project Length for new Curb & Gutter:	100
*Paved Left Shoulder Width:	0	*Paved Right Shoulder Width:	4
*Number of Travel Lanes :	2 ☒		
Lane 1 Width :	12.0	Lane 2 Width :	12.0
Number of Center/Shared Lanes :	0 ☒		
Pavement Structure Width:	24		

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Concrete Alt#1 Quantities

Layers	Bid Item No	Bid Item Desc	Units	Quantity
1	415.0080	Concrete Pavement, 8 inch	SY	16,896

Additional Initial Construction Quantities:

Bid Item No	Bid Item Desc	Units	Quantity
415.0080	Concrete Pavement, 8 inch (Shoulders)	SY	2,816
601.0409	Concrete Curb & Gutter 30-Inch Type A	LF	12,672

Other Quantities:

Other Description	Unit	Quantity
	Sel v	0.0
	Sel v	0.0
	Sel v	0.0

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Concrete Alternative - Maintenance & Rehabilitation Summary - Alt #1

						Add	Delete
Year	Type of Work	Activity	Service Life	Cost per Lane Mile	Calculate		
0	Initial Construction ☐		25				
8	Concrete Maintenance	1st Cycle		\$4000.0			
16	Concrete Maintenance	2nd Cycle		\$8000.0			
25	Concrete Rehabilitation	Concrete Repair & Grind ☐	8		Calculate		
28	Concrete Maintenance	1st Cycle		\$4000.0			
31	Concrete Maintenance	2nd Cycle		\$8000.0			
33	Concrete Rehabilitation	Concrete Repair & HMA Overlay ☐	15		Calculate		
38	Concrete Maintenance	1st Cycle		\$2000.0			
43	Concrete Maintenance	2nd Cycle		\$2500.0			
48	Concrete Rehabilitation	Mill, Concrete Repair & HMA ☐	15		Calculate		
53	Concrete Maintenance	1st Cycle		\$2000.0			
58	Concrete Maintenance	2nd Cycle		\$2500.0			
63						Next Alternative	
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Version A



User: Todd Peschke

Concrete Repair & Grind

% of Surface Area to be Repaired: Grind Limits: ☒

Item	Units	Quantity
Concrete Pavement Repair	SY	848
Drilled Dowel Bars	EACH	1,696
Sawing Concrete	LF	3,816
Concrete Pavement Continuous Diamond Grinding	SY	19,712
	☒	0.0

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Concrete Repair & HMA Overlay

% of Surface Area to be Repaired: 5.0

Removing Concrete Surface Partial Depth Limits: None

Overlay Limits: Pavement Structure and Shoulders ☒

Type	HMA Mix Type	Thickness	Asphaltic Material(PG)	% Asphalt in Mix	# of Tack Coat Layers	Tack Coat Coverage GAL/SY
Overlay	HMA Pavement Type E-10 ☒	4.0	Asphaltic Material PG64-28 ☒	5.5	2	0.025

Calculate:

Item	Units	Quantity
Base Patching Concrete	SY	848
Drilled Dowel Bars	EACH	1,696
Sawing Concrete	LF	3,816
Removing Concrete Surface Partial Depth	SF	0
HMA Pavement Type E-10	TON	4,415.5
Asphaltic Material PG64-28	TON	242.9
Tack Coat(Pavement Structure)	GAL	985.6
Base Aggregate Dense 3/4-Inch(Shoulder Gravel)	TON	0
	☐ ☒	0.0

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Mill, Concrete Repair & HMA Overlay

Milling Limits: Milling Depth: (in)% of Surface Area to be Repaired: Removing Concrete Surface Partial Depth Limits: Overlay Limits:

Type	HMA Mix Type	Thickness	Asphaltic Material(PG)	% Asphalt in Mix	# of Tack Coat Layers	Tack Coat Coverage GAL/SY
Overlay	HMA Pavement Type E-10	4.0	Asphaltic Material PG64-28	5.5	2	0.025

Item	Units	Quantity
Removing Asphaltic Surface Milling	SY	19,712
Base Patching Concrete	SY	848
Drilled Dowel Bars	EACH	1,696
Sawing Concrete	LF	3,816
Removing Concrete Surface Partial Depth	SF	0
HMA Pavement Type E-10	TON	4,415.5
Asphaltic Material PG64-28	TON	242.9
Tack Coat(Pavement Structure)	GAL	985.6
Base Aggregate Dense 3/4-inch(Shoulder Gravel)	TON	0
		0.0

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HMA Alt#1 Description

Layers	Existing Pavement	Material Type	Thickness in.	Unit Weight lbs/SY/in	%AC	PG	# of Tack Coat Layers	Tack Coat Coverage Gal/SY
1	N	HMA Pavement Type E-10	7.0	112.0	5.5	Asphaltic Material PG64-28 ▾	2	0.025
2	N	Base Aggregate Dense 1 1/4-inch	14.0	2.0	-----	-----	-----	-----

Shoulders

Material Type	Thickness in.	%AC	PG	# of Tack Coat Layers	Tack Coat Coverage Gal/SY
HMA Pavement Type E-10 ▾	7.0	5.5	Asphaltic Material PG64-28 ▾	2	0.025

Additional Construction Process

Add Construction Process

Delete Construction Process

Layers	Other	Process Description	% of LCCA Length Requiring Process	Existing Pavement Width ft.	% of Surface Area Requiring Repair	# of Stations
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HMA Alt#2 Description

Layers	Existing Pavement	Material Type	Thickness in.	Unit Weight lbs/SY/in	%AC	PG	# of Tack Coat Layers	Tack Coat Coverage Gal/SY
1	N	HMA Pavement Type E-10	9.0	112.0	5.5	Asphaltic Material PG64-28	2	0.025
2	N	Base Aggregate Dense 1 1/4-Inch	6.0	2.0	-----	-----	-----	-----

Shoulders

Material Type	Thickness in.	%AC	PG	# of Tack Coat Layers	Tack Coat Coverage Gal/SY
HMA Pavement Type E-10	9.0	5.5	Asphaltic Material PG64-28	2	0.025

Additional Construction Process

Add Construction Process

Delete Construction Process

Layers	Other	Process Description	% of LCCA Length Requiring Process	Existing Pavement Width ft.	% of Surface Area Requiring Repair	# of Stations
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WISCONSIN DEPARTMENT OF TRANSPORTATION

Doing Business

WisPave Home | File | Design | LCCA | Exit



User: Todd Peschke

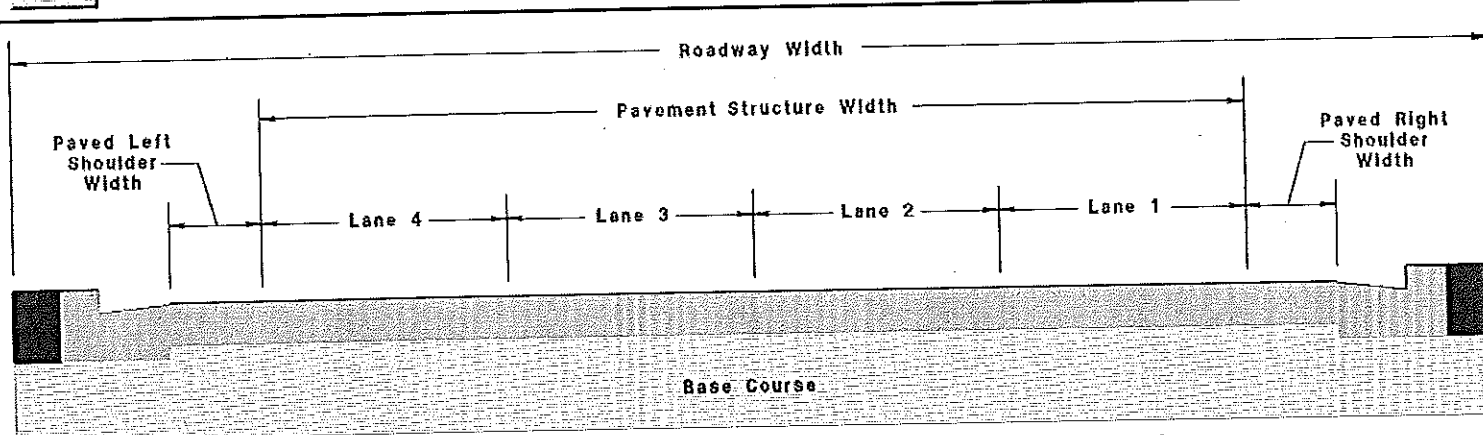
Pavement Design Details			
Project ID:	2788-01-00	Design Name:	Section #2
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)
		Designer:	Todd Peschke
		Design Date:	01/12/2015
		County:	Waukesha

HMA Alt#1 Urban Cross Section

*Roadway Width:	35	* % of Project Length for new Curb & Gutter:	100
*Paved Left Shoulder Width:	0	*Paved Right Shoulder Width:	4
*Number of Travel Lanes :	2		
Lane 1 Width :	12.0	Lane 2 Width :	12.0
Number of Center/Shared Lanes :	0		
Pavement Structure Width:	24		

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HMA Alt#1 Quantities

Layers	Bid Item No	Bid Item Desc	Units	Quantity
1	460.1110	HMA Pavement Type E-10	TON	6,623.2
	455.0120	Asphaltic Material PG64-28	TON	364.3
	455.0605	Tack Coat	GAL	844.8
2	305.0120	Base Aggregate Dense 1 1/4-inch	TON	19,438.2

Additional Initial Construction Quantities :

Bid Item No	Bid Item Desc	Units	Quantity
460.1110	HMA Pavement Type E-10 (Shoulders)	TON	1,103.9
455.0120	Asphaltic Material PG64-28 (Shoulders)	TON	60.7
455.0605	Tack Coat (Shoulders)	GAL	140.8
601.0411	Concrete Curb & Gutter 30-Inch Type D	LF	12,672

Other Quantities :

Other Description	Unit	Quantity
	Sele ☒	0.0
	Sele ☒	0.0
	Sele ☒	0.0

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HMA Alt#2 Quantities

Layers	Bid Item No	Bid Item Desc	Units	Quantity
1	460.1110	HMA Pavement Type E-10	TON	8,515.6
	455.0120	Asphaltic Material PG64-28	TON	468.4
	455.0605	Tack Coat	GAL	844.8
2	305.0120	Base Aggregate Dense 1 1/4-inch	TON	9,034.7

Additional Initial Construction Quantities :

Bid Item No	Bid Item Desc	Units	Quantity
460.1110	HMA Pavement Type E-10 (Shoulders)	TON	1,419.3
455.0120	Asphaltic Material PG64-28 (Shoulders)	TON	78.1
455.0605	Tack Coat (Shoulders)	GAL	140.8
601.0411	Concrete Curb & Gutter 30-Inch Type D	LF	12,672

Other Quantities :

Other Description	Unit	Quantity
	Sele ▼	0.0
	Sele ▼	0.0
	Sele ▼	0.0

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HMA Alternative - Maintenance & Rehabilitation Summary - Alt #1

Year	Type of Work	Activity	Service Life	Cost per Lane Mile	Calculate
0	Initial Construction - ☐		18		
6	HMA Maintenance	1st Cycle		\$2000.0	
12	HMA Maintenance	2nd Cycle		\$2500.0	
18	HMA Rehabilitation	Mill & HMA Overlay ☐	12		Calculate
22	HMA Maintenance	1st Cycle		\$2000.0	
26	HMA Maintenance	2nd Cycle		\$2500.0	
30	HMA Rehabilitation	Mill & HMA Overlay ☐	12		Calculate
34	HMA Maintenance	1st Cycle		\$2000.0	
38	HMA Maintenance	2nd Cycle		\$2500.0	
42	HMA Rehabilitation	Mill & HMA Overlay ☐	12		Calculate
46	HMA Maintenance	1st Cycle		\$2000.0	
50	HMA Maintenance	2nd Cycle		\$2500.0	
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Mill & HMA Overlay

Milling Limits: Milling Depth: (in)Overlay Limits:

Type	HMA Mix Type	Thickness	Asphaltic Material(PG)	% Asphalt in Mix	# of Tack Coat Layers	Tack Coat Coverage GAL/SY
Overlay	HMA Pavement Type E-10	4.0	Asphaltic Material PG64-28	5.5	2	0.025

Calculate

Item	Units	Quantity
Removing Asphaltic Surface Milling	SY	19,712
HMA Pavement Type E-10	TON	4,415.5
Asphaltic Material PG64-28	TON	242.9
Tack Coat(Pavement Structure)	GAL	985.6
Base Aggregate Dense 3/4-inch(Shoulder Gravel)	TON	0
		0.0

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Version A



Mill & HMA Overlay

Milling Limits: Milling Depth: (in)Overlay Limits:

Type	HMA Mix Type	Thickness	Asphaltic Material(PG)	% Asphalt in Mix	# of Tack Coat Layers	Tack Coat Coverage GAL/SY
Overlay	HMA Pavement Type E-10	4.0	Asphaltic Material PG64-28	5.5	2	0.025

Calculate

Item	Units	Quantity
Removing Asphaltic Surface Milling	SY	19,712
HMA Pavement Type E-10	TON	4,415.5
Asphaltic Material PG64-28	TON	242.9
Tack Coat(Pavement Structure)	GAL	985.6
Base Aggregate Dense 3/4-inch(Shoulder Gravel)	TON	0
	☒	0.0

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Version A



Mill & HMA Overlay

Milling Limits: ☐ Milling Depth: (in)Overlay Limits: ☐

Type	HMA Mix Type	Thickness	Asphaltic Material(PG)	% Asphalt in Mix	# of Tack Coat Layers	Tack Coat Coverage GAL/SY
Overlay	HMA Pavement Type E-10 ☐	4.0	Asphaltic Material PG64-28 ☐	5.5	2	0.025

Calculate

Item	Units	Quantity
Removing Asphaltic Surface Milling	SY	19,712
HMA Pavement Type E-10	TON	4,415.5
Asphaltic Material PG64-28	TON	242.9
Tack Coat(Pavement Structure)	GAL	985.6
Base Aggregate Dense 3/4-Inch(Shoulder Gravel)	TON	0
	☐	0.0

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HMA Alternative - Maintenance & Rehabilitation Summary - Alt #2

Year	Type of Work	Activity	Service Life	Cost per Lane Mile	Calculate
0	Initial Construction - ☐		18		
6	HMA Maintenance	1st Cycle		\$2000.0	
12	HMA Maintenance	2nd Cycle		\$2500.0	
18	HMA Rehabilitation	Mill & HMA Overlay ☐	12		Calculate
22	HMA Maintenance	1st Cycle		\$2000.0	
26	HMA Maintenance	2nd Cycle		\$2500.0	
30	HMA Rehabilitation	Mill & HMA Overlay ☐	12		Calculate
34	HMA Maintenance	1st Cycle		\$2000.0	
38	HMA Maintenance	2nd Cycle		\$2500.0	
42	HMA Rehabilitation	Mill & HMA Overlay ☐	12		Calculate
46	HMA Maintenance	1st Cycle		\$2000.0	
50	HMA Maintenance	2nd Cycle		\$2500.0	
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Mill & HMA Overlay

Milling Limits: Milling Depth: (in)Overlay Limits:

Type	HMA Mix Type	Thickness	Asphaltic Material(PG)	% Asphalt in Mix	# of Tack Coat Layers	Tack Coat Coverage GAL/SY
Overlay	HMA Pavement Type E-10	4.0	Asphaltic Material PG64-28	5.5	2	0.025

Calculate

Item	Units	Quantity
Removing Asphaltic Surface Milling	SY	19,712
HMA Pavement Type E-10	TON	4,415.5
Asphaltic Material PG64-28	TON	242.9
Tack Coat(Pavement Structure)	GAL	985.6
Base Aggregate Dense 3/4-inch(Shoulder Gravel)	TON	0
	0.0	

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Mill & HMA Overlay

Milling Limits: Milling Depth: (in)Overlay Limits:

Type	HMA Mix Type	Thickness	Asphaltic Material(PG)	% Asphalt in Mix	# of Tack Coat Layers	Tack Coat Coverage GAL/SY
Overlay	HMA Pavement Type E-10	4.0	Asphaltic Material PG64-28	5.5	2	0.025

Calculate

Item	Units	Quantity
Removing Asphaltic Surface Milling	SY	19,712
HMA Pavement Type E-10	TON	4,415.5
Asphaltic Material PG64-28	TON	242.9
Tack Coat(Pavement Structure)	GAL	985.6
Base Aggregate Dense 3/4-inch(Shoulder Gravel)	TON	0
		0.0

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Mill & HMA Overlay

Milling Limits: ☐ Milling Depth: (in)

Overlay Limits: ☐

Type	HMA Mix Type	Thickness	Asphaltic Material(PG)	% Asphalt in Mix	# of Tack Coat Layers	Tack Coat Coverage GAL/SY
Overlay	HMA Pavement Type E-10 ☐	4.0	Asphaltic Material PG64-28 ☐	5.5	2	0.025

Item	Units	Quantity
Removing Asphaltic Surface Milling	SY	19,712
HMA Pavement Type E-10	TON	4,415.5
Asphaltic Material PG64-28	TON	242.9
Tack Coat(Pavement Structure)	GAL	985.6
Base Aggregate Dense 3/4-inch(Shoulder Gravel)	TON	0
	☐	0.0

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Mill & HMA Overlay

Milling Limits: Milling Depth: (in)Overlay Limits:

Type	HMA Mix Type	Thickness	Asphaltic Material(PG)	% Asphalt in Mix	# of Tack Coat Layers	Tack Coat Coverage GAL/SY
Overlay	HMA Pavement Type E-10 ☐	4.0	Asphaltic Material PG64-28 ☐	5.5	2	0.025

Calculate

Item	Units	Quantity
Removing Asphaltic Surface Milling	SY	19,712
HMA Pavement Type E-10	TON	4,415.5
Asphaltic Material PG64-28	TON	242.9
Tack Coat(Pavement Structure)	GAL	985.6
Base Aggregate Dense 3/4-inch(Shoulder Gravel)	TON	0
	☐	0.0

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HMA Bid Items

Bid Item Desc	Bid Item No	Units	Unit Cost
Asphaltic Material PG64-28	455.0120	TON	136.51
Tack Coat	455.0605	GAL	3.18
HMA Pavement Type E-10	460.1110	TON	54.92
Concrete Curb & Gutter 30-inch Type D	601.0411	LF	10.92

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Concrete Bid Items

Bid Item Desc	Bid Item No	Units	Unit Cost
Base Patching Concrete	390.0303	SY	48.45
Concrete Pavement, 8 inch	415.0080	SY	32.7
Drilled Dowel Bars	416.0620	EACH	11.53
Concrete Pavement Repair	416.1710	SY	77.33
Concrete Pavement Continuous Diamond Grinding	420.1000	SY	4.88
Concrete Curb & Gutter 30-inch Type A	601.0409	LF	12.81
Sawing Concrete	690.0250	LF	2.33

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WisPave:

WISCONSIN DEPARTMENT OF TRANSPORTATION

Doing Business

[WisPave Home](#) | [File](#) | [Design](#) | [LCCA](#) | [Exit](#)



User: Todd Peschke

Base Course Bid Items

Bid Item Desc	Bid Item No	Units	Unit Cost
Base Aggregate Dense 1 1/4-inch	305.0120	TON	10.61

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WisPave:

WISCONSIN DEPARTMENT OF TRANSPORTATION

Doing Business

[WisPave Home](#) | [File](#) | [Design](#) | [LCCA](#) | [Exit](#)



User: Todd Peschke

Remove Pavement Bid Items

Bid Item Desc	Bid Item No	Units	Unit Cost
Removing Asphaltic Surface Milling	204.0120	SY	2.03

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Costs For All Alternatives

Concrete Alt#1

Initial Construction Costs

Bid Item Desc	Bid Item No	Units	Costs
Concrete Pavement, 8 inch	415.0080	SY	\$552,499.20
Concrete Pavement, 8 inch (Shoulders)	415.0080	SY	\$92,083.20
Concrete Curb & Gutter 30-inch Type A	601.0409	LF	\$162,328.32
		Total:	\$806,910.00

Rehab#1

Bid Item Desc	Bid Item No	Units	Costs
Drilled Dowel Bars	416.0620	EACH	\$19,554.88
Concrete Pavement Continuous Diamond Grinding	420.1000	SY	\$96,194.56
Concrete Pavement Repair	416.1710	SY	\$65,575.84
Sawing Concrete	690.0250	LF	\$8,891.28
		Total:	\$190,216.00

Rehab#2

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material PG64-28	455.0120	TON	\$33,158.28
Tack Coat	455.0605	GAL	\$3,134.21
HMA Pavement Type E-10	460.1110	TON	\$242,499.26
Base Patching Concrete	390.0303	SY	\$41,085.60
		EXHIBIT #214	

Wispave:

Drilled Dowel Bars	416.0620	EACH	\$19,554.88
Sawing Concrete	690.0250	LF	\$8,891.28
		Total:	\$348,323.00

Rehab#3

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material PG64-28	455.0120	TON	\$33,158.28
Tack Coat	455.0605	GAL	\$3,134.21
HMA Pavement Type E-10	460.1110	TON	\$242,499.26
Base Patching Concrete	390.0303	SY	\$41,085.60
Drilled Dowel Bars	416.0620	EACH	\$19,554.88
Sawing Concrete	690.0250	LF	\$8,891.28
Removing Asphaltic Surface Milling	204.0120	SY	\$40,015.36
		Total:	\$388,338.00

Maintenance Costs

Maintenance Cycle	Cost per Lane Mile	Total Cycle Cost
1	\$4,000.00	\$9,600.00
2	\$8,000.00	\$19,200.00
3	\$4,000.00	\$9,600.00
4	\$8,000.00	\$19,200.00
5	\$2,000.00	\$4,800.00
6	\$2,500.00	\$6,000.00
7	\$2,000.00	\$4,800.00
8	\$2,500.00	\$6,000.00
Total:		\$79,200.00

HMA Alt#1**Initial Construction Costs**

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material	455.0120	TON	\$49,730.59
		EXHIBIT #215	

Wispave:

PG64-28			
Tack Coat	455.0605	GAL	\$2,686.46
HMA Pavement Type E-10	460.1110	TON	\$363,746.14
Base Aggregate Dense 1 1/4- inch	305.0120	TON	\$206,239.30
Asphaltic Material PG64-28 (Shoulders)	455.0120	TON	\$8,286.16
Tack Coat (Shoulders)	455.0605	GAL	\$447.74
HMA Pavement Type E-10 (Shoulders)	460.1110	TON	\$60,626.19
Concrete Curb & Gutter 30- inch Type D	601.0411	LF	\$138,378.24
		Total:	\$830,140.00

Rehab#1

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material PG64-28	455.0120	TON	\$33,158.28
Tack Coat	455.0605	GAL	\$3,134.21
HMA Pavement Type E-10	460.1110	TON	\$242,499.26
Removing Asphaltic Surface Milling	204.0120	SY	\$40,015.36
		Total:	\$318,807.00

Rehab#2

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material PG64-28	455.0120	TON	\$33,158.28
Tack Coat	455.0605	GAL	\$3,134.21
HMA Pavement Type E-10	460.1110	TON	\$242,499.26
Removing Asphaltic	204.0120	SY	\$40,015.36

EXHIBIT #216

Surface Milling			
Total:			\$318,807.00

Rehab#3

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material PG64-28	455.0120	TON	\$33,158.28
Tack Coat	455.0605	GAL	\$3,134.21
HMA Pavement Type E-10	460.1110	TON	\$242,499.26
Removing Asphaltic Surface Milling	204.0120	SY	\$40,015.36
Total:			\$318,807.00

Maintenance Costs

Maintenance Cycle	Cost per Lane Mile	Total Cycle Cost
1	\$2,000.00	\$4,800.00
2	\$2,500.00	\$6,000.00
3	\$2,000.00	\$4,800.00
4	\$2,500.00	\$6,000.00
5	\$2,000.00	\$4,800.00
6	\$2,500.00	\$6,000.00
7	\$2,000.00	\$4,800.00
8	\$2,500.00	\$6,000.00
Total:		\$43,200.00

HMA Alt#2**Initial Construction Costs**

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material PG64-28	455.0120	TON	\$63,941.28
Tack Coat	455.0605	GAL	\$2,686.46
HMA Pavement Type E-10	460.1110	TON	\$467,676.75
Base Aggregate Dense 1 1/4-inch	305.0120	TON	\$95,858.17
Asphaltic	EXHIBIT #217		

Material PG64-28 (Shoulders)	455.0120	TON	\$10,661.43
Tack Coat (Shoulders)	455.0605	GAL	\$447.74
HMA Pavement Type E-10 (Shoulders)	460.1110	TON	\$77,947.96
Concrete Curb & Gutter 30- inch Type D	601.0411	LF	\$138,378.24
Total:			\$857,598.00

Rehab#1

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material PG64-28	455.0120	TON	\$33,158.28
Tack Coat	455.0605	GAL	\$3,134.21
HMA Pavement Type E-10	460.1110	TON	\$242,499.26
Removing Asphaltic Surface Milling	204.0120	SY	\$40,015.36
Total:			\$318,807.00

Rehab#2

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material PG64-28	455.0120	TON	\$33,158.28
Tack Coat	455.0605	GAL	\$3,134.21
HMA Pavement Type E-10	460.1110	TON	\$242,499.26
Removing Asphaltic Surface Milling	204.0120	SY	\$40,015.36
Total:			\$318,807.00

Rehab#3

Bid Item Desc	Bid Item No	Units	Costs
Asphaltic Material PG64-28	455.0120	TON	\$33,158.28
Tack Coat	455.0605	GAL	\$3,134.21

EXHIBIT #218

Wispave:

HMA Pavement Type E-10	460.1110	TON	\$242,499.26
Removing Asphaltic Surface Milling	204.0120	SY	\$40,015.36
Total:			\$318,807.00

Maintenance Costs

Maintenance Cycle	Cost per Lane Mile	Total Cycle Cost
1	\$2,000.00	\$4,800.00
2	\$2,500.00	\$6,000.00
3	\$2,000.00	\$4,800.00
4	\$2,500.00	\$6,000.00
5	\$2,000.00	\$4,800.00
6	\$2,500.00	\$6,000.00
7	\$2,000.00	\$4,800.00
8	\$2,500.00	\$6,000.00
Total:		\$43,200.00

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Version A



LIFE CYCLE COST ANALYSIS RESULTS

Current Year: 2015

Project Length: 1.2 Miles

Construction Year: 2017

Analysis Basis: LCCA Length

Analysis Period: 50 yrs

Discount Rate(%): 5

Present Worth Costs

	Concrete Alt#1	HMA Alt#1	HMA Alt#2
Initial Construction Costs	\$731,891.81	\$752,962.20	\$777,866.69
Maintenance Costs	\$21,929.12	\$11,915.21	\$11,915.21
Rehabilitation Costs	\$147,961.45	\$224,318.10	\$224,318.10
Rehabilitation Salvage Value	(\$26,620.70)	(\$8,405.49)	(\$8,405.49)
Total Facility Costs	\$875,161.68	\$980,790.01	\$1,005,694.51
	+ 0.00%	+ 12.07%	+ 14.92%

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Version A



User: Todd Peschke

Edit Pavement Design General Information

* Project ID:	2788-01-00	* Designer's Name:	Todd Peschke
* Design Name:	Section #3	* Design Date:	01/12/2015
* Roadway Name:	Waukesha Bypass	* Type:	State v
* Project Termini:	(STH 59 to IH 94)	* Status:	Draft v
* Highway Name:	Waukesha Bypass		
* Region:	SE v		
* County:	Waukesha v Select v		

Comments:

Section #3: STH 59 - Sta 34+07 to Sta 61+83

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Version A

WISCONSIN DEPARTMENT OF TRANSPORTATION

Doing Business

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User: Todd Peschke

Pavement Design Details			
Project ID:	2788-01-00	Design Name:	Section #3
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)
		Designer:	Todd Peschke
		Design Date:	01/12/2015
		County:	Waukesha

Soil Parameters

*Design Group Index (DGI):	12	▼
*Subgrade Improvement:	☒ Yes ☐ No	
*Subgrade Soil Support Value(SSV):	4.7	▼
*Subgrade Modulus of Subgrade Reaction(k):	375	▼
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Pavement Design Details			
Project ID:	2788-01-00	Design Name:	Section #3
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)
		Designer:	Todd Peschke
		Design Date:	01/12/2015
		County:	Waukesha

Traffic Parameters

*Construction Year:	2017	*Design Year:	2037
*Construction Year AADT:	13000	*Design Year AADT:	15100
*Directional Factor(DF):	0.5 v	*Lane Distribution Factor(LDF):	0.95 v

Truck Classification	% of AADT
2D	2.2
3SU	0.7
2S-1,-2	4.6
3S-2	0.8
2-S1-2	0.0
Total % Truck Traffic	8.3

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Pavement Design Details			
Project ID:	2788-01-00	Design Name:	Section #3
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)
		Designer:	Todd Peschke
		Design Date:	01/12/2015
		County:	Waukesha

Concrete Pavement Design

Truck Type	% of AADT	DLT	# of Trucks	ESAL Load Factor	ESALs
2D	2.2	6,674	147	0.3	44
3SU	0.7	6,674	47	1.2	56
2S-1,-2	4.6	6,674	307	0.6	184
3S-2	0.8	6,674	53	1.6	85
2-S1-2	0.0	6,674	0	2.1	0

Design Lane Daily ESALs: 370
 Design Lane Total Life ESALs: 2,698,998 Rounded to: 2,700,000

Soil Parameters

Subgrade Improvement Flag selected: Yes

k : 375

Design Calculation

Calculated Pavement Thickness:

7.5

Pavement Thickness(ALT# 1):

8.0 ☒

Pavement Thickness(ALT# 2):

0.0 ☒

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Pavement Design Details					
Project ID:	2788-01-00	Design Name:	Section #3	Design Date:	01/12/2015
Highway:	Waukesha Bypass	Project Termini:	(STH 59 to IH 94)	County:	Waukesha
		Designer:	Todd Peschke		

HMA Pavement Design

Truck Type	% of AADT	DLT	# of Trucks	ESAL Load Factor	ESALs
2D	2.2	6,674	147	0.3	44
3SU	0.7	6,674	47	0.8	37
2S-1,-2	4.6	6,674	307	0.5	153
3S-2	0.8	6,674	53	0.9	48
2-S1-2	0.0	6,674	0	2.0	0

Design Lane Daily ESALs: 282

Design Lane Total Life ESALs: 2,058,600

Rounded to: 2,100,000

Soil Parameters

DGI : 12

Subgrade Improvement Flag selected: Yes

SSV : 4.7

Design Calculation

Calculated Required SN:

4.18

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