

## Life-Cycle Cost Analysis (LCCA) Example

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Abbreviations: M = Mainline  
OS = Outside Shoulder  
IS = Inside Shoulder  
R = Ramps

### Roadway Data:

#### Mainline:

Length = 5,817 ft

Width = (4) 12-ft Lanes + (2) 4-ft Inside Shoulders + (2) 10-ft Outside Shoulders = 48 ft + 8 ft + 20ft = 76 ft

Area ((2) 26-ft Mainline) = (5,817 ft) x (52 ft) x (1/9 yd<sup>2</sup>/ft<sup>2</sup>) = 33,610 yd<sup>2</sup>

Area ((2) 4-ft Inside Shoulders) = (5,817 ft) x (2) x (4 ft) x (1/9 yd<sup>2</sup>/ft<sup>2</sup>) = 5,170 yd<sup>2</sup>

Area ((2) 8-ft Outside Shoulders) = (5,817 ft) x (2) x (8 ft) x (1/9 yd<sup>2</sup>/ft<sup>2</sup>) = 10,341 yd<sup>2</sup>

#### Ramps (All combined):

Length = 7,762 ft

Width = 16-ft Lane + 4-ft Inside Shoulder + 8-ft Outside Shoulder = 16 ft + 4 ft + 8 ft = 28 ft

Area (Mainline, Inside Shoulder, and Outside Shoulder) = (7,762 ft) x (28 ft) x (1/9 yd<sup>2</sup>/ft<sup>2</sup>) = 24,148 yd<sup>2</sup>

### HMA Pavement Treatment Cost

Mainline and Shoulders: 13 inches of HMA Pavement  
Ramps: 12.5 inches of HMA Pavement

#### Pay Items:

##### Mainline & Inside Shoulder

165 lb/yd<sup>2</sup> QC/QA-HMA, 4, 76, Surface, 9.5 mm

275 lb/yd<sup>2</sup> QC/QA-HMA, 4, 76, Intermediate, 19.0 mm

385 lb/yd<sup>2</sup> QC/QA-HMA, 4, 64, Base, 19.0 mm

250 lb/yd<sup>2</sup> QC/QA-HMA, 5, 76, Intermediate, OG, 19.0 mm

330 lb/yd<sup>2</sup> QC/QA-HMA, 4, 64, Base, 19.0 mm

##### Outside Shoulder

165 lb/yd<sup>2</sup> QC/QA-HMA, 1, 64, Surface, 9.5 mm

275 lb/yd<sup>2</sup> QC/QA-HMA, 1, 64, Intermediate, 19.0 mm

385 lb/yd<sup>2</sup> QC/QA-HMA, 1, 64, Base, 19.0 mm

250 lb/yd<sup>2</sup> QC/QA-HMA, 5, 76, Intermediate, OG, 19.0 mm

330 lb/yd<sup>2</sup> QC/QA-HMA, 1, 64, Base, 19.0 mm

##### Ramps (Mainline, Inside Shoulder, and Outside Shoulder)

165 lb/yd<sup>2</sup> QC/QA-HMA, 3, 70, Surface, 9.5 mm

275 lb/yd<sup>2</sup> QC/QA-HMA, 3, 70, Intermediate, 19.0 mm

330 lb/yd<sup>2</sup> QC/QA-HMA, 3, 64, Base, 19.0 mm

250 lb/yd<sup>2</sup> QC/QA-HMA, 5, 76, Intermediate, OG, 19.0 mm

330 lb/yd<sup>2</sup> QC/QA-HMA, 3, 64, Base, 19.0 mm

**Initial Construction Cost:**

Surface (M & IS):	$(38,780 \text{ yd}^2) \times (165 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$76.26/\text{t})$	=	\$243,982.43
Surface (OS)	$(10,341 \text{ yd}^2) \times (165 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$56.09/\text{t})$	=	\$47,852.20
Surface (R)	$(24,148 \text{ yd}^2) \times (165 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$69.61/\text{t})$	=	\$138,677.74
Joint Adhesive, Surface*	$(38,792 \text{ lft}) \times (\$0.39/\text{lft})$	=	\$15,128.88
Liquid Asphalt Sealant	$(38,792 \text{ lft}) \times (\$0.25/\text{lft})$	=	\$9,698.00
Intermediate (M & IS)	$(38,780 \text{ yd}^2) \times (275 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$55.36/\text{t})$	=	\$295,193.36
Intermediate (OS)	$(10,341 \text{ yd}^2) \times (275 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$51.52/\text{t})$	=	\$73,255.64
Intermediate (R)	$(24,148 \text{ yd}^2) \times (275 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$54.30/\text{t})$	=	\$180,394.62
Joint Adhesive, Intermediate*	$(38,792 \text{ lft}) \times (\$0.39/\text{lft})$	=	\$15,128.88
Base (M & IS)	$(38,780 \text{ yd}^2) \times (715 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$50.45/\text{t})$	=	\$699,431.23
Base (OS)	$(10,341 \text{ yd}^2) \times (715 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$46.91/\text{t})$	=	\$173,421.93
Base (R)	$(24,148 \text{ yd}^2) \times (660 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$49.74/\text{t})$	=	\$396,370.10
Base OG (M, IS, & OS)	$(49,121 \text{ yd}^2) \times (250 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$53.26/\text{t})$	=	\$327,023.06
Base OG (R)	$(24,148 \text{ yd}^2) \times (250 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$53.26/\text{t})$	=	\$160,765.31
Tack (M, IS, & OS)	$(49,121 \text{ yd}^2) \times (4) \times (\$0.15/\text{yd}^2)$	=	\$29,472.60
Tack (R)	$(24,148 \text{ yd}^2) \times (4) \times (\$0.15/\text{yd}^2)$	=	\$14,488.80
Base Seal	$(65 \text{ t}) \times (\$260/\text{t})$	=	\$16,900.00
<b>Total Cost</b>			<b>\$2,837,184.78</b>

\*Assume 4 mainline joints and 2 ramp joints.

**Maintenance Costs:****Joint Seal Cost:**

<u>Age 3</u>			
Mainline & Ramps	$(38,792 \text{ ft}) \times (25\%) \times (\$1.0/\text{ft})$	=	\$9,698.00
Traffic Maintenance	5% of Contract Cost	=	\$484.90
<b>Total Cost</b>			<b>\$10,182.90</b>
<u>Age 6</u>			
Mainline & Ramps	$(38,792 \text{ ft}) \times (50\%) \times (\$1.0/\text{ft})$	=	\$19,396.00
Traffic Maintenance	5% of Contract Cost	=	\$969.80
<b>Total Cost</b>			<b>\$20,365.80</b>
<u>Age 9</u>			
Mainline & Ramps	$(38,792 \text{ ft}) \times (75\%) \times (\$1.0/\text{ft})$	=	\$29,094.00
Traffic Maintenance	5% of Contract Cost	=	\$1,454.70
<b>Total Cost</b>			<b>\$30,548.70</b>
<u>Age 12 &amp; Beyond</u>			
Mainline & Ramps	$(38,792 \text{ ft}) \times (100\%) \times (\$1.0/\text{ft})$	=	\$38,792.00
Traffic Maintenance	5% of Contract Cost	=	\$1,939.60
<b>Total Cost</b>			<b>\$40,731.60</b>

**Mill and HMA Overlay Cost:**

Milling Cost (M, IS, & OS)	$(49,121 \text{ yd}^2) \times (\$0.79/\text{yd}^2)$	=	\$38,805.59
Milling Cost (R)	$(24,148 \text{ yd}^2) \times (\$0.79/\text{yd}^2)$	=	\$19,076.92
Tack (M, IS, & OS)	$(49,121 \text{ yd}^2) \times (2) \times (\$0.15/\text{yd}^2)$	=	\$14,736.30
Tack (R)	$(24,148 \text{ yd}^2) \times (2) \times (\$0.15/\text{yd}^2)$	=	\$7,244.40
Surface (M & IS)	$(38,780 \text{ yd}^2) \times (165 \text{ lb}/\text{yd}^2) \times (1/2000 \text{ t}/\text{lb}) \times (\$76.26/\text{t})$	=	\$243,982.43
Surface (OS)	$(10,341 \text{ yd}^2) \times (165 \text{ lb}/\text{yd}^2) \times (1/2000 \text{ t}/\text{lb}) \times (\$56.09/\text{t})$	=	\$47,852.20
Surface (R)	$(24,148 \text{ yd}^2) \times (165 \text{ lb}/\text{yd}^2) \times (1/2000 \text{ t}/\text{lb}) \times (\$69.61/\text{t})$	=	\$138,677.74
Joint Adhesive, Surface*	$(38,792 \text{ lft}) \times (\$0.39/\text{lft})$	=	\$15,128.88
Liquid Asphalt Sealant	$(38,792 \text{ lft}) \times (\$0.25/\text{lft})$	=	\$9,698.00
Intermediate (M & IS)	$(38,780 \text{ yd}^2) \times (275 \text{ lb}/\text{yd}^2) \times (1/2000 \text{ t}/\text{lb}) \times (\$55.36/\text{t})$	=	\$295,193.36
Intermediate (OS)	$(10,341 \text{ yd}^2) \times (275 \text{ lb}/\text{yd}^2) \times (1/2000 \text{ t}/\text{lb}) \times (\$51.52/\text{t})$	=	\$73,255.64
Intermediate (R)	$(24,148 \text{ yd}^2) \times (275 \text{ lb}/\text{yd}^2) \times (1/2000 \text{ t}/\text{lb}) \times (\$54.30/\text{t})$	=	\$180,394.62
Joint Adhesive, Intermediate*	$(38,792 \text{ lft}) \times (\$0.39/\text{lft})$	=	\$15,128.88
Var Depth O Wedge(M)	$(2) \times (2) \times (0.25) \times (5,817 \text{ ft}) \times (1/27 \text{ yd}^3/\text{ft}^3) \times (1.69 \text{ t}/\text{yd}^3) \times (\$15.0/\text{t})$	=	\$5,461.52
Var Depth O Wedge(R)	$(2) \times (0.25) \times (7,762 \text{ ft}) \times (1/27 \text{ yd}^3/\text{ft}^3) \times (1.69 \text{ t}/\text{yd}^3) \times (\$15.0/\text{t})$	=	\$3,643.83
Traffic Maintenance	5% of Contract Cost	=	\$54,929.12
<b>Total Cost</b>			<b>\$1,163,209.42</b>

\*Assume 4 mainline joints and 2 ramp joints.

**Mill and Resurface Cost:**

Milling Cost (M, IS, & OS)	$(49,121 \text{ yd}^2) \times (\$0.79/\text{yd}^2)$	=	\$38,805.59
Milling Cost (R)	$(24,148 \text{ yd}^2) \times (\$0.79/\text{yd}^2)$	=	\$19,076.92
Tack (M, IS, & OS)	$(49,121 \text{ yd}^2) \times (\$0.15/\text{yd}^2)$	=	\$7,368.15
Tack (R)	$(24,148 \text{ yd}^2) \times (\$0.15/\text{yd}^2)$	=	\$3,622.20
Full Depth Patch on TL (M)	$(33,610 \text{ yd}^2) \times (1,815 \text{ lb}/\text{yd}^2) \times (1/2000 \text{ t}/\text{lb}) \times (1\%) \times (\$118.48/\text{t})$	=	\$36,137.67
Full Depth patch on TL (R)	$(13,800 \text{ yd}^2) \times (1,705 \text{ lb}/\text{yd}^2) \times (1/2000 \text{ t}/\text{lb}) \times (1\%) \times (\$89.68/\text{t})$	=	\$10,550.40
Surface (M & IS)	$(38,780 \text{ yd}^2) \times (165 \text{ lb}/\text{yd}^2) \times (1/2000 \text{ t}/\text{lb}) \times (\$76.26/\text{t})$	=	\$243,982.43
Surface (OS)	$(10,341 \text{ yd}^2) \times (165 \text{ lb}/\text{yd}^2) \times (1/2000 \text{ t}/\text{lb}) \times (\$56.09/\text{t})$	=	\$47,852.20
Surface (R)	$(24,148 \text{ yd}^2) \times (165 \text{ lb}/\text{yd}^2) \times (1/2000 \text{ t}/\text{lb}) \times (\$69.61/\text{t})$	=	\$138,677.74
Joint Adhesive, Surface*	$(38,792 \text{ lft}) \times (\$0.39/\text{lft})$	=	\$15,128.88
Liquid Asphalt Sealant	$(38,792 \text{ lft}) \times (\$0.25/\text{lft})$	=	\$9,698.00
Traffic Maintenance	5% of Contract Cost	=	\$28,060.11
<b>Total Cost</b>			<b>\$598,960.30</b>

\*Assume 4 mainline joints and 2 ramp joints.

## **PCCP Treatment Cost**

Mainline and Inside Shoulder: 10.5 inches of PCCP  
 Outside Shoulder: \_\_\_\_\_ inches of HMA Pavement  
 Ramps: 9 inches of PCCP

### **Pay Items:**

#### Mainline and Inside Shoulder:

10.5 in. QC/QA PCCP with 14-ft wide slab for outside lane with D-1 Joints @ 15 ft on Subbase for PCCP

#### Outside Shoulder:

165 lb/yd<sup>2</sup> QC/QA-HMA, 1, 64, Surface, 9.5 mm  
 275 lb/yd<sup>2</sup> QC/QA-HMA, 1, 64, Intermediate, 19.0 mm  
 715 lb/yd<sup>2</sup> QC/QA-HMA, 1, 64, Base, 19.0 mm, on Subbase for PCCP

#### Ramps (Mainline, Inside Shoulder, and Outside Shoulder):

9 in. QC/QA PCCP with D-1 Joints @ 16 ft on Subbase for PCCP

### **Initial Construction Cost:**

M & IS (10.5" PCCP)	(38,780 yd <sup>2</sup> ) x (\$27.83/yd <sup>2</sup> )	= \$1,079,247.40
Ramps (9" PCCP)	(24,148 yd <sup>2</sup> ) x (\$26.26/yd <sup>2</sup> )	= \$634,126.48
HMA Surface (OS)	(10,341 yd <sup>2</sup> ) x (165 lb/yd <sup>2</sup> ) x (1/2000 t/lb) x (\$56.09/t)	= \$47,852.20
HMA Intermediate (OS)	(10,341 yd <sup>2</sup> ) x (275 lb/yd <sup>2</sup> ) x (1/2000 t/lb) x (\$51.52/t)	= \$73,255.64
HMA Base (OS)	(10,341 yd <sup>2</sup> ) x (715 lb/yd <sup>2</sup> ) x (1/2000 t/lb) x (\$46.91/t)	= \$173,421.93
9" Subbase for PCCP (M, IS, & OS)	(49,121 yd <sup>2</sup> ) x ((9/12) in./ft) x (1/3 yd/ft) x (\$27.90/yd <sup>3</sup> )	= \$342,618.98
9" Subbase for PCCP (R)	(24,148 yd <sup>2</sup> ) x ((9/12) in./ft) x (1/3 yd/ft) x (\$27.90/yd <sup>3</sup> )	= \$168,432.30
D-1 Joints (M)	(5,817 ft) x (1/15 joint/ft) x (60 ft/joint) x (\$9.55/ft)	= \$222,209.40
D-1 Joints (R)	(7,762 ft) x (1/16 joint/ft) x (28 ft/joint) x (\$9.55/ft)	= \$129,722.43
Tack (OS)	(10,341 yd <sup>2</sup> ) x (2) x (\$0.15/yd <sup>2</sup> )	= \$3,102.30
<b>Total Cost</b>		<b>\$2,873,989.06</b>

**Maintenance Costs:****Joint Seal Cost:**

D-1 Joints (M)	$(5,817 \text{ ft}) \times (1/15 \text{ joint/ft}) \times (60 \text{ ft/joint}) \times (\$2/\text{ft})$	=	\$46,536.00
D-1 Joints (R)	$(7,762 \text{ ft}) \times (1/16 \text{ joint/ft}) \times (28 \text{ ft/joint}) \times (\$2/\text{ft})$	=	\$27,167.00
Longitudinal Joint (M)	$(5,817 \text{ ft}) \times (4) \times (\$1/\text{ft})$	=	\$23,268.00
Longitudinal Joint (R)	$(7,762 \text{ ft}) \times (\$1/\text{ft})$	=	\$7,762.00
Traffic Maintenance	5% of Contract Cost	=	\$5,236.65
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Total Cost			\$109,969.65

**Mill and HMA Overlay Cost:**

Milling Cost (M, IS, & R)	$(62,928 \text{ yd}^2) \times (\$1.76/\text{yd}^2)$	=	\$110,753.28
Milling Cost (OS)	$(10,341 \text{ yd}^2) \times (\$0.79/\text{yd}^2)$	=	\$8,169.39
Tack (M, IS, & OS)	$(49,121 \text{ yd}^2) \times (2) \times (\$0.15/\text{yd}^2)$	=	\$14,736.30
Tack (R)	$(24,148 \text{ yd}^2) \times (2) \times (\$0.15/\text{yd}^2)$	=	\$7,244.40
Patch (M, TL)	$(5,817 \text{ ft}) \times (1/15 \text{ joint/ft}) \times (52 \text{ ft/joint}) \times (1/3 \text{ yd/ft}) \times (2 \text{ yd})$ $\times (3\%) \times (\$118.70/\text{yd}^2)$	=	\$47,873.13
Patch (R, TL)	$(7,762 \text{ ft}) \times (1/16 \text{ joint/ft}) \times (16 \text{ ft/joint}) \times (1/3 \text{ yd/ft}) \times (2 \text{ yd})$ $\times (3\%) \times (\$118.70/\text{yd}^2)$	=	\$18,426.99
Surface (M & IS)	$(38,780 \text{ yd}^2) \times (165 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$76.26/\text{t})$	=	\$243,982.43
Surface (OS)	$(10,341 \text{ yd}^2) \times (165 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$56.09/\text{t})$	=	\$47,852.20
Surface (R)	$(24,148 \text{ yd}^2) \times (165 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$69.61/\text{t})$	=	\$138,677.74
Joint Adhesive, Surface*	$(38,792 \text{ lft}) \times (\$0.39/\text{lft})$	=	\$15,128.88
Liquid Asphalt Sealant	$(38,792 \text{ lft}) \times (\$0.25/\text{lft})$	=	\$9,698.00
Intermediate (M & IS)	$(38,780 \text{ yd}^2) \times (275 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$55.36/\text{t})$	=	\$295,193.36
Intermediate (OS)	$(10,341 \text{ yd}^2) \times (275 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$51.52/\text{t})$	=	\$73,255.64
Intermediate (R)	$(24,148 \text{ yd}^2) \times (275 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$54.30/\text{t})$	=	\$180,394.62
Joint Adhesive, Intermediate*	$(38,792 \text{ lft}) \times (\$0.39/\text{lft})$	=	\$15,128.88
Var Depth O Wedge(M)	$(2) \times (2) \times (0.3) \times (5,817 \text{ ft}) \times (1/27 \text{ yd}^3/\text{ft}^3) \times (1.69 \text{ t/yd}^3)$ $\times (\$15/\text{t})$	=	\$6,553.82
Var Depth O Wedge(R)	$(2) \times (0.3) \times (7,762 \text{ ft}) \times (1/27 \text{ yd}^3/\text{ft}^3) \times (1.69 \text{ t/yd}^3) \times (\$15/\text{t})$	=	\$4,372.59
Traffic Maintenance	5% of Contract Cost	=	\$61,387.18
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Total Cost			\$1,298,828.84

\*Assume 4 mainline joints and 2 ramp joints.

**Mill and Resurface Cost:**

Milling Cost (M, IS, & OS)	$(49,121 \text{ yd}^2) \times (\$0.79/\text{yd}^2)$	=	\$38,805.59
Milling Cost (R)	$(24,148 \text{ yd}^2) \times (\$0.79/\text{yd}^2)$	=	\$19,076.92
Tack (M, IS, & OS)	$(49,121 \text{ yd}^2) \times (\$0.15/\text{yd}^2)$	=	\$7,368.15
Tack (R)	$(24,148 \text{ yd}^2) \times (\$0.15/\text{yd}^2)$	=	\$3,622.20
Composite Patch, Concrete (M)	$(5,817 \text{ ft}) \times (1/15 \text{ joint/ft}) \times (52 \text{ ft/joint}) \times (1/3 \text{ yd/ft}) \times (2 \text{ yd})$ $\times (1\%) \times (\$118.70/\text{yd}^2)$	=	\$15,957.71
Composite Patch, Concrete (R)	$(7,762 \text{ ft}) \times (1/16 \text{ joint/ft}) \times (16 \text{ ft/joint}) \times (1/3 \text{ yd/ft}) \times (2 \text{ yd})$ $\times (1\%) \times (\$118.70/\text{yd}^2)$	=	\$6,142.33
Composite Patch, HMA(M)	$(5,817 \text{ ft}) \times (1/15 \text{ joint/ft}) \times (17.33 \text{ yd/joint}) \times (2 \text{ yd}) \times (4\%)$ $\times (440 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$118.48/\text{t})$	=	\$14,014.06
Composite Patch, HMA(R)	$(7,762 \text{ ft}) \times (1/16 \text{ joint/ft}) \times (5.33 \text{ yd/joint}) \times (2 \text{ yd}) \times (4\%)$ $\times (440 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$89.68/\text{t})$	=	\$4,081.21
Surface (M & IS)	$(38,780 \text{ yd}^2) \times (165 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$76.26/\text{t})$	=	\$243,982.43
Surface (OS)	$(10,341 \text{ yd}^2) \times (165 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$56.09/\text{t})$	=	\$47,852.20
Surface (R)	$(24,148 \text{ yd}^2) \times (165 \text{ lb/yd}^2) \times (1/2000 \text{ t/lb}) \times (\$69.61/\text{t})$	=	\$138,677.74
Joint Adhesive, Surface*	$(38,792 \text{ lft}) \times (\$0.39/\text{lft})$	=	\$15,128.88
Liquid Asphalt Sealant	$(38,792 \text{ lft}) \times (\$0.25/\text{lft})$	=	\$9,698.00
Traffic Maintenance	5% of Contract Cost	=	\$27,735.47
<b>Total Cost</b>			<b>\$592,142.90</b>

\*Assume 4 mainline joints and 2 ramp joints.

<b>HMA Present Worth (PW) for Initial Construction and Future Rehabilitation Work</b>			
<b>Age in Years</b>	<b>Rehabilitation Work</b>	<b>Cost</b>	<b>Present Worth Cost</b>
0	Initial Construction Cost	\$2,837,184.78	\$2,837,184.78
3	Joint Seal (Age 3)	\$10,182.90	\$9,052.56
6	Joint Seal (Age 6)	\$20,365.80	\$16,095.39
9	Joint Seal (Age 9)	\$30,548.70	\$21,463.11
12	Joint Seal (Age 12)	\$40,731.60	\$25,440.84
15	Joint Seal (Age > 12)	\$40,731.60	\$22,616.81
18	Joint Seal (Age > 12)	\$40,731.60	\$20,106.26
20	Mill and HMA Overlay	\$1,163,209.42	\$530,873.59
23	Joint Seal (Age 3)	\$10,182.90	\$4,131.47
26	Joint Seal (Age 6)	\$20,365.80	\$7,345.72
29	Joint Seal (Age 9)	\$30,548.70	\$9,795.48
32	Joint Seal (Age 12)	\$40,731.60	\$11,610.87
35	Mill and Resurface	\$598,960.30	\$151,785.81
38	Joint Seal (Age 3)	\$10,182.90	\$2,294.06
41	Joint Seal (Age 6)	\$20,365.80	\$4,078.82
44	Mill and Resurface	\$598,960.30	\$106,642.69
47	Joint Seal (Age 3)	\$10,182.90	\$1,611.78
50	Salvage Value	\$199,653.44	-\$27,638.88
Total HMA PW Cost			\$3,754,491.16

<b>PCCP PW for Initial Construction and Future Rehabilitation Work</b>			
<b>Age in Years</b>	<b>Rehabilitation Work</b>	<b>Cost</b>	<b>Present Worth Cost</b>
0	Initial Construction Cost	\$2,873,989.06	\$2,873,989.06
8	Joint Seal (PCCP)	\$109,969.65	\$80,353.75
16	Joint Seal (PCCP)	\$109,969.65	\$58,713.70
24	Joint Seal (PCCP)	\$109,969.65	\$42,901.52
30	Mill and HMA Overlay	\$1,298,828.84	\$400,453.18
33	Joint Seal (Age 3)	\$10,182.90	\$2,791.07
36	Joint Seal (Age 6)	\$20,365.80	\$4,962.51
39	Joint Seal (Age 9)	\$30,548.70	\$6,617.48
42	Mill and Resurface	\$592,142.90	\$114,031.88
45	Joint Seal (Age 3)	\$10,182.90	\$1,743.30
48	Joint Seal (Age 6)	\$20,365.80	\$3,099.57
50	Salvage Value	\$0.00	\$0.00
Total PCCP PW Cost			\$3,589,657.02

$$PW = F [1/(1 + i)^n]$$

Where: F = Future Construction Cost  
i = Discount Rate (4%)  
n = Number of Years from Year Zero

**Initial Construction Cost and PW for Future Maintenance of the Pavement:**

$X_1$  = HMA Section = \$3,754,491.16

$X_2$  = PCCP Section = \$3,589,657.02

$$\% \text{ Difference from Average} = \frac{(X_1 - X_2)}{\frac{1}{2}(X_1 + X_2)} = 4.49\%$$