

# MEMORANDUM

## DEPARTMENT OF TRANSPORTATION

Region II – Materials  
1019 Erie Avenue  
Pueblo, Colorado 81002  
(719) 546-5438 FAX (719) 546-5702



## **PROJECT FBR 0251-339 I-25 Ilex Design Build MP 98 to MP 99 Project Code: 17666**

DATE: October 2, 2013  
TO: Don Garcia, Project Manager  
FROM: Craig Wieden, Region 2 Materials Engineer  
SUBJECT: Pavement Justification Report with LCCA

This project will consist of reconstruction of the current I-25/Ilex Bridges for both northbound and southbound I-25 in Pueblo, CO. It is my understanding that the project will consist of the reconstruction/realignment of I-25 along with construction of new bridges over Ilex, the HARP Extension, the BNSF Railroad, and Gruma Drive. The vertical profile of I-25 between these structures will be raised which will require reconstruction of the interstate pavements between them. Per Don Garcia, CDOT Project Manager, the length of the mainline pavement reconstruction was provided as 1,410 feet (excluding structures), with an ultimate pavement width of 134 feet. A total pavement area of 54,388 square yards was provided to us in order to perform a Life Cycle Cost Analysis (LCCA).

Since the vertical profile of the roadway will be raised, we have made the assumption that the top two feet of the subgrade will be imported and the soil properties will be stipulated in the contract. Based upon this assumption, a seasonal subgrade k-value of 250 psi/in was utilized for a concrete pavement thickness design (A-1 or A-2 soils) while a minimum R-value of 60 was used to develop an HMA pavement thickness design.

With the above assumptions and design considerations in mind, two alternate pavement sections were evaluated for this project and included:

- Portland Cement Concrete Pavement (PCCP) Construction consisting of 12-inches of PCCP over 6 inches Aggregate Base Course (ABC) placed on a minimum 2 feet of embankment soil with an AASHTO soil classification of A-1 or A-2.

And,

- Hot Mix Asphalt (HMA) Construction consisting of 7-inches HMA (2 inches Grade SX(100)(PG 76-28 over 5 inches Grade SX(100)(PG 64-22) over 6 inches Aggregate Base Course (ABC) placed on a minimum 2 feet of embankment with a minimum R-value of 60.

The PCCP thickness design was conducted using the 1998 Supplement to the AASHTO Guide for Design of Pavement Structures, Rigid Pavement Design, while the HMA pavement design were conducted using the AASHTOWare computer program DARWin. Design ESAL's utilized in the PCCP and HMA designs were obtained from the Division of Transportation Development (DTD) website and were based on 2012 published traffic volumes. The design parameters utilized for the alternate pavement thickness designs are summarized below. Additionally, copies of the pavement thickness calculation outputs are attached to this memorandum.

### PCCP Design

PCCP Initial Design Life	30-Years
18-kip Design ESAL's	30,000,000
Serviceability Index	2.0
28-day Mean PCC Modulus of Rupture	650 psi
Elastic Modulus of Slab	3,400,000 psi
Mean Effective k-value	250 psi/inch*
Reliability Level	95%
Overall Standard Deviation	0.34
Calculated Design Thickness	12 inches**

\* Top 2 feet of embankment soils to consist of soil meeting AASHTO soil classification of A-1 or A-2.

\*\* Includes an additional ¼ inch of thickness for future diamond grinding and was rounded up to the nearest ½ inch.

### HMA Design

HMA Initial Design Life	20-Years
18-kip Design ESAL's	12,000,000
Serviceability Index	2.0
Subgrade Modulus	18,259 psi*
Reliability Level	95%
Overall Standard Deviation	0.44
Required Design Structural Number	3.79
Calculated Structural Number	3.98**

\* Top 2 feet of embankment soils to consist of soil with a minimum R-value = 60.

\*\* 7 inches of HMA over 6 inches of ABC Class 6 (min. R-value = 77).

### Life Cycle Cost Analysis

In accordance with the CDOT 2014 Pavement Design Manual (PDM), a Probabilistic Life Cycle Cost Analysis (LCCA) using the Net Present Value (NPV) economic analysis over a 40-year period was conducted to compare the construction alternates, and the associated rehabilitation strategies for this project. For the PCCP construction alternate, a rehabilitation at year 27, consisting of 0.5% full-depth PCCP slab replacement in the driving lanes, saw & seal joints, and full width diamond grinding was utilized. For the HMA construction alternate, a time to the first rehabilitation of 13 years was utilized in the analysis, with subsequent rehabilitations occurring at 13 year intervals after that. All HMA rehabilitations consisted of 2-inch mill and fill treatments with polymerized HMA. Other materials costs included in the LCCA for both alternates were the ABC layer, and select embankment fill (top 2 feet). Since the length of the project will be in an elevated fill section, it is anticipated that guardrail will be required along the length of the pavement and no safety edge was included in the analysis for this reason. The following presents a summary of the items, costs, and standard deviations utilized in the LCCA analysis:

FBR 0251-339 – I-25 Ilex Design Build  
Pavement Justification Report (Continued)

Item	Unit	Unit Price	SD
PCCP	Sq. Yard/Inch	\$4.49	\$0.96
Grade SX(100)(PG 64-22)	Tons	\$68.19	\$11.88
Grade SX(100)(PG 76-28)	Tons	\$72.63	\$12.60
ABC Class 6	Cubic Yards	\$27.41	\$7.42
Embankment Special	Cubic Yards	\$15.84	\$10.70
Removal of Asphalt Mat (Planing)	Sq. Yards	\$2.46	\$1.31
Diamond Grinding PCCP	Sq. Yards	\$4.29	\$1.26
Saw & Seal Joints	Lin. Foot	\$1.62	\$0.19
Removal of PCCP	Sq. Yard	\$20.28	\$11.94
PCCP Slab Replacement (Fast Track)	Sq. Yard/Inch	\$9.12	\$2.61
Annual Maintenance (PCCP)	Lane Mile	\$449.00	N/A
Annual Maintenance (HMA)	Lane Mile	\$812.00	N/A

Additionally, Construction Engineering for each initial construction alternate and rehabilitation was assumed at 22.10%, while Preliminary Engineering and Traffic Control were assumed at 10% and 15%, respectively. It is understood that regardless of the alternate constructed, a minimum of 2-lanes of through traffic will be required to be maintained throughout the initial construction period at all times. It is anticipated that the pavement can be built and placed as the structures are being constructed and before they are opened to traffic. Therefore, initial user costs for the initial PCCP and HMA construction alternates were left at zero. User Costs for both the PCCP and HMA rehabilitation strategies were calculated using the CDOT WorkZone User Software and are attached to this memorandum.

Using the above unit prices, assumptions, and calculated values; the Probabilistic LCCA was 25.9% in favor of the HMA construction alternate versus the PCCP construction alternate. **Since the LCCA indicates the HMA alternate is more than 10% in favor of HMA, the HMA alternate should be selected. Formation of a Pavement Type Selection Committee is not warranted for this project.** The results of the Probabilistic LCCA as well as supporting pricing and quantity information are attached to this memorandum.

If you have any questions or need additional information, please don't hesitate to call.

cc: Karen Rowe  
 Scott Dalton  
 Joe DeHeart  
 Jennifer Billings  
 Jody Pieper  
 Frank Walters  
 CDOT HQ Pavement Design – Jay Goldbaum  
 CDOT HQ Pavement Design – John Kacinski

# PCCP Thickness Design Output (Reconstruction)

# Rigid Pavement Design - Based on AASHTO Supplemental Guide

Reference: *LTPP DATA ANALYSIS - Phase I: Validation of Guidelines for k-Value Selection and Concrete Pavement Performance Prediction*

## I. General

Agency:   
Street Address:   
City:   
State:

Project Number:

ID:

Description:

Location:

## II. Design

### Serviceability

Initial Serviceability, P<sub>1</sub>:   
Terminal Serviceability, P<sub>2</sub>:

### PCC Properties

28-day Mean Modulus of Rupture, (S'<sub>c</sub>):  psi  
Elastic Modulus of Slab, E<sub>c</sub>:  psi  
Poisson's Ratio for Concrete, m:

### Base Properties

Elastic Modulus of Base, E<sub>b</sub>:  psi  
Design Thickness of Base, H<sub>b</sub>:  in  
Slab-Base Friction Factor, f:

### Reliability and Standard Deviation

Reliability Level (R):  %  
Overall Standard Deviation, S<sub>o</sub>:

### Climatic Properties

Mean Annual Wind Speed, WIND:  mph  
Mean Annual Air Temperature, TEMP:  °F  
Mean Annual Precipitation, PRECIP:  in

### Subgrade k-Value

psi/in

### Design ESALs

million

Pavement Type, Joint Spacing (L)

JPCP

JRCP

CRCP

Joint Spacing:

ft

JPCP

Effective Joint Spacing:  in

Edge Support

Conventional 12-ft wide traffic lane

Conventional 12-ft wide traffic lane + tied PCC

2-ft widened slab w/conventional 12-ft traffic lane

Edge Support Factor:

Sensitivity Analysis

Slab Thickness used for  
Sensitivity Analysis:  in

Modulus of Rupture

Elastic Modulus (Slab)

Elastic Modulus (Base)

Base Thickness

k-Value

Joint Spacing

Reliability

Standard Deviation

Calculated Slab Thickness for Above Inputs:

**11.71 in**

# HMA Thickness Design Output (Reconstruction)

# 1993 AASHTO Pavement Design

## DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare  
Computer Software Product

### Flexible Structural Design Module

HMA Alternate  
20-Year Initial Design Period  
R-value of Subgrade = 60  
Top 2' of Embankment Select Fill

### Flexible Structural Design

18-kip ESALs Over Initial Performance Period	12,000,000
Initial Serviceability	4.5
Terminal Serviceability	2.5
Reliability Level	95 %
Overall Standard Deviation	0.44
Roadbed Soil Resilient Modulus	18,259 psi
Stage Construction	1
 Calculated Design Structural Number	 3.79 in

### Specified Layer Design

<u>Layer</u>	<u>Material Description</u>	Struct Coef. <u>(Ai)</u>	Drain Coef. <u>(Mi)</u>	Thickness <u>(Di)(in)</u>	Width <u>(ft)</u>	Calculated <u>SN (in)</u>
1	HMA Grade SX (100)(PG 76-28)	0.44	1	2	-	0.88
2	HMA Grade SX (100)(PG 64-22)	0.44	1	5	-	2.20
3	ABC Class 6 (Min. R-value = 78)	0.15	1	6	-	0.90
Total	-	-	-	13.00	-	3.98

# RealCost Probabilistic LCCA Report

I-25 Ilex to 1st Street - Design Build

Statistics	LCCAOutput:Alternative 1: Agency Cost	LCCAOutput: Alternative 1: User Cost	LCCAOutput: Alternative 2: Agency Cost	LCCAOutput: Alternative 2: User Cost
Probability Function				
Minimum	\$3,125.21	\$26.93	\$3,973.53	\$13.07
Maximum	\$5,435.97	\$659.68	\$6,493.19	\$484.65
Mean	\$4,140.05	\$237.05	\$5,212.53	\$259.76
Median	\$4,147.85	\$189.43	\$5,203.26	\$265.31
Standard Deviation	\$410.08	\$120.25	\$505.44	\$106.45
Percentile (5%)	\$3,459.49	\$107.82	\$4,379.93	\$75.14
Percentile (10%)	\$3,606.20	\$124.92	\$4,531.18	\$110.00
Percentile (75%)	\$4,425.15	\$290.99	\$5,589.42	\$347.41
Percentile (95%)	\$4,826.64	\$488.71	\$6,065.23	\$417.26

NPV Comparison - HMA to PCCP Reconstruction

25.9%

More than 10% in In favor of HMA,  
No Pavement Type Selection Committee is  
warranted and HMA should be selected.

## RealCost Input Data

<b>1. Economic Variables</b>	
Value of Time for Passenger Cars (\$/hour)	\$17.00
Value of Time for Single Unit Trucks (\$/hour)	\$35.00
Value of Time for Combination Trucks (\$/hour)	\$36.50

<b>2. Analysis Options</b>	
Include User Costs in Analysis	Yes
Include User Cost Remaining Life Value	Yes
Use Differential User Costs	Yes
User Cost Computation Method	Specified
Include Agency Cost Remaining Life Value	Yes
Traffic Direction	Both
Analysis Period (Years)	40
Beginning of Analysis Period	2014
Discount Rate (%)	2.6
	<b>LCCALOGNORMAL(2.6,0.25)</b>
Number of Alternatives	2

<b>3. Project Details</b>	
State Route	I-25
Project Name	Ilex to 1st Street
Region	2
County	Pueblo
Analyzed By	Craig Wieden
Mileposts	
Begin	98.00
End	99.00
Length of Project (miles)	1.00
Comments	LCCA for the Pavement Between Structures

<b>4. Traffic Data</b>	
AADT Construction Year (total for both directions)	32,232
Cars as Percentage of AADT (%)	93.9
Single Unit Trucks as Percentage of AADT (%)	2.4
Combination Trucks as Percentage of AADT (%)	3.7
Annual Growth Rate of Traffic (%)	1.3
	<b>LCCATRIANG(0.34,1.34,2.34)</b>
Speed Limit Under Normal Operating Conditions (mph)	55
No of Lanes in Each Direction During Normal Conditions	2
Free Flow Capacity (vphpl)	1901
Rural or Urban Hourly Traffic Distribution	Urban
Queue Dissipation Capacity (vphpl)	1504
Maximum AADT (total for both directions)	182,496
Maximum Queue Length (miles)	5.0

<b>Alternative 1</b>	HMA Alternate	
<b>Number of Activities</b>	4	
<b>Activity 1</b>	Initial Construction - 2" 76-28 HMA over 5" 64-22 HMA over 6" ABC on 2'=60	
Agency Construction Cost (\$1000)	\$3,007.67	
	<b>LCCATRIANG(2178,3011,3834)</b>	
User Work Zone Costs (\$1000)	\$0.00	
Work Zone Duration (days)	365	
No of Lanes Open in Each Direction During Work Zone	2	
Activity Service Life (years)	14.0	
	<b>LCCATRIANG(7,13,22)</b>	
Activity Structural Life (years)	20.0	
Maintenance Frequency (years)	1	
Agency Maintenance Cost (\$1000)	0.812	
Work Zone Length (miles)	1.00	
Work Zone Speed Limit (mph)	45	
Work Zone Capacity (vphpl)	1504	
Traffic Hourly Distribution	Week Day 1	
Time of Day of Lane Closures (use whole numbers based on a 24-hour clock)		
Inbound	Start	End
First period of lane closure	0	2400
Second period of lane closure		
Third period of lane closure		
Outbound	Start	End
First period of lane closure	0	2400
Second period of lane closure		
Third period of lane closure		
<b>Activity 2</b>	2" 76-28 HMA Mill and Fill	
Agency Construction Cost (\$1000)	\$872.00	
	<b>LCCATRIANG(623,873,1120)</b>	
User Work Zone Costs (\$1000)	\$45.00	
Work Zone Duration (days)	10	
No of Lanes Open in Each Direction During Work Zone	1	
Activity Service Life (years)	14.0	
	<b>LCCATRIANG(7,13,22)</b>	
Activity Structural Life (years)	10.0	
Maintenance Frequency (years)	1	
Agency Maintenance Cost (\$1000)	0.812	
Work Zone Length (miles)	1.00	
Work Zone Speed Limit (mph)	45	
Work Zone Capacity (vphpl)	1504	
Traffic Hourly Distribution	Week Day 1	
Time of Day of Lane Closures (use whole numbers based on a 24-hour clock)		
Inbound	Start	End
First period of lane closure	2000	500
Second period of lane closure		
Third period of lane closure		
Outbound	Start	End
First period of lane closure	2000	500
Second period of lane closure		
Third period of lane closure		

<b>Activity 3</b>	2" 76-28 HMA Mill and Fill	
Agency Construction Cost (\$1000)	\$872.00	
	<b>LCCATRIANG(623,873,1120)</b>	
User Work Zone Costs (\$1000)	\$294.00	
Work Zone Duration (days)	10	
No of Lanes Open in Each Direction During Work Zone	1	
Activity Service Life (years)	14.0	
	<b>LCCATRIANG(7,13,22)</b>	
Activity Structural Life (years)	10.0	
Maintenance Frequency (years)	1	
Agency Maintenance Cost (\$1000)	0.812	
Work Zone Length (miles)	1.00	
Work Zone Speed Limit (mph)	45	
Work Zone Capacity (vphpl)	1504	
Traffic Hourly Distribution	Week Day 1	
Time of Day of Lane Closures (use whole numbers based on a 24-hour clock)		
Inbound	Start	End
First period of lane closure	2000	500
Second period of lane closure		
Third period of lane closure		
Outbound	Start	End
First period of lane closure	2000	500
Second period of lane closure		
Third period of lane closure		

<b>Activity 4</b>	2" 76-28 HMA Mill and Fill	
Agency Construction Cost (\$1000)	\$872.00	
	<b>LCCATRIANG(623,873,1120)</b>	
User Work Zone Costs (\$1000)	\$791.00	
Work Zone Duration (days)	10	
No of Lanes Open in Each Direction During Work Zone	1	
Activity Service Life (years)	14.0	
	<b>LCCATRIANG(7,13,22)</b>	
Activity Structural Life (years)	10.0	
Maintenance Frequency (years)	1	
Agency Maintenance Cost (\$1000)	0.812	
Work Zone Length (miles)	1.00	
Work Zone Speed Limit (mph)	45	
Work Zone Capacity (vphpl)	1504	
Traffic Hourly Distribution	Week Day 1	
Time of Day of Lane Closures (use whole numbers based on a 24-hour clock)		
Inbound	Start	End
First period of lane closure	2000	500
Second period of lane closure		
Third period of lane closure		
Outbound	Start	End
First period of lane closure	2000	500
Second period of lane closure		
Third period of lane closure		

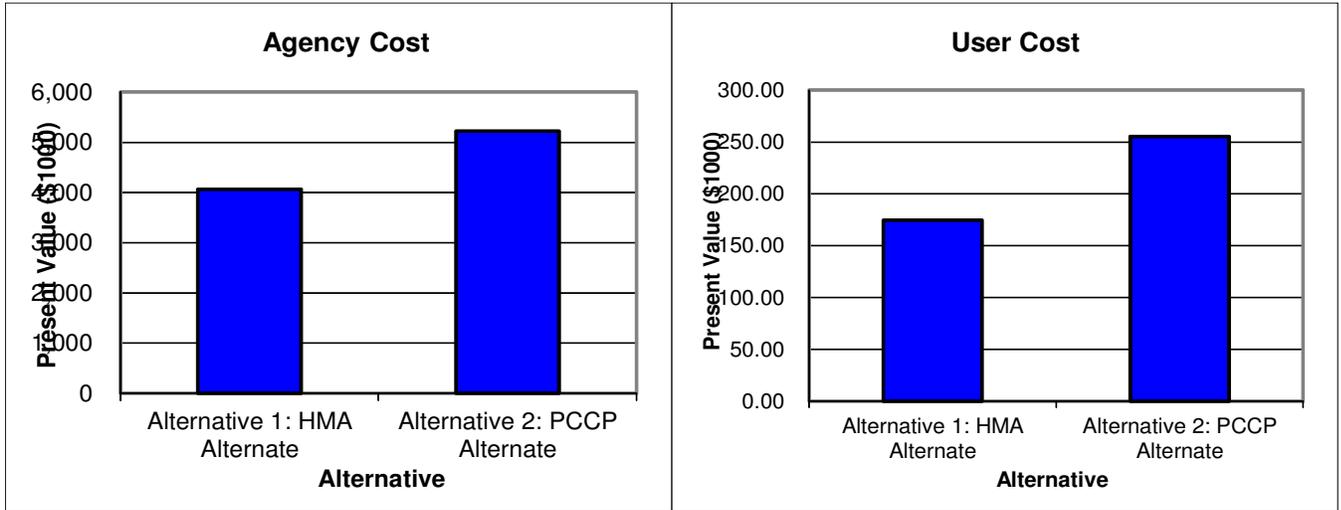
<b>Alternative 2</b>	PCCP Alternate
<b>Number of Activities</b>	2

<b>Activity 1</b>	Initial Construction - 12" PCCP over 6" ABC Class 6 on 2' R=60	
Agency Construction Cost (\$1000)	\$5,058.00	
	<b>LCCATRIANG(3794,5058,6322)</b>	
User Work Zone Costs (\$1000)	\$0.00	
Work Zone Duration (days)	365	
No of Lanes Open in Each Direction During Work Zone	2	
Activity Service Life (years)	27.7	
	<b>LCCATRIANG(16,27,40)</b>	
Activity Structural Life (years)	30.0	
Maintenance Frequency (years)	1	
Agency Maintenance Cost (\$1000)	0.449	
Work Zone Length (miles)	1.00	
Work Zone Speed Limit (mph)	45	
Work Zone Capacity (vphpl)	1504	
Traffic Hourly Distribution	Week Day 1	
Time of Day of Lane Closures (use whole numbers based on a 24-hour clock)		
Inbound	Start	End
First period of lane closure	0	2400
Second period of lane closure		
Third period of lane closure		
Outbound	Start	End
First period of lane closure	0	2400
Second period of lane closure		
Third period of lane closure		

<b>Activity 2</b>	PCCP Rehab at 27 Years	
Agency Construction Cost (\$1000)	\$412.00	
	<b>LCCATRIANG(297,412,527)</b>	
User Work Zone Costs (\$1000)	\$682.00	
Work Zone Duration (days)	19	
No of Lanes Open in Each Direction During Work Zone	1	
Activity Service Life (years)	18.0	
	<b>LCCATNORMAL(18,6.6,11.4,24.6)</b>	
Activity Structural Life (years)	18.0	
Maintenance Frequency (years)	1	
Agency Maintenance Cost (\$1000)	0.449	
Work Zone Length (miles)	1.00	
Work Zone Speed Limit (mph)	45	
Work Zone Capacity (vphpl)	1504	
Traffic Hourly Distribution	Week Day 1	
Time of Day of Lane Closures (use whole numbers based on a 24-hour clock)		
Inbound	Start	End
First period of lane closure	2000	500
Second period of lane closure		
Third period of lane closure		
Outbound	Start	End
First period of lane closure	2000	500
Second period of lane closure		
Third period of lane closure		

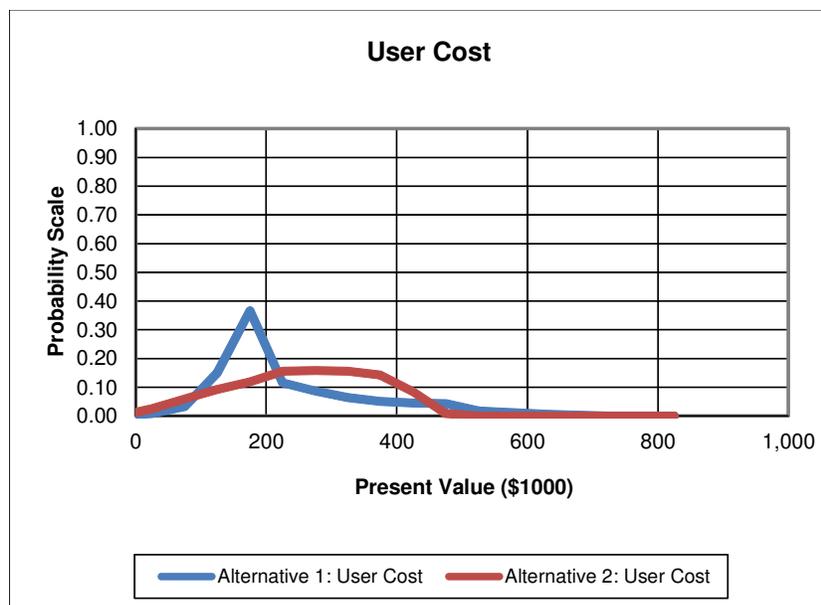
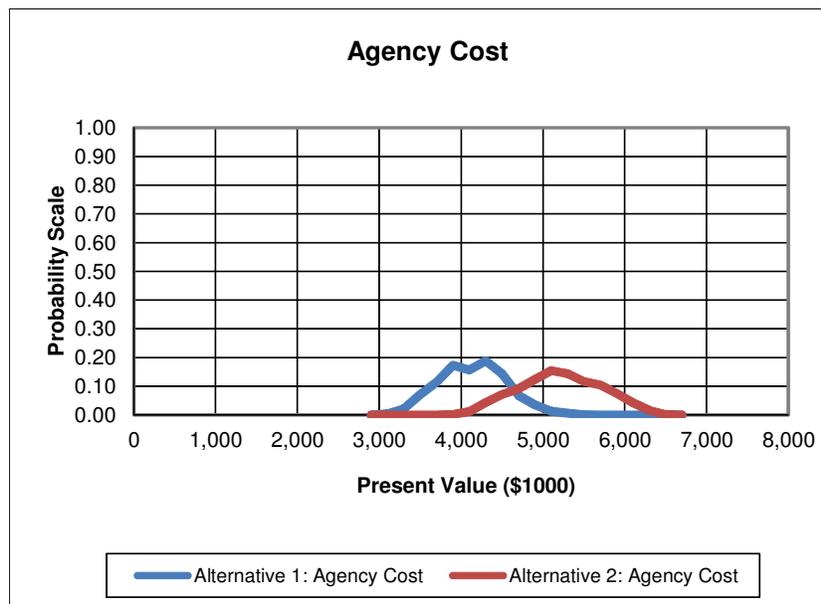
Deterministic Results

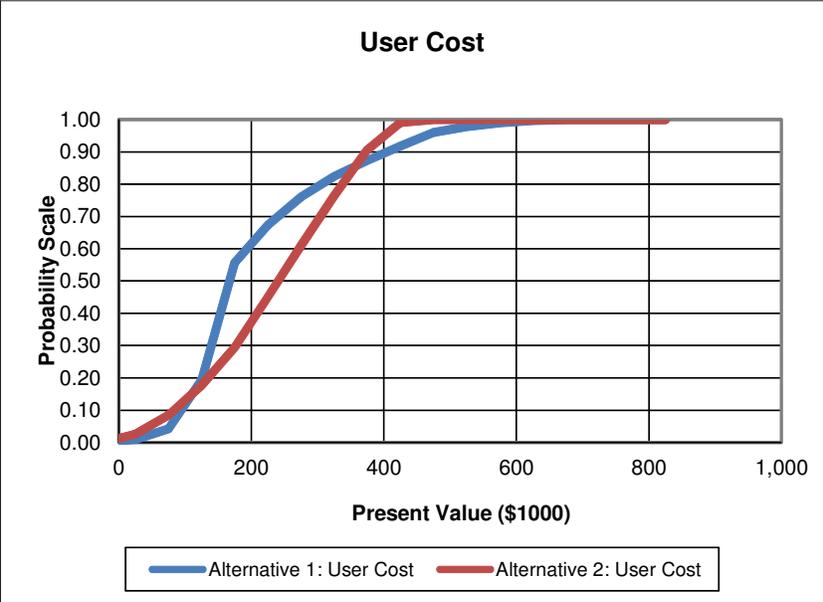
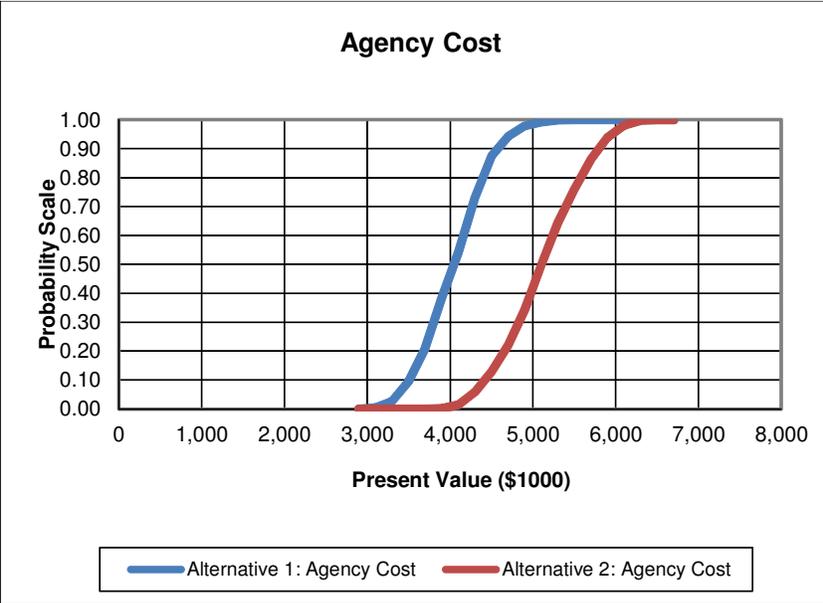
Total Cost	Alternative 1: HMA Alternate		Alternative 2: PCCP Alternate	
	Agency Cost (\$1000)	User Cost (\$1000)	Agency Cost (\$1000)	User Cost (\$1000)
Undiscounted Sum	\$4,781.71	\$339.00	\$5,357.37	\$467.30
Present Value	\$4,060.23	\$174.71	\$5,223.05	\$255.49
EUAC	\$164.48	\$7.08	\$211.59	\$10.35



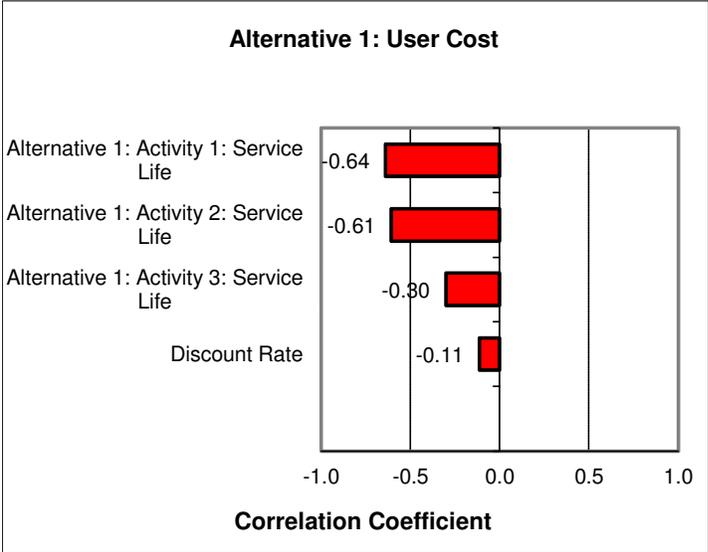
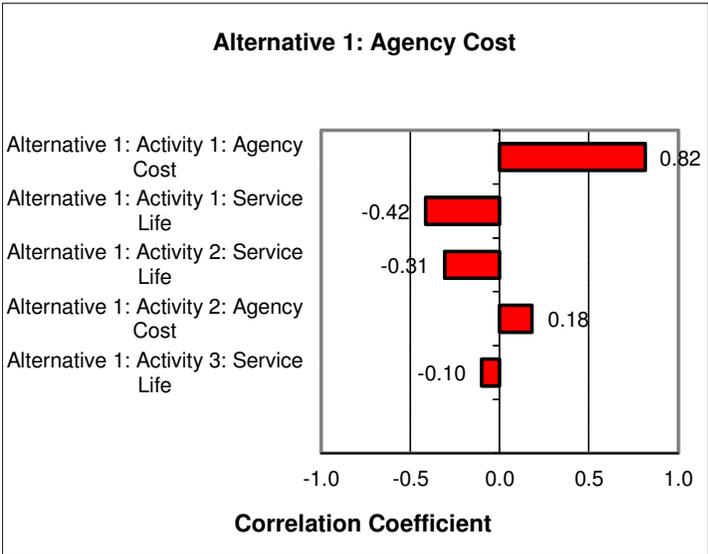
Probabilistic Results

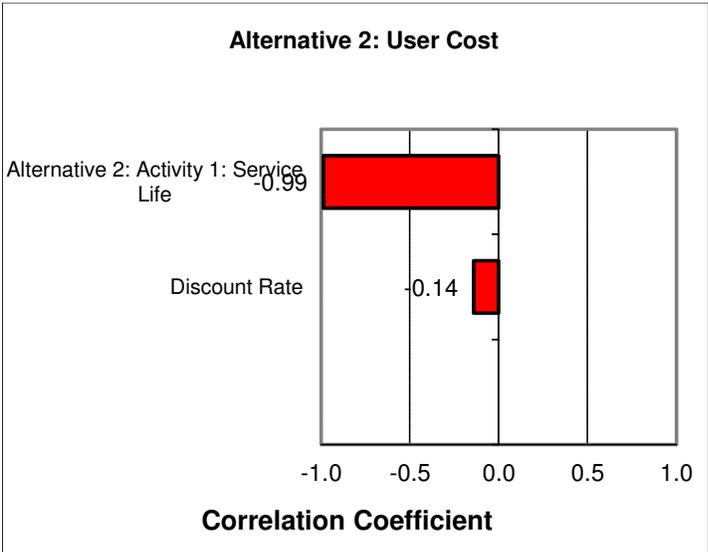
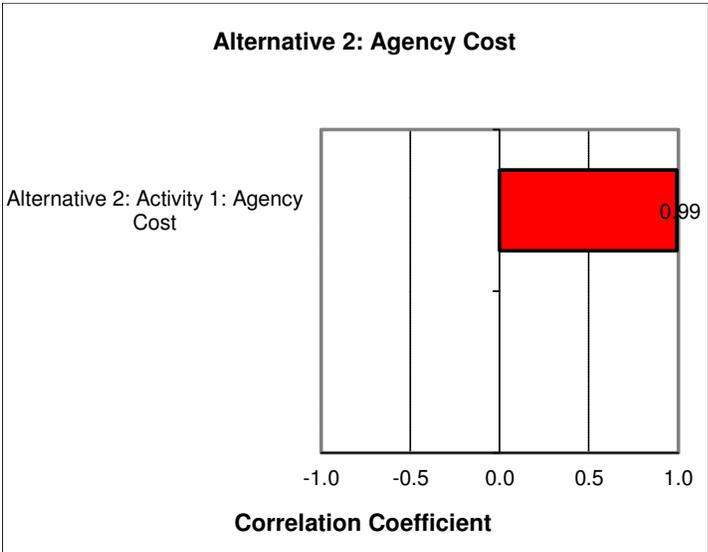
Total Cost (Present Value)	Alternative 1: HMA Alternate		Alternative 2: PCCP Alternate	
	Agency Cost (\$1000)	User Cost (\$1000)	Agency Cost (\$1000)	User Cost (\$1000)
Mean	\$4,140.05	\$237.05	\$5,212.53	\$259.76
Standard Deviation	\$410.08	\$120.25	\$505.44	\$106.45
Minimum	\$3,125.21	\$26.93	\$3,973.53	\$13.07
Maximum	\$5,435.97	\$659.68	\$6,493.19	\$484.65





Tornado Graphs





# User Costs Outputs

CDOT REPORT - Summary Input and Output for the Single Lane Closure Strategy

<b>INPUT DATA</b>		
<b>Project Name</b>	Ilex PCCP Rehab Night Work	
<b>Freeway Name</b>	I-25	
<b>Input Filename</b>	C:\ILEXPCCP.WZM	
<b>Project Start Date</b>		
<b>Project End Date</b>		
<b>Design Speed</b>	65 mph	
<b>Speed Limit</b>	55 mph	
<b>Workzone Speed Limit</b>	45 mph	
<b>Grade</b>	2.0 %	
<b>Work Zone Length</b>	1.00 miles	
<b>Total Number of Lanes</b>	2	
<b>Number of Open Lanes</b>	1	
<b>Number of Temporary Lanes</b>	0	
<b>AADT, Directional</b>	39181	
<b>Percentage of Single Unit Trucks</b>	2.4 %	
<b>Percentage of Combination Trucks</b>	3.7 %	
<b>Functional Class</b>	Urban Interstate (Weekday)	
<b>OUTPUT SUMMARY</b>		
<b><u>TYPE OF WORK</u></b>	<b><u>ADDITIONAL USER COST</u></b>	<b><u>DURATION</u></b>
	<b><u>DUE TO WORKZONE</u></b>	
412-Concrete Pavement <= 14.0 inch	\$81,977.16	3
202-Removal of Concrete	\$145,132.66	3
412-Routing & Sealing PCCP Cracks	\$263,575.98	6
202-Removal of Concrete (Diamond Grind)	\$191,593.73	7
<b>TOTAL ADDL. USER COST</b>	<b>\$682,279.53</b>	<b>19</b>
<b>TOTAL USER COST FOR NORMAL CONDITION (WITH NO WORKZONE)</b>		
<b>FOR A DURATION OF 19 DAYS = \$106,499.20</b>		
<b>Disclaimer:</b>		
<b>The values presented in this program are intended to provide guidelines only.</b>		
<b>Engineering judgement must be applied to use these values.</b>		
<b>No one but the user can assure that these results are properly applied.</b>		

CDOT REPORT - Summary Input and Output for the Single Lane Closure Strategy

<b>INPUT DATA</b>		
<b>Project Name</b>	Ilex HMA Rehab Night Work - Year 2027	
<b>Freeway Name</b>	I-25	
<b>Input Filename</b>	C:\ILEXHMA.WZM	
<b>Project Start Date</b>		
<b>Project End Date</b>		
<b>Design Speed</b>	65 mph	
<b>Speed Limit</b>	55 mph	
<b>Workzone Speed Limit</b>	45 mph	
<b>Grade</b>	2.0 %	
<b>Work Zone Length</b>	1.00 miles	
<b>Total Number of Lanes</b>	2	
<b>Number of Open Lanes</b>	1	
<b>Number of Temporary Lanes</b>	0	
<b>AADT, Directional</b>	32577	
<b>Percentage of Single Unit Trucks</b>	2.4 %	
<b>Percentage of Combination Trucks</b>	3.7 %	
<b>Functional Class</b>	Urban Interstate (Weekday)	
<b>OUTPUT SUMMARY</b>		
<b><u>TYPE OF WORK</u></b>	<b><u>ADDITIONAL USER COST</u></b>	<b><u>DURATION</u></b>
	<b><u>DUE TO WORKZONE</u></b>	
202-Removal of Asphalt (Planing)	\$15,395.50	4
403-HBP (Asphalt) <= 2.0 inch	\$29,147.76	6
<b>TOTAL ADDL. USER COST</b>	<b>\$44,543.27</b>	<b>10</b>
<b>TOTAL USER COST FOR NORMAL CONDITION (WITH NO WORKZONE)</b>		
<b>FOR A DURATION OF 10 DAYS = \$46,545.31</b>		
<b>Disclaimer:</b>		
<b>The values presented in this program are intended to provide guidelines only.</b>		
<b>Engineering judgement must be applied to use these values.</b>		
<b>No one but the user can assure that these results are properly applied.</b>		

CDOT REPORT - Summary Input and Output for the Single Lane Closure Strategy

<b>INPUT DATA</b>		
<b>Project Name</b>	Ilex HMA Rehab Night Work - Year 2027	
<b>Freeway Name</b>	I-25	
<b>Input Filename</b>	C:\ILEXHMA.WZM	
<b>Project Start Date</b>		
<b>Project End Date</b>		
<b>Design Speed</b>	65 mph	
<b>Speed Limit</b>	55 mph	
<b>Workzone Speed Limit</b>	45 mph	
<b>Grade</b>	2.0 %	
<b>Work Zone Length</b>	1.00 miles	
<b>Total Number of Lanes</b>	2	
<b>Number of Open Lanes</b>	1	
<b>Number of Temporary Lanes</b>	0	
<b>AADT, Directional</b>	38709	
<b>Percentage of Single Unit Trucks</b>	2.4 %	
<b>Percentage of Combination Trucks</b>	3.7 %	
<b>Functional Class</b>	Urban Interstate (Weekday)	
<b>OUTPUT SUMMARY</b>		
<b><u>TYPE OF WORK</u></b>	<b><u>ADDITIONAL USER COST</u></b>	<b><u>DURATION</u></b>
	<b><u>DUE TO WORKZONE</u></b>	
202-Removal of Asphalt (Planing)	\$100,158.78	4
403-HBP (Asphalt) <= 2.0 inch	\$193,978.87	6
<b>TOTAL ADDL. USER COST</b>	<b>\$294,137.65</b>	<b>10</b>
<b>TOTAL USER COST FOR NORMAL CONDITION (WITH NO WORKZONE)</b>		
<b>FOR A DURATION OF 10 DAYS = \$55,371.89</b>		
<b>Disclaimer:</b>		
<b>The values presented in this program are intended to provide guidelines only.</b>		
<b>Engineering judgement must be applied to use these values.</b>		
<b>No one but the user can assure that these results are properly applied.</b>		

CDOT REPORT - Summary Input and Output for the Single Lane Closure Strategy

<b>INPUT DATA</b>		
<b>Project Name</b>	Ilex HMA Rehab Night Work - Year 2027	
<b>Freeway Name</b>	I-25	
<b>Input Filename</b>	C:\ILEXHMA.WZM	
<b>Project Start Date</b>		
<b>Project End Date</b>		
<b>Design Speed</b>	65 mph	
<b>Speed Limit</b>	55 mph	
<b>Workzone Speed Limit</b>	45 mph	
<b>Grade</b>	2.0 %	
<b>Work Zone Length</b>	1.00 miles	
<b>Total Number of Lanes</b>	2	
<b>Number of Open Lanes</b>	1	
<b>Number of Temporary Lanes</b>	0	
<b>AADT, Directional</b>	44842	
<b>Percentage of Single Unit Trucks</b>	2.4 %	
<b>Percentage of Combination Trucks</b>	3.7 %	
<b>Functional Class</b>	Urban Interstate (Weekday)	
<b>OUTPUT SUMMARY</b>		
<b><u>TYPE OF WORK</u></b>	<b><u>ADDITIONAL USER COST</u></b>	<b><u>DURATION</u></b>
	<b><u>DUE TO WORKZONE</u></b>	
202-Removal of Asphalt (Planing)	\$287,822.30	4
403-HBP (Asphalt) <= 2.0 inch	\$503,292.48	6
<b>TOTAL ADDL. USER COST</b>	<b>\$791,114.78</b>	<b>10</b>
<b>TOTAL USER COST FOR NORMAL CONDITION (WITH NO WORKZONE)</b>		
<b>FOR A DURATION OF 10 DAYS = \$64,221.88</b>		
<b>Disclaimer:</b>		
<b>The values presented in this program are intended to provide guidelines only.</b>		
<b>Engineering judgement must be applied to use these values.</b>		
<b>No one but the user can assure that these results are properly applied.</b>		

# Pavement Section Cost Summaries

## HMA Alternate

Green Cells require inputs

Red Cells and Red Values are input into Realcost

### Initial Construction - 2" HMA 76-28, 5" HMA 64-22, over 6" ABC over min. 2' R=60

Quantity	Item	Unit Cost	Stan Dev.	Minimum	Average	Maximum
14831	Embankment R=60	\$ 15.84	\$ 10.70	\$ 76,231.91	\$ 234,924.80	\$ 393,617.69
9971	ABC Class 6	\$ 27.41	\$ 7.42	\$ 199,322.96	\$ 273,308.76	\$ 347,294.57
15705	HMA PG 64-22	\$ 68.19	\$ 11.88	\$ 884,322.37	\$ 1,070,892.24	\$ 1,257,462.12
15705	HMA PG 64-22 AC Adjustment	\$ (2.56)	\$ 0.54	\$ (40,203.61)	\$ 8,480.45	\$ 51,824.97
6282	HMA PG 76-28	\$ 72.63	\$ 12.60	\$ 377,097.29	\$ 456,248.15	\$ 535,399.01
6282	HMA PG 76-28 AC Adjustment	\$ (2.56)	\$ 0.54	\$ (16,081.44)	\$ 3,392.18	\$ 20,729.99
	Total			\$ 1,480,689.47	\$ 2,047,246.59	\$ 2,606,328.34
	22.10% CE			\$ 327,232.37	\$ 452,441.50	\$ 575,998.56
	10.0% PE			\$ 148,068.95	\$ 204,724.66	\$ 260,632.83
	15.0% TC			\$ 222,103.42	\$ 307,086.99	\$ 390,949.25
	Initial Construction with CE, PE, and TC			\$ 2,178,094.22	\$ 3,011,499.73	\$ 3,833,908.99
	Workzone User Costs			\$ -	\$ -	\$ -
	Total Initial Construction and User Costs			\$ 2,178,094.22	\$ 3,011,499.73	\$ 3,833,908.99

### Rehabilitation 1, 2 and 3 - 2" SMA Mill and Fill

Quantity	Item	Unit Cost	Stan Dev.	Minimum	Average	Maximum
54388	Removal of Asphalt Mat (Planing)	\$ 2.46	\$ 1.31	\$ 62,546.20	\$ 133,794.48	\$ 205,042.76
6282	HMA PG 76-28	\$ 72.63	\$ 12.60	\$ 377,097.29	\$ 456,248.15	\$ 535,399.01
6282	HMA PG 76-28 AC Adjustment	\$ (2.56)	\$ 0.54	\$ (16,081.44)	\$ 3,392.18	\$ 20,729.99
	Total			\$ 423,562.05	\$ 593,434.81	\$ 761,171.75
	22.10% CE			\$ 93,607.21	\$ 131,149.09	\$ 168,218.96
	10.0% PE			\$ 42,356.21	\$ 59,343.48	\$ 76,117.18
	15.0% TC			\$ 63,534.31	\$ 89,015.22	\$ 114,175.76
	Rehab Total (entered into Realcost)			\$ 623,059.78	\$ 872,942.61	\$ 1,119,683.65
	Workzone User Costs at Year 13		1	\$ 44,543.00	\$ 44,543.00	\$ 44,543.00
	Workzone User Costs at Year 26		1	\$ 294,137.00	\$ 294,137.00	\$ 294,137.00
	Workzone User Costs at Year 39		1	\$ 791,115.00	\$ 791,115.00	\$ 791,115.00
	Total Initial Construction and User Costs			\$ 1,752,854.78	\$ 2,002,737.61	\$ 2,249,478.65
	Total Rehab and User Costs Discounted to Year 13		0.7163	\$ 478,203.87	\$ 657,194.94	\$ 833,935.55
	Total Rehab and User Costs Discounted to Year 26		0.5137	\$ 471,163.98	\$ 599,528.79	\$ 726,279.67
	Total Rehab and User Costs Discounted to Year 39		0.368	\$ 520,416.32	\$ 612,373.20	\$ 703,173.90
	Discounted 8% Salvage to Year 40		0.3582	(171,577.80)	(202,024.80)	(231,755.40)

### Annual Maintenance

	Unit Cost	Dis. Rate	Minimum	Average	Maximum
2 Lane Miles Discounted to Year 40	\$ 812.00	0.3582	\$ 18,614.94	\$ 18,614.94	\$ 18,614.94

### Deterministic Summary

Initial Construction	\$ 3,011,499.73
Rehabilitation #1	\$ 657,194.94
Rehabilitation #2	\$ 599,528.79
Rehabilitation #3	\$ 612,373.20
Salvage Value	\$ (202,024.80)
Annual Maintenance	\$ 18,614.94
	\$ 4,084,813.60

PCCP Alternate

Green Cells require inputs

Red Cells and Red Values are input into Realcost

**Initial Construction 12" PCCP over 6" of ABC**

Quantity	Item	Thickness	Unit Cost	Stan Dev.	Minimum	Average	Maximum	
9971	ABC Class 6		\$ 27.41	\$ 7.42	\$ 199,322.96	\$ 273,308.76	\$ 347,294.57	
14831	Embankment (A-1 or A-2)		\$ 15.84	\$ 10.70	\$ 76,231.91	\$ 234,924.80	\$ 393,617.69	
54388	PCCP	12	\$ 4.49	\$ 0.96	\$ 2,303,875.68	\$ 2,930,425.44	\$ 3,556,975.20	
Total					\$ 2,579,430.55	\$ 3,438,659.00	\$ 4,297,887.46	
					22.10% CE	\$ 570,054.15	\$ 759,943.64	\$ 949,833.13
					10.0% PE	\$ 257,943.05	\$ 343,865.90	\$ 429,788.75
					15.0% TC	\$ 386,914.58	\$ 515,798.85	\$ 644,683.12
Initial Construction Total (input into Realcost)					\$ 3,794,342.33	\$ 5,058,267.40	\$ 6,322,192.46	
Workzone User Costs					\$ -	\$ -	\$ -	
Total Initial Construction and User Costs					\$ 3,794,342.33	\$ 5,058,267.40	\$ 6,322,192.46	

**Rehabilitation #1 1/2% Slab Replacement in the Travel Lanes, Full Width Diamond Grinding, and Joint Resealing**

Quantity	Item	Thickness (in)	Unit Cost	Stan Dev.	Minimum	Average	Maximum		
141	Removal of PCCP		20.28	11.94	\$ 1,179.35	\$ 2,867.77	\$ 4,556.19		
141	Fast Track PCCP	12	9.12	2.61	\$ 11,046.86	\$ 15,475.78	\$ 19,904.70		
54388	Diamond Grinding		4.29	1.26	\$ 164,795.64	\$ 233,324.52	\$ 301,853.40		
17484	Saw & Seal Joints		1.62	0.19	\$ 25,002.12	\$ 28,324.08	\$ 31,646.04		
Total					\$ 202,023.96	\$ 279,992.15	\$ 357,960.33		
					22.10% CE	\$ 44,647.30	\$ 61,878.27	\$ 79,109.23	
					10.0% PE	\$ 20,202.40	\$ 27,999.21	\$ 35,796.03	
					15.0% TC	\$ 30,303.59	\$ 41,998.82	\$ 53,694.05	
Rehab Total (input into Realcost)					\$ 297,177.25	\$ 411,868.45	\$ 526,559.65		
Workzone User Costs					\$ 682,279.00	\$ 682,279.00	\$ 682,279.00		
Total Rehabilitation and User Costs					\$ 979,456.25	\$ 1,094,147.45	\$ 1,208,838.65		
Total Rehabilitation and User Costs Discounted to Year					27	0.501	\$ 490,707.58	\$ 548,167.87	\$ 605,628.16

**Annual Maintenance**

	Unit Cost	Dis. Rate	Minimum	Average	Maximum
2 Lane Miles Discounted to Year 40	\$ 449.00	0.3582	\$ 10,293.24	\$ 10,293.24	\$ 10,293.24

**Deterministic Summary**

Initial Construction	\$ 5,058,267.40
Rehabilitation #1	\$ 548,167.87
Annual Maintenance	\$ 10,293.24
<b>Total</b>	<b>\$ 5,616,728.50</b>

# Unit Costs and Standard Deviations



Project Development Branch  
Construction Estimate & Market Analysis Unit

Item 202 - Removal of Asphalt Mat (Planing)

Search for Items / Bid Cost Between Selected Date

SELECT ITEM # Between	202-00240	AND	202-00240
000- bid Letting Date Between	01/01/12	AND	12/31/20
mm/dd/y		6/30/2000	

Submit Q Reset

#	Bid Date	Contract ID	Location	Unit	Awarded To	Item	Quantity	Unit Cost	Total Cost	Work Type	Region*
6	FEB 02	C18823	I-70	E	INTERSTA	202-	30909	5.13	158563.2		3
11	FEB 16	C18187	I-70B	E	INTERSTA	202-	19184	2.74	52564.16		3
13	FEB 16	C18010	US 24 &	E	TONY J.	202-	14335	1.3	18635.5	12	2
19	MAR 22	C18596	I-70	E	MARTIN	202-	25548	4.3	109856.4	1	3
22	MAR 29	C18775	US 85	E	AGGREGA	202-	10067	1.5	15100.5	1	4
24	MAR 29	C18282	SH 115,	E	TEZAK	202-	28404	1.31	37209.24	5	2
29	APR 26	C18735	I-25:	E	AGGREGA	202-	81055	0.94	76191.7	1	6
32	MAY 03	C17757	SH 85 IN	E	CASTLE	202-	15085	3.45	52043.25	5	4
33	MAY 03	C18727	SH 9	E	MARTIN	202-	22599	2.24	50621.76	1	1
34	MAY 10	C18530	US6(VASQ	E	ASPHALT	202-	256089	1.6	409742.4	1	6
35	MAY 10	C18349	I-70 EAST	E	INTERSTA	202-	235310	0.55	129420.5	1	3
36	MAY 17	C18789R	US 160	E	A & S	202-	7895	3	23685	1	5
37	MAY 17	C18442	SH40	E	MARTIN	202-	58156	1	58156	1	6
38	MAY 17	C18242	US 50	E	A & S	202-	84844	1	84844	1	2
41	MAY 24	C18380R	ANTELOP	E	SCHMIDT	202-	10967	2.8	30707.6	1	1
44	JUN 28	C18747	SH391	E	BRANNAN	202-	54511	1.2	65413.2	1	6
51	AUG 16	C18647T	I-70 CHIEF	E	A-1	202-	10423	4.9	51072.7	21	1
54	SEP 20	C18224	BRIDGE	E	ZAK DIRT,	202-	29691	2.05	60866.55	3	4
57	OCT 04	C18080	WIDENIN	E	TONY J.	202-	16301	2.6	42382.6	5	2
65	DEC 06	C18929R	I-	E	COLUMBI	202-	22297	5.25	117059.3	1	1
73	FEB 07	C18806	US 34	E	MARTIN	202-	17047	1.75	29832.25		4
80	FEB 21	C17818	I-76	E	INTERSTA	202-	41985	2.63	110420.6	20	4
82	FEB 21	C18894	I-70B	E	LAWSON	202-	35645	2.7	96241.5		3
83	FEB 21	C18456	TOWAOC	E	OLDCASTL	202-	10594	1.71	18115.74	1	5
84	FEB 21	C18906	SH 36,	E	AGGREGA	202-	42972	2.71	116454.1	1	1
91	MAR 14	C19144	R6 CPR	E	HAMON	202-	13043	4	52172	1	6
93	APR 04	C18623	SH103	E	ASPHALT	202-	87446	2.5	218615	1	1
94	APR 04	C19125	US 491,	E	W.W.	202-	24606	1.46	35924.76	1	5
95	APR 11	C17558	US 160	E	CONCRET	202-	34042	4	136168	12	5
101	APR 18	C18897	INTERSEC	E	ROCKY	202-	18177	2.09	37989.93	5	2
108	MAY 09	C18771	I-70 EXIT	E	LAWSON	202-	22286	2.65	59057.9		3
109	MAY 09	C18971	US 285	E	APC	202-	46829	1.01	47297.29		5
111	MAY 16	C18465	SH93	E	HAMON	202-	35462	1.4	49646.8	5	4
118	JUN 20	C19336	SH40	E	STRUCTU	202-	18494	4.75	87846.5	1	1
120	JUL 18	C19520	SH86:FRA	E	MARTIN	202-	75750	2	151500	1	1

ject is done by CDOT Maintenance unit

\$ 2.46 Average  
\$ 1.31 Standard Deviation

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**Project Development Branch  
Construction Estimate & Market Analysis Unit**

Item 202 - Removal of PCCP

**Search for Items / Bid Cost Between Selected Date**

SELECT ITEM # Between	202-00210	AND	202-00210
000-		699-	
bid Letting Date Between	01/01/12	AND	12/31/20
mm/dd/y		6/30/2000	

#	Bid Date	Cntrct ID	Location	Unit	Awarded To	Item	Quantity	Unit Cost	Total Cost	Work Type	Region*
2	FEB 09	C18230	SH95:68T	E	MARTIN	202-	131	9.6	1257.6	1	6
4	MAR 01	C18323	SH 62	E	FLATIRON	202-	257	11.6	2981.2	3	5
5	APR 26	C18822	SH 135 &	E	TECHNOL	202-	101	20	2020	5	3
8	MAY 24	C18862	US 34 -	E	CASTLE	202-	53	23.75	1258.75		4
9	MAY 24	C18290	US 160 AT	E	LAWSON	202-	63	7.5	472.5	12	5
11	JUN 28	C18747	SH391	E	BRANNAN	202-	57.39	17	975.63	1	6
13	JUL 19	C18905	SH285:	E	CRUZ	202-	158	32	5056	5	1
15	AUG 30	C18455	US 138	E	TLM	202-	160	15	2400	3	4
17	OCT 04	C18080	WIDENIN	E	TONY J.	202-	44	10	440	5	2
20	NOV 05	C19377	I-70 WB	E	TLM	202-	204	45	9180	4	1
22	DEC 20	C17821	SH115	E	AVALANC	202-	87	9	783	5	2
24	FEB 14	C18363R	WEIGH-IN-	E	GLASER	202-	233	44	10252	4	0
26	FEB 21	C18894	I-70B	E	LAWSON	202-	300	18.25	5475		3
28	MAR 07	C18737	COLORAD	E	CHATO'S	202-	84	10	840	12	6
33	MAY 09	C18837	US 34	E	W.L.	202-	153	15	2295	5	4
36	JUN 20	C19051	I-25	E	ABCO	202-	180	34	6120	5	1
38	JUL 26	C19737	Emergenc	E	EDGE	202-	256	23	5888	12	6

ject is done by CDOT Maintenance unit

\$ 20.28 Average  
\$ 11.94 Standard Deviation

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**Project Development Branch  
Construction Estimate & Market Analysis Unit**

Item 202 - Diamond Grinding PCCP

Search for Items / Bid Cost Between Selected Date

SELECT ITEM #	202-00170	AND	202-00170
Between	699-		
BID LETTING DATE	01/01/11	AND	12/31/20
Between	6/30/2000		

mm/dd/y

Submit

#	Bid Date	Cntrct ID	Location	Unit	Awarded To	Item	Quantity	Unit Cost	Total Cost	Work Type	Region*
1	JAN 13	C17843	I-25	E	AGGREGA	202-00170	5040	5.1	25704	12	4
3	JUL 21	C18257A	US 287	E	TLM	202-00170	31300	3	93900	12	2
4	MAY 03	C18371	I-25/US	E	SCOTT	202-00170	35589	3.45	122782.1	4	2
9	MAY 16	C19229	I-76 SLAB	E	ZAK DIRT	202-00170	14512	5.6	81267.2		4

ject is done by CDOT Maintenance unit

\$ 4.29 Average  
\$ 1.26 Standard Deviation

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 Search for Items / Bid Cost Between Selected Date

Item 203 - Embankment (Special)

SELECT ITEM # Between	203-00062	AND	203-00062
000- Bid Letting Date Between	01/01/11	AND	12/31/20
mm/dd/y	6/30/2000		

Submit Q Reset

#	Bid Date	Cntrct ID	Location	Unit	Awarded To	Item	Quantity	Unit Cost	Total Cost	Work Type	Region*
2	MAR 24	C16212	I-	E	LAWRENC	203-	12095	10.41	125909	3	6
3	JUN 23	C16639	SH 392 & I-	E	EDWARD	203-	65630	5.59	366871.7	12	4
5	SEP 15	C15494	SH145	E	AMERICA	203-	11700	20	234000	17	5
6	OCT 06	C17860	SH115	E	TEZAK	203-	49239	8.38	412622.8	5	2
7	OCT 27	C11873	CHERRYV	E	CONCRET	203-	59251	14	829514	12	4
9	MAR 29	C18282	SH 115,	E	TEZAK	203-	14116	13.33	188166.3	5	2
13	JUL 26	C16884	SH 119	E	JALISCO	203-	17651	15	264765	12	4
16	MAY 16	C18465	SH93	E	HAMON	203-	10734	40	429360	5	4

ject is done by CDOT Maintenance unit

\$ 15.84 Average  
\$ 10.70 Standard Deviation

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**Project Development Branch  
Construction Estimate & Market Analysis Unit**

Item 304 - ABC Class 6 (Cu. Yard)

**Search for Items / Bid Cost Between Selected Date**

SELECT ITEM # Between 000-	304-06007	AND 699-	304-06007
BID LETTING DATE Between mm/dd/y	01/01/11	AND 6/30/2000	12/31/20

Submit Q Reset

#	Bid Date	Cntrct ID	Location	Unit	Awarded To	Item	Quantity	Unit Cost	Total Cost	Work Type	Region*
1	JAN 20	C17783-	I-	E	HAMON	304-	15364	19	291916		6
8	JUN 16	C18070	I-76:	E	SEMA	304-	10284	24	246816	3	6
9	JUN 16	C15898	US 550B -	E	OLDCASTL	304-	9566	35	334810	5	5
15	OCT 27	C11873	CHERRYV	E	CONCRET	304-	16924	22.9	387559.6	12	4
16	OCT 27	C15790A	I-25:SB	E	HAMON	304-	9109	24	218616	11	6
19	DEC 01	C18369R	US 6	E	ELAM	304-	7030	42	295260	1	3
28	MAR 22	C18231	SH 145	E	LAWRENC	304-	5974	37.09	221575.7	3	5
29	APR 12	C15042	US 160	E	APC	304-	17652	21.76	384107.5	11	5
34	MAY 03	C17757	SH 85 IN	E	CASTLE	304-	24076	23.1	556155.6	5	4
45	JUL 26	C16884	SH 119	E	JALISCO	304-	6663	23.75	158246.3	12	4
51	SEP 20	C18224	BRIDGE	E	ZAK DIRT,	304-	6089	29	176581	3	4
52	NOV 08	C17735	US 50	E	SEMA	304-	19161	35	670635	12	3
65	MAR 28	C16439	SH 9	E	APC	304-	16463	19.73	324815	1	1

ject is done by CDOT Maintenance unit

\$ 27.41 Average  
\$ 7.42 Standard Deviation

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**Project Development Branch  
Construction Estimate & Market Analysis Unit**

Item 403 - Grade SX(100)(PG 64-22)

**Search for Items / Bid Cost Between Selected Date**

SELECT ITEM # Between 000-	403-34841	AND	403-34841
BID LETTING DATE Between mm/dd/y	01/01/12	AND	12/31/20

6/30/2000

Submit Q Reset

#	Bid Date	Cntrct ID	Location	Unit	Awarded To	Item	Quantity	Unit Cost	Total Cost	Work Type	Region*
1	FEB 09	C17988	SH21	E	ROCKY	403-	7473	67.64	505473.7	1	2
3	MAR 29	C18282	SH 115,	E	TEZAK	403-	8799	64.02	563312	5	2
5	MAY 17	C18242	US 50	E	A & S	403-	26599	68	1808732	1	2
6	JUL 12	C18226	I-	E	MARTIN	403-	13013	54.31	706736	1	6
8	NOV 01	C18556	US 50 -	E	KIRKLAND	403-	10298	87	895926	1	2

Project is done by CDOT Maintenance unit

\$ 68.19 Average  
\$ 11.88 Standard Deviation

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**Project Development Branch  
Construction Estimate & Market Analysis Unit**

Item 403 - Grade SX(100)(PG 76-28)

Search for Items / Bid Cost Between Selected Date

403-34871 uuu-	403-34871	AND 699-	403-34871
12/31/20 uuuu/uu/y	01/01/12	AND 6/30/2000	12/31/20

Submit Q Reset

#	Bid Date	Cntrct ID	Location	Unit	Awarded To	Item	Quantity	Unit Cost	Total Cost	Work Type	Region*
4	MAR 01	C18082	SH95	E	ZAK DIRT,	403-	1989	70	139230	3	6
5	MAR 29	C18282	SH 115,	E	TEZAK	403-	4681	78.17	365913.8	5	2
6	APR 26	C18735	I-25:	E	AGGREGA	403-	9362	70	655340	1	6
7	MAY 17	C18442	SH40	E	MARTIN	403-	9196	61	560956	1	6
8	JUN 28	C18747	SH391	E	BRANNAN	403-	8245	64	527680	1	6
11	OCT 04	C18080	WIDENIN	E	TONY J.	403-	2104	91	191464	5	2
14	JAN 24	C15402	Ft.	E	CASTLE	403-	1677	96	160992	12	4
17	MAR 14	C18449	C470:	E	APC	403-	8826	56.35	497345.1	1	6
23	APR 25	C19019	US 50A,	E	A & S	403-	3830	72.1	276143		2
25	MAY 16	C18465	SH93	E	HAMON	403-	5915	67.67	400268.1	5	4

ject is done by CDOT Maintenance unit

\$ 72.63 Average  
\$ 12.60 Standard Deviation

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**Project Development Branch  
Construction Estimate & Market Analysis Unit**

Search for Items / Bid Cost Between Selected Date

Item 412 - PCCP (sq yard inch)

SELECT ITEM #	412-00900	AND	412-01200
Between	699-00010		
Bid Letting Date	01/01/12	AND	12/31/20
Between	6/30/2000		
mm/dd/yy			

Submit Q Reset

#	Bid Date	Cntrct ID	Location	Unit	Awarded To	Item	Quantity	Thickness	Unit Cost	Price per Square-yd Inch	Total Cost	Work Type	Region*
3	JAN 19	C17083	I-225	E	SEMA	412-01050	8852	10.5	33	\$ 3.14	292116	12	6
6	FEB 02	C18823	I-70	E	INTERSTA	412-01100	26809	11	54.99	\$ 5.00	1474227		3
9	FEB 16	C18187	I-70B	E	INTERSTA	412-00975	13987	9.75	54.88	\$ 5.63	767606.6		3
14	MAY 03	C18371	I-25/US	E	SCOTT	412-01100	19703	11	48	\$ 4.36	945744	4	2
16	MAY 10	C18349	I-70 EAST	E	INTERSTA	412-00925	7803	9.25	35.86	\$ 3.88	279815.6	1	3
18	MAY 24	C18862	US 34 -	E	CASTLE	412-00900	76151	9	23.65	\$ 2.63	1800971		4
19	MAY 24	C18290	US 160 AT	E	LAWSON	412-00900	44694	9	45	\$ 5.00	2011230	12	5
22	JUL 26	C16884	SH 119	E	JALISCO	412-01200	23875	12	51	\$ 4.25	1217625	12	4
23	AUG 02	C18899-	US-85	E	DONDLIN	412-01075	61355	10.75	38.8	\$ 3.61	2380574	12	1
25	SEP 26	C18149	PECOS	E	KIEWIT	412-01150	9738	11.5	62.45894	\$ 5.43	608225.2	3	6
28	JAN 17	C19303	I-70	E	INTERSTA	412-01100	84334	11	41.23	\$ 3.75	3477091		3
32	FEB 21	C17818	I-76	E	INTERSTA	412-01200	5776	12	46.27	\$ 3.86	267255.5	20	4
33	FEB 21	C18894	I-70B	E	LAWSON	412-00975	23338	9.75	46	\$ 4.72	1073548		3
35	APR 11	C17558	US 160	E	CONCRET	412-01000	14501	10	60.5	\$ 6.05	877310.5	12	5
38	APR 18	C18843	SH 177/SH	E	JALISCO	412-01050	9934	10.5	55	\$ 5.24	546370		6
41	MAY 09	C18771	I-70 EXIT	E	LAWSON	412-00900	21247	9	48	\$ 5.33	1019856		3

ject is done by CDOT Maintenance unit

\$ 4.49 Average  
\$ 0.96 Standard Deviation

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**Project Development Branch  
Construction Estimate & Market Analysis Unit**

PCCP (square yard inch fast track)

Search for Items / Bid Cost Between Selected Date

SELECT ITEM # Between 000-	412-009	AND	412-01200
BID LETTING DATE Between mm/dd/yy	01/01/	AND	12/31/ 6/30/2000

Submit Q Reset

#	Bid Date	Cntrct ID	Location	Unit	Awarded T	Item	Quantity	Thickness	Unit Cost	Price per Sq-Yd Inch	Total Cost	Work Type	Region*
5	JAN 19	C17083	I-225	E	SEMA	<a href="#">412-00952</a>	205	9.5	37	\$ 3.89	7585	<a href="#">12</a>	6
7	FEB 09	C18230	SH95:68T	E	MARTIN	<a href="#">412-01020</a>	131	10	72.5	\$ 7.25	9497.5	<a href="#">1</a>	6
11	MAY 03	C17936	RAISED	E	CHATO'S	<a href="#">412-01020</a>	174	10	87	\$ 8.70	15138	<a href="#">5</a>	6
17	MAY 17	C18442	SH40	E	MARTIN	<a href="#">412-01120</a>	182	11	130	\$ 11.82	23660	<a href="#">1</a>	6
27	OCT 11	C19193	US285	E	K.E.C.I.	<a href="#">412-00952</a>	334	9.5	105	\$ 11.05	35070		1
37	APR 18	C18736	SH30:	E	BRANNAN	<a href="#">412-01120</a>	910	11	84.94	\$ 7.72	77295.4	<a href="#">1</a>	6
39	APR 25	C19177	TWO	E	ATIELAH	<a href="#">412-00920</a>	323	9	110	\$ 12.22	35530	<a href="#">5</a>	2
43	JUN 07	C19351	I-70	E	FLATIRON	<a href="#">412-01020</a>	100	10	93.41	\$ 9.34	9341	<a href="#">12</a>	3
45	JUN 07	C19351	I-70	E	FLATIRON	<a href="#">412-00920</a>	216	9	90.8	\$ 10.09	19612.8	<a href="#">12</a>	3

Project is done by CDOT Maintenance unit

\$ 9.12 Average  
\$ 2.61 Standard Deviation

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**Project Development Branch  
Construction Estimate & Market Analysis Unit**

Item 412 - Saw and Seal PCCP Joints

Search for Items / Bid Cost Between Selected Date

SELECT ITEM # Between	412-14000	AND	412-14000
BID LETTING DATE Between	01/01/08	AND	12/31/20
	mm/dd/y		6/30/2000

Submit Q Reset

#	Bid Date	Cntrct ID	Location	Unit	Awarded To	Item	Quantity	Unit Cost	Total Cost	Work Type	Region*
1	APR 17	C15951	I-70	E	QUALITY	412-	116000	1.75	203000	4	6
2	JAN 29	C16522	US34-	E	AGGREGA	412-	76344	1.7	129784.8	1	4
6	SEP 09	C17437	SH 83:	E	HAMON	412-	60000	1.6	96000	1	6
7	JUL 21	C18257A	US 287	E	TLM	412-	29469	1.75	51570.75	12	2
9	MAY 03	C18371	I-25/US	E	SCOTT	412-	47027	1.3	61135.1	4	2

ject is done by CDOT Maintenance unit

\$ 1.62 Average  
\$ 0.19 Standard Deviation

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