MEMORANDUM

DEPARTMENT OF TRANSPORTATION
Region II – Materials
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Pueblo, Colorado 81002
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PROJECT IM C040-029
I-25 Colorado Springs North
Design Build - MP 149.3 to MP 154
Project Code: 17354

DATE: March 13, 2012
TO: Dan Hunt, Project Engineer
FROM: Craig Wieden, Region 2 Asst. Materials Engineer CAW 3/13/12
SUBJECT: Pavement Justification Report with LCCA – Southbound I-25

This project will consist of capacity improvements to I-25 beginning on the north end of Colorado springs at approximately MP 149.3 (North of I-25 over Pine Creek), and extending to the north along I-25 to approximately MP 154 (I-25 over Black Squirrel Creek). It is my understanding that the desired improvements will allow for a final configuration of four (4) through lanes per direction, as well as a 12-foot wide inside shoulder, and a 10-foot wide outside shoulder. To accomplish this, the CDOT Region 2 North Program Engineering project team has determined that reconstruction of the southbound portion of this project will be required in order to eliminate excessive vertical grade differences between the northbound and southbound lanes, as well as to correct super elevations. A similar final configuration of northbound I-25 will be accomplished through widening of the existing HMA lanes. The Pavement Justification Report for the northbound lanes of I-25 is covered under a separate memorandum.

A preliminary soil survey was conducted at the site in February 2010. During this preliminary soil survey, a total of 32 shallow pavement investigation borings were drilled. Soils were similarized in the field based on visual classification in accordance with the CDOT Field Materials Manual. A total of four (4) bulk soil samples were obtained during the soil survey and were submitted to CDOT HQ Soils for testing. Testing conducted on the soils consisted of classifications and R-value testing. The soils tested classified as A-1-b, and A-3 when classified in accordance with AASHTO M 145, and exhibited R-values ranging from a low of 75 to a high of 79. Based upon this information, a seasonal subgrade k-value of 275 psi/in was utilized for a concrete pavement thickness design, 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) Reconstruction consisting of 13-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 better.

And,

- Hot Mix Asphalt (HMA) Reconstruction consisting of 8-inches HMA 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 designs 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 2010 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	44,000,000
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	275 psi/inch*
Reliability Level	95%
Overall Standard Deviation	0.34
Calculated Design Thickness	13 inches**

* Top 2 feet of embankment soils to consist of soil meeting AASHTO soil classification of A-1 or better.
** Includes an additional ¼ inch of thickness for future diamond grinding and was rounded up to the nearest ½ inch.

HMA Design (New Construction Widening)

HMA Initial Design Life	20-Years
18-kip Design ESAL's	18,000,000
Serviceability Index	2.0
Subgrade Modulus	18,259 psi*
Reliability Level	95%
Overall Standard Deviation	0.44
Required Design Structural Number	4.03
Calculated Structural Number	4.24**

* Top 2 feet of embankment soils to consist of soil with a minimum R-value = 60.
** 2 inches of SMA over 6 inches of HMA over 6 inches of ABC Class 6 (min. R-value = 77).

Life Cycle Cost Analysis

In accordance with the CDOT 2012 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 three 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 50% full width diamond grinding was utilized. For the HMA construction alternates (both reconstruction and widening), rehabilitations at years 13 (use of polymerized SMA wearing course for initial construction), 26 and 39, consisting of 2-inch mill and fill treatments with polymerized SMA were assumed. Other materials costs included in the LCCA were the ABC layer, 2 feet of embankment (special) due to classification and/or R-value due to the differing thickness, asphalt removal (all alternates), and asphalt saw cutting (for HMA widening). The following presents a summary of the items, costs, and standard deviations utilized in the LCCA analysis:

Item	Unit	Unit Price	SD
PCCP Paving	Sq. Yard/Inch	$3.35	$0.70
Grade SX(100)(PG 64-22)	Tons	$48.25	$4.95
½" Nominal SMA	Tons	$95.00	$10.38
ABC Class 6	Tons	$14.94	$3.79

Embankment (Special)	Cu. Yards	$10.30	$5.02
Saw cut Asphalt	Lin. Foot	$2.04	$0.53
Removal of Asphalt	Sq. Yards	$2.88	$1.66
Removal of Asphalt Mat (Planing)	Sq. Yards	$1.51	$0.65
Diamond Grinding PCCP	Sq. Yards	$5.88	$3.30
Saw & Seal Joints	Lin. Foot	$1.74	$0.65
Removal of PCCP	Sq. Yard	$22.94	$10.18
PCCP Slab Replacement (Fast Track)	Sq. Yard/Inch	$7.42	$3.71
Annual Maintenance (PCCP)	Lane Mile	$499.00	N/A
Annual Maintenance (HMA)	Lane Mile	$1,270.00	N/A

NOTE: A unit cost of $95/ton for SMA was utilized in the analysis due to recent bid results in Region 2. The SMA standard deviation used in the LCCA was obtained from the SMA bid item using similar tonnage projects. The remaining unit costs and standard deviations shown were obtained from actual winning bids on similar sized projects. When possible, these unit costs generally were based on projects bid in 2011 and 2012, however, a few items used data from years prior to 2011 in order to get a larger unit cost data set.

Additionally, Preliminary Engineering for each initial construction alternate and rehabilitation was assumed at 10%, Construction Engineering was assumed at 17.45%, and Traffic Control was assumed at 15%. It is anticipated 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. For the reconstruction alternates, it is assumed that detour paving will be required in order to meet this requirement. Due to unknowns in detour construction cost/phasing, user costs for the initial PCCP and HMA construction alternates were kept at zero. User Costs for both the PCCP and HMA rehabilitation strategies were calculated using the CDOT WorkZone Software. User costs outputs for the rehabilitation strategies are attached to this memorandum.

Using the above unit prices, assumptions, and calculated values; the Probabilistic LCCA was 4.5% in favor of the HMA reconstruction alternate versus the PCCP reconstruction alternate. **Since the LCCA indicates the widening alternates are within 10%, the designs are considered to be equivalent. In accordance with section 10.9 of the CDOT Pavement Design Manual, we recommend that a Pavement Type Selection Committee be formed as soon as possible in order to select the best alternate.** 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.

I concur:

Richard Zamora
CDOT Region 2 Materials Engineer

cc: Doug Lollar
Richard Zamora
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:	CDOT
Street Address:	1019 Erie Avenue
City:	Pueblo
State:	CO, 81001
Project Number:	17354
ID:	I-25 - Pine Creek North
Description:	I-25 - Pine Creek North Design Build
Location:	Colorado Springs, Colorado

II. Design

Serviceability

Initial Serviceability, P1:	4.5	
Terminal Serviceability, P2:	2.5	

PCC Properties

28-day Mean Modulus of Rupture, $(S'_c)'$:	650	psi
Elastic Modulus of Slab, E_c:	3,400,000	psi
Poisson's Ratio for Concrete, m:	0.15	

Base Properties

Elastic Modulus of Base, E_b:	30,000	psi
Design Thickness of Base, H_b:	6.0	in
Slab-Base Friction Factor, f:	1.4	

Reliability and Standard Deviation

Reliability Level (R):	95.0	%
Overall Standard Deviation, S_0:	0.34	

Climatic Properties

Mean Annual Wind Speed, WIND:	10.1	mph
Mean Annual Air Temperature, TEMP:	48.9	°F
Mean Annual Precipitation, PRECIP:	15.4	in

Subgrade k-Value

275 psi/in

Design ESALs

44.0 million

Pavement Type, Joint Spacing (L)

- (●) JPCP
- ( ) JRCP
- ( ) CRCP

Joint Spacing: 15.0 ft

JPCP

Effective Joint Spacing: 180 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: 0.94

Sensitivity Analysis

Slab Thickness used for Sensitivity Analysis: 12.69 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: 12.69 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

I-25 Colorado Springs North Design Build
Pine Creek North to Black Squirrel Creek
20-Year Initial Design
HMA Reconstruction and HMA Widening
R-value of Subgrade = 60

Flexible Structural Design

18-kip ESALs Over Initial Performance Period	18,000,000
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	4.03 in

Specified Layer Design

Layer	Material Description	Struct Coef. (Ai)	Drain Coef. (Mi)	Thickness (Di)(in)	Width (ft)	Calculated SN (in)
1	SMA Wearing Course	0.44	1	2	-	0.88
2	HMA Grade SX(100)(PG 64-22)	0.44	1	6	-	2.64
3	ABC Class 6 (min. R-value = 77)	0.12	1	6	-	0.72
4	2' Min R=60 Embankment	0	1	24	-	0.00
Total	-	-	-	38.00	-	4.24

RealCost Probabilistic LCCA Report

RealCost Input Data

1. Economic Variables	
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

2. Analysis Options	
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	2013
Discount Rate (%)	3.3 **LCCALOGNORMAL(3.3,0.19)**
Number of Alternatives	2

3. Project Details	
State Route	I-25
Project Name	Colorado Springs North Design Build - Southbound Reconstruction LCCA
Region	2
County	El Paso
Analyzed By	C. Wieden
Mileposts	
Begin	149.25
End	154.00
Length of Project (miles)	4.75
Comments	

4. Traffic Data	
AADT Construction Year (total for both directions)	78,300
Cars as Percentage of AADT (%)	90.5
Single Unit Trucks as Percentage of AADT (%)	3.6
Combination Trucks as Percentage of AADT (%)	5.9
Annual Growth Rate of Traffic (%)	1.3 **LCCATRIANG(0.34,1.34,2.34)**
Speed Limit Under Normal Operating Conditions (mph)	75
No of Lanes in Each Direction During Normal Conditions	4
Free Flow Capacity (vphpl)	1852
Rural or Urban Hourly Traffic Distribution	Rural
Queue Dissipation Capacity (vphpl)	1300
Maximum AADT (total for both directions)	417,696
Maximum Queue Length (miles)	5.0

Alternative 1	HMA Reconstruction - Alternate 4	
Number of Activities	4	

Activity 1	HMA Reconstruction - 4-Lanes - Southbound Only from Pine Creek to Black Squirrel Creek	
Agency Construction Cost ($1000)	$11,416.67 **LCCATRIANG(8966,11417,13867)**	
User Work Zone Costs ($1000)		
Work Zone Duration (days)	250	
No of Lanes Open in Each Direction During Work Zone	2	
Activity Service Life (years)	14.0 **LCCATRIANG(7,13,22)**	
Activity Structural Life (years)	20.0	
Maintenance Frequency (years)	1	
Agency Maintenance Cost ($1000)	1.27	
Work Zone Length (miles)	4.68	
Work Zone Speed Limit (mph)	45	
Work Zone Capacity (vphpl)	1300	
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	24
Second period of lane closure		
Third period of lane closure		
Outbound	Start	End
First period of lane closure	0	24
Second period of lane closure		
Third period of lane closure		

Activity 2	Rehab - 2" Mill and Fill with SMA	
Agency Construction Cost ($1000)	$3,461.33 **LCCATRIANG(2949,3461,3974)**	
User Work Zone Costs ($1000)	$173.00	
Work Zone Duration (days)	15	
No of Lanes Open in Each Direction During Work Zone	3	
Activity Service Life (years)	14.0 **LCCATRIANG(7,13,22)**	
Activity Structural Life (years)	10.0	
Maintenance Frequency (years)	1	
Agency Maintenance Cost ($1000)	1.27	
Work Zone Length (miles)	4.68	
Work Zone Speed Limit (mph)	45	
Work Zone Capacity (vphpl)	1300	
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	20	24
Second period of lane closure	0	5
Third period of lane closure		
Outbound	Start	End
First period of lane closure	20	24
Second period of lane closure	0	5
Third period of lane closure		

Activity 3	Rehab - 2" Mill and Fill with SMA	
Agency Construction Cost ($1000)	$3,461.33 **LCCATRIANG(2949,3461,3974)**	
User Work Zone Costs ($1000)	$223.00	
Work Zone Duration (days)	15	
No of Lanes Open in Each Direction During Work Zone	3	
Activity Service Life (years)	14.0 **LCCATRIANG(7,13,22)**	
Activity Structural Life (years)	10.0	
Maintenance Frequency (years)	1	
Agency Maintenance Cost ($1000)	1.27	
Work Zone Length (miles)	4.68	
Work Zone Speed Limit (mph)	45	
Work Zone Capacity (vphpl)	1300	
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	20	24
Second period of lane closure	0	5
Third period of lane closure		
Outbound	Start	End
First period of lane closure	20	24
Second period of lane closure	0	5
Third period of lane closure		

Activity 4	Rehab - 2" Mill and Fill with SMA	
Agency Construction Cost ($1000)	$3,461.33 **LCCATRIANG(2949,3461,3974)**	
User Work Zone Costs ($1000)	$486.00	
Work Zone Duration (days)	15	
No of Lanes Open in Each Direction During Work Zone	3	
Activity Service Life (years)	14.0 **LCCATRIANG(7,13,22)**	
Activity Structural Life (years)	10.0	
Maintenance Frequency (years)	1	
Agency Maintenance Cost ($1000)	1.27	
Work Zone Length (miles)	4.68	
Work Zone Speed Limit (mph)	45	
Work Zone Capacity (vphpl)	1300	
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	20	24
Second period of lane closure	0	5
Third period of lane closure		
Outbound	Start	End
First period of lane closure	20	24
Second period of lane closure	0	5
Third period of lane closure		

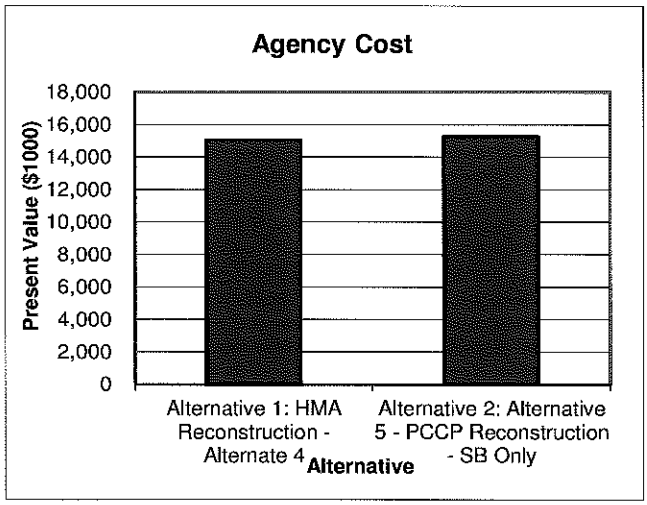
Alternative 2	Alternative 5 - PCCP Reconstruction - SB Only	
Number of Activities	2	

Activity 1	Initial Construction - 4 Lanes	
Agency Construction Cost ($1000)	$14,963.33 **LCCATRIANG(11322,14963,18605)**	
User Work Zone Costs ($1000)		
Work Zone Duration (days)	250	
No of Lanes Open in Each Direction During Work Zone	2	
Activity Service Life (years)	27.7 **LCCATRIANG(16,27,40)**	
Activity Structural Life (years)	20.0	
Maintenance Frequency (years)	1	
Agency Maintenance Cost ($1000)	1.27	
Work Zone Length (miles)	4.68	
Work Zone Speed Limit (mph)	45	
Work Zone Capacity (vphpl)	1300	
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	24
Second period of lane closure		
Third period of lane closure		
Outbound	Start	End
First period of lane closure	0	24
Second period of lane closure		
Third period of lane closure		

Activity 2	PCCP Rehab at Year 2040	
Agency Construction Cost ($1000)	$698.00 **LCCATRIANG(342,698,1054)**	
User Work Zone Costs ($1000)	$1,671.00	
Work Zone Duration (days)	78	
No of Lanes Open in Each Direction During Work Zone	3	
Activity Service Life (years)	27.7 **LCCATRIANG(16,27,40)**	
Activity Structural Life (years)	10.0	
Maintenance Frequency (years)	1	
Agency Maintenance Cost ($1000)	1.27	
Work Zone Length (miles)	4.68	
Work Zone Speed Limit (mph)	45	
Work Zone Capacity (vphpl)	1300	
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	20	24
Second period of lane closure	0	5
Third period of lane closure		
Outbound	Start	End
First period of lane closure	20	24
Second period of lane closure	0	5
Third period of lane closure		

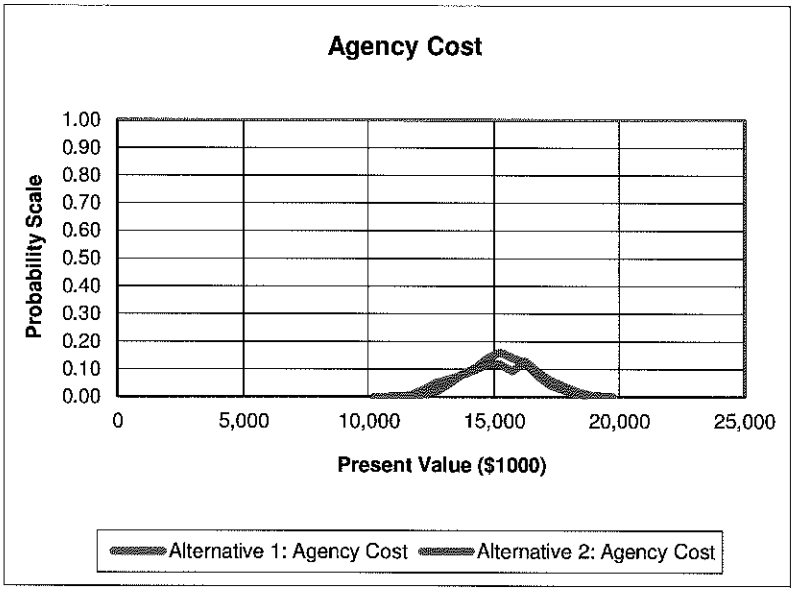
Deterministic Results

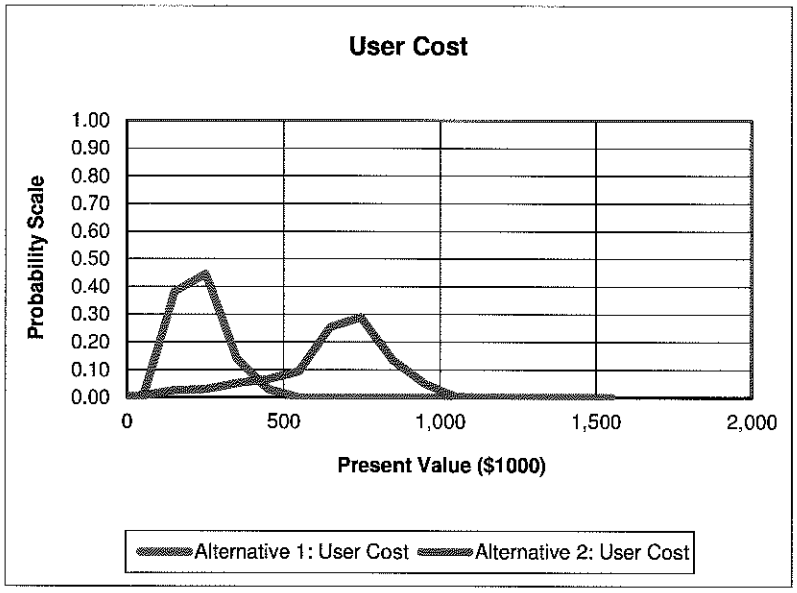
Total Cost	Alternative 1: HMA Reconstruction - Alternate 4		Alternative 2: Alternative 5 - PCCP Reconstruction - SB Only	
	Agency Cost ($1000)	User Cost ($1000)	Agency Cost ($1000)	User Cost ($1000)
Undiscounted Sum	$18,386.31	$396.00	$15,709.58	$1,671.00
Present Value	$15,034.58	$199.66	$15,271.68	$673.24
EUAC	$682.35	$9.06	$693.11	$30.55



Probabilistic Results

Total Cost (Present Value)	Alternative 1: HMA Reconstruction - Alternate 4		Alternative 2: Alternative 5 - PCCP Reconstruction - SB Only	
	Agency Cost ($1000)	User Cost ($1000)	Agency Cost ($1000)	User Cost ($1000)
Mean	$15,254.64	$231.69	$15,230.62	$656.35
Standard Deviation	$1,282.66	$71.20	$1,526.11	$183.48
Minimum	$11,262.36	$84.74	$11,585.69	$14.75
Maximum	$19,046.63	$482.25	$18,871.78	$1,019.42





User Costs Outputs

Southbound I-25 Pine Creek to Black Squirrel Creek - Probabilistic NPV Comparison

Statistics	LCCAOutput:Alternative 1: Agency Cost	LCCAOutput: Alternative 1: User Cost	LCCAOutput: Alternative 2: Agency Cost	LCCAOutput: Alternative 2: User Cost
Probability Function				
Minimum	$11,262.36	$84.74	$11,585.69	$14.75
Maximum	$19,046.63	$482.25	$18,871.78	$1,019.42
Mean	$15,254.64	$231.69	$15,230.62	$656.35
Median	$15,230.54	$211.32	$15,219.17	$690.95
Standard Deviation	$1,282.66	$71.20	$1,526.11	$183.48
Percentile (5%)	$13,154.21	$142.71	$12,745.36	$259.38
Percentile (10%)	$13,615.62	$156.34	$13,077.57	$377.55
Percentile (75%)	$16,133.35	$271.57	$16,364.74	$773.44
Percentile (95%)	$17,400.09	$374.33	$17,691.26	$902.72

NPV Comparison - HMA to PCCP Reconstruction

4.5%	In favor of HMA, use Pavement Type Selection Committee

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

	INPUT DATA	
Project Name	C/S I-25 North DB - Southbound Reconstruction	
Freeway Name	I-25	
Input Filename		
Project Start Date		
Project End Date		
Design Speed	75 mph	
Speed Limit	65 mph	
Workzone Speed Limit	45 mph	
Grade	2.0 %	
Work Zone Length	4.70 miles	
Total Number of Lanes	4	
Number of Open Lanes	3	
Number of Temporary Lanes	0	
AADT, Directional	90409	
Percentage of Single Unit Trucks	4.4 %	
Percentage of Combination Trucks	6.5 %	
Functional Class	Urban Interstate (Weekday)	
	OUTPUT SUMMARY	
TYPE OF WORK	**ADDITIONAL USER COST**	**DURATION**
	DUE TO WORKZONE	
202-Removal of Concrete	$224,706.73	4
202-Removal of Concrete (Diamond Grind	$1,122,006.60	45
412-Concrete Pavement <= 14.0 inch	$135,197.89	5
412-Routing & Sealing PCCP Cracks	$188,947.90	5
TOTAL ADDL. USER COST	$1,670,859.12	59
TOTAL USER COST FOR NORMAL CONDITION (WITH NO WORKZONE)		
FOR A DURATION OF 59 DAYS = $3,193,886.64		
Disclaimer:		
The values presented in this program are intended to provide guidelines only.		
Engineering judgement must be applied to use these values.		
No one but the user can assure that these results are properly applied.		

User Costs – Concrete Rehabilitation – Northbound & Southbound

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

	INPUT DATA	
Project Name	C/S I-25 North DB - Southbound Reconstruction	
Freeway Name	I-25	
Input Filename		
Project Start Date		
Project End Date		
Design Speed	75 mph	
Speed Limit	65 mph	
Workzone Speed Limit	45 mph	
Grade	2.0 %	
Work Zone Length	4.70 miles	
Total Number of Lanes	4	
Number of Open Lanes	3	
Number of Temporary Lanes	0	
AADT, Directional	62608	
Percentage of Single Unit Trucks	4.4 %	
Percentage of Combination Trucks	6.5 %	
Functional Class	Urban Interstate (Weekday)	
	OUTPUT SUMMARY	
TYPE OF WORK	**ADDITIONAL USER COST**	**DURATION**
	DUE TO WORKZONE	
202-Removal of Asphalt (Planing)	$82,200.45	7
403-Stone Mastic Asphalt	$90,862.31	8
TOTAL ADDL. USER COST	$173,062.76	15
TOTAL USER COST FOR NORMAL CONDITION (WITH NO WORKZONE)		
FOR A DURATION OF 15 DAYS = $561,806.10		
Disclaimer:		
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HMA 1st Rehabilitation – Year 2026

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

	INPUT DATA	
Project Name	C/S I-25 North DB - Southbound Reconstruction	
Freeway Name	I-25	
Input Filename		
Project Start Date		
Project End Date		
Design Speed	75 mph	
Speed Limit	65 mph	
Workzone Speed Limit	45 mph	
Grade	2.0 %	
Work Zone Length	4.70 miles	
Total Number of Lanes	4	
Number of Open Lanes	3	
Number of Temporary Lanes	0	
AADT, Directional	76509	
Percentage of Single Unit Trucks	4.4 %	
Percentage of Combination Trucks	6.5 %	
Functional Class	Urban Interstate (Weekday)	
	OUTPUT SUMMARY	
TYPE OF WORK	**ADDITIONAL USER COST**	**DURATION**
	DUE TO WORKZONE	
202-Removal of Asphalt (Planing)	$105,529.44	7
403-Stone Mastic Asphalt	$117,399.21	8
TOTAL ADDL. USER COST	$222,928.65	15
TOTAL USER COST FOR NORMAL CONDITION (WITH NO WORKZONE)		
FOR A DURATION OF 15 DAYS = $686,847.18		
Disclaimer:		
The values presented in this program are intended to provide guidelines only.		
Engineering judgement must be applied to use these values.		
No one but the user can assure that these results are properly applied.		

HMA 2nd Rehabilitation – Year 2039

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

	INPUT DATA	
Project Name	C/S I-25 North DB - Southbound Reconstruction	
Freeway Name	I-25	
Input Filename		
Project Start Date		
Project End Date		
Design Speed	75 mph	
Speed Limit	65 mph	
Workzone Speed Limit	45 mph	
Grade	2.0 %	
Work Zone Length	4.70 miles	
Total Number of Lanes	4	
Number of Open Lanes	3	
Number of Temporary Lanes	0	
AADT, Directional	90409	
Percentage of Single Unit Trucks	4.4 %	
Percentage of Combination Trucks	6.5 %	
Functional Class	Urban Interstate (Weekday)	
	OUTPUT SUMMARY	
TYPE OF WORK	**ADDITIONAL USER COST**	**DURATION**
	DUE TO WORKZONE	
202-Removal of Asphalt (Planing)	$183,437.27	7
403-Stone Mastic Asphalt	$302,316.64	8
TOTAL ADDL. USER COST	$485,753.92	15
TOTAL USER COST FOR NORMAL CONDITION (WITH NO WORKZONE)		
FOR A DURATION OF 15 DAYS = $812,005.08		
Disclaimer:		
The values presented in this program are intended to provide guidelines only.		
Engineering judgement must be applied to use these values.		
No one but the user can assure that these results are properly applied.		

HMA 3rd Rehabilitation – Year 2052

Pavement Section Cost Summaries

Reconstruction of SB I-25 from Pine Creek to Black Squirrel Creek

4 lanes each direction w/10' outside shoulder and 12' inside shoulder

Start of Project	149.25	End of Concrete at Pine Creek
End of Project	153.99	Black Squirrel Creek
Length of Project	4.74	Miles

Width of Project Pavement	70	feet	
Total Number of Travel Lanes	4		Southbound Only
Area of New Pvment	194656	Square Yards	

Removal Area

From	To	Length (ft)	Width	Area (SY)
149.25	149.359	575.5	112	7162.0
149.359	149.406	248.2	112	3088.2
149.406	150	3136.3	120	41817.6
150	150.083	438.2	112	5453.7
150.083	150.303	1161.6	94	12132.3
150.303	150.378	396.0	94	4136.0
150.378	150.511	702.2	82	6398.2
150.511	150.992	2539.7	94	26525.5
150.992	151.281	1525.9	112	18989.2
151.281	151.49	1103.5	88	10790.0
151.49	151.538	253.4	100	2816.0
151.538	151.741	1071.8	88	10480.2
151.741	151.972	1219.7	94	12738.9
151.972	152	147.8	70	1149.9
152	152.907	4789.0	76	40440.1
152.907	153	491.0	88	4801.3
153	153.15	792.0	88	7744.0
153.15	153.2	264.0	88	2581.3
153.2	153.25	264.0	88	2581.3
153.25	153.9	3432.0	88	33557.3
				127692 Area of HMA Removal

NB and SB Area divided by 2

Aggregate Base Course @ 140 lbs/cubic foot

61316.6 Tons x 10% for irregularities = 67448 Tons

Area of PCCP	194656	Square Yards @ 13" Thick		
Area of PCCP in Travel Lanes	133478			
Lineal Feet of PCCP Joints	241930			
Reconstruction Lane Miles	19			
Tons of HMA =	64236.48	Tons	x 5% irregularities	67448 Tons
Tons of SMA =	21412.16	Tons	x 5% irregularities	22483 Tons

Project Totals

Removal of HMA	127692	Square Yards
HMA	67448	Tons
SMA	22483	Tons
PCCP	194656	Square Yards
ABC Class 6	67448	Tons
Embankment	137186	Cubic Yards (Length x Width +4' x Depth(2'))

SB HMA Reconstruction Alternate (Pine Creek to Black Squirrel Creek)

Green Cells require inputs

Red Cells and Red Values are input into Realcost

Initial Construction - 2" SMA, 6" HMA over 6" ABC over min. 2' R=60

Quantity	Item	Unit Cost	Stan Dev.	Minimum	Average	Maximum
127692	Removal of Asphalt	$ 2.88	$ 1.66	$ 155,783.65	$ 367,751.58	$ 579,719.50
137186	Embankment	$ 10.30	$ 5.02	$ 724,342.78	$ 1,413,017.17	$ 2,101,691.56
67448	ABC Class 6	$ 14.94	$ 3.79	$ 752,048.59	$ 1,007,677.66	$ 1,263,306.73
67448	HMA (Grade SX)(100)(PG 64-22)	$ 51.07	$ 7.46	$ 2,941,420.54	$ 3,444,584.89	$ 3,947,749.23
22483	SMA	$ 95.00	$ 10.38	$ 1,902,491.83	$ 2,135,862.96	$ 2,369,234.09
			Total	$ 6,476,087.39	$ 8,368,894.26	$ 10,261,701.12
		17.45%	CE	$ 1,130,077.25	$ 1,460,372.05	$ 1,790,666.85
		10.0%	PE	$ 647,608.74	$ 836,889.43	$ 1,026,170.11
		15.0%	TC	$ 971,413.11	$ 1,255,334.14	$ 1,539,255.17
	Initial Construction with CE, PE, and TC			$ 9,225,186.49	$ 11,921,489.87	$ 14,617,793.25
	Workzone User Costs			$ -	$ -	$ -
	Total Initial Construction and User Costs			$ 9,225,186.49	$ 11,921,489.87	$ 14,617,793.25

Rehabiliation 1, 2 and 3 - 2" SMA Mill and Fill

Quantity	Item	Unit Cost	Stan Dev.	Minimum	Average	Maximum
194656	Removal of Asphalt Mat (Planing)	$ 1.51	$ 0.65	$ 167,404.16	$ 293,930.56	$ 420,456.96
22483	SMA	$ 95.00	$ 10.38	$ 1,902,491.83	$ 2,135,862.96	$ 2,369,234.09
			Total	$ 2,069,895.99	$ 2,429,793.52	$ 2,789,691.05
		17.45%	CE	$ 361,196.85	$ 423,998.97	$ 486,801.09
		10.0%	PE	$ 206,989.60	$ 242,979.35	$ 278,969.11
		15.0%	TC	$ 310,484.40	$ 364,469.03	$ 418,453.66
	Rehab Total (entered into Realcost)			$ 2,948,566.84	$ 3,461,240.87	$ 3,973,914.90
	Workzone User Costs at Year 13		1	$ 173,026.00	$ 173,026.00	$ 173,026.00
	Workzone User Costs at Year 26		1	$ 222,929.00	$ 222,929.00	$ 222,929.00
	Workzone User Costs at Year 39		1	$ 485,754.00	$ 485,754.00	$ 485,754.00
	Total Initial Construction and User Costs			$ 3,434,320.84	$ 3,946,994.87	$ 4,459,668.90
	Total Rehab and User Costs Discounted to Year 13		0.656	$ 2,047,764.90	$ 2,384,079.07	$ 2,720,393.23
	Total Rehab and User Costs Discounted to Year 26		0.4316	$ 1,368,817.60	$ 1,590,087.72	$ 1,811,357.83
	Total Rehab and User Costs Discounted to Year 39		0.2838	$ 974,660.25	$ 1,120,157.14	$ 1,265,654.03
Discounted	8% Salvage to Year 40		0.2742	(245,957.40)	(282,700.20)	(319,443.00)

Annual Maintenance

	Unit Cost	Dis. Rate			
19 Lane Miles Discounted to Year 40	$ 1,270.00	0.2742	$ 264,100.67	$ 264,100.67	$ 264,100.67

Deterministic Summary

Initial Construction	$ 11,921,489.87
Rehabilitation #1	$ 2,384,079.07
Rehabilitation #2	$ 1,590,087.72
Rehabilitation #3	$ 1,120,157.14
Salvage Value	$ (282,700.20)
Annual Maintenance	$ 264,100.67
	$ 16,997,214.26

SB PCCP Reconstruction Alternate (Pine Creek to Black Squirrel Creek)

Green Cells require inputs

Red Cells and Red Values are input into Realcost

Initial Construction **13" PCCP over 6" of ABC**

Quantity	Item	Thickness	Unit Cost	Stan Dev.	Minimum	Average	Maximum
127692	Removal of Asphalt		$ 2.88	$ 1.66	$ 155,783.65	$ 367,751.58	$ 579,719.50
137186	Embankment		$ 10.30	$ 5.02	$ 724,342.78	$ 1,413,017.17	$ 2,101,691.56
67448	ABC Class 6		$ 14.94	$ 3.79	$ 752,048.59	$ 1,007,677.66	$ 1,263,306.73
194656	PCCP	13	$ 3.35	$ 0.70	$ 6,705,899.20	$ 8,477,268.80	$ 10,248,638.40
				Total	$ 8,338,074.23	$ 11,265,715.21	$ 14,193,356.20
			17.45%	CE	$ 1,454,993.95	$ 1,965,867.30	$ 2,476,740.66
			10.0%	PE	$ 833,807.42	$ 1,126,571.52	$ 1,419,335.62
			15.0%	TC	$ 1,250,711.13	$ 1,689,857.28	$ 2,129,003.43
				Initial Construction Total (input into Realcost)	$ 11,877,586.74	$ 16,048,011.32	$ 20,218,435.90
				Workzone User Costs		$ -	$ -
				Total Initial Construction and User Costs	$ 11,877,586.74	$ 16,048,011.32	$ 20,218,435.90

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

Quanitty	Item	Thickness (in)	Unit Cost	Stan Dev.	Minimum	Average	Maximum
667	Removal of PCCP		22.94	10.18	$ 8,515.92	$ 15,309.97	$ 22,104.02
667	Fast Track PCCP	13	7.42	3.71	$ 32,188.32	$ 64,376.63	$ 96,564.95
194656	Diamond Grinding		5.88	3.3	$ 502,212.48	$ 1,144,577.28	$ 1,786,942.08
241930	Saw & Seal Joints		1.74	0.65	$ 263,703.26	$ 420,957.50	$ 578,211.74
				Total	$ 806,619.98	$ 1,645,221.39	$ 2,483,822.80
	667 SY x 13 in = 241 CY		17.45%	CE	$ 140,755.19	$ 287,091.13	$ 433,427.08
	Assume 27 CY/night = 9 nights		10.0%	PE	$ 80,662.00	$ 164,522.14	$ 248,382.28
			15.0%	TC	$ 120,993.00	$ 246,783.21	$ 372,573.42
				Rehab Total (input into Realcost)	$ 342,410.18	$ 698,396.48	$ 1,054,382.78
				Workzone User Costs	$ 1,670,859.00	$ 1,670,859.00	$ 1,670,859.00
				Total Rehabilitation and User Costs	$ 2,013,269.18	$ 2,369,255.48	$ 2,725,241.78
	Total Rehabilitation and User Costs Discounted to Year		27	0.4184	$ 842,351.83	$ 991,296.49	$ 1,140,241.16

Annual Maintenance

		Unit Cost	Dis. Rate			
19	Lane Miles Discounted to Year 40	$ 499.00	0.2742	$ 103,768.69	$ 103,768.69	$ 103,768.69

Deterministic Summary

Initial Construction	$ 16,048,011.32
Rehabilitation #1	$ 991,296.49
Annual Maintenance	$ 103,768.69
Total	$ 17,143,076.50

Unit Costs and Standard Deviations

PCCP cost per square yard-inch

arch for Items / Bid Cost Between Selected Date

000-	412-0100C	AND 699-	412-01400
mm/dd/y	01/01/0E	AND 6/30/2000	12/31/2C

Submit Q Reset

#	Bid Date	Cntrct ID	Location	Unit	Awarded To	Item	Thickness (in)	Quantity	Unit Cost	Cost/ Sq yd-inch	Total Cost	Work Type	Region *
5	APR 03	C15069	South of	E	CASTLE ROCK	412-01100	11	333671	30.61	$ 2.78	10213669	12	2
6	APR 10	C15555	I-25,	E	EDWARD	412-01200	12	52805	39	$ 3.25	2059395	12	1
9	APR 10	C15555	I-25,	E	EDWARD	412-01250	12.5	81234	43	$ 3.44	3493062	12	1
11	APR 17	C16046	I70	E	LAWRENCE	412-01050	10.5	77862	40.77	$ 3.88	3174434	12	1
14	APR 17	C16046	I70	E	LAWRENCE	412-01125	11.25	53818	45.21	$ 4.02	2433112	12	1
15	JUN 05	C15504	Doubletre	E	LAWSON	412-01025	10.25	123448	39	$ 3.80	4814472	12	5
31	APR 30	C16819	US 40/287	E	CASTLE ROCK	412-01075	10.75	212084	27.36	$ 2.55	5802618	12	1
33	JUL 23	C14976	US-85	E	LAWSON	412-01025	10.25	44335	33	$ 3.22	1463055	12	1
37	SEP 03	C17024	US 287	E	LAWSON	412-01100	11	155996	31.9	$ 2.90	4976272	12	2
41	DEC 30	C17170	ALAMEDA	E	JALISCO	412-01300	13	29723	50	$ 3.85	1486150	3	6
43	APR 15	C16657	PARKER	E	HAMON	412-01000	10	31257	34.7	$ 3.47	1084618	13	6
44	APR 29	C16417	I-225:	E	INTERSTATE	412-01300	13	115325	26.83	$ 2.06	3094170	12	6
48	MAY 06	C16262	HUGO-	E	CASTLE ROCK	412-01075	10.75	230312	28	$ 2.60	6448736	12	1
50	OCT 07	C17813	I-70	E	LAWSON	412-01100	11	29151	57	$ 5.18	1661607	1	3
53	DEC 02	C16275	SH 86-	E	CASTLE ROCK	412-01000	10	35993	26.9	$ 2.69	968211.7	1	1
54	DEC 16	C17583	FEDERAL:	E	SCOTT	412-01000	10	30710	41.25	$ 4.13	1266788	12	6
59	JAN 20	C17783-	I-	E	HAMON	412-01300	13	42460	45.6	$ 3.51	1936176		6
60	MAR 31	C17667	US 40/287	E	CASTLE ROCK	412-01075	10.75	94493	32.25	$ 3.00	3047399	12	1
63	JUN 16	C18070	I-76:	E	SEMA	412-01350	13.5	27523	49	$ 3.63	1348627	3	6
66	AUG 11	C16376	US 40/287	E	LAWSON	412-01050	10.5	69699	31.5	$ 3.00	2195519	12	1
										$ 3.35	Average		
										$ 0.70	Standard Deviation		

ject is done by CDOT Maintenance unit

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ABC Class 6 (Ton)

arch for Items / Bid Cost Between Selected Date

000-	304-0600(	AND 699-	304-06000
mm/dd/y	01/01/0(	AND 6/30/2000	12/31/2(

Submit Q Reset

#	Bid Date	Cntrct ID	Location	Unit	Awarded T	Item	Quantity	Unit Cost	Total Cost	Work Type	Region *
3	JAN 15	C15915	POWERS/	E	HAMON	304-	39497	13.6	537159.2	3	2
12	MAY 28	C17187	SH 92	E	TEZAK	304-	30362	13.32	404421.8	12	3
13	JUN 11	C17174	SH 13	E	ELAM	304-	39717	16	635472	12	3
34	DEC 30	C17170	ALAMEDA	E	JALISCO	304-	24845	10	248450	3	6
36	JAN 28	C17282	CR	E	FOUR	304-	16741	15.24	255132.8	13	5
45	APR 15	C16657	PARKER	E	HAMON	304-	25335	16	405360	13	6
51	MAY 27	C17318	I-70B	E	LAWSON	304-	14958	8	119664	11	3
61	SEP 09	C17635	US 160	E	SEMA	304-	47571	19	903849	12	5
73	JAN 20	C17783-	I-	E	HAMON	304-	43336	14	606704		6
84	JUN 02	C18142	SH 10	E	HABITAT	304-	12284	19	233396	12	2
87	JUN 09	C17358	SH 131	E	CONNELL	304-	18327	23	421521	4	3
89	JUN 09	C18034	US 550 AT	E	OLDCASTL	304-	16278	16.04	261099.1		5
93	JUN 16	C16679	SH93: SH	E	APC	304-	15220	11.83	180052.6	1	6
94	JUN 23	C16639	SH 392 & I-	E	EDWARD	304-	19919	12.19	242812.6	12	4
103	SEP 08	C18163	SH 13 -	E	OLDCASTL	304-	19232	16.95	325982.4		3

ject is done by CDOT Maintenance unit

$ 14.94 Average
$ 3.79 Standard Deviation

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Embankment Special (CY)

arch for Items / Bid Cost Between Selected Date

000-	203-00062	AND 699-	203-00062
mm/dd/yy	01/01/09	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 15	C15915	POWERS/	E	HAMON	203-00062	76651	9.05	693691.6	3	2
5	SEP 03	C17024	US 287	E	LAWSON	203-00062	29166	6.5	189579	12	2
8	MAR 18	C17679-	US85/C-	E	EDWARD	203-00062	15132	10.6	160399.2	12	6
9	MAR 18	C17669	BRIDGE	E	WALSENBURG	203-00062	7031	7	49217	11	2
11	SEP 30	C17353	SH115	E	R.E. MONKS	203-00062	9000	3.85	34650	12	2
12	SEP 30	C17353	SH115	E	R.E. MONKS	203-00062	33540	12	402480	12	2
14	OCT 21	C15697	SH 71	E	CONNELL	203-00062	8435	18.3	154360.5	12	4
15	JAN 27	C18131	SH 89-	E	SEMA	203-00062	6300	10	63000		2
16	MAR 24	C16212	I-	E	LAWRENCE	203-00062	12095	10.41	125909	3	6
17	JUN 23	C16639	SH 392 & I-	E	EDWARD	203-00062	65630	5.59	366871.7	12	4
19	SEP 15	C15494	SH145	E	AMERICAN CIVIL	203-00062	11700	20	234000	17	5

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$ 10.30 Average
$ 5.02 Standard Deviation

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Sawing Asphalt (10-inch)

arch for Items / Bid Cost Between Selected Date

Select Item # Between 000-	202-0503(	AND 699-	202-05030
Bid Letting Date Between mm/dd/y	01/01/0	AND 6/30/2000	12/31/2(

Submit Q Reset

#	Bid Date	Cntrct ID	Location	Unit	Awarded T	Item	Quantity	Unit Cost	Total Cost	Work Type	Region *
1	JAN 31	C16420	SH50 -	E	KIEWIT	202-	8296	3	24888	5	2
3	JUL 02	C17072	US50 E.	E	KIEWIT	202-	8862	2	17724	5	2
4	AUG 27	C14089-	SAUNDER	E	TRICON 2,	202-	88	2.63	231.44	3	2
5	FEB 18	C17665	US50B	E	ROCKY	202-	5881	1.43	8409.83	1	2
6	OCT 07	C17046	US 50 -	E	TONY J.	202-	1790	1.6	2864	5	2
7	NOV 04	C17809	US 50 SH	E	TONY J.	202-	236	2	472	5	2
9	MAR 17	C17766	I-70 WEST	E	AMERICA	202-	43500	2	87000	1	3
10	JUN 02	C18142	SH 10	E	HABITAT	202-	66	1.69	111.54	12	2

ject is done by CDOT Maintenance unit

$ 2.04 Average
$ 0.53 Standard Deviation

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Removal of Asphalt Mat (Planing)

arch for Items / Bid Cost Between Selected Date

202-00240	AND	202-00240	
000-	699-		
01/01/0	AND	12/31/2	
mm/dd/y	6/30/2000		

Removal of HMA (Planing)

Submit Q Reset

#	Bid Date	Cntrct ID	Location	Unit	Awarded T	Item	Quantity	Unit Cost	Total Cost	Work Type	Region *
4	JAN 29	C16522	US34-	E	AGGREGA	202-	214815	1.57	337259.6	1	4
7	FEB 12	C16161	SH95:ARIZ	E	LAFARGE	202-	78767	0.8	63013.6	1	6
8	FEB 26	C16214	SH 66	E	LAWSON	202-	238534	0.85	202753.9	4	4
10	FEB 26	C16596	HIGHWAY	E	ROCKY	202-	271172	1.26	341676.7	1	2
11	FEB 26	C16705	SH 40:	E	ASPHALT	202-	79006	1.5	118509	1	6
12	MAR 19	C16830	I-25	E	SCHMIDT	202-	34046	2.26	76943.96	1	2
13	APR 02	C16869	I-70	E	ASPHALT	202-	399098	1.58	630574.8	20	1
14	APR 02	C17250	COLFAX:KI	E	ASPHALT	202-	106387	1.1	117025.7	1	6
15	APR 02	C17252	SH88:FED	E	AGGREGA	202-	26559	0.95	25231.05	1	6
16	APR 02	C17255	I-25	E	BRANNAN	202-	123852	1.09	134998.7	1	6
17	APR 16	C17251	SH 177,	E	LAFARGE	202-	69723	1.39	96914.97		6
24	APR 30	C16968	QUINCY:	E	BRANNAN	202-	30071	1.09	32777.39	1	6
25	APR 30	C16068	SH 9 -	E	ZAK DIRT,	202-	52973	1.85	98000.05	12	1
26	MAY 14	C17256	C-	E	CASTLE	202-	62011	2.48	153787.3	1	6
40	JUN 18	C16891	I-70	E	LAFARGE	202-	271501	1.5	407251.5	1	3
42	JUL 02	C17072	US50 E.	E	KIEWIT	202-	26138	2	52276	5	2
44	JUL 09	C16967	US 50	E	ROCKY	202-	317158	0.91	288613.8	5	2
46	JUL 23	C14976	US-85	E	LAWSON	202-	62104	2	124208	12	1
49	JUL 30	C17407	SH119	E	PREMIER	202-	33634	1.3	43724.2	1	4
50	JUL 30	C16944	REGION 5	E	FOUR	202-	55294	0.9	49764.6	1	5
56	SEP 03	C17024	US 287	E	LAWSON	202-	26954	1.6	43126.4	12	2
59	DEC 03	C15827	I-70 &	E	ASPHALT	202-	249622	0.88	219667.4	13	6
60	DEC 03	C17452	I-70	E	ELAM	202-	141761	1.5	212641.5	1	3
66	FEB 04	C17316	I-70 WEST	E	ASPHALT	202-	167069	1.4	233896.6	1	1
67	FEB 04	C17391	I25 -	E	LAFARGE	202-	447932	1.37	613666.8	1	2
68	FEB 18	C17665	US50B	E	ROCKY	202-	234907	1.45	340615.2	1	2
70	FEB 25	C17617A	SH 14	E	LAFARGE	202-	161348	1.2	193617.6	5	3
71	MAR 04	C17615	SH 2:	E	LAFARGE	202-	101508	0.87	88311.96		6
72	MAR 04	C17357	US 160	E	APC	202-	26716	2.45	65454.2	1	5
76	MAR 25	C15653	SH 157A,	E	BRANNAN	202-	116003	1.35	156604.1	1	4
77	APR 01	C17168	SH2:ALAM	E	LAFARGE	202-	146127	1.28	187042.6	1	6
78	APR 01	C17221	SH 21	E	SCHMIDT	202-	111867	1.72	192411.2	4	2
80	APR 08	C17263	BAILEY-	E	LAFARGE	202-	226864	1.3	294923.2	1	1
84	APR 29	C17746	I-25	E	LAFARGE	202-	513564	0.85	436529.4	5	2
89	MAY 27	C17318	I-70B	E	LAWSON	202-	31982	3.8	121531.6	11	3
92	JUN 10	C17704	I-	E	AMERICA	202-	80208	1.5	120312	5	6
93	JUN 17	C17600	FY10 R4	E	DIAMOND	202-	20480	2.03	41574.4	21	4
94	JUN 17	C17163	SH128:	E	APC	202-	50161	1	50161	1	6
98	JUL 01	C17264	TURKEY	E	BRANNAN	202-	70165	2.25	157871.3	1	1
100	AUG 26	C17730R	MTCE R5	E	OLDCASTL	202-	107848	1.2	129417.6	1	5
102	SEP 02	C17826	SH 115	E	ROCKY	202-	352796	0.89	313988.4	1	2
103	SEP 09	C17847	I 70	E	ASPHALT	202-	147343	0.9	132608.7	1	1
108	OCT 07	C17813	I-70	E	LAWSON	202-	31161	4	124644	1	3
115	NOV 18	C17823	US 50 LAS	E	A & S	202-	224181	1	224181	1	2
120	DEC 23	C17846	I-25	E	APC	202-	796709	0.97	772807.7		2
123	JAN 13	C17768	SH 7:US	E	ASPHALT	202-	28645	1.4	40103	1	6
129	MAR 03	C17824	US 50	E	ROCKY	202-	134188	1.21	162367.5		2
132	MAR 17	C17766	I-70 WEST	E	AMERICA	202-	259224	1.5	388836	1	3
133	MAR 24	C16212	I-	E	LAWRENC	202-	67510	1.72	116117.2	3	6
137	APR 07	C17021	SH 121	E	CASTLE	202-	121990	1.55	189084.5	20	6
138	APR 07	C17619	US36	E	ASPHALT	202-	200805	0.8	160644	1	4
141	APR 21	C17902	SH	E	AGGREGA	202-	50656	1.7	86115.2	1	1
143	APR 28	C17537	I-70	E	LAWRENC	202-	16430	2.18	35817.4	3	6
144	MAY 12	C17637	SH 172	E	ELAM	202-	33957	2.2	74705.4	1	5
146	MAY 12	C17700	COLFAX:S	E	LAFARGE	202-	65446	1	65446	1	6
147	MAY 12	C17884	SH 287:	E	BRANNAN	202-	176492	1.9	335334.8	1	6
148	MAY 12	C17864	I-70	E	LAFARGE	202-	65938	1.6	105500.8	1	6
149	MAY 19	C18148	BELLEVIE	E	AGGREGA	202-	45065	1.25	56331.25	1	6
150	MAY 26	C17315	SH 91	E	ELAM	202-	273802	1.2	328562.4	1	1
155	JUN 16	C18070	I-76:	E	SEMA	202-	30673	0.9	27605.7	3	6
156	JUN 16	C16679	SH93: SH	E	APC	202-	244708	1.03	252049.2	1	6
162	JUL 14	C17495	SH 52	E	BRANNAN	202-	136570	1.66	226706.2	1	4
163	JUL 21	C18262	SH 83	E	AGGREGA	202-	105332	2.9	305462.8	1	1

ject is done by CDOT Maintenance unit

145961 $ 1.51 Average
$ 0.65 Standard Deviation

N TO HOME PAGE

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6) Select Format from pull down menu, then Row, then Height, and enter 13 in Row height box

Grinding and Texturing PCCP

Search for Items / Bid Cost Between Selected Date

Item # Between 000-	202-0017C	AND 699-	202-00170
Bid Letting Date Between mm/dd/y	01/01/05	AND 6/30/2000	12/31/2C

Submit Q Reset

#	Bid Date	Cntrct ID	Location	Unit	Awarded T	Item	Quantity	Unit Cost	Total Cost	Work Type	Region *
1	MAY 12	C15028R	Rifle-Silt	E	AMERICA	202-	328797	3.27	1075166	21	3
7	AUG 21	C16728	PORT OF	E	AZTEC	202-	1602	11.03	17670.06	17	0
8	JUL 09	C17304	I-70 EXIT	E	SCOTT	202-	7167	7	50169	1	3
12	JAN 13	C17843	I-25	E	AGGREGA	202-	5040	5.1	25704	12	4
14	JUL 21	C18257A	US 287	E	TLM	202-	31300	3	93900	12	2

ject is done by CDOT Maintenance unit

$ 5.88 Average
$ 3.30 Standard Deviation

N TO HOME PAGE

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2) Choose Copy from Edit
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6) Select Format from pull down menu, then Row, then Height, and enter 13 in Row height box

Removal of PCCP

Search for Items / Bid Cost Between Selected Date

000-	202-00210	AND 699-	202-00210
mm/dd/yy	01/01/10	AND 6/30/2000	12/31/20

Submit Q Reset

#	Bid Date	Cntrct ID	Location	Unit	Awarded T	Item	Quantity	Unit Cost	Total Cost	Work Type	Region*
1	JAN 14 2010	C17303	I-70	E	AMERICA	202-	387	9	3483	5	3
2	JAN 28 2010	C17489	SH 82	E	VILLALOB	202-	985	17.2	16942	1	3
3	JAN 28 2010	C17489	SH 82	E	VILLALOB	202-	282	18.85	5315.7	1	3
6	MAR 25 2010	C17377	MTCE R4	E	COLORAD	202-	3750	24.35	91312.5	22	4
7	APR 01 2010	C17168	SH2:ALAM	E	LAFARGE	202-	563	14.85	8360.55	1	6
10	MAY 06 2010	C17015	SH 287 AT	E	MOUNTAI	202-	1277	9.9	12642.3	5	4
12	JUN 17 2010	C17600	FY10 R4	E	DIAMOND	202-	1140	29	33060	21	4
13	AUG 19 2010	C17949	I-76 SLAB	E	TLM	202-	1579	35	55265	1	4
16	OCT 07 2010	C18072	PORT OF	E	STURGEO	202-	127	25.5	3238.5	6	0
18	DEC 16 2010	C17583	FEDERAL:	E	SCOTT	202-	1304	9.7	12648.8	12	6
22	MAR 17 2011	C18101	R4 FY11 I-	E	CHATO'S	202-	3950	24	94800	22	4
26	JUN 16 2011	C17682R	I25 N OF	E	COLORAD	202-	433	33	14289	2	4
29	JUN 30 2011	C18284	I-76	E	APC	202-	2000	28.84	57680	1	4
30	JUN 30 2011	C18372	R4 FY12 I-	E	TLM	202-	2344	42	98448	22	4

ject is done by CDOT Maintenance unit

$ 22.94 Average
$ 10.18 Standard Deviation

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Sawing and Sealing PCCP Joints

arch for Items / Bid Cost Between Selected Date

000-	412-1400(	AND 699-	412-14000
mm/dd/y	01/01/05	AND 6/30/2000	12/31/20

Submit Q Reset

#	Bid Date	Cntrct ID	Location	Unit	Awarded T	Item	Quantity	Unit Cost	Total Cost	Work Type	Region *
1	JAN 20	C15075	Cortez &	E	NEW	412-	251668	1.19	299484.9	22	5
2	JUN 02	C15271	FY06	E	NEW	412-	174497	1.5	261745.5	21	2
3	AUG 18	C14683R	FT.	E	CONCRET	412-	1000	3.75	3750	17	4
4	MAR 30	C15584	FY06	E	NEW	412-	300767	1.5	451150.5	1	2
6	MAY 31	C15910	Preventiv	E	NEW	412-	330000	1.5	495000	4	6
7	APR 17	C15951	I-70	E	QUALITY	412-	116000	1.75	203000	4	6
8	JAN 29	C16522	US34-	E	AGGREGA	412-	76344	1.7	129784.8	1	4
9	APR 02	C17246	I-70:	E	NEW	412-	200000	1.55	310000	12	6
10	MAY 14	C17256	C-	E	CASTLE	412-	215527	1.64	353464.3	1	6
11	APR 15	C17533	SH	E	ZAK DIRT,	412-	265000	1.4	371000	6	6
12	SEP 09	C17437	SH 83:	E	HAMON	412-	60000	1.6	96000	1	6
13	JUL 21	C18257A	US 287	E	TLM	412-	29469	1.75	51570.75	12	2

ject is done by CDOT Maintenance unit

$ 1.74 Average
$ 0.65 Standard Deviation

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Fast Track PCCP

arch for Items / Bid Cost Between Selected Date

000-	412-0102(	AND 699-	412-01420
mm/dd/y	01/01/1(	AND 6/30/2000	12/31/2(

Submit Q Reset

#	Bid Date	Cntrct ID	Location	Unit	Awarded T	Item	Thickness	Quantity	Unit Cost	Cost/ Sq yd - in	Total Cost	Work Type	Region *
1	APR 01	C17168	SH2:ALA	E	LAFARGE	412-01120	11	170	92.1	$ 8.37	15657	1	6
2	APR 29	C16417	I-225:	E	INTERSTA	412-01020	10	1000	32.84	$ 3.28	32840	12	6
6	OCT 07	C18072	PORT OF	E	STURGEO	412-01220	12	547	105	$ 8.75	57435	6	0
8	DEC 16	C17583	FEDERAL:	E	SCOTT	412-01020	10	2837	75	$ 7.50	212775	12	6
11	JAN 13	C17768	SH 7:US	E	ASPHALT	412-01120	11	90	52	$ 4.73	4680	1	6
16	JUN 16	C16679	SH93: SH	E	APC	412-01120	11	408	158.86	$ 14.44	64814.88	1	6
17	JUN 16	C18070	I-76:	E	SEMA	412-01352	13.5	3058	66	$ 4.89	201828	3	6

ject is done by CDOT Maintenance unit

$ 7.42 Average
$ 3.71 Standard Deviation

N TO HOME PAGE

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Removal of Asphalt Mat

arch for Items / Bid Cost Between Selected Date

000-	202-0022(	AND 699-	202-00220
mm/dd/y	01/01/0E	AND 6/30/2000	12/31/2(

Submit Q Reset

#	Bid Date	Cntrct ID	Location	Unit	Awarded T	Item	Quantity	Unit Cost	Total Cost	Work Type	Region *
17	APR 10	C15555	I-25,	E	EDWARD	202-	94143	2.5	235357.5	12	1
19	APR 17	C16046	I70	E	LAWRENC	202-	37723	3.3	124485.9	12	1
26	JUN 05	C15504	Doubletre	E	LAWSON	202-	107776	2.5	269440	12	5
31	JUN 26	C13808	US 34	E	CASTLE	202-	134716	2.3	309846.8	11	4
35	JUL 31	C15049	US 285:	E	SCOTT	202-	19002	2.75	52255.5	10	1
47	JAN 15	C15915	POWERS/	E	HAMON	202-	14506	3.32	48159.92	3	2
60	APR 23	C16170	I-25:	E	HAMON	202-	16006	5.35	85632.1	0	6
61	APR 23	C17249	I-76 AND	E	CASTLE	202-	30539	1.05	32065.95	5	6
71	MAY 28	C17187	SH 92	E	TEZAK	202-	25112	1.71	42941.52	12	3
85	JUL 16	C17265	US 285:	E	HUDICK	202-	15521	0.87	13503.27	11	1
86	JUL 23	C14976	US-85	E	LAWSON	202-	35570	1.9	67583	12	1
90	AUG 13	C16493	US 40	E	SCOTT	202-	38235	1.75	66911.25	12	3
95	DEC 03	C15827	I-70 &	E	ASPHALT	202-	26625	2.31	61503.75	13	6
98	DEC 30	C17170	ALAMEDA	E	JALISCO	202-	37040	4.2	155568	3	6
99	JAN 14	C17303	I-70	E	AMERICA	202-	23079	2	46158	5	3
100	JAN 28	C17489	SH 82	E	VILLALOB	202-	15203	3.35	50930.05	1	3
115	APR 15	C16657	PARKER	E	HAMON	202-	34459	3.08	106133.7	13	6
119	APR 29	C16417	I-225:	E	INTERSTA	202-	64621	2.64	170599.4	12	6
123	MAY 27	C17318	I-70B	E	LAWSON	202-	31982	3.8	121531.6	11	3
140	SEP 30	C17353	SH115	E	R.E.	202-	25905	0.65	16838.25	12	2
148	NOV 18	C17672R	SH-24	E	AMERICA	202-	23000	0.8	18400	11	3
152	DEC 16	C17583	FEDERAL:	E	SCOTT	202-	31303	7	219121	12	6
158	JAN 20	C17783-	I-	E	HAMON	202-	63922	6	383532		6
180	JUN 16	C16679	SH93: SH	E	APC	202-	27672	1.58	43721.76	1	6
181	JUN 16	C18070	I-76:	E	SEMA	202-	29388	2.6	76408.8	3	6
182	JUN 16	C17658	GEORGET	E	CONCRET	202-	3898	6.5	25337	12	1
183	JUN 23	C16639	SH 392 & I-	E	EDWARD	202-	27994	3.05	85381.7	12	4
194	AUG 11	C16376	US 40/287	E	LAWSON	202-	34565	1.75	60488.75	12	1

ject is done by CDOT Maintenance unit

38197 $ 2.88 Average
$ 1.66 Standard Deviation

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Grade SX (100)(PG 64-22)

Project Development Branch
Construction Estimate & Market Analysis Unit

Search for Items / Bid Cost Between Selected Date

Select Item # Between 000-	403-34841	AND 699-00010	403-34841
Bid Letting Date Between mm/dd/yy	01/01/1(	AND 6/30/2000	12/31/2(

Submit Q Reset

#	Bid Date	Cntrct ID	Location	Unit	Awarded T	Item	Quantity	Unit Cost	Total Cost	Work Type	Region *
1	FEB 04	C17391	I25 -	E	LAFARGE	403-34841	71861.46	53.25	3826623	1	2
2	FEB 18	C17665	US50B	E	ROCKY	403-34841	41079	49.14	2018622	1	2
3	APR 01	C17221	SH 21	E	SCHMIDT	403-34841	30391	44.35	1347841	4	2
5	APR 29	C17746	I-25	E	LAFARGE	403-34841	64971	44	2858724	5	2
10	SEP 02	C17826	SH 115	E	ROCKY	403-34841	50488	43.08	2175023	1	2
11	SEP 30	C17353	SH115	E	R.E.	403-34841	16050	47	754350	12	2
16	DEC 23	C17846	I-25	E	APC	403-34841	113222	52.6	5955477		2
20	MAR 24	C16212	I-	E	LAWRENC	403-34841	23598	57.22	1350278	3	6
24	OCT 06	C17860	SH115	E	TEZAK	403-34841	23498	52.46	1232705	5	2
25	FEB 09	C17988	SH21	E	ROCKY	403-34841	7473	67.64	505473.7	1	2

ject is done by CDOT Maintenance unit

$ 51.07 Average Bid Price
$ 7.46 Standard Deviation

N TO HOME PAGE

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SMA w/PG 76-28

arch for Items / Bid Cost Between Selected Date

Select Item # Between 000-	403-0921(	AND 699-	403-09210
Bid Letting Date Between mm/dd/y	01/01/0E	AND 6/30/2000	12/31/2(

Submit Q Reset

#	Bid Date	Cntrct ID	Location	Unit	Awarded T	Item	Quantity	Unit Cost	Total Cost	Work Type	Region *
1	JAN 17	C16172	I-25,	E	PREMIER	403-	19660	67.7	1330982	1	1
2	JAN 24	C16222	I-25	E	AGGREGA	403-	39724	75	2979300	1	4
3	MAR 13	C16453	I-70 VAIL	E	A & S	403-	35190.8	63.3	2227578	1	3
4	JUN 05	C16641R	I-70	E	ASPHALT	403-	23812	80	1904960	1	1
5	JUN 04	C17167	I-25	E	AGGREGA	403-	10232	80	818560	1	4
6	OCT 15	C17242	SH 82	E	GRAND	403-	11162	65	725530	1	3
7	DEC 03	C17452	I-70	E	ELAM	403-	16909	58	980722	1	3
8	JAN 28	C17622	I-25 RUBB	E	COULSON	403-	23651	86	2033986	1	4
9	FEB 04	C17316	I-70 WEST	E	ASPHALT	403-	2856	72	205632	1	1
10	APR 08	C17648	I-25	E	BRANNAN	403-	10059.79	75.79	762431.5	1	4
11	JUL 01	C17264	TURKEY	E	BRANNAN	403-	7799	80	623920	1	1
12	JAN 13	C17843	I-25	E	AGGREGA	403-	11781	80.9	953082.9	12	4
13	JUL 21	C18262	SH 83	E	AGGREGA	403-	23332	95.65	2231706	1	1

ject is done by CDOT Maintenance unit

$ 75.33 Average
$ 10.18 Standard Deviation

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Use $95/ton with $10.18 SD to reflect Region 2 Bids on SH 21 and I-25

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Preliminary Soil Survey

COLORADO DEPARTMENT OF TRANSPORTATION

FIELD REPORT FOR SAMPLE IDENTIFICATION OR MATERIALS DOCUMENTATION

Metric units ☐ yes ☒ no

Field sheet No. 188251		Date 2/2/2010	
Project No.	Project location I-25 MP 149.5 TO 155.5		
Project code (SA#) 16785	Function 3020	Region 2	Part. P

Sample submitted: (ie.: Soil, ABC, Hydrated lime, HMA, concrete cores, steel, etc.) SOIL	Field office phone number 719-546-5779
	Field office FAX number 719-546-5777
Item 203 / Class / Grading	Special provisions applicable: ☐ yes ☒ no
Previously used on Project No.: / Previous CDOT Form #157 F/S No.(s):	☐ CDOT Form #633 (sack) ☐ CDOT Form #634 (can)

- Sample Identification: Quantity & Unit of material submitted, describe tests required, precise location sample removed from (stationing), etc.
- Materials Documentation: Field inspected (describe appearance, weight/dimensions, model/serial number), COC &/or CTR provided, etc.

SUBMITTING FOUR (4) SACKS OF SOIL FOR A PRELIMINARY SOIL SURVEY: PLEASE RUN THE FOLLOWING TESTS:

CLASSIFICATION
R-VALUE

FEB 17 2010

2010-0013-0016

APL/QML Acceptance: APL Ref. No.	Product name:	Date checked:
APL/QML Acceptance: APL Ref. No.	Product name:	Date checked:

Preliminary ☒	Construction ☐	Maintenance ☐	Emergency ☐	Date needed

Contractor	Supplier
Sampled from (Pit, roadway, windrow, stock, etc.) ROADWAY	Pit name or owner

Quantity represented 1 LANE MILE	Previous quantity	Total quantity to date

Sample submitted: ☒ Yes ☐ No	Shipped to: ☒ Central lab ☐ Region lab	Via CDOT	Date 2/17/09

Sampled or inspected by (Name) CRAIG WIEDEN	(Title) PE I	Lab phone number 719-546-5779
Supervisor (Pro./Res./Matls. Engr./Maint. Supt.) RICHARD ZAMORA	Title PE II	Address 1019 ERIE PUEBLO, CO 81001

Distribution: White copy - Staff Materials Branch
(submit white copy only if sample or information is directed to Staff Materials)
Canary copy - Region Materials Engineer
Pink copy - Resident Engineer

Previous editions may be used until supplies are exhausted

CDOT Form #157 9/07

COLORADO DEPARTMENT OF TRANSPORTATION

PRELIMINARY SOIL SURVEY

Note 1: If samples are submitted leave sieve analysis section blank.
Note 3: Sulfate content expressed as percent (dry soil), or ppm in water.
Note 2: Comments should be placed in the description column of the form.
Note 4: R-values referenced are noted 'Survey by Group Class' portion of this report.

Form #157 No.	Form #554 No.	Date:
188251	898	02/02/10
Project No.	STA R200-158	
Project location	I-25 MP 149.5 to MP 155.5	
Project code (SA#)	16785	

STATION AND LOG	TEST NO.	DESCRIPTION	SULFATE CONTENT (SO_4)	R-VAL REF	Per CP 24, Section 4						LIQUID LIMIT	PLASTIC. INDEX	CLASSIFICATION AND GROUP INDEX	MOIST. %	M_R PSI
					3/4"	3/8"	#4	#10	#40	#200					
MM 149.5 NB PL (CORE)															
0-12.5"	1A	HMA (Stripped from 4.5"-6.5")													
12.5"-21"	1B	Granular Base Reddish Brown - SAMPLE 1B			100	94	80	65	38	16	8	NP	A-1-b(0)	0.4	32883
21"-36"	1C	Silty/Clayey Sand Brown to Gray - SAMPLE 1C				100	98	81	42	17	NV	NP	A-1-b(0)	0.1	33975
MM 150.5 NB PL (AUGER)															
0-12"	2A	HMA													
12"-21.5"	2B	Granular Base - Similar to 1B											A-1-b(0)		32883
21.5"-36"	2C	Tan Silty Sand - Fine Grained - SAMPLE 2C				100	98	93	53	9.3	19	NP	A-3(0)	0.2	29812
MM 151 NB INSIDE SHLDR															
0-21"	3A	SM/SC - Similar to 1C											A-1-b(0)		33975
21"-36"	3B	Silty Sand - Tan - Fine to Coarse - SAMPLE 3B			100	99	93	72	30	12	23	5	A-1-b(0)	0.3	33975
MM 151.5 NB PL (CORE)															
0-15"	4A	HMA													
15"-23"	4B	Granular Base - Similar to 1B											A-1-b(0)		32883
23"-36"	4C	Tan SM - Similar to 3B											A-1-b(0)		33975
MM 152.5 NB PL (AUGER)															
0-14.5"	5A	HMA													
14.5"-24"	5B	Granular Base - Similar to 1B											A-1-b(0)		32883
24"-36"	5C	Tan SM - Similar to 3B											A-1-b(0)		33975
MM 153.5 NB PL (CORE)															
0-14"	6A	HMA													
14"-26"	6B	Granular Base - Similar to 1B											A-1-b(0)		32883
26"-36"	6C	Tan SM - Similar to 3B											A-1-b(0)		33975

☐Materials and Geotechnical
☐Region Materials Engineer
☐Resident Engineer

CDOT Form #555 04/09

COLORADO DEPARTMENT OF TRANSPORTATION

PRELIMINARY SOIL SURVEY

Note 1: If samples are submitted leave sieve analysis section blank.
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Note 2: Comments should be placed in the description column of the form.
Note 4: R-values referenced are noted 'Survey by Group Class' portion of this report.

Form #157 No.	Form #554 No.	Date:
188251	898	02/02/10
Project No.	STA R200-158	
Project location	I-25 MP 149.5 to MP 155.5	
Project code (SA#)	16785	

STATION AND LOG	TEST NO.	DESCRIPTION	SULFATE CONTENT (SO_4)	R-VAL REF	Per CP 24, Section 4						LIQUID LIMIT	PLASTIC. INDEX	CLASSIFICATION AND GROUP INDEX	MOIST. %	M_R PSI
					3/4"	3/8"	#4	#10	#40	#200					
MM 154.5 NB PL (AUGER)															
0-15.5"	7A	HMA													
15.5"-23"	7B	Granular Base - Similar to 1B											A-1-b(0)		32883
23"-33"	7C	SM/SC - Similar to 1C											A-1-b(0)		33975
33"-36"	7D	SC Dark Brown - No Sample													
MM 155.5 NB PL (CORE)															
0-15"	8A	HMA													
15"-19"	8B	Granular Base - Similar to 1B											A-1-b(0)		32883
19"-36"	8C	Tan SM - Similar to 3B											A-1-b(0)		33975
MM 149.5 NB AC LN (AUGER)															
0-10"	9A	HMA													
10"-24"	9B	SM/SC - Similar to 1C (DDC ON CONCRETE)													
MM 150 NB PL (AUGER)															
0-10.5"	10A	HMA													
10.5"-17"	10B	Granular Base - Similar to 1B											A-1-b(0)		32883
17"-36"	10C	SM - Fine Grained - Similar to 2C											A-3(0)		29812
MM 150.5 NB AC LN (AUGER)															
0-9.5"	11A	HMA													
9.5"-16.5"	11B	Granular Base - Similar to 1B											A-1-b(0)		32883
16.5"-36"	11C	SM - Fine Grained - Similar to 2C											A-3(0)		29812
MM 151 NB DL (AUGER)															
0-15.5"	12A	HMA													
15.5"-23"	12B	Granular Base - Similar to 1B											A-1-b(0)		32883
23"-36"	12C	Tan SM - Similar to 3B											A-1-b(0)		33975

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CDOT Form #555 04/09

COLORADO DEPARTMENT OF TRANSPORTATION

PRELIMINARY SOIL SURVEY

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Form #157 No.	Form #554 No.	Date:
188251	898	
Project No.	STA R200-158	
Project location	I-25 MP 149.5 to MP 155.5	
Project code (SA#)	16785	

STATION AND LOG	TEST NO.	DESCRIPTION	SULFATE CONTENT (SO_4)	R-VAL REF	Per CP 24, Section 4						LIQUID LIMIT	PLASTIC. INDEX	CLASSIFICATION AND GROUP INDEX	MOIST. %	M_R PSI
					3/4"	3/8"	#4	#10	#40	#200					
MM 152 NB DL (AUGER)															
0-13.5"	13A	HMA													
13.5"-20.5"	13B	Granular Base - Similar to 1B											A-1-b(0)		32883
20.5"-36"	13C	Tan SM - Similar to 3B											A-1-b(0)		33975
MM 153 NB DL (AUGER)															
0-14.5"	14A	HMA													
14.5"-27"	14B	Granular Base - Similar to 1B											A-1-b(0)		32883
27"-36"	14C	SC - Dark Brown - No Sample													
MM 153.5 NB AC LN (AUGER)															
0-12"	15A	HMA													
12"-21.5"	15B	Granular Base - Similar to 1B											A-1-b(0)		32883
21.5"-36"	15C	SM/SC - Similar to 1C											A-1-b(0)		33975
MM 154 NB DL (AUGER)															
0-11.5"	16A	HMA													
11.5"-23.5"	16B	Granular Base - Similar to 1B											A-1-b(0)		32883
23.5"-36"	16C	Tan SM - Similar to 3B											A-1-b(0)		33975
MM 155 NB DL (AUGER)															
0-15"	17A	HMA													
15"-25.5"	17B	Granular Base - Similar to 1B											A-1-b(0)		32883
25.5"-36"	17C	Tan SM - Similar to 3B											A-1-b(0)		33975
MM 155.5 SB PL (CORE)															
0-14.5"	18A	HMA													
14.5"- 18"	18B	Granular Base - Similar to 1B											A-1-b(0)		32883
18"-36"	18C	Tan SM - Similar to 3B											A-1-b(0)		33975

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CDOT Form #555 04/09

COLORADO DEPARTMENT OF TRANSPORTATION

PRELIMINARY SOIL SURVEY

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Form #157 No. 188251	Form #554 No. 898	Date:
Project No.	STA R200-158	
Project location	I-25 MP 149.5 to MP 155.5	
Project code (SA#)	16785	

STATION AND LOG	TEST NO.	DESCRIPTION	SULFATE CONTENT (SO_4)	R-VAL REF	Per CP 24, Section 4						LIQUID LIMIT	PLASTIC INDEX	CLASSIFICATION AND GROUP INDEX	MOIST. %	M_R PSI
					3/4"	3/8"	#4	#10	#40	#200					
MM 154.5 SB PL (AUGER)															
0-17"	18A	HMA													
17"-23"	18B	Granular Base - Similar to 1B											A-1-b(0)		32883
23"-36"	18C	Tan SM - Similar to 3B											A-1-b(0)		33975
MM 153.5 SB PL (CORE)															
0-14.5"	19A	HMA													
14.5"-18"	19B	Granular Base - Similar to 1B											A-1-b(0)		32883
18"-36"	19C	Tan SM - Similar to 3B											A-1-b(0)		33975
MM 152.5 SB PL (AUGER)															
0-16"	20A	HMA													
16"-23"	20B	Granular Base - Similar to 1B											A-1-b(0)		32883
23"-36"	20C	Tan SM - Similar to 3B											A-1-b(0)		33975
MM 153 SB INSIDE SHLDR															
0-23"	21A	SM/SC - Dk Brown - Similar to 1C											A-1-b(0)		33975
23"-36"	21B	Tan SM - Similar to 3B											A-1-b(0)		33975
MM 152 SB INSIDE SHLDR															
0-16"	22A	SM - Fine Grained - Similar to 2C													
16"-27"	22B	SM/SC - Similar to 1C											A-1-b(0)		33975
27"-36"	22C	Tan SM - Similar to 3B											A-1-b(0)		33975
MM 151.5 SB PL (CORE)															
0-14.5"	23A	HMA													
14.5"-22.5"	23B	Granular Base - Similar to 1B											A-1-b(0)		32883
22.5"-36"	23C	Tan SM - Similar to 3B											A-1-b(0)		33975

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COLORADO DEPARTMENT OF TRANSPORTATION

PRELIMINARY SOIL SURVEY

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Note 3: Sulfate content expressed as percent (dry soil), or ppm in water.
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Note 4: R-values referenced are noted 'Survey by Group Class' portion of this report.

Form #157 No.	Form #554 No.	Date:
188251	898	
Project No.	STA R200-158	
Project location	I-25 MP 149.5 to MP 155.5	
Project code (SA#)	16785	

STATION AND LOG	TEST NO.	DESCRIPTION	SULFATE CONTENT (SO_4)	R-VAL REF	Per CP 24, Section 4						LIQUID LIMIT	PLASTIC. INDEX	CLASSIFICATION AND GROUP INDEX	MOIST. %	M_R PSI
					3/4"	3/8"	#4	#10	#40	#200					
M 150.5 SB PL (AUGER)															
0-16"	24A	HMA													
16"-25"	24B	Granular Base - Similar to 1B											A-1-b(0)		32883
25"-36"	24C	SM - Fine Grained - Similar to 2C											A-3(0)		29812
MM 150 SB INSIDE SHLDR															
0-17"	25A	SM/SC Brown - Similar to 1C											A-1-b(0)		33975
17"-33"	25B	SM - Fine Grained - Similar to 2C											A-3(0)		29812
33"-36"	25C	Tan SM - Similar to 3B											A-1-b(0)		33975
MM 149.5 SB PL (CORE)															
0-11.5"	26A	HMA (Stripped between 4" and 5")													
11.5"-21"	26B	Granular Base - Similar to 1B											A-1-b(0)		32883
21"-36"	26C	SM - Fine Grained - Similar to 2C											A-3(0)		29812
MM 155 SB DL (CORE)															
0-13.5"	27A	HMA													
13.5"-29"	27B	Granular Base - Similar to 1B											A-1-b(0)		32883
29"-36"	27C	Tan SM - Similar to 3B											A-1-b(0)		33975
MM 154 SB DL (AUGER)															
0-12"	28A	HMA													
12"-24"	28B	Granular Base - Similar to 1B											A-1-b(0)		32883
24"-36"	28C	Tan SM - Similar to 3B											A-1-b(0)		33975
MM 153 SB DL (CORE)															
0-14"	29A	HMA													
14"-24"	29B	Granular Base - Similar to 1B											A-1-b(0)		32883
24"-36"	29C	Tan SM - Similar to 3B											A-1-b(0)		33975

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CDOT Form #555 04/09

COLORADO DEPARTMENT OF TRANSPORTATION

PRELIMINARY SOIL SURVEY

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Note 3: Sulfate content expressed as percent (dry soil), or ppm in water.
Note 2: Comments should be placed in the description column of the form.
Note 4: R-values referenced are noted 'Survey by Group Class' portion of this report.

Form #157 No.	Form #554 No.	Date:
188251	898	02/02/10
Project No.	STA R200-158	
Project location	I-25 MP 149.5 to MP 155.5	
Project code (SA#)	16785	

STATION AND LOG	TEST NO.	DESCRIPTION	SULFATE CONTENT (SO_4)	R-VAL REF	Per CP 24, Section 4						LIQUID LIMIT	PLASTIC. INDEX	CLASSIFICATION AND GROUP INDEX	MOIST. %	M_R PSI
					3/4"	3/8"	#4	#10	#40	#200					
MM 152 - SB DL (Auger)															
0-13"	30A	HMA													
13"-23"	30B	Granular Base - Similar to 1B											A-1-b(0)		32883
23"-36"	30C	Tan SM - Similar to 3B											A-1-b(0)		33975
MM 151 SB DL (CORE)															
0-18"	31A	HMA													
18"-30"	31B	Granular Base - Similar to 1B											A-1-b(0)		32883
30"-36"	31C	Tan SM - Similar to 3B											A-1-b(0)		33975
MM 150 SB DL (AUGER)															
0-11"	32A	HMA													
11"-14"	32B	Granular Base - Similar to 1B											A-1-b(0)		32883
14"-36"	32C	SM - Fine Grained - Similar to 2C											A-3(0)		29812

☐ Materials and Geotechnical
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CDOT Form #555 04/09

COLORADO DEPARTMENT OF TRANSPORTATION
Gradation Report

Project ID	16785	**Location**	R2 SURFACE TREATMENT PE POOL		
Project	STA R200-158	**Source**	ROADWAY	**Report Date**	2/26/2010
F.S. #	188251	**Region**	02	**Final Design**	3020
Engineer	C.K. Su - Soils and Rockfall Program			**Working Days**	7
Comments					

Test #	Lab #	SP?	Station	Depth	LL	PL	PI	%Moist	R-Val	Group Class(GI)	mr
1B	2010-0013	None	MP 149.5 NB PL (Core)	12.5" - 21.0"	8	8	NP	0.4	78	A-1-b(0)	32883

Gradations:

mm	75	25	19	9.5	#4	#10	#40	#200
in	3	1	3/4	3/8				
%Pass			100	94	80	65	38	16
As Run			100	94	80	65	38	16

Proctor:

MDD :
OMC :
SpG :
Abs :

Lab Performing Work:

Atterberg : CDOT
Direct Shear :
R-Value : CDOT
T99 :
T180 :
Mechanical Analysis : CDOT
Other :

Test #	Lab #	SP?	Station	Depth	LL	PL	PI	%Moist	R-Val	Group Class(GI)	mr
1C	2010-0014	None	MP 149.5 NB PL (Core)	21.0" - 36.0"	NV	NP	NP	0.1	79	A-1-b(0)	33975

Gradations:

mm	75	25	19	9.5	#4	#10	#40	#200
in	3	1	3/4	3/8				
%Pass				100	98	81	42	17
As Run				100	98	81	42	17

Proctor:

MDD :
OMC :
SpG :
Abs :

Lab Performing Work:

Atterberg : CDOT
Direct Shear :
R-Value : CDOT
T99 :
T180 :
Mechanical Analysis : CDOT
Other :

Test #	Lab #	SP?	Station	Depth	LL	PL	PI	%Moist	R-Val	Group Class(GI)	mr
2C	2010-0015	None	MP 150.5 NB PL (Auger)	21.5" - 36.0"	19	19	NP	0.2	75	A-3(0)	29812

Gradations:

mm	75	25	19	9.5	#4	#10	#40	#200
in	3	1	3/4	3/8				
%Pass				100	98	93	53	9.3
As Run				100	98	93	53	9.3

Proctor:

MDD :
OMC :
SpG :
Abs :

Lab Performing Work:

Atterberg : CDOT
Direct Shear :
R-Value : CDOT
T99 :
T180 :
Mechanical Analysis : CDOT
Other :

Key

LL = Liquid Limit (AASHTO T89)
PL = Plastic Limit (AASHTO T90)
PI = Plastic Index (AASHTO T90)
SP? = Meets special provision requirements?
R-Val = Stab R-Value (CP-L3101)
mr = Resilient Modulus (psi)
GI = Group Index
MDD = Maximum Dry Density
OMC = Optimum Moisture Content
SpG = Bulk Specific Gravity
Abs = Absorption

CDOT #323 11/2002

COLORADO DEPARTMENT OF TRANSPORTATION
Gradation Report

Project ID	16785	**Location**	R2 SURFACE TREATMENT PE POOL		
Project	STA R200-158	**Source**	ROADWAY	**Report Date**	2/26/2010
F.S. #	188251	**Region**	02	**Final Design**	3020
Engineer	C.K. Su - Soils and Rockfall Program			**Working Days**	7
Comments					

Test #	Lab #	SP?	Station	Depth	LL	PL	PI	%Moist	R-Val	Group Class(GI)	mr
3B	2010-0016	None	MP 151.0 NB Inside Shldr	21.0" - 36.0"	23	18	5	0.3	79	A-1-b(0)	33975

Gradations:

mm	75	25	19	9.5	#4	#10	#40	#200
in	3	1	3/4	3/8				
%Pass			100	99	93	72	30	12
As Run			100	99	93	72	30	12

Proctor:

MDD :
OMC :
SpG :
Abs :

Lab Performing Work:

Atterberg	: CDOT	T180	:
Direct Shear	:	Mechanical Analysis	: CDOT
R-Value	: CDOT	Other	:
T99	:		

Key

LL = Liquid Limit (AASHTO T89)	SP?	=	Meets special provision requirements?	MDD	= Maximum Dry Density
PL = Plastic Limit (AASHTO T90)	R-Val	=	Stab R-Value (CP-L3101)	OMC	= Optimum Moisture Content
PI = Plastic Index (AASHTO T90)	mr	=	Resilient Modulus (psi)	SpG	= Bulk Specific Gravity
	GI	=	Group Index	Abs	= Absorption

CDOT #323 11/2002

Survey *188251* R-values by Group Class

GroupClass A-1-b

	Labno	Rvalue	LL	PI	GI	p19mm:	p9_5mm:	p#4:	p#10	p#40	p#200
	2010-0013	78	8	NP	0	100	94	80	65	38	16
	2010-0014	79	NV	NP	0		100	98	81	42	17
	2010-0016	79	23	5	0	100	99	93	72	30	12
'GroupClass' =	A-1-b (3 R-values)										
	Average	79									

GroupClass A-3

	Labno	Rvalue	LL	PI	GI	p19mm:	p9_5mm:	p#4:	p#10	p#40	p#200
	2010-0015	75	19	NP	0		100	98	93	53	9.3
'GroupClass' =	A-3 (1 R-value)										
	Average	75									