North I-25 Project

Cost Estimate Review

FINAL REPORT

July 2010

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Executive Summary

The Federal Highway Administration (FHWA), the Colorado Department of Transportation (CDOT), and their consultants participated in a workshop to review the cost estimate and schedule for the North I-25 Project at the CDOT Region 6 Offices in Denver, Colorado during July of 2010. The objective of the review was to verify the accuracy and reasonableness of the current CDOT total cost estimate and schedule and to develop a probability range for the cost estimate that represents the project's current stage of development.

It should be noted that this project is in the final stages of the environmental process. The Final Environmental Impact Statement (EIS) is currently scheduled for February 2011 with a Phase I Record of Decision (ROD) anticipated for summer 2011. This cost estimate review analyzed the cost estimates for both the overall Final EIS Preferred Alternative and Phase I of the project.

Significant results of the review:

- The anticipated project schedule is determined by anticipated funding. Furthermore, the project has a long delivery timeframe and the project estimate in terms of year of expenditure (YOE) dollars is considerably more expensive when compared to the base (2009) costs. The three phases of the preferred alternative are currently scheduled for completion in years 2035, 2055, and 2075, respectively.
- The CDOT post-review Preferred Alternative project estimate is $2.178 billion (2009 dollars) and $7.712 billion (YOE). Based on the review, the escalated range of costs for the total project is between $6.748 billion and $11.495 billion with an 80% confidence.
- The CDOT post-review Phase I project estimate is $641.0 million (2009 dollars) and $1.101 billion (YOE). Based on the review, the escalated range of costs for the total project is between $1.098 billion and $1.374 billion with an 80% confidence.

- The current Phase I estimate of $1.101 billion is at a 10% confidence level. The estimate at the 70% level of confidence is $1.271 billion. This is the minimum level of funding that must be committed to the project for the approval of the Major Project Financial Plan.
- Project schedule could potentially lower or increase YOE cost. For example, for each year Phase I is delayed, the project cost is expected to increase by approximately $48 million. This is consistent with the results of the analysis showing that the most significant influence on the project cost was the escalation of the construction costs.

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CHAPTER 1 – REVIEW SUMMARY

Introduction

The Federal Highway Administration (FHWA) and the Colorado Department of Transportation (CDOT) conducted a workshop in Denver, Colorado to review the cost and schedule estimates for the North I-25 Project. The workshop was conducted at the CDOT's Region 6 Office on July 12-15, 2010.

The intent of the review was to verify the accuracy and reasonableness of the current CDOT total cost estimate and schedule and to develop a probability range for the cost estimate that represents the current stage of project development. This document summarizes and reports the results of this review. Appendix F of this report includes the Review Team's close-out presentation given on July 15, 2010.

It should be noted that the environmental document for this project will be progressed as a phased Record of Decision (ROD). Thus, this cost estimate review analyzed the cost estimates for both the overall Final Environmental Impact Statement (EIS) Preferred Alternative and Phase I of the project.

Review Objective

The objective of the cost estimate review was to conduct an unbiased risk-based review to verify the accuracy and reasonableness of the current total cost estimate to complete the project and to develop a probability range for the cost estimate that represents the current stage of project design. Part of this study is to also review the proposed construction schedule to determine its impact on the project cost.

Basis of Review

The "Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users" (SAFETEA-LU) (Pub.L. 109-59, 119 Stat. 1144) requires the financial plan for all Federal-aid projects with an estimated total cost of $500,000,000 or more to be

approved by the Secretary (i.e. FHWA) based on reasonable assumptions. The $500,000,000 threshold includes all project costs (Engineering, Construction, Right-of-Way (ROW), Utilities, Construction Engineering, Inflation, etc.). The FHWA has interpreted “reasonable assumptions” to be a risk based analysis. Projects that are $100- $500 million are subject to review at the discretion of the FHWA Division Office. The cost estimate reviews are required to provide the risk based assessment of the estimate and are used in the approval of the financial plan.

Project Background

DESCRIPTION

The CDOT, in cooperation with the FHWA and the Federal Transit Administration (FTA), has begun to develop a project known as the North I-25 Project that will make improvements to the Interstate 25 corridor from the Fort Collins-Wellington area to Denver. The three phase project includes the following activities:

- General Purpose Lanes: One new general purpose lane in each direction of I-25 between State Highway 66 and State Highway 14.
- Tolled Express Lanes (TEL): One buffer-separated TEL in each direction of I-25 from the existing high occupancy vehicle/toll lanes at 84th Avenue to SH 14.
- Interchange Improvements: 16 interchanges along the corridor will be upgraded.
- Express Bus: Addition of express bus service with 13 stations along I-25, US 34 and Harmony Road with service from Fort Collins and Greeley to downtown Denver and from Fort Collins to Denver International Airport.
- Commuter Rail: Addition of commuter rail service with 9 stations connecting Fort Collins to Longmont and Thornton using the Burlington Northern Santa Fe Railroad, generally paralleling US 287 and tying into FasTracks North metro rail in Thornton which will connect to Downtown Denver. Passengers may also connect to the FasTracks northwest rail in Longmont, which will travel to Boulder.
- Commuter Bus: Addition of commuter bus service with 8 stations along US 85 connecting Greeley to downtown Denver.

- Congestion Management: These improvements include accommodations for ridesharing, carpools, and vanpools, along with additional bicycle and pedestrian facilities. Also, signal timing, ramp metering on I-25 and signage may be improved.

Phase I consist of the following work activities:

- Widening I-25 between SH 66 and SH 56 with one TEL in each direction.
- Widening I-25 between SH 392 and Prospect.
- Widening I-25 between 120th Avenue and approximately US 36 with one buffer-separated TEL in each direction.
- I-25 interchange replacements and upgrades at SH 14, Prospect, SH 56, CR 34, SH 7, 104th Avenue. Thornton Parkway and 84th Avenue will be constructed to their ultimate configurations.
- Six carpool lots upgraded at I-25 interchanges.
- Commuter rail right of way preservation.
- I-25 regional bus service will be initiated connecting Fort Collins and Greeley to downtown Denver and Denver International Airport, including construction of four transit stations and the purchase of 27 buses.
- Commuter bus along US 85 connecting Greeley to downtown Denver would be implemented, including construction of five stations, 17 queue jumps/transit signal priority intersections and the purchase of five buses.
- One or more of the existing bus maintenance facilities in northern Colorado will be upgraded.

PURPOSE AND NEED

The purpose of the proposed project is to meet long-term travel needs between the For-Collins-Wellington area, the rapidly growing population centers along the I-25 corridor, and south to the Denver Metro area. To meet long-term travel needs, the project must improve safety, mobility and accessibility, and provide modal alternatives and interrelationships.

The project is needed because there has been an increased frequency and severity of crashes, increased traffic congestion leading to mobility and accessibility problems, aging and functionally obsolete infrastructure, and lack of modal alternatives.

LOCATION

The project is located north of Denver along the I-25 corridor. The project area extends from SH 1 in Fort Collins/Wellington at the north end to US 36 on the south, and from US 287 and the Burlington Northern and Santa Fe (BNSF) Railway routes on the west to US 85 and the Union Pacific Railroad (UPRR) routes on the east. The project spans portions of four counties: Adams, Boulder, Larimer, and Weld. The project involves three transportation planning regions (TPRs): the Denver Regional Council of Governments (DRCOG), the North Front Range Metropolitan Planning Organization (NFRMPO), and the Upper Front Range Regional Planning Commission (UFRRPC). Major population centers in the project area include Fort Collins, Greeley, Loveland, and the communities in the northern portion of the Denver metropolitan area (Denver Metro Area).

The limits of the entire North I-25 Project are shown in Figure 1, North I-25 Project Location Map.

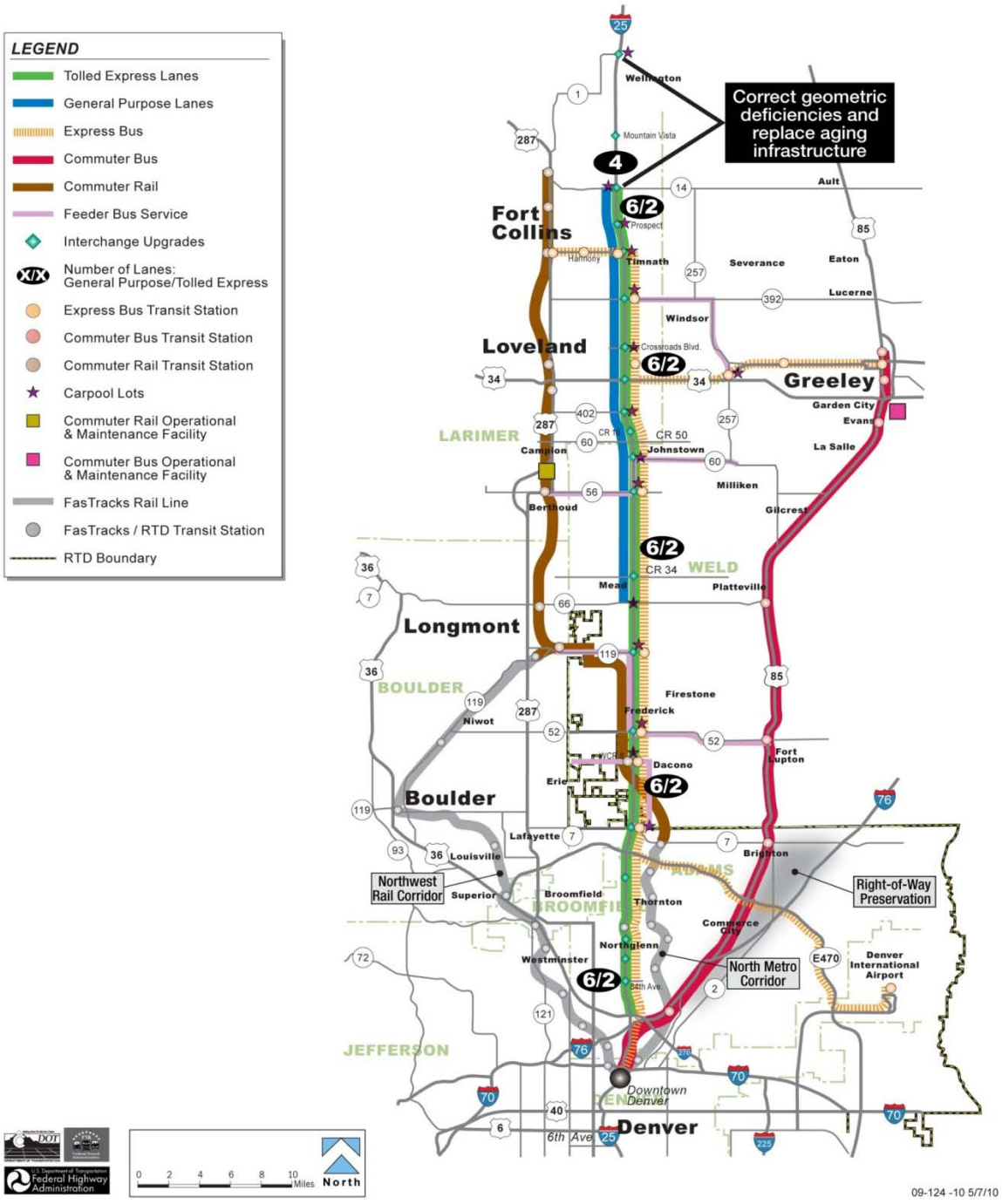

FIGURE 1 North I-25 Project Location Map

SCHEDULE

This project is currently in the final stages of the environmental process. The Draft EIS was approved in October 2008. The Final EIS is currently scheduled for February 2011 with a Phase I ROD anticipated for summer 2011. The project is currently at a 5-20% design level. Construction is not anticipated to start until 2020. The current construction schedule is based on the 2035 long range fiscally constrained plan that identifies when the funds will become available for construction. The project schedule is shown in Table 1.

PROJECT SCHEDULE	
Draft EIS	October 2008
Preferred Alternative Identified	December 2009
Final EIS	February 2011
Phase I Record of Decision	June 2011
Phase I Construction Duration	2020-2035
Phase II Construction Duration	2036-2055
Phase II Construction Duration	2056-2075

Table 1 North I-25 Project Schedule

Estimate Summary

The CDOT provided a cost estimate for the project prior to the workshop. The CDOT pre-review estimate for the preferred alternative was $2,184.1 million in 2009 dollars and included design/engineering, construction, construction engineering, environmental mitigation, ROW, costs expended, inflation, and contingencies. Adjustments were made during the review that decreased the estimate to $2,178.5 million in 2009 dollars. The pre-review estimate for Phase I was $648.5 million in 2009 dollars and decreased to $640.9 million in 2009 dollars after changes were made to the estimate.

Cost estimates, especially those for Major Projects, usually contain a degree of uncertainty due to unknowns and risks associated with the level of design detail completion. For this reason, it is logical to use a probabilistic approach and express the estimate as a range rather than a point value. To express the estimate as a range, risks and opportunities were developed and the workshop review team selected assumption curves that best modeled the cost impacts and probabilities based on the uncertainty associated with those risks and opportunities. The assumption curves were incorporated into a Monte Carlo simulation program to forecast a range

of estimated project costs. Chapter 3 discusses the assumptions and results of the probabilistic analysis for this project in more detail.

Estimate Adjustments

During the review, changes were made to some of the items in the pre-review estimate. These changes are identified as follows:

- Inflation Factor
  - Lowered to 3.3% (from 4.35%)
    - Assumption curve from 2.7% to 5.3%
  - Added separate factor for ROW (5%)
    - Assumption curve from 4% to 6%
- Concrete pavement lowered, $41/sy to $38.50/sy
- Type 7 guardrail lowered from $90/lf to $75/lf
- Cable guardrail raised, $10/lf to $20/lf
- Erosion control (highway) allowance from 3.1% to 5%
- Mobilization (highway - R4) from 15.7% to 11.0%
- Retaining Wall 10’-20’ (rail) from $700/lf to $690/lf
- Unforeseen Condition (rail) from 1% to 5%
- ROW (rail) from $24.8m to $26.4m

Threats and Opportunities

During the course of the review the team identified and discussed numerous threats and opportunities. A threat is anything that can add to the cost of the project. An opportunity is anything that can reduce the cost of the project. Some of these are listed below.

Threats:

- Funding availability
    - Letting delay (increase in inflation)
- Market conditions
    - Material prices (i.e. steel, fuel)
    - Unknown future inflation
- Environmental permit delays
    - Regulation changes
- Design, criteria changes, soils
- Uncertainty on owner/operator of rail and bus
- Rail line on new alignment
- Railroad agreements, payments, design reviews
- Land use changes (ROW, ridership)
- Project timeframe (65 years)
- Unknown procurement method

Opportunities:

- Market conditions
    - Material prices (i.e. steel, fuel)
    - Potential reduction in inflation
    - Better pricing through competition
- Technology
    - Bridges, ITS
- Retaining wall/ROW trade-off
- Final design
- Schedule acceleration – Funding availability
- Innovative procurement
- More regional commuter rail experience in the future
- Not overly complex roadway project

Review Findings

The review team found many examples of good estimating practices. Some of these include the following:

- Use of unit prices and historical percentages from recent similar projects in the I-25 corridor
- More detailed estimate than typical at this stage of a project
- Up front consideration of variation in prices and quantities
- Used lessons learned from previous CERs
- Involvement of CDOT executive/region management

Review Recommendations

During the workshop the Review Team developed the following recommendations for implementation:

- Finalize and submit environmental document, project management plan, and financial plan
- Refine and manage project schedule and budget
- Manage threats and opportunities through a risk management plan
- Look for opportunities to accelerate schedule to take advantage of current market conditions and inflation savings
- Develop consistent CDOT escalation rate

Next Steps

FHWA uses the resulting estimated cost of the project at the 70% confidence level in the Final EIS document. Additionally, a Financial Management Information System (FMIS) Major Project Identifier should be requested for the project and the project's major project classification with the FHWA's Project Delivery Team should be changed to "active".

CHAPTER 2 – REVIEW METHODOLOGY

Study Objective

The objectives of the review were to verify the accuracy and reasonableness of the current total cost estimate and schedule to complete the project and to develop a probability range for the cost estimate that represents the current phase of project development. The project is currently in the final stages of the environmental phase.

Review Team

The project review team was developed with the intent of having individuals with a strong knowledge of the project and/or major project work and expertise in specific disciplines of the project. Throughout the workshop, the review team discussed the development of the project, cost estimate quantities, unit prices, assumptions, opportunities and risks. Individuals with specific project expertise briefed the review team on that portion of the project or estimate development process. The review agenda and sign-in sheet of the participants are provided in Appendices A and B, respectively.

The Review Team was comprised of the following members:

- FHWA
    - Division Office
    - Resource Center
    - Headquarters
- CDOT
- Project Consultants – Felsburg Holt & Ullevig

Documents provided by CDOT prior to the Review Team attending this workshop and documents available during the workshop were:

- Project History and Schedule

- Project Cost Estimate and Estimate Basis
- Draft Environmental Impact Statement
- Project Schematics and Aerial Layouts
- Comparable Project Data
- Inflation Data (from CDOT Construction Index, area Metropolitan Planning Organizations (MPO), and Regional Transportation District (RTD))

Review Process

- Project Team input
    - FHWA, CDOT and Project Consultants
- Basis of Review
    - Review based on estimates provided by the Team in advance with revisions made during the review
    - Review to determine the reasonableness of assumptions used in the estimate
    - Not an independent FHWA estimate
    - Did not verify quantities and unit prices
- Methodology
    - Estimate Review
        - Understanding of estimate development process
        - Explanation of contingencies and projected escalation rates
        - Identification of threats and opportunities for various items
    - Modeled Variation of Inputs
        - Reviewed major cost elements
        - Developed impacts and probabilities for significant project threats and opportunities
        - Developed probability assumption distributions
    - Performed Monte Carlo simulation to generate a project estimate forecast as a range

CHAPTER 3 – PROBABILITY ANALYSIS

The objective of the probability analysis during the workshop was to determine the review team's confidence level in the current values being produced for the estimate. The results of this probability analysis could then be used to determine if the risk/contingency factors in the estimate are reasonable.

The review team discussed each work package and major component, including the current estimate, scope, schedule, risks and opportunities. Based on this review, probability curves were selected for each of the major line items in the project estimates for each contract, considering the probability that the final bid or contract value would be within a certain range of the current estimate. Next, a forecast curve was generated from the random sampling (10,000 iterations) of the input probability curves previously defined by the review team. This type of analysis provided a statistical level of certainty that the variation of the forecast distribution curve reflected the underlying variation of the cost inputs as determined by the review team. The resulting forecast curves were then analyzed to provide information on the confidence level in the project cost estimates and remaining budgets.

The review team used a statistical software tool called Crystal Ball® in order to establish a sense of perspective on the cost expectations for the project. This software selection is an add-in program for use with the Excel™ spreadsheet program and it permitted the application of Monte Carlo simulation technology to analyze key components of current cost estimates prepared by the project delivery team. As is the case with many real-world problems involving elements of uncertainty, the analysis of the variables is much too complex to be solved by strict analytical methods. There are simply too many combinations of input values to calculate every possible result. In the case of this workshop cost model, the Monte Carlo simulation supplied random numbers for selected cells identified as "assumption cells"; with these random numbers falling within the range of real-life possibilities defined by the Review Team. Each set of these random numbers is essential input to a "what-if" scenario. In this case, each scenario outcome represents a possible outcome from an expected real-world bidding and construction cycle. The model is recalculated for each scenario many times and builds a final forecast probability curve that reflects the combined uncertainty of the assumption cells on the model's output. This

plotted probability curve provides a range that can be expected for a final project cost, with degrees of certainty to model the potential final outcome.

The outcome depicted in this final probability curve is typically stated in the following manner: “There is an 80% (or whatever percentage depicted) degree of certainty that the construction cost will be in a range from $x to $y, provided that our understandings and related assumptions do not change significantly between now and the end of construction.” In order for this to work correctly the Review Team must supply the program with the probable range of unit costs and quantities for each assumption cell in the spreadsheet, and must supply an indicative characterization for the probability spread for each of these cells. This shows up in the form of probability distribution curves. The triangular probability curves are commonly used when relying on expert opinion. In the case of this workshop, the Review Team utilized a triangular probability distribution for the vast majority of assumption cells. The probability assumption curves depict how the Project Team modeled the major cost elements for this Project. Based on these assumption curves, the Monte Carlo analysis would select a random number for each of these curves and sum each random selection for the resulting probabilities. The probability assumption curves shown in this section are only for those items that have a significant impact on the results of the analysis.

Forecast Results for Total Project Cost

Figures 2 and 3 depict the forecast curve for the total project cost in YOE dollars for the Preferred Alternative and Phase I, respectively. These costs include design/engineering, construction, construction engineering, environmental mitigation, ROW, costs expended, escalation, and contingencies. The certainty in Figure 2, shown by the blue shaded area, represents an 80% probability that the total YOE cost for the project will be between $6,748.0 million and $11,495.4 million. Additionally, the figure shows that the estimate at the 70% level of confidence is $9.474.9 million (YOE). This can be interpreted as a 70% probability that the total Preferred Alternative cost will be $9,474.9 million (YOE) or less. Alternatively, there is a 30% probability the project cost will be $9,474.9 million (YOE) or higher.

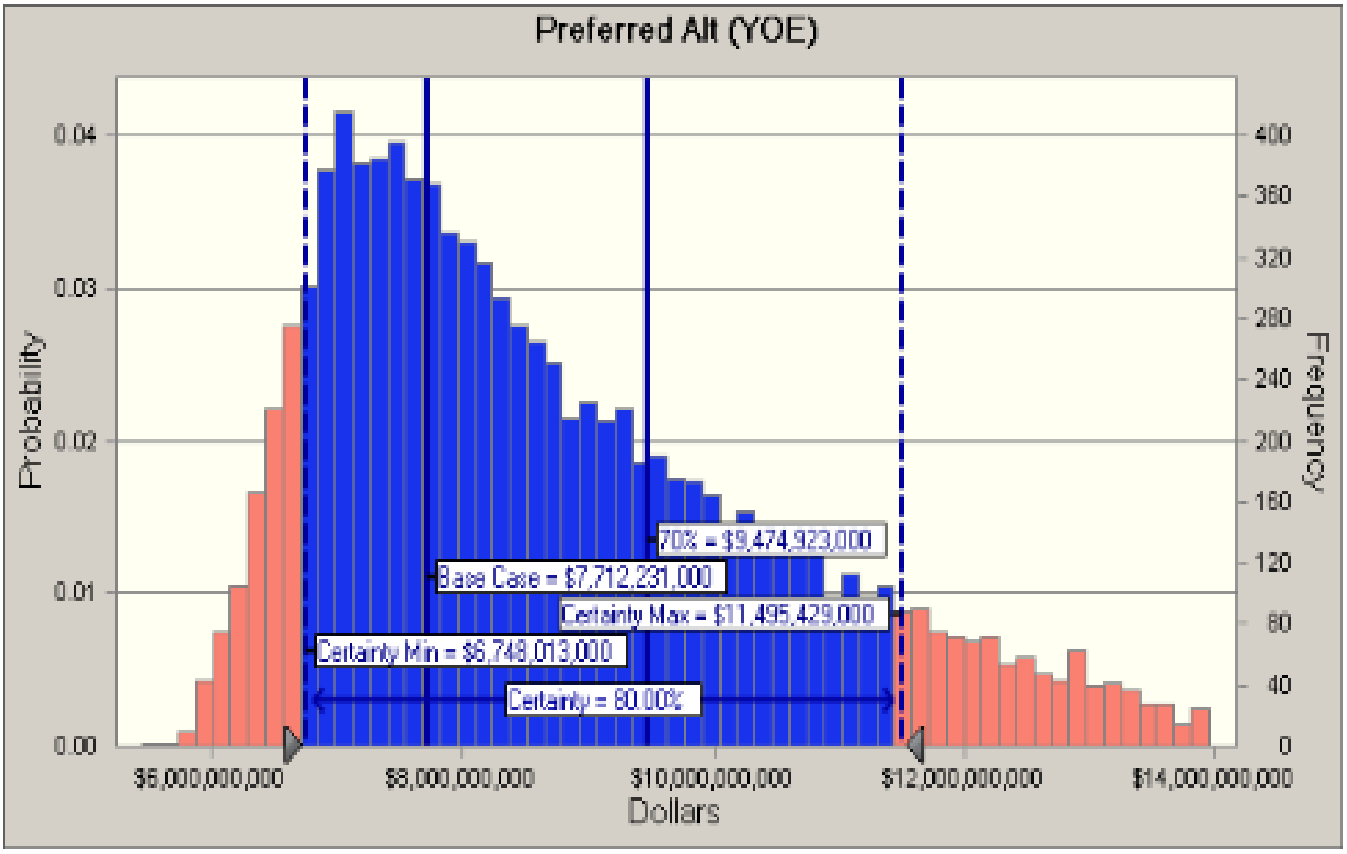

FIGURE 2 – Distribution of Total Project Year of Expenditure Costs for the Preferred Alternative showing base cost and 70% probability cost

Figure 3 shows that there is an 80% chance that the total Phase 1 project cost will be between $1,098.3 million and $1,374.1 million (YOE). Additionally, the figure shows that the estimate at the 70% level of confidence is $1,271.2 million (YOE). The cost at the 70% probability is considered the minimum amount of funding needed to approve the Major Project Financial Plan for the project. The base case (i.e. estimate after adjustments made during review) of $1,100.6 million (YOE) is also shown in Figure 3. As shown, the cost at 70% minimum exceeds the base case estimate by $170.6 million dollars. This difference is approximately a 16% increase to the base case estimate.

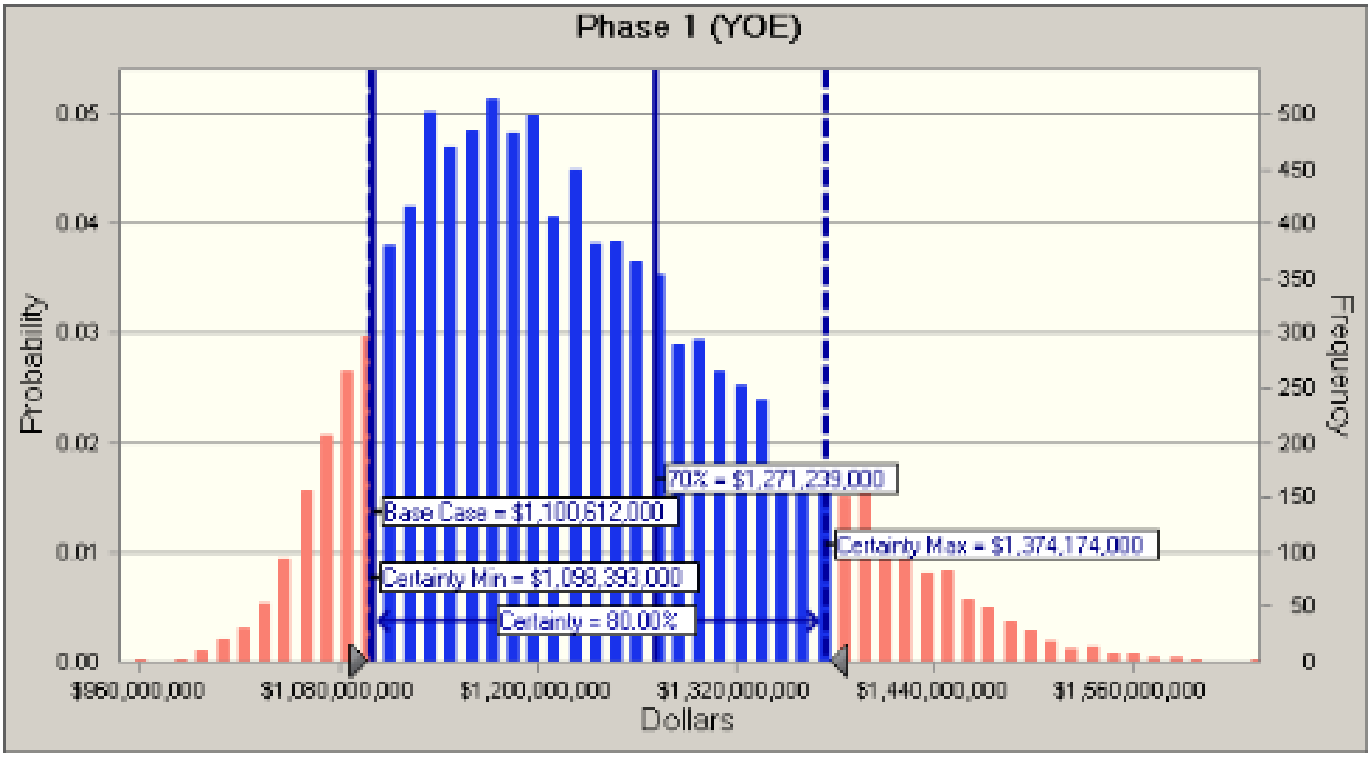

FIGURE 3 – Distribution of Total Project Year of Expenditure Costs for Phase I showing base cost and 70% probability cost

Percentile Rankings of Total Project Cost

The values that comprise Figures 2 and 3 are shown in Table 2 as percentile rankings of the total project costs in YOE dollars for the Preferred Alternative and Phase I. As shown in the table, there is a 70% probability that total Phase I project costs will be less than $1,271.2 million. However, there is only a 10% probability the project costs will be less than $1,098.4 million and a 10% probability of the project costs will exceed $1,374.1 million.

Percentile	Preferred Alternative	Phase 1
0%	$5,449,159,000	$953,461,000
10%	$6,748,013,000	$1,098,393,000
20%	$7,125,178,000	$1,130,345,000
30%	$7,482,515,000	$1,156,061,000
40%	$7,856,255,000	$1,181,538,000
50%	$8,290,487,000	$1,207,181,000
60%	$8,817,202,000	$1,237,705,000
70%	$9,474,923,000	$1,271,239,000
80%	$10,305,317,000	$1,312,975,000
90%	$11,495,429,000	$1,374,174,000
100%	$16,346,966,000	$1,629,202,000

TABLE 2 – Percentile Rankings of Total Project Cost in Year of Expenditure Dollars

Sensitivity Analysis

The sensitivity charts in Figures 4 and 5 show how the variation in the cost estimate components impact the variation of the total cost estimate for the project. Those inputs at the top of the graph have greater impact on the variation in total project costs (both positively and negatively) while those at the bottom have less impact. As shown in Figure 4, the unit cost of construction escalation accounts for 81.5% of the total project cost variability. This chart can be used to better understand the key drivers in the project cost estimate. Assumption curves for inputs with a significant impact on the total cost estimate are discussed in greater detail below.

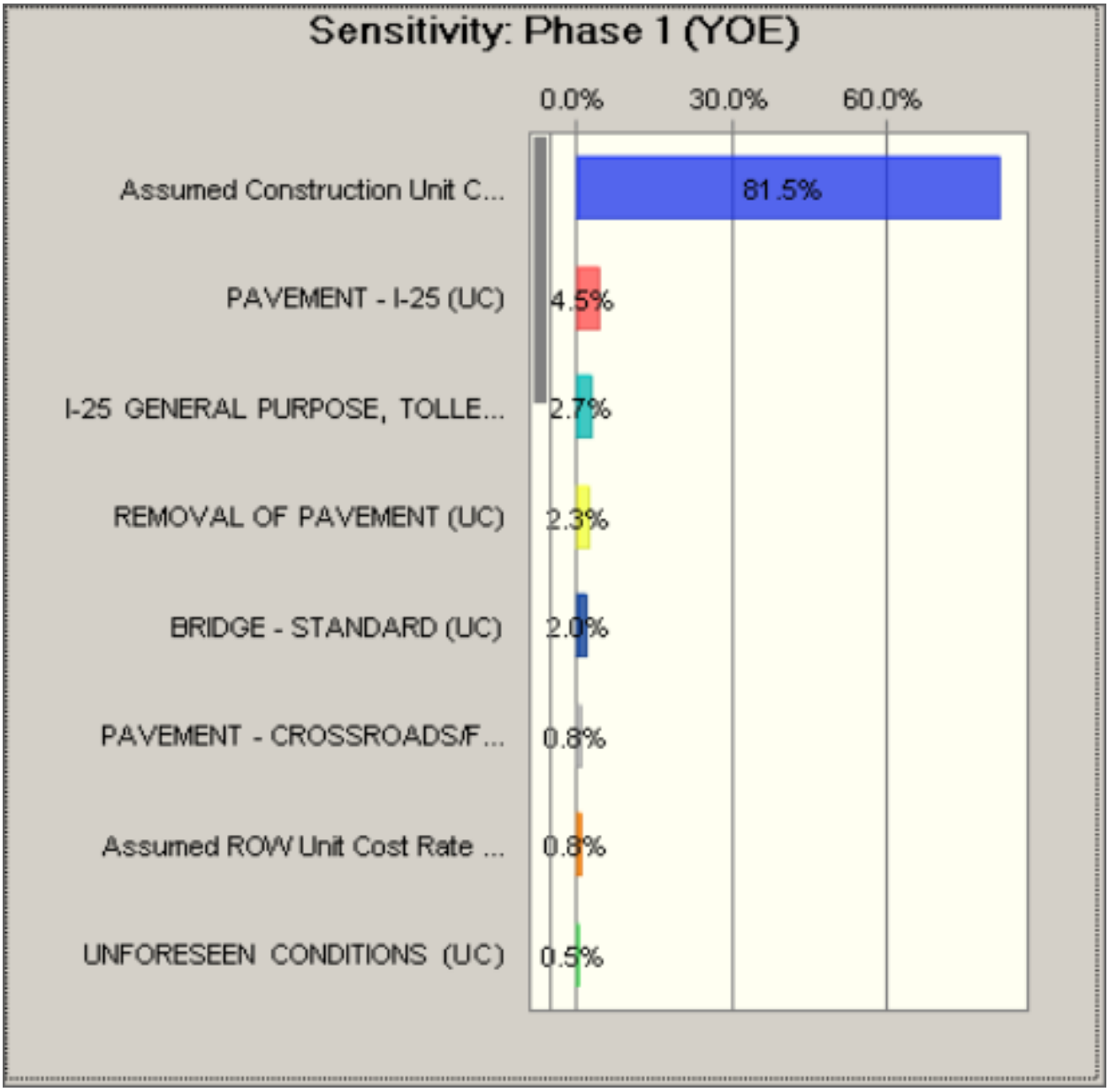

FIGURE 4 – Sensitivity Chart for Year of Expenditure Costs of the Preferred Alternative

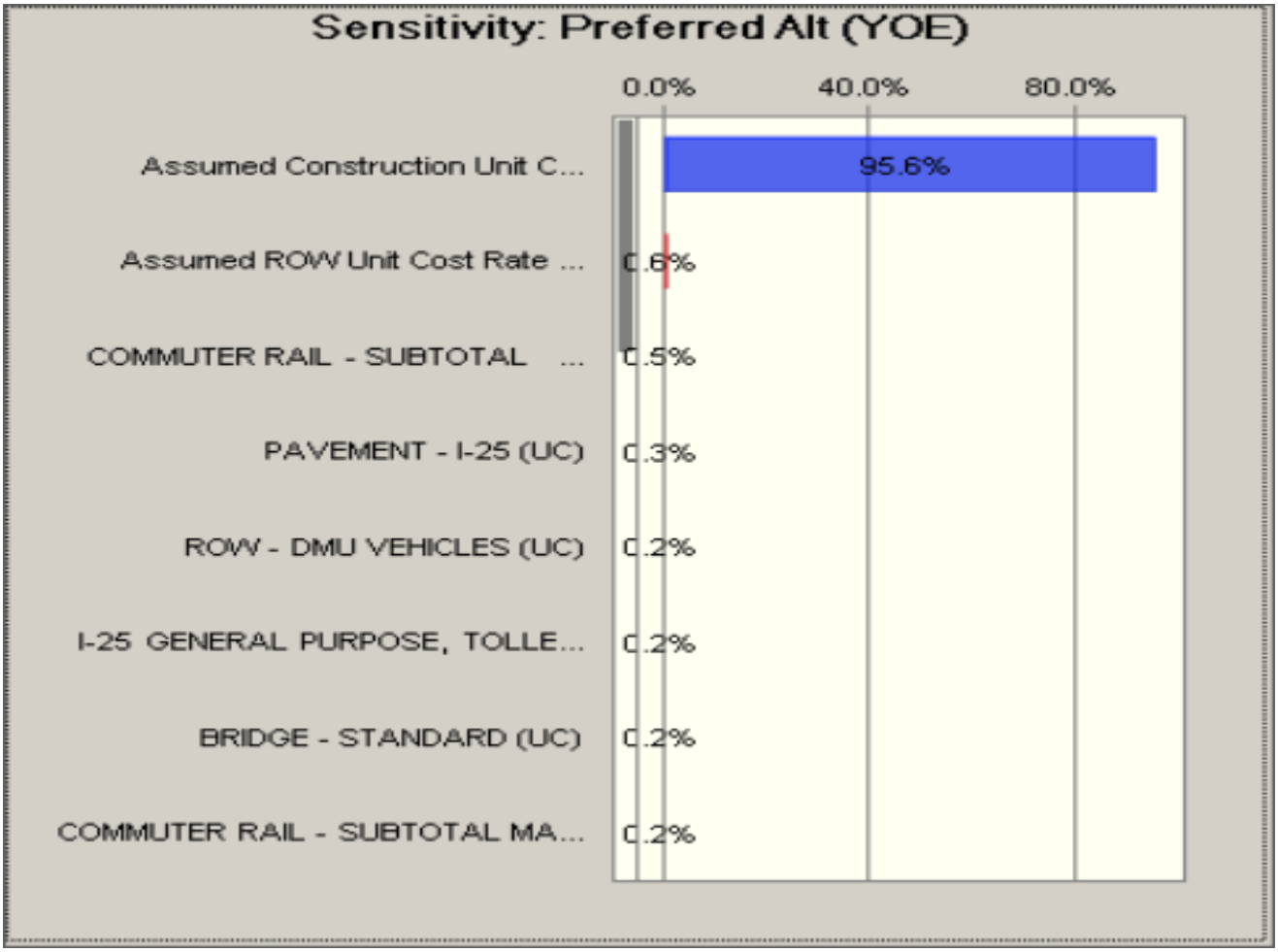

FIGURE 5 – Sensitivity Chart for Year of Expenditure Costs of Phase I

Selected Assumptions Curves

Assumed Construction Unit Cost Rate of Escalation

This project's anticipated schedule assumes the Preferred Alternative will be constructed by 2075 and that Phase I of the project will be completed by 2035. After reviewing data from CDOT's Construction Cost Index, as well as escalation rates and methodologies of area MPOs and the RTD, the project team decided the best way to handle inflation was to use a constant escalation rate for the duration of the project. This approach seemed to better reflect the long project length and fluctuations in the economy that typically occur from year to year. An escalation rate of 3.3% with a range of 2.74 -5.34% was used. Figure 6 shows the assumption

curve for construction unit cost rate of escalation. This range represents a low to moderate level of inflation.

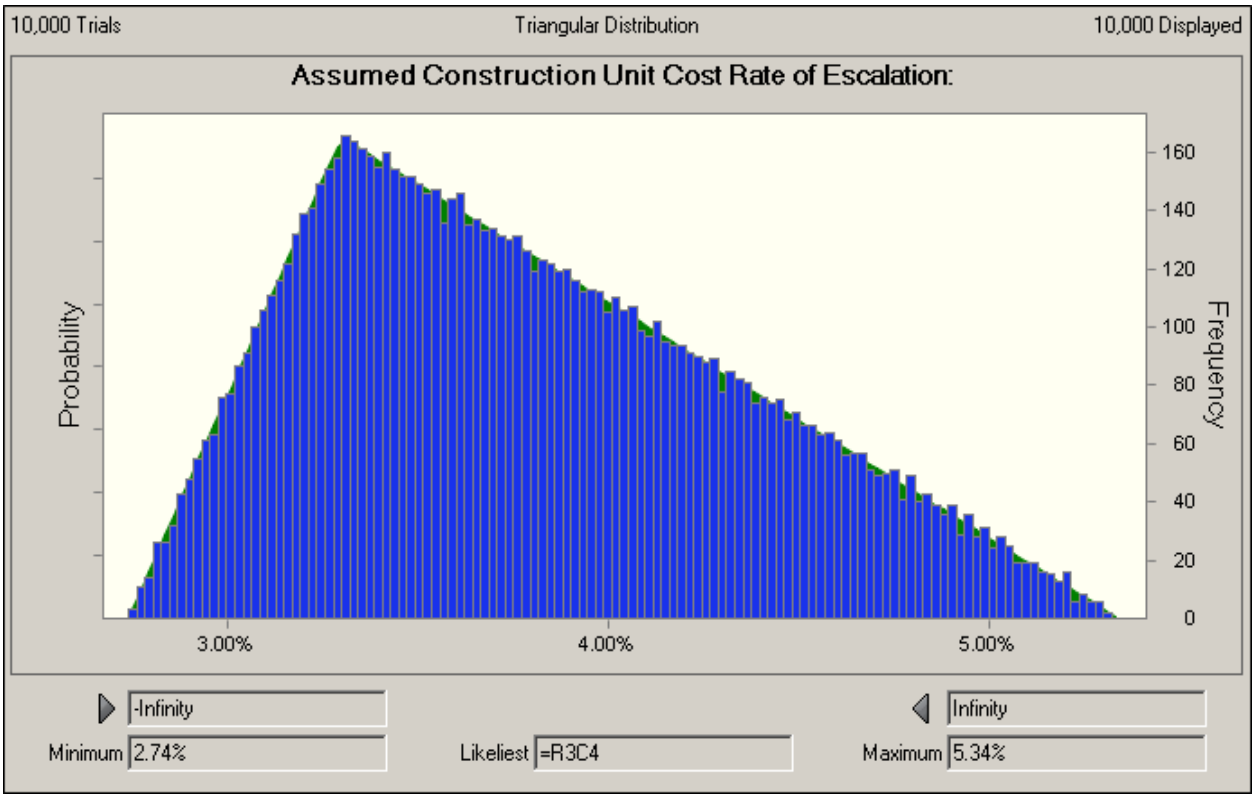

FIGURE 6 – Assumption Curve for the Construction Unit Cost Rate of Escalation

Assumed ROW Unit Cost Rate of Escalation

The project team also modeled the uncertainty of the rate of escalation for ROW. Based on data such as the home price index from 1970 to 2010 and market value assessments from area assessors' offices, CDOT's ROW Unit recommended a ROW rate of escalation of 5%. Based on this input, the escalation rate was modeled as having a possible minimum value of 4% and a maximum value of 6%. Figure 7 shows the triangular distribution curve used to model this variation in ROW unit cost rate of escalation.

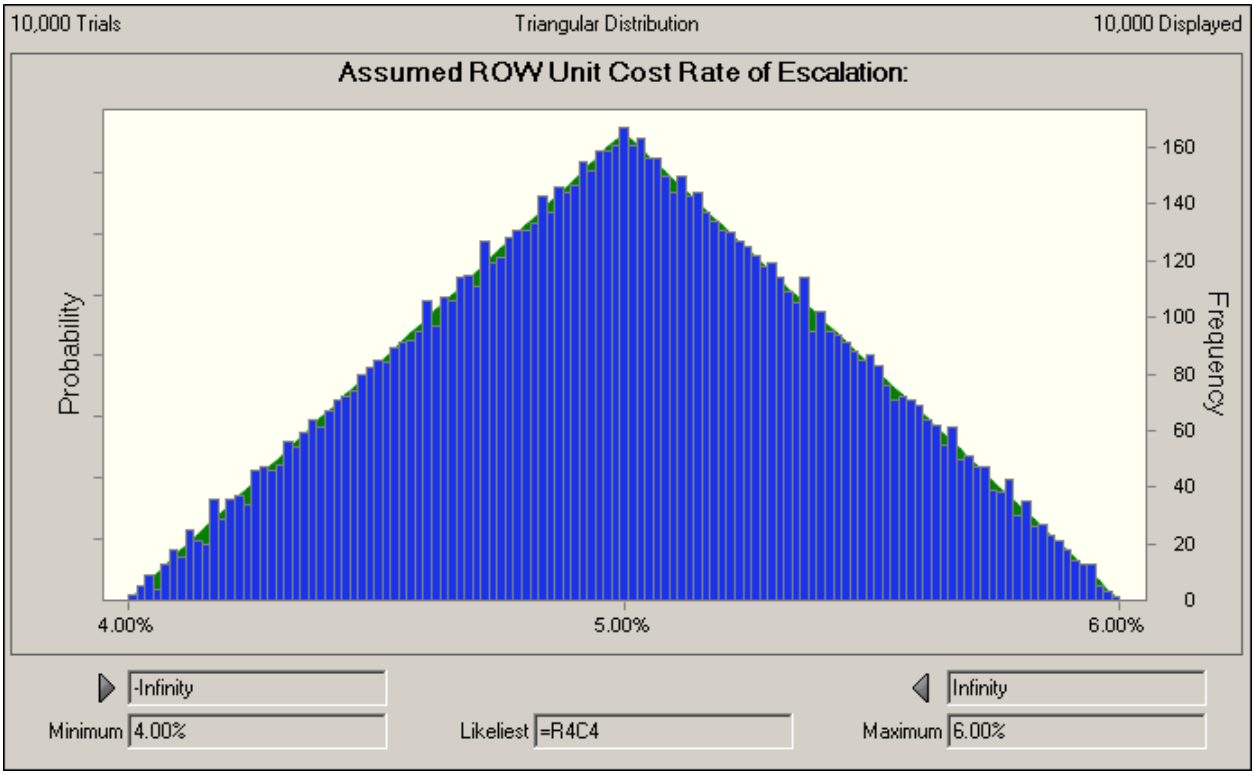

FIGURE 7 – Assumption Curve for the Assumed ROW Unit Cost Rate of Escalation

Earthwork – Region 4 (UC)

During the review, it was determined there is uncertainty in the cost associated with the earthwork for Region 4. The unit cost of earthwork included embankment material, unclassified excavation and muck excavation and was based on similar, recently completed projects on I-25 in Region 4. The cost of earthwork ranged from 15% to 30% of the quantified, major items in the estimate with a midpoint of 22.8%. Figure 8 shows the Student's t distribution used to model the variation in the unit cost of earthwork in Region 4.

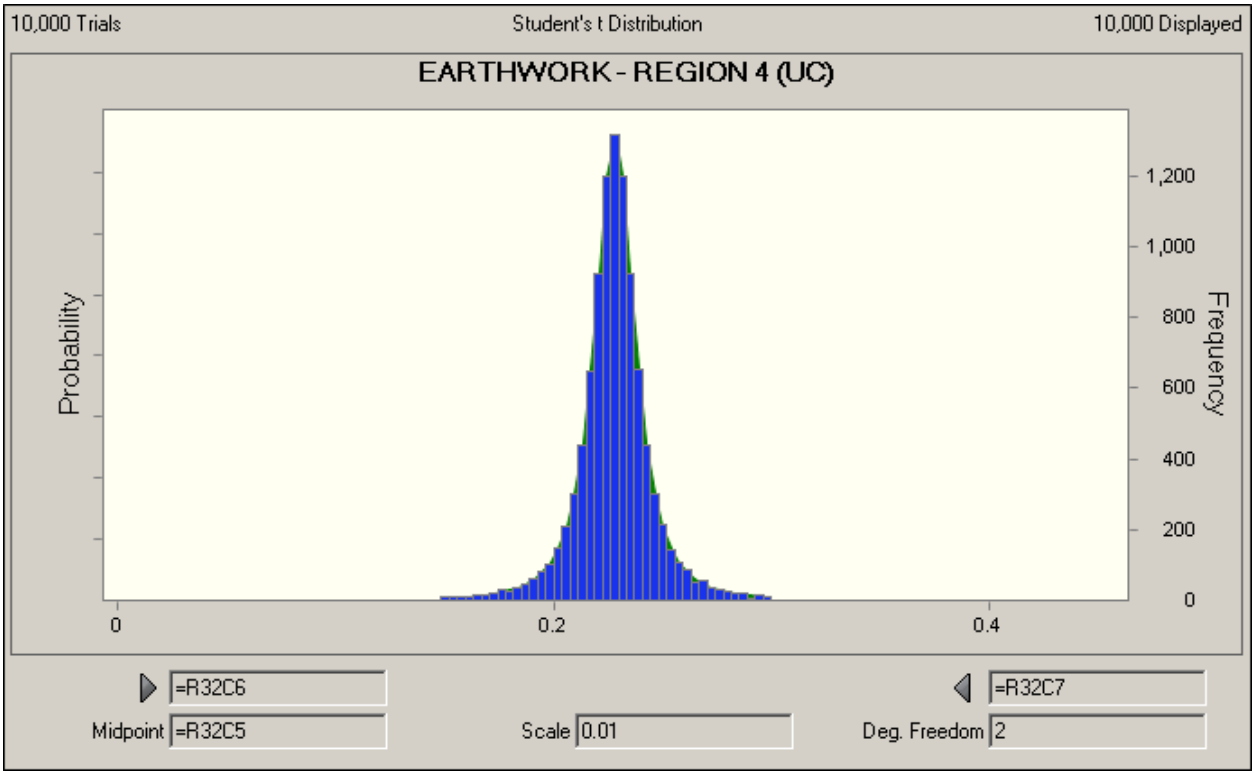

FIGURE 8 – Assumption Curve for Construction Inflation in Year 2013

Commuter Rail Unforeseen Conditions

The costs of the commuter rail are a major component of the Preferred Alternative. Additionally, because of the current level of design, limited experience with commuter rail in the region, unidentified owner/operator of the rail service, and lack of final agreements with the railroad companies, the project team determined there are unknowns associated with the cost of the commuter rail that should be modeled using the Monte Carlo simulation. Based on these considerations, the cost of items related to unforeseen conditions was estimated at 5% of the construction cost of the commuter rail bid items with a variation from 0% to 5%. Figure 9 shows the triangular distribution curve used to model the variation in the unforeseen conditions for commuter rail.

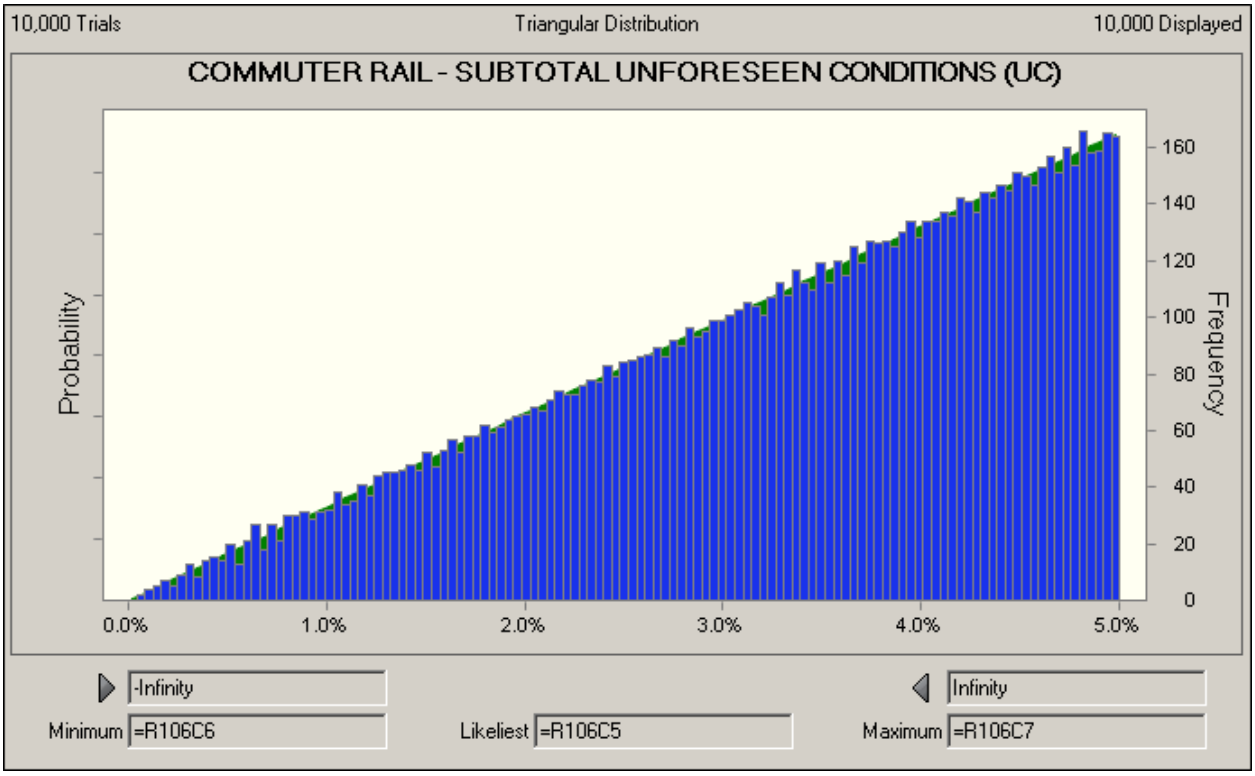

FIGURE 9 – Assumption Curve for Commuter Rail Unforeseen Conditions

Schedule Analysis

Because of the current development stage of the project and duration of the project, the project team determined that it would be beneficial to analyze some of the effects of the schedule on the cost estimate. The current schedule is based on the 2035 long range fiscally constrained plan that identifies when the funds will become available for construction. It was determined that a one-year delay in the current project schedule for the Preferred Alternative would increase project cost by approximately $385.1 million. For Phase 1, a one-year delay to the project would be an additional $48.4 million.

Additionally, an analysis was performed that modeled variability associated with the schedule of the project. Ranges were place on the mid-year of construction in the original cost estimate worksheet and a Monte Carlo simulation was executed. For example, the construction of the SH 7 Par-clo Interchange scheduled to take place in Phase I was modeled as most likely occurring in 2030 with a possibility of occurring between 2025 and 2035. Table 3 shows the results of this analysis and its comparison with the forecast results discussed in previous

sections of this report that did not model the variability of schedule. The results are most significant for the Preferred Alternative. These results show that by adding flexibility to the schedule and the possibility of accelerating construction, the total project 70% level of confidence cost for the Preferred Alternative decreases by approximately $600 million. The full Crystal Ball Report for this analysis is included in the Appendix D.

		FORECAST	
		No Schedule Variability	**Schedule Variability**
PREFERRED ALTERNATIVE	70% (YOE)	$9,474,923,000	$8,877,822,000
	Baseline (YOE)	$7,712,231,000	$7,712,231,000
	70% (2009)	$2,144,469,000	$2,144,113,000
	Baseline (2009)	$2,178,470,000	$2,178,470,000
PHASE I	70% (YOE)	$1,271,239,000	$1,211,703,000
	Baseline (YOE)	$1,100,612,000	$1,100,612,000
	70% (2009)	$677,280,000	$677,424,000
	Baseline (2009)	$640,997,000	$640,997,000

TABLE 2 – Percentile Rankings of Total Project Cost in Year of Expenditure Dollars

Summary

This probabilistic analysis resulted in a cost estimate at the 70% confidence level of $9,474.9 million (YOE) for the Preferred Alternative of the North I-25 Project. The cost for Phase I at the 70% confidence level was $1,271.2 million (YOE). These costs should be reported in the Final EIS for the project, as well as in any project information conveyed to the public. The 70% confidence level is also the minimum amount of funding that must be shown for the approval of the Financial Plan. The Appendix includes a PDF file of the entire report of inputs and results of this analysis.

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APPENDIX

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Appendix A

CER Agenda

AGENDA
FHWA Cost Estimate Review Meeting

NORTH I-25 EIS
information. cooperation. transportation.

CDOT Region 4 - North I-25 EIS **@CDOT Region 6**
Monday, July 12 to Friday July 16, 2010 **North Holly Office Training Classroom**
4670 Holly Street, Unit D Denver, CO 80216

Project Introduction **Monday, July 12**

8:00	AM	Field Review
12:00	PM	Lunch
1:00	PM	Introductions and Overview of CER Process by FHWA
2:00	PM	Project and Cost Estimate Methodology Overview
2:30	PM	Escalation
3:30	PM	Removals/Relocations
5:00	PM	Adjourn

Roadway **Tuesday, July 13**

8:30	AM	Construction/Reconstruction (Base and Surface Treatments)
9:30	AM	Earthwork
10:30	AM	Landscaping, Roadside Features
11:30	AM	Lunch
12:30	PM	Bridges/Structures/Retaining Walls/Sound Walls
1:30	PM	Port of Entry
2:30	PM	Unforeseen Conditions
3:30	PM	Utilities/Planning and Engineering
4:30	PM	Right-of-Way
5:00	PM	Adjourn

Transit and Additional Roadway **Wednesday, July 14**

8:30	AM	Express Bus and Commuter Bus
9:30	AM	Carpool Lots
10:30	AM	Commuter Rail including Insurance and Legal
11:30	AM	Lunch
12:30	PM	Lighting, Traffic Signals, Permanent Signing/Striping
1:30	PM	Intelligent Transportation System, Managed Lane System
2:30	PM	Construction Traffic Control
3:30	PM	Drainage/Erosion Control
4:30	PM	Mobilization
5:00	PM	Adjourn

Team Work and Closeout **Thursday, July 15**

8:30	AM	Items not previously covered (or follow upon previous line items)
9:30	AM	CER Team Work
12:00	PM	Lunch
1:00	PM	Closeout Dry Run
2:00	PM	Closeout Presentation
5:00	PM	Adjourn

Friday, July 16 Closeout Presentation (If the review progresses longer than expected, then the Closeout Presentation could be Friday morning; TBD)

Appendix B

CER Sign-In Sheet

7-12-10

Cost Estimate Review

Name	Organization	Email
Holly Bock	Felsburg Holt & Ullevig	Holly.Bock@fhueng.com
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Danielle Smith	Jacobs Engineering	Danielle.Smith@Jacobs.com
Steven Griffin	CDOT R4	Steven.Griffin@dot...

Name	Organization	Email
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I 25 North Corridor
Closeout Presentation - July 15

Bernie Kuna	FHWA RC
Latoya Johnson	FHWA HQ
Ralph Rizzo	FHWA RC
Johnny Olson	CDOT R4-RTD
Myron Hora	CDOT R4 EPEM
Ina Zisman	CDOT R4 Traffic
Cindy Otegui	Felsburg Holt & Ullevig
Kendra Gabbert	FHU
Holly Buck	FHU
Angie Drumm	CDOT Grant Rq
Carol Parr	CDOT R4
Mark Gosselin	CDOT R4
Tom Anzia	FHU
Gus Bieber	CDOT
Long Nguyen	CDOT
Brian Wiltshire	Felsburg Holt + Ullevig
[redacted]	[redacted]
Shawn Cutting	FHWA
Pam Hutton	CDOT
Peggy Catlin	CDOT
Kathie Kelly	FHWA CO DIV
Monica Pavlik	FHWA CO DIV
Vivien Hoang	FHWA CO DIV
David Kosmiski	CDOT - R6

Appendix C

CER Probability Analysis Report

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Appendix D

CER Probability Analysis Report with Schedule Variability

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Appendix E

CER Closeout Presentation

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Appendix F

North I-25 CER Information Packet

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