Initial Financial Plan

As of December 1, 2013

I-94 Ford Freeway Modernization Project

I-96 to Conner Avenue

City of Detroit, Wayne County, Michigan

MDOT
Michigan Department of Transportation

U.S. Department of Transportation
Federal Highway Administration

Michigan Division

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March 5, 2014

In Reply Refer To:
HDA-MI

Mr. Kirk T. Steudle, P.E.
State Transportation Director
Michigan Department of Transportation
Lansing, MI

I-94 Modernization Project, I-96 to Conner Avenue Initial Financial Plan (IFP) Review

Dear Director Steudle:

Thank you for submitting the I-94 Initial Financial Plan dated December 1, 2013. We are of the opinion that the plan provides a comprehensive estimate of the cost, as well as the financial resources needed to complete the project. We hereby acknowledge that the Initial Financial Plan meets the requirements outlined in the FHWA Finance Plan Guidance.

The first annual update to the Finance Plans should be as of December 1, 2014 and is due to our office within 90 days (approximately March 1, 2015).

We particularly want to recognize the efforts your MDOT I-94 Major Project team made to prepare this plan since it is MDOT's very first financial plan to successfully satisfy the FHWA Major Project requirements. Since it was the first, this MDOT team had to create a framework that worked for Michigan. We look forward to achieving similar positive outcomes for Michigan's other major projects as they progress.

Sincerely,

Ryan Rizzo

Ryan Rizzo
Major Projects Manager

For: Russell L. Jorgenson, P.E.
Division Administrator

RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF TRANSPORTATION
LANSING

KIRK T. STEUDLE
DIRECTOR

December 18, 2013

Michigan Department of Transportation

I-94 Ford Freeway Modernization Project
I-96 to Conner Avenue
City of Detroit, Wayne County, Michigan
Initial Financial Plan

Letter of Certification

The Michigan Department of Transportation has developed a comprehensive Financial Plan for I-94 Ford Freeway Modernization Project, I-96 to Conner Avenue, City of Detroit, Wayne County, Michigan in accordance with the requirements of Section 106, Title 23, and the Financial Plan guidance issued by the Federal Highway Administration. The plan provides detailed cost estimates to complete the project and the estimates of financial resources to be utilized to fully finance the project.

The cost data in the Financial Plan provide an accurate accounting of costs incurred to date and include a realistic estimate of future costs based on engineers' estimates and expected construction cost escalation factors. While the estimates of financial resources rely upon assumptions regarding future economic conditions and demographic variables, they represent realistic, estimates of available monies to fully fund the project.

We believe the Financial Plan provides an accurate basis upon which to schedule and fund I-94 Ford Freeway Modernization Project, I-96 to Conner Avenue, City of Detroit, Wayne County, Michigan. The Department will review and update the financial plan on an annual basis.

To the best of our knowledge and belief, the Financial Plan as submitted herewith, fairly and accurately presents the financial position of I-94 Ford Freeway Modernization Project, I-96 to Conner Avenue, City of Detroit, Wayne County, Michigan, cash flows, and expected conditions for the project's life cycle. The financial forecasts in the Financial Plan are based on our judgment of the expected project conditions and our expected course of action. We believe that the assumptions underlying the Financial Plan are reasonable and appropriate. Further, we have made available all significant information that we believe is relevant to the Financial Plan and, to the best of our knowledge and belief, the documents and records supporting the assumptions are appropriate.

Kirk T. Steudle, Director
Michigan Department of Transportation

December 18, 2013
Date

Enclosure
BFA:MF:FOD:EAT:BC:ak
cc: L. Mester, G. Johnson, M. Frierson, E. Timpf, T. Kratofil, T. Stepanski, B. Chapman, M. Bowerman, Executive File

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EXECUTIVE SUMMARY – PLAN OVERVIEW

The I-94 Ford Freeway Modernization Project (the Project) involves the complete reconstruction of 6.7 miles of I-94 in the City of Detroit, with widening from three lanes in each direction to four lanes in each direction. The Project includes the construction of continuous service roads along the mainline, new major interchanges, new bridges over I-94, and a new drainage system.

In December 2005, the Federal Highway Administration (FHWA) issued a Record of Decision (ROD), which identified the preferred alternative in the Final Environmental Impact Statement (FEIS) as the selected alternative (see Figure ES-1 below). The construction schedule for the Project as currently envisioned will span approximately twenty-four years.

Figure ES-1 Project Map

PROJECT SPONSOR, PARTNERS, AND MANAGEMENT

The Project Sponsors are the FHWA, the Michigan Department of Transportation (MDOT) and the City of Detroit. The overall management of the Project will be the responsibility of MDOT.

INITIAL FINANCIAL PLAN SUMMARY

This document is the Project's Initial Financial Plan (IFP). It is submitted by MDOT, as required by Section 106 of Title 23 of the United States Code, and is consistent with guidance issued by FHWA[1]. The IFP provides detailed cost estimates to complete the Project as well as estimates of financial resources to fund the segments of the Project that are currently scheduled for construction.

This IFP demonstrates the State's commitment to complete the Project, and for sound financial planning for Major Projects, as defined by Section 106 of Title 23 and modified by Section 1305 (b) of the Transportation Equity Act for the 21st Century (TEA-21), Section 1904 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), and Moving Ahead for Progress in the 21st Century Act (MAP-21) Public Law 112-141.

A Technical Memorandum entitled "**I-94 Detailed Engineering Report (DER) Conceptual Base Plan Design Opinion of Probable Cost"** is used as a basis to develop this financial plan. The memo is in Appendix A.

Within the IFP, the following topics are addressed (by chapter):

- **Chapter 1. Introduction** – This chapter provides an overview of the Project and the individual segments that together make up the Project, describes the management plan, and provides a history of the Project to date, including a review of the status of all ongoing activities.

- **Chapter 2. Project Cost Estimate** – This chapter provides a detailed description of the cost elements of the Project and provides current estimates of those costs. It also summarizes the costs incurred to date and provides detail on key cost-related assumptions.

  The current cost estimate is based on the state fiscal year (FY) 2013. The state FY is based on the period of October 1 through September 30.

  The total baseline estimated cost for the Project is $1,976.7 million in FY 2013 dollars. The projected year of expenditure cost (YOE), inflated to year of letting, is $2,913.4 million. The YOE estimate reflects the current project schedule and reasonable assumptions for future inflation. MDOT will continue to monitor and adjust the cost estimate based on new project-specific information, as well as

[1] Federal Highway Administration. *Financial Plans Guidance*, January 2007

information on economic conditions that will affect project costs. For purposes of this Financial Plan, unless otherwise noted, the YOE estimate is calculated to the year of the respective individual contract lettings.

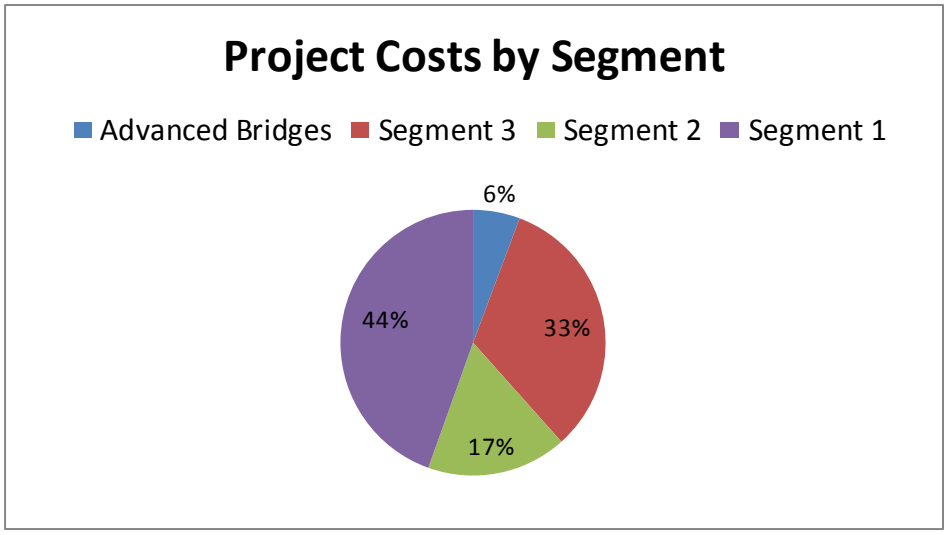
Table ES-1 and Figure ES-2 provide an overview of the Project costs. These costs are presented in YOE dollars based on the current project schedule, current cost estimates, and reasonable estimates of inflation.

For purposes of this Financial Plan, the Project has been broken into four Segments. Segments represent how the project was packaged for construction contracts or lettings, to represent the logical breaks in the construction schedule, or to reflect how the project has been grouped together by physical location, or by like elements. The Segments for this Project are Advanced Bridges, Segment 1 (Cass Avenue to east of I-96), Segment 2 (Chene Street to Cass Avenue including the I-75 interchange) and Segment 3, (Conner Avenue to Chene Street). As the Project will be constructed in a general southwest to northeast order, Project Segments in this IFP will typically be presented in reverse chronological order of Advanced Bridges followed by Segments 3, 2 and 1.

Table ES-1. Project Cost Estimate, by Segment (Year of Expenditure dollars, in millions)

Project Segment	Total Project Cost
Advanced Bridges	166.3
Segment 3	951.8
Segment 2	498.0
Segment 1	1,297.3
Total (Y.O.E) =	**$2,913.4**

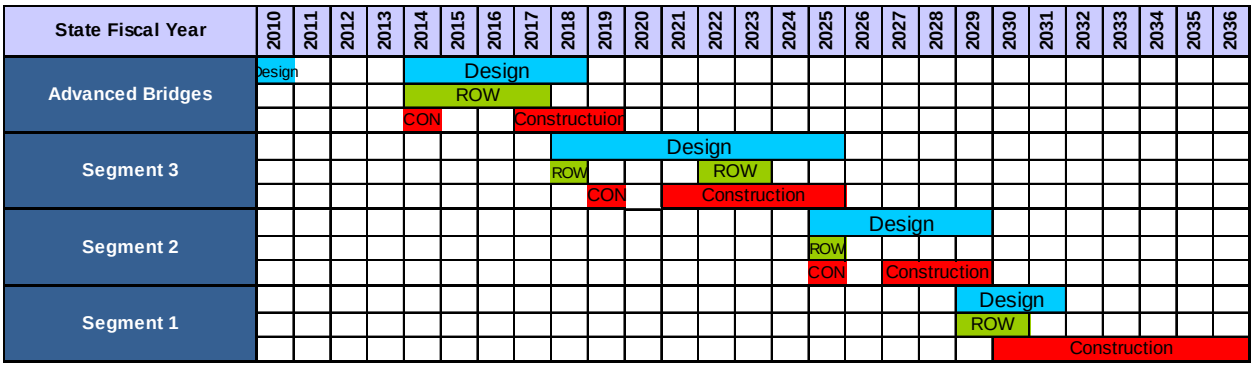
Figure ES-2. Project Cost Breakdown by Segment (Year of Expenditure dollars, in millions**)**



- **Chapter 3. Implementation Plan** – This chapter provides information on the planned schedule for implementation of all the Project elements. It also provides information regarding the assignment of implementation responsibilities and provides a summary of the status of necessary permits and approvals.

  Based on the current planned project delivery approach, the Project is scheduled to be constructed in 25 construction packages over a 24-year build out period to construction completion. Scheduled first is the Advanced Bridges segment, followed by Segment 3, then Segment 2, and finally Segment 1. The Project is scheduled to be physically completed by the conclusion of FY 2036. (See Appendix B for a detailed project schedule).

Figure ES-3. Project Schedule Overview



- **Chapter 4. Project Funding** – This chapter reviews MDOT's overall plan of finance for the Project, describes in detail the planned sources of funds, and reviews the funding plan in the context of the State's overall transportation program and available resources. The planned sources of funds in this chapter are shown in year of obligation.

  As currently conceived and for the purposes of this IFP, the Project will be funded with traditional funding; approximately 81.5 percent federal funding and 18.5 percent state funding with the City of Detroit responsible for contributing 12.5 percent of the state's portion. (*See Table ES-2 for a summary of funding planned for the Project*).

  Federal funding sources are from the National Highway Performance Program. State Transportation Funds are from the state restricted fund for transportation purposes as provided for in Michigan Public Act 51 of 1951, here after described as the State Trunkline Fund (STF). The City of Detroit must provide local funds to meet their minimum participation amount, as required by Michigan Public Act 51 of 1951.

Table ES-2. Summary Project Funding by Source

Funding Source	Expended / Obligated	Programmed	Total
Federal			
Formula funds (by category)			
National Highway Performance Program	135,494,702	2,238,906,243	2,374,400,945
SUBTOTAL - Federal	**135,494,702**	**2,238,906,243**	**2,374,400,945**
State			
State Match on Federal Formula Funds	-	-	-
Michigan State Trunkline Funds (Act 51)	26,911,908	444,690,734	471,602,642
SUBTOTAL - State	**26,911,908**	**444,690,734**	**471,602,642**
Local			
Local Match on Federal Formula Funds			
Act 51 partcipation	3,844,558	63,527,248	67,371,806
SUBTOTAL - Local	**3,844,558**	**63,527,248**	**67,371,806**
GRAND TOTAL	**$166,251,169**	**$2,747,124,224**	**$2,913,375,393**

- **Chapter 5. Project Cash Flow** – This chapter provides a summary of the annual cash flow needs for the Project. Project cash needs are shown by year in Figure ES-4. The planned sources and uses of funds at the summary level are shown in Figure ES-5 and Figure ES-6. Chapter 5 discusses cash flow and sources and uses in detail. Note the Segment for Early Preliminary Engineering (EPE) is not included with the cash needs, as the segment was completed in prior fiscal years and is not part of this IFP.

Figure ES-4. Total Project Annual Cash Flow (Year of Expenditure dollars, in millions)

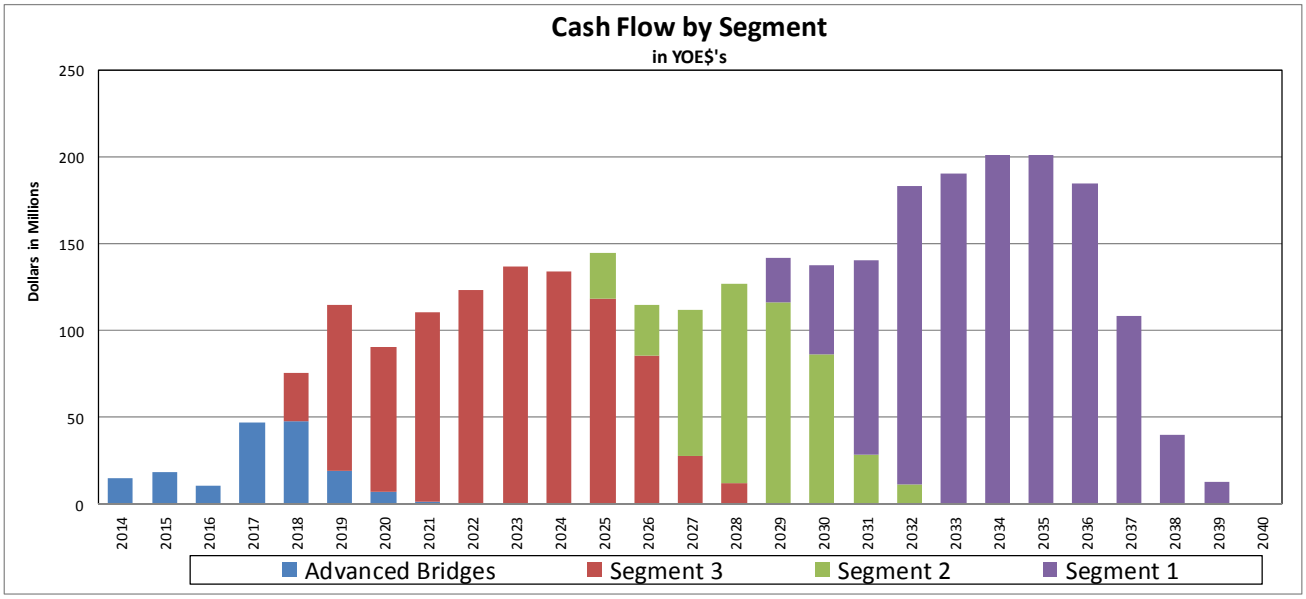


Figure ES-5. Total Project Sources of Funds

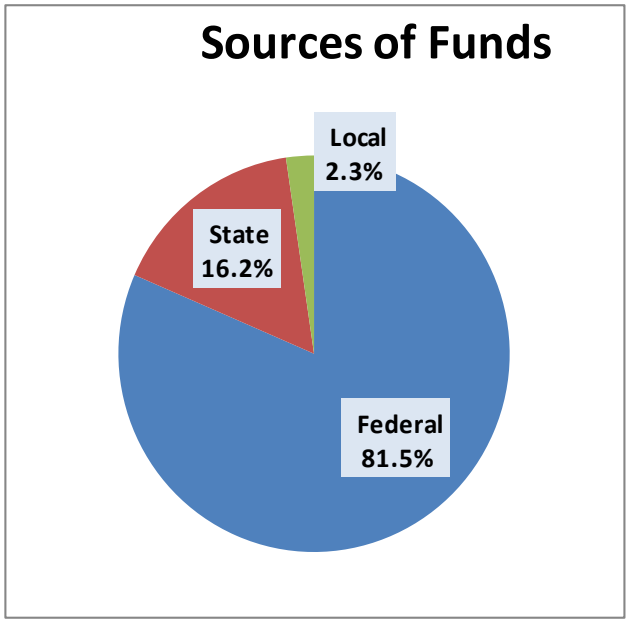
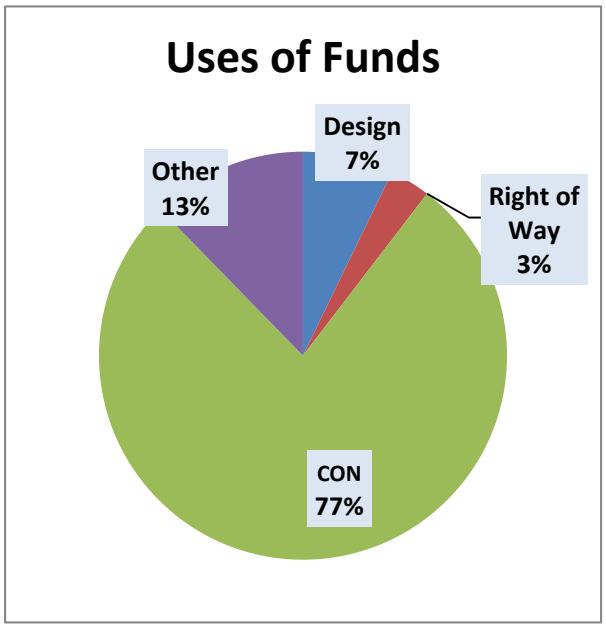


Figure ES-6. Total Project Uses of Funds



- Chapter 6. Other Factors – This chapter addresses a number of important factors, which could affect the Project including interdependencies with the transportation program, budgets, and other projects.

ANNUAL UPDATES

MDOT is fully committed to meet its obligations under this plan based on its current legal authorities. Circumstances can change and alternatives may present themselves as superior to the baseline plan, as articulated in this document. Future annual updates will account for any such revisions to the funding plan.

MDOT has selected the anniversary date method to establish the date for which data will be refreshed and to establish the date for annual updates. The anniversary date for this IFP is December 1, 2013. MDOT will provide annual updates using data that is current as of each December 1st, until the project is substantially complete. Each updated financial plan will be submitted within three months of the December 1st anniversary date in accordance with major project requirements.

CONCLUSION

This IFP creates a record of planned expenditures and funding sources secured for the Project, and documents sources of funding through project completion. The presentation of this IFP is based upon currently available information and as such, MDOT is fully prepared to complete the Project on schedule and in accordance with the projected funding requirements.

CHAPTER 1 – INTRODUCTION

PROJECT DESCRIPTION

The Project involves the complete reconstruction of 6.7 miles of I-94 in the City of Detroit, widening it from three lanes in each direction to four lanes in each direction. The Project includes the construction of continuous service roads along the mainline, new major interchanges, new bridges over I-94, and a new drainage system. In December 2005, the FHWA issued a Record of Decision as the preferred alternative in the FEIS as the selected alternative.

The project begins just east of the I-94/I-96 interchange, includes the I-94/M-10, & I-94/I-75 freeway-to-freeway interchanges, and ends just east of the I-94/Conner Avenue interchange. The project scope includes:

- Construction of an additional lane in each direction along I-94 (total of four through lanes in each direction).
- Reconstruction of the two freeway-to-freeway interchanges
- Reconstruction of various partial and full-service interchanges
- Removal and/or replacement of a number of pedestrian, railroad and vehicle bridges
- Construction of continuous service drives along the corridor and through the interchanges

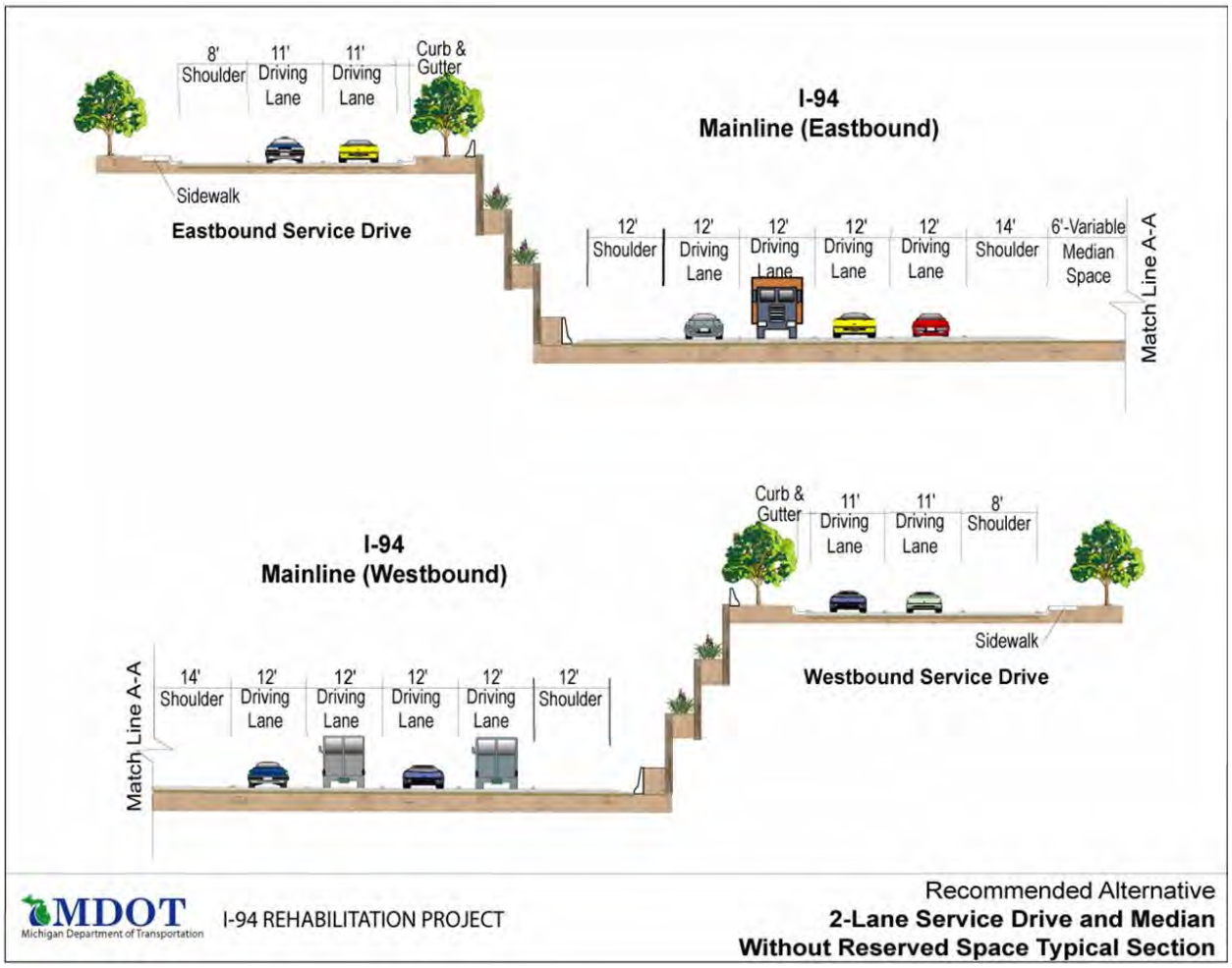
Figure 1-1. Project Location Map

Because of the proposed interchange improvements at M-10 and I-75, the study limits include portions of these limited-access highways. On M-10, the project limits extend from Pallister

Avenue in the north to Martin Luther King Boulevard in the south, and on I-75, from East Grand Boulevard in the north to Warren Avenue in the south.

The existing mainline is a below-grade, six-lane facility with three travel lanes in each direction. I-94, from I-96 to Conner Avenue, is in an area of dense urban development with closely spaced interchanges. These interchanges serve numerous major traffic generators and provide access to Detroit's central business district. The project area includes two major freeway-to-freeway interchanges, eight interchanges with local streets, equating to ten interchanges in less than seven miles. More than 66 bridges cross I-94 between East Grand Boulevard and Conner Avenue. A discontinuous series of service roads provides linkage to local streets.

Figure 1-2. Mainline Cross Section



The Project consists of four separate segments, which are expected to be broken down into 25 separate construction packages involving major construction segments. Each segment is briefly described below.

- ADVANCED BRIDGES
- SEGMENT 1 - EAST OF I-96 TO CASS AVENUE INCLUDING THE M-10 INTERCHANGE
- SEGMENT 2 - CASS AVENUE TO CHENE STREET INCLUDING THE I-75 INTERCHANGE
- SEGMENT 3 - CHENE STREET TO EAST OF CONNER AVENUE

Early Preliminary Engineering

The consultant firm of Parsons Brinkerhoff performed the EPE for the entire Project from September 1994 to December 2005. The consultant firm of CH2MHill developed the engineer's detailed cost estimate as transmitted to MDOT on June 8, 2010. The total cost of the EPE segment was $21 million. Expenses were incurred between FY 1994 and FY 2010 to complete the Feasibility Study, Environmental Clearance Documents, and the DER. The I-94 Project reports can be found on the Project website at http://www.michigan.gov/mdot/0,1607,7-151-9621_11058---,00.html or by searching michigan.gov/mdot/studies with your browser. No further discussion of EPE is in the IFP nor is this prior year cost included in segment presentations, funding or cash needs.

Advanced Bridges

There are 67 bridges included in the entire Project. Based on the prioritization of state of good repair and critical need, the bridge on Van Dyke was determined to be in greatest need of replacement. FHWA authorized the construction on March 2011 under the designation of operational independence and non-concurrent construction. This bridge project is no longer part of the greater I-94 Project and is not discussed in this document. Authorization for the eleven most critical bridges was advanced to this Segment; they have priority for scheduling, and funding. Seven of these eleven bridges are within the termini of Segment 3, between Chene Street and Conner Ave. Segment 3 is the next phase to be scheduled, followed by Segment 2, and then Segment 1.

Segment 3

Segment 3 is from east of Conner Avenue to Chene Street. This segment is 3.8 miles long and includes freeway widening and reconstruction, new bridges, interchanges, and service drives.

Segment 2

Segment 2 is from Chene Street westerly to Cass Avenue and includes the I-75 freeway-to-freeway interchange reconstruction, as well as freeway widening and reconstruction, new bridges, interchanges, and service drives. The segment is 1.5 miles long.

Segment 1

Segment 1 is from Cass Avenue westerly to just east of I-96 and is 1.5 miles long. It includes the M-10 freeway-to-freeway interchange reconstruction as well as freeway widening and reconstruction, new bridges, interchanges, and service drives.

PROJECT SPONSOR, PARTNERS, AND MANAGEMENT

The Project Sponsors are the FHWA, MDOT, and the City of Detroit. FHWA and the City of Detroit are cost sharing partners. MDOT has management and oversight responsibility. MDOT is a separate state agency within the government of the State of Michigan. MDOT is self-funded with dedicated, legislatively restricted revenue sources. MDOT owns, operates, and maintains approximately 10,000 miles of trunkline. MDOT administers an annual budget of approximately $1.8 billion. The proposed Project is well within the capabilities of the department to manage successfully.

PROJECT MANAGEMENT AND OVERSIGHT

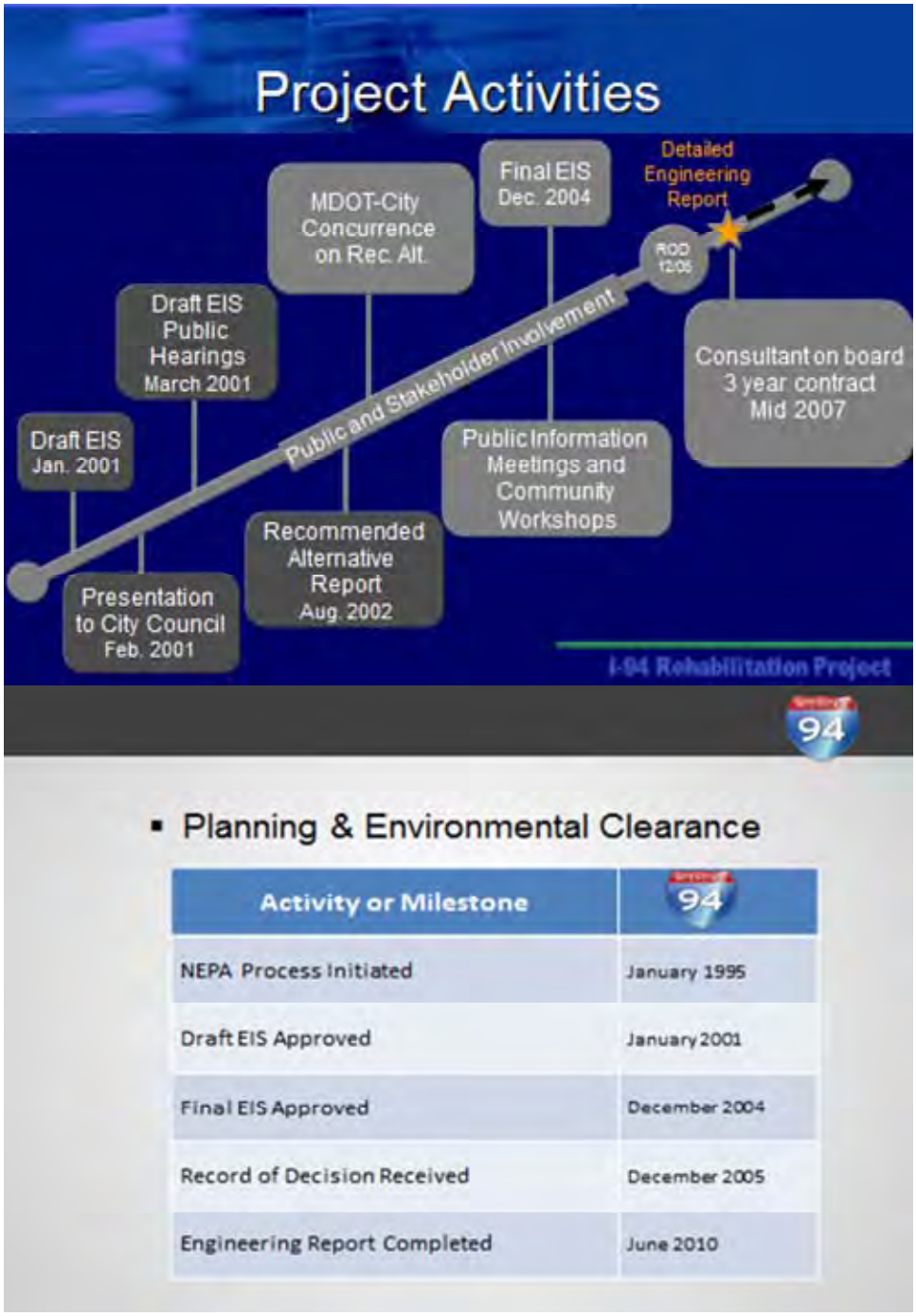
MDOT will oversee all Project activities from the preliminary engineering and environmental phases through final construction. To assist with this endeavor, MDOT will retain an Owners Representative (OR). Contractual agreements will not transfer the overall responsibility of project oversight to the Consultant. MDOT is also responsible for developing the Project Management Plan (PMP) to prescribe the project management and oversight method, including scope, schedule, cost oversight, and cost containment procedures.

Because of the complexity of the Project, MDOT oversight will be exercised by the MDOT Leadership Team, which is comprised of the Director of the Department, the Chief Operations Officer, and the Directors of the various bureaus within MDOT.

The MDOT Senior Project Manager is Terry Stepanski, P.E. It is the role and responsibility of the Senior Project Manager to provide overall administration, coordination, and technical oversight to the Project. Various levels of support staff and teams have been established with roles and responsibilities accountable to the Senior Project Manager. The specific roles and responsibilities are defined in the PMP.

OVERVIEW OF ACTIVITIES AND PROJECT SCHEDULE

Figure 1-3 Project History Timeline



Activity or Milestone	94
NEPA Process Initiated	January 1995
Draft EIS Approved	January 2001
Final EIS Approved	December 2004
Record of Decision Received	December 2005
Engineering Report Completed	June 2010

Table 1-1 presents an overview of the Project schedule. Project schedule is discussed more fully in Chapter 3.

Table 1-1. Project Schedule Overview by Segment and Element

State Fiscal Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Advanced Bridges	Design				Design																						
					ROW																						
					CON			Constructuior																			
Segment 3									Design																		
									ROW				ROW														
										CON		Construction															
Segment 2																Design											
																ROW											
																CON		Construction									
Segment 1																				Design							
																				ROW							
																					Construction						

CHAPTER 2 - PROJECT COST ESTIMATE

INTRODUCTION

This chapter provides a detailed description of the cost elements of the Project and provides current estimates of those costs. It also summarizes the costs incurred to date and provides detail on key cost-related assumptions.

COST ESTIMATE OVERVIEW

The detailed cost estimate was developed by the consultant firm of CH2MHill. It is herein referred to as the I-94 DER dated June 2010. Unit prices were reviewed and updated in September 2013 based on actual prices MDOT paid for similar work in the Metro area. The base cost estimate is in 2013 dollars.

The current total estimated cost for the Project is $1,976.7 million in FY 2013 dollars and $2,913.4 million based on the projected year of expenditure (inflated to year of letting) and current expectations of construction-related inflation. The year of expenditure estimate reflects the current Project letting schedule and reasonable assumptions for future inflation. MDOT will continue to monitor, adjust the cost estimate based on new information on underlying economic conditions, and to reflect any changes in Annual Updates to the Financial Plan.

It is highly possible the final cost of the Project will differ from the estimate. The DER report provides for a low to high range of costs. The lower and higher ends of the variance are unlikely to occur. As this Project progresses to final design, the range should become narrower. It is typical to determine the cost of a major project such as this one at 70 percent probability range. Considering all risks to project costs, the 70 percent probability range determines what the cost of the Project will be if most of these risks occur. Conversely, the Project cost has a 30 percent probability to cost more than the estimate at this level. The 70 percent probability estimate for this Project was $2,912.7 million, based on the results of the November 18-20, 2013 Cost Estimate Review (CER), see Appendix C.

The November 18-20, 2013 CER was an update of the initial CER performed in April 2011. The CER Team used the original base estimate of $1,652 million. The original base estimate includes $105 million of risks and opportunities added from the initial CER. New adjustments of $97 million were made with the most significant being added costs for mobilization ($50M), construction change order risks ($30M), and utilities ($5M). The CER Team's probabilistic risk at the 70 percent range resulted in a total cost, in YOE dollars, of $2,912.7 million. See Appendix D for the CER II Report.

MDOT, taking a slightly different approach, added the net estimate changes to the DER and inflated the 25 individual construction packages to year of letting. MDOT's YOE estimate is $2,913.4 million.

Independent from the CER II and MDOT estimates, the consulting firm of HNTB reviewed and created a cost estimate. HNTB was present during the CER II. HNTB has collaborated with MDOT for many innovative contracting workshops on this Project, including the I-94 Practical Design Workshop, MDOT Success Management Workshop, and SHRP2 Workshops. HNTB's independent estimate of this Project using the full build out schedule presented in this IFP is also consistent with the CER and MDOT totals.

COST ESTIMATING METHODOLOGIES AND KEY ASSUMPTIONS HISTORY

Baseline Cost Estimating Methodology by Cost Element

A Technical Memorandum entitled "I-94 DER Conceptual Base Plan Design Opinion of Probable Cost," is used as the basis to develop this financial plan. It can be found in Appendix A.

The Opinion of Probable Cost provides an estimate commensurate with the level of design development performed to date, and includes contingency factors to account for design elements, which are not fully developed at that time. The June 2010 un-inflated baseline cost was $1,811.7 million. An analysis of actual unit prices paid for similar work in the Detroit Metro region was performed by MDOT's internal Specifications and Estimates Section. Many unit prices increased due to inflation, however, a few unit prices remained the same, and some decreased which is reflective of the region's economy. The cost estimate was brought up to date by using MDOT's 2013 actual unit prices. Additional changes were made to the DER during the CER II. The updated baseline cost using this method is $1,976.7 million.

Baseline Inflation Assumption

The projects in the Advanced Bridge Segment are typical replacement bridge projects with little or no expectation of delays or unplanned costs. The design for these bridges will be let in the current fiscal year in one contract with construction planned for FY 2014 for the Woodward Avenue Bridge and all others planned in FY 2017. Inflation of 3 percent was added to the base costs.

A 3 percent annual inflation rate was applied to ROW purchases, design, construction, construction engineering, and utilities for the fourteen construction packages in Segments 3 and 2. These packages will be designed and built between FY 2018 and FY 2029. Inflation for all elements within Segment 1 was calculated at a slightly higher amount of 3.1 percent. The higher rate was used for Segment 1 due to economic influences discussed in the updated CER II. Segment 1 will be designed and built from FY 2029 – FY 2036.

The 3 percent inflation rate is slightly above the current Consumer Price Index rate for the region. MDOT will continue to monitor market conditions and adjust the inflation rates as appropriate. Adjustments for inflation will be reflected in the Annual Updates to the IFP.

COST ELEMENTS

The cost estimate to complete the Project is broken down into four segments. It is typical to accumulate costs incurred for EPE. As this element was completed in FY 2010, it is not discussed below, nor is the associated cost included in the presentation of cost estimate.

The costs for each project segment have been further broken down into major project elements as follows:

1) **Preliminary Engineering Road and Bridge (PE)** – Development of plans, specifications, and estimates necessary to let the Project for construction.

2) **Right of Way (ROW)** – Total costs to purchase ROW including appraisals, administration, management, and acquisition of required ROW.

3) **Construction** – Total estimated cost to construct the Project. Including clearing, drainage, guardrail, and other removals; earthwork; pavement and base materials; drainage and erosion control; structures; maintenance of traffic; sidewalk, curb and gutter and other miscellaneous items of construction; and mobilization.

   3(A) **Construction Contingencies** – The Association for the Advancement of Cost Estimating International defines contingency as "a specific provision for unforeseeable elements of cost within the defined project scope; particularly important where previous experience relating estimates and actual costs has shown unforeseeable events which will increase costs are likely to occur." Note the contingency is not intended to cover future inflation. The base cost estimate includes a contingency of 25 percent for structures and 25 percent for the roadway and all other items.

   3(B) **Miscellaneous and Incidentals** – various project-related activities such as sidewalks, curb and gutter, freeway lighting and landscaping, and handling of hazardous materials, wetlands, and cultural resources mitigation as well as historic mitigation of sensitive historic properties.

4) **Construction Engineering** – Engineering services required throughout the construction of the Project.

5) **Utilities** – all public and private utility relocation and new utility construction, such as telephone, electric, gas, fiber optics, water, sewer, and storm drainage.

6) **Owners Representative** - MDOT is planning to use an Owners Representative (OR) for this Project due to the complexities and duration of a modernization project in an established urban area of this magnitude. The OR will serve as an extension of the Senior Project Manager and will assist with project design, management, cost, schedule, and quality.

7) **Global Risks and Opportunities** - The initial CER disclosed many global risks and opportunities for the roadway segments of the Project. MDOT chose to manage the value of those risks and opportunities as a separate element.

Presentation of Project by Major Segment

Table 2-1 provides an overview of the Project costs by segment. These costs are presented in Baseline and Year of Expenditure dollars based on the current project letting schedule, current cost estimates, and reasonable estimates of inflation.

Table 2-1. Project Cost Estimate by Segment (Year of Expenditure dollars, in millions)

Project Segment	Total Project Cost
Advanced Bridges	166.3
Segment 3	951.8
Segment 2	498.0
Segment 1	1,297.3
Total (Y.O.E) =	**$2,913.4**

Advanced Bridges Segment

The Advanced Bridges segment of the Project includes eleven bridges for which MDOT has determined to be in the most critical need of replacement. Seven of the eleven bridges are within the same footprint as Segment 3. Preliminary engineering for Advanced Bridges began in FY 2010 for the Gratiot Bridge. One contract will be let for Design in FY 2014 and construction is scheduled to begin in FY 2014 with the Woodward Bridge and others to follow in FY 2017.

Table 2-2 provides an overview of the Advanced Bridges Segment of the Project. These costs are presented in year of expenditure dollars based on the current project letting schedule, current cost estimates, and reasonable estimates of inflation.

Table 2-2. Project Cost Estimate for Advanced Bridges (Year of Expenditure dollars, in millions)

Project Segment	Total Project Cost
AB#1 Gratiot	13.2
AB#3 MT. Elliot	22.7
AB#4 Second Avenue	28.0
AB#5 Chene & Concord	18.3
AB#6 Cadillac & Cass	16.5
AB#7 Brush & French	18.5
Woodward Bridge	15.1
Trumbell Bridge	6.8
Owners Representative Contract	15.0
Opportunity Buys (ROW)	12.0
Risks and Opportunities	-
Total (Y.O.E) =	**$166.3**

Segment 3

Segment 3 is the longest and most congested segment within the corridor; therefore, it was determined to schedule the Project from east to west after completing the Advanced Bridges. This segment consists of freeway reconstruction and widening along with the reconstruction of vehicular bridges over I-94, pedestrian bridge, railroad bridges, and service roads. Preliminary engineering and acquisitions of ROW will begin in FY 2018.

Segment 3 is scheduled for design in FY 2018. The design will be let as one package with oversight performed by the OR during all years of construction FY 2019–FY 2025. The Construction phase is scheduled from FY 2019–FY 2025. Table 2-3 provides an overview of Segment 3 of the Project. These costs are presented in Year of Expenditure dollars based on the current project letting schedule, current cost estimates, and reasonable estimates of inflation.

Table 2-3. Project Cost Estimate for Segment 3 (Year of Expenditure dollars, in millions)

Project Segment	Total Project Cost
#1 Dequindre	240.3
#2 St Aubin & Frontenac	174.9
#3 Frontenac, Burns, Conner	42.8
#4 Pedestrian Bridges	43.4
#5 Gratiot Ramps	41.8
#6 Norfolk Southern & Conrail	55.9
#7 Frontenac & Norcorss	124.4
#8 Pump Stations	26.9
#9 Temporary Widening	3.5
#10 Frontenac & Connor	118.4
Owners Rep Contract	26.9
Risks and Opportunities	52.6
Total (Y.O.E) =	**$951.8**

Segment 2

Segment 2 is scheduled for construction in years FY 2027–FY 2029. The most significant costs for this segment will be the reconstruction of the I-94/I-75 freeway-to-freeway interchange. Other work includes 1.5 miles of freeway reconstruction, service drive construction, and cross road bridges. Design will be let in one contract in FY 2025 with amounts allocated for the OR contract and global Risks and Opportunities throughout.

Table 2-4 provides an overview of Segment 2 of the Project. The costs are presented in Year of Expenditure dollars based on the current project letting schedule, current cost estimates, and reasonable estimates of inflation.

Table 2-4. Project Cost Estimate for Segment 2 (Year of Expenditure dollars, in millions)

Project Segment	Total Project Cost
#11 Between Cass & I-75	32.1
#12 Brush & Russell	305.6
#13 Second Ave & Russell	72.9
#14 Rehab I-75	6.2
Owners Rep Contract	16.9
Risks and Opportunities	64.2
Total (Y.O.E) =	**$498.0**

Segment 1

Segment 1 is the last segment to be scheduled. Construction lettings are anticipated to be in years FY 2030-FY 2036. The most significant construction packages in this portion of the Project include the reconstruction of the I-94/M-10 freeway-to-freeway interchange, the railroad bridges, and 1.5 miles of freeway reconstruction, service roads and cross road bridges. Costs by construction package are shown in the table and graph below. Table 2-5 provides an overview of Segment 1 of the Project. These costs are presented in Year of Expenditure dollars based on the current project letting schedule, current cost estimates, and reasonable estimates of inflation.

Table 2-5. Project Cost Estimate for Segment 1 (Year of Expenditure dollars, in millions)

Project Element	Total Project Cost
Owners Rep Contract	$3.2
Preliminary Engineering/Bridge	18.2
Preliminary Engineering/Road	48.6
Right-of-Way	24.4
CE	73.8
Construction	1,077.9
Risks and Opportunities	34.1
Utilities	17.2
Total (Y.O.E) =	**$1,297.3**

COST BREAKDOWN BY CONSTRUCTION SEGMENT AND PROJECT ELEMENT

Table 2-6 provides a summary breakdown of project costs by segment and project element, in year of expenditure dollars.

Table 2-6. Project Cost Estimate by Construction Segment and Project Element

Project Element	Cost by Segment				Total Project Cost
	Advanced Bridges	Segment 3	Segment 2	Segment 1	
Owners Representative	$15.0	$26.9	$16.9	$3.2	$62.0
Preliminary Engineering/Bridge	14.3	44.2	22.0	18.2	98.7
Preliminary Engineering/Road	-	-	0.4	48.6	48.9
Right-of-Way	20.1	38.4	10.8	24.5	93.7
CE	7.6	49.7	24.1	73.8	155.1
Construction	100.6	719.5	353.7	1,077.9	2,251.6
Risks and Opportunities	-	52.6	64.2	34.1	151.0
Utilities	8.8	20.4	5.9	17.2	52.3
Total (Y.O.E) =	**$166.3**	**$951.8**	**$498.0**	**$1,297.3**	**$2,913.4**

The following tables (Tables 2-7 through 2-10) provide a summary breakdown of project costs by element for each Segment of the Project.

Table 2-7. Advanced Bridges

Project Element	Cost by Segment										Total Project Cost
	AB#1 Gratiot	AB#3 MT. Elliot	AB#4 Second Avenue	AB#5 Chene & Concord	AB#6 Cadillac & Cass	AB#7 Brush & French	Woodward Bridge	Trumbell Bridge	Owners Representative Contract	Opportunity Buys (ROW)	
Owners Representative	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$15.0	$0.0	$15.0
Preliminary Engineering/Bridge	1.5	2.2	1.3	2.4	2.3	2.3	1.5	0.8	-	-	14.3
Right-of-Way	-	1.7	1.7	1.0	1.5	2.2	-	-	-	12.0	20.1
CE	0.7	1.3	1.7	1.0	0.7	0.8	1.0	0.4	-	-	7.6
Construction	9.7	16.7	22.2	12.8	9.9	11.1	12.7	5.6	-	-	100.6
Risks and Opportunities	-	-	-	-	-	-	-	-	-	-	-
Utilities	1.4	0.8	1.2	1.2	2.1	2.1	-	-	-	-	8.8
Total (Y.O.E) =	**$13.2**	**$22.7**	**$28.0**	**$18.3**	**$16.5**	**$18.5**	**$15.1**	**$6.8**	**$15.0**	**$12.0**	**$166.3**

Table 2-8. Segment 3

Project Element	Cost by Segment												Total Project Cost
	Dequindre	St Aubin & Frontenac	#3 Frontenac, Burns, Conner	#4 Pedestrian Bridges	#5 Gratiot Ramps	#6 Norfolk Southern & Conrail	#7 Frontenac & Norcorss	#8 Pump Stations	#9 Temporary Widening	#10 Frontenac & Connor	Owners Rep Contract	Risks and Opportunities	
Preliminary Engineering	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$26.9	$0.0	$26.9
Preliminary Engineering/Bridge	13.2	9.0	2.1	1.9	1.9	2.9	6.2	1.3	0.2	5.7	-	-	44.2
Preliminary Engineering/Road	-	-	-	-	-	-	-	-	-	-	-	-	-
Right-of-Way	9.8	10.2	3.0	6.8	5.6	-	2.2	-	-	0.7	-	-	38.4
CE	13.7	9.8	2.4	2.2	2.2	3.3	7.2	1.6	0.2	7.0	-	-	49.7
Construction	202.8	136.3	33.7	32.5	29.3	49.7	106.0	23.9	3.1	102.1	-	-	719.5
Risks and Opportunities	-	-	-	-	-	-	-	-	-	-	-	52.6	52.6
Utilities	0.8	9.6	1.6	-	2.8	-	2.8	-	-	2.9	-	-	20.4
Total (Y.O.E) =	**$240.3**	**$174.9**	**$42.8**	**$43.4**	**$41.8**	**$55.9**	**$124.4**	**$26.9**	**$3.5**	**$118.4**	**$26.9**	**$52.6**	**$951.8**

Table 2-9. Segment 2

Project Element	Cost by Segment						Total Project Cost
	Cass and I-75	Brush & Russel	Avenue and Russell	#14 Rehab I-75	Owners Rep Contract	Risks and Opportunities	
Owners Representative	$0.0	$0.0	$0.0	$0.0	$16.9	$0.0	$16.9
Preliminary Engineering/Bridge	1.9	16.1	3.9	-	-	-	22.0
Preliminary Engineering/Road	-	-	-	0.4	-	-	0.4
Right-of-Way	-	8.6	2.2	-	-	-	10.8
CE	1.9	17.6	4.2	0.4	-	-	24.1
Construction	27.0	260.0	61.2	5.5	-	-	353.7
Risks and Opportunities	-	-	-	-	-	64.2	64.2
Utilities	1.3	3.3	1.3	-	-	-	5.9
Total (Y.O.E) =	**$32.1**	**$305.6**	**$72.9**	**$6.2**	**$16.9**	**$64.2**	**$498.0**

Table 2-10. Segment 1

Project Element	Cost by Segment							Total Project Cost
	Cross Streets	Rehab Pump Stations	CN Rail & Conrail Bridges	Between I-96 and Trumbull	Service Drives-Trumbell & Cass	Owners Rep Contract	Risks and Opportunities	
Owners Rep Contract	$0.0	$0.0	$0.0	$0.0	$0.0	$3.2	$0.0	$3.2
Preliminary Engineering/Bridge	-	-	18.2	-	-	-	-	18.2
Preliminary Engineering/Road	8.4	1.0	-	2.6	36.5	-	-	48.6
Right-of-Way	9.1	-	4.8	-	10.6	-	-	24.4
CE	9.0	1.0	20.9	2.8	40.1	-	-	73.8
Construction	125.8	15.5	309.8	39.7	587.1	-	-	1,077.9
Risks and Opportunities	-	-	-	-	-	-	34.1	34.1
Utilities	6.5	-	-	3.2	7.4	-	-	17.2
Total (Y.O.E) =	**$158.8**	**$17.6**	**$353.7**	**$48.3**	**$681.6**	**$3.2**	**$34.1**	**$1,297.3**

FHWA Major Projects Cost Estimate Review

The FHWA Major Projects Team performed the initial CER on the Project April 25-29, 2011. The purpose of the CER was to verify the accuracy and reasonableness of the current project total cost estimate and project schedule, and to develop a probability range for the cost estimate that represents the Project's current stage of development.

The Senior Project Manager, together with subject matter experts from MDOT, and Consultant, CH2MHill, discussed and supported the design, schedule, and unit prices used to estimate the Project. The following documents were reviewed: Project Cost Estimate Spreadsheet, Project Schedule, project risks, draft IFP, draft PMP, Accelerated Construction Technology Transfer Workshop Report, and the I-94 DER Opinion of Probable Cost. Over 25 cost and schedule risks were identified and quantified. Unit prices, current and anticipated market conditions, and influences on inflation were discussed. In addition, many opportunities to reduce costs were identified and discussed.

The 35 percent contingency used in the Project cost estimate was replaced with actual dollar values for uncertainties related to: base variability, quantity and unit cost variability, and schedule and market risks. The total value of the uncertainties was determined to be $105 million and is referred to as Risks and Opportunities. A Monte Carlo analysis was then used to model a probable cost range for the Project.

The FHWA recommended MDOT fund the Project at the 70 percent probability range. The resulting derived cost estimate at the 70 percent confidence level in year of expenditure (YOE) dollars increased the MDOT estimate to $2,840.1 million, a 3.7 percent increase.

The CER was updated again in November 2013 (CER II). The CER II Team used the previously adjusted base estimate of $1,652 million. The adjusted base estimate includes the $105 million of risks and opportunities added from the initial CER. As a result of the CER II additional adjustments of $97 million were made with the most significant being those that added costs for mobilization ($50M), construction change order risks ($30M) and utilities ($5M). The CER II Team's probabilistic risk at the 70 percent range resulted in a total cost, in YOE dollars, of $2,912.7 million.

MDOT, taking a slightly different approach, applied the CER II changes to the base estimate. MDOT added the original base estimate plus the additions from the first CER and the changes from the CER II and inflated the new values to the year of letting of each of the 25 construction packages. MDOT's YOE estimate is $2,913.4 million. MDOT will show the Project is fully funded at the higher $2,913.4 million estimate.

Independent from the CER and MDOT methods, the consulting firm of HNTB also estimated the YOE cost of the Project. HNTB has collaborated with MDOT for many innovative contracting workshops on this Project including the I-94 Practical Design Workshop, MDOT Success Management Workshop, and SHRP2 Workshops. HNTB was present at the CER II. HNTB's independent estimate of this Project is also consistent with the CER and MDOT totals.

A detailed discussion of the results of the CER and MDOT's plans to mitigate risks and implement opportunities is included in Chapter 6. The complete Initial CER Report is included as Appendix C and the updated CER II Report is included as Appendix D.

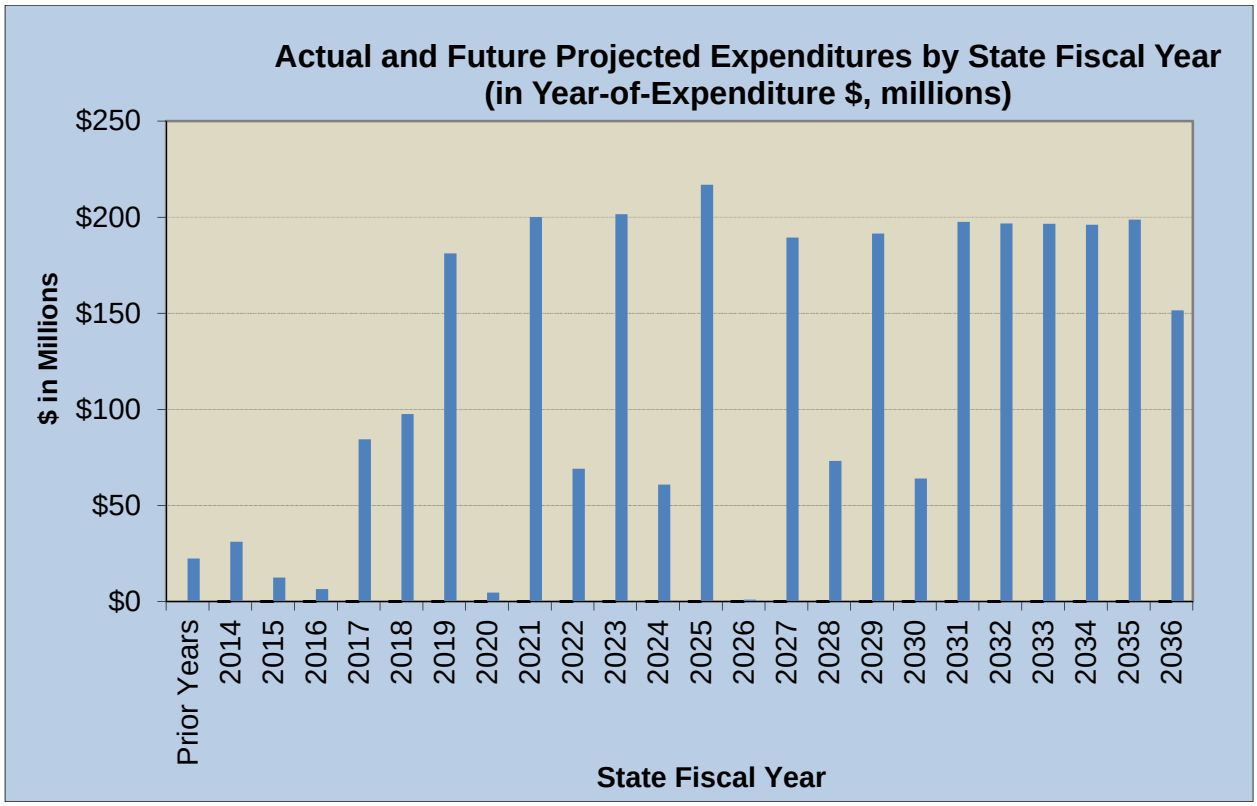
Costs to Date

Actual expenditures to date include those incurred for EPE and PE. The cost of the corridor study in 1994 comprised most of the $21 million of EPE costs. $1.4 million of PE for the Gratiot Bridge occurred primarily in 2010.

Actual and Future Expenditures

Actual and future expenditures are shown below. Future expenses are shown as anticipated lettings, inflated to year of obligation. Future expenditures total $2,912.0 million.

Figure 2-1. Actual and Projected Future Expenditures by State Fiscal Year (YOE$'s in millions)



COST MANAGEMENT RESPONSIBILITY

MDOT has ongoing responsibility for the oversight of the Project and, in particular, the management of project costs and project schedule. MDOT recognizes the importance of cost control for a project of this scale. As such, the possibility of using new and/or innovative contracting strategies to build and finance the Project will be considered as opportunities present themselves. If MDOT does adopt an innovative contract strategy for this Project, this will be reflected in future updates of this financial plan.

Methods for estimating and monitoring the value of project costs and the associated risks of potential variances in cost will be developed from MDOT's best past practices and industry best practices. Best practices include the implementation of an Earned Value Management System (EVMS), contingency management consistent with FHWA Major Project Guidelines, utilization of several of MDOT's cost tracking packages including Map Project Information System, Map Financial Obligation System, Administrative Customizable Reporting System, and the Michigan Administrative Information Network (MAIN).

As part of the cost control process, risks and opportunities will be continually monitored to assess the potential for cost overruns, and opportunities for savings. Each design consultant will be required to provide constant updates and confirm the work can be secured within the target amount for each construction package.

Implementation of an EVMS is a key component of program and project management to ensure cost, schedule, and technical aspects of the contract are truly integrated. An EVMS will be developed for this Project, as defined by ANSI/EIA 748-A-1998. The EVMS process can identify trends and forecasts of the Project.

Amounts for unknown costs are included as contingencies in the cost estimate consistent with FHWA Major Project Guidelines. Each contingency is managed by evaluating project segment budgets and reallocating costs within the baseline to support the remaining segments and any other cost requirements. Similarly, modifications in scope will be evaluated within each segment to determine if the modifications can be accommodated within the allocation for that segment.

MDOT uses several software packages to manage projects, including:

Map Project Information System – Collects and tracks information about projects from scoping through obligation and electronically documents a projects change control.

Program/Project Management Software – Coordinates project tasks between staff and transmits project changes for review and approval (for inclusion in MDOT's capital program).

Map Financial Obligation System – Used to manage the financing of approved job phases (elements), including coordination of federal fund obligation and disbursement,

communication between Program Management and Program Control, project initiation, project accounting, and FHWA.

Administrative Customizable Reporting System – Allows MDOT employees to create their own reports that access data from the shared project databases.

Michigan Administrative Information Network (MAIN) – Is an integrated, automated, administrative information system for the State of Michigan. It is comprised of components and systems that support the State's accounting, payroll, purchasing, contracting, budgeting, personnel, revenue management activities, and requirements.

Primavera (P3) Version E/C – Is a commercially available project management software tool for task management.

All of these systems have a set of pre-packaged reports that address normal tracking needs, and they also have the ability to generate custom designed reports to address unusual needs. All of these systems (except Primavera) are integrated and share cost information. The distinguishing characteristics are the non-cost project information that can be retrieved from each system. In addition, the Primavera system allows for resource and cost loading of the Master Project Schedule. Detailed reporting of the Project is available to show total project status with regard to schedule and budget.

CHAPTER 3 - IMPLEMENTATION PLAN

INTRODUCTION

Based on the currently planned project delivery approach, all contracts for the Project are scheduled for tender by the conclusion of FY 2036. This chapter provides information on the planned letting schedule for implementation of all elements of the Project. It also provides additional information regarding the assignment of implementation responsibilities and provides a summary of the status of necessary permits and approvals.

PROJECT DESCRIPTION/PHASING

As detailed in Chapter 1 of this IFP, four segments comprise the I-94 Project, which is being implemented to rehabilitate 6.7 miles of the I-94 corridor and 66 bridges from the I-96 Interchange to Connor Avenue. The Project segments in order of completion are:

- ADVANCED BRIDGES
- SEGMENT 3 - CHENE STREET TO EAST OF CONNER AVENUE
- SEGMENT 2 - CASS AVENUE TO CHENE STREET INCLUDING THE I-75 INTERCHANGE
- SEGMENT 1 - EAST OF I-96 TO CASS AVENUE INCLUDING THE M-10 INTERCHANGE

Given the structure of the Project as outlined above, it is clear that the coordination of design and construction sequencing among the various segments will be critical. Such sequencing also could have a significant impact on overall costs and financing requirements.

IMPLEMENTATION RESPONSIBILITY

Because of the magnitude of this Project, MDOT oversight will be exercised by the MDOT Leadership Team, which is comprised of the Director of the Department, Deputy Directors, and the Directors of the various bureaus within MDOT.

The MDOT Senior Project Manager is Terry Stepanski, P.E. It is the role and responsibility of the Senior Project Manager to provide overall administration, coordination, and technical oversight to the Project. Various support staff and teams have been established with roles and responsibilities accountable to the Senior Project Manager. The specific roles and responsibilities are defined in the PMP. MDOT will use an OR for this Project due to the complexities and duration of a modernization project in an established urban area of this magnitude. The OR will serve as an extension of the Senior Project Manager and will assist with project design, management, cost, schedule, and quality.

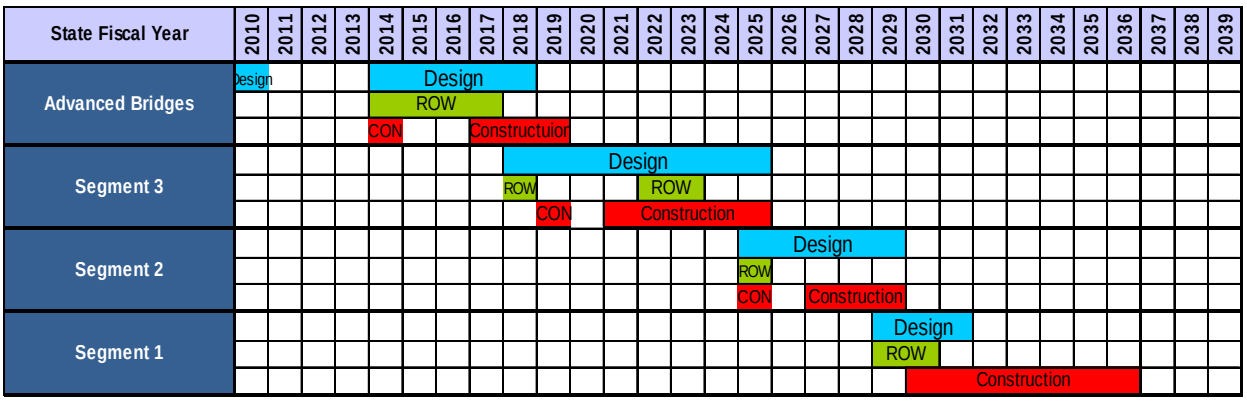
Moving this Project from concept to completion will be very complex. Managing the process will be accomplished with a number of tools and software applications; such as our proprietary Program/Project Management software, and Primavera for scheduling and budget. Our proprietary software Field Manager, will be used to capture actual costs by activity, as they are incurred.

Additional information about the implementation strategy and management responsibilities can be found in the PMP on the Project.

SUMMARY PROJECT SCHEDULE

The delivery of the Project will consist of various design, ROW and construction schedules with lettings planned throughout the future years. A summary schedule is shown below based on the letting schedules of the 25 construction packages, the design and ROW required and the anticipated duration of each phase. For purposes of the summary schedules shown below, the Design element includes the OR contract and PE. A complete detailed project schedule is provided as Appendix B.

Figure 3-1. Summary Project Letting Schedule by Segment and Element



Individual project schedules for each remaining segment are shown below.

Figure 3-2. Summary Project Schedule Advanced Bridges

State Fiscal Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
AB#1 Gratiot		Design									
									CON		
									Utilities		
AB#2 Van Dyke OINCC				Design							
				ROW							
					CON						
AB#3 MT. Elliot						Design					
							ROW				
									CON		
									Utilities		
AB#4 Second Avenue						Design					
							ROW				
									CON		
									Utilities		
AB#5 Chene & Concord						Design					
							ROW				
										CON	
										Utilities	
AB#6 Cadillac & Cass						Design					
							ROW				
									CON		
									Utilities		
AB#7 Brush & French						Design					
							ROW				
									CON		
									Utilities		
Woodward Bridge						Design					
						CON					
Trumbell Bridge										Design	
											CON
Owners Representative Contract						Design					
Opportunity Buys (ROW)											
						ROW					

Figure 3-3. Summary Project Schedule Segment 3

State Fiscal Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
#1 Dequindre			Design								
			ROW								
				CON		CON					
				Utilities							
#2 St Aubin & Frontenac			Design								
			ROW								
						CON					
						CON	Utilities				
Frontenac, Burnes, Conner			Design								
							ROW				
							CON				
							Utilities				
#4 Pedestrian Bridges			Design								
								ROW			
								CON			
								CON			
#5 Gratiot Ramps			Design								
							ROW				
								CON			
								Utilities			
Norfolk Southern & Conrail			Design								
								CON			
Frontenac & Norcorss			Design								
							ROW				
								CON			
								Utilities			
Pump Stations			Design								
										CON	
Temporary Widening			Design								
										CON	
Frontenac & Connor			Design								
							ROW				
										CON	
										Utilities	
Owners Rep Contract			Design								
Risks and Opportunities											
			CON		CON						

Figure 3-4. Summary Project Schedule Segment 2

State Fiscal Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
#11 Between Cass & I-75			Design								
			ROW								
			CON								
			Utilities								
#12 Brush & Russell			Design								
			ROW								
					CON						
					Utilities						
#13 Second Ave & Russell			Design								
			ROW								
					CON						
					Utilities						
#14 Rehab I-75			Design								
			CON								
Owners Rep Contract			Design	Design	Design	Design	Design				
Risks and Opportunities											
			CON		CON						

Figure 3-5. Summary Project Schedule Segment 1

State Fiscal Year	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Cross Streets		Design									
		ROW									
				CON							
		Utilities									
Rehab Pump Stations		Design									
			CON								
CN Rail & Conrail Bridges				Design							
		ROW									
								CON	CON		
Between I-96 and Trumbull		Design									
				CON							
		Utilities									
Service Drives-Trumbell & Cass			Design								
			ROW								
					CON	CON	CON	CON			
		Utilities									
Owners Rep Contract		Design									
Risks and Responsibilities											
		CON		CON							

STATUS OF PERMITS AND APPROVALS

As discussed, further in the Risk Management section of this IFP (see Chapter 6), early and frequent communication, and coordination, with the permitting agencies will facilitate the permitting processes. At this time, permits are expected to be issued in a timely manner, posing no risk to project completion, scope, or cost.

Those permits as required in the FEIS are outlined in Table 3-1.

Table 3-1. Required Permits and Status

Issuing Agency	Permit/Notification	Status
Michigan Department of Environmental Quality	National Pollution DES Permit	Application not submitted.
Michigan Department of Natural Resources	Act 203 of the 1974 Michigan Endangered Species Act Notification	Application not submitted.
Michigan Department of Environmental Quality	Air Quality Permit	Application not submitted.
US Fish & Wildlife Service	Federal Endangered Species Permit	Application not submitted.

CHAPTER 4 - PROJECT FUNDING

INTRODUCTION

As described in detail in Chapter 2, based on current estimates and the most up-to-date information on construction-related inflation, the Project will require an estimated $2,913.4 million (in year of expenditure dollars) to fully fund all project elements over the planned project horizon. This chapter reviews MDOT's plan of finance for the Project, describes in detail the planned sources of funds, and reviews the funding plan in the context of the State's overall transportation programs and available resources.

PROJECT PLAN OF FINANCE

As currently planned, the Project will be funded through traditional federal aid, state, and local match.

SOURCE OF FUNDS

Funding sources is referred to as falling into one of the following categories:

- **Expended and/or Obligated Funds** – including funds that have actually been spent and those that have been obligated for the Project.
- **Programmed Funds**– refers to those funds for which there is a commitment but no actual expenditures or obligations (i.e., funding included in MDOT's Five Year Transportation Program and the Long Range Plan).

Obligated funds are commitments made by MDOT and Regional Planning Organizations to fund the Projects selected through the planning process. Obligated funds for the Project are constrained in MDOT's programming systems MPINS and MFOS, at the detailed job number and funding source level, i.e., by FINSYS code.

Programmed funds are financially committed through the planning process and resulting inclusion in long range planning documents. Commitments for programmed funding are documented by the MDOT Five Year Plan State Transportation Improvement Plan (STIP), the regional Transportation Improvement Plan (TIP), and the Regional Transportation Plan (RTP).

The Southeast Michigan Council of Governments (SEMCOG) is the regional planning organization in which this Project physically resides. SEMCOG's 2040 Regional Transportation Plan and the 2014-2017 Transportation Improvement Program include the Project as fiscally constrained. The FHWA Michigan Division Administrator recognizes the LRP and TIP as the Plan of record for Southeast Michigan.

Both the TIP and LRP can be found in their entirety at the following website: http://www.semcog.org/2040RegionalTransportationPlan.aspx .

The *SEMCOG 2014–2017* TIP includes the programming for the Advanced Bridges Segment. The TIP was adopted by SEMCOG's General Assembly on December 6, 2013.

Figure 4-1. SEMCOG TIP

Fiscal Year	Project Name	Limits	Primary Work Type	Project Description	Phase	Total Phase Cost ($1000s)	MDOT Job No.	Local ID No.	Comments
2014	I-94	I-96 to Conner Avenue (8 bridges)	Bridge replacement	Replace bridges	PE	10,501	113124	11559	Freeway modernization 113125, 113551, 113552, 113553, 113558, 113126, and 113127
2014	I-94	From I-96 to Conner Ave.	Freeway Modernization	Project Manager for freeway modernization	EPE	4,000	122114	11528	Includes MDOT # 122115, 122116, and 122117
2014	I-94	I-96 to Conner Avenue	Bridge - other	Rehabilitate bridge	CON	10,100	120802	11570	Modernization of the freeway by replacing the Woodward bridge over I-94
2014	I-94	from I-96 to Conner Ave	Freeway Modernization	Purchase ROW for freeway modernization	ROW	1,500	122118	11548	ROW Purchases Includes # 122119, 122121 and 122122.
2015	I-94	From I-96 to Conner Ave.	Freeway Modernization	Project Manager for freeway modernization	EPE	2,500	122114	11528	Includes MDOT # 122115, 122116, and 122117
2015	I-94	from I-96 to Conner Ave	Freeway Modernization	Purchase ROW for freeway modernization	ROW	2,000	122118	11548	ROW Purchases Includes # 122119, 122121 and 122122.
2015	I-94	I-96 to Connor Avenue (8 bridges)	Freeway Modernization	Purchase ROW for freeway modernization	ROW	8,900	113124	11559	Freeway modernization 113125, 113551, 113552, 113553, 113558, 113126, and 113127
2016	I-94	From I-96 to Conner Ave.	Freeway Modernization	Project Manager for freeway modernization	EPE	3,001	122114	11528	Includes MDOT # 122115, 122116, and 122117
2016	I-94	from I-96 to Conner Ave	Freeway Modernization	Purchase ROW for freeway modernization	ROW	3,500	122118	11548	ROW Purchases Includes # 122119, 122121 and 122122.
2017	I-94	From I-96 to Conner Ave.	Freeway Modernization	Project Manager for freeway modernization	EPE	4,000	122114	11528	Includes MDOT # 122115, 122116, and 122117
2017	I-94	I-96 to Conner Avenue	Bridge replacement	Replace bridges	CON	75,692	113124	11569	Modernization of the freeway by replacing the Second, Mt. Elliot, Chene, Cadillac, and Gratiot bridges over I-94 (113125, 113552, 113553, 108061, and 113126)
2017	I-94	from I-96 to Conner Ave	Freeway Modernization	Purchase ROW for freeway modernization	ROW	5,001	122118	11548	ROW Purchases Includes # 122119, 122121 and 122122.
						130,695			

The SEMCOG 2040 RTP includes the remaining packages for the Advanced Bridges Segment and all packages for Segments 3–1. The Project in the LRP is listed as RTP Project Number 935 (RTP 935).

Figure 4-2. SEMCOG RTP 935.

Project ID	Project Name	Project Limits	Proposed Work	Jurisdiction	Year	Cost (in 1,000s)
Project 935	I-94	from I-96 to Connor	Widen to 4 lanes in both directions, reconstruct interchanges	MDOT	2018 2019 2020 2021-2025 2026-2030 2031-2035 2036-2040	2,776,800

The funds listed in the RTP for the above are Federal National Highway Performance Program and State Transportation Funds with local match as required by Michigan statute.

Project Funding

MDOT anticipates $2,913.4 million will be needed to complete the Project. This includes the already expended federal and state funding of $1.5 million (FY 2010) for the design of the Gratiot Bridge in the Advanced Bridges Segment.

Table 4-1 shows the current breakdown of overall funding for the total project cost including those already expended of $2,913.4 million.

Federal Funding

Federal funds are a significant source of funding for the Project. It is anticipated that the future Federal funds will be from the National Highway Performance Program. MDOT received a $100,000 grant from the Federal institution, Strategic Highway Research Program for New Strategies for Managing Complex Projects (SHRP2 R10). Half of the funds ($50,000) will be used in FY2014 to update the Project Management Plan.

State Funding

State Transportation Funds are from the state restricted fund for transportation purposes as provided for in Public Act 51 of 1951, so in described as the STF. The revenues of the STF are from the motor vehicle fuels taxes, vehicle registration taxes, and interest and miscellaneous fees deposited into the Michigan Transportation Fund, and statutorily distributed to the STF.

Local Funding

Local match will be provided by the City of Detroit to meet their minimum participation amount, as required by Michigan Public Act 51 of 1951. According to this law, incorporated cities and villages are required to participate with MDOT in the cost of improving highways. This Act gives MDOT the authority withhold the distribution of motor fuel and registration

revenues earned and due to the City from the Michigan Transportation Fund for unpaid invoices due to MDOT for local match on participating construction projects.

Table 4-1. Summary Total Project Funding by Source (Year of Expenditure dollars, in millions)

Funding Source		Expended / Obligated	Programmed	Total
Federal				
Formula funds (by category)				
	National Highway Performance Program	135,494,702	2,238,856,243	2,374,350,945
	SHRP2 R10 Grant	-	50,000	50,000
SUBTOTAL - Federal		**135,494,702**	**2,238,906,243**	**2,374,400,945**
State				
State Match on Federal Formula Funds		-	-	-
	Michigan State Trunkline Funds (Act 51)	26,911,908	444,690,734	471,602,642
SUBTOTAL - State		**26,911,908**	**444,690,734**	**471,602,642**
Local				
Local Match on Federal Formula Funds				
	Act 51 partcipation	3,844,558	63,527,248	67,371,806
SUBTOTAL - Local		**3,844,558**	**63,527,248**	**67,371,806**
GRAND TOTAL		**$166,251,169**	**$2,747,124,224**	**$2,913,375,393**

RECONCILIATION OF THE TIP AND LRP FUNDING TO TOTAL PROJECT FUNDING

The following table shows the reconciliation of SEMCOG's TIP and LRP to MDOT's anticipated Project funding. Reconciling items include PE and ROW for Advanced Bridges previously obligated (prior to FY 2014).

Table 4.2. Reconciliation of SEMCOG TIP and LRP to Total Project Funding

Project Costs in YOE$	2,913,375,000
SEMCOG TIP	130,695,000
SEMCOG LRP	2,776,800,000
SEMCOG Total Funding	2,907,495,000
Difference	5,880,000
PE and ROW Previously Obligated	5,880,000

PROJECT FUNDING IN RELATION TO MICHIGAN'S OVERALL TRANSPORTATION PROGRAM

MDOT's Statewide Transportation Improvement Program and Long Range Plan are broken into seven regions. Each region must stay within its own separate budget for project planning and selection. This Project is in the Metro Region, which is within the geographic limits of the SEMCOG Regional Transportation Planning Organization. MDOT's transportation program for the Metro Region is listed in its entirety in the SEMCOG RTP

and as such is fiscally constrained. A complete list of MDOT's projects within the SEMCOG MPO jurisdiction can be found at the following website http://www.semcog.org/2040RegionalTransportationPlan.aspx.

The RTP includes all the major projects for this region such as the I-75 Freeway Improvement Project, the Blue Water Bridge Plaza and Interchange Project, the New International Trade Crossing (NITC) and the Detroit Intermodal Freight Terminal Project.

POTENTIAL ALTERNATIVE FUNDING APPROACHES

While the State is fully committed to meet its obligations under this plan and based on its current legal authorities, MDOT recognizes that circumstances can change and alternative structures may present themselves as superior to the baseline plan, as articulated in this document. Future Annual Updates will account for any such revisions to the Plan of Finance and incorporate new funding capabilities for the Project.

KEY REVENUE-RELATED ASSUMPTIONS, RISKS, AND MITIGATIONS

As with any project of the size and duration of the Project, there are a great number of uncertainties regarding the magnitude and timing of project costs in relation to the availability of funding. These risks and the strategies being utilized to address them are discussed in Chapter 6 of this IFP.

CHAPTER 5 - PROJECT CASH FLOW

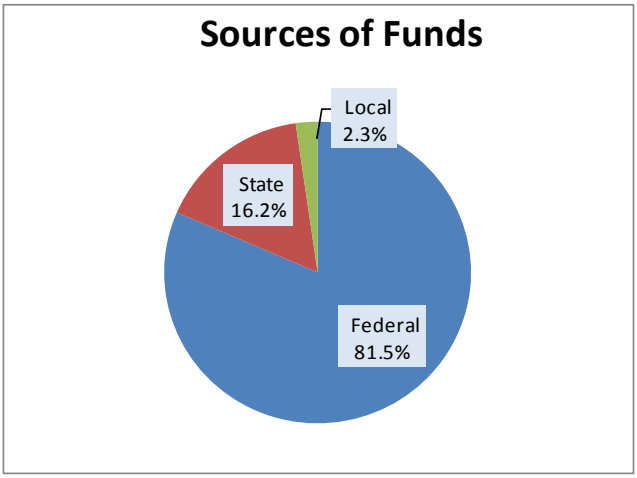
INTRODUCTION

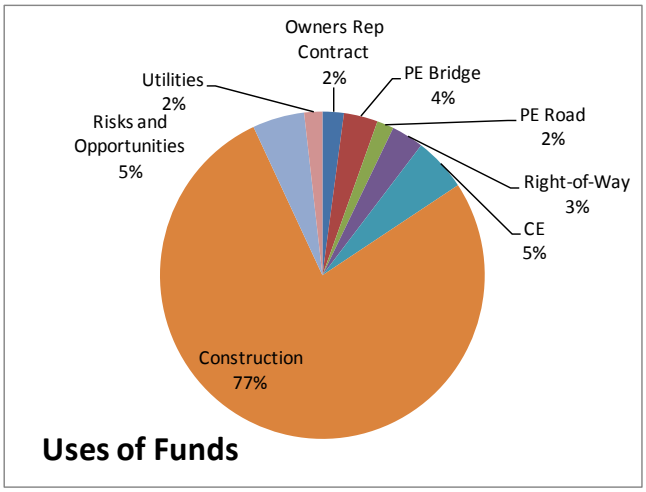
This chapter provides a summary of the annual cash flow needs of the Project. Specific plans, contract packages, and resulting projections of actual cash outlays will be updated substantially in subsequent Annual Updates to the IFP. At a minimum, it is anticipated that such updates will address strategies to manage the timing of resource availability and cash flow requirements.

SOURCES AND USES OF FUNDS

As described in Chapter 4 of this IFP and based on current plans, the Project will be funded with Federal and state funds with local match. Figure 5-1 provides a summary of the planned sources and uses of funds for the Project.

Figure 5-1. Sources and Uses of Funds – Total Project (Year of Expenditure dollars, in millions)





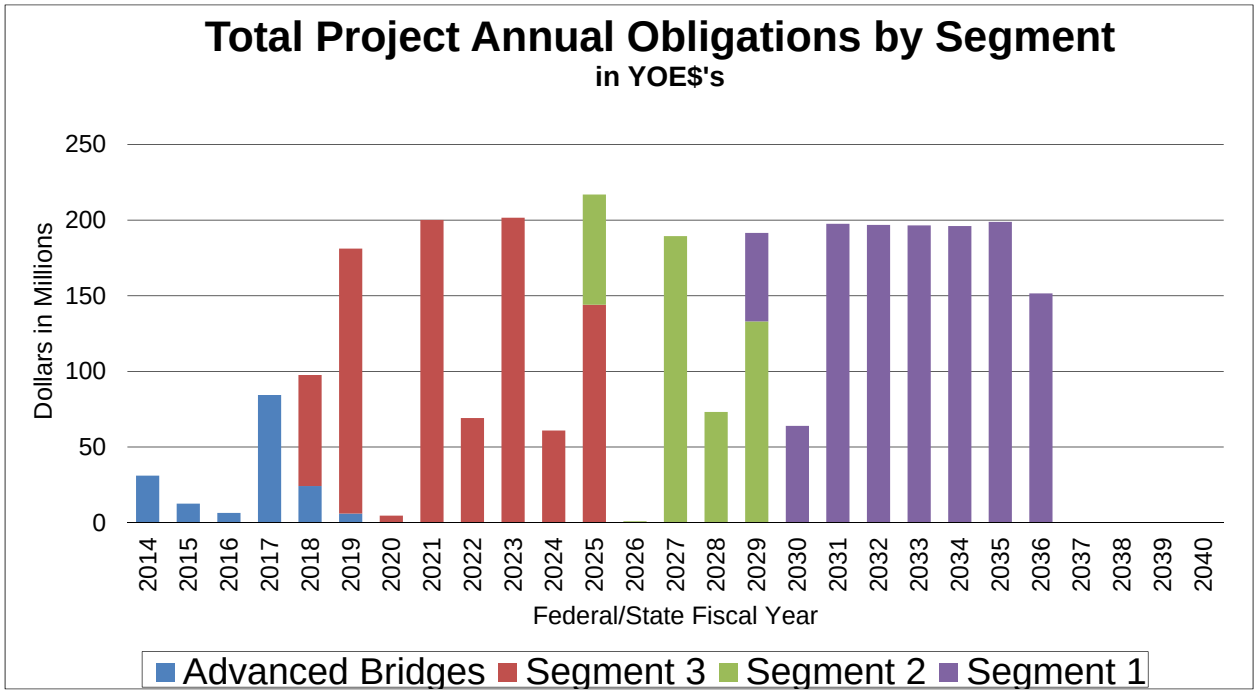
PROJECT OBLIGATIONS AND CASH FLOW

Obligations versus Annual Cash Outlays

The Project funding plan in Chapter 4 reflects obligations by project segment on an annual basis. This is to ensure that MDOT meets its requirement that federal and state funds will be available and appropriated prior to making contractual commitments for lettings.
Once MDOT develops letting schedules for each contract package, a more detailed analysis of the anticipated timing of cash outlays will be presented, to update the Plan to manage the annual cash flow for the Project. Given the Project's overall size, this will be quite important not only to ensure the availability of revenues as needed but also to help manage

the impact of the Project on the Department's overall program. Figure 5-2 below shows MDOT's obligations for each segment of the Project, inflated to the year of obligation.

Figure 5-2. Total Project Annual Obligations by Segment



Planning for Cash Flow

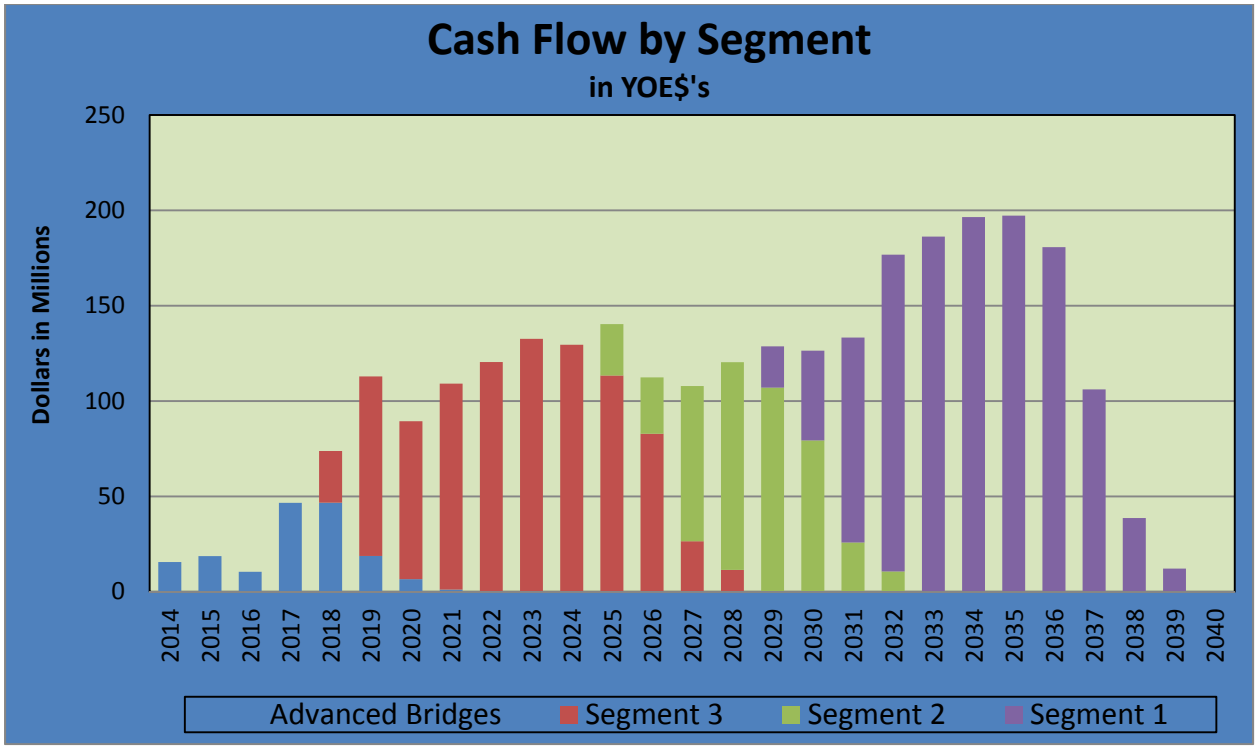
For cash flow planning purposes, MDOT uses historical averages for cash outlays by project type. Significant improvements are being made to both the contractor payment and project close out processes. However, for purposes of this IFP, the outlay of cash for vendor payments for this Project uses the averages for construction projects as shown in Table 5-1 below. The percentages represent cash needs for all phases of a project including Design, ROW, and Construction as well adjustments for claims, audits, and all other accounting transactions through financial close. These averages were applied to the annual obligation totals to arrive at cash flows shown in Figure 5-3, Total Project Cash Flow. Cash flow for Advanced Bridges uses the historical percentages for Preserve projects. The percentages for capacity improvement projects were applied to all other Segments.

Table 5-1. MDOT Historical Cash Flow Schedule for Vendor Payments

Allocation	FY 1	FY 2	FY 3	FY 4
Advanced Bridges	50.0%	40.0%	7.0%	3.0%
Segments 3-2-1	37.0%	40.0%	15.0%	8.0%

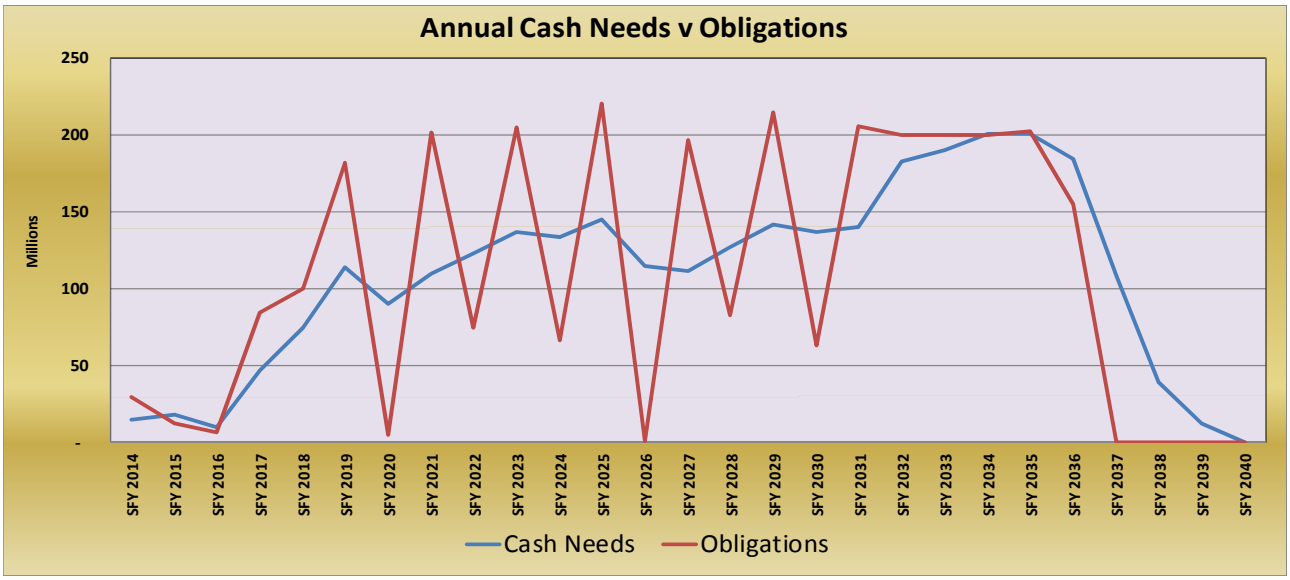
Cash flow by segment for the I-94 Project is shown in the chart below in YOE dollars.

Figure 5-3. Total Project Cash Flow (Year of Expenditure dollars, in millions).



The graph below demonstrates the relationship between obligations and cash needs. Obligations precede the need for cash and as such, MDOT can ensure that cash is available to make contractor payments.

Figure 5-4. Obligations verses Cash Flow (Year of Expenditure dollars)



Cash Management

MDOT uses the TRNS*Port Construction and Administration System (CAS) and Project Accounting and Billing (PAB) software systems to manage vendor payments and the timing of cash needed for these payments against the availability of federal, state, and local funds. Each contract is obligated at the job number, category, and fund level detail within the MFOS and PAB systems. Each week, pay items earned are documented in the field at the job number level using MDOT's Field Manager (part of TRNS*Port) system. Vendor payments are reviewed approved and posted electronically to PAB. Through an interface between PAB and the State of Michigan's accounting system, MAIN, the payment is scheduled. The federal portion of the estimate report is billed to FHWA each week. The payments and billings are coordinated so the vendor payments are made and the Federal funds are received on the same day.

Monitoring of State Transportation Fund revenues occur on a monthly basis. In addition, actual revenues vs. budgeted revenues are reviewed as well as obligations for all planned projects. MDOT follows cash management practices required by the Federal Cash Management Improvement Act of 1990, as amended.

Interactions with State Transportation Programs, Budgets, and Other Projects

As described in this IFP, MDOT has made specific commitments to the completion of the Project. Commitments are incorporated into the STIP, relevant TIPs, and the SEMCOG Local Road Program (LRP) according to this Initial Financial Plan, the needs of the Project, and available funding. The chart below shows the amount of funding needed for the Project in relation to all other funding available for the total capital program.

Figure 5-5. Funding Available for Program

CHAPTER 6 – PUBLIC PRIVATE PARTNERSHIP ASSESSMENT

At the current time, MDOT does not have legislative authority to enter into a public private partnership for a Project of this magnitude nor does MDOT have legislative authority to toll roadways including additions to existing road ways.

CHAPTER 7 – RISK AND RESPONSE STRATEGIES

INTRODUCTION

This chapter addresses a number of important factors that could affect the Project and, in particular, the financial plan for the Project. These include cost and funding related risks, and associated mitigation strategies, as well as interdependencies with the State's overall transportation program, budget, and other projects.

Cost escalation is a risk that can affect the overall ability to achieve expectations of completing a project on time and within budget. Recent national events draw heightened attention to the need for cost management and, in particular, a focus on identifying and mitigating cost related risks. All design and construction projects have risk elements that can affect costs, and should be identified and mitigated to the greatest extent possible. These risk elements include, but are not limited to, project scope and design, ROW acquisition, NEPA litigation, permitting, schedules, contract packaging, general and construction related inflationary pressures. The chapter briefly outlines areas of potential cost risks and possible mitigation measures MDOT is currently considering and/or pursuing for the Project.

With design segments for all 25-construction packages, careful attention needs to be given to design development and construction sequencing to keep the Project on schedule. The two Cost Estimate Reviews identified all known major risk factors that may be present as the Project moves forward. Action will be taken early on those items with the potential to increase cost or cause delay.

A Value Engineering Study was held during the EPE phase of the Project. Another Value Engineering Study will be held at the appropriate time, MDOT will be utilizing its well established extensive QA/QC processes throughout the design and construction of this Project.

A CER was performed by the FHWA Major Projects Office from April 25-29, 2011. The objective of the CER was to verify the accuracy and reasonableness of the current Project total cost estimate and schedule, and to develop a probability range for the cost estimate, which represents the Project's current stage of development. Through this process, FHWA was able to determine the DER was developed at an appropriate level of detail and the estimated project cost appropriately represents the cost of the Project in YOE dollars.

To arrive at this conclusion, the Team, together with MDOT subject matter experts, defined and discussed known and probable unknown risk elements. Following FHWA's process, costs were assigned to these risks and the corresponding contingency percentages were reduced. The result of this review on the estimated cost of the Project, in YOE dollars at the 70 percent confidence level, was an increase of $105.1 million, or 3.7 percent.

The adjustments to the cost estimate made during the initial CER are listed below:

Estimate Adjustments

- Eliminate the overall design contingency of 35 percent
- Add 10 percent allocated contingency to Bridges
- Add 35 percent unallocated contingency to Utilities
- Add $9 million for pavement sections
- Add $25 million for early completion incentives
- Add $30 million to the public information campaign
- Increase mobilization from 5 percent to 10 percent
- Increase preliminary engineering from 7 percent to 9.5 percent
- Increase construction engineering from 7 percent to 11 percent

Adjustments to Costs for Risks as Determined by the CER Process

- Increase ROW estimate for impacts to existing buildings, parking, access to construction sites, and to accommodate temporary rail tracks
- Increase estimate for additional noise walls
- Increase estimate for an additional pedestrian bridge
- Add for community jobs training
- Add for technology costs and ROW to construct bridges offsite
- Add to the material costs of steel bridges
- Increase estimate for ground stabilization under structures
- Add for storage capacity
- Increase estimate for replacement of pump stations rather than refurbishment
- Add to mitigate damage to aging water and sewer systems
- Add for general construction risks of overruns and change orders
- Increase estimate to replace existing slopes with secant pile walls
- Increase for the possibility of encountering hydrogen sulfide latent water
- Add for the possibility of needing to use drilled shafts rather than pile drivers in some locations
- Add for use of extended life pavements
- Increase estimate for additional use of ITS technologies
- Increase estimate to provide for MOT techniques

Adjustment to Costs for Opportunities as Identified in the CER

- Reduce estimate for savings related to rail agreement for temporary runarounds
- Reduce estimate for opportunities related to VECP's during construction
- Reduce estimate for in inflation due to schedule acceleration with full lane closures.

The complete report of the FHWA Cost Estimate Review is included as Appendix C.

The Updated CER II addressed the following risks and opportunities. MDOT accepted the likely probability of these risks and opportunities occurring, and adjusted the unit prices used to estimate each package. The complete report of the FHWA Updated Cost Estimate Review II is also included in Appendix C.

- Added ROW to Account for United Sound Recording Studios Building - $1 M
- Added Environmental Commitments Item - $ 1 M
- Increased Mobilization from 5 percent to 10 percent - $50 M
- Increased (doubled) ITS Estimate - $4 M

- New Line Item for Subgrade Undercutting - $3 M
- Add Line Item for Construction Change Orders - $30 M
- Added cost for drilled shafts to avoid utilities - $15 M
- Added Line Item for Job Skills Training - $5 M
- Reduced Advanced Bridges PE to reflect 2013 costs – ($1 M)
- Reduced Advanced Bridges ROW + UT to reflect 2013 costs – ($2 M)
- Reduced Advanced Bridges CON to reflect 2013 costs – ($9 M)

Mitigation of Risks

The following is a detailed discussion of the various risks and possible mitigation strategies.

Foundations

A preliminary investigation of the existing boring logs in the corridor is being completed to determine generalized soil profiles and to make a preliminary recommendation on the proposed foundation types for the structures. Since this investigation is limited to the existing borings from the corridor and those borings were completed in excess of fifty years ago, any recommendation will need to be confirmed with a complete geotechnical investigation, prior to the foundation design, including new borings, soil analysis, and possible pile load tests. See the Geotechnical Report for additional recommendations.

Utilities

As defined in the scope of work, the drainage design for the DER focused only on the major trunklines along mainline I-94 and M-10. The goal was to identify and maintain existing drainage patterns and develop an overall drainage plan including potential major utility conflicts for mainlines. Additional drainage design and utility investigations, particularly along the service drives, will be required for future design development. Considerations for potential retaining wall types have been evaluated based on the limited geotechnical data available. Each retaining wall type will potentially affect the existing utilities differently (example: use of tiebacks, excavation for CIP wall, etc.).

The Subsurface Utility Engineering (SUE) mapping completed in 2002 was based on ASCE/CI 38-02 using Quality Levels B-D. Additional utility investigations, including Quality Level A, will be required to facilitate identifying known and potentially unknown utilities. When final design begins, utility mapping will require updates to the latest ASCE standard guideline. Further investigation is needed to determine what additional public/private utilities may be reimbursable other than the Detroit Water and Sewer Department, and the Power and Lighting Department (PLD) municipal utilities.

Contamination and Remediation

The FEIS lists 49 potential hazardous waste sites within the corridor. Evaluation of the potential contamination cleanup and remediation costs, particularly in the industrial areas near the I-94 and I-75 freeway-to-freeway interchange, will need further investigation during future design activities.

Railroads

Future coordination will be required with the railroads to establish agreements regarding sharing tracks and to determine who will perform work on the property for tracks; the railroads or contractors. The temporary earth retention for the railroad bridges is conceptual. Additional detailed analysis will be required in final design to fully size the substructures and foundations, and obtain approval of staging details from the railroads. For the recommended CS/MOT plan, runarounds were required to maintain rail traffic. The conceptual layouts of the runarounds extended beyond the limits of the scope of work for survey. Additional topographical survey will be required in the next phase of design to confirm geometric design of the runarounds. The track profiles may increase the length or change the overall configuration of the required runarounds.

Pavement Section

A pavement design selection process is not required for the DER. To facilitate the DER and opinion of cost development, a concrete pavement type was assumed. Should this assumption change to asphalt, unit prices would change, including potential adjustments to excavation and embankment quantities.

ROW Acquisition

MDOT estimates the Project will require the acquisition of 39 parcels, containing 42 structures. There are approximately 300 additional minor (small size and do not involve structures) ROW takes required along the corridor. Delays in property acquisition can lead to cost increases, which affects the purchase price by escalation in real estate values. MDOT has identified the potential properties for purchase and, to the extent possible, is proceeding with advanced acquisitions.

NEPA Litigation

Prior to the start of construction, the highest litigation risks generally relate to the National Environmental Policy Act (NEPA). To mitigate the potential impacts of future litigation that could cause schedule delays and cost escalation, risk and mitigation measures were addressed with the development of the Environmental Impact Statement (EIS). MDOT intends to adhere to the recommendations outlined in the EIS and take further litigation risk management steps as necessary.

Permitting

As reviewed in Chapter 3 of this IFP, numerous permits are required for the Project. Failure to secure permits as needed can lead to construction delays and cost escalation. Beyond normal construction-related permits, and prior to the start of construction, permits are required from Michigan Department of Natural Resources, Michigan Department of Environmental Quality, and the U.S. Fish and Wildlife Service. It is MDOT's responsibility to obtain these permits. In order to mitigate potential permitting delays, all permitting agencies are being contacted early in design, made aware of future permitting needs, solicited for process feedback, and kept apprised of potential permitting issues.

Schedule

Schedule delays, especially during construction, are primary causes of cost escalation. While expediting project schedules can often help to reduce inflation-related cost escalation, aggressive acceleration can sometimes drive up costs for particular project elements. To mitigate these potential schedule-related impacts, construction analysis will include the sequencing/scheduling to minimize the potential for delays, the advantages and disadvantages of potential accelerations are carefully considered prior to implementation. Other specific items for consideration include utility relocations, ROW acquisition activities, and the potential impacts of other construction projects.

Construction Packaging

Packaging of bid documents can have a positive or negative impact on construction cost. Various bidding strategies will be considered when deciding how to structure the construction packages. These include, but may not be limited to, exploring opportunities to utilize competitive bidding, use of local contractors, and optimization of alternate construction methods, potential incentive/disincentive clauses, and pursuit of the most advantageous scheduling options.

Inflationary Pressures

As with any major multi-year project, inflation is a key risk as it relates to the Project budget and ultimate project completion. As discussed in Chapter 2, Project cost estimates have been inflated annually based on the best currently available information. The provision for inflation will be reviewed on an ongoing basis throughout the life of the Project. Cost management strategies (such as the use of fixed price contracts) and cost reduction opportunities to offset unforeseen inflationary increases also will be explored, as necessary.

FUNDING RISKS AND MITIGATION STRATEGIES

As with any major construction project, there are uncertainties associated with project funding. Following is a review of the key funding-related project risks and associated mitigation strategies MDOT is considering and/or actively pursuing to address these risks.

Risk of Non-Appropriation of Funds

The greatest financial risk for a project expected to span over 20 years for full completion, is the risk federal and state funds may not be available to support appropriations.

Risk of Delays in Funding Availability

A recognized funding risk includes delays in funding due to federal and/or state funding lapses, competition for available funding at the federal level, and the risk that revenues may not be at projected rates.

Risk of Local Funding Availability

The Project is within the City of Detroit. According to Michigan law, Act 51 of 1951, as amended, incorporated cities and villages are required to participate with MDOT in the cost of improving highways. The City of Detroit's local match requirement is $67.4 million over the life of the Project. The City was approved for bankruptcy in 2013 and by nature of this action, a risk exists that local match may not be provided. However, the City's transportation funds are restricted for transportation purposes. In addition, MDOT has the ability to withhold the distribution of motor fuel and registration revenues earned and due to the City from the Michigan Transportation Fund for unpaid invoices for local match on participating construction projects.

Mitigation Strategies

All projects are subject to unknowns. MDOT will carefully monitor the progress of the Project elements to identify, evaluate, and mitigate the impacts of unknowns as necessary throughout the life of the Project. MDOT will employ mitigation strategies in an effort to contain the Project costs within the estimates and the contingencies currently established.

Despite the application of appropriate cost management and mitigation strategies, costs may increase above estimates. To alleviate this possibility, MDOT will follow FHWA's cost estimating guidance and employ risk based cost assessment methodologies to the extent appropriate.

MDOT is fully committed to the Project and intends to continue to make funds available to meet project needs and schedules. MDOT will continue to consider alternative funding structures, as appropriate.

CHAPTER 8 – ANNUAL UPDATE CYCLE

FINANCIAL PLAN UPDATES

MDOT plans to provide Annual Updates to this Financial Plan based on the anniversary date method. The anniversary date of this IFP is December 1. Each annual update will be based on actual data from MDOT's internal data systems and on budgets and plans using an as of date of December 1st.

MDOT will update and expand upon items as more current information becomes known. Examples of items that will be expanded upon in the Annual Updates, based on actual known information and anticipated progress on the Project, are:

- Updates to the Project schedule detailing those segments of the Project which will be advanced as funding becomes available;
- Updates to cost estimates based on the completion of more detailed design work and re-estimation of unit costs, as well as continued monitoring of inflationary forces;
- More detailed cash flow forecasting (i.e., of anticipated encumbrances/obligations as distinct from anticipated cash needs;
- Tracking of actual expenditures against projected cash flow needs;
- Tracking of actual revenues against projected funding and updated project costs as well as strategies to address any funding shortfalls, as necessary; and
- Incorporation of any additional funding sources and/or financing approaches to address any funding gaps that may have developed since this IFP.

Given the importance of managing overall costs, MDOT will continue to make efforts to incorporate alternative funding and finance approaches to help manage the impact of inflation on overall project costs.

GLOSSARY

ASCE – American Society of Civil Engineers

CER – Cost Estimate Review

DER – Detailed Engineering Report

EIS – Environmental Impact Statement

EPE – Early Preliminary Engineering

EVMS – Earned Value Management System

FEIS – Final Environmental Impact Statement

FHWA – Federal Highway Administration

FTA – Federal Transit Administration

FY – Fiscal Year

IFP –Initial Financial Plan

LRP – Local Road Program

MAIN – Michigan Administrative Information Network

MAP-21 – Moving Ahead for Progress in the 21st Century Act

MDOT – Michigan Department of Transportation

NEPA – National Environmental Policy Act

OINCC – Operational Independent Non-Concurrent Construction

OR – Owners Representative

P3's – Public Private Partnership

PE – Preliminary Engineering Road and Bridge

PMP – Project Management Plan

Project – I-94 Edsel Ford Freeway Modernization Project

ROD – Record of Decision

ROW – Right of Way

SAFETEA-LU – Section 1904 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users

SEMCOG – The Southeast Michigan Council of Governments

STF – State Trunkline Fund

STIP – State Transportation Improvement Plan

TEA-21 – Transportation Equality Act for the 21st Century

TIP – Transportation Improvement Plan

RTP 935 – RTP Project Number 935

RTP – Regional Transportation Plan

RTP – Regional Long Range Transportation Plan

YOE – Year of Expenditure

I-94 Detailed Engineering Report Conceptual Base Plan Design Opinion of Probable Cost JN 32587

PREPARED FOR: Terry Stepanski/Michigan DOT

PREPARED BY: CH2M HILL

DATE: June 7, 2010

Introduction

This memorandum summarizes the opinion of probable cost for the I-94 Rehabilitation project, from I-96 to just east of Conner Avenue in the City of Detroit, Wayne County. The corridor is 6.7 miles of urban freeway with two system interchanges (M-10 and I-75), 67 bridges and 6 railroad overpasses. This opinion of probable cost discusses the packages, cost per package, estimating methods and processes, unit price derivation and assumptions used to develop the costs for the corridor. It also identifies potential risks and opportunities for potential cost savings.

The opinion of probable cost provides an estimate commensurate with the level of design development performed to date, and includes contingency factors to account for design elements which are not fully developed at this time. This opinion of probable cost is based on the I-94 Detailed Engineering Report (DER) dated June 2010.

Opinion of Probable Cost

The opinion of probable cost is provided for the ten (10) advance bridges (with 7 construction packages) and the three segments, with 19 construction packages, as identified in the "Recommended Construction Sequencing and Maintenance of Traffic (CS/MOT)" memorandum dated December 7, 2009, for a total of 26 packages. Table 1 provides a Description of Segments and Costs. The Description of Construction Packages and Costs is shown in Table 2. See Appendices for additional detailed information. Unless otherwise stated, construction costs are based on 2009 Average Unit Price information from Michigan DOT for the Metro Region, the last published for the 2nd Quarter of 2009.

Table 1: Description of Segments and Costs

Segment	Description	Low Range -30.00%	Segment Cost 2009	High Range 35.00%
Advanced Bridges	I-94	$81,100,000	$115,400,000	$156,100,000
1	I-96 to Cass Avenue, including M-10 system interchange.	$493,600,000	$704,400,000	$951,400,000
2	Cass Avenue to Chene Street, including I-75 system interchange	$197,000,000	$281,300,000	$379,800,000
3	Chene Street to Norcross Street	$497,600,000	$710,600,000	$959,500,000
Total		$1,269,300,000	$1,811,700,000	$2,446,800,000

Table 2: Description of Construction Packages and Costs

Conrtract	Description	Low Range -30.00%	Segment Cost 2009	High Range 35.00%
Advanced Bridges 1	Gratiot (M-3)	$12,600,000	$17,900,000	$24,200,000
Advanced Bridges 2	Van Dyke (M-53)	$6,700,000	$9,500,000	$12,900,000
Advanced Bridges 3	Mt. Elliot	$13,900,000	$19,800,000	$26,800,000
Advanced Bridges 4	2nd Avenue	$18,200,000	$26,000,000	$35,100,000
Advanced Bridges 5	Chene and Concord	$9,800,000	$13,900,000	$18,800,000
Advanced Bridges 6	Cadillac and Cass	$9,400,000	$13,300,000	$18,000,000
Advanced Bridges 7	Brush and French	$10,500,000	$15,000,000	$20,300,000
1	Dequindre Bridge, including WB to I-75, and vicinity streets/bridges between I-75 and Chene	$137,100,000	$195,800,000	$264,400,000
2	I-94 between St. Aubin and Frontenac, vicinity streets between St. Aubin and Frontenac; E. Grand Bridge	$108,100,000	$154,300,000	$208,400,000
3	Frontenac, Burns, Conner, and Barrett bridges	$23,200,000	$33,100,000	$44,700,000
4	Pedestrian bridges at Helen, Townsend, Seminole, Rohns, Springfield and Malcolm	$20,200,000	$28,800,000	$38,900,000
5	Gratiot ramps and vicinity streets	$24,000,000	$34,200,000	$46,200,000
6	Norfolk Southern and Conrail bridges (Part-width construction)	$31,200,000	$44,500,000	$60,100,000
7	I-94 EB and vicinity streets between Frontenac and Norcross	$70,100,000	$100,100,000	$135,200,000
8	Reconstruct all pump stations between Woodward and Conner	$14,300,000	$20,300,000	$27,500,000
9	Temporary widening along I-94 WB between Frontenac and Norcross	$2,000,000	$2,800,000	$3,800,000
10	I-94 WB and vicinity streets between Frontenac and Connor	$63,400,000	$90,500,000	$122,200,000
11	Cross streets, and various retaining walls and service drives between Cass and I-75	$17,200,000	$24,500,000	$33,100,000
12	I-94, I-75 ramps, and various service drives between Brush and Russell	$140,000,000	$200,000,000	$270,000,000
13	I-94 between 2nd and Russell; M-10 NB to EB ramp; Woodward Ave.	$36,400,000	$52,000,000	$70,200,000
14	Rehabilitate I-75	$3,400,000	$4,800,000	$6,500,000
15	Cross streets, various retaining walls and service drives between I-96 and Trumbull; Grand River, Linwood, 14th, Rosa Parks and Trumbull bridges	$65,800,000	$94,000,000	$126,900,000
16	Rehabilitate Pump Stations	$7,900,000	$11,200,000	$15,200,000
17	CN Rail and Conrail bridges over I-94 and M-10	$133,800,000	$191,100,000	$258,000,000
18	I-94 and adjacent ramps between I-96 and Trumbull	$21,400,000	$30,500,000	$41,200,000
19	I-94, M-10, adjacent ramps, and various service drives between Trumbull and Cass	$268,700,000	$383,800,000	$518,200,000
Total		$1,269,300,000	$1,811,700,000	$2,446,800,000

Updates from the January 21, 2010 Cost Opinion

The following updates were made to the draft memorandum and the opinion of cost:

- Additional recommendations for consideration during final design for contingency and potential cost savings
- Noted that impacts to the overall project costs due to the extended duration of funding and numerous construction contracts are not included
- Added costs for right-of-way for the property at 5600 Wabash
- Adjusted costs to reflect Conceptual Structure Study report, dated June 2010. The study report includes updates to bridge superstructure type and quantities, and additional considerations bridge construction staging factors for several structures.
- Adjusted MITS costs in accordance with the June 2010 conceptual plan

Notable changes in the opinion of probably cost (base cost before incidentals and contingencies) are:

- Right-of-way costs increased by $2.0 million
- Bridge structures costs increased by $7.8 million
- MITS costs increased by $0.9 million

Cost Basis

Cost Resources

The following is a summary list of the various cost resources used in developing the cost estimate.

- 2009 Average Unit Price information from MDOT (Metro Region), published for the 2nd Quarter of 2009
- CH2M HILL historical data in the Detroit area for labor, equipment and materials
- Comparable projects located within the region of study
- Estimators' Experience and Judgment

Estimate Methodology

This cost estimate is considered a Parametric Model with Estimator Judgment. The estimate includes allowance costs and unit prices for certain components of the estimate. Appendix A contains the Cost Model – Quantity and Unit Price Derivation. A summary listing of Unit Costs/Description is contained in Appendix B.

Estimate Range

This opinion of probable cost follows the practices set for by the Association for the Advancement of Cost Estimating International (AACEI) Recommended Practice No.s 17R-97 and 18R-97 for Class 3 at a 15 percent design level. A Class 3 estimate is for budget, authorization or control and as such, it typically forms the initial control estimate against which all actual costs and resources will be monitored. Often it is used as the project budget until replaced by more detailed estimates. The level-of-accuracy range for this class and design level is plus 35 percent to minus 30 percent of the estimated construction cost. See Appendix C – AACEI Classification System.

For this opinion of probable cost, a plus 35 percent to minus 30 percent of the segment or package base cost was used to reflect the level of engineering completion. The actual cost (at completion of construction) at present value may be up to 35 percent higher or be 30 percent lower than the estimate. The range is intended to cover costs associated with risks, such as those noted under Potential Areas of Cost Risk, but that have not been further defined through a formal Risk Assessment.

Contingency

The AACEI defines contingency as "a specific provision for unforeseeable elements of cost within the defined project scope; particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur." Note that the contingency is not intended to cover future inflation. By including a contingency, the accuracy level of the estimate has not changed. For the Engineering Report, the recommendation for structures contingency is 35 percent and 35 percent for the roadway and all other items.

Consideration should be given during final design to maintaining contingency into the two separate and distinct areas of design/development and construction reserve (contract change orders). The construction reserve would remain as a line item throughout the design/development process.

Escalation

No escalation has been applied to this opinion of probable cost.

Excluded Costs

The opinion of probable cost excludes the following costs:

- Michigan DOT escalation for fuel, structural steel, and liquid asphalt
- Snow and ice maintenance during the construction
- Impacts to the overall project costs due to the extended duration of funding and numerous construction contracts

Disclaimer – Final Project Costs

The opinions of probable cost (estimates) shown, and any resulting conclusions on project financial or economic feasibility or funding requirements, have been prepared for guidance in project evaluation and implementation from the information available at the time the opinion was prepared. The final costs of the project and resulting feasibility will depend on actual labor and material costs, competitive market conditions, actual site conditions, final project scope, implementation schedule, continuity of personnel and engineering, and other variable factors. The recent increases or decreases in material pricing may have a significant impact which is not predictable and careful review or consideration must be used in evaluation of material prices. As a result, the final project costs will vary from the opinions of probable cost presented herein. Because of these factors, project feasibility, benefit/cost ratios, risks, and funding needs must be carefully reviewed prior to making specific financial decisions or establishing project budgets to help ensure proper project evaluation and adequate funding.

Estimate Comparison with April 2004 Value Engineering

A Value Engineering (VE) Report was completed for the project in April of 2004. Table 3 summarizes the range of costs from the report.

Table 3: Summary of April 2004 VE Costs

	Minimum Cost	Expected Cost	Maximum Cost
Total	$744,675,000	$897,735,000	$1,133,420,000

There are significant differences in cost between this opinion of probable cost and the VE Report. Much of the work from the VE was based upon a very preliminary work done in the FEIS. The DER is based on a greater level of detail and available material. The notable differences are divided into quantity and unit price changes, as follows.

Quantity

- The roadway and railroad bridges at Grand/I-75 were affected by an increased length of an auxiliary lane on NB I-75, approximately 1,200 feet longer.
- Three required bridges were not included in the VE
  - Milwaukee Ave over M-10
  - W. Grand over M-10
  - Pallister over M-10
- For Dequindre Bridge, the VE report assumed the majority of the bridge can be saved, with only a few spans being reconstructed, a smaller widening section, and a small amount of deck replacement. The alternative shown in the DER requires that more than one-third of the bridge be replaced, replacement of the entire deck, and a larger widened section due to 12-foot inside shoulders. The shoulders were 4-foot wide in the FEIS.
- The VE included base cost of $46M for removal and replacement of 6 railroad bridges (VE, Pages 106 and 107). The current cost is for 9 bridges being removed and 6 more new bridges, in addition to a runaround for a base cost of $115M. In addition, no costs for runarounds were included in the estimate since no coordination with the railroads had been performed prior to the VE, so railroad requirements had to be assumed.
- In some cases, the VE noted that quantities had not been updated since 2001 and possibly since 1999 (VE, Page 12).
- Retaining walls had an area of 700K Sft (VE, Page 79) versus the current 1.1M Sft. The required height of walls, the location and type of wall all factored into increased area.
- The FEIS did not include sidewalks for much of the corridor. When sidewalks were added, the area of affected parcels increased. The vertical clearances of the pedestrian bridges were also increased to meet full design standards, which increased impacts.

Unit Prices

- Unit prices for retaining walls increased from a base cost of $60/Sft (VE, Page 108) to $140/Sft or $175/Sft, depending on the type of wall. Some of this is attributable to potentially poor soil conditions in sections of the corridor.
- Unit prices for bridges are approximately twice the cost per Sft. These standard bridge costs have risen since 2004.
- Inflation for approximately 6 years would increase prices by approximately 25 percent.

Potential Areas of Cost Risk

Overall Estimate

No escalation of costs for right-of-way, construction or engineering has been applied. Therefore, future budgeting and development of the overall project financial plan will need to be indexed to account for inflation.

Currently, no funding is identified for the project. Inflation costs and changes in design criteria will potentially increase the overall cost of the project.

Right-of-Way

Right-of-Way costs can significantly fluctuate (increase or decrease) over time due to unforeseen market conditions or redevelopment of parcels required for the project.

Maintenance of Traffic

As noted in the Recommended CS/MOT Memorandum, a number of scenarios, goals, and constraints were evaluated to develop a recommended approach. There are numerous other ways to construct the project; any of which may increase or decrease the costs.

Foundations

A preliminary investigation of the existing boring logs in the corridor is being completed to determine generalized soil profiles and to make a preliminary recommendation on the proposed foundation types for the structures. Since this investigation is limited to the existing borings from the corridor and those borings were completed in excess of fifty years ago, any recommendation the report makes will need to be confirmed with a complete geotechnical investigation, prior to the foundation design, including new borings, soil analysis, and possible pile load tests. See the Geotechnical Report for additional recommendations.

Utilities

As defined in the scope of work, the drainage design for the DER focused only on the major trunklines along mainline I-94 and M-10. The goal was to identify and maintain existing drainage patterns, and develop an overall drainage plan including potential major utility conflicts for the mainlines. Additional drainage design and utility investigations, particularly along the service drives, will be required for future design development. Considerations for potential retaining wall types have been evaluated based on the limited geotechnical data available. Each retaining wall type will potentially affect the existing utilities differently (example: use of tie-backs, excavation for CIP wall, etc).

The Subsurface Utility Engineering (SUE) mapping that was completed in 2002 was based on ASCE/CI 38-02 using Quality Levels B-D. Additional utility investigations, including Quality Level A, will be required to facilitate identifying known and potentially unknown utilities. When final design begins, utility mapping will need to be updated to the latest ASCE standard guideline.

Further investigation is needed to determine what additional public/private utilities may be reimbursable other than the Detroit Water and Sewer Department (DWSD) and Power and Lighting Department (PLD) municipal utilities.

Contamination and Remediation

The FEIS lists 49 potential hazardous waste sites within the corridor. Evaluation of the potential contamination cleanup and remediation costs, particularly in the industrial areas near the I-94 and I-75 System Interchange, will need further investigation during future design activities.

Railroads

Future coordination will be required with the railroads to establish regarding sharing tracks and who will perform work on their property for tracks – railroads or contractors.

The temporary earth retention for the railroad bridges is very conceptual. Additional detailed analysis will be required in final design to fully size the substructures and foundations, and obtain approval of staging details from the railroads.

For the recommended CS/MOT plan, runarounds were required to maintain rail traffic. The conceptual layouts of the runarounds extended beyond the limits of the scope of work for survey. Additional topographical survey will be required in the next phase of design to confirm geometric design of the runarounds. The track profiles may increase the length or change the overall configuration of the required runarounds.

Pavement Section

A pavement design selection process is not required for the DER. To facilitate the DER and opinion of cost development, a concrete pavement type was assumed. Should this assumption change to asphalt, unit prices would change, including potential adjustments to excavation and embankment quantities.

Potential Areas of Cost Savings

Considering the significant differences between the VE study and DER, it is recommended that prior to any future design efforts, a follow-up Value Planning or Value Engineering study be performed to determine additional potential cost savings.

As part of future design development, it would also be beneficial for MDOT to conduct a comprehensive Risk Assessment of the I-94 project to identify and manage additional cost savings and opportunities.

Consideration should be given to the development of earth flow diagrams, efforts to revise the profile to optimize the earthwork volumes and cost, and location/provision of potential stockpile sites to minimize waste/borrow between different construction contracts.

Appendices

APPENDIX A - COST MODEL - QUANTITY AND UNIT PRICE DERIVATION

APPENDIX B – SUMMARY OF UNIT COSTS/DESCRIPTION

APPENDIX C- AACEI CLASSIFICATION SYSTEM

APPENDIX D - COST SUMMARY BY SEGMENT

APPENDIX E - CASH FLOW FOR MDOT

APPENDIX F - COST SUMMARY BY PACKAGE (See enclosed CD)

APPENDIX G - PUMP STATIONS, HIGHWAY BRIDGES, REHABILIATION BRIDGES, RAILROAD BRIDGES AND RETAINING WALL SUMMARY SHEETS (See enclosed CD)

APPENDIX A

COST MODEL - QUANTITY AND UNIT PRICE DERIVATION

Cost Model Description

The cost model is consistent with the level of engineering work that has been performed to date and the analysis relies on estimates of quantities for major construction items such as pavement, earthwork, structures and drainage. Quantity based estimates were prepared for major items that most influence the construction costs, including roadway pavement (removal and new pavement), earthwork, highway and railroad bridges (removal and new bridges), and retaining walls (removal and new walls), drainage, concrete formwork (curb and gutter, barriers) and pump stations.

In general, the three highest cost items were developed as follows:

- Highway bridges - MDOT unit prices per square foot were used, with an adjustment for foundation conditions applied. The unit prices used are consistent with the Conceptual Structures Study Report, dated June, 2010.
- Roadway items - Quantity estimates were derived from measuring dimensions directly from MicroStation utilizing GEOPAK, and using stationing and elevations of the alignments shown in the Conceptual Roadway Base Plans.
- Railroad bridges used a bottom up estimate based on quantities and are consistent with the Conceptual Structures Study Report.

Unless noted below, costs for most other items are estimated as percentages or lump sum values based on experience with similar facilities. The percentages will vary per construction package and are based on the type, location, and complexity of the item.

Allowances were sometimes included to cover items that could be identified but which cannot be quantified at the particular level of design development.

Cost Model Quantity and Unit Price Derivation

A brief description of cost items and their use in the cost model follows:

Right-of-Way

The value of $60 million was assumed for the cost of Right-of-Way, in coordination with MDOT Real Estate, to account for costs from the FEIS and additional properties impacted, as shown in the Conceptual Base Plans. The cost includes MDOT legal, acquisition, relocation and appraisal costs, and excludes remediation costs. No additional contingency was set aside to cover changes in the market conditions.

An additional $2,000,000 allowance was included for the facilities at 5600 Wabash (DDOT Bus maintenance Facility) to cover costs for relocation of the heating equipment in one of the buildings. However, demolition of an old chimney stack and remediation for at least 5 buried tanks at the site may be required and were not included in the allowance. The DER notes that additional studies of the mainline alignment during final design may reduce ROW impacts on the site. However, it is likely that the old chimney stack will still need to be demolished since it appears to be unstable at this time.

Construction

Removals

Clearing

The area of clearing was determined using the project topographical mapping and MicroStation to measure the areas.

Drainage Removal

Drainage structure removals were based on existing survey data and sewer removal quantities were based on known and available existing SUE data.

Guardrail Removal

Guardrail removal was determined using the project topographical mapping and MicroStation to measure the lengths.

Pavement Removal

The area of pavement removal was determined using the latest topographical mapping, MicroStation and GEOPAK to measure the areas. The cost analysis assumes removal of the existing pavement (mainline, shoulders and curb and gutter) within the project limits.

In several locations in the corridor, HMA pavement overlays concrete pavement. In these locations, the HMA section was less than 5 inches and the concrete section was less than 10 inches. Under these conditions, the pavement removal area quantities were considered a composite asphalt and concrete pavement and were accounted for only once.

Concrete Barrier Removal

Concrete barrier removal was determined utilizing the project topographical mapping and MicroStation to measure the lengths.

Sidewalk Removal

Sidewalk removal was calculated using the project topographical mapping, MicroStation and GEOPAK to measure the areas.

Incidental Removals

Incidental removals cover other items not quantified such as attenuator removals, subgrade correction, clearing for fence. It is assumed these items are included in the overall project contingency. Therefore the percentage in the cost model was set at 0% for incidental removal items.

Earthwork

Earthwork calculations for Excavation and Embankment were calculated using MicroStation and GEOPAK to develop cross sections along each roadway. These cross sections were used to develop the earthwork volumes using the average end area method. The output information was used to determine the overall quantity on a per construction package basis.

The unit price for Excavation and Embankment are each set to $12.00 and $8.00/Cyd respectively.

Incidental Earthwork

The additional earthwork that may be necessary to construct the retaining walls was not included. Incidental earthwork also covers other items not quantified such as Concrete Barrier Backfill (CIP). It is assumed these items are included in the overall project

contingency. Therefore the percentage in the cost model was set at 0% for incidental earthwork items.

Pavement and Base Materials

The pavement section used for cost purposes was an assumed MDOT concrete pavement sections, based on information taken from Section 6 of the MDOT Roadway Design Manual, MDOT Standard Plans and similar MDOT projects.

The following unit prices were used:

- Mainline and Ramps - Conc, Pavt, Nonreinf, 12 inch (including pavement joints) - $47.50/Syd
- Local Roads - Conc, Pavt, Nonreinf, 9 inch (including pavement joints - $35.00/Syd
- Shoulders - Shoulders, Nonreinf Conc (including pavement joints) - $27.00/Syd

Subbase

The volume of subbase was determined using MicroStation and GEOPAK to measure the areas and multiplying it by the depth of the subbase.

Open Graded Drainage Course

The quantity of open graded drainage course was developed using MicroStation and GEOPAK to measure the areas.

Geotextile Separator

The quantity for geotextile separator is the same as the open-graded drainage course, which was measured using MicroStation and GEOPAK.

Pavement

Pavement areas were calculated using MicroStation and GEOPAK to measure the areas.

Concrete quality assurance was set at 2% of the concrete pavement and concrete work under Miscellaneous Construction.

Incidental Pavement and Base Materials

Incidental pavement and base materials covers other items not quantified such as non-chloride accelerator. It is assumed these items are included in the overall project contingency. Therefore the percentage in the cost model was set at 0% for incidental pavement and base materials items.

Drainage and Erosion Control

This item covers the roadway drainage facilities including underdrain, trunkline and non-trunkline storm sewer, underground storm water storage, catch basins, manholes, and pump stations.

Underdrain

The length of underdrain was determined based using MDOT standard plans and the typical sections. The underdrain outlet connections to the catch basins were assumed as 10% of the total length of underdrain.

Storm Sewer

Trunkline storm sewers and manholes on I-94 and M-10 were based on the conceptual drainage layout taking into consideration roadway geometry and construction staging. The

lateral sewers and catch basins were developed using assumptions of inlet spacing of 150 feet for the depressed freeway sections.

Service Drive and Cross Street storm sewers were not developed as part of the conceptual drainage plan. Assumptions were made regarding size and spacing of the related drainage structures and storm sewer pipe. In general, for the service drives, the inlet spacing was assumed to be 100 feet. Inlets will be located along the outside of each service drive as indicated by the proposed shed section in the typical sections.

Other key assumptions used to develop storm sewer quantities were:

- All sewer pipe was assumed to be Class A, based on depth of bury and initial information on concept layout.
- Drainage Structure size was based on maximum pipe size per the MDOT Drainage Manual.
- Drainage Structures larger than 72 inch are included under Special Drainage Structures.
- No separate quantities for Drainage Structure, Add Depth have been included. The unit price has been adjusted to account for this.
- Drainage Structure Covers were assumed at an average of 500 pounds per cover.
- Storm sewer trunkline routing was determined in coordination with the construction staging and maintaining traffic efforts. Temporary drainage infrastructure during construction was assumed to be minimal. It was also assumed that no stormwater bypass pumping due to construction phasing schemes would be required.
- Major utility relocation costs including DWSD combined sewer modifications have been included under Utility Relocation.

Pump Stations

Pump stations were developed in separate estimates and included removals and new construction. Some pump stations were identified as rehabilitation candidates. Costs for replacing pump stations are based on bid prices for new pump station construction.

- Pump Station rehabilitation prices are based on recent bid tabulations for similar pump stations recently rehabilitated in the Metro Region.
- Pump station wet well structures are assumed to be cast-in-place concrete with a wall thickness of 18 inches.
- The junction chambers where each pump station discharge pipe ties into the DWSD combined sewers are included in the item “Special Drainage Structures”.
- Pumps are assumed to be submersible propeller type with draft tubes. Unit prices for the pumps were confirmed with local suppliers.
- Due to limited geotechnical information, only a standard foundation was considered for the pump stations. Excavation was assumed to be 3 feet below bottom of slab. The bottom slab was assumed to be 5 feet thick.

Erosion Control

Erosion control includes the items related to erosion control work on the roadside slopes, sedimentation basin, stormwater management, inlet protection, and silt fence. Historical data and experience from similar projects indicates a typical range of 7 percent of the cost of earthwork and drainage should be allocated for erosion control, unless this yielded a value that appeared too low for the particular project.

Incidental Drainage

Incidental drainage covers other items not quantified such as drainage structure taps, sewer taps, additional depth drainage structures, temporary drainage connections. It is assumed these items are included in the overall project contingency. Therefore the percentage in the cost model was set at 0%for incidental drainage items.

Structures

The structures, including removals, highway, pedestrian and railroad bridges, along with retaining walls are the single largest construction cost item. The unit prices are based on the 2008 Bridge Repair Cost Estimate (revision date 1/29/09) updated to the baseline date for this opinion of cost, and historical cost data for the Metro Region.

Structure Removal

Bridge removal areas were estimated based on the length and width measurements from the most recent inspection reports. These limits do not include bridge approach pavement since the area is included in the roadway quantities.

The unit price for bridge removal is:

- Typical grade separation $28/SF

Bridge Rehabilitation

The structure carrying I-94 over the Dequindre Rail Yard (Dequindre Bridge) was replaced in 1999-2000. As such, the structure is in good condition and does not require complete replacement to accommodate the proposed I-94 widening. However, due to the close proximity of the I-75 / I-94 interchange and the several ramps that tie directly into the Dequindre Bridge, a portion of the structure will need to be replaced. The remainder of the bridge can be widened to accommodate the proposed lanes. The entire deck will need to be replaced to accommodate the shift in the I-94 centerline. Additional description of the recommended alternative for the Dequindre Bridge can be found in the Conceptual Structure Study Report dated June 2010.

The unit prices for rehabilitated bridges are:

- Mainline – Concrete $140/SF
- Deck Replacement $85/SF
- Mainline – Concrete, Widening $180/SF

Highway Bridges

New bridge areas are based on the proposed roadway width (travel lanes plus bike lanes, sidewalks, and parapets). Structure limits are estimated based on the plans and do not include bridge approach pavement since the area is included in the roadway quantities. A summary of Highway Bridge costs are included in Appendix G.

Bridges identified as having 'normal' foundations assume pile foundations. Given the geotechnical uncertainties at this stage, an additional risk factor was applied to a selection of bridges and retaining walls in the corridor. Two areas were in the Geotechnical Report to have poor or very poor soils based on existing soil borings. These areas are located between M-1 (Woodward Avenue) and Chene Street, and M-53 (Van Dyke) to McClellan Avenue. The risk factor applied accounts for costs associated with longer/additional piling, high strength piling, and/or ground improvements that may be required due to the poor soils.

Unit Prices and Cost Distribution

Bridge costs were determined using the deck area and the following unit prices for new bridges:

- Mainline Bridge – Steel I Girder $160/SF
- Local Road Overpass – Steel I Girder $160/SF
- Local Road Overpass – Steel I Girder - Curved $180/SF
- Local Road Overpass – Concrete I Beam $140/SF
- Local Road Overpass – Concrete Box Beam $140/SF
- System Interchange Ramps – Steel Box Lower Level $190/SF
- System Interchange Ramps – Steel Box Upper Level $210/SF
- Braided Ramp Bridge $195/SF

To account for additional potential risks in the cost of the foundations, the unit prices for the bridges were broken out as follows:

- Superstructure 70%
- Substructure 20%
- Foundation 10%

The costs for the superstructure include all costs related to the beams and bridge deck, including such items as sidewalks, railing, bearings, etc. The substructure costs include the abutments and piers, and the foundation costs include all items related to the piling.

Foundation Considerations

Poor soil conditions in several sections of the corridor are expected to require extensive foundations. Bridges identified as having 'normal' foundations assume steel H-pile foundations. Given the geotechnical uncertainties at this stage, an additional risk factor was applied to a selection of bridges and retaining walls in the corridor. Two areas were identified as having poor or very poor soils based on existing soil borings (see the Geotechnical Report). These areas are located between M-1 (Woodward Avenue) and Chene Street, and M-53 (Van Dyke) to McClellan Avenue. The risk factor applied accounts for costs associated with longer/additional piling, high strength piling, and/or ground improvements that may be required due to the poor soils. Foundation costs were increased as follows:

- Poor 9%
- Very Poor 12%

The locations and the reasons for the classification are described as follows:

I-96 to M-1 (Woodward Avenue)

- Condition: Normal
- Not in bedrock valley area as identified in the Geotechnical Report

M-1 (Woodward Avenue) to I-75

- Condition: Very Poor
- The bedrock lies very deep and is described as a valley in the bedrock profile per the Geotechnical Report. Above the bedrock, there is a very thin 'crust' of hard clay overlying soft plastic clay.

I-75 to Chene

- Condition: Poor

- The bedrock lies very deep and is described as a valley in the bedrock profile per Geotechnical Report. Above the bedrock, there is a thicker 'crust' of hard clay overlying soft plastic clay.

Chene to M-53 (Van Dyke Avenue)

- Condition: Normal
- Not in bedrock valley area as identified in the Geotechnical Report.

M-53 (Van Dyke Avenue) to McClellan

- Condition: Poor
- The bedrock lies very deep and is described as a valley in the bedrock profile per Geotechnical Report. Above the bedrock, there is a 'crust' of hard clay overlying soft plastic clay.

McClellan to Conner

- Condition: Normal
- Not in bedrock valley area as identified in the Geotechnical Report.

Gratiot

- Condition: Poor
- Due to evidence of unsuitable materials in vicinity as noted in the Geotechnical Report.

Construction Staging

Several bridges must be built in stages in order to maintain traffic during construction. A factor of 10 percent of the total new construction cost was applied to those bridges. Dequindre Bridge was the only exception, where the factor was applied to new construction and the removal cost since the structure must also be demolished in stages. Only bridges on major routes were considered since there are a number of potential detour routes for the local roads.

Pedestrian Bridges

Pedestrian bridge costs were determined using the deck area and the following unit prices for new bridges:

- Pedestrian Bridge $160/SF
- Pedestrian Bridge Ramp $90/SF

Foundation costs were increased as described under highway bridges.

No pedestrian bridges require construction staging.

Railroad Bridges

The costs for railroad bridges were developed from a detailed breakdown of bid items and types of work in all but one case. The detailed estimates are not included, but a summary is included in Appendix G. Costs include demolition, new bridge construction, and where required runaround track, drainage and bridges.

One bridge, the CN and Conrail RR Bridge over I-94 (X05 of 82252), was developed from comparisons with other structures in the corridor. MDOT determined that a structure study was not required at this time and would be deferred to later stages of design. The area of the bridge that will be removed was determined and an estimated cost per square foot of removal was applied. The area of new bridge was calculated and an estimated cost per square foot of new bridge was applied. The per square foot cost used for this structure is

slightly higher than that used for the smaller runaround structures, based on quantities of steel.

Bridges X02-8 of 82023, X02 of 82023, X01-8 of 82112 and X01 of 82112 all use the same runaround, therefore the costs are summarized in a separate table.

Retaining Wall Removal

The retaining wall removal quantities were based on the area of the exposed face of the walls, measured from the ground level in front of the wall to the top of the wall.

The unit price for retaining wall removal is:

- Concrete Cantilever Wall $12/SF

Retaining Walls

Locations, lengths and approximate heights of retaining walls were determined from the conceptual base plans. Approximate lengths and heights were taken from both the plan view and profile view. A summary of Retaining Wall costs are included in Appendix G.

Retaining wall locations were determined utilizing GEOPAK's Corridor Modeler to create cross sections for each alignment. These models and cross sections were used to determine the location as well as profiles of the proposed retaining walls.

Retaining Wall Types and Unit Prices

Based on the retaining wall report being prepared for this project, two walls types were identified as the recommended wall types.

Unit prices, based on these wall types are:

- Cut walls – Tangent/Secant pile walls, including concrete, reinforcing steel, precast concrete panels for the facing, excavation, and decorative fencing along the top of the wall
- Fill walls - Cast-in-place concrete walls on drilled shafts, including reinforcing steel, excavation, shoring, backfill, concrete landscaping, decorative fencing along the top, and underdrain behind the wall or MSE walls including panels, straps, and standard or light weight fill

Unit prices for retaining walls depending on the type of wall were assumed based on current engineering practice. Prices for cut walls ranged from $140/Sft for the tangent pile wall to $170 for the secant pile wall. Prices for fill walls ranges from $140/Sft to $175/Sft for CIP walls supported by drilled shafts, depending on wall height.

Three wall heights were used for the analysis. Wall costs from other Michigan projects were reviewed to develop the following unit prices:

- Cut wall
  - 0-10 Feet $140/Sft
  - 10-20 Feet $160/Sft
  - Greater than 20 feet $170/Sft
- Fill wall
  - 0-10 Feet $140/Sft
  - 10-20 Feet $165/Sft
  - Greater than 20 feet $175/Sft

Foundation Considerations

Four areas in the corridor were identified as having unsuitable materials such as fill, construction debris, and soft clay. The four locations are McClellan Avenue (Approx. Station 761+00), Gratiot Ave (Approx. Station 767+00), Garland St (Approx. Station 786+00) and the Conrail Shared Assets RR located west of Conner Ave (Approx. Station 807+00). The foundation adjustment factor was applied to walls in the vicinity to account for deep foundations and/or soil improvement that may be required.

In addition to the four areas noted, walls greater than 14 feet in height may require tiebacks, deep foundations, light weight fill and/or soil improvement. Therefore the following conditions were used:

- Average wall height greater than 14ft: Poor
- Wall height greater than 20ft: Very Poor

Noise Walls

A noise study was not included in the scope of work for the project, therefore the quantities for the noise walls were taken from the Final Environmental Impact Statement dated December 2004. Three walls were identified including proposed lengths and heights.

The unit price range for noise walls is between $35/Sft for ground mounted to $55/Sft for walls mounted on retaining walls on poor/difficult foundation conditions. Since noise wall location and type of support will be defined in future design studies, the unit price has been averaged and set at:

- Noise wall $45/SF

Aesthetics

Bridge aesthetic items may include decorative fencing or railing, colored concrete, decorative formwork, and other items that may be incorporated from the Corridor Design Guidelines.

This was set at 4 percent of the new bridges and new retaining wall costs.

Incidental Structural

Bridge incidental items include bridge and retaining wall construction staging costs, maintenance of traffic directly associated with the bridge or retaining wall construction, deck drainage, expansion joints, special drainage requirements and other items. It is assumed these items are included in the overall project contingency. Therefore the percentage in the cost model was set at 0% for incidental structural items.

Traffic

It is assumed that all construction activities will be performed while maintaining traffic in the manner described in the Recommended CS/MOT.

Maintaining Traffic

This item is intended to include typical costs of maintaining traffic during construction including temporary pavement, barrier, signalization, signing, striping, maintaining detour route, channelizing devices, crossovers, and railroad flagging and signing.

This was set at 5 percent of the Pavement and Base Materials and the Structures, unless this gave a value that appeared too low or too high for the particular project. Also as a check, this item is typically between 3 to 5 percent of the total direct cost.

Off-Site Traffic Mitigation Projects

As mentioned in the Recommended CS/MOT Memorandum, advance off-site mitigation packages will be required. These will be developed as part of a detailed Transportation Management Plan (TMP) to be prepared in future design efforts.

In projects of this scope and magnitude, there are often projects that may required to upgrade facilities outside of the corridor such as arterial improvements, resurfacing local streets, restriping of major detour routes and arterial signal progression improvements. These projects would be identified as part of a Traffic Management Plan that will be developed in the future. For example, costs for the Marquette Interchange in Milwaukee were about $20M of the total $750M and I-94 N/S project in Milwaukee were estimated to be about $35M of the total $1.2B. These numbers equate to about 3 percent of the project. Therefore, off-site traffic mitigation was set at 3 percent of the Removals, Earthwork, Pavement and Base Materials, Drainage and Erosion Control and Structures.

Signing and Pavement Marking

This item includes the mainline, ramp and local street pavement markings along with non-freeway signing.

The cost was set at 8 percent of the Pavement and Base Materials. Also as a check, this item is typically between 0.5 to 2 percent of the total direct cost.

Freeway Signing

Conceptual signing plans were not included in the scope of work for the project; therefore the location, number and sizes of freeway guide signs have not been developed. Quantities were determined by counting the number of existing bridge mounted signs, sign trusses, and cantilever signs, and assumed the general signage requirements will be about the same for the new geometric configuration.

The unit price was set at $100,000 per installation.

Traffic Signals

The number of traffic signals required was determined by counting the number of existing signalized intersections in the corridor.

The unit price was set at $125,000 per intersection which is based on recent installation costs of box-span signals in the Metro Region.

MITS

A MITS plan was prepared for the I-94 corridor and costs were developed based on removal and replacement of the existing ITS infrastructure. This plan and costs were summarized in the "Conceptual ITS Design-Communications Plan" memorandum dated June 8, 2010.

Incidental Traffic

Traffic incidental items include flag control, and minor traffic devices. It is assumed these items are included in the overall project contingency. Therefore the percentage in the cost model was set at 0% of the pavement and base materials items.

Miscellaneous Construction

This item includes sidewalks, curb and gutter, concrete barrier, guardrail and attenuators, lighting, fencing, landscaping and incidentals.

Sidewalk
Sidewalks were assumed to be 4 inches thick, with a 6-foot minimum width. The quantities for sidewalk were determined using MicroStation and GEOPAK to measure the areas.

Curb, Curb and Gutter and Valley Gutter
The quantities for curbing were developed using MicroStation and GEOPAK to measure the lengths of each element.

Concrete Barrier
The length of concrete barrier was determined using MicroStation and GEOPAK to measure the lengths of each element.

Guardrail and Attenuators
The length of guardrail and number of attenuators were calculated using MicroStation and GEOPAK to measure the lengths and number of each element.

Freeway Lighting
The proposed freeway lighting was developed by comparing costs of other recent urban freeway reconstruction projects containing lighting in the Metro region. It was determined that a value of $750,000/mile, plus $50,000 per tower light in the system interchanges was reasonable for this project. Freeway lighting costs were allocated between packages based on the length criteria and an estimated density of towers in the interchange areas, and are summed up as a LS cost.

Fencing
The length of fencing was developed using the limited access right-of-way information along with MicroStation and GEOPAK to measure the length.

Landscaping
Landscaping prices were developed using experience from previous urban freeway projects in the Metro Region.

- System Interchange $500,000/Ea
- Service Interchange $150,000/Ea
  - E. Grand Blvd, Mt. Elliot, Gratiot and Connor have opportunities for Landscape development
- Freeway $300,000/mile

The length of each Service Drive contract was then measured using MicroStation to determine a LS cost for each contract. It was assumed that landscaping will not be included with the advanced bridge work.

Contamination and Remediation

For this opinion of probable cost, an allowance of between $15M to $20M was provided to account for mitigation of these sites. This is roughly 35 percent of the cost of the drainage and earthwork items.

Incidental Miscellaneous Construction

Incidental Miscellaneous Construction items include contractor staking and other items. It is assumed these items are included in the overall project contingency. Therefore the percentage in the cost model was set at 0% for incidental miscellaneous construction items.

Utility Relocation

Typical utilities are defined as electric service, cable, water, sanitary sewer, telephone, standard gas lines, etc. A utility conflict matrix was developed for the project, based on a 10-15 percent level of design. Further investigations are needed to fully realize the impacts and costs associated with the existing utilities. Consideration also needs to be made on the type of utility agreements between the parties, and the impacts to the construction schedule associated with the relocation of major utilities.

Public Lighting Department

Quantities and cost to replace existing Public Lighting Department (PLD) facilities were developed by using the SUE data to determine the number and lengths of existing facilities. This information was used to determine the number of proposed facilities that would be required by assuming the proposed facilities would be between 110-200 percent more than existing. This assumption was based on a particular construction package size, amount of existing vs. proposed service drives and number of cross streets. PLD costs were been allocated between packages based on the length criteria, and are summed up as a LS cost.

Detroit Water and Sewer Department

Quantities and cost to replace existing Detroit Water and Sewer Department (DWSD) facilities were developed by dividing the DWSD quantities into the four categories listed below.

Major Relocation – Water

Quantities and cost for major relocation of water facilities were developed using the utility conflict matrix based on the Conceptual Roadway Base Plans, and conceptual drainage trunkline layout. The Major Relocation – Water category includes water mains crossing I-94 and major water mains along the service drives that will be impacted by the proposed roadway and drainage improvements. Several large diameter water mains cross under I-94 in tunnel structures that will be impacted by the proposed freeway widening. In addition to relocation costs, protect-in-place costs have been included where appropriate. Refer to the utility plans and conflict matrix in the Engineering Report.

Incidental Relocation – Water

Incidental Relocation - Water items include the other removal, trenching, pipe, valves, hydrants and related items for the DWSD water system not quantified under the Major Relocation –Water category. The incidental category is for water main relocation for impacted infrastructure mostly on the service drives and cross streets.

This was set at 10 percent of the Major Relocation - Water costs. A high percentage was used due to several unknowns in storm drainage design on the service drives and cross streets, which could potentially cause a large number of conflicts.

Major Relocation – Sanitary

Quantities and cost for major relocation of sanitary and combined sewer facilities were developed using the utility conflict matrix based on the Conceptual Roadway Base Plans and the conceptual drainage trunkline layout.

The Major Relocation –Sewer category includes large diameter sewers crossing I-94 and major sewers along the service drives that will be impacted by the proposed roadway and drainage improvements. Several large diameter sewers crossing under I-94 are planned to be protected in place. Refer to the utility plans and conflict matrix in the Engineering Report.

Incidental Relocation – Sanitary

Incidental Relocation - Sanitary items include the removals, modifications and ties to the existing DWSD combined sewer system and other related items. The major sanitary sewers crossing I-94 are included in the Major Relocation category above. This category for incidental sanitary relocation for impacted infrastructure on the service drives and cross streets.

This was set at 10 percent of the Major Relocation - Sanitary costs. A high percentage was used due to several unknowns in storm drainage design on the service drives and cross streets which could potentially cause a large number of conflicts.

Incidental Utility Relocation

Incidental Utility items include removal of abandoned utilities, unassigned utilities and other items. It is assumed these items are included in the overall project contingency. Therefore the percentage in the cost model was set at 0% for incidental utility relocation items.

Mobilization

An average fixed rate for mobilization, as defined below, was applied across the project for both Roadway and Structural items. This rate was not adjusted for each contract based on the overall value of that contract. For instance, a smaller contract might require a higher rate, and a larger contract a smaller rate.

Roadway Mobilization

The roadway mobilization is 5% of all items except structures.

Structure Mobilization

The structure mobilization is 5% of all structures items.

Contingency

Roadway Contingency

See discussion under Cost Basis.

Structure Contingency

See discussion under Cost Basis.

Engineering and Management

Program Management and Administration

It is assumed that a project of this magnitude would require extensive administration, even over the projected 10 year program. The administration costs would cover all aspects of the project coordination among the various groups working on the project. This effort would include coordination of overall maintenance of traffic, development of corridor wide concept designs such as signing, lighting, landscaping, and coordination between designers of adjoining contracts, to name a few activities. This work would also include all aspects of an ongoing public involvement program. Staffing could be a combination of MDOT and consultant staff, or just MDOT. In either case, a special corridor team would likely need to be defined to deliver the right-of-way, design and construction.

This was set as 3% of all construction items.

Preliminary Engineering

Preliminary engineering was set based on typical MDOT percentages for design of the project.

This was set as 7% of all construction items.

Construction Engineering

Construction engineering was set based on typical MDOT percentages for construction of the project, including all resident engineering, material testing, shop drawing review, contract administration and inspection.

This was set as 7% of all construction items.

APPENDIX B

SUMMARY OF UNIT COSTS/DESCRIPTION

JOB NUMBER:
32587
I-94 Detailed Engineering Report
I-96 to Conner

Conceptual Base Plans

UNIT PRICES/DESCRIPTIONS

Items	Units	$/Unit or % Construction	Miscellaneous Factors	Miscellaneous Factors	Miscellaneous Factors	Comments	Item Description	Unit Cost Data Source
I. RIGHT-OF-WAY								
Right-of-Way								
??? Allowance	LS					See individual contract for actual allocatiion	Includes legal, acquisition, relocation and appraisal costs	MDOT
Contingency	%	0.00%					% of ROW	
II. CONSTRUCTION								
1. Removal								
Clearing								
2010001 Clearing	Acre	$4,200.00						
Drainage Removal								
2030011 Dr Structure, Rem	Ea	$250.00						
2030015 Sewer, Rem, Less than 24 inch	Ft	$9.00						
2030016 Sewer, Rem, 24 inch to 48 inch	Ft	$12.00						
2030017 Sewer, Rem, Over 48 inch	Ft	$26.00						
Guardrail Removal								
2040008 Guardrail, Rem	Ft	$1.25						
Pavement Removal								
2040011 Pavt, Rem	Syd	$4.75						
Concrete Barrier Removal								
2040012 Conc Barrier, Rem	Ft	$10.00						
Sidewalk Removal								
2040013 Sidewalk, Rem	Syd	$5.50						
Incidental Removals	%	0.00%				See individual contract for actual rate used	% of Clearing and all Removals	
2. Earthwork								
Excavation								
2050016 Excavation, Earth	Cyd	$12.00						
Embankment								
2050010 Embankment, CIP	Cyd	$8.00						
Incidental Earthwork	%	0.00%				See individual contract for actual rate used	% of Excavation and Embankment	
3. Pavement and Base Materials								
Subbase								
3010002 Subbase, CIP (See Typ Section)	Cyd	$12.00						
Aggregate Base								
3020030 Aggregate Base, 12 inch	Syd	$5.00						
Open Graded Drainage Course								
3030001 Open-Graded Dr Cse, 4 inch (XS & Serv Dr.)	Syd	$5.00						
303000X Open-Graded Dr Cse, 6 inch (ML & RP) (See Ty	Syd	$7.00						
3030020 Geotextile Separator	Syd	$1.25						
Pavement								
5020002 Cold Milling HMA Surface	Ton	$7.61						
5020020 Pavt Joint and Crack Repr, Det 7	Ft	$4.40						
5020021 Pavt Joint and Crack Repr, Det 8	Ft	$5.50						
5020025 Hand Patching	Ton	$72.00						
5020045 HMA, 3E3	Ton	$45.00						
5020051 HMA, 4E3	Ton	$50.00						
5020053 HMA, 4E30	Ton	$78.00						
5020059 HMA, 5E30	Ton	$78.00						
6020106 Conc, Pavt, Nonreinf, 9 inch	Syd	$35.00						
6020112 Conc, Pavt, Nonreinf, 12 inch (See Typ Section)	Syd	$47.50						
6020222 Shoulder, Nonreinf Conc (See Typ Section)	Syd	$27.00						
6030023 Joint Repr, Longit	Ft	$5.00						
6037011 Concrete Pavement Repairs	Syd	$100.00						
Conc Quality Assurance	LS	2.00%					% of Concrete Pavment and MIscellaneous Construction	
Incidental Pavement and Base Materials	%	0.00%				See individual contract for actual rate used	% of Subbase, Drainage Course and Pavement	
4. Drainage and Erosion Control								
Underdrain								
4040043 Underdrain, Pipe, Open-Graded, 6 inch	Ft	$6.00						
4040093 Underdrain, Outlet, 6 inch	Ft	$8.00						
Storm Sewer						See individual contract for actual rate used	Includes Pipe, Structures, & Covers	Individual Drainage system layouts per Construction Package
4020033 Sewer, Cl A, 12 inch, Tr Det B	Ft	$32.00						
4020034 Sewer, Cl A, 15 inch, Tr Det B	Ft	$35.00						
4020035 Sewer, Cl A, 18 inch, Tr Det B	Ft	$38.00						
4020036 Sewer, Cl A, 24 inch, Tr Det B	Ft	$44.00						
4020037 Sewer, Cl A, 30 inch, Tr Det B	Ft	$64.00						
4020038 Sewer, Cl A, 36 inch, Tr Det B	Ft	$75.00						
4020039 Sewer, Cl A, 42 inch, Tr Det B	Ft	$97.00						
4020040 Sewer, Cl A, 48 inch, Tr Det B	Ft	$144.00						
4020041 Sewer, Cl A, 54 inch, Tr Det B	Ft	$196.00						
4020042 Sewer, Cl A, 60 inch, Tr Det B	Ft	$233.00						
4020043 Sewer, Cl A, 66 inch, Tr Det B	Ft	$310.00						
4020044 Sewer, Cl A, 72 inch, Tr Det B	Ft	$450.00						
4020046 Sewer, Cl A, 84 inch, Tr Det B	Ft	$565.00						
4020048 Sewer, Cl A, 96 inch, Tr Det B	Ft	$750.00						
4030005 Dr Structure, 48 inch dia	Ea	$1,250.00						

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UNIT PRICES/DESCRIPTIONS

Items			Units	$/Unit or % Construction	Miscellaneous Factors	Miscellaneous Factors	Miscellaneous Factors	Comments	Item Description	Unit Cost Data Source
	4030010	Dr Structure, 60 inch dia	Ea	$2,000.00						
	4030015	Dr Structure, 72 inch dia	Ea	$3,000.00						
	4030051	Dr Structure Cover	Lb	$1.15	500	lbs/cover				
	4030053	Dr Structure Cover, Adj, Case 2	Ea	$300.00						
	4037050	Special Drainage Structure	Ea	$12,500.00						
Pump Stations										
	???	Pump Station	Ea	See Pump				See Pump Station Tab for cost of individual stations		
Erosion Control			%	7.00%				See individual contract for actual rate used	% of Earthwork	
Incidental Drainage			%	0.00%				See individual contract for actual rate used	% of Underdrain, Storm Sewer, Pump Stations and Erosion	
5. Structures										
Structure Removal										
	???	Cross Road	Sft	$28.00				See Hwy Bridge Tab for cost of individual bridges		
	???	Mainline	Sft	$28.00				See Hwy Bridge Tab for cost of individual bridges		
	???	Service Drive	Sft	$28.00				See Hwy Bridge Tab for cost of individual bridges		
	???	Ramp	Sft	$28.00				See Hwy Bridge Tab for cost of individual bridges		
	???	Pedestrian	Sft	$20.00						
Bridge Rehabilitation					**Beam Reuse Facto**	**Deck Replacement**	**Widening**			
	???	Concrete I Beam Rehabilitation	Sft	$140.00	0.75	$85.00	$180.00	See Rehab Bridges Tab for cost of individual bridges		
Factors - New Bridges					**Superstructure**	**Substructure**	**Foundation**			
		Steel I Girder	Sft	$160.00	70.00%	20.00%	10.00%			
		Steel I Girder Curved	Sft	$180.00	70.00%	20.00%	10.00%			
		Steel Box Lower Level	Sft	$190.00	70.00%	20.00%	10.00%			
		Steel Box Upper Level	Sft	$210.00	70.00%	20.00%	10.00%			
		Concrete I Beam	Sft	$140.00	70.00%	20.00%	10.00%			
		Concrete Box Beam	Sft	$140.00	70.00%	20.00%	10.00%			
		Pedestrian Bridge	Sft	$160.00	70.00%	20.00%	10.00%			
		Ped Bridge Ramp	Sft	$90.00	70.00%	20.00%	10.00%			
		Braided Ramp	Sft	$195.00	70.00%	20.00%	10.00%			
Factors - Foundation Adjustment								Increase for cost of foundations due to varying soil conditions		
		Normal	%	0.00%				Increase for cost of foundations due to varying soil conditions		
		Poor	%	9.00%				Increase for cost of foundations due to varying soil conditions		
		Very Poor	%	12.00%				Increase for cost of foundations due to varying soil conditions		
Highway Bridges										
	???	Cross Road	Ea					See Hwy Bridges Tab for cost of individual bridges		
	???	Mainline	Ea					See Hwy Bridges Tab for cost of individual bridges		
	???	Service Drive	Ea					See Hwy Bridges Tab for cost of individual bridges		
	???	Ramp	Ea					See Hwy Bridges Tab for cost of individual bridges		
Pedestrian Bridges										
	???	Pedestrian	Ea					See Hwy Bridges Tab for cost of individual bridges		
Railroad Bridges										
	???	Railroad Bridges	Ea					See RR Bridges Tab for cost of individual bridges		
Retaining Wall Removal			Sft							
	???	Retaining Wall Removal	Sft	$12.00				See Walls Tab for cost of individual walls		
Retaining Walls			Sft		**Short (0-10 ft)**	**Medium (10-20 ft)**	**Tall (+20 ft)**			
	???	Cut	Sft		$140.00	$160.00	$170.00	See Walls Tab for cost of individual walls		
	???	Fill	Sft		$140.00	$165.00	$175.00	See Walls Tab for cost of individual walls		
Noise Walls										
	???	Noise Walls	Sft	$45.00				See Walls Tab for cost of individual walls		
Aesthetics			%	4.00%				See individual contract for actual rate used	% of Structure Removal, All Bridges and Retaining Walls	
Incidental Structural			%	0.00%				See individual contract for actual rate used	% of Structure Removal, All Bridges, Ret. Walls and	
6. Traffic										
Maintaining Traffic			%	5.00%				See individual contract for actual rate used	% of all Pavement and Base Materials, and all Structures	
Off-Site Traffic Mitigation Projects			%	3.00%				See individual contract for actual rate used	% of 1, 2, 3, 4, and 5	Marquette:$20M/$750M, I-94 N/S:$35M/$1.2B=3%
Signing and Pavement Marking			%	8.00%				See individual contract for actual rate used	% of all Pavement and Base Materials	
Freeway Signing Bridges										
	???	Freeway Signing Bridges	Ea	$100,000.00				Based on existing number of bridge mounted and sign		
Traffic Signals										
	???	Traffic Signals	Ea	$125,000.00				Based on number of existing traffic signals		
MITS										
	???	MITS	LS	See Misc Tab						Assumption
Incidental Traffic			%	0.00%				See individual contract for actual rate used	% of MOT, Signing/Marking, Sign Bridges, Signals and MITS	
7. Miscellaneous Construction										
Sidewalk										
	8030002	Sidewalk, Conc, 4 inch	Sft	$3.00						
Curb, Curb & Gutter and Valley Gutter										
	8020001	Curb, Conc, Det E1	Ft	$15.00						
	8020005	Curb, Conc, Det G1	Ft	$15.00						
	8020006	Curb, Conc, Det G2	Ft	$15.00						
	8020030	Curb and Gutter, Conc, Det D1	Ft	$15.00						
	8020035	Curb and Gutter, Conc, Det F1	Ft	$15.00						
	8020037	Curb and Gutter, Conc, Det F3	Ft	$15.00						
	8020039	Curb and Gutter, Conc, Det F5	Ft	$15.00						
	8020060	Valley Gutter, Conc	Ft	$15.00						
Concrete Barrier										
	8040001	Conc, Barrier, Single Face, Type A	Ft	$67.00						

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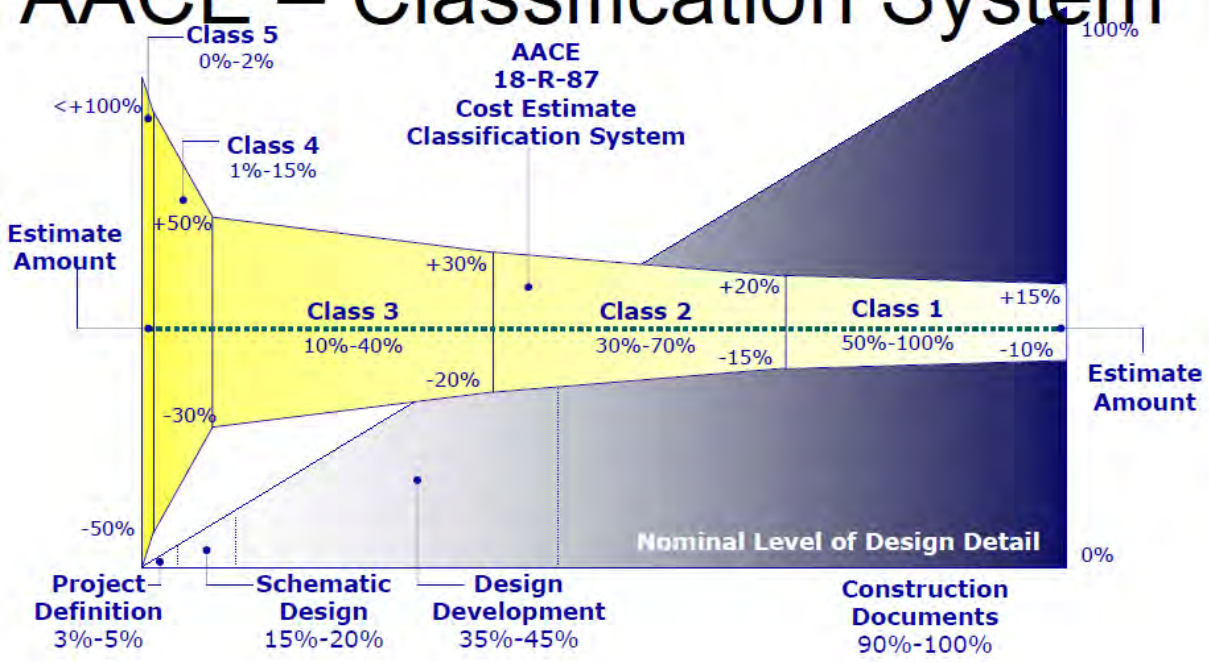
Conceptual Base Plans

UNIT PRICES/DESCRIPTIONS

Items		Units	$/Unit or % Construction	Miscellaneous Factors	Miscellaneous Factors	Miscellaneous Factors	Comments	Item Description	Unit Cost Data Source
8040005	Conc, Barrier, Double Face, Type A	Ft	$89.00						
8040010	Conc, Barrier, Split, Type A	Ft	$135.00						
8040015	Glare Screen, Conc	Ft	$28.00						
Guardrail and Attenuators									
8070002	Guardrail, Type T	Ft	$18.00						
8070043	Guardrail Approach Terminal, Type 2T	Ea	$2,100.00						
XXXXXX	Impact Attenuator	Ea	$3,000.00						
Freeway Lighting									
???	Freeway Lighting	LS	See Misc Tab				See individual contract for actual rate used		
Fencing									
8080013	Fence, Chain Link, 72 inch	Ft	$15.00					High mast lighing at 200-foot spacing	
Landscaping									
???	Landscaping	LS	See Misc Tab				See individual contract for actual rate used		
Contamination and Remediation		%	35.00%				See individual contract for actual rate used	% of all Earthwork and Drainage	
Incidental Miscellaneous Construction		%	0.00%				See individual contract for actual rate used	% of all Miscellaneous Construction Items	
8. Utility Relocation									
Public Lighting Department		LS							
???	Public Lighting Department	LS	See Misc Tab				See individual contract for actual rate used		
Detroit Water and Sewer Department		LS							
Major Relocation - Water		LS					See Individual Major Relocation		
???	Protect Water Main in Place	Ft	$100.00					Concrete cap	
???	Relocate WM 6"-12"	Ft	$200.00					Includes removal, trenching, & installation	
???	Relcoate WM 16"-30"	Ft	$500.00					Includes removal, trenching, & installation	
???	Greater than WM 30"	Ft	$1,000.00					Tunnel	
???	Service Drive WM Relocation	Ft	$200.00					Includes removal, trenching, & installation	
Incidental Relocation - Water		%	10.00%				Covers relocations along Sevice Drives and other incidentals	% of Major Relocation - Water	
Major Relocation - Sanitary		LS					See Individual Major Relocation		
???	Protect Sanitary Sewer in Place	Ft	$100.00					Concrete cap	
???	Relocate SS Less than 24"	Ft	$100.00					Includes removal, trenching, MH's, & pipe	
???	Relocate SS 24"-48"	Ft	$250.00					Includes removal, trenching, MH's, & pipe	
???	Relocate SS Over 48"	Ft	$750.00					Includes removal, trenching, MH's, & pipe	
Incidental Relocation - Sanitary		%	10.00%				Covers relocations along Sevice Drives and other incidentals	% of Major Relocation - Sanitary	
Incidental Utility Relocation		%	0.00%					% of all Utility Relocation items	
9. Mobilization									
Roadway Mobilization		%	5.00%				See individual contract for actual rate used	% of 1, 2, 3, 4, 6, 7 and 8	
Structure Mobilization		%	5.00%				See individual contract for actual rate used	% of 5	
10. Contingency									
Roadway Contingency		%	35.00%				See individual contract for actual rate used	% of 1, 2, 3, 4, 6, 7 and 8	
Structure Contingency		%	35.00%				See individual contract for actual rate used	% of 5	
III. ENGINEERING AND MANAGEMENT									
Program Management and Administration		%	3.00%				See individual contract for actual rate used	% of all construction (1-10)	
Preliminary Engineering		%	7.00%				See individual contract for actual rate used	% of all construction (1-10)	
Construction Engineering		%	7.00%				See individual contract for actual rate used	% of all construction (1-10)	

APPENDIX C
AACEI CLASSIFICATION SYSTEM

AACE – Classification System



Construction Cost Estimate Accuracy Ranges

AACE 18R-97 Cost Est Classification

AACE COST ESTIMATE CLASSIFICATION SYSTEM

					AACE 17R & 18R		CH2M HILL	
	Project Definition				Expected Accuracy		Contingency Range	
Estimate Class	Start	End	End Useage	Methodology	Low	High	Low	High
Class 5	0%	2%	Concept Screening	Capacity Factor, Parametric Model, Judgement or Anology	-50%	100%	30%	35%
Class 4	1%	15%	Study or Feasiblity	Equipment Factored or Parametric Model	-30%	50%	25%	30%
Class 3	10%	40%	Budget, Autorization, or Control	Semi Detailed Unit Cost with Assembly Level Line Items	-20%	30%	15%	25%
Class 2	30%	70%	Control or Bid/Tender	Detailed Unit Costs with Forced Detailed Take-off	-15%	20%	10%	15%
Class 1	50%	100%	Check Estimate or Bid/Tender	Detailed Unit Costs with Detailed Take-off	-10%	15%	5%	10%

Table 1	ESTIMATE CLASSIFICATION SYSTEM				
General Project Information	**Class 5**	**Class 4**	**Class 3**	**Class 2**	**Class 1**
Project Scope Description	General	Preliminary	Defined	Defined	Defined
Plant Production / Facility Capacity	Assumed	Preliminary	Defined	Defined	Defined
Plant Location	General	Approximate	Specific	Specific	Specific
Soils & Hydrology	None	Preliminary	Defined	Defined	Defined
Integrated Project Plan	None	Preliminary	Defined	Defined	Defined
Project Master Schedule	None	Preliminary	Defined	Defined	Defined
Escalation Strategy	None	Preliminary	Defined	Defined	Defined
Work Breakdown Structure	None	Preliminary	Defined	Defined	Defined
Project Code of Accounts	None	Preliminary	Defined	Defined	Defined
Contracting Strategy	Assumed	Assumed	Preliminary	Defined	Defined
Engineering Deliverables					
Block Flow Diagrams	Started/Preliminary	Preliminary/Complete	Completed	Completed	Completed
Plot Plans		Started	Preliminary/Complete	Completed	Completed
Process Flow Diagrams (PFDs)		Started/Preliminary	Preliminary/Complete	Completed	Completed
Utility Flow Diagrams (UFDs)		Started/Preliminary	Preliminary/Complete	Completed	Completed
Piping & Instrument Diagrams (P&IDS)		Started	Preliminary/Complete	Completed	Completed
Heat and Material Balances		Started	Preliminary/Complete	Completed	Completed
Process Equipment List		Started/Preliminary	Preliminary/Complete	Completed	Completed
Utility Equipment List		Started/Preliminary	Preliminary/Complete	Completed	Completed
Electrical One Line Drawings		Started/Preliminary	Preliminary/Complete	Completed	Completed
Specifications and Datasheets		Started	Preliminary/Complete	Completed	Completed
General Equipment Arrangement Drawings		Started	Preliminary/Complete	Completed	Completed
Spare Parts Lists			Started/Preliminary	Preliminary	Completed
Architectural Details / Schedules			Started	Preliminary	Completed
Structural Details			Started	Preliminary	Completed
Mechanical Discipline Drawings			Started	Preliminary	Completed
Electrical Discipline Drawings			Started	Preliminary	Preliminary/Complete
Instrumentation / Control System Discipline Drawings			Started	Preliminary	Preliminary/Complete
Civil/Site Discipline Drawings			Started	Preliminary	Preliminary/Complete

Source Document: AACE 17R-97 Estimate Classification and 18R-97 Estimate Classification as Applied in the Process Industry.

APPENDIX D
COST SUMMARY BY SEGMENT

PROJECT OPINION OF COST SUMMARY
JOB NUMBER: 32587
TITLE: I-94 Detailed Engineering Report

Conceptual Base Plans

I-96 to Conner
Length: 6.7 Miles
FILE: 2010-06-07 I-94 Opinion of Cost.xls

Region: Metro
TSC: Detroit
Prepared By: CH2M HILL
Std. Specs for Construction: 2003
Date: Jun-8-10
Time: 4:59:40 PM
Base Cost Year: Dec-09

CONTRACT SUMMARY BY SEGMENT

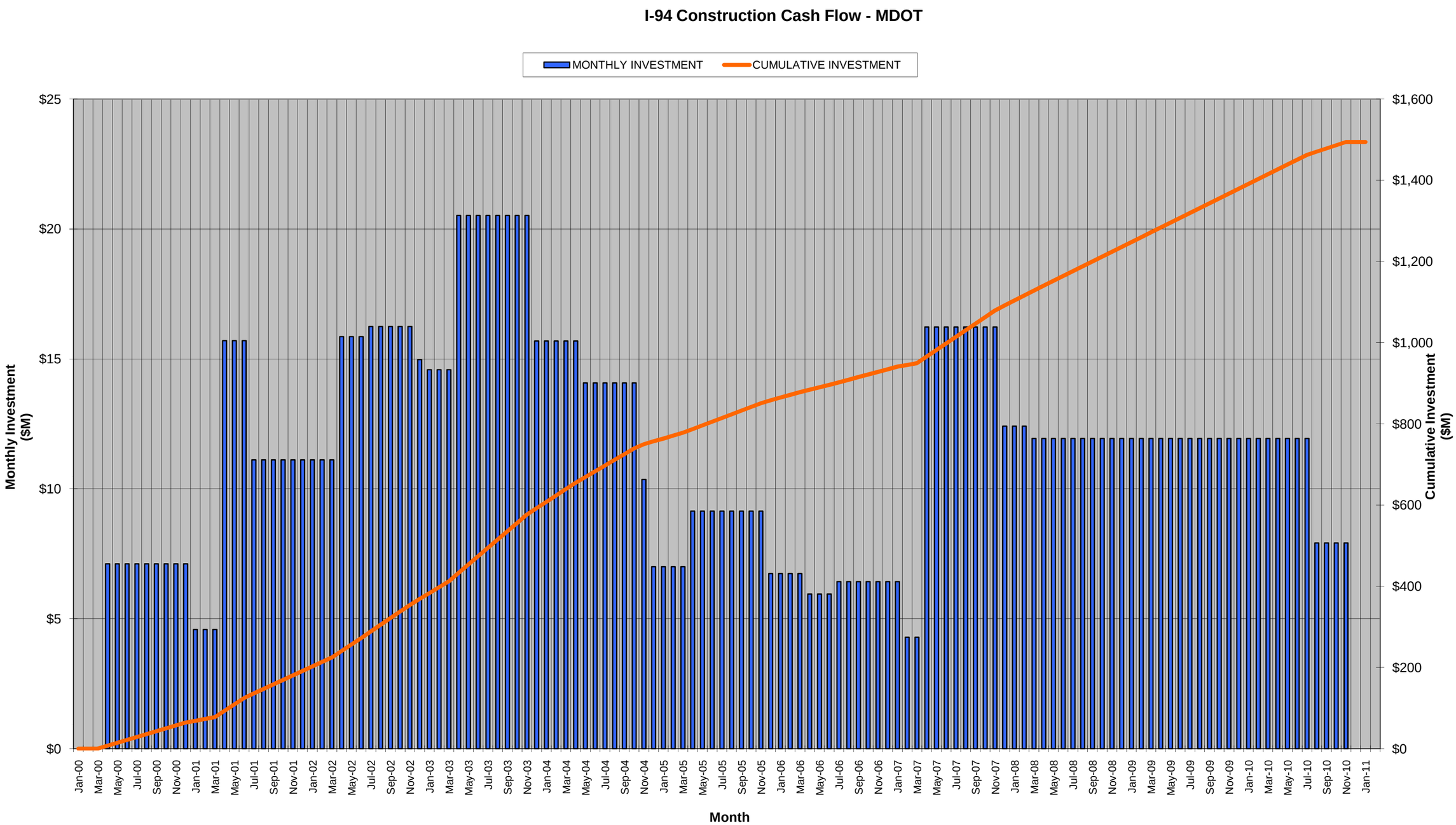
Letting Month/Year	Apr-00	Apr-00	Apr-00	Apr-00	Apr-00	Apr-00	Apr-00	
Duration (Months)	9	9	15	15	15	15	15	
Package	Advanced Bridge 1	Advanced Bridge 2	Advanced Bridge 3	Advanced Bridge 4	Advanced Bridge 5	Advanced Bridge 6	Advanced Bridge 7	Totals
Segment	ADV	ADV	ADV	ADV	ADV	ADV	ADV	
Project Description	Gratiot (M-3)	Van Dyke (M-53)	Mt. Elliot	2nd Avenue	Chene and Concord	Cadillac and Cass	Brush and French	Advanced Contracts
I. RIGHT-OF-WAY								
Right-of-Way	$592,550	$17,875	$1,440,807	$1,607,387	$728,236	$832,928	$2,576,903	$7,796,686
Contingency	$0	$0	$0	$0	$0	$0	$0	$0
I. RIGHT-OF-WAY TOTALS	$592,550	$17,875	$1,440,807	$1,607,387	$728,236	$832,928	$2,576,903	$7,796,686
II. CONSTRUCTION								
1. Removal								
Clearing	$504	$672	$3,570	$840	$1,008	$378	$756	$7,728
Drainage Removal	$5,315	$14,180	$17,400	$23,450	$18,870	$11,145	$11,141	$101,501
Guardrail Removal	$71	$0	$0	$0	$0	$99	$0	$170
Pavement Removal	$66,087	$39,197	$62,714	$118,155	$40,261	$30,188	$36,817	$393,419
Concrete Barrier Removal	$0	$0	$4,110	$2,881	$0	$480	$0	$7,471
Sidewalk Removal	$14,751	$10,208	$19,377	$24,506	$7,189	$6,801	$10,120	$92,952
Incidental Removals	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$86,728	$64,257	$107,171	$169,832	$67,328	$49,091	$58,834	$603,241
2. Earthwork								
Excavation	$89,940	$33,096	$58,560	$241,393	$0	$56,654	$0	$479,643
Embankment	$29,056	$2,928	$22,584	$99,927	$0	$4,661	$0	$159,156
Incidental Earthwork	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$118,996	$36,024	$81,144	$341,320	$0	$61,315	$0	$638,799
3. Pavement and Base Materials								
Subbase	$473,364	$276,048	$245,472	$149,204	$144,492	$77,806	$130,740	$1,497,126
Aggregate Base	$0	$0	$0	$0	$0	$0	$0	$0
Open Graded Drainage Course	$107,669	$60,394	$111,238	$214,678	$65,656	$49,374	$56,894	$665,903
Pavement	$513,800	$283,220	$508,165	$928,150	$334,600	$248,140	$288,890	$3,104,965
Conc Quality Assurance	$12,708	$7,546	$13,087	$24,999	$8,409	$6,598	$7,497	$80,844
Incidental Pavement and Base Materials	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$1,107,541	$627,208	$877,962	$1,317,031	$553,157	$381,918	$484,021	$5,348,838
4. Drainage and Erosion Control								
Underdrain	$31,886	$27,762	$30,940	$62,560	$10,948	$23,862	$14,283	$202,241
Storm Sewer	$94,517	$144,445	$199,845	$344,770	$171,975	$105,067	$99,038	$1,159,657
Pump Stations	$0	$0	$0	$0	$0	$0	$0	$0
Erosion Control	$17,178	$14,576	$21,835	$52,406	$12,805	$13,317	$7,932	$140,049
Incidental Drainage	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$143,581	$186,783	$252,620	$459,736	$195,728	$142,246	$121,253	$1,501,947
5. Structures								
Structure Removal	$890,624	$476,952	$542,127	$489,188	$643,552	$788,144	$593,712	$4,424,299
Bridge Rehabilitation	$0	$0	$0	$0	$0	$0	$0	$0
Highway Bridges	$5,590,012	$2,892,310	$6,506,240	$3,799,040	$4,430,862	$4,260,260	$4,342,692	$31,821,416
Pedestrian Bridges	$0	$0	$0	$0	$0	$0	$0	$0
Railroad Bridges	$0	$0	$0	$0	$0	$0	$0	$0
Retaining Wall Removal	$0	$0	$0	$0	$0	$0	$0	$0
Retaining Walls	$0	$0	$0	$5,151,939	$0	$0	$0	$5,151,939
Noise Walls	$0	$0	$0	$0	$0	$0	$0	$0
Aesthetics	$259,225	$134,770	$281,935	$377,607	$202,977	$201,936	$197,456	$1,655,906
Incidental Structural	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$6,739,861	$3,504,032	$7,330,302	$9,817,774	$5,277,391	$5,250,340	$5,133,860	$43,053,560
6. Traffic								
Maintaining Traffic	$560,867	$294,163	$593,671	$802,185	$423,462	$412,871	$409,241	$3,496,460
Off-Site Traffic Mitigation Projects	$368,852	$198,824	$389,214	$544,756	$274,212	$264,821	$260,909	$2,301,588
Signing and Pavement Marking	$88,603	$50,177	$70,237	$105,362	$44,253	$30,553	$38,722	$427,907
Freeway Signing Bridges	$100,000	$100,000	$100,000	$100,000	$200,000	$200,000	$100,000	$900,000
Traffic Signals	$250,000	$250,000	$250,000	$125,000	$375,000	$375,000	$500,000	$2,125,000
MITS	$0	$0	$0	$0	$0	$0	$0	$0
Incidental Traffic	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$1,368,322	$893,164	$1,403,122	$1,677,303	$1,316,927	$1,283,245	$1,308,872	$9,250,955
7. Miscellaneous Construction								
Sidewalk	$54,993	$47,682	$66,567	$144,363	$42,189	$38,508	$43,239	$437,541
Curb, Curb & Gutter and Valley Gutter	$66,615	$46,410	$79,605	$177,457	$43,650	$43,239	$42,735	$499,711
Concrete Barrier	$0	$0	$0	$0	$0	$0	$0	$0
Guardrail and Attenuators	$0	$0	$0	$0	$0	$0	$0	$0
Freeway Lighting	$0	$0	$0	$0	$0	$0	$0	$0
Fencing	$4,500	$6,900	$3,900	$14,655	$9,900	$8,255	$6,150	$54,260
Landscaping	$0	$0	$0	$0	$0	$0	$0	$0
Contamination and Remediation	$91,902	$77,982	$116,817	$280,370	$68,505	$71,246	$42,439	$749,261
Incidental Miscellaneous Construction	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$218,010	$178,974	$266,889	$616,845	$164,244	$161,248	$134,563	$1,740,773
8. Utility Relocation								
Public Lighting Department	$723,000	$223,000	$442,000	$425,000	$323,000	$247,000	$291,000	$2,674,000
Major Relocation - Water	$0	$0	$320,000	$44,000	$0	$0	$0	$364,000
Incidental Relocation - Water	$0	$0	$32,000	$4,400	$0	$0	$0	$36,400
Major Relocation - Sanitary	$0	$43,000	$31,500	$0	$97,000	$0	$0	$171,500
Incidental Relocation - Sanitary	$0	$4,300	$3,150	$0	$9,700	$0	$0	$17,150
Incidental Utility Relocation	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$723,000	$270,300	$828,650	$473,400	$429,700	$247,000	$291,000	$3,263,050
9. Mobilization								
Roadway Mobilization	$188,309	$112,836	$190,878	$252,773	$136,354	$116,303	$119,927	$1,117,380
Structure Mobilization	$336,993	$175,202	$366,515	$490,889	$263,870	$262,517	$256,693	$2,152,679
TOTALS	$525,302	$288,038	$557,393	$743,662	$400,224	$378,820	$376,620	$3,270,059
10. Contingency								
Roadway Contingency	$1,318,162	$789,849	$1,336,145	$1,769,413	$954,479	$814,122	$839,490	$7,821,660
Structure Contingency	$2,358,951	$1,226,411	$2,565,606	$3,436,221	$1,847,087	$1,837,619	$1,796,851	$15,068,746
TOTALS	$3,677,113	$2,016,260	$3,901,751	$5,205,634	$2,801,566	$2,651,741	$2,636,341	$22,890,406
II. CONSTRUCTION TOTALS	$14,708,454	$8,065,040	$15,607,004	$20,822,537	$11,206,265	$10,606,964	$10,545,364	$91,561,628
III. ENGINEERING AND MANAGEMENT								
Program Management and Administration	$441,254	$241,951	$468,210	$624,676	$336,188	$318,209	$316,361	$2,746,849
Preliminary Engineering	$1,029,592	$564,553	$1,092,490	$1,457,578	$784,439	$742,487	$738,175	$6,409,314
Construction Engineering	$1,029,592	$564,553	$1,092,490	$1,457,578	$784,439	$742,487	$738,175	$6,409,314
III. ENGINEERING AND MANAGEMENT TOTALS	$2,500,438	$1,371,057	$2,653,190	$3,539,832	$1,905,066	$1,803,183	$1,792,711	$15,565,477
IV. TOTAL ESTIMATED COST	$17,801,442	$9,453,972	$19,701,001	$25,969,756	$13,839,567	$13,243,075	$14,914,978	$114,923,791
35.00% High Range	$24,200,000	$12,900,000	$26,800,000	$35,100,000	$18,800,000	$18,000,000	$20,300,000	$156,100,000
Total Contract Cost	$17,900,000	$9,500,000	$19,800,000	$26,000,000	$13,900,000	$13,300,000	$15,000,000	$115,400,000
-30.00% Low Range	$12,600,000	$6,700,000	$13,900,000	$18,200,000	$9,800,000	$9,400,000	$10,500,000	$81,100,000

Letting Month/Year	Apr-01	Apr-01	Apr-01	Apr-01	Apr-01	Apr-01	Apr-02	Apr-02	Jul-02	Apr-03	
Duration (Months)	43	44	24	32	20	24	20	32	6	32	
Package	Construction 1	Construction 2	Construction 3	Construction 4	Construction 5	Construction 6	Construction 7	Construction 8	Construction 9	Construction 10	Totals
Segment	3	3	3	3	3	3	3	3	3	3	
Project Description	Dequindre Bridge, including WB to I-75, and vicinity streets/bridges between I-75 and Chene	I-94 between St. Aubin and Frontenac, vicinity streets between St. Aubin and Frontenac; E. Grand Bridge	Frontenac, Burns, Conner, and Barrett bridges	Pedestrian bridges at Helen, Townsend, Seminole, Rohns, Springfield and Malcolm	Gratiot ramps and vicinity streets	Norfolk Southern and Conrail bridges (Part-width construction)	I-94 EB and vicinity streets between Frontenac and Norcross	Reconstruct all pump stations between Woodward and Conner	Temporary widening along I-94 WB between Frontenac and Norcross	I-94 WB and vicinity streets between Frontenac and Connor	Segment 3
I. RIGHT-OF-WAY											
Right-of-Way	$8,719,447	$9,081,164	$2,339,270	$5,239,368	$4,445,834	$0	$1,750,055	$0	$0	$550,742	$32,125,880
Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
I. RIGHT-OF-WAY TOTALS	$8,719,447	$9,081,164	$2,339,270	$5,239,368	$4,445,834	$0	$1,750,055	$0	$0	$550,742	$32,125,880
II. CONSTRUCTION											
1. Removal											
Clearing	$3,948	$35,154	$5,712	$0	$10,878	$0	$12,978	$0	$0	$11,340	$80,010
Drainage Removal	$0	$283,852	$41,543	$0	$44,434	$0	$240,243	$0	$0	$123,666	$733,738
Guardrail Removal	$891	$2,489	$335	$0	$4,131	$0	$1,521	$0	$0	$1,404	$10,771
Pavement Removal	$73,573	$896,230	$189,796	$0	$155,107	$0	$606,195	$0	$73,625	$558,695	$2,553,221
Concrete Barrier Removal	$11,140	$124,130	$0	$0	$1,160	$0	$173,570	$0	$0	$29,670	$339,670
Sidewalk Removal	$4,367	$104,220	$32,571	$0	$19,910	$0	$22,880	$0	$0	$17,837	$201,785
Incidental Removals	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$93,919	$1,446,075	$269,957	$0	$235,620	$0	$1,057,387	$0	$73,625	$742,612	$3,919,195
2. Earthwork											
Excavation	$342,492	$8,017,104	$184,440	$0	$1,114,908	$0	$3,423,192	$0	$426,660	$3,442,512	$16,951,308
Embankment	$115,136	$744,000	$88,424	$0	$149,776	$0	$102,704	$0	$0	$78,072	$1,278,112
Incidental Earthwork	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$457,628	$8,761,104	$272,864	$0	$1,264,684	$0	$3,525,896	$0	$426,660	$3,520,584	$18,229,420
3. Pavement and Base Materials											
Subbase	$299,772	$3,279,480	$927,372	$0	$693,132	$0	$1,771,476	$0	$0	$1,813,152	$8,784,384
Aggregate Base	$0	$0	$0	$0	$0	$0	$0	$0	$100,000	$0	$100,000
Open Graded Drainage Course	$162,864	$1,914,146	$307,379	$0	$345,816	$0	$1,295,939	$0	$0	$1,291,650	$5,317,794
Pavement	$769,636	$8,896,158	$1,528,343	$0	$1,553,084	$0	$5,941,958	$0	$313,500	$5,805,645	$24,808,324
Conc Quality Assurance	$19,891	$226,881	$38,963	$58	$40,362	$0	$171,065	$0	$0	$132,271	$629,491
Incidental Pavement and Base Materials	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$1,252,163	$14,316,665	$2,802,057	$58	$2,632,394	$0	$9,180,438	$0	$413,500	$9,042,718	$39,639,993
4. Drainage and Erosion Control											
Underdrain	$0	$712,986	$96,326	$0	$164,952	$0	$536,180	$0	$0	$511,132	$2,021,576
Storm Sewer	$0	$5,981,627	$443,130	$0	$639,600	$0	$5,042,101	$0	$309,573	$1,111,577	$13,527,608
Pump Stations	$0	$0	$0	$0	$0	$0	$0	$7,899,896	$0	$0	$7,899,896
Erosion Control	$32,034	$1,081,900	$56,862	$0	$144,847	$0	$637,292	$552,993	$51,536	$360,031	$2,917,495
Incidental Drainage	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$32,034	$7,776,513	$596,318	$0	$949,399	$0	$6,215,573	$8,452,889	$361,109	$1,982,740	$26,366,575
5. Structures											
Structure Removal	$1,302,596	$1,304,724	$1,498,168	$296,000	$362,145	$0	$0	$0	$0	$0	$4,763,633
Bridge Rehabilitation	$57,275,900	$0	$0	$0	$0	$0	$0	$0	$0	$0	$57,275,900
Highway Bridges	$23,762,267	$4,020,120	$7,924,420	$0	$0	$0	$0	$0	$0	$0	$35,706,807
Pedestrian Bridges	$0	$0	$0	$12,028,941	$0	$0	$0	$0	$0	$0	$12,028,941
Railroad Bridges	$7,036,114	$0	$0	$0	$0	$23,323,036	$0	$0	$0	$0	$30,359,150
Retaining Wall Removal	$0	$308,580	$0	$0	$0	$0	$0	$0	$0	$0	$308,580
Retaining Walls	$4,578,982	$23,230,561	$0	$0	$7,275,758	$0	$22,826,949	$0	$0	$26,930,148	$84,842,398
Noise Walls	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Aesthetics	$3,758,234	$1,154,559	$376,904	$492,998	$305,516	$932,921	$913,078	$0	$0	$1,077,206	$9,011,416
Incidental Structural	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$97,714,093	$30,018,544	$9,799,492	$12,817,939	$7,943,419	$24,255,957	$23,740,027	$0	$0	$28,007,354	$234,296,825
6. Traffic											
Maintaining Traffic	$7,391,165	$2,967,224	$875,065	$961,348	$727,376	$1,819,197	$2,239,524	$0	$20,675	$2,552,687	$19,554,261
Off-Site Traffic Mitigation Projects	$4,479,743	$2,804,351	$618,331	$576,810	$586,148	$1,091,518	$1,967,369	$380,380	$57,370	$1,948,320	$14,510,340
Signing and Pavement Marking	$100,173	$1,145,333	$224,165	$5	$210,592	$0	$734,435	$0	$33,080	$723,417	$3,171,200
Freeway Signing Bridges	$800,000	$700,000	$0	$0	$100,000	$0	$600,000	$0	$0	$600,000	$2,800,000
Traffic Signals	$250,000	$875,000	$1,250,000	$0	$0	$0	$0	$0	$0	$0	$2,375,000
MITS	$0	$321,264	$0	$0	$0	$0	$765,781	$0	$0	$765,781	$1,852,826
Incidental Traffic	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$13,021,081	$8,813,172	$2,967,561	$1,538,163	$1,624,116	$2,910,715	$6,307,109	$380,380	$111,125	$6,590,205	$44,263,627
7. Miscellaneous Construction											
Sidewalk	$43,806	$368,898	$200,025	$2,880	$142,506	$0	$145,848	$0	$0	$129,021	$1,032,984
Curb, Curb & Gutter and Valley Gutter	$124,800	$1,147,545	$219,765	$0	$322,515	$0	$680,490	$0	$0	$678,885	$3,174,000
Concrete Barrier	$56,302	$931,455	$0	$0	$0	$0	$1,784,959	$0	$0	$0	$2,772,716
Guardrail and Attenuators	$18,900	$35,358	$0	$0	$12,000	$0	$12,300	$0	$0	$15,126	$93,684
Freeway Lighting	$476,000	$738,000	$0	$0	$18,000	$0	$1,289,000	$0	$0	$19,000	$2,540,000
Fencing	$23,400	$184,050	$29,700	$0	$102,150	$0	$0	$0	$0	$134,700	$474,000
Landscaping	$0	$750,000	$0	$0	$0	$0	$550,000	$550,000	$0	$0	$1,850,000
Contamination and Remediation	$171,382	$5,788,166	$304,214	$0	$774,929	$0	$3,409,514	$2,958,511	$275,719	$1,926,163	$15,608,598
Incidental Miscellaneous Construction	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$914,590	$9,943,472	$753,704	$2,880	$1,372,100	$0	$7,872,111	$3,508,511	$275,719	$2,902,895	$27,545,982
8. Utility Relocation											
Public Lighting Department	$700,000	$2,875,000	$1,262,000	$0	$1,022,000	$0	$885,000	$0	$0	$937,000	$7,681,000
Major Relocation - Water	$0	$2,970,800	$0	$0	$1,008,000	$0	$993,400	$0	$0	$935,400	$5,907,600
Incidental Relocation - Water	$0	$297,080	$0	$0	$100,800	$0	$99,340	$0	$0	$93,540	$590,760
Major Relocation - Sanitary	$0	$1,300,500	$0	$0	$0	$0	$138,800	$0	$0	$107,800	$1,547,100
Incidental Relocation - Sanitary	$0	$130,050	$0	$0	$0	$0	$13,880	$0	$0	$10,780	$154,710
Incidental Utility Relocation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$700,000	$7,573,430	$1,262,000	$0	$2,130,800	$0	$2,130,420	$0	$0	$2,084,520	$15,881,170
9. Mobilization											
Roadway Mobilization	$823,571	$2,931,522	$446,223	$77,055	$510,456	$145,536	$1,814,447	$617,089	$83,087	$1,343,314	$8,792,300
Structure Mobilization	$4,885,705	$1,500,927	$489,975	$640,897	$397,171	$1,212,798	$1,187,001	$0	$0	$1,400,368	$11,714,842
TOTALS	$5,709,276	$4,432,449	$936,198	$717,952	$907,627	$1,358,334	$3,001,448	$617,089	$83,087	$2,743,682	$20,507,142
10. Contingency											
Roadway Contingency	$5,764,995	$20,520,651	$3,123,561	$539,385	$3,573,190	$1,018,750	$12,701,127	$4,319,623	$581,608	$9,403,196	$61,546,086
Structure Contingency	$34,199,933	$10,506,490	$3,429,822	$4,486,279	$2,780,197	$8,489,585	$8,309,009	$0	$0	$9,802,574	$82,003,889
TOTALS	$39,964,928	$31,027,141	$6,553,383	$5,025,664	$6,353,387	$9,508,335	$21,010,136	$4,319,623	$581,608	$19,205,770	$143,549,975
II. CONSTRUCTION TOTALS	$159,859,712	$124,108,565	$26,213,534	$20,102,656	$25,413,546	$38,033,341	$84,040,545	$17,278,492	$2,326,433	$76,823,080	$574,199,904
III. ENGINEERING AND MANAGEMENT											
Program Management and Administration	$4,795,791	$3,723,257	$786,406	$603,080	$762,406	$1,141,000	$2,521,216	$518,355	$69,793	$2,304,692	$17,225,996
Preliminary Engineering	$11,190,180	$8,687,600	$1,834,947	$1,407,186	$1,778,948	$2,662,334	$5,882,838	$1,209,494	$162,850	$5,377,616	$40,193,993
Construction Engineering	$11,190,180	$8,687,600	$1,834,947	$1,407,186	$1,778,948	$2,662,334	$5,882,838	$1,209,494	$162,850	$5,377,616	$40,193,993
III. ENGINEERING AND MANAGEMENT TOTALS	$27,176,151	$21,098,457	$4,456,300	$3,417,452	$4,320,302	$6,465,668	$14,286,892	$2,937,343	$395,493	$13,059,924	$97,613,982
IV. TOTAL ESTIMATED COST	$195,755,310	$154,288,186	$33,009,104	$28,759,476	$34,179,682	$44,499,009	$100,077,492	$20,215,835	$2,721,926	$90,433,746	$703,939,766
35.00% High Range	$264,400,000	$208,400,000	$44,700,000	$38,900,000	$46,200,000	$60,100,000	$135,200,000	$27,500,000	$3,800,000	$122,200,000	$951,400,000
Total Contract Cost	$195,800,000	$154,300,000	$33,100,000	$28,800,000	$34,200,000	$44,500,000	$100,100,000	$20,300,000	$2,800,000	$90,500,000	$704,400,000
-30.00% Low Range	$137,100,000	$108,100,000	$23,200,000	$20,200,000	$24,000,000	$31,200,000	$70,100,000	$14,300,000	$2,000,000	$63,400,000	$493,600,000

Letting Month/Year	Apr-03	Apr-03	Apr-05	Apr-05		Apr-06	Jul-06	Apr-07	Apr-07	Apr-07		
Duration (Months)	13	36	22	22		20	20	40	44	44		
Package	Construction 11	Construction 12	Construction 13	Construction 14	Totals	Construction 15	Construction 16	Construction 17	Construction 18	Construction 19	Totals	
Segment	1 & 2	2	1&2	2		1	1	1	1	1		
Project Description	Cross streets, and various retaining walls and service drives between Cass and I-75	I-94, I-75 ramps, and various service drives between Brush and Russell	I-94 between 2nd and Russell; M-10 NB to EB ramp; Woodward Ave.	Rehabilitate I-75	Segment 2	Cross streets, various retaining walls and service drives between I-96 and Trumbull; Grand River, Linwood, 14th, Rosa Parks and Trumbull bridges	Rehabilitate Pump Stations	CN Rail and Conrail bridges over I-94 and M-10	I-94 and adjacent ramps between I-96 and Trumbull	I-94, M-10, adjacent ramps, and various service drives between Trumbull and Cass	Segment 1	
I. RIGHT-OF-WAY												
Right-of-Way	$1,058	$6,215,354	$1,607,495	$0	$7,823,907	$4,733,731	$0	$3,043,263	$0	$6,476,533	$14,253,527	$62,000,000
Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
I. RIGHT-OF-WAY TOTALS	$1,058	$6,215,354	$1,607,495	$0	$7,823,907	$4,733,731	$0	$3,043,263	$0	$6,476,533	$14,253,527	$62,000,000
II. CONSTRUCTION												
1. Removal												
Clearing	$4,578	$23,310	$4,704	$0	$32,592	$9,828	$0	$0	$4,494	$33,012	$47,334	$167,664
Drainage Removal	$11,351	$81,590	$98,020	$0	$190,961	$81,590	$0	$0	$98,336	$398,687	$578,613	$1,604,813
Guardrail Removal	$253	$2,044	$392	$0	$2,689	$1,116	$0	$0	$298	$2,785	$4,199	$17,829
Pavement Removal	$84,036	$573,800	$414,885	$0	$1,072,721	$239,399	$0	$0	$350,256	$1,296,543	$1,886,198	$5,905,559
Concrete Barrier Removal	$2,133	$189,750	$116,149	$0	$308,032	$2,992	$0	$0	$147,852	$422,163	$573,007	$1,228,180
Sidewalk Removal	$13,546	$49,605	$11,441	$0	$74,592	$44,635	$0	$0	$0	$66,397	$111,032	$480,361
Incidental Removals	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$115,897	$920,099	$645,591	$0	$1,681,587	$379,560	$0	$0	$601,236	$2,219,587	$3,200,383	$9,404,406
2. Earthwork												
Excavation	$708,088	$0	$2,224,411	$0	$2,932,499	$1,102,668	$0	$0	$2,299,600	$5,413,931	$8,816,199	$29,179,649
Embankment	$67,942	$0	$346,540	$0	$414,482	$121,830	$0	$0	$103,532	$441,086	$666,448	$2,518,198
Incidental Earthwork	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$776,030	$0	$2,570,951	$0	$3,346,981	$1,224,498	$0	$0	$2,403,132	$5,855,017	$9,482,647	$31,697,847
3. Pavement and Base Materials												
Subbase	$309,043	$1,812,444	$1,119,304	$0	$3,240,791	$277,266	$0	$0	$462,274	$1,483,352	$2,222,892	$15,745,193
Aggregate Base	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$100,000
Open Graded Drainage Course	$156,891	$998,270	$877,725	$0	$2,032,886	$412,398	$0	$0	$950,069	$2,736,285	$4,098,752	$12,115,335
Pavement	$741,056	$4,118,215	$4,521,750	$2,106,704	$11,487,725	$2,005,518	$0	$0	$4,435,847	$12,170,563	$18,611,928	$58,012,942
Conc Quality Assurance	$19,457	$120,939	$117,913	$21,416	$279,725	$52,889	$0	$0	$111,055	$340,460	$504,404	$1,494,464
Incidental Pavement and Base Materials	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$1,226,447	$7,049,868	$6,636,692	$2,128,120	$17,041,127	$2,748,071	$0	$0	$5,959,245	$16,730,660	$25,437,976	$87,467,934
4. Drainage and Erosion Control												
Underdrain	$69,834	$428,234	$318,109	$0	$816,177	$230,724	$0	$0	$291,618	$1,622,640	$2,144,982	$5,184,976
Storm Sewer	$487,136	$1,496,324	$1,791,640	$251,850	$4,026,950	$2,306,229	$0	$0	$810,628	$8,281,389	$11,398,246	$30,112,461
Pump Stations	$0	$0	$115,000	$0	$115,000	$115,000	$4,556,275	$0	$0	$115,000	$4,786,275	$12,801,171
Erosion Control	$93,310	$134,719	$335,699	$17,630	$581,358	$271,352	$318,939	$0	$245,376	$1,111,183	$1,946,850	$5,585,752
Incidental Drainage	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$650,280	$2,059,277	$2,560,448	$269,480	$5,539,485	$2,923,305	$4,875,214	$0	$1,347,622	$11,130,212	$20,276,353	$53,684,360
5. Structures												
Structure Removal	$1,440,636	$4,260,193	$809,592	$0	$6,510,421	$2,084,656	$0	$0	$0	$7,795,540	$9,880,196	$25,578,549
Bridge Rehabilitation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$57,275,900
Highway Bridges	$0	$64,082,662	$3,651,051	$0	$67,733,713	$14,334,688	$0	$0	$0	$92,730,542	$107,065,230	$242,327,166
Pedestrian Bridges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,733,870	$3,733,870	$15,762,811
Railroad Bridges	$0	$0	$0	$0	$0	$0	$0	$91,864,256	$0	$0	$91,864,256	$122,223,406
Retaining Wall Removal	$0	$206,640	$24,300	$0	$230,940	$0	$0	$41,400	$125,340	$357,180	$523,920	$1,063,440
Retaining Walls	$7,146,567	$13,572,050	$4,217,676	$0	$24,936,293	$17,194,321	$0	$6,616,556	$0	$39,833,097	$63,643,974	$178,574,604
Noise Walls	$0	$2,067,660	$0	$0	$2,067,660	$0	$0	$0	$0	$400,500	$400,500	$2,468,160
Aesthetics	$343,488	$3,367,568	$348,105	$0	$4,059,161	$1,344,547	$0	$3,940,888	$5,014	$5,794,029	$11,084,478	$25,810,961
Incidental Structural	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$8,930,691	$87,556,773	$9,050,724	$0	$105,538,188	$34,958,212	$0	$102,463,100	$130,354	$150,644,758	$288,196,424	$671,084,997
6. Traffic												
Maintaining Traffic	$731,124	$6,919,251	$1,010,639	$106,406	$8,767,420	$2,759,269	$0	$7,684,733	$307,739	$12,134,890	$22,886,631	$54,704,772
Off-Site Traffic Mitigation Projects	$526,471	$4,391,371	$965,898	$107,892	$5,991,632	$1,900,514	$219,385	$4,610,840	$469,872	$8,396,111	$15,596,722	$38,400,282
Signing and Pavement Marking	$98,116	$563,989	$530,935	$170,250	$1,363,290	$219,846	$0	$0	$476,740	$1,338,453	$2,035,039	$6,997,436
Freeway Signing Bridges	$0	$700,000	$1,000,000	$0	$1,700,000	$0	$0	$0	$700,000	$1,400,000	$2,100,000	$7,500,000
Traffic Signals	$0	$625,000	$250,000	$0	$875,000	$750,000	$0	$0	$0	$1,375,000	$2,125,000	$7,500,000
MITS	$0	$0	$1,065,723	$0	$1,065,723	$0	$0	$0	$927,885	$163,806	$1,091,691	$4,010,240
Incidental Traffic	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$1,355,711	$13,199,611	$4,823,195	$384,548	$19,763,065	$5,629,629	$219,385	$12,295,573	$2,882,236	$24,808,260	$45,835,083	$119,112,730
7. Miscellaneous Construction												
Sidewalk	$65,168	$252,051	$98,434	$0	$415,653	$281,255	$0	$0	$0	$528,236	$809,491	$2,695,669
Curb, Curb & Gutter and Valley Gutter	$166,632	$902,070	$413,833	$0	$1,482,535	$357,680	$0	$0	$398,148	$1,733,875	$2,489,703	$7,645,949
Concrete Barrier	$0	$774,634	$861,643	$0	$1,636,277	$0	$0	$0	$718,765	$2,590,338	$3,309,103	$7,718,096
Guardrail and Attenuators	$3,000	$120,312	$15,159	$0	$138,471	$6,000	$0	$0	$0	$121,273	$127,273	$359,428
Freeway Lighting	$10,000	$1,856,000	$346,000	$0	$2,212,000	$0	$0	$0	$790,000	$2,100,000	$2,890,000	$7,642,000
Fencing	$47,837	$131,100	$34,440	$0	$213,377	$106,197	$0	$0	$550	$287,995	$394,742	$1,136,379
Landscaping	$175,000	$500,000	$0	$0	$675,000	$285,000	$0	$0	$0	$900,000	$1,185,000	$3,710,000
Contamination and Remediation	$499,209	$720,747	$1,795,990	$94,318	$3,110,264	$1,451,731	$1,706,325	$0	$1,312,764	$5,944,830	$10,415,650	$29,883,773
Incidental Miscellaneous Construction	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$966,846	$5,256,914	$3,565,499	$94,318	$9,883,577	$2,487,863	$1,706,325	$0	$3,220,227	$14,206,547	$21,620,962	$60,791,294
8. Utility Relocation												
Public Lighting Department	$593,000	$1,454,000	$752,000	$0	$2,799,000	$1,600,000	$0	$0	$0	$3,165,000	$4,765,000	$17,919,000
Major Relocation - Water	$300,000	$627,000	$84,500	$0	$1,011,500	$1,260,000	$0	$0	$1,280,000	$1,117,000	$3,657,000	$10,940,100
Incidental Relocation - Water	$30,000	$62,700	$8,450	$0	$101,150	$126,000	$0	$0	$128,000	$111,700	$365,700	$1,094,010
Major Relocation - Sanitary	$0	$81,000	$45,500	$0	$126,500	$1,050,000	$0	$0	$588,500	$281,500	$1,920,000	$3,765,100
Incidental Relocation - Sanitary	$0	$8,100	$4,550	$0	$12,650	$105,000	$0	$0	$58,850	$28,150	$192,000	$376,510
Incidental Utility Relocation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$923,000	$2,232,800	$895,000	$0	$4,050,800	$4,141,000	$0	$0	$2,055,350	$4,703,350	$10,899,700	$34,094,720
9. Mobilization												
Roadway Mobilization	$300,711	$1,535,928	$1,084,869	$143,823	$3,065,331	$976,696	$340,046	$614,779	$923,452	$3,982,682	$6,837,655	$19,812,666
Structure Mobilization	$446,535	$4,377,839	$452,536	$0	$5,276,910	$1,747,911	$0	$5,123,155	$6,518	$7,532,238	$14,409,822	$33,554,253
TOTALS	$747,246	$5,913,767	$1,537,405	$143,823	$8,342,241	$2,724,607	$340,046	$5,737,934	$929,970	$11,514,920	$21,247,477	$53,366,919
10. Contingency												
Roadway Contingency	$2,104,974	$10,751,499	$7,594,082	$1,006,763	$21,457,318	$6,836,874	$2,380,323	$4,303,451	$6,464,167	$27,878,772	$47,863,587	$138,688,651
Structure Contingency	$3,125,742	$30,644,871	$3,167,753	$0	$36,938,366	$12,235,374	$0	$35,862,085	$45,624	$52,725,665	$100,868,748	$234,879,749
TOTALS	$5,230,716	$41,396,370	$10,761,835	$1,006,763	$58,395,684	$19,072,248	$2,380,323	$40,165,536	$6,509,791	$80,604,437	$148,732,335	$373,568,400
II. CONSTRUCTION TOTALS	$20,922,864	$165,585,479	$43,047,340	$4,027,052	$233,582,735	$76,288,993	$9,521,293	$160,662,143	$26,039,163	$322,417,748	$594,929,340	$1,494,273,607
III. ENGINEERING AND MANAGEMENT												
Program Management and Administration	$627,686	$4,967,564	$1,291,420	$120,812	$7,007,482	$2,288,670	$285,639	$4,819,864	$781,175	$9,672,532	$17,847,880	$44,828,207
Preliminary Engineering	$1,464,600	$11,590,984	$3,013,314	$281,894	$16,350,792	$5,340,230	$666,491	$11,246,350	$1,822,741	$22,569,242	$41,645,054	$104,599,153
Construction Engineering	$1,464,600	$11,590,984	$3,013,314	$281,894	$16,350,792	$5,340,230	$666,491	$11,246,350	$1,822,741	$22,569,242	$41,645,054	$104,599,153
III. ENGINEERING AND MANAGEMENT TOTALS	$3,556,886	$28,149,532	$7,318,048	$684,600	$39,709,066	$12,969,130	$1,618,621	$27,312,564	$4,426,657	$54,811,016	$101,137,988	$254,026,513
IV. TOTAL ESTIMATED COST	$24,480,808	$199,950,365	$51,972,883	$4,711,652	$281,115,708	$93,991,854	$11,139,914	$191,017,970	$30,465,820	$383,705,297	$710,320,855	$1,810,300,120
35.00% High Range	$33,100,000	$270,000,000	$70,200,000	$6,500,000	$379,800,000	$126,900,000	$15,200,000	$258,000,000	$41,200,000	$518,200,000	$959,500,000	$2,446,800,000
Total Contract Cost	$24,500,000	$200,000,000	$52,000,000	$4,800,000	$281,300,000	$94,000,000	$11,200,000	$191,100,000	$30,500,000	$383,800,000	$710,600,000	$1,811,700,000
-30.00% Low Range	$17,200,000	$140,000,000	$36,400,000	$3,400,000	$197,000,000	$65,800,000	$7,900,000	$133,800,000	$21,400,000	$268,700,000	$497,600,000	$1,269,300,000

The opinions of probable cost (estimates) shown, and any resulting conclusions on project financial or economic feasibility or funding requirements, have been prepared for guidance in project evaluation and implementation from the information available at the time the opinion was prepared. The final costs of the project and resulting feasibility will depend on actual labor and material costs, competitive market conditions, actual site conditions, final project scope, implementation schedule, continuity of personnel and engineering, and other variable factors. The recent increases or decreases in material pricing may have a significant impact which is not predictable and careful review or consideration must be used in evaluation of material prices. As a result, the final project costs will vary from the opinions of probable cost presented herein. Because of these factors, project feasibility, benefit/cost ratios, risks, and funding needs must be carefully reviewed prior to making specific financial decisions or establishing project budgets to

APPENDIX E
CASH FLOW FOR MDOT


I-94 Construction Cash Flow - MDOT
MONTHLY INVESTMENT
CUMULATIVE INVESTMENT
Monthly Investment ($M)
Cumulative Investment ($M)
$25
$20
$15
$10
$5
$0
$1,600
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$1,200
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$800
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$400
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Sep-10
Nov-10
Jan-11
Month

APPENDIX F
COST SUMMARY BY PACKAGE

PROJECT OPINION OF COST SUMMARY
JOB NUMBER: 32587
TITLE: I-94 Detailed Engineering Report

Conceptual Base Plans

I-96 to Conner
Length: 6.7 Miles
FILE: 2010-06-07 I-94 Opinion of Cost.xls

Region: Metro
TSC: Detroit
Prepared By: CH2M HILL
Std. Specs for Construction: 2003
Date: Jun-8-10
Time: 4:59:40 PM
Base Cost Year: Dec-09

LETTING SUMMARY

Letting Month/Year	Apr-00	Apr-00	Apr-00	Apr-00	Apr-00	Apr-00	Apr-00	Apr-01	Apr-01	Apr-01	Apr-01	Apr-01	Apr-01	Apr-02	Apr-02	Jul-02	Apr-03	Apr-03	Apr-03	Apr-05	Apr-05	Apr-06	Jul-06	Apr-07	Apr-07	Apr-07	
Duration (Months)	9	9	15	15	15	15	15	43	44	24	32	20	24	20	32	6	32	13	36	22	22	20	20	40	44	44	
Package	Advanced Bridge 1	Advanced Bridge 2	Advanced Bridge 3	Advanced Bridge 4	Advanced Bridge 5	Advanced Bridge 6	Advanced Bridge 7	Construction 1	Construction 2	Construction 3	Construction 4	Construction 5	Construction 6	Construction 7	Construction 8	Construction 9	Construction 10	Construction 11	Construction 12	Construction 13	Construction 14	Construction 15	Construction 16	Construction 17	Construction 18	Construction 19	
Segment	ADV	ADV	ADV	ADV	ADV	ADV	ADV	3	3	3	3	3	3	3	3	3	3	1 & 2	2	1&2	2	1	1	1	1	1	
Project Description	Gratiot (M-3)	Van Dyke (M-53)	Mt. Elliot	2nd Avenue	Chene and Concord	Cadillac and Cass	Brush and French	Dequindre Bridge, including WB to I-75, and vicinity streets/bridges between I-75 and Chene	I-94 between St. Aubin and Frontenac, vicinity streets between St. Aubin and Frontenac; E. Grand Bridge	Frontenac, Burns, Conner, and Barrett bridges	Pedestrian bridges at Helen, Townsend, Seminole, Rohns, Springfield and Malcolm	Gratiot ramps and vicinity streets	Norfolk Southern and Conrail bridges (Part-width construction)	I-94 EB and vicinity streets between Frontenac and Norcross	Reconstruct all pump stations between Woodward and Conner	Temporary widening along I-94 WB between Frontenac and Norcross	I-94 WB and vicinity streets between Frontenac and Connor	Cross streets, and various retaining walls and service drives between Cass and I-75	I-94, I-75 ramps, and various service drives between Brush and Russell	I-94 between 2nd and Russell; M-10 NB to EB ramp; Woodward Ave.	Rehabilitate I-75	Cross streets, various retaining walls and service drives between I-96 and Trumbull; Grand River, Linwood, 14th, Rosa Parks and Trumbull bridges	Rehabilitate Pump Stations	CN Rail and Conrail bridges over I-94 and M-10	I-94 and adjacent ramps between I-96 and Trumbull	I-94, M-10, adjacent ramps, and various service drives between Trumbull and Cass	
I. RIGHT-OF-WAY TOTALS	$592,550	$17,875	$1,440,807	$1,607,387	$728,236	$832,928	$2,576,903	$8,719,447	$9,081,164	$2,339,270	$5,239,368	$4,445,834	$0	$1,750,055	$0	$0	$550,742	$1,058	$6,215,354	$1,607,495	$0	$4,733,731	$0	$3,043,263	$0	$6,476,533	$62,000,000
1. Removal	$86,728	$64,257	$107,171	$169,832	$67,328	$49,091	$58,834	$93,919	$1,446,075	$269,957	$0	$235,620	$0	$1,057,387	$0	$73,625	$742,612	$115,897	$920,099	$649,591	$0	$379,560	$0	$0	$601,236	$2,219,587	$9,404,406
2. Earthwork	$118,996	$36,024	$81,144	$341,320	$0	$61,315	$0	$457,628	$8,761,104	$272,864	$0	$1,264,684	$0	$3,525,896	$0	$426,660	$3,520,584	$776,030	$0	$2,570,951	$0	$1,224,498	$0	$0	$2,403,132	$5,855,017	$31,697,847
3. Pavement and Base Materials	$1,107,541	$627,208	$877,962	$1,317,031	$553,157	$381,918	$484,021	$1,252,163	$14,316,665	$2,802,057	$58	$2,632,394	$0	$9,180,438	$0	$413,500	$9,042,718	$1,226,447	$7,049,868	$6,636,692	$2,128,120	$2,748,071	$0	$0	$5,959,245	$16,730,660	$87,467,934
4. Drainage and Erosion Control	$143,581	$186,783	$252,620	$459,736	$195,728	$142,246	$121,253	$32,034	$7,776,513	$596,318	$0	$949,399	$0	$6,215,573	$8,452,889	$361,109	$1,982,740	$650,280	$2,059,277	$2,560,448	$269,480	$2,923,305	$4,875,214	$0	$1,347,622	$11,130,212	$53,684,360
5. Structures	$6,739,861	$3,504,032	$7,330,302	$9,817,774	$5,277,391	$5,250,340	$5,133,860	$97,714,093	$30,018,544	$9,799,492	$12,817,939	$7,943,419	$24,255,957	$23,740,027	$0	$0	$28,007,354	$8,930,691	$87,556,773	$9,050,724	$0	$34,958,212	$0	$102,463,100	$130,354	$150,644,758	$671,084,997
6. Traffic	$1,368,322	$893,164	$1,403,122	$1,677,303	$1,316,927	$1,283,245	$1,308,872	$13,021,081	$8,813,172	$2,967,561	$1,538,163	$1,624,116	$2,910,715	$6,307,109	$380,380	$111,125	$6,590,205	$1,355,711	$13,199,611	$4,823,195	$384,548	$5,629,629	$219,385	$12,295,573	$2,882,236	$24,808,260	$119,112,730
7. Miscellaneous Construction	$218,010	$178,974	$266,889	$616,845	$164,244	$161,248	$134,563	$914,590	$9,943,472	$753,704	$2,880	$1,372,100	$0	$7,872,111	$3,508,511	$275,719	$2,902,895	$966,846	$5,256,914	$3,565,499	$94,318	$2,487,863	$1,706,325	$0	$3,220,227	$14,206,547	$60,791,294
8. Utility Relocation	$723,000	$270,300	$828,650	$473,400	$429,700	$247,000	$291,000	$700,000	$7,573,430	$1,262,000	$0	$2,130,800	$0	$2,130,420	$0	$0	$2,084,520	$923,000	$2,232,800	$895,000	$0	$4,141,000	$0	$0	$2,055,350	$4,703,350	$34,094,720
9. Mobilization	$525,302	$288,038	$557,393	$743,662	$400,224	$378,820	$376,620	$5,709,276	$4,432,449	$936,198	$717,952	$907,627	$1,358,334	$3,001,448	$617,089	$83,087	$2,743,682	$747,246	$5,913,767	$1,537,405	$143,823	$2,724,607	$340,046	$5,737,934	$929,970	$11,514,920	$53,366,919
10. Contingency	$3,677,113	$2,016,260	$3,901,751	$5,205,634	$2,801,566	$2,651,741	$2,636,341	$39,964,928	$31,027,141	$6,553,383	$5,025,664	$6,353,387	$9,508,335	$21,010,136	$4,319,623	$581,608	$19,205,770	$5,230,716	$41,396,370	$10,761,835	$1,006,763	$19,072,248	$2,380,323	$40,165,536	$6,509,791	$80,604,437	$373,568,400
II. CONSTRUCTION TOTALS	$14,708,454	$8,065,040	$15,607,004	$20,822,537	$11,206,265	$10,606,964	$10,545,364	$159,859,712	$124,108,565	$26,213,534	$20,102,656	$25,413,546	$38,033,341	$84,040,545	$17,278,492	$2,326,433	$76,823,080	$20,922,864	$165,585,479	$43,047,340	$4,027,052	$76,288,993	$9,521,293	$160,662,143	$26,039,163	$322,417,748	$1,494,273,607
III. ENGINEERING AND MANAGEMENT TOTALS	$2,500,438	$1,371,057	$2,653,190	$3,539,832	$1,905,066	$1,803,183	$1,792,711	$27,176,151	$21,098,457	$4,456,300	$3,417,452	$4,320,302	$6,465,668	$14,286,892	$2,937,343	$395,493	$13,059,924	$3,556,886	$28,149,532	$7,318,048	$684,600	$12,969,130	$1,618,621	$27,312,564	$4,426,657	$54,811,016	$254,026,513
IV. TOTAL ESTIMATED COST TOTALS	$17,801,442	$9,453,972	$19,701,001	$25,969,756	$13,839,567	$13,243,075	$14,914,978	$195,755,310	$154,288,186	$33,009,104	$28,759,476	$34,179,682	$44,499,009	$100,077,492	$20,215,835	$2,721,926	$90,433,746	$24,480,808	$199,950,365	$51,972,883	$4,711,652	$93,991,854	$11,139,914	$191,017,970	$30,465,820	$383,705,297	$1,810,300,120

APPENDIX G

PUMP STATIONS, HIGHWAY BRIDGES, REHABILIATION BRIDGES, RAILROAD BRIDGES AND RETAINING WALL SUMMARY SHEETS

PROJECT OPINION OF COST SUMMARY		Region:	Metro
JOB NUMBER:	32587	TSC:	Detroit
TITLE:	I-94 Detailed Engineering Report	Prepared By:	CH2M HILL
Conceptual Base Plans		Std. Specs for Construction:	2003
I-96 to Conner		Date:	Jun-8-10
Length:	6.7 Miles	Time:	4:59:40 PM
FILE:	2010-06-07 I-94 Opinion of Cost.xls	Base Cost Year:	Dec-09

PACKAGE TITLE: All Pump Stations

Worksheet Title: Pump Stations

I-94 EB @ Seneca (D01 of 82024)

#	Description	Dim.	Unit	Quantity	Unit	Contract Unit Price	8 Total	Comments
1	Removal			1	LS	$150,000.00	$150,000	Includes Removal of Electrical Building
3	45 Hp Pumps			3	Ea	$80,000.00	$240,000	Submersible Propeller Pumps Estimated 45 hp
4	Electrical Controls & VFDs			1	LS	$300,000.00	$300,000	Includes Controls, Monitoring, Generator
5	Excavation	Increase	10.00%	2047	Cyd	$30.00	$61,410	
	Area[2]	1047	Ft					
	Depth[3]	48	Ft					
6	Sheeting			1	LS	$180,000.00	$180,000	Temp Sheet Piling
7	Concrete Wet Well (pour in place)	Increase	10.00%	338	Cyd	$750.00	$253,250.00	Reinforcing Steel incl. in Concrete costs
	Pump Station Area (inside)	434	Sft					
	Diameter	23.5	Ft					
	Pump Station Depth	40	Ft					
	Wall & top thickness	1.5	Ft					
	Bottom thickness	5	Ft					
	Walls	4702.0	Cft					
	Bottom	2758.0	Cft					
	Top	828.0	Cft					
	Total Concrete	8288.0	Cft					
8	Mechanical Sub Costs			1	LS	$145,000.00	$145,000	HVAC, piping
9	Electrical Building Costs			1	LS	$185,000.00	$185,000	Electrical Control Bldg
10	Discharge Chamber			1	LS	$60,000.00	$60,000	
11	DIP Discharge Piping			100	Ft	$155.00	$15,500	
12	Metal Work			1	LS	$70,000.00	$70,000	Trash Rack, Ladders, Doors, Hatches
13	Dewatering			1	LS	$80,000.00	$80,000	
14	Backfill Class II Compacted	Increase	25.00%	512	Cyd	$50.00	$25,600	25% of Excavation volume
1	Miscellaneous	Increase	15.00%	1	LS	$1,765,760	$264,864	
					I-94 EB @ Seneca (D01 of 82024)	Subtotal	$2,030,624	

Assumptions: 1-Add 3 feet to inside dimension to account for wall thickness
2-Add 5 feet on each side for area to form plus 3 feet for wall thickness
3-Add 8 feet for subgrade cut plus bottom thickness

I-94 EB @ Cadillac (D01 of 82025)

#	Description	Dim.	Unit	Quantity	Unit	Contract Unit Price	8 Total	Comments
1	Removal			1	LS	$150,000.00	$150,000	Includes Removal of Electrical Building
3	45 Hp Pumps			4	Ea	$75,000.00	$300,000	Submersible Propeller Pumps Estimated 35 hp
4	Electrical Controls & VFDs			1	LS	$275,000.00	$275,000	Includes Controls, Monitoring, Generator
5	Excavation	Increase	10.00%	2405	Cyd	$30.00	$72,150	
	Area[2]	1135	Ft					
	Depth[3]	52	Ft					
6	Sheeting			1	LS	$180,000.00	$180,000	Temp Sheet Piling
7	Concrete Wet Well (pour in place)	Increase	10.00%	387	Cyd	$750.00	$290,056.00	Reinforcing Steel incl. in Concrete costs
	Pump Station Area (inside)	491	Sft					
	Diameter	25	Ft					
	Pump Station Depth	44	Ft					
	Wall & top thickness	1.5	Ft					
	Bottom thickness	5	Ft					
	Walls	5490.0	Cft					
	Bottom	3079.0	Cft					
	Top	924.0	Cft					
	Total Concrete	9493.0	Cft					
8	Mechanical Sub Costs			1	LS	$145,000.00	$145,000	HVAC, piping
9	Electrical Building Costs			1	LS	$200,000.00	$200,000	Electrical Control Bldg
10	Discharge Chamber			1	LS	$60,000.00	$60,000	
11	DIP Discharge Piping			100	Ft	$155.00	$15,500	
12	Metal Work			1	LS	$80,000.00	$80,000	Trash Rack, Ladders, Doors, Hatches
13	Dewatering			1	LS	$80,000.00	$80,000	
14	Backfill Class II Compacted	Increase	25.00%	602	Cyd	$50.00	$30,100	25% of Excavation volume
1	Miscellaneous	Increase	15.00%	1	LS	$1,877,806	$281,671	
					I-94 EB @ Cadillac (D01 of 82025)	Subtotal	$2,159,477	

Assumptions: 1-Add 3 feet to inside dimension to account for wall thickness
2-Add 5 feet on each side for area to form plus 3 feet for wall thickness
3-Add 8 feet for subgrade cut plus bottom thickness

PROJECT OPINION OF COST SUMMARY		Region:	Metro
JOB NUMBER:	32587	TSC:	Detroit
TITLE:	I-94 Detailed Engineering Report	Prepared By:	CH2M HILL
Conceptual Base Plans		Std. Specs for Construction:	2003
I-96 to Conner		Date:	Jun-8-10
Length:	6.7 Miles	Time:	4:59:40 PM
FILE:	2010-06-07 I-94 Opinion of Cost.xls	Base Cost Year:	Dec-09

PACKAGE TITLE: All Pump Stations

Worksheet Title: Pump Stations

I-94 EB @ Conner (D02 of 82025)

#	Description	Dim.	Unit	Quantity	Unit	Contract Unit Price	8 Total	Comments
1	Removal			1	LS	$150,000.00	$150,000	Includes Removal of Electrical Building
3	80 Hp Pumps			5	Ea	$115,000.00	$575,000	Submersible Propeller Pumps Estimated 80 hp
4	Electrical Controls & VFDs			1	LS	$375,000.00	$375,000	Includes Controls, Monitoring, Generator
5	Excavation	Increase	10.00%	3729	Cyd	$30.00	$111,870	
	Area[2]	1453	Ft					
	Depth[3]	63	Ft					
6	Sheeting			1	LS	$180,000.00	$180,000	Temp Sheet Piling
7	Concrete Wet Well (pour in place)	Increase	10.00%	559	Cyd	$750.00	$419,139.00	Reinforcing Steel incl. in Concrete costs
	Pump Station Area (inside)	707	Sft					
	Diameter	30	Ft					
	Pump Station Depth	55	Ft					
	Wall & top thickness	1.5	Ft					
	Bottom thickness	5	Ft					
	Walls	8157.0	Cft					
	Bottom	4277.0	Cft					
	Top	1283.0	Cft					
	Total Concrete	13717.0	Cft					
8	Mechanical Sub Costs			1	LS	$165,000.00	$165,000	HVAC, piping
9	Electrical Building Costs			1	LS	$200,000.00	$200,000	Electrical Control Bldg
10	Discharge Chamber			1	LS	$60,000.00	$60,000	
11	DIP Discharge Piping			150	Ft	$155.00	$23,250	
12	Metal Work			1	LS	$100,000.00	$100,000	Trash Rack, Ladders, Doors, Hatches
13	Dewatering			1	LS	$90,000.00	$90,000	
14	Backfill Class II Compacted	Increase	25.00%	933	Cyd	$50.00	$46,650	25% of Excavation volume
1	Miscellaneous	Increase	15.00%	1	LS	$2,495,909	$374,386	
				I-94 EB @ Conner (D02 of 82025)		Subtotal	$2,870,295	

Assumptions: 1-Add 3 feet to inside dimension to account for wall thickness
2-Add 5 feet on each side for area to form plus 3 feet for wall thickness
3-Add 8 feet for subgrade cut plus bottom thickness

I-75 SB @ Ferry

#	Description	Dim.	Unit	Quantity	Unit	Contract Unit Price	8 Total	Comments
2	Electrical Sub Costs			1	LS	$170,000.00	$170,000.00	Includes Controls, Monitoring, Generator
3	Mechanical Sub Costs			1	LS	$50,000.00	$50,000.00	Includes HVAC, piping
4	Metal Work Costs			1	LS	$75,000.00	$75,000.00	Includes Trash Rack, Railing, Hatches, Ladders, Doors, etc
5	Structural Rehabilitation			1	LS	$150,000.00	$150,000.00	Includes Removals, Coating, Patching, Concrete, Rebar
6	Submersible Propeller Pumps			3	Ea	$95,000.00	$285,000.00	Includes Ex Pump Removal and New Equipment Install
1	Miscellaneous	Increase	15.00%	1	LS	$730,000	$109,500	
				I-75 SB @ Ferry		Subtotal	$839,500	

I-94 EB @ Brush Street

#	Description	Dim.	Unit	Quantity	Unit	Contract Unit Price	13 Total	Comments
1	Removal			1	LS	$100,000.00	$100,000	
3	45 Hp Pumps				Ea	$80,000.00	$0	
4	Electrical Controls & VFDs				LS	$300,000.00	$0	
5	Excavation	Increase	10.00%	0	Cyd	$30.00	$0	
	Area[2]	0	Ft					
	Depth[3]	8	Ft					
6	Sheeting				LS	$180,000.00	$0	
7	Concrete Wet Well (pour in place)	Increase	10.00%	0	Cyd	$750.00	$0.00	
	Pump Station Area (inside)	0	Sft					
	Diameter		Ft					
	Pump Station Depth		Ft					
	Wall & top thickness		Ft					
	Bottom thickness		Ft					
	Walls	0.0	Cft					
	Bottom	0.0	Cft					
	Top	0.0	Cft					
	Total Concrete	0.0	Cft					
8	Mechanical Sub Costs				LS	$145,000.00	$0	
9	Electrical Building Costs				LS	$185,000.00	$0	
10	Discharge Chamber				LS	$60,000.00	$0	
11	DIP Discharge Piping				Ft	$155.00	$0	
12	Metal Work				LS	$70,000.00	$0	
13	Dewatering				LS	$80,000.00	$0	
14	Backfill Class II Compacted	Increase	25.00%	0	Cyd	$50.00	$0	
1	Miscellaneous	Increase	15.00%	1	LS	$100,000	$15,000	
				I-94 EB @ Brush Street		Subtotal	$115,000	

Assumptions: 1-Add 3 feet to inside dimension to account for wall thickness
2-Add 5 feet on each side for area to form plus 3 feet for wall thickness
3-Add 8 feet for subgrade cut plus bottom thickness

PROJECT OPINION OF COST SUMMARY		Region:	Metro
JOB NUMBER:	32587	TSC:	Detroit
TITLE:	I-94 Detailed Engineering Report	Prepared By:	CH2M HILL
Conceptual Base Plans		Std. Specs for Construction:	2003
I-96 to Conner		Date:	Jun-8-10
Length:	6.7 Miles	Time:	4:59:40 PM
FILE:	2010-06-07 I-94 Opinion of Cost.xls	Base Cost Year:	Dec-09

PACKAGE TITLE: All Pump Stations

Worksheet Title: Pump Stations

I-94 EB @ 14th Street (D07 of 82023)

#	Description	Dim.	Unit	Quantity	Unit	Contract Unit Price	15 Total	Comments
1	Removal			1	LS	$100,000.00	$100,000	
3	45 Hp Pumps				Ea	$80,000.00	$0	
4	Electrical Controls & VFDs				LS	$300,000.00	$0	
5	Excavation	Increase	10.00%	0	Cyd	$30.00	$0	
	Area^2	0	Ft					
	Depth^3	8	Ft					
6	Sheeting				LS	$180,000.00	$0	
7	Concrete Wet Well (pour in place)	Increase	10.00%	0	Cyd	$750.00	$0.00	
	Pump Station Area (inside)	0	Sft					
	Diameter		Ft					
	Pump Station Depth		Ft					
	Wall & top thickness		Ft					
	Bottom thickness		Ft					
	Walls	0.0	Cft					
	Bottom	0.0	Cft					
	Top	0.0	Cft					
	Total Concrete	0.0	Cft					
8	Mechanical Sub Costs				LS	$145,000.00	$0	
9	Electrical Building Costs				LS	$185,000.00	$0	
10	Discharge Chamber				LS	$60,000.00	$0	
11	DIP Discharge Piping				Ft	$155.00	$0	
12	Metal Work				LS	$70,000.00	$0	
13	Dewatering				LS	$80,000.00	$0	
14	Backfill Class II Compacted	Increase	25.00%	0	Cyd	$50.00	$0	
1	Miscellaneous	Increase	15.00%	1	LS	$100,000	$15,000	
						I-94 EB @ 14th Street (D07 of 82023) Subtotal	$115,000	

Assumptions: 1-Add 3 feet to inside dimension to account for wall thickness
2-Add 5 feet on each side for area to form plus 3 feet for wall thickness
3-Add 8 feet for subgrade cut plus bottom thickness

I-94 EB @ Hecla (D08 of 82023)

#	Description	Dim.	Unit	Quantity	Unit	Contract Unit Price	16 Total	Comments
1	Removal			1	LS	$150,000.00	$150,000	Includes Removal of Electrical Building
3	35 Hp Pumps			3	Ea	$75,000.00	$225,000	Submersible Propeller Pumps Estimated 35 hp
4	Electrical Controls & VFDs			1	LS	$300,000.00	$300,000	Includes Controls, Monitoring, Generator
5	Excavation	Increase	10.00%	2175	Cyd	$30.00	$65,250	
	Area^2	1047	Ft					
	Depth^3	51	Ft					
6	Sheeting			1	LS	$180,000.00	$180,000	Temp Sheet Piling
7	Concrete Wet Well (pour in place)	Increase	10.00%	352	Cyd	$750.00	$264,028.00	Reinforcing Steel incl. in Concrete costs
	Pump Station Area (inside)	434	Sft					
	Diameter	23.5	Ft					
	Pump Station Depth	43	Ft					
	Wall & top thickness	1.5	Ft					
	Bottom thickness	5	Ft					
	Walls	5055.0	Cft					
	Bottom	2758.0	Cft					
	Top	828.0	Cft					
	Total Concrete	8641.0	Cft					
8	Mechanical Sub Costs			1	LS	$145,000.00	$145,000	HVAC, piping
9	Electrical Building Costs			1	LS	$185,000.00	$185,000	Electrical Control Bldg
10	Discharge Chamber			1	LS	$60,000.00	$60,000	
11	DIP Discharge Piping			100	Ft	$155.00	$15,500	
12	Metal Work			1	LS	$75,000.00	$75,000	Trash Rack, Ladders, Doors, Hatches
13	Dewatering			1	LS	$80,000.00	$80,000	
14	Backfill Class II Compacted	Increase	25.00%	544	Cyd	$50.00	$27,200	25% of Excavation volume
1	Miscellaneous	Increase	15.00%	1	LS	$1,771,978	$265,797	
						I-94 EB @ Hecla (D08 of 82023) Subtotal	$2,037,775	

Assumptions: 1-Add 3 feet to inside dimension to account for wall thickness
2-Add 5 feet on each side for area to form plus 3 feet for wall thickness
3-Add 8 feet for subgrade cut plus bottom thickness

M-10 NB @ Selden (D06 of 82111)

#	Description	Dim.	Unit	Quantity	Unit	Contract Unit Price	16 Total	Comments
2	Electrical Sub Costs			1	LS	$170,000.00	$170,000.00	Includes Controls, Monitoring, Generator
3	Mechanical Sub Costs			1	LS	$50,000.00	$50,000.00	Includes HVAC, piping
4	Metal Work Costs			1	LS	$75,000.00	$75,000.00	Includes Trash Rack, Railing, Hatches, Ladders, Doors, etc
5	Structural Rehabilitation			1	LS	$150,000.00	$150,000.00	Includes Removals, Coating, Patching, Concrete, Rebar
6	Submersible Propeller Pumps			3	Ea	$95,000.00	$285,000.00	Includes Ex Pump Removal and New Equipment Install
1	Miscellaneous	Increase	15.00%	1	LS	$730,000	$109,500	
						M-10 NB @ Selden (D06 of 82111) Subtotal	$839,500	

PROJECT OPINION OF COST SUMMARY		Region:	Metro
JOB NUMBER:	32587	TSC:	Detroit
TITLE:	I-94 Detailed Engineering Report	Prepared By:	CH2M HILL
Conceptual Base Plans		Std. Specs for Construction:	2003
I-96 to Conner		Date:	Jun-8-10
Length:	6.7 Miles	Time:	4:59:40 PM
FILE:	2010-06-07 I-94 Opinion of Cost.xls	Base Cost Year:	Dec-09

PACKAGE TITLE: All Pump Stations

Worksheet Title: Pump Stations

M-10 SB @ Forest

#	Description	Dim.	Unit	Quantity	Unit	Unit Price	Total	Comments
						Contract	16	
2	Electrical Sub Costs			1	LS	$170,000.00	$170,000.00	Includes Controls, Monitoring, Generator
3	Mechanical Sub Costs			1	LS	$50,000.00	$50,000.00	Includes HVAC, piping
4	Metal Work Costs			1	LS	$75,000.00	$75,000.00	Includes Trash Rack, Railing, Hatches, Ladders, Doors, etc
5	Structural Rehabilitation			1	LS	$150,000.00	$150,000.00	Includes Removals, Coating, Patching, Concrete, Rebar
6	Submersible Propeller Pumps			3	Ea	$95,000.00	$285,000.00	Includes Ex Pump Removal and New Equipment Install
1	Miscellaneous	Increase	15.00%	1	LS	$730,000	$109,500	
				M-10 SB @ Forest		Subtotal	$839,500	

M-10 NB @ Milwaukee (D01 of 82112)

#	Description	Dim.	Unit	Quantity	Unit	Unit Price	Total	Comments
						Contract	16	
2	Electrical Sub Costs			1	LS	$170,000.00	$170,000.00	Includes Controls, Monitoring, Generator
3	Mechanical Sub Costs			1	LS	$50,000.00	$50,000.00	Includes HVAC, piping
4	Metal Work Costs			1	LS	$75,000.00	$75,000.00	Includes Trash Rack, Railing, Hatches, Ladders, Doors, etc
5	Structural Rehabilitation			1	LS	$150,000.00	$150,000.00	Includes Removals, Coating, Patching, Concrete, Rebar
6	Submersible Propeller Pumps			3	Ea	$95,000.00	$285,000.00	Includes Ex Pump Removal and New Equipment Install
1	Miscellaneous	Increase	15.00%	1	LS	$730,000	$109,500	
				M-10 NB @ Milwaukee (D01 of 82112)		Subtotal	$839,500	

M-10 Interchange (D09 of 82023)

#	Description	Dim.	Unit	Quantity	Unit	Unit Price	Total	Comments
						Contract	19	
1	Removal			1	LS	$100,000.00	$100,000	
3	45 Hp Pumps				Ea	$80,000.00	$0	
4	Electrical Controls & VFDs				LS	$300,000.00	$0	
5	Excavation	Increase	10.00%	0	Cyd	$30.00	$0	
	Area[2]	0	Ft					
	Depth[3]	8	Ft					
6	Sheeting				LS	$180,000.00	$0	
7	Concrete Wet Well (pour in place)	Increase	10.00%	0	Cyd	$750.00	$0.00	
	Pump Station Area (inside)	0	Sft					
	Diameter		Ft					
	Pump Station Depth		Ft					
	Wall & top thickness		Ft					
	Bottom thickness		Ft					
	Walls	0.0	Cft					
	Bottom	0.0	Cft					
	Top	0.0	Cft					
	Total Concrete	0.0	Cft					
8	Mechanical Sub Costs				LS	$145,000.00	$0	
9	Electrical Building Costs				LS	$185,000.00	$0	
10	Discharge Chamber				LS	$60,000.00	$0	
11	DIP Discharge Piping				Ft	$155.00	$0	
12	Metal Work				LS	$70,000.00	$0	
13	Dewatering				LS	$80,000.00	$0	
14	Backfill Class II Compacted	Increase	25.00%	0	Cyd	$50.00	$0	
1	Miscellaneous	Increase	15.00%	1	LS	$100,000	$15,000	
				M-10 Interchange (D09 of 82023)		Subtotal	$115,000	

Assumptions: *1-Add 3 feet to inside dimension to account for wall thickness*
2-Add 5 feet on each side for area to form plus 3 feet for wall thickness
3-Add 8 feet for subgrade cut plus bottom thickness

	Total						$12,801,171

PROJECT OPINION OF COST SUMMARY
JOB NUMBER 32587
TITLE: I-94 Detailed Engineering Report
Conceptual Base Plans
I-96 to Conner
Length: 6.7 Miles
FILE: 2010-06-07 I-94 Opinion of Cost.xls

Region: Metro
TSC: Detroit
Prepared By: CH2M HILL
Std. Specs for Construction: 2003
Date: Jun-8-10
Time: 4:59:40 PM
Base Cost Year: Dec-09

TITLE: **All New Highway Bridges and All Removed Bridges**
Worksheet Title: Hwy Bridges

			Removal Cost				New Construction Cost															
				Removal			Proposed		Superstructure		Substructure		Foundation				Construction Staging					
Location	Type	Contract Package	Type	Deck Area	Unit Price	Total Cost	Deck Area	Unit Price	% of Structure	Cost	% of Structure	Cost	Foundation Adjustment Condition	% Increase	% of Structure	Cost	Subtotal	Staging Factor	Cost	Total Cost	Utility Risk	Other Risk
Cross Road Bridges																						
M-3 (Gratiot Avenue) over I-94	Concrete I Beam	A1	Cross Road	31,808	$ 28.00	$ 890,624.00	35,975	$ 140.00	70%	$ 3,525,550.00	20%	$ 1,007,300.00	Poor	9%	10%	$ 548,979.00	$ 5,081,829.00	10%	$ 508,183.00	$ 5,590,012.00	Yes	
M-53 (Van Dyke Street) over I-94	Steel I Girder	A2	Cross Road	17,034	$ 28.00	$ 476,952.00	16,287	$ 160.00	70%	$ 1,824,144.00	20%	$ 521,184.00	Poor	9%	10%	$ 284,045.00	$ 2,629,373.00	10%	$ 262,937.00	$ 2,892,310.00	Yes	
Mt. Elliot Street over I-94	Steel I Girder	A3	Cross Road	11,492	$ 28.00	$ 321,776.00	40,664	$ 160.00	70%	$ 4,554,368.00	20%	$ 1,301,248.00	Normal	0%	10%	$ 650,624.00	$ 6,506,240.00		$ -	$ 6,506,240.00	Yes	
2nd Blvd over I-94	Steel I Girder	A4	Cross Road	17,471	$ 28.00	$ 489,188.00	23,744	$ 160.00	70%	$ 2,659,328.00	20%	$ 759,808.00	Normal	0%	10%	$ 379,904.00	$ 3,799,040.00		$ -	$ 3,799,040.00		Two Stage Construction with Pier Relocation
Chene Street over I-94	Steel I Girder	A5	Cross Road	11,560	$ 28.00	$ 323,680.00	14,765	$ 160.00	70%	$ 1,653,680.00	20%	$ 472,480.00	Poor	9%	10%	$ 257,502.00	$ 2,383,662.00		$ -	$ 2,383,662.00		Two Stage Construction with Pier Relocation
Concord Avenue over I-94	Steel I Girder	A5	Cross Road	11,424	$ 28.00	$ 319,872.00	12,795	$ 160.00	70%	$ 1,433,040.00	20%	$ 409,440.00	Normal	0%	10%	$ 204,720.00	$ 2,047,200.00		$ -	$ 2,047,200.00		
Cass Avenue over I-94	Steel I Girder	A6	Cross Road	15,568	$ 28.00	$ 435,904.00	15,529	$ 160.00	70%	$ 1,739,248.00	20%	$ 496,928.00	Normal	0%	10%	$ 248,464.00	$ 2,484,640.00		$ -	$ 2,484,640.00		Two Stage Construction with Pier Relocation
Cadillac Avenue over I-94	Concrete Box Beam	A6	Cross Road	12,580	$ 28.00	$ 352,240.00	12,683	$ 140.00	70%	$ 1,242,934.00	20%	$ 355,124.00	Normal	0%	10%	$ 177,562.00	$ 1,775,620.00		$ -	$ 1,775,620.00		
Brush Street over I-94	Concrete I Beam	A7	Cross Road	10,602	$ 28.00	$ 296,856.00	19,019	$ 140.00	70%	$ 1,863,862.00	20%	$ 532,532.00	Very Poor	12%	10%	$ 298,218.00	$ 2,694,612.00		$ -	$ 2,694,612.00	Yes	
French Road over I-94	Concrete Box Beam	A7	Cross Road	10,602	$ 28.00	$ 296,856.00	11,772	$ 140.00	70%	$ 1,153,656.00	20%	$ 329,616.00	Normal	0%	10%	$ 164,808.00	$ 1,648,080.00		$ -	$ 1,648,080.00		
Milwaukee Avenue over I-75	Concrete I Beam	1	Cross Road	14,694	$ 28.00	$ 411,432.00	11,048	$ 140.00	70%	$ 1,082,704.00	20%	$ 309,344.00	Very Poor	12%	10%	$ 173,233.00	$ 1,565,281.00		$ -	$ 1,565,281.00		
E. Grand Blvd over I-75	Steel I Girder Curved	1	Cross Road	16,955	$ 28.00	$ 474,740.00	18,150	$ 180.00	70%	$ 2,286,900.00	20%	$ 653,400.00	Very Poor	12%	10%	$ 365,904.00	$ 3,306,204.00		$ -	$ 3,306,204.00		RR bridge in vicinity of W abutment
E. Grand Blvd over I-94	Steel I Girder Curved	2	Cross Road	22,302	$ 28.00	$ 624,456.00	22,334	$ 180.00	70%	$ 2,814,084.00	20%	$ 804,024.00	Normal	0%	10%	$ 402,012.00	$ 4,020,120.00		$ -	$ 4,020,120.00	Yes	
Frontenac Avenue over I-94	Concrete Box Beam	3	Cross Road	10,416	$ 28.00	$ 291,648.00	12,263	$ 140.00	70%	$ 1,201,774.00	20%	$ 343,364.00	Normal	0%	10%	$ 171,682.00	$ 1,716,820.00		$ -	$ 1,716,820.00		
Burns Avenue over I-94	Concrete I Beam	3	Cross Road	10,187	$ 28.00	$ 285,236.00	11,280	$ 140.00	70%	$ 1,105,440.00	20%	$ 315,840.00	Normal	0%	10%	$ 157,920.00	$ 1,579,200.00		$ -	$ 1,579,200.00		
Conner Avenue over I-94	Concrete I Beam	3	Cross Road	22,287	$ 28.00	$ 624,036.00	23,141	$ 140.00	70%	$ 2,267,818.00	20%	$ 647,948.00	Normal	0%	10%	$ 323,974.00	$ 3,239,740.00		$ -	$ 3,239,740.00		
Barrett Avenue over I-94	Concrete Box Beam	3	Cross Road	10,616	$ 28.00	$ 297,248.00	9,919	$ 140.00	70%	$ 972,062.00	20%	$ 277,732.00	Normal	0%	10%	$ 138,866.00	$ 1,388,660.00		$ -	$ 1,388,660.00		
M-1 (Woodward Avenue) over I-94	Concrete Box Beam	13	Cross Road	28,914	$ 28.00	$ 809,592.00	23,427	$ 140.00	70%	$ 2,295,846.00	20%	$ 655,956.00	Very Poor	12%	10%	$ 367,335.00	$ 3,319,137.00	10%	$ 331,914.00	$ 3,651,051.00	Yes - DWSD under foundation	
Grand River Avenue over I-94	Steel I Girder	15	Cross Road	25,566	$ 28.00	$ 715,848.00	25,568	$ 160.00	70%	$ 2,863,616.00	20%	$ 818,176.00	Normal	0%	10%	$ 409,088.00	$ 4,090,880.00	10%	$ 409,088.00	$ 4,499,968.00	Yes	
Linwood Avenue over I-94	Concrete Box Beam	15	Cross Road	10,722	$ 28.00	$ 300,216.00	13,740	$ 140.00	70%	$ 1,346,520.00	20%	$ 384,720.00	Normal	0%	10%	$ 192,360.00	$ 1,923,600.00		$ -	$ 1,923,600.00		
14th Street over I-94	Concrete Box Beam	15	Cross Road	13,543	$ 28.00	$ 379,204.00	15,663	$ 140.00	70%	$ 1,534,974.00	20%	$ 438,564.00	Normal	0%	10%	$ 219,282.00	$ 2,192,820.00		$ -	$ 2,192,820.00	Yes - sewer parallel to exist pier	
Rosa Parks Blvd over I-94	Concrete Box Beam	15	Cross Road	7,430	$ 28.00	$ 208,040.00	15,663	$ 140.00	70%	$ 1,534,974.00	20%	$ 438,564.00	Normal	0%	10%	$ 219,282.00	$ 2,192,820.00		$ -	$ 2,192,820.00	Yes - sewer parallel to exist pier	
Trumbull Avenue over I-94	Concrete Box Beam	15	Cross Road	17,191	$ 28.00	$ 481,348.00	25,182	$ 140.00	70%	$ 2,467,836.00	20%	$ 705,096.00	Normal	0%	10%	$ 352,548.00	$ 3,525,480.00		$ -	$ 3,525,480.00	Yes - sewer parallel to exist pier	
W. Grand Blvd over M-10	Steel I Girder	19	Cross Road	17,920	$ 28.00	$ 501,760.00	24,942	$ 160.00	70%	$ 2,793,504.00	20%	$ 798,144.00	Normal	0%	10%	$ 399,072.00	$ 3,990,720.00	10%	$ 399,072.00	$ 4,389,792.00		
Milwaukee Avenue over M-10	Concrete Box Beam	19	Cross Road	7,770	$ 28.00	$ 217,560.00	10,560	$ 140.00	70%	$ 1,034,880.00	20%	$ 295,680.00	Normal	0%	10%	$ 147,840.00	$ 1,478,400.00		$ -	$ 1,478,400.00		
Warren Avenue over M-10	Concrete I Beam	19	Cross Road	17,780	$ 28.00	$ 497,840.00	23,520	$ 140.00	70%	$ 2,304,960.00	20%	$ 658,560.00	Normal	0%	10%	$ 329,280.00	$ 3,292,800.00		$ -	$ 3,292,800.00		
Forest Avenue over M-10	Concrete I Beam	19	Cross Road	11,433	$ 28.00	$ 320,124.00	18,107	$ 140.00	70%	$ 1,774,486.00	20%	$ 506,996.00	Normal	0%	10%	$ 253,498.00	$ 2,534,980.00		$ -	$ 2,534,980.00		
U-turn Structure N of Selden	Steel I Girder	19	Cross Road		$ 28.00	$ -	7,212	$ 160.00	70%	$ 807,744.00	20%	$ 230,784.00	Normal	0%	10%	$ 115,392.00	$ 1,153,920.00		$ -	$ 1,153,920.00		
Braided Ramp Structure: Forest on and off ramps	Braided Ramp	19	Cross Road		$ 28.00	$ -	8,943	$ 195.00	70%	$ 1,220,720.00	20%	$ 348,777.00	Normal	0%	10%	$ 174,389.00	$ 1,743,886.00		$ -	$ 1,743,886.00		
Pallister Avenue over M-10	Steel I Girder	19	Cross Road	13,865	$ 28.00	$ 388,220.00	13,925	$ 160.00	70%	$ 1,559,600.00	20%	$ 445,600.00	Normal	0%	10%	$ 222,800.00	$ 2,228,000.00		$ -	$ 2,228,000.00		
Total						$ 12,032,496.00				$ 56,920,252.00		$ 16,262,929.00				$ 8,350,583.00	$ 81,533,764.00		$ 1,911,194.00	$ 83,444,958.00		
Mainline Bridges																						
I-94 Westbound over I-75	Concrete I Beam	12	Mainline	23,250	$ 28.00	$ 651,000.00	27,830	$ 140.00	70%	$ 2,727,340.00	20%	$ 779,240.00	Very Poor	12%	10%	$ 436,374.00	$ 3,942,954.00	10%	$ 394,295.00	$ 4,337,249.00		
I-94 Eastbound over I-75	Concrete I Beam	12	Mainline		$ 28.00	$ -	21,747	$ 140.00	70%	$ 2,131,206.00	20%	$ 608,916.00	Very Poor	12%	10%	$ 340,993.00	$ 3,081,115.00	10%	$ 308,112.00	$ 3,389,227.00		
M-10 Northbound over I-94	Concrete I Beam	19	Mainline	28,393	$ 28.00	$ 795,004.00	19,955	$ 140.00	70%	$ 1,955,590.00	20%	$ 558,740.00	Normal	0%	10%	$ 279,370.00	$ 2,793,700.00		$ -	$ 2,793,700.00		
M-10 Southbound over I-94	Concrete I Beam	19	Mainline	28,124	$ 28.00	$ 787,472.00	24,016	$ 140.00	70%	$ 2,353,568.00	20%	$ 672,448.00	Normal	0%	10%	$ 336,224.00	$ 3,362,240.00		$ -	$ 3,362,240.00		
Total						$ 2,233,476.00				$ 9,167,704.00		$ 2,619,344.00				$ 1,392,961.00	$ 13,180,009.00		$ 702,407.00	$ 13,882,416.00		
Service Drive Bridges																						
Westbound I-94 at Dequindre	Concrete I Beam	1	Service Drive		$ 28.00	$ -	49,803	$ 140.00	70%	$ 4,880,694.00	20%	$ 1,394,484.00	Poor	9%	10%	$ 759,994.00	$ 7,035,172.00		$ -	$ 7,035,172.00		
Eastbound I-94 at Dequindre	Concrete I Beam	1	Service Drive		$ 28.00	$ -	47,154	$ 140.00	70%	$ 4,621,092.00	20%	$ 1,320,312.00	Poor	9%	10%	$ 719,570.00	$ 6,660,974.00		$ -	$ 6,660,974.00		
Westbound I-94 over I-75	Concrete I Beam	12	Service Drive		$ 28.00	$ -	9,871	$ 140.00	70%	$ 967,358.00	20%	$ 276,388.00	Very Poor	12%	10%	$ 154,777.00	$ 1,398,523.00		$ -	$ 1,398,523.00		
Eastbound I-94 over I-75	Concrete I Beam	12	Service Drive		$ 28.00	$ -	10,402	$ 140.00	70%	$ 1,019,396.00	20%	$ 291,256.00	Very Poor	12%	10%	$ 163,103.00	$ 1,473,755.00		$ -	$ 1,473,755.00		
Northbound M-10 over I-94	Concrete I Beam	19	Service Drive		$ 28.00	$ -	8,269	$ 140.00	70%	$ 810,362.00	20%	$ 231,532.00	Normal	0%	10%	$ 115,766.00	$ 1,157,660.00		$ -	$ 1,157,660.00		
Southbound M-10 over I-94	Concrete I Beam	19	Service Drive		$ 28.00	$ -	8,873	$ 140.00	70%	$ 869,554.00	20%	$ 248,444.00	Normal	0%	10%	$ 124,222.00	$ 1,242,220.00		$ -	$ 1,242,220.00		
Total						$ -				$ 13,168,456.00		$ 3,762,416.00				$ 2,037,432.00	$ 18,968,304.00		$ -	$ 18,968,304.00		
Interchange Ramps																						
75 Ramp A	Steel Box Lower Level	1	Ramp		$ 28.00	$ -	27,016	$ 190.00	70%	$ 3,593,128.00	20%	$ 1,026,608.00	Very Poor	12%	10%	$ 574,900.00	$ 5,194,636.00		$ -	$ 5,194,636.00		
75 Ramp B	Steel Box Lower Level	12	Ramp		$ 28.00	$ -	21,807	$ 190.00	70%	$ 2,900,331.00	20%	$ 828,666.00	Very Poor	12%	10%	$ 464,053.00	$ 4,193,050.00		$ -	$ 4,193,050.00		
75 Ramp C	Steel Box Lower Level	12	Ramp		$ 28.00	$ -	21,184	$ 190.00	70%	$ 2,817,472.00	20%	$ 804,992.00	Very Poor	12%	10%	$ 450,796.00	$ 4,073,260.00		$ -	$ 4,073,260.00		
75 Ramp D	Steel Box Lower Level	12	Ramp		$ 28.00	$ -	25,403	$ 190.00	70%	$ 3,378,599.00	20%	$ 965,314.00	Very Poor	12%	10%	$ 540,576.00	$ 4,884,489.00		$ -	$ 4,884,489.00		
75 Ramp E	Steel Box Upper Level	12	Ramp		$ 28.00	$ -	30,665	$ 210.00	70%	$ 4,507,755.00	20%	$ 1,287,930.00	Very Poor	12%	10%	$ 721,241.00	$ 6,516,926.00		$ -	$ 6,516,926.00		
75 Ramp F	Steel Box Upper Level	12	Ramp		$ 28.00	$ -	59,940	$ 210.00	70%	$ 8,811,180.00	20%	$ 2,517,480.00	Very Poor	12%	10%	$ 1,409,789.00	$ 12,738,449.00		$ -	$ 12,738,449.00		
75 Ramp G	Steel Box Upper Level	12	Ramp		$ 28.00	$ -	35,605	$ 210.00	70%	$ 5,233,935.00	20%	$ 1,495,410.00	Very Poor	12%	10%	$ 837,430.00	$ 7,566,775.00		$ -	$ 7,566,775.00		
75 Ramp H	Steel Box Upper Level	12	Ramp		$ 28.00	$ -	63,575	$ 210.00	70%	$ 9,345,525.00	20%	$ 2,670,150.00	Very Poor	12%	10%	$ 1,495,284.00	$ 13,510,959.00		$ -	$ 13,510,959.00		
M-10 Ramp A	Steel Box Upper Level	19	Ramp		$ 28.00	$ -	33,513	$ 210.00	70%	$ 4,926,411.00	20%	$ 1,407,546.00	Normal	0%	10%	$ 703,773.00	$ 7,037,730.00		$ -	$ 7,037,730.00	4'-6" DWSD Combined Sewer Crossing Sta 109	
M-10 Ramp B	Steel Box Lower Level	19	Ramp		$ 28.00	$ -	26,926	$ 190.00	70%	$ 3,581,158.00	20%	$ 1,023,188.00	Normal	0%	10%	$ 511,594.00	$ 5,115,940.00		$ -	$ 5,115,940.00	15'x6" DWSD Combined Sewer Crossing Sta. 211	
M-10 Ramp C	Steel Box Upper Level	19	Ramp		$ 28.00	$ -	34,028	$ 210.00	70%	$ 5,002,043.00	20%	$ 1,429,155.00	Normal	0%	10%	$ 714,578.00	$ 7,145,776.00		$ -	$ 7,145,776.00		
M-10 Ramp D	Steel Box Lower Level	19	Ramp		$ 28.00	$ -	34,938	$ 190.00	70%	$ 4,646,688.00	20%	$ 1,327,625.00	Normal	0%	10%	$ 663,813.00	$ 6,638,126.00		$ -	$ 6,638,126.00	5'-3" DWSD Brick Combined Sewer Cross Sta. 408	
M-10 Ramp E	Steel Box Lower Level	19	Ramp		$ 28.00	$ -	38,347	$ 190.00	70%	$ 5,100,151.00	20%	$ 1,457,186.00	Normal	0%	10%	$ 728,593.00	$ 7,285,930.00		$ -	$ 7,285,930.00		
M-10 Ramp F	Steel Box Upper Level	19	Ramp		$ 28.00	$ -	61,913	$ 210.00	70%	$ 9,101,138.00	20%	$ 2,600,325.00	Normal	0%	10%	$ 1,300,163.00	$ 13,001,626.00		$ -	$ 13,001,626.00	4'-6" DWSD Combined Sewer Crossing Sta 631	
M-10 Ramp G	Steel Box Lower Level	19	Ramp		$ 28.00	$ -	44,162	$ 190.00	70%	$ 5,873,480.00	20%	$ 1,678,137.00	Normal	0%	10%	$ 839,069.00	$ 8,390,686.00		$ -	$ 8,390,686.00		
M-10 Ramp H	Steel Box Upper Level	19	Ramp		$ 28.00	$ -	60,653	$ 210.00	70%	$ 8,915,991.00	20%	$ 2,547,426.00	Normal	0%	10%	$ 1,273,713.00	$ 12,737,130.00		$ -	$ 12,737,130.00		
Total						$ -				$ 87,734,985.00		$ 25,067,138.00				$ 13,229,365.00	$ 126,031,488.00		$ -	$ 126,031,488.00		

PROJECT OPINION OF COST SUMMARY
JOB NUMBEI 32587
TITLE: I-94 Detailed Engineering Report
Conceptual Base Plans
I-96 to Conner
Length: 6.7 Miles
FILE: 2010-06-07 I-94 Opinion of Cost.xls

Region: Metro
TSC: Detroit
Prepared By: CH2M HILL
Std. Specs for Construction: 2003
Date: Jun-8-10
Time: 4:59:40 PM
Base Cost Year: Dec-09

TITLE: **All New Highway Bridges and All Removed Bridges**
Worksheet Title: Hwy Bridges

			Removal Cost				New Construction Cost															
				Removal			Proposed		Superstructure		Substructure		Foundation				Construction Staging					
Location	Type	Contract Package	Type	Deck Area	Unit Price	Total Cost	Deck Area	Unit Price	% of Structure	Cost	% of Structure	Cost	Foundation Adjustment Condition	% Increase	% of Structure	Cost	Subtotal	Staging Factor	Cost	Total Cost	Utility Risk	Other Risk
Cross Road Bridges																						
Pedestrian Bridges																						
Helen Avenue Walkover - Bridge	Pedestrian Bridge	4	Pedestrian	2,189	$ 20.00	$ 43,780.00	5,372	$ 160.00	70%	$ 601,664.00	20%	$ 171,904.00	Normal	0%	10%	$ 85,952.00	$ 859,520.00		$ -	$ 859,520.00		
Helen Avenue Walkover - Approach Ramp	Ped Bridge Ramp	4	Pedestrian		$ 20.00	$ -	14,164	$ 90.00	70%	$ 892,332.00	20%	$ 254,952.00	Normal	0%	10%	$ 127,476.00	$ 1,274,760.00		$ -	$ 1,274,760.00		
Townsend Avenue Walkover - Bridge	Pedestrian Bridge	4	Pedestrian	2,484	$ 20.00	$ 49,680.00	5,888	$ 160.00	70%	$ 659,456.00	20%	$ 188,416.00	Normal	0%	10%	$ 94,208.00	$ 942,080.00		$ -	$ 942,080.00		
Townsend Avenue Walkover - Approach Ramp	Ped Bridge Ramp	4	Pedestrian		$ 20.00	$ -	14,332	$ 90.00	70%	$ 902,916.00	20%	$ 257,976.00	Normal	0%	10%	$ 128,988.00	$ 1,289,880.00		$ -	$ 1,289,880.00		
Seminole Avenue Walkover - Bridge	Pedestrian Bridge	4	Pedestrian	2,791	$ 20.00	$ 55,820.00	6,035	$ 160.00	70%	$ 675,920.00	20%	$ 193,120.00	Poor	9%	10%	$ 105,250.00	$ 974,290.00		$ -	$ 974,290.00		
Seminole Avenue Walkover - Approach Ramp	Ped Bridge Ramp	4	Pedestrian		$ 20.00	$ -	14,858	$ 90.00	70%	$ 936,054.00	20%	$ 267,444.00	Poor	9%	10%	$ 145,757.00	$ 1,349,255.00		$ -	$ 1,349,255.00		
Rohns Avenue Walkover - Bridge	Pedestrian Bridge	4	Pedestrian	2,036	$ 20.00	$ 40,720.00	5,644	$ 160.00	70%	$ 632,128.00	20%	$ 180,608.00	Poor	9%	10%	$ 98,431.00	$ 911,167.00		$ -	$ 911,167.00		
Rohns Avenue Walkover - Approach Ramp	Ped Bridge Ramp	4	Pedestrian		$ 20.00	$ -	14,739	$ 90.00	70%	$ 928,557.00	20%	$ 265,302.00	Poor	9%	10%	$ 144,590.00	$ 1,338,449.00		$ -	$ 1,338,449.00		
Springfield Avenue Walkover - Bridge	Pedestrian Bridge	4	Pedestrian	2,522	$ 20.00	$ 50,440.00	5,950	$ 160.00	70%	$ 666,400.00	20%	$ 190,400.00	Normal	0%	10%	$ 95,200.00	$ 952,000.00		$ -	$ 952,000.00		
Springfield Avenue Walkover - Approach Ramp	Ped Bridge Ramp	4	Pedestrian		$ 20.00	$ -	14,442	$ 90.00	70%	$ 909,846.00	20%	$ 259,956.00	Normal	0%	10%	$ 129,978.00	$ 1,299,780.00		$ -	$ 1,299,780.00		
Malcolm Avenue Walkover - Bridge	Pedestrian Bridge	4	Pedestrian	2,778	$ 20.00	$ 55,560.00	3,400	$ 160.00	70%	$ 380,800.00	20%	$ 108,800.00	Normal	0%	10%	$ 54,400.00	$ 544,000.00		$ -	$ 544,000.00		
Malcolm Avenue Walkover - Approach Ramp	Ped Bridge Ramp	4	Pedestrian		$ 20.00	$ -	3,264	$ 90.00	70%	$ 205,632.00	20%	$ 58,752.00	Normal	0%	10%	$ 29,376.00	$ 293,760.00		$ -	$ 293,760.00		
Merrick Avenue Walkover - Bridge	Pedestrian Bridge	19	Pedestrian	4,383	$ 20.00	$ 87,660.00	5,925	$ 160.00	70%	$ 663,600.00	20%	$ 189,600.00	Normal	0%	10%	$ 94,800.00	$ 948,000.00		$ -	$ 948,000.00		
Merrick Avenue Walkover - Approach Ramp	Ped Bridge Ramp	19	Pedestrian		$ 20.00	$ -	11,322	$ 90.00	70%	$ 713,286.00	20%	$ 203,796.00	Normal	0%	10%	$ 101,898.00	$ 1,018,980.00		$ -	$ 1,018,980.00		
Holden Avenue Walkover - Bridge	Pedestrian Bridge	19	Pedestrian	3,859	$ 20.00	$ 77,180.00	4,990	$ 160.00	70%	$ 558,880.00	20%	$ 159,680.00	Normal	0%	10%	$ 79,840.00	$ 798,400.00		$ -	$ 798,400.00		
Holden Avenue Walkover - Approach Ramp	Ped Bridge Ramp	19	Pedestrian		$ 20.00	$ -	10,761	$ 90.00	70%	$ 677,943.00	20%	$ 193,698.00	Normal	0%	10%	$ 96,849.00	$ 968,490.00		$ -	$ 968,490.00		
Total						$ 460,840.00				$ 11,005,414.00		$ 3,144,404.00				$ 1,612,993.00	$ 15,762,811.00		$ -	$ 15,762,811.00		
Removals Only																						
Saginaw over I-94		A3	Cross Road	7,870	$ 28.00	$ 220,351.00																
Piquette over I-75		1	Cross Road	14,872	$ 28.00	$ 416,424.00																
Harper over I-94		2	Cross Road	6,845	$ 28.00	$ 191,664.00																
Lucky over I-94		2	Cross Road	8,505	$ 28.00	$ 238,143.00																
Ramp over EB E Grand		2	Ramp	8,945	$ 28.00	$ 250,461.00																
McClellan over I-94		5	Cross Road	12,934	$ 28.00	$ 362,145.00																
John R. over I-94		11	Cross Road	10,609	$ 28.00	$ 297,051.00																
Beaubien over I-94		11	Cross Road	10,732	$ 28.00	$ 300,505.00																
3rd Street over I-94		11	Cross Road	30,110	$ 28.00	$ 843,080.00																
Ferry over I-75		12	Cross Road	16,298	$ 28.00	$ 456,355.00															Yes	
Ferry over Ramp		12	Cross Road	7,266	$ 28.00	$ 203,458.00															Yes	
S18 of 82251		12	Ramp	2,997	$ 28.00	$ 83,916.00																
S21 of 82251		12	Ramp	4,644	$ 28.00	$ 130,032.00																
S22 of 82251		12	Ramp	6,270	$ 28.00	$ 175,560.00																
S23 of 82251		12	Ramp	8,903	$ 28.00	$ 249,284.00																
S24 of 82251		12	Ramp	11,780	$ 28.00	$ 329,840.00																
S25 of 82251		12	Ramp	22,388	$ 28.00	$ 626,864.00																
S26 of 82251		12	Ramp	17,550	$ 28.00	$ 491,400.00																
S28 of 82251		12	Ramp	6,820	$ 28.00	$ 190,960.00																
S30 of 82251		12	Ramp	23,983	$ 28.00	$ 671,524.00																
S22 of 82023		19	Ramp	12,381	$ 28.00	$ 346,668.00																
S23 of 82023		19	Ramp	10,037	$ 28.00	$ 281,036.00																
S25 of 82023		19	Ramp	45,360	$ 28.00	$ 1,270,080.00																
S26 of 82023		19	Ramp	49,014	$ 28.00	$ 1,372,392.00																
S28 of 82025		19	Ramp	10,542	$ 28.00	$ 295,176.00																
S29 of 82026		19	Ramp	12,112	$ 28.00	$ 339,136.00																
Brooklyn Ave. Walkover over I-94 (WSU over I-94)		19	Cross Road	4,442	$ 28.00	$ 124,376.00																
Selden Avenue Walkover over M-10		19	Cross Road	1,312	$ 28.00	$ 36,736.00																
Canfield Avenue Walkover over M-10		19	Cross Road	2,040	$ 28.00	$ 57,120.00																
Total						$ 10,851,737.00				$ -		$ -				$ -				$ -		
Total						$ 25,578,549.00				$ 177,996,811.00		$ 50,856,231.00				$ 26,623,334.00	$ 255,476,376.00		$ 2,613,601.00	$ 258,089,977.00		

PROJECT OPINION OF COST SUMMARY

JOB NUMBER 32587

TITLE: I-94 Detailed Engineering Report

Conceptual Base Plans

I-96 to Conner

Length: 6.7 Miles

FILE: 2010-06-07 I-94 Opinion of Cost.xls

Region: Metro

TSC: Detroit

Prepared By: CH2M HILL

Std. Specs for Construction: 2003

Date: Jun-8-10

Time: 4:59:40 PM

Base Cost Year: Dec-09

TITLE: All Rehabiliated Bridges

Worksheet Title: Rehab Bridges

Rehabilitation

Dequindre	Concrete I Beam Rehabilitatio	1	Mainline	148,000	$ 28.00	0.75	$ 3,108,000.00	148,000	$ 140.00	$ 20,720,000.00	180,200	$ 85.00	$ 15,317,000.00	71,800	$ 180.00	$ 12,924,000.00	$ 52,069,000.00	10%	$ 5,206,900.00	$ 57,275,900.00		
Total							$ 3,108,000.00			$ 20,720,000.00			$ 15,317,000.00			$ 12,924,000.00	$ 52,069,000.00		$ 5,206,900.00	$ 57,275,900.00		

PROJECT OPINION OF COST SUMMARY		Region:	Metro
JOB NUMBER:	32587	TSC:	Detroit
TITLE:	I-94 Detailed Engineering Report	Prepared By:	CH2M HILL
Conceptual Base Plans		Std. Specs for Construction:	2003
I-96 to Conner		Date:	Jun-8-10
Length:	6.7 Miles	Time:	4:59:40 PM
FILE:	2010-06-07 I-94 Opinion of Cost.xls	Base Cost Year:	Dec-09

PACKAGE TITLE All Railroad Bridges

Worksheet Title: RR Bridges

CN and Conrail RR Bridge over I-75 (X05 of 82252)

Contract 1

Bridge Reconstruction - 7 Span; Steel deck plate girder spans

Existing Bridge1				Notes	
Total Bridge Length	I-75		Ft	1. Cost includes removal of	Spans 6 & 7
Out to Out Bridge Width	I-75		Ft	2. Contingency increased due to geotechnical uncertainties at project location.	
Bridge Deck Area	I-75	0.0	Sft	3. Mobilization increased from typical 5% to 10% due to project location in urban Detroit.	
Removal Area	Spans 6 & 7	13,826.0	Sft	Costs for utility work, right of way and easements are included under the roadway portion of this project.	
Proposed Bridge					
Total Bridge Length		105.6	Ft		

Description		Unit	Unit Price	Total	Comments
Demolition		per Sft	$ 32.40	$ 447,962	
Proposed Bridge Construction		per foot	$ 47,430.00	$ 5,008,608	Unit price per foot built from detailed analysis
		per foot		$ -	
		per foot		$ -	
Proposed Bridge Construction		per foot	$ 47,430.00	$ 5,456,570	
Proposed Spur Track - bridge construction					
Runaround Costs - track work				$ 800,000	
		per Sft	$ 32.40	$ -	
		per Sft	$ 500.00	$ -	
				$ -	
	% of Bridge and Runaround - Track and Drainage			$ -	
	% of Bridge and Runaround - Track and Drainage			$ -	
			Subtotal:	$ 6,256,570	
Contingency[2]				$ -	Included at the bottom of each contract, therefore value is zero here
Mobilization[3]				$ -	Included at the bottom of each contract, therefore value is zero here
	CN and Conrail RR Bridge over I-75 (X05 of 82252)		Total	$ 6,256,570	and

Conrail Railroad Bridge over I-94 (X02 of 82024)

Contract 6

Bridge Replacement - 4 Span; Steel through plate girder and floor beam spans

Existing Bridge[1]				Notes	
Total Bridge Length	I-94	126.5	Ft	1. Cost includes removal of	None Required
Out to Out Bridge Width	I-94	52.3	Ft	2. Contingency increased due to geotechnical uncertainties at project location.	
Bridge Deck Area	I-94	6,621.0	Sft	3. Mobilization increased from typical 5% to 10% due to project location in urban Detroit.	
Removal Area			Sft	Costs for utility work, right of way and easements are included under the roadway portion of this project.	
Proposed Bridge					
Total Bridge Length		351.4	Ft		

Description		Unit	Unit Price	Total	Comments
Demolition		per Sft	$ 32.40	$ 214,520	
Proposed Bridge Construction - Superstructure		per foot	$ 9,461.01	$ 3,324,599	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction - Substructure		per foot	$ 4,581.96	$ 1,610,101	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction - Foundation		per foot	$ 2,341.78	$ 822,901	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction		per foot	$ 16,384.75	$ 5,972,121	
Proposed Spur Track - bridge construction					
Runaround Costs - Track and Drainage				$ 1,565,000	From detailed cost est., less contingency, engineering, CM and permits
Runaround Costs - Removal of Bridges	2,520.0	per Sft	$ 32.40	$ 81,648	Existing bridge 126' x 20'
Runaround Costs - Bridges		per Sft	$ 400.00	$ 1,008,000	
Stage Construction				$ -	
Maintenance of Traffic	% of Bridge and Runaround - Track and Drainage			$ -	
Aesthetics	% of Bridge and Runaround - Track and Drainage			$ -	
			Subtotal:	$ 8,626,769	
Contingency[2]				$ -	Included at the bottom of each contract, therefore value is zero here
Mobilization[3]				$ -	Included at the bottom of each contract, therefore value is zero here
	Conrail Railroad Bridge over I-94 (X02 of 82024)		Total	$ 8,626,769	

PROJECT OPINION OF COST SUMMARY		Region:	Metro
JOB NUMBER:	32587	TSC:	Detroit
TITLE:	I-94 Detailed Engineering Report	Prepared By:	CH2M HILL
Conceptual Base Plans		Std. Specs for Construction:	2003
I-96 to Conner		Date:	Jun-8-10
Length:	6.7 Miles	Time:	4:59:40 PM
FILE:	2010-06-07 I-94 Opinion of Cost.xls	Base Cost Year:	Dec-09

PACKAGE TITLE **All Railroad Bridges**

Worksheet Title: RR Bridges

Conrail Railroad Bridge over I-94 (X01 of 82025)

Contract 6

Bridge Replacement - 4 Span; Steel through plate girder and floor beam spans

Existing Bridge[1]				Notes	
Total Bridge Length	I-94	133.5	Ft	1. Cost includes removal of	Spur
Out to Out Bridge Width	I-94	35.5	Ft	2. Contingency increased due to geotechnical uncertainties at project location.	
Bridge Deck Area	I-94	4,740.0	Sft	3. Mobilization increased from typical 5% to 10% due to project location in urban Detroit.	
Removal Area	Spur	2,625.6	Sft	Costs for utility work, right of way and easements are included under the roadway portion of this project.	
Proposed Bridge				Costs include removal and replacement of existing sub base slabs.	
Total Bridge Length		352.4	Ft		

Description			Unit	Unit Price	Total	Comments
Demolition			per Sft	$ 32.40	$ 238,645	
Proposed Bridge Construction - Superstructure			per foot	$ 9,434.17	$ 3,324,602	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction - Substructure			per foot	$ 6,413.45	$ 2,260,100	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction - Foundation			per foot	$ 2,335.13	$ 822,900	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction			per foot	$ 18,182.75	$ 6,646,247	
Proposed Spur Track - bridge construction					$ 6,240,300	
Runaround Costs - Track and Drainage					$ 599,000	From detailed cost est., less contingency, engineering, CM and permits
Runaround Costs - Removal of Bridges		2,800.0	per Sft	$ 32.40	$ 90,720	Existing bridge 133' x 21'
Runaround Costs - Bridges			per Sft	$ 400.00	$ 1,120,000	
Stage Construction					$ -	
Maintenance of Traffic	% of Bridge and Runaround - Track and Drainage				$ -	
Aesthetics	% of Bridge and Runaround - Track and Drainage				$ -	
				Subtotal:	$ 14,696,267	
Contingency[2]					$ -	Included at the bottom of each contract, therefore value is zero here
Mobilization[3]					$ -	Included at the bottom of each contract, therefore value is zero here
	Conrail Railroad Bridge over I-94 (X01 of 82025)			Total	$ 14,696,267	

Conrail Railroad Bridge over I-75 (X03 of 82252)

Contract 1

Bridge Removal

Existing Bridge[1]				Notes	
Total Bridge Length	I-75	219.2	Ft	1. Cost includes removal of	None Required
Out to Out Bridge Width	I-75	74.4	Ft	2. Contingency increased due to geotechnical uncertainties at project location.	
Bridge Deck Area	I-75	16,316.0	Sft	3. Mobilization increased from typical 5% to 10% due to project location in urban Detroit.	
Removal Area			Sft	Costs for utility work, right of way and easements are included under the roadway portion of this project.	
Proposed Bridge					
Total Bridge Length		352.4	Ft		

Description			Unit	Unit Price	Total	Comments
Demolition			per Sft	$ 32.40	$ 528,638	
Proposed Bridge Construction - Superstructure			per foot		$ -	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction - Substructure			per foot		$ -	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction - Foundation			per foot		$ -	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction			per foot	$ -	$ 528,638	
Proposed Spur Track - bridge construction						
Runaround Costs - Track and Drainage					$ -	
Runaround Costs - Removal of Bridges			per Sft	$ 32.40	$ -	
Runaround Costs - Bridges			per Sft	$ 500.00	$ -	
Stage Construction					$ -	
Maintenance of Traffic	% of Bridge and Runaround - Track and Drainage				$ -	
Aesthetics	% of Bridge and Runaround - Track and Drainage				$ -	
				Subtotal:	$ 528,638	
Contingency[2]					$ -	Included at the bottom of each contract, therefore value is zero here
Mobilization[3]					$ -	Included at the bottom of each contract, therefore value is zero here
	Conrail Railroad Bridge over I-75 (X03 of 82252)			Total	$ 528,638	

PROJECT OPINION OF COST SUMMARY		Region:	Metro
JOB NUMBER:	32587	TSC:	Detroit
TITLE:	I-94 Detailed Engineering Report	Prepared By:	CH2M HILL
Conceptual Base Plans		Std. Specs for Construction:	2003
I-96 to Conner		Date:	Jun-8-10
Length:	6.7 Miles	Time:	4:59:40 PM
FILE:	2010-06-07 I-94 Opinion of Cost.xls	Base Cost Year:	Dec-09

PACKAGE TITLE **All Railroad Bridges**

Worksheet Title: RR Bridges

NS Railroad Bridge over I-75 (X04 of 82252)

Contract 1

Bridge Removal

Existing Bridge[1]				Notes	
Total Bridge Length	I-75	219.2	Ft	1. Cost includes removal of	None Required
Out to Out Bridge Width	I-75	35.3	Ft	2. Contingency increased due to geotechnical uncertainties at project location.	
Bridge Deck Area	I-75	7,744.0	Sft	3. Mobilization increased from typical 5% to 10% due to project location in urban Detroit.	
Removal Area			Sft	Costs for utility work, right of way and easements are included under the roadway portion of this project.	
Proposed Bridge					
Total Bridge Length		352.4	Ft		

Description		Unit	Unit Price	Total	Comments
Demolition		per Sft	$ 32.40	$ 250,906	
Proposed Bridge Construction - Superstructure		per foot		$ -	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction - Substructure		per foot		$ -	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction - Foundation		per foot		$ -	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction		per foot	$ -	$ 250,906	
Proposed Spur Track - bridge construction					
Runaround Costs - Track and Drainage				$ -	
Runaround Costs - Removal of Bridges		per Sft	$ 32.40	$ -	
Runaround Costs - Bridges		per Sft	$ 400.00	$ -	
Stage Construction				$ -	
Maintenance of Traffic	% of Bridge and Runaround - Track and Drainage			$ -	
Aesthetics	% of Bridge and Runaround - Track and Drainage			$ -	
			Subtotal:	$ 250,906	
Contingency[2]				$ -	Included at the bottom of each contract, therefore value is zero here
Mobilization[3]				$ -	Included at the bottom of each contract, therefore value is zero here
	NS Railroad Bridge over I-75 (X04 of 82252)		Total	$ 250,906	

CN Railroad Bridge over I-94 (X02-8 of 82023)

Contract 17

Bridge Replacement - 4 Span; Steel through plate girder and floor beam and truss spans

Existing Bridge[1]				Notes	
Total Bridge Length	I-94	183.5	Ft	1. Cost includes removal of	Kirby
Out to Out Bridge Width	I-94	35.0	Ft	2. Contingency increased due to geotechnical uncertainties at project location.	
Bridge Deck Area	I-94	6,423.0	Sft	3. Mobilization increased from typical 5% to 10% due to project location in urban Detroit.	
Removal Area	Kirby	3,906.0	Sft	Costs for utility work, right of way and easements are included under the roadway portion of this project.	
Proposed Bridge				Costs include removal and replacement of existing sub base slabs.	
Total Bridge Length		468.5	Ft	Costs for runarounds are included on separate estimate.	

Description		Unit	Unit Price	Total	Comments
Demolition		per Sft	$ 32.40	$ 334,660	
Proposed Bridge Construction - Superstructure		per foot	$ 23,006.40	$ 10,778,500	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction - Substructure		per foot	$ 8,291.14	$ 3,884,400	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction - Foundation		per foot	$ 3,289.22	$ 1,541,000	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction		per foot	$ 34,586.77	$ 16,538,560	
Proposed Spur Track - bridge construction					
Runaround Costs - Track and Drainage				$ -	
Runaround Costs - Removal of Bridges		per Sft	$ 32.40	$ -	
Runaround Costs - Bridges		per Sft	$ 400.00	$ -	
Stage Construction				$ -	
Maintenance of Traffic	% of Bridge and Runaround - Track and Drainage			$ -	
Aesthetics	% of Bridge and Runaround - Track and Drainage			$ -	
			Subtotal:	$ 16,538,560	
Contingency[2]				$ -	Included at the bottom of each contract, therefore value is zero here
Mobilization[3]				$ -	Included at the bottom of each contract, therefore value is zero here
	CN Railroad Bridge over I-94 (X02-8 of 82023)		Total	$ 16,538,560	

PROJECT OPINION OF COST SUMMARY		Region:	Metro
JOB NUMBER:	32587	TSC:	Detroit
TITLE:	I-94 Detailed Engineering Report	Prepared By:	CH2M HILL
Conceptual Base Plans		Std. Specs for Construction:	2003
I-96 to Conner		Date:	Jun-8-10
Length:	6.7 Miles	Time:	4:59:40 PM
FILE:	2010-06-07 I-94 Opinion of Cost.xls	Base Cost Year:	Dec-09

PACKAGE TITLE **All Railroad Bridges**

Worksheet Title: RR Bridges

Conrail Railroad Bridge over I-94 (X02 of 82023)

Contract 17

Bridge Replacement - 4 Span; Steel through plate girder and floor beam and truss spans

Existing Bridge[1]				Notes	
Total Bridge Length	I-94	182.2	Ft	1. Cost includes removal of	Kirby and Wabash
Out to Out Bridge Width	I-94	62.0	Ft	2. Contingency increased due to geotechnical uncertainties at project location.	
Bridge Deck Area	I-94	11,297.0	Sft	3. Mobilization increased from typical 5% to 10% due to project location in urban Detroit.	
Removal Area	Kirby and Wabash	10,450.0	Sft	Costs for utility work, right of way and easements are included under the roadway portion of this project.	
Proposed Bridge				Costs include removal and replacement of existing sub base slabs.	
Total Bridge Length		468.5	Ft	Costs for runarounds are included on separate estimate.	

Description		Unit	Unit Price	Total	Comments
Demolition		per Sft	$ 32.40	$ 704,603	
Proposed Bridge Construction - Superstructure		per foot	$ 23,006.40	$ 10,778,498	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction - Substructure		per foot	$ 8,291.14	$ 3,884,399	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction - Foundation		per foot	$ 3,289.22	$ 1,541,000	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction		per foot	$ 34,586.76	$ 16,908,500	
Proposed Spur Track - bridge construction					
Runaround Costs - Track and Drainage				$ -	
Runaround Costs - Removal of Bridges		per Sft	$ 32.40	$ -	
Runaround Costs - Bridges		per Sft	$ 500.00	$ -	
Stage Construction				$ -	
Maintenance of Traffic	% of Bridge and Runaround - Track and Drainage			$ -	
Aesthetics	% of Bridge and Runaround - Track and Drainage			$ -	
			Subtotal:	$ 16,908,500	
Contingency[2]				$ -	Included at the bottom of each contract, therefore value is zero here
Mobilization[3]				$ -	Included at the bottom of each contract, therefore value is zero here
	Conrail Railroad Bridge over I-94 (X02 of 82023)		Total	$ 16,908,500	

CN Railroad Bridge over M-10 (X01-8 of 82112)

Contract 17

Bridge Replacement - 4 Span; Steel through plate girder and floor beam spans

Existing Bridge[1]				Notes	
Total Bridge Length	M-10	140.1	Ft	1. Cost includes removal of	Hamilton
Out to Out Bridge Width	M-10	35.0	Ft	2. Contingency increased due to geotechnical uncertainties at project location.	
Bridge Deck Area	M-10	4,904.0	Sft	3. Mobilization increased from typical 5% to 10% due to project location in urban Detroit.	
Removal Area	Hamilton	2,720.0	Sft	Costs for utility work, right of way and easements are included under the roadway portion of this project.	
Proposed Bridge				Costs for runarounds are included on separate estimate.	
Total Bridge Length		397.8	Ft		

Description		Unit	Unit Price	Total	Comments
Demolition		per Sft	$ 32.40	$ 247,018	
Proposed Bridge Construction - Superstructure		per foot	$ 27,564.48	$ 10,965,701	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction - Substructure		per foot	$ 5,133.98	$ 2,042,400	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction - Foundation		per foot	$ 3,834.90	$ 1,525,600	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction		per foot	$ 36,533.36	$ 14,780,719	
Proposed Spur Track - bridge construction					
Runaround Costs - Track and Drainage				$ -	
Runaround Costs - Removal of Bridges		per Sft	$ 32.40	$ -	
Runaround Costs - Bridges		per Sft	$ 400.00	$ -	
Stage Construction				$ -	
Maintenance of Traffic	% of Bridge and Runaround - Track and Drainage			$ -	
Aesthetics	% of Bridge and Runaround - Track and Drainage			$ -	
			Subtotal:	$ 14,780,719	
Contingency[2]				$ -	Included at the bottom of each contract, therefore value is zero here
Mobilization[3]				$ -	Included at the bottom of each contract, therefore value is zero here
	CN Railroad Bridge over M-10 (X01-8 of 82112)		Total	$ 14,780,719	

PROJECT OPINION OF COST SUMMARY		Region:	Metro
JOB NUMBER:	32587	TSC:	Detroit
TITLE:	I-94 Detailed Engineering Report	Prepared By:	CH2M HILL
Conceptual Base Plans		Std. Specs for Construction:	2003
I-96 to Conner		Date:	Jun-8-10
Length:	6.7 Miles	Time:	4:59:40 PM
FILE:	2010-06-07 I-94 Opinion of Cost.xls	Base Cost Year:	Dec-09

PACKAGE TITLE **All Railroad Bridges**

Worksheet Title: RR Bridges

Conrail Railroad Bridge over M-10 (X01 of 82112)

Contract 17

Bridge Replacement - 4 Span; Steel through plate girder and floor beam spans

Existing Bridge[1]				Notes	
Total Bridge Length	M-10	143.5	Ft	1. Cost includes removal of	Hamilton
Out to Out Bridge Width	M-10	50.8	Ft	2. Contingency increased due to geotechnical uncertainties at project location.	
Bridge Deck Area	M-10	7,283.0	Sft	3. Mobilization increased from typical 5% to 10% due to project location in urban Detroit.	
Removal Area	Hamilton	3,995.0	Sft	Costs for utility work, right of way and easements are included under the roadway portion of this project.	
Proposed Bridge				Costs for runarounds are included on separate estimate.	
Total Bridge Length		399.8	Ft		

Description		Unit	Unit Price	Total	Comments
Demolition		per Sft	$ 32.40	$ 365,407	
Proposed Bridge Construction - Superstructure		per foot	$ 27,426.59	$ 10,965,699	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction - Substructure		per foot	$ 5,108.30	$ 2,042,401	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction - Foundation		per foot	$ 3,815.72	$ 1,525,601	Unit price per foot built from bid items and detailed quantity takeoff
Proposed Bridge Construction		per foot	$ 36,350.61	$ 14,899,108	
Proposed Spur Track - bridge construction					
Runaround Costs - Track and Drainage				$ -	
Runaround Costs - Removal of Bridges		per Sft	$ 32.40	$ -	
Runaround Costs - Bridges		per Sft	$ 400.00	$ -	
Stage Construction				$ -	
Maintenance of Traffic	% of Bridge and Runaround - Track and Drainage			$ -	
Aesthetics	% of Bridge and Runaround - Track and Drainage			$ -	
			Subtotal:	$ 14,899,108	
Contingency[2]				$ -	Included at the bottom of each contract, therefore value is zero here
Mobilization[3]				$ -	Included at the bottom of each contract, therefore value is zero here
	Conrail Railroad Bridge over M-10 (X01 of 82112)		Total	$ 14,899,108	

Runaround

Contract 17

For X02-8 of 82023, X02 of 82023, X01-8 of 82112 and X01 of 82112

Existing Bridge[1]				Notes	
Total Bridge Length			Ft	1. Cost includes removal of	None Required
Out to Out Bridge Width			Ft		
Bridge Deck Area		0.0	Sft		
Removal Area			Sft		
Proposed Bridge					
Total Bridge Length			Ft		

Description		Unit	Unit Price	Total	Comments
Demolition		per Sft	$ 32.40	$ -	
Proposed Bridge Construction - Superstructure		per foot		$ -	
Proposed Bridge Construction - Substructure		per foot		$ -	
Proposed Bridge Construction - Foundation		per foot		$ -	
Proposed Bridge Construction		per foot	$ -	$ -	
Proposed Spur Track - bridge construction					
Runaround Costs - Track and Drainage				$ 6,943,000	From detailed cost est., less contingency, engineering, CM and permits
Runaround Costs - Removal of Bridges		per Sft		$ 1,839,809	See Backup calculations.
Runaround Costs - Bridges		per Sft		$ 19,954,560	See Backup calculations.
Stage Construction				$ -	
Maintenance of Traffic	% of Bridge and Runaround - Track and Drainage			$ -	
Aesthetics	% of Bridge and Runaround - Track and Drainage			$ -	
			Subtotal:	$ 28,737,369	
Contingency[2]				$ -	Included at the bottom of each contract, therefore value is zero here
Mobilization[3]				$ -	Included at the bottom of each contract, therefore value is zero here
	Runaround		Total	$ 28,737,369	
		Total		$ 122,223,406	

PROJECT OPINION OF COST SUMMARY		Region:	Metro
JOB NUMBER:	32587	TSC:	Detroit
TITLE:	I-94 Detailed Engineering Report	Prepared By:	CH2M HILL
Conceptual Base Plans		Std. Specs for Construction:	2003
I-96 to Conner		Date:	Jun-8-10
Length:	6.7 Miles	Time:	4:59:40 PM
FILE:	2010-06-07 I-94 Opinion of Cost.xls	Base Cost Year:	Dec-09

PACKAGE TITLE **All Railroad Bridges**

Worksheet Title: RR Bridges

Runarounds for X02-8 of 82023, X02 of 82023, X01-8 of 82112 and X01 of 82112 Backup Calculations

	Removal or Existing					Construction for Temporary Condition						
Street	Remove Remove Bridge(s)	Area (Sft)	Bridge Removal Cost (Sft)	Remove Ramp	Ramp/Ret Wall Removal Cost (Location)	Temporary Bridge	Area (Sft)	New Bridge Cost	Temporary Bridge Cost (Sft)	Removal of Temporary Condition	Ramp/Ret Wall Reconstruction Cost (Location)	Comments
			$ 32.40		$ 20,000				$ 400.00		$ 100,000	
15th	No	0	$ -		$ -	No	0		$ -	$ -	$ -	
14th	Yes	4,765	$ 154,386	Yes	$ 20,000	Yes	8,996		$ 3,598,400	$ 291,470	$ 100,000	
Wabash	No	0	$ -		$ -	Yes	5,148		$ 2,059,200	$ 166,795	$ -	
Kirby	No	0	$ -		$ -	No	0		$ -	$ -	$ -	
I-94	No	0	$ -		$ -	Yes	5,676	$ 16,538,560	$ 2,270,400	$ 183,902	$ -	
12th (Rosa Parks)	Yes	2,994	$ 97,006		$ -	Yes	3,078		$ 1,231,200	$ -	$ -	No removal required. Conrail bridge reconstructed for runaround.
Commonwealth	Yes	818	$ 26,503	Yes	$ 20,000	Yes	4,496		$ 1,798,400	$ 145,670	$ 100,000	
Trumbull	Yes	3,889	$ 126,004		$ -	Yes	4,028		$ 1,611,200	$ -	$ -	No removal required. Conrail bridge reconstructed for runaround.
Lincoln	No	0	$ -	Yes	$ 20,000	Yes	4,010		$ 1,604,000	$ 129,924	$ 100,000	
Holden	Yes	2,383	$ 77,209		$ -	Yes	3,147		$ 1,258,800	$ -	$ -	No removal required. Conrail bridge reconstructed for runaround.
Hamilton	No	0	$ -		$ -	Yes	2,694		$ 1,077,440	$ 87,273	$ -	
M-10	No	0	$ -		$ -	Yes	4,714	$ 14,780,719	$ 1,885,520	$ 152,727	$ -	
3rd	Yes	1,200	$ 38,880		$ -	Yes	3,150		$ 1,260,000	$ 102,060	$ -	
			$ 519,988		$ 60,000			$ 31,319,279	$ 19,654,560	$ 1,259,821	$ 300,000	

Removals	
Bridge Removal Cost (Sft)	$ 519,988
Ramp / Retaining Wall Removal Cost (Location)	$ 60,000
Removal of Temporary Condition	$ 1,259,821
Total	$ 1,839,809

Construction	
Temp. Bridge Cost (Sft)	$ 19,654,560
Ramp/Retaining Wall Reconstruction Cost (Location)	$ 300,000
Total	$ 19,954,560

$ - Included in temp structure over freeway

PROJECT OPINION OF COST SUMMARY

JOB NUMBEf 32587

TITLE: I-94 Detailed Engineering Report

Conceptual Base Plans

I-96 to Conner

Length: 6.7 Miles

FILE: 2010-06-07 I-94 Opinion of Cost.xls

Region: Metro
TSC: Detroit
Prepared By: CH2M HILL
Std. Specs for Construction: 2003
Date: Jun-8-10
Time: 4:59:40 PM
Base Cost Year: Dec-09

TITLE: New Retaining Walls

Worksheet Title: Walls

Location	Type	Contract Package	Removal Cost: Removals: Length	Removals: Average Height	Removals: Unit Price	Removals: Total Cost	New Construction Cost: Short (0-10 ft): Length	Short: Average Height	Short: Unit Price	Short: Cost	Medium (10-20 ft): Length	Medium: Average Height	Medium: Unit Price	Medium: Cost	Tall (20+ ft): Length	Tall: Average Height	Tall: Unit Price	Tall: Cost	Foundation: Foundation Adjustment: Condition	Foundation: Foundation Adjustment: % Increase	Foundation: Cost	Total Cost	Utility Risk	Other Risk
Existing Remaining Wall Removal																								
Saginaw - SW Quadrant		2	115	6	$ 12.00	$ 7,590.00																		
Saginaw - SE Quadrant		2	115	6	$ 12.00	$ 7,590.00																		
Harper - SW Quadrant		2	320	10	$ 12.00	$ 38,400.00																		
Harper - SE Quadrant		2	340	18	$ 12.00	$ 71,400.00																		
Harper - NE Quadrant		2	260	20	$ 12.00	$ 62,400.00																		
Railroad - NE Quadrant		2	320	10	$ 12.00	$ 38,400.00																		
Railroad - SE Quadrant		2	600	12	$ 12.00	$ 82,800.00																		
75 South to 94 East		12	400	8	$ 12.00	$ 36,000.00																		
94 East to 75 North		12	290	9	$ 12.00	$ 31,320.00																		
75 North to 94 West		12	450	12	$ 12.00	$ 62,100.00																		
94 West to 75 South - 1		12	275	5	$ 12.00	$ 16,500.00																		
94 West to 75 South - 2		12	440	12	$ 12.00	$ 60,720.00																		
Woodward Ave - NW Quadrant		13	270	8	$ 12.00	$ 24,300.00																		
X02-8 Of 82023 (Conrail SW Quad)		17	155	10	$ 12.00	$ 18,600.00																		
X02 Of 82023 (CN SE Quad)		17	190	10	$ 12.00	$ 22,800.00																		
Ramp H (EB I-96 Ramp to EB I-94_Left)		18	325	9	$ 12.00	$ 35,100.00																		
Ramp H (EB I-96 Ramp to EB I-94_Right)		18	150	10	$ 12.00	$ 18,000.00																		
Rosa Parks SE Quad		18	185	16	$ 12.00	$ 35,520.00																		
Rosa Parks NE Quad		18	180	17	$ 12.00	$ 36,720.00																		
NB M-10 North of Selden		19	425	12	$ 12.00	$ 61,200.00																		
M-10 Interchange SE Quad		19	350	10	$ 12.00	$ 42,000.00																		
M-10 Interchange NE Quad		19	430	16	$ 12.00	$ 82,560.00																		
West Grand Blvd Ramp A - Left		19	605	17	$ 12.00	$ 123,420.00																		
West Grand Blvd Ramp A - Right		19	250	16	$ 12.00	$ 48,000.00																		
					$ 12.00	$ -																		
Total						$ 1,063,440.00				$ -				$ -				$ -			$ -	$ -		
Proposed Retaining Walls - Cut																								
R-116	Cut	A4			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	598	24	$ 170.00	$ 2,439,840.00	Very Poor	12%	$ 292,781.00	$ 2,732,621.00		
R-133	Cut	A4			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	591	22	$ 170.00	$ 2,160,105.00	Very Poor	12%	$ 259,213.00	$ 2,419,318.00		
R-321	Cut	2			$ 12.00	$ -	190	5	$ 140.00	$ 133,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 133,000.00		
R-322 Sta 670+75 to 675+35	Cut	2			$ 12.00	$ -	460	6	$ 140.00	$ 386,400.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 386,400.00		
R-322 Sta 675+35 to 675+72	Cut	2			$ 12.00	$ -			$ 140.00	$ -	37	15	$ 160.00	$ 88,800.00			$ 170.00	$ -	Poor	9%	$ 7,992.00	$ 96,792.00		
R-322 Sta 675+72 to 676+00	Cut	2			$ 12.00	$ -			$ 140.00	$ -	28	20	$ 160.00	$ 89,600.00			$ 170.00	$ -	Poor	9%	$ 8,064.00	$ 97,664.00		
R-323 Sta 677+75 to 678+17	Cut	2			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	42	21	$ 170.00	$ 146,370.00	Very Poor	12%	$ 17,564.00	$ 163,934.00		
R-323 Sta 678+17 to 680+15	Cut	2			$ 12.00	$ -			$ 140.00	$ -	198	15	$ 160.00	$ 475,200.00			$ 170.00	$ -	Poor	9%	$ 42,768.00	$ 517,968.00		
R-323 Sta 680+15 to 683+25	Cut	2			$ 12.00	$ -	265	6	$ 140.00	$ 222,440.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 222,440.00		
R-324 Sta 690+00 to 691+32	Cut	2			$ 12.00	$ -	132	7	$ 140.00	$ 129,360.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 129,360.00		
R-324 Sta 691+32 to 695+40	Cut	2			$ 12.00	$ -			$ 140.00	$ -	408	15	$ 160.00	$ 979,200.00			$ 170.00	$ -	Poor	9%	$ 88,128.00	$ 1,067,328.00		
R-325 Sta 696+00 to 697+00	Cut	2			$ 12.00	$ -			$ 140.00	$ -	100	19	$ 160.00	$ 296,000.00			$ 170.00	$ -	Poor	9%	$ 26,640.00	$ 322,640.00		
R-325 Sta 697+00 to 701+60	Cut	2			$ 12.00	$ -			$ 140.00	$ -	460	16	$ 160.00	$ 1,177,600.00			$ 170.00	$ -	Poor	9%	$ 105,984.00	$ 1,283,584.00		
R-301 Sta 667+50 to 670+00	Cut	2			$ 12.00	$ -	250	4	$ 140.00	$ 140,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 140,000.00		
R-301 Sta 670+00 to 674+00	Cut	2			$ 12.00	$ -			$ 140.00	$ -	400	15	$ 160.00	$ 960,000.00			$ 170.00	$ -	Poor	9%	$ 86,400.00	$ 1,046,400.00		
R-301 Sta 674+00 to 675+75	Cut	2			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	175	21	$ 170.00	$ 624,750.00	Very Poor	12%	$ 74,970.00	$ 699,720.00		
R-303 Sta 695+75 to 700+00	Cut	2			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	425	21	$ 170.00	$ 1,517,250.00	Very Poor	12%	$ 182,070.00	$ 1,699,320.00		
R-303 Sta 700+00 to 701+25	Cut	2			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	125	20	$ 170.00	$ 425,000.00	Very Poor	12%	$ 51,000.00	$ 476,000.00		
R-304	Cut	2			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	525	20	$ 170.00	$ 1,785,000.00	Very Poor	12%	$ 214,200.00	$ 1,999,200.00		
R-347 Sta 5679+00 to 5680+50	Cut	2			$ 12.00	$ -	150	7	$ 140.00	$ 136,500.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 136,500.00		
R-347 Sta 5680+50 to 5683+50	Cut	2			$ 12.00	$ -			$ 140.00	$ -	300	15	$ 160.00	$ 720,000.00			$ 170.00	$ -	Poor	9%	$ 64,800.00	$ 784,800.00		
R-347 Sta 5683+50 to 5688+00	Cut	2			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	450	23	$ 170.00	$ 1,721,250.00	Very Poor	12%	$ 206,550.00	$ 1,927,800.00		
R-348 Sta 5688+40 to 5689+00	Cut	2			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	60	21	$ 170.00	$ 214,200.00	Very Poor	12%	$ 25,704.00	$ 239,904.00		
R-348 Sta 5689+00 to 5690+75	Cut	2			$ 12.00	$ -			$ 140.00	$ -	175	15	$ 160.00	$ 420,000.00			$ 170.00	$ -	Poor	9%	$ 37,800.00	$ 457,800.00		
R-348 Sta 5690+75 to 5691+75	Cut	2			$ 12.00	$ -	100	7	$ 140.00	$ 91,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 91,000.00		
R-342 Sta 5685+00 to 5685+50	Cut	2			$ 12.00	$ -	50	9	$ 140.00	$ 63,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 63,000.00		
R-342 Sta 5685+50 to 5687+50	Cut	2			$ 12.00	$ -			$ 140.00	$ -	200	15	$ 160.00	$ 480,000.00			$ 170.00	$ -	Poor	9%	$ 43,200.00	$ 523,200.00		
R-342 Sta 5687+50 to 5689+25	Cut	2			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	175	23	$ 170.00	$ 669,375.00	Very Poor	12%	$ 80,325.00	$ 749,700.00		
R-343 Sta 5689+75 to 5691+25	Cut	2			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	150	22	$ 170.00	$ 561,000.00	Very Poor	12%	$ 67,320.00	$ 628,320.00		
R-343 Sta 5691+25 to 5693+25	Cut	2			$ 12.00	$ -			$ 140.00	$ -	200	15	$ 160.00	$ 480,000.00			$ 170.00	$ -	Poor	9%	$ 43,200.00	$ 523,200.00		
R-343 Sta 5693+25 to 5695+00	Cut	2			$ 12.00	$ -	175	6	$ 140.00	$ 147,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 147,000.00		
R-221	Cut	2			$ 12.00	$ -			$ 140.00	$ -	148	16	$ 160.00	$ 378,880.00			$ 170.00	$ -	Poor	9%	$ 34,099.00	$ 412,979.00		
R-222 Sta 645+00 to 647+75	Cut	2			$ 12.00	$ -	275	6	$ 140.00	$ 231,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 231,000.00		
R-222 Sta 647+75 to 652+00	Cut	2			$ 12.00	$ -			$ 140.00	$ -	425	15	$ 160.00	$ 1,020,000.00			$ 170.00	$ -	Poor	9%	$ 91,800.00	$ 1,111,800.00		
R-223 Sta 653+25 to 653+75	Cut	2			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	50	21	$ 170.00	$ 178,500.00	Very Poor	12%	$ 21,420.00	$ 199,920.00		
R-223 Sta 653+75 to 654+50	Cut	2			$ 12.00	$ -			$ 140.00	$ -	75	15	$ 160.00	$ 180,000.00			$ 170.00	$ -	Poor	9%	$ 16,200.00	$ 196,200.00		
R-223 Sta 654+50 to 655+70	Cut	2			$ 12.00	$ -	120	6	$ 140.00	$ 100,800.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 100,800.00		
R-208 Sta 635+75 to 636+75	Cut	2			$ 12.00	$ -	100	6	$ 140.00	$ 84,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 84,000.00		
R-208 Sta 636+75 to 638+25	Cut	2			$ 12.00	$ -			$ 140.00	$ -	150	15	$ 160.00	$ 348,000.00			$ 170.00	$ -	Poor	9%	$ 31,320.00	$ 379,320.00		
R-209 Sta 639+00 to 639+50	Cut	2			$ 12.00	$ -			$ 140.00	$ -	50	14	$ 160.00	$ 112,000.00			$ 170.00	$ -	Normal	0%	$ -	$ 112,000.00		
R-209 Sta 639+50 to 639+75	Cut	2			$ 12.00	$ -	25	7	$ 140.00	$ 22,750.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 22,750.00		
R-209 Sta 639+75 to 643+50	Cut	2			$ 12.00	$ -	375	4	$ 140.00	$ 210,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 210,000.00		
R-210 Sta 642+25 to 652+00	Cut	2			$ 12.00	$ -	975	6	$ 140.00	$ 819,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 819,000.00		
R-210 Sta 652+00 to 652+57	Cut	2			$ 12.00	$ -			$ 140.00	$ -	57	14	$ 160.00	$ 127,680.00			$ 170.00	$ -	Normal	0%	$ -	$ 127,680.00		
R-211 Sta 653+75 to 654+25	Cut	2			$ 12.00	$ -			$ 140.00	$ -	50	15	$ 160.00	$ 120,000.00			$ 170.00	$ -	Poor	9%	$ 10,800.00	$ 130,800.00		
R-211 Sta 654+25 to 657+00	Cut	2			$ 12.00	$ -	275	8	$ 140.00	$ 288,750.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 288,750.00		
R-336 Sta 783+50 to 785+00	Cut	5			$ 12.00	$ -	190	7	$ 140.00	$ 172,900.00			$ 160.00	$ -			$ 170.00	$ -	Very Poor	12%	$ 20,748.00	$ 193,648.00		

PROJECT OPINION OF COST SUMMARY
JOB NUMBEf 32587
TITLE: I-94 Detailed Engineering Report
Conceptual Base Plans
I-96 to Conner
Length: 6.7 Miles
FILE: 2010-06-07 I-94 Opinion of Cost.xls

Region: Metro
TSC: Detroit
Prepared By: CH2M HILL
Std. Specs for Construction: 2003
Date: Jun-8-10
Time: 4:59:40 PM
Base Cost Year: Dec-09

TITLE: **New Retaining Walls**
Worksheet Title: Walls

R-336 Sta 785+00 to 786+50	Cut	5			$ 12.00	$ -			$ 140.00	$ -	150	14	$ 160.00	$ 324,000.00			$ 170.00	$ -	Very Poor	12%	$ 38,880.00	$ 362,880.00		
R-336 Sta 786+50 to 792+50	Cut	5			$ 12.00	$ -	600	8	$ 140.00	$ 672,000.00			$ 160.00	$ -			$ 170.00	$ -	Very Poor	12%	$ 80,640.00	$ 752,640.00		
R-336 Sta 792+50 to 793+75	Cut	5			$ 12.00	$ -			$ 140.00	$ -	125	15	$ 160.00	$ 300,000.00			$ 170.00	$ -	Very Poor	12%	$ 36,000.00	$ 336,000.00		
R-312 Sta 750+90 to 753+00	Cut	5			$ 12.00	$ -			$ 140.00	$ -	210	12	$ 160.00	$ 386,400.00			$ 170.00	$ -	Normal	0%	$ -	$ 386,400.00		
R-312 Sta 753+00 to 755+25	Cut	5			$ 12.00	$ -	225	7	$ 140.00	$ 204,750.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 204,750.00		
R-315 Sta 769+50 to 771+50	Cut	5			$ 12.00	$ -	200	7	$ 140.00	$ 182,000.00			$ 160.00	$ -			$ 170.00	$ -	Very Poor	12%	$ 21,840.00	$ 203,840.00		
R-315 Sta 771+50 to 774+25	Cut	5			$ 12.00	$ -			$ 140.00	$ -	275	15	$ 160.00	$ 660,000.00			$ 170.00	$ -	Very Poor	12%	$ 79,200.00	$ 739,200.00		
R-316 Sta 775+00 to 786+50	Cut	5			$ 12.00	$ -			$ 140.00	$ -	1,150	14	$ 160.00	$ 2,576,000.00			$ 170.00	$ -	Very Poor	12%	$ 309,120.00	$ 2,885,120.00		
R-316 Sta 786+50 to 793+75	Cut	5			$ 12.00	$ -	725	9	$ 140.00	$ 913,500.00			$ 160.00	$ -			$ 170.00	$ -	Very Poor	12%	$ 109,620.00	$ 1,023,120.00		
R-316 Sta 793+75 to 794+50	Cut	5			$ 12.00	$ -			$ 140.00	$ -	75	14	$ 160.00	$ 168,000.00			$ 170.00	$ -	Very Poor	12%	$ 20,160.00	$ 188,160.00		
R-305 Sta 707+00 to 715+00	Cut	7			$ 12.00	$ -			$ 140.00	$ -	800	15	$ 160.00	$ 1,920,000.00			$ 170.00	$ -	Poor	9%	$ 172,800.00	$ 2,092,800.00		
R-305 Sta 715+00 to 717+00	Cut	7			$ 12.00	$ -	200	7	$ 140.00	$ 182,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 182,000.00		
R-306	Cut	7			$ 12.00	$ -	75	4	$ 140.00	$ 42,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 42,000.00		
R-307 Sta 715+00 to 719+00	Cut	7			$ 12.00	$ -	400	6	$ 140.00	$ 336,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 336,000.00		
R-307 Sta 719+00 to 720+50	Cut	7			$ 12.00	$ -	150	3	$ 140.00	$ 63,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 63,000.00		
R-307 Sta 720+50 to 721+50	Cut	7			$ 12.00	$ -	100	7	$ 140.00	$ 91,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 91,000.00		
R-307 Sta 721+50 to 722+00	Cut	7			$ 12.00	$ -			$ 140.00	$ -	50	14	$ 160.00	$ 112,000.00			$ 170.00	$ -	Normal	0%	$ -	$ 112,000.00		
R-307 Sta 722+00 to 723+75	Cut	7			$ 12.00	$ -			$ 140.00	$ -	175	18	$ 160.00	$ 504,000.00			$ 170.00	$ -	Poor	9%	$ 45,360.00	$ 549,360.00		
R-308 Sta 724+75 to 725+25	Cut	7			$ 12.00	$ -			$ 140.00	$ -	50	15	$ 160.00	$ 116,000.00			$ 170.00	$ -	Poor	9%	$ 10,440.00	$ 126,440.00		
R-308 Sta 725+25 to 726+00	Cut	7			$ 12.00	$ -	75	7	$ 140.00	$ 73,500.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 73,500.00		
R-308 Sta 726+00 to 731+75	Cut	7			$ 12.00	$ -	575	8	$ 140.00	$ 603,750.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 603,750.00		
R-309 Sta 728+50 to 730+00	Cut	7			$ 12.00	$ -	150	7	$ 140.00	$ 136,500.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 136,500.00		
R-309 Sta 730+00 to 732+75	Cut	7			$ 12.00	$ -			$ 140.00	$ -	275	15	$ 160.00	$ 638,000.00			$ 170.00	$ -	Poor	9%	$ 57,420.00	$ 695,420.00		
R-310	Cut	7			$ 12.00	$ -			$ 140.00	$ -	925	18	$ 160.00	$ 2,590,000.00			$ 170.00	$ -	Poor	9%	$ 233,100.00	$ 2,823,100.00		
R-311	Cut	7			$ 12.00	$ -			$ 140.00	$ -	800	16	$ 160.00	$ 1,984,000.00			$ 170.00	$ -	Poor	9%	$ 178,560.00	$ 2,162,560.00		
R-313 Sta 752+50 to 754+25	Cut	7			$ 12.00	$ -	175	7	$ 140.00	$ 159,250.00			$ 160.00	$ -			$ 170.00	$ -	Very Poor	12%	$ 19,110.00	$ 178,360.00		
R-313 Sta 754+25 to 759+50	Cut	7			$ 12.00	$ -			$ 140.00	$ -	525	15	$ 160.00	$ 1,260,000.00			$ 170.00	$ -	Very Poor	12%	$ 151,200.00	$ 1,411,200.00		
R-313 Sta 759+50 to 764+25	Cut	7			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	475	21	$ 170.00	$ 1,695,750.00	Very Poor	12%	$ 203,490.00	$ 1,899,240.00		
R-314	Cut	7			$ 12.00	$ -	425	5	$ 140.00	$ 297,500.00			$ 160.00	$ -			$ 170.00	$ -	Very Poor	12%	$ 35,700.00	$ 333,200.00		
R-317 Sta 795+20 to 796+00	Cut	7			$ 12.00	$ -			$ 140.00	$ -	80	15	$ 160.00	$ 185,600.00			$ 170.00	$ -	Poor	9%	$ 16,704.00	$ 202,304.00		
R-317 Sta 796+00 to 800+00	Cut	7			$ 12.00	$ -			$ 140.00	$ -	400	13	$ 160.00	$ 832,000.00			$ 170.00	$ -	Normal	0%	$ -	$ 832,000.00		
R-317 Sta 800+00 to 805+75	Cut	7			$ 12.00	$ -	575	8	$ 140.00	$ 644,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 644,000.00		
R-318	Cut	7			$ 12.00	$ -	400	4	$ 140.00	$ 224,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 224,000.00		
R-319 Sta 822+50 to 824+00	Cut	7			$ 12.00	$ -	150	7	$ 140.00	$ 147,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 147,000.00		
R-319 Sta 824+00 to 828+00	Cut	7			$ 12.00	$ -			$ 140.00	$ -	400	15	$ 160.00	$ 960,000.00			$ 170.00	$ -	Poor	9%	$ 86,400.00	$ 1,046,400.00		
R-319 Sta 828+00 to 834+20	Cut	7			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	620	22	$ 170.00	$ 2,266,100.00	Very Poor	12%	$ 271,932.00	$ 2,538,032.00		
R-320 Sta 834+75 to 839+00	Cut	7			$ 12.00	$ -			$ 140.00	$ -	425	15	$ 160.00	$ 1,020,000.00			$ 170.00	$ -	Poor	9%	$ 91,800.00	$ 1,111,800.00		
R-320 Sta 839+00 to 841+75	Cut	7			$ 12.00	$ -	275	7	$ 140.00	$ 250,250.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 250,250.00		
R-344	Cut	7			$ 12.00	$ -	91	5	$ 140.00	$ 63,700.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 63,700.00		
R-345	Cut	7			$ 12.00	$ -			$ 140.00	$ -	267	17	$ 160.00	$ 704,880.00			$ 170.00	$ -	Poor	9%	$ 63,439.00	$ 768,319.00		
R-346 Sta 5808+40 to 5809+25	Cut	7			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	85	21	$ 170.00	$ 303,450.00	Very Poor	12%	$ 36,414.00	$ 339,864.00		
R-346 Sta 5809+25 to 5811+50	Cut	7			$ 12.00	$ -			$ 140.00	$ -	225	15	$ 160.00	$ 540,000.00			$ 170.00	$ -	Poor	9%	$ 48,600.00	$ 588,600.00		
R-346 Sta 5811+50 to 5813+25	Cut	7			$ 12.00	$ -	175	7	$ 140.00	$ 159,250.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 159,250.00		
R-326 Sta 701+75 to 706+00	Cut	10			$ 12.00	$ -			$ 140.00	$ -	425	18	$ 160.00	$ 1,190,000.00			$ 170.00	$ -	Poor	9%	$ 107,100.00	$ 1,297,100.00		
R-327 Sta 706+75 to 707+50	Cut	10			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	75	21	$ 170.00	$ 261,375.00	Very Poor	12%	$ 31,365.00	$ 292,740.00		
R-327 Sta 707+50 to 708+50	Cut	10			$ 12.00	$ -			$ 140.00	$ -	100	19	$ 160.00	$ 304,000.00			$ 170.00	$ -	Poor	9%	$ 27,360.00	$ 331,360.00		
R-327 Sta 708+50 to 713+50	Cut	10			$ 12.00	$ -			$ 140.00	$ -	500	17	$ 160.00	$ 1,360,000.00			$ 170.00	$ -	Poor	9%	$ 122,400.00	$ 1,482,400.00		
R-327 Sta 713+50 to 715+75	Cut	10			$ 12.00	$ -			$ 140.00	$ -	225	14	$ 160.00	$ 504,000.00			$ 170.00	$ -	Normal	0%	$ -	$ 504,000.00		
R-327 Sta 715+75 to 718+50	Cut	10			$ 12.00	$ -	275	7	$ 140.00	$ 250,250.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 250,250.00		
R-328 Sta 715+00 to 717+00	Cut	10			$ 12.00	$ -	200	7	$ 140.00	$ 182,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 182,000.00		
R-328 Sta 717+00 to 719+50	Cut	10			$ 12.00	$ -			$ 140.00	$ -	250	15	$ 160.00	$ 600,000.00			$ 170.00	$ -	Poor	9%	$ 54,000.00	$ 654,000.00		
R-328 Sta 719+50 to 721+00	Cut	10			$ 12.00	$ -			$ 140.00	$ -	150	15	$ 160.00	$ 348,000.00			$ 170.00	$ -	Poor	9%	$ 31,320.00	$ 379,320.00		
R-328 Sta 721+00 to 722+75	Cut	10			$ 12.00	$ -	175	9	$ 140.00	$ 220,500.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 220,500.00		
R-328 Sta 722+75 to 723+50	Cut	10			$ 12.00	$ -			$ 140.00	$ -	75	14	$ 160.00	$ 168,000.00			$ 170.00	$ -	Normal	0%	$ -	$ 168,000.00		
R-329 Sta 724+50 to 725+25	Cut	10			$ 12.00	$ -			$ 140.00	$ -	75	13	$ 160.00	$ 150,000.00			$ 170.00	$ -	Normal	0%	$ -	$ 150,000.00		
R-329 Sta 725+25 to 731+00	Cut	10			$ 12.00	$ -	575	8	$ 140.00	$ 644,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 644,000.00		
R-329 Sta 731+00 to 732+80	Cut	10			$ 12.00	$ -			$ 140.00	$ -	180	10	$ 160.00	$ 288,000.00			$ 170.00	$ -	Normal	0%	$ -	$ 288,000.00		
R-330	Cut	10			$ 12.00	$ -	300	7	$ 140.00	$ 294,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 294,000.00		
R-331 Sta 732+50 to 734+00	Cut	10			$ 12.00	$ -	150	7	$ 140.00	$ 136,500.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 136,500.00		
R-331 Sta 734+00 to 737+00	Cut	10			$ 12.00	$ -			$ 140.00	$ -	300	15	$ 160.00	$ 720,000.00			$ 170.00	$ -	Poor	9%	$ 64,800.00	$ 784,800.00		
R-331 Sta 737+00 to 738+50	Cut	10			$ 12.00	$ -			$ 140.00	$ -	150	20	$ 160.00	$ 480,000.00			$ 170.00	$ -	Poor	9%	$ 43,200.00	$ 523,200.00		
R-331 Sta 738+50 to 741+00	Cut	10			$ 12.00	$ -			$ 140.00	$ -	250	17	$ 160.00	$ 680,000.00			$ 170.00	$ -	Poor	9%	$ 61,200.00	$ 741,200.00		
R-331 Sta 741+00 to 742+25	Cut	10			$ 12.00	$ -			$ 140.00	$ -	125	17	$ 160.00	$ 340,000.00			$ 170.00	$ -	Poor	9%	$ 30,600.00	$ 370,600.00		
R-332 Sta 742+75 to 743+50	Cut	10			$ 12.00	$ -			$ 140.00	$ -	75	16	$ 160.00	$ 192,000.00			$ 170.00	$ -	Very Poor	12%	$ 23,040.00	$ 215,040.00		
R-332 Sta 743+50 to 748+00	Cut	10			$ 12.00	$ -			$ 140.00	$ -	450	14	$ 160.00	$ 1,008,000.00			$ 170.00	$ -	Very Poor	12%	$ 120,960.00	$ 1,128,960.00		
R-332 Sta 748+00 to 752+00	Cut	10			$ 12.00	$ -			$ 140.00	$ -	400	12	$ 160.00	$ 768,000.00			$ 170.00	$ -	Very Poor	12%	$ 92,160.00	$ 860,160.00		
R-332 Sta 752+00 to 755+50	Cut	10			$ 12.00	$ -	350	8	$ 140.00	$ 392,000.00			$ 160.00	$ -			$ 170.00	$ -	Very Poor	12%	$ 47,040.00	$ 439,040.00		
R-332 Sta 755+50 to 760+50	Cut	10			$ 12.00	$ -			$ 140.00	$ -	500	16	$ 160.00	$ 1,280,000.00			$ 170.00	$ -	Very Poor	12%	$ 153,600.00	$ 1,433,600.00		
R-332 Sta 760+50 to 762+00	Cut	10			$ 12.00	$ -	150	6	$ 140.00	$ 126,000.00			$ 160.00	$ -			$ 170.00	$ -	Very Poor	12%	$ 15,120.00	$ 141,120.00		
R-333	Cut	10			$ 12.00	$ -	425	7	$ 140.00	$ 386,750.00			$ 160.00	$ -			$ 170.00	$ -	Very Poor	12%	$ 46,410.00	$ 433,160.00		
R-334	Cut	10			$ 12.00	$ -			$ 140.00	$ -	600	19	$ 160.00	$ 1,824,000.00			$ 170.00	$ -	Very Poor	12%	$ 218,880.00	$ 2,042,880.00		
R-335 Sta 774+75 to 776+00	Cut	10			$ 12.00	$ -			$ 140.00	$ -	125	15	$ 160.00	$ 290,000.00			$ 170.00	$ -	Very Poor	12%	$ 34,800.00	$ 324,800.00		
R-335 Sta 776+00 to 780+00	Cut	10			$ 12.00	$ -	400	5	$ 140.00	$ 280,000.00			$ 160.00	$ -			$ 170.00	$ -	Very Poor	12%	$ 33,600.00	$ 313,600.00		
R-335 Sta 780+00 to 782+50	Cut	10			$ 12.00	$ -	250	7	$ 140.00	$ 227,500.00			$ 160.00	$ -			$ 170.00	$ -	Very Poor	12%	$ 27,300.00	$ 254,800.00		
R-335 Sta 782+50 to 784+00	Cut	10			$ 12.00	$ -			$ 140.00	$ -	190	11	$ 160.00	$ 319,200.00			$ 170.00	$ -	Very Poor	12%	$ 38,304.00	$ 357,504.00		
R-335 Sta 784+00 to 786+50	Cut	10			$ 12.00	$ -	250	7	$ 140.00	$ 227,500.00			$ 160.00	$ -			$ 170.00	$ -	Very Poor	12%	$ 27,300.00	$ 254,800.00		
R-337 Sta 794+50 to 795+25	Cut	10			$ 12.00	$ -			$ 140.00	$ -	75	18	$ 160.00	$ 210,000.00			$ 170.00	$ -	Poor	9%	$ 18,900.00	$ 228,900.00		
R-337 Sta 795+25 to 799+00	Cut	10			$ 12.00	$ -			$ 140.00	$ -	375	16	$ 160.00	$ 960,000.00			$ 170.00	$ -	Poor	9%	$ 86,400.00	$ 1,046,400.00		
R-337 Sta 799+00 to 802+00	Cut	10			$ 12.00	$ -			$ 140.00	$ -	300	13	$ 160.00	$ 624,000.00			$ 170.00	$ -	Normal	0%	$ -	$ 624,000.00		
R-337 Sta 802+00 to 803+25	Cut	10			$ 12.00	$ -	125	7	$ 140.00	$ 113,750.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 113,750.00		
R-338 Sta 807+00 to 808+25	Cut	10			$ 12.00	$ -	125	7	$ 140.00	$ 122,500.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 122,500.00		

PROJECT OPINION OF COST SUMMARY
JOB NUMBEf 32587
TITLE: I-94 Detailed Engineering Report
Conceptual Base Plans
I-96 to Conner
Length: 6.7 Miles
FILE: 2010-06-07 I-94 Opinion of Cost.xls

Region: Metro
TSC: Detroit
Prepared By: CH2M HILL
Std. Specs for Construction: 2003
Date: Jun-8-10
Time: 4:59:40 PM
Base Cost Year: Dec-09

TITLE: **New Retaining Walls**
Worksheet Title: Walls

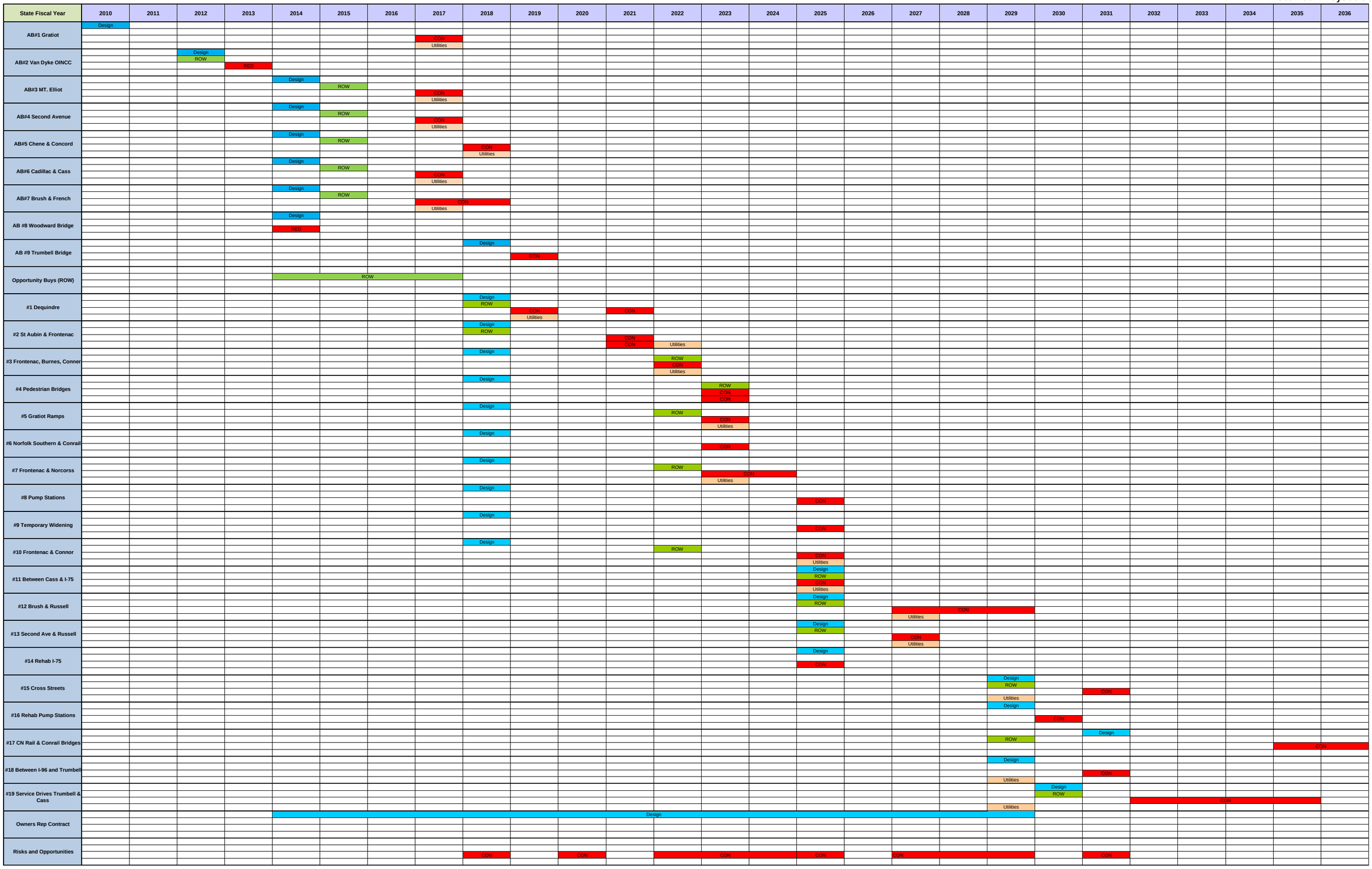
R-338 Sta 808+25 to 811+65	Cut	10			$ 12.00	$ -			$ 140.00	$ -	275	13	$ 160.00	$ 572,000.00			$ 170.00	$ -	Normal	0%	$ -	$ 572,000.00		
R-338 Sta 811+65 to 813+00	Cut	10			$ 12.00	$ -	135	7	$ 140.00	$ 122,850.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 122,850.00		
R-339	Cut	10			$ 12.00	$ -	535	8	$ 140.00	$ 561,750.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 561,750.00		
R-340 Sta 822+50 to 824+50	Cut	10			$ 12.00	$ -	200	7	$ 140.00	$ 182,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 182,000.00		
R-340 Sta 824+50 to 830+00	Cut	10			$ 12.00	$ -			$ 140.00	$ -	550	15	$ 160.00	$ 1,320,000.00			$ 170.00	$ -	Poor	9%	$ 118,800.00	$ 1,438,800.00		
R-340 Sta 830+00 to 834+00	Cut	10			$ 12.00	$ -			$ 140.00	$ -	400	20	$ 160.00	$ 1,280,000.00			$ 170.00	$ -	Poor	9%	$ 115,200.00	$ 1,395,200.00		
R-341 Sta 834+50 to 838+00	Cut	10			$ 12.00	$ -			$ 140.00	$ -	350	15	$ 160.00	$ 840,000.00			$ 170.00	$ -	Poor	9%	$ 75,600.00	$ 915,600.00		
R-341 Sta 838+00 to 840+00	Cut	10			$ 12.00	$ -	200	7	$ 140.00	$ 196,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 196,000.00		
R-349 Sta 5802+50 to 5803+25	Cut	10			$ 12.00	$ -	75	8	$ 140.00	$ 84,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 84,000.00		
R-349 Sta 5802+50 to 5805+75	Cut	10			$ 12.00	$ -			$ 140.00	$ -	325	14	$ 160.00	$ 728,000.00			$ 170.00	$ -	Normal	0%	$ -	$ 728,000.00		
R-350	Cut	10			$ 12.00	$ -			$ 140.00	$ -	195	18	$ 160.00	$ 561,600.00			$ 170.00	$ -	Poor	9%	$ 50,544.00	$ 612,144.00		
R-351	Cut	10			$ 12.00	$ -	102	7	$ 140.00	$ 92,820.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 92,820.00		
R-213 Sta 566+75 to 573+50	Cut	11			$ 12.00	$ -			$ 140.00	$ -	675	17	$ 160.00	$ 1,782,000.00			$ 170.00	$ -	Poor	9%	$ 160,380.00	$ 1,942,380.00		
R-213 Sta 573+50 to 574+25	Cut	11			$ 12.00	$ -	75	7	$ 140.00	$ 73,500.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 73,500.00		
R-214 Sta 572+50 to 574+00	Cut	11			$ 12.00	$ -	150	7	$ 140.00	$ 136,500.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 136,500.00		
R-214 Sta 574+00 to 575+00	Cut	11			$ 12.00	$ -			$ 140.00	$ -	100	14	$ 160.00	$ 224,000.00			$ 170.00	$ -	Normal	0%	$ -	$ 224,000.00		
R-214 Sta 575+00 to 579+60	Cut	11			$ 12.00	$ -			$ 140.00	$ -	460	18	$ 160.00	$ 1,324,800.00			$ 170.00	$ -	Poor	9%	$ 119,232.00	$ 1,444,032.00		
R-202 Sta 571+75 to 578+75	Cut	11			$ 12.00	$ -	700	6	$ 140.00	$ 588,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 588,000.00		
R-202 Sta 578+75 to 579+50	Cut	11			$ 12.00	$ -			$ 140.00	$ -	75	13	$ 160.00	$ 156,000.00			$ 170.00	$ -	Normal	0%	$ -	$ 156,000.00		
R-215 Sta 580+25 to 584+50	Cut	12			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	425	21	$ 170.00	$ 1,517,250.00	Very Poor	12%	$ 182,070.00	$ 1,699,320.00		
R-215 Sta 584+50 to E508+00	Cut	12			$ 12.00	$ -			$ 140.00	$ -	601	15	$ 160.00	$ 1,442,400.00			$ 170.00	$ -	Poor	9%	$ 129,816.00	$ 1,572,216.00		
R-215 Sta E508+00 to D403+75	Cut	12			$ 12.00	$ -	260	7	$ 140.00	$ 254,800.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 254,800.00		
R-215 Sta D403+75 to D404+50	Cut	12			$ 12.00	$ -			$ 140.00	$ -	75	12	$ 160.00	$ 138,000.00			$ 170.00	$ -	Normal	0%	$ -	$ 138,000.00		
R-225 Sta E522+50 to E527+00	Cut	12			$ 12.00	$ -	450	6	$ 140.00	$ 378,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 378,000.00		
R-225 Sta E527+00 to E531+50	Cut	12			$ 12.00	$ -			$ 140.00	$ -	450	15	$ 160.00	$ 1,044,000.00			$ 170.00	$ -	Poor	9%	$ 93,960.00	$ 1,137,960.00		
R-225 Sta E531+50 to E532+75	Cut	12			$ 12.00	$ -	125	7	$ 140.00	$ 113,750.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 113,750.00		
R-113	Cut	13			$ 12.00	$ -	470	9	$ 140.00	$ 592,200.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 592,200.00		
R-114-2	Cut	13			$ 12.00	$ -			$ 140.00	$ -	605	16	$ 160.00	$ 1,500,400.00			$ 170.00	$ -	Poor	9%	$ 135,036.00	$ 1,635,436.00		
R-132-2	Cut	13			$ 12.00	$ -			$ 140.00	$ -	358	11	$ 160.00	$ 630,080.00			$ 170.00	$ -	Normal	0%	$ -	$ 630,080.00		
R-141	Cut	13			$ 12.00	$ -	203	9	$ 140.00	$ 255,780.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 255,780.00		
R-100	Cut	15			$ 12.00	$ -	366	9	$ 140.00	$ 461,160.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 461,160.00		
R-101	Cut	15			$ 12.00	$ -			$ 140.00	$ -	172	14	$ 160.00	$ 371,520.00			$ 170.00	$ -	Normal	0%	$ -	$ 371,520.00		
R-102	Cut	15			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	438	21	$ 170.00	$ 1,526,430.00	Very Poor	12%	$ 183,172.00	$ 1,709,602.00		
R-103	Cut	15			$ 12.00	$ -			$ 140.00	$ -	812	13	$ 160.00	$ 1,624,000.00			$ 170.00	$ -	Normal	0%	$ -	$ 1,624,000.00		
R-104	Cut	15			$ 12.00	$ -			$ 140.00	$ -	808	14	$ 160.00	$ 1,809,920.00			$ 170.00	$ -	Normal	0%	$ -	$ 1,809,920.00		
R-109	Cut	15			$ 12.00	$ -			$ 140.00	$ -	389	13	$ 160.00	$ 778,000.00			$ 170.00	$ -	Normal	0%	$ -	$ 778,000.00		
R-110	Cut	15			$ 12.00	$ -			$ 140.00	$ -	1,053	19	$ 160.00	$ 3,116,880.00			$ 170.00	$ -	Poor	9%	$ 280,519.00	$ 3,397,399.00		
R-117	Cut	15			$ 12.00	$ -			$ 140.00	$ -	80	15	$ 160.00	$ 192,000.00			$ 170.00	$ -	Poor	9%	$ 17,280.00	$ 209,280.00		
R-118	Cut	15			$ 12.00	$ -	487	9	$ 140.00	$ 613,620.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 613,620.00		
R-119	Cut	15			$ 12.00	$ -	879	7	$ 140.00	$ 861,420.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 861,420.00		
R-120	Cut	15			$ 12.00	$ -	635	8	$ 140.00	$ 711,200.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 711,200.00		
R-125	Cut	15			$ 12.00	$ -			$ 140.00	$ -	464	14	$ 160.00	$ 1,002,240.00			$ 170.00	$ -	Normal	0%	$ -	$ 1,002,240.00		
R-126	Cut	15			$ 12.00	$ -			$ 140.00	$ -	1,045	20	$ 160.00	$ 3,344,000.00			$ 170.00	$ -	Poor	9%	$ 300,960.00	$ 3,644,960.00		
R-105	Cut	17			$ 12.00	$ -			$ 140.00	$ -	378	14	$ 160.00	$ 816,480.00			$ 170.00	$ -	Normal	0%	$ -	$ 816,480.00		
R-106	Cut	17			$ 12.00	$ -	160	8	$ 140.00	$ 168,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 168,000.00		
R-107	Cut	17			$ 12.00	$ -	84	9	$ 140.00	$ 99,960.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 99,960.00		
R-108	Cut	17			$ 12.00	$ -			$ 140.00	$ -	475	19	$ 160.00	$ 1,406,000.00			$ 170.00	$ -	Poor	9%	$ 126,540.00	$ 1,532,540.00		
R-121	Cut	17			$ 12.00	$ -			$ 140.00	$ -	480	18	$ 160.00	$ 1,344,000.00			$ 170.00	$ -	Poor	9%	$ 120,960.00	$ 1,464,960.00		
R-122	Cut	17			$ 12.00	$ -	385	8	$ 140.00	$ 431,200.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 431,200.00		
R-123	Cut	17			$ 12.00	$ -	165	10	$ 140.00	$ 219,450.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 219,450.00		
R-124	Cut	17			$ 12.00	$ -			$ 140.00	$ -	371	15	$ 160.00	$ 890,400.00			$ 170.00	$ -	Poor	9%	$ 80,136.00	$ 970,536.00		
R-146	Cut	17			$ 12.00	$ -			$ 140.00	$ -	166	11	$ 160.00	$ 278,880.00			$ 170.00	$ -	Normal	0%	$ -	$ 278,880.00		
R-147	Cut	17			$ 12.00	$ -			$ 140.00	$ -	168	11	$ 160.00	$ 295,680.00			$ 170.00	$ -	Normal	0%	$ -	$ 295,680.00		
R-162	Cut	17			$ 12.00	$ -	275	4	$ 140.00	$ 134,750.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 134,750.00		
R-163	Cut	17			$ 12.00	$ -	162	9	$ 140.00	$ 204,120.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 204,120.00		
R-111-1	Cut	19			$ 12.00	$ -	425	10	$ 140.00	$ 595,000.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 595,000.00		
R-127-2	Cut	19			$ 12.00	$ -			$ 140.00	$ -	895	14	$ 160.00	$ 1,933,200.00			$ 170.00	$ -	Normal	0%	$ -	$ 1,933,200.00		
R-129 (WSD)	Cut	19			$ 12.00	$ -			$ 140.00	$ -	192	14	$ 160.00	$ 430,080.00			$ 170.00	$ -	Normal	0%	$ -	$ 430,080.00		
R-129 (NSD)	Cut	19			$ 12.00	$ -	379	6	$ 140.00	$ 318,360.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 318,360.00		
R-129 (WSD TO NSD)	Cut	19			$ 12.00	$ -			$ 140.00	$ -	479	18	$ 160.00	$ 1,379,520.00			$ 170.00	$ -	Poor	9%	$ 124,157.00	$ 1,503,677.00		
R-129 (3RD)	Cut	19			$ 12.00	$ -			$ 140.00	$ -	128	12	$ 160.00	$ 245,760.00			$ 170.00	$ -	Normal	0%	$ -	$ 245,760.00		
R-130 (WSD)	Cut	19			$ 12.00	$ -	208	8	$ 140.00	$ 218,400.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 218,400.00		
R-130 (3RD)	Cut	19			$ 12.00	$ -			$ 140.00	$ -	138	12	$ 160.00	$ 253,920.00			$ 170.00	$ -	Normal	0%	$ -	$ 253,920.00		
R-134	Cut	19			$ 12.00	$ -	1,384	10	$ 140.00	$ 1,937,600.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 1,937,600.00		
R-135	Cut	19			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	307	21	$ 170.00	$ 1,095,990.00	Very Poor	12%	$ 131,519.00	$ 1,227,509.00		
R-136	Cut	19			$ 12.00	$ -			$ 140.00	$ -	890	15	$ 160.00	$ 2,136,000.00			$ 170.00	$ -	Poor	9%	$ 192,240.00	$ 2,328,240.00		
R-137	Cut	19			$ 12.00	$ -	348	7	$ 140.00	$ 341,040.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 341,040.00		
R-138	Cut	19			$ 12.00	$ -			$ 140.00	$ -	281	11	$ 160.00	$ 472,080.00			$ 170.00	$ -	Normal	0%	$ -	$ 472,080.00		
R-139	Cut	19			$ 12.00	$ -			$ 140.00	$ -	152	11	$ 160.00	$ 267,520.00			$ 170.00	$ -	Normal	0%	$ -	$ 267,520.00		
R-140	Cut	19			$ 12.00	$ -			$ 140.00	$ -	762	11	$ 160.00	$ 1,341,120.00			$ 170.00	$ -	Normal	0%	$ -	$ 1,341,120.00		
R-148	Cut	19			$ 12.00	$ -			$ 140.00	$ -	479	17	$ 160.00	$ 1,264,560.00			$ 170.00	$ -	Poor	9%	$ 113,810.00	$ 1,378,370.00		
R-149	Cut	19			$ 12.00	$ -			$ 140.00	$ -			$ 160.00	$ -	365	21	$ 170.00	$ 1,303,050.00	Very Poor	12%	$ 156,366.00	$ 1,459,416.00		
R-150	Cut	19			$ 12.00	$ -			$ 140.00	$ -	612	16	$ 160.00	$ 1,566,720.00			$ 170.00	$ -	Poor	9%	$ 141,005.00	$ 1,707,725.00		
R-151	Cut	19			$ 12.00	$ -			$ 140.00	$ -	672	19	$ 160.00	$ 1,989,120.00			$ 170.00	$ -	Poor	9%	$ 179,021.00	$ 2,168,141.00		
R-152	Cut	19			$ 12.00	$ -			$ 140.00	$ -	660	19	$ 160.00	$ 1,953,600.00			$ 170.00	$ -	Poor	9%	$ 175,824.00	$ 2,129,424.00		
R-153	Cut	19			$ 12.00	$ -			$ 140.00	$ -	1,384	14	$ 160.00	$ 3,100,160.00			$ 170.00	$ -	Normal	0%	$ -	$ 3,100,160.00		
R-154	Cut	19			$ 12.00	$ -			$ 140.00	$ -	1,341	15	$ 160.00	$ 3,111,120.00			$ 170.00	$ -	Poor	9%	$ 280,001.00	$ 3,391,121.00		
R-155	Cut	19			$ 12.00	$ -			$ 140.00	$ -	583	13	$ 160.00	$ 1,212,640.00			$ 170.00	$ -	Normal	0%	$ -	$ 1,212,640.00		
R-156	Cut	19			$ 12.00	$ -			$ 140.00	$ -	762	13	$ 160.00	$ 1,584,960.00			$ 170.00	$ -	Normal	0%	$ -	$ 1,584,960.00		
R-157	Cut	19			$ 12.00	$ -	280	9	$ 140.00	$ 352,800.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 352,800.00		
R-164	Cut	19			$ 12.00	$ -	435	10	$ 140.00	$ 578,550.00			$ 160.00	$ -			$ 170.00	$ -	Normal	0%	$ -	$ 578,550.00		

PROJECT OPINION OF COST SUMMARY
JOB NUMBEf 32587
TITLE: I-94 Detailed Engineering Report
Conceptual Base Plans
I-96 to Conner
Length: 6.7 Miles
FILE: 2010-06-07 I-94 Opinion of Cost.xls

Region: Metro
TSC: Detroit
Prepared By: CH2M HILL
Std. Specs for Construction: 2003
Date: Jun-8-10
Time: 4:59:40 PM
Base Cost Year: Dec-09

TITLE: New Retaining Walls
Worksheet Title: Walls

R-165	Cut	19			$ 12.00	$ -			$ 140.00	$ -	345	16	$ 160.00	$ 855,600.00			$ 170.00	$ -	Poor	9%	$ 77,004.00	$ 932,604.00		
R-166	Cut	19			$ 12.00	$ -			$ 140.00	$ -	365	20	$ 160.00	$ 1,168,000.00			$ 170.00	$ -	Poor	9%	$ 105,120.00	$ 1,273,120.00		
R-167	Cut	19			$ 12.00	$ -			$ 140.00	$ -	624	12	$ 160.00	$ 1,198,080.00			$ 170.00	$ -	Normal	0%	$ -	$ 1,198,080.00		
					$ 12.00	$ -																		
Total						$ -				$ 24,304,680.00				$ 99,118,080.00				$ 22,412,035.00			$ 10,194,420.00	$ 156,029,215.00		
Proposed Retaining Walls - Fill																								
R-217 Sta 5610+00 to 5610+75	Fill	1			$ 12.00	$ -	75	7	$ 140.00	$ 73,500.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 73,500.00		
R-217 Sta 5610+75 to 5611+40	Fill	1			$ 12.00	$ -			$ 140.00	$ -	65	13	$ 165.00	$ 134,063.00			$ 175.00	$ -	Normal	0%	$ -	$ 134,063.00		
R-218 Sta 5610+00 to 5610+75	Fill	1			$ 12.00	$ -	75	7	$ 140.00	$ 73,500.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 73,500.00		
R-218 Sta 5610+75 to 5611+30	Fill	1			$ 12.00	$ -			$ 140.00	$ -	55	13	$ 165.00	$ 113,438.00			$ 175.00	$ -	Normal	0%	$ -	$ 113,438.00		
R-219 Sta 5624+25 to 5624+75	Fill	1			$ 12.00	$ -			$ 140.00	$ -	50	12	$ 165.00	$ 99,000.00			$ 175.00	$ -	Normal	0%	$ -	$ 99,000.00		
R-219 Sta 5624+75 to 5626+00	Fill	1			$ 12.00	$ -	125	6	$ 140.00	$ 105,000.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 105,000.00		
R-220 Sta 5624+35 to 5624+75	Fill	1			$ 12.00	$ -			$ 140.00	$ -	40	13	$ 165.00	$ 85,800.00			$ 175.00	$ -	Normal	0%	$ -	$ 85,800.00		
R-220 Sta 5624+75 to 5626+00	Fill	1			$ 12.00	$ -	125	6	$ 140.00	$ 105,000.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 105,000.00		
R-205 Sta 5610+50 to 5611+50	Fill	1			$ 12.00	$ -	100	7	$ 140.00	$ 91,000.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 91,000.00		
R-205 Sta 5611+50 to 5613+40	Fill	1			$ 12.00	$ -			$ 140.00	$ -	190	16	$ 165.00	$ 485,925.00			$ 175.00	$ -	Poor	9%	$ 43,733.00	$ 529,658.00		
R-206 Sta 5610+50 to 5611+50	Fill	1			$ 12.00	$ -	100	7	$ 140.00	$ 91,000.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 91,000.00		
R-206 Sta 5611+50 to 5613+40	Fill	1			$ 12.00	$ -			$ 140.00	$ -	190	16	$ 165.00	$ 485,925.00			$ 175.00	$ -	Poor	9%	$ 43,733.00	$ 529,658.00		
R-207 Sta 5629+75 to 5630+00	Fill	1			$ 12.00	$ -			$ 140.00	$ -	25	14	$ 165.00	$ 55,688.00			$ 175.00	$ -	Normal	0%	$ -	$ 55,688.00		
R-207 Sta 5630+00 to 5630+25	Fill	1			$ 12.00	$ -	25	7	$ 140.00	$ 22,750.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 22,750.00		
R-226	Fill	1			$ 12.00	$ -			$ 140.00	$ -	178	15	$ 165.00	$ 440,550.00			$ 175.00	$ -	Poor	9%	$ 39,650.00	$ 480,200.00		
R-227 Ramp F	Fill	1			$ 12.00	$ -	775	8	$ 140.00	$ 813,750.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 813,750.00		
R-227 Ramp A	Fill	1			$ 12.00	$ -	285	9	$ 140.00	$ 359,100.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 359,100.00		
R-228 Ramp F	Fill	1			$ 12.00	$ -			$ 140.00	$ -	41	14	$ 165.00	$ 94,710.00			$ 175.00	$ -	Normal	0%	$ -	$ 94,710.00		
R-228 I-75	Fill	1			$ 12.00	$ -			$ 140.00	$ -	110	19	$ 165.00	$ 344,850.00			$ 175.00	$ -	Poor	9%	$ 31,037.00	$ 375,887.00		
R-230-1	Fill	1			$ 12.00	$ -	90	7	$ 140.00	$ 81,900.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 81,900.00		
R-230-2	Fill	1			$ 12.00	$ -			$ 140.00	$ -	98	15	$ 165.00	$ 242,550.00			$ 175.00	$ -	Poor	9%	$ 21,830.00	$ 264,380.00		
R-300	Fill	2			$ 12.00	$ -	535	7	$ 140.00	$ 486,850.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 486,850.00		
R-302 Sta 689+00 to 691+00	Fill	2			$ 12.00	$ -	200	6	$ 140.00	$ 168,000.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 168,000.00		
R-302 Sta 691+00 to 693+50	Fill	2			$ 12.00	$ -			$ 140.00	$ -	250	15	$ 165.00	$ 618,750.00			$ 175.00	$ -	Poor	9%	$ 55,688.00	$ 674,438.00		
R-302 Sta 693+50 to 695+25	Fill	2			$ 12.00	$ -			$ 140.00	$ -			$ 165.00	$ -	175	21	$ 175.00	$ 643,125.00	Very Poor	12%	$ 77,175.00	$ 720,300.00		
R-212	Fill	11			$ 12.00	$ -			$ 140.00	$ -			$ 165.00	$ -	165	21	$ 175.00	$ 606,375.00	Very Poor	12%	$ 72,765.00	$ 679,140.00		
R-201 Sta 566+75 to 572+75	Fill	11			$ 12.00	$ -			$ 140.00	$ -	600	17	$ 165.00	$ 1,633,500.00			$ 175.00	$ -	Poor	9%	$ 147,015.00	$ 1,780,515.00		
R-201 Sta 572+75 to 574+00	Fill	11			$ 12.00	$ -	125	7	$ 140.00	$ 122,500.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 122,500.00		
R-204	Fill	12			$ 12.00	$ -	153	7	$ 140.00	$ 149,940.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 149,940.00		
R-224 Sta E522+50 to E524+50	Fill	12			$ 12.00	$ -			$ 140.00	$ -			$ 165.00	$ -	200	25	$ 175.00	$ 857,500.00	Very Poor	12%	$ 102,900.00	$ 960,400.00		
R-224 Sta E524+50 to E526+25	Fill	12			$ 12.00	$ -			$ 140.00	$ -	175	15	$ 165.00	$ 433,125.00			$ 175.00	$ -	Poor	9%	$ 38,981.00	$ 472,106.00		
R-224 Sta E526+25 to E528+50	Fill	12			$ 12.00	$ -	225	7	$ 140.00	$ 204,750.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 204,750.00		
R-231	Fill	12			$ 12.00	$ -	58	7	$ 140.00	$ 52,780.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 52,780.00		
R-232	Fill	12			$ 12.00	$ -	168	9	$ 140.00	$ 199,920.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 199,920.00		
R-203 Sta F613+00 to F614+25	Fill	12			$ 12.00	$ -	125	7	$ 140.00	$ 113,750.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 113,750.00		
R-203 Sta F614+25 to F616+75	Fill	12			$ 12.00	$ -			$ 140.00	$ -	250	16	$ 165.00	$ 639,375.00			$ 175.00	$ -	Poor	9%	$ 57,544.00	$ 696,919.00		
R-216	Fill	12			$ 12.00	$ -	255	7	$ 140.00	$ 232,050.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 232,050.00		
R-229	Fill	12			$ 12.00	$ -			$ 140.00	$ -			$ 165.00	$ -	95	21	$ 175.00	$ 349,125.00	Very Poor	12%	$ 41,895.00	$ 391,020.00		
R-235-1	Fill	12			$ 12.00	$ -	46	7	$ 140.00	$ 41,860.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 41,860.00		
R-235-2	Fill	12			$ 12.00	$ -			$ 140.00	$ -	60	15	$ 165.00	$ 148,500.00			$ 175.00	$ -	Poor	9%	$ 13,365.00	$ 161,865.00		
R-235-3	Fill	12			$ 12.00	$ -			$ 140.00	$ -			$ 165.00	$ -	21	22	$ 175.00	$ 80,850.00	Very Poor	12%	$ 9,702.00	$ 90,552.00		
R-234-1	Fill	12			$ 12.00	$ -			$ 140.00	$ -			$ 165.00	$ -	485	23	$ 175.00	$ 1,952,125.00	Very Poor	12%	$ 234,255.00	$ 2,186,380.00		
R-234-2	Fill	12			$ 12.00	$ -			$ 140.00	$ -	375	15	$ 165.00	$ 928,125.00			$ 175.00	$ -	Poor	9%	$ 83,531.00	$ 1,011,656.00		
R-234-3	Fill	12			$ 12.00	$ -	200	6	$ 140.00	$ 168,000.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 168,000.00		
R-233-1	Fill	12			$ 12.00	$ -	300	6	$ 140.00	$ 252,000.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 252,000.00		
R-233-2	Fill	12			$ 12.00	$ -			$ 140.00	$ -	310	16	$ 165.00	$ 818,400.00			$ 175.00	$ -	Poor	9%	$ 73,656.00	$ 892,056.00		
R-114-1	Fill	13			$ 12.00	$ -	170	10	$ 140.00	$ 226,100.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 226,100.00		
R-115	Fill	13			$ 12.00	$ -	175	8	$ 140.00	$ 196,000.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 196,000.00		
R-142	Fill	13			$ 12.00	$ -	675	7	$ 140.00	$ 614,250.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 614,250.00		
R-143	Fill	13			$ 12.00	$ -	51	10	$ 140.00	$ 67,830.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 67,830.00		
R-111-2	Fill	19			$ 12.00	$ -	315	8	$ 140.00	$ 352,800.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 352,800.00		
R-1R-12	Fill	19			$ 12.00	$ -	526	11	$ 140.00	$ 810,040.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 810,040.00		
R-127-1	Fill	19			$ 12.00	$ -	129	7	$ 140.00	$ 126,420.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 126,420.00		
R-128	Fill	19			$ 12.00	$ -	296	8	$ 140.00	$ 310,800.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 310,800.00		
R-131	Fill	19			$ 12.00	$ -	384	11	$ 140.00	$ 564,480.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 564,480.00		
R-132-1	Fill	19			$ 12.00	$ -	180	9	$ 140.00	$ 214,200.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 214,200.00		
R-144	Fill	19			$ 12.00	$ -	74	5	$ 140.00	$ 51,800.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 51,800.00		
R-145	Fill	19			$ 12.00	$ -	380	7	$ 140.00	$ 372,400.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 372,400.00		
R-158	Fill	19			$ 12.00	$ -	357	9	$ 140.00	$ 449,820.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 449,820.00		
R-159	Fill	19			$ 12.00	$ -	270	6	$ 140.00	$ 226,800.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 226,800.00		
R-160	Fill	19			$ 12.00	$ -	67	7	$ 140.00	$ 60,970.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 60,970.00		
R-161	Fill	19			$ 12.00	$ -	535	6	$ 140.00	$ 411,950.00			$ 165.00	$ -			$ 175.00	$ -	Normal	0%	$ -	$ 411,950.00		
					$ 12.00	$ -																		
Total						$ -				$ 9,065,560.00				$ 7,802,274.00				$ 4,489,100.00			$ 1,188,455.00	$ 22,545,389.00		
Total						$ 1,063,440.00				$ 33,370,240.00				$ 106,920,354.00				$ 26,901,135.00			$ 11,382,875.00	$ 178,574,604.00		


State Fiscal Year
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AB#1 Gratiot
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Utilities
AB#2 Van Dyke OINCC
Design
ROW
RED
AB#3 MT. Elliot
Design
ROW
CON
Utilities
AB#4 Second Avenue
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Utilities
AB#5 Chene & Concord
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Utilities
AB#6 Cadillac & Cass
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ROW
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Utilities
AB#7 Brush & French
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ROW
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Utilities
AB #8 Woodward Bridge
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RED
AB #9 Trumbell Bridge
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Utilities
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#2 St Aubin & Frontenac
Design
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Utilities
#3 Frontenac, Burnes, Conner
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Utilities
#4 Pedestrian Bridges
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#5 Gratiot Ramps
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Utilities
#6 Norfolk Southern & Conrail
Design
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#7 Frontenac & Norcorss
Design
ROW
CON
Utilities
#8 Pump Stations
Design
CON
#9 Temporary Widening
Design
CON
#10 Frontenac & Connor
Design
ROW
CON
Utilities
#11 Between Cass & I-75
Design
ROW
CON
Utilities
#12 Brush & Russell
Design
ROW
CON
Utilities
#13 Second Ave & Russell
Design
ROW
CON
Utilities
#14 Rehab I-75
Design
CON
#15 Cross Streets
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ROW
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Utilities
#16 Rehab Pump Stations
Design
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#17 CN Rail & Conrail Bridges
Design
ROW
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#18 Between I-96 and Trumbell
Design
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Utilities
#19 Service Drives Trumbell & Cass
Design
ROW
CON
Utilities
Owners Rep Contract
Design
Risks and Opportunities
CON
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I-94 Edsel Ford Freeway Rehabilitation Project

Detroit, Michigan

FHWA Cost Estimate Review

April 2011

Final Report

MDOT
Michigan Department of Transportation

DEPARTMENT OF TRANSPORTATION
UNITED STATES OF AMERICA

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EXECUTIVE SUMMARY

The Federal Highway Administration (FHWA), the Michigan Department of Transportation (MDOT), and their consultants conducted a workshop to review the cost estimate for the I-94 Edsel Ford Freeway Rehabilitation Project. The workshop was held at the Lansing Transportation Service Center in Lansing, Michigan on April 26-29, 2011. The closeout presentation was conducted via webinar on May 4, 2011. The objective of the review was to verify the accuracy and reasonableness of the current project total cost estimate and schedule and to develop a probability range for the cost estimate that represents the project's current stage of development. Significant results of the review are as follows:

The MDOT pre-review estimate for the project was $2.635 billion Year of Expenditure (YOE) dollars. The anticipated completion date was State fiscal year 2032.

Approximately $212 million in net adjustments were made to the estimate during the week of the review. The modifications included increases to the allowances for mobilization, construction engineering and preliminary engineering, as well as additional line items for early completion incentives, public information activities during construction, and contingencies allocated for structures and utility items.

Several good practices were identified during the review by the team including:

- Detailed estimate for level of design
    - Development of Detailed Engineering Report
- MDOT Specification & Estimate Unit review of estimates for quality control
- Estimate was updated in Year of Obligation dollars
- Use of conservative unit costs & contingency
- Project team and subject matter experts were familiar with project
- Use of preliminary Value Engineering (VE) Studies
- Incorporation of many Accelerated Construction Technology Transfer (ACTT) workshop recommendations

During the week of the review over 25 cost and schedule risk events were identified and quantified for the project by the team. Consequently, $360 million in contingency (35% of construction costs) was removed from the base estimate and redistributed in the probabilistic and risk-based analysis. Based on this risk assessment the range of total project costs varies between $1.906 billion and $3.064 billion YOE dollars. The 70%

level of confidence requires a budget of $2.840 billion YOE. This is the required baseline cost to be used in the major project financial plan to show adequate project funding.

The following recommendations are provided based on this review:

- Update estimates to reflect estimate changes made during review
- Revise estimate contingency to reflect risks and unknowns identified during review
- Consider innovative finance techniques
    - Advance total project construction
    - Bundle contracts to reduce user impacts and reduce costs
- Continue coordination with railroads to minimize or eliminate temporary runarounds
- Reconsider full mainline closures to reduce cost and shorten length of user impacts
- Establish procedures for risk-based estimation, especially for major projects
- Develop a plan to manage risks and opportunities
    - Continue updating estimate based on risk management
    - Maintain a risk register
- Consider the use of a Management Reserve after contract award

CHAPTER 1 – REVIEW PROCESS

REVIEW OBJECTIVE

The objective of the FHWA cost estimate review for the I-94 Edsel Ford Freeway Rehabilitation Project in Detroit, Michigan is to:

- Conduct an unbiased, risk-based evaluation to verify the accuracy and reasonableness of the current total cost and schedule estimates
- Develop a probability range for the cost and schedule estimate that represents the project's current stage of design.

BASIS OF REVIEW

The "Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users" (SAFETEA-LU) requires the financial plan for all Federal-aid projects with an estimated total cost of $500 million or more to be approved by the Secretary (i.e. FHWA) based on reasonable assumptions. The $500 million threshold includes all project costs, such as engineering, construction, right-of-way, utilities, construction engineering, and inflation. The FHWA has interpreted 'reasonable assumptions' to be a risk based analysis. The cost estimate review provides the risk based assessment and is used in the approval of the financial plan.

This is an independent review, but does not use an independent FHWA estimate. The review team used an estimate provided in a spreadsheet by MDOT as the base.

REVIEW TEAM

The Review Team included individuals with a strong knowledge of the Project and/or of major project work, including discipline experts. Individuals with specific project expertise briefed the Team regarding technical details and the estimate development process. The Team discussed the critical components and assumptions of the estimate, as well as the consistency in estimate development across all project segments.

Quantities and unit costs were reviewed and verified with the discipline experts. Finally, they considered variability and risks which could affect various segments of the project.

The Review Team was comprised of the following members:

- FHWA
    - Division Office
    - Headquarters Project Delivery Team
    - Resource Center
- MDOT
- Consultants – CH2M-Hill

The agenda and attendance sheet are provided in Appendices D and E.

DOCUMENTS REVIEWED

Documents reviewed prior to and during the workshop included:

- Project Cost Estimate
- Project Schedule
- Project Risks
- Draft Initial Financial Plan
- Draft Project Management Plan
- Accelerated Construction Technology Transfer (ACTT) Workshop Report (April 2007)
- I-94 Detailed Engineering Report – Opinion of Probable Cost (June 2010)

REVIEW METHODOLOGY

During the study, the FHWA staff participated in discussions to gain a better understanding of the project and its risks. The following general steps were followed:

- Verify Base Estimate
  - Understand project scope and the estimate development process
  - Discuss assumptions for contingencies and projected inflation rates
  - Review major cost elements
  - Identify Threats and Opportunities for various items (Risks)
- Consider Variation of Inputs
  - Develop market condition range for major cost elements
  - Model variation of inflation
  - Determine probability of occurrence and schedule and cost impacts for significant project threats and opportunities
  - Develop probability assumption distributions
- Perform Monte Carlo simulation to model variability and risk and generate likely range of project cost and schedule

The following discussion provides more detail about the concepts utilized during the review.

Verify Accuracy of Cost Estimate

The Review Team was provided an overview of the State's estimating process. This overview included understanding the scope of the project, stage of design and current cost estimating process used by the State. The overview also included a review of

project documents. The Review Team interviewed the subject matter experts and verified the accuracy of the State's estimate for both quantity and unit cost for each major cost element. Where changes were needed these changes were recorded and the estimate updated. Additions or deletions were also recorded and the state's estimate updated to reflect the change. Following the completion of the on-site review, any additional changes or corrections to the estimate were confirmed with the State.

Model Uncertainties

In general, uncertainties in the state's estimate can be described as those relating to base variability, cost and schedule risk events, and market risks. Each of these were discussed and modeled to reflect the total uncertainty associated with the state's estimate.

The Review Team discussed the uncertainties associated with Market Conditions at the time of letting. There is a strong relationship between the number of bidders and the cost of a project at the time of letting. Market condition is a measure of uncertainty that reflects the overall competitive bidding environment at the time of letting. Material and labor availability also affect market conditions. Market condition is applied to the base estimate using a binomial estimate of probability for better than planned and worse than planned bidding environments.

Base variability is a measure of uncertainty in a cost estimate and represents unknown-unknowns (i.e. estimate items that have not been thought of) and is typically represented using a symmetrical distribution about the base estimate.

The Review Team interviewed the State to define the components of contingency and establish the risk register for both cost and schedule risks. The risk register includes the event risk name, a description of the event, a probability measure of the likelihood the event will occur, as well as a probability distribution of costs if the event were to occur. The register also identifies if the risk event is a threat or opportunity for cost/schedule. Risk threats increase costs/schedule and opportunities decrease cost/schedule. A very important feature of the risk register is to establish the relationship of risk events. For example, some risks are mutually inclusive or mutually exclusive. Mutually inclusive means the risk event can only occur if the prior risk event occurs. Conversely, for a risk event to be mutually exclusive means that it can only occur if the prior risk event does not occur. Risk events can also be independent in which case the probability of occurrence is not dependent on any other risk event. Correlation determines how one risk event will sample relative to another risk event. Correlation should only be established when there is reason to suspect that a relationship exists and needs to be accounted for in the simulation.

After models were developed for market conditions, base variability, and risk events the Review Team utilized the Monte Carlo simulation to generate a probability based estimate of YOE Total Project Costs. A simulation is essentially a rigorous extension of a "what-if" or sensitivity analysis that uses randomly selected sets of values from the probability distributions representing uncertainty to calculate separate and discrete results. A single iteration within a simulation is the process of sampling from all input distributions and performing a single calculation to produce a deterministic result. It is important that each iteration represent a scenario, or outcome, that is possible. It is for this reason that the simulation outcomes be reviewed to ensure accuracy. The process of sampling from a probability distribution is repeated until the specified number of computer iterations is completed or until the simulation process converges. Simulation convergence is that point at which additional iterations do not significantly change the shape of the output distribution. The results of the simulation are arrayed in the form of a distribution covering all possible outcomes. The key benefit of this process is that probability is associated with costs.

Communicate Results

The last part of the review is to communicate the results. This is accomplished by providing a closeout presentation and final report to both State and FHWA Division leaders. At the end of the review the Review Team provides a closeout presentation that summarizes the review findings. The presentation identifies the review objectives and agenda, discusses the methodology, and highlights the results of the review including the pre/post workshop estimate results and identifies any estimate adjustments made during the review. The closeout presentation also identifies any significant cost and schedule risks, and provides a brief overview of recommendations by the Review Team. The closeout presentation for this review was given on May 4, 2011 via webinar. The presentation is included in Appendix B.

It is important that everyone understand that the estimate review is a snapshot in time of the estimate. As the project continues to develop, it is expected that the estimate will change and be updated. Following the review if errors or omissions are identified and confirmed with the State these modifications will be incorporated into the final report.

The final report communicates all findings of the review to the State and Division and serves as the official document for the cost estimate review. As noted earlier the review results are used in the approval of the financial plan. Cost estimate review reports are maintained by the FHWA Project Delivery Team in Washington DC.

CHAPTER 2 – REVIEW SUMMARY

PROJECT BACKGROUND

Scope
The I-94 Edsel Ford Freeway Rehabilitation project will reconstruct 6.7 miles of I-94 in the City of Detroit. The limits of the project begin east of the I-94/I-96 interchange and ends east of Conner Avenue. The scope includes widening of I-94 from three to four lanes in each direction, reconstruction of two system interchanges (I-94/M-10 and I-94/I-75), removal and/or replacement of 67 vehicle, pedestrian, and/or railroad bridges, reconstruction of various partial and full-service interchanges, and construction of continuous service drives along the corridor and through the interchanges.

Purpose and Need
As outlined in the project's 2004 Final Environmental Impact Statement (FEIS), the purpose of the I-94 Edsel Ford Freeway Rehabilitation Project is "the improvement of the condition and capacity of the existing I-94 roadway and interchanges."

The planned improvements will allow this I-94 corridor to continue to fulfill intended functions of providing for the national and civil defense, and meeting the needs of local and interstate commerce. Deficiencies discussed in the environmental document include:

- A lack of capacity indicated by frequent congestion with stop-and-go conditions;
- Safety issues (above average crash rates) related to the lack of ramps, inadequate length of ramps, and the lack of adequate acceleration-deceleration lanes for merging and weaving traffic;
- Poor local traffic circulation due to the lack of continuous service drives;
- Aging bridge and pavement conditions;
- Limited accommodation of pedestrians and bicyclists; and
- Outdated design including the M-10/I-94 interchange having left- and right-hand on-ramps and off-ramps.

Project Segments
The overall project has been divided into four segments:

> **Advanced Bridges** – This segment includes the reconstruction or replacement of 10 bridges along the corridor that have been identified based on prioritization of state of good repair and critical need. This segment is scheduled to begin in 2012.
>
> **Segment 3 – East of I-96 to Cass Avenue** – This segment includes 3.8 miles of construction. The construction for this segment will begin in 2018.

Segment 2 – Cass Avenue to Chene Street – This 1.5 mile long design section includes the I-75 Interchange reconstruction. Construction is scheduled to begin in 2023.

Segment 1 – Chene Street to East of Conner Ave - This segment is 1.5 miles long and includes reconstruction of the M-10 Interchange. Construction of this segment begins 2027.

A map of the project is shown in Figure 1.

Figure 1 Map of the I-94 Edsel Ford Freeway Rehabilitation Project

Schedule
The Final EIS was signed in December 2004 and the Record of Decision was signed in December 2005. MDOT intends to begin construction in summer 2012. The entire project is anticipated to be completed in summer 2032.

REVIEW FINDINGS

During the review, the team found many examples of good estimating practices including:

- Detailed estimate for level of design
    - Development of Detailed Engineering Report
- MDOT Specification & Estimate Unit review of estimates for quality control
- Estimate was updated in Year of Obligation dollars
- Use of conservative unit costs & contingency
- Project team and subject matter experts were familiar with project
- Use of preliminary Value Engineering (VE) Studies
- Incorporation of many Accelerated Construction Technology Transfer (ACTT) workshop recommendations

ESTIMATE

The MDOT pre-review estimate for the project was $2.635 billion Year of Expenditure (YOE) dollars. The cost in 2010 dollars was $1.766 billion. It should be noted that these cost include $20.5 million that have already been incurred for the project during the planning, environmental, and early preliminary engineering phases.

During the review, revisions were made to the pre-review estimate. The sum of these changes increased the base estimate by $212 million in 2011 dollars. Details of all changes can be seen by comparing the pre- and post review cost estimate spreadsheets. Revisions included the following modifications.

- Eliminated or Reduced Roadway & Structures Contingencies
    - Added 10% Bridge Allocated Contingency - $46 million
    - Added 35% Utility Allocated Contingency - $12 million
- Updated Metro Pavement Section - ($9 million)
- Added Early Completion Incentives - $25 million

- Added Construction Public Information - $ 30 million
- Increased Mobilization from 5% to 10% - $50 million
- Decreased Program Management and Administration from 3% to 0% - ($ 43 million)
  - Distributed in Preliminary Engineering and Construction Engineering line items
- Increased Preliminary Engineering from 7% to 9.5% - $39 million
  - Includes additional 1% for overall program management
- Increased Construction Engineering from 7% to 11% - $62 million
  - Includes additional 1% for overall program management

It should be noted that an additional $360 million in contingency (35% of construction costs) was removed from the base estimate and redistributed as part of the probabilistic and risk-based analysis that is discussed in Chapter 3.

REVIEW RECOMMENDATIONS

- Update estimates to reflect estimate changes made during review
- Revise estimate contingency to reflect risks and unknowns identified during review
- Consider innovative finance techniques
  - Advance total project construction
  - Bundle contracts to reduce user impacts and reduce costs
- Continue coordination with railroads to minimize or eliminate temporary runarounds
- Reconsider full mainline closures to reduce cost and shorten length of user impacts
- Establish procedures for risk-based estimation, especially for major projects
- Develop a plan to manage risks and opportunities
  - Continue updating estimate based on risk management
  - Maintain a risk register

- Consider the use of a Management Reserve after contract award

CHAPTER 3 – RISK ANALYSIS

Cost estimates, especially those for Major Projects, usually contain a degree of uncertainty due to unknowns and risks associated with the level of detail design completion. For this reason, it is logical to use a probabilistic approach and express the estimate as a range rather than a point value. During the cost estimate review, uncertainties in the project estimate such as base variability, inflation, market conditions, and risk events were modeled by the Team to reflect the opinions of the subject matter experts interviewed. The Team used the Monte-Carlo simulation to incorporate the uncertainties into forecast curves that represents a range of costs and completion dates for the Project.

FORECAST RESULTS FOR TOTAL PROJECT COSTS

Figure 2 shows the results of the simulation for the Project. The figure depicts the forecast curve for the Total Project Cost in the YOE dollars. These costs include construction, design/engineering, construction engineering, right-of-way, inflation, and allowances. The probable range of total project cost is shown by the blue shaded area, with the 70% level of confidence estimate at $2.840 billion. Alternatively, these results predict a 30% probability that total project costs will exceed this value based on the underlying variation within the estimate.

Figure 2 – Probable range of Total Project Costs

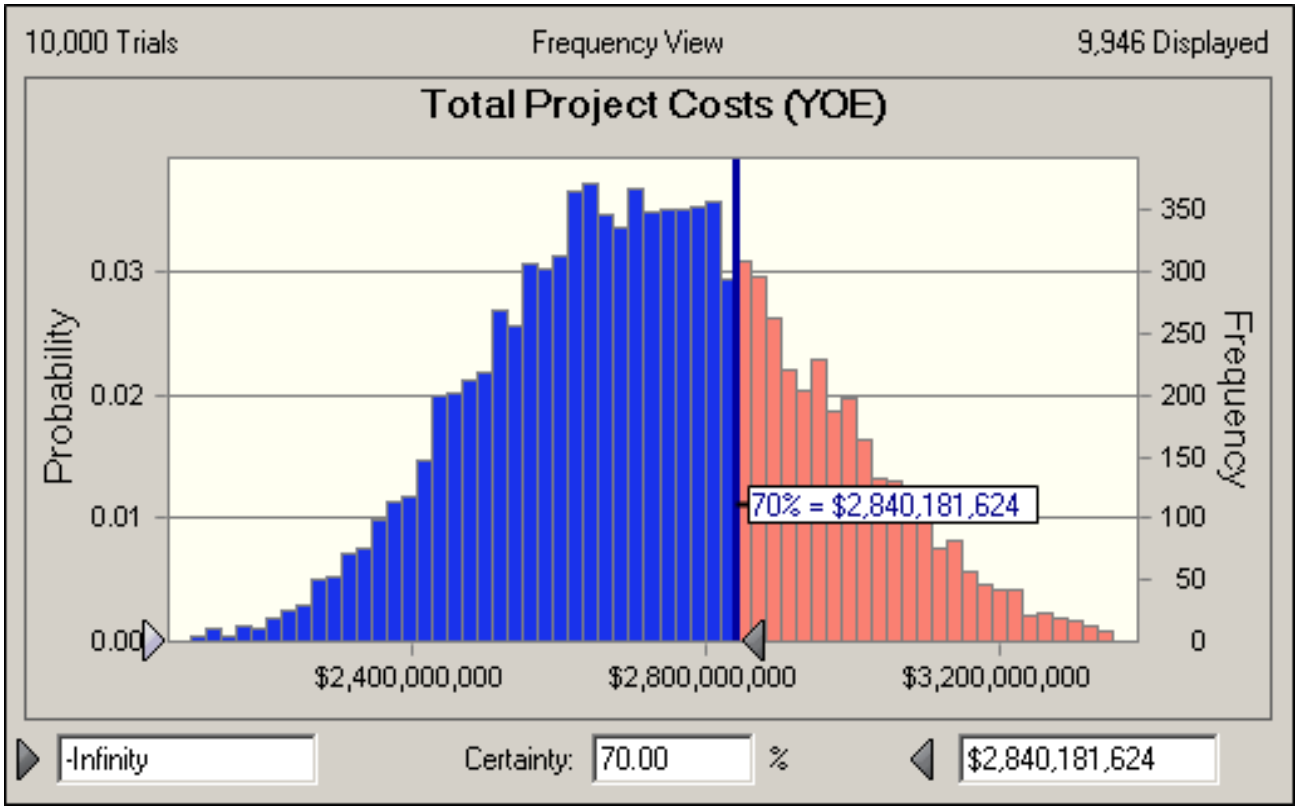


Table 1 demonstrates that the project cost range from $1.906 billion to $3.642 billion. The lower and higher ends of the variance are unlikely. The higher end at 100% reflects an occurrence where all significant risks will be realized, including those with a relatively low likelihood. This wide range of variation is due to the early design stage for the project. As design progresses closer to final design, this range should become narrower. The 70% estimate is greater than the pre-review base value of $2.635 billion by approximately 6% and the pre-review estimate is close to the 35% confidence level as seen from Table 1. It is highly recommended this range of costs be presented in any project information to provide the public with the sense of variability and uncertainty.

Table 1 Percentile Rankings of Total Project Costs in YOE Dollars.

Percentile	Forecast values
0%	$1,906,451,942
10%	$2,442,330,443
20%	$2,533,928,218
30%	$2,604,005,068
40%	$2,660,546,649
50%	$2,720,302,891
60%	$2,778,484,549
70%	$2,840,181,624
80%	$2,914,154,416
90%	$3,016,240,472
100%	$3,641,683,347

FORECAST RESULTS FOR PROJECT COMPLETION DATE

Figure 3 shows the forecast curve for the date of project completion. Based on a schedule base variability of +/- 10% and identified schedule risks, Figure 3 shows that there is a 70 percent probability that the project will be completed prior to April 2033. The figure also indicates a 30 percent probability of exceeding this date. The project schedule is mostly driven by funding availability. It should be noted that the schedule could be dramatically shortened should more funding become available in early years.

Advanced funding scenarios were not modeled. Table 2 displays the percentile rankings for the project completion date forecast. These results are only for informational purposes and are not required to be reported in the project's financial plan.

Figure 3 - Probable range of Total Schedule

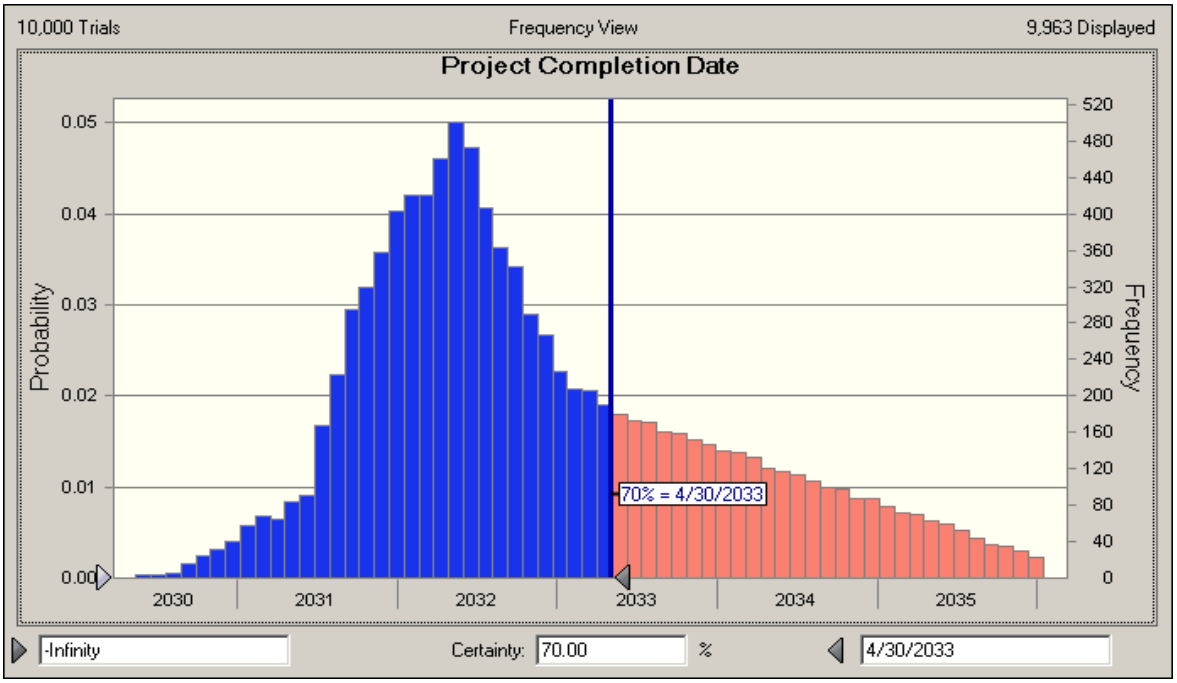


Table 2 – Percentile ranking of Total Project Schedule Completion Dates

Percentile	Forecast Values
0%	5/15/2030
10%	9/16/2031
20%	12/26/2031
30%	3/16/2032
40%	5/26/2032
50%	8/12/2032
60%	11/24/2032
70%	4/30/2033
80%	11/20/2033
90%	8/12/2034
100%	5/14/2036

PROBABILITY ASSUMPTIONS

The assumptions discussed below describe how the Team modeled the risk events, base variability, inflation, and market conditions that served as inputs for the results shown in the previous section of the report. As discussed in Chapter 1, the Monte Carlo analysis selects random inputs from these distributions to determine discrete values for a given number of iterations. The model runs the simulation through 10,000 iterations and ranks the results to determine the likely range of cost and schedule for the project.

Risk - Threats and Opportunities

The purpose of the risk register is to identify significant cost and schedule risks in the estimate. In a traditional cost estimate, risks are often accounted for using estimates of contingency. The Review Team identified that 35% of construction cost ($360 million) had been designated as contingency in the pre-review base estimate to account for the level of design as recommended by the Association for the Advancement of Cost Estimating International (AACEI). During the review subject matter experts were interviewed to break out the components of contingency as explicit risk events into a risk register. The risk events for cost and schedule are identified in Tables 3, 4, and 5.

The team identified and discussed risks to the project in terms of threats and opportunities. For purposes of this review, a threat is a risk event that can add to the cost and/or schedule of the project and an opportunity is an event that can reduce the cost and/or accelerate the schedule.

These risks were described and quantified in a risk register during the review. For example, the team identified that there is a possible opportunity related to the final agreements with the railroad companies along the corridor in Segment 1. Based on a final agreement, potentially no shoofly or runaround will be needed to accommodate railroad operations during construction. The realization of this opportunity will lead to a decrease in the construction cost associated with the temporary bridge structure. The team identified a 30% likelihood that the opportunity could occur. Additionally, if the risk event occurred there would be a most likely savings of $40.5 million and a minimum and maximum savings of $35 million and $45 million, respectively.

The risk events were also categorized as either a global risk or a segment specific risk. Global risks are those risks that are not specific to one segment of the project and occur throughout the 20-year duration of the project's construction. In addition to specific project risks that were identified, the Team also modeled risks to account for unidentified and aggregate minor risks. To model unidentified risk, the team considered the characteristics and complexity of this project and estimated the possibility of additional risk (unknown-unknowns) that are typical in similar projects. To capture the impact of aggregate minor or less significant risks to the project, the team considered less costly risks that had been identified during the review. This included risks associated with surplus/excess property, vibration mitigation, and cultural environment enhancements and/or mitigation.

Table 3 Cost Threats

Segment	Functional Assignment	Event Risk Name	Detailed Description of Risk Event	Probability	Min Cost	Most Likely Cost	Max Cost
1	CN+UT	Additional pedestrian bridge	Additional pedestrian bridge may be necessitated by development in area	0.3	$3.7 M	$3.7 M	$10 M
1	ROW	Additional ROW for RR	Additional ROW to accommodate temporary tracks	0.95	$0.9 M	$1.5 M	$2.5 M
1	CN+UT	Innovative bridge construction	Potential to decrease time to construct bridges, may be additional cost due to technology and ROW for offsite construction	0.3	$5 M	$10 M	$15 M
3	ROW	Damages to ROW	Impacts to existing buildings and parking areas and provide access during construction	0.75	$1 M	$4 M	$15 M
3	ROW	Additional ROW for RR in Segment 3	Additional ROW to accommodate temporary tracks; includes cost for both RRs in Segment 3	0.95	$0.9 M	$1.5 M	$2.5 M
Global	CN+UT	Unidentified Risks	Threats not identified	0.65	$45 M	$56 M	$68 M
Global	CN+UT	Aggregate Minor	Threats aggregate minor	0.65	$18 M	$22.6 M	$27 M
Global	CN+UT	Additional noise walls	Modifications to noise wall quantities may be necessary	0.8	$0	$2.5 M	$5 M
Global	CN+UT	Skills Training	Community jobs training (RCAR)	1	$4 M	$5 M	$6 M
Global	CN+UT	Impacts to sanitary sewer	Final design/construction impacts necessitate replacement of sanitary sewer	0.6	$3 M	$5 M	$7 M
Global	CN+UT	Structures Contingency	Structures (bridges & walls) contingency to cover risks such as longer/additional piling, high strength piling, ground improvements due to poor soil, and/or increased steel prices	1	$70 M	$105 M	$134 M
Global	CN+UT	Larger drainage pipes/storage requirements	Additional storage capacity may be needed as final design progresses; cost for hydrodynamic separators	0.75	$4 M	$5 M	$6 M

Table 3 Cost Threats (con't)

Segment	Functional Assignment	Event Risk Name	Detailed Description of Risk Event	Probability	Min Cost	Most Likely Cost	Max Cost
Global	CN+UT	Pump Station Risk	Some pump stations may need to be replacement instead of refurbishment; estimate only assumes foundations 3 ft below pump station	0.35	$5 M	$7 M	$9 M
Global	CN+UT	Design of drainage for service roads	Drainage design along service roads may change as design of service road progresses	0.5	$2 M	$3 M	$5 M
Global	CN+UT	Damage to existing DWSD infrastructure	Potential damage during construction to the existing water and sewer system	0.35	$1 M	$2 M	$3 M
Global	CN+UT	Construction Contingency	Includes costs associated with overruns and change orders; may include risks such as construction accidents, vehicle accidents, electrical issues, security/safety issues; new construction methods such as secant pile walls	1	$0	$30 M	$70 M
Global	CN+UT	Slope Stability/ Global Stability	Impacts of replacing existing slopes with secant pile walls; current estimate based on older surveys	0.5	$0	$10 M	$36 M
Global	CN+UT	Unknown Soil conditions	Possibility of encountering hydrogen sulfide latent water	0.1	$1 M	$2 M	$3 M
Global	CN+UT	Foundation modifications due to Utility conflicts	Drill shafts may need to be used in some locations instead of drill shafts to avoid utilities (bridges & walls)	1	$15 M	$18 M	$25 M
Global	CN+UT	Pavement design for longer life cycles	Possible usage of enhanced pavement methods such as stabilized cement base, non-corrosive dowel bars to reduce maintenance requirements and user costs in the future	0.6	$4 M	$5.5 M	$7.5 M
Global	CN+UT	Additional ITS Requirements	Potential future ITS technologies	0.75	$2 M	$3 M	$4 M
Global	CN+UT	Innovative traffic control methods	Includes cost for innovative maintenance of traffic techniques (MOT) such as moveable barrier systems, traffic models performed during construction	0.75	$1 M	$2 M	$4 M

Table 4 Cost Opportunities

Segment	Functional Assignment	Event Risk Name	Detailed Description of Risk Event	Probability	Min Cost	Most Likely Cost	Max Cost
1	CN+UT	Railroad Bridges	Final agreement with railroads could provide decrease in cost; potentially no shoofly would be needed	0.3	$35 M	$40.5 M	$45 M
1	CN+UT	Full Traffic Closures during Construction	Reconsider full closure options on interstate during construction; potentially leads to decrease cost and accelerated schedule; possible increase in user delay costs	0.5	$14 M	$35 M	$56 M
2	CN+UT	Full Traffic Closures during Construction	Reconsider full closure options on interstate during construction; potentially leads to decrease cost and accelerated schedule; possible increase in user delay costs	0.5	$5.5 M	$13 M	$22 M
3	CN+UT	Full Traffic Closures during Construction	Reconsider full closure options on interstate during construction; potentially leads to decrease cost and accelerated schedule; possible increase in user delay costs	0.25	$13 M	$32 M	$52 M
Global	CN+UT	Unidentified Risks	Opportunities not identified	0.5	$9.8 M	$12 M	$14.7 M
Global	CN+UT	Aggregate Minor	Opportunity aggregate Minor	0.5	$4.9 M	$6 M	$7.4 M
Global	CN+UT	Value Engineering Change Proposals (VECP)	Opportunities in cost associated with VECPs during construction	0.5	$1 M	$2 M	$4 M
Global	CN+UT	Lower Mobilization Cost	Lower mobilization costs; typically mobilization cost estimated at 10% of construction costs	0.35	$0	$0	$44 M

Schedule Analysis

In the schedule analysis, only schedule risks were identified that may impact the critical path for the project. Due to the current packaging of the project into four segments and 26 construction contracts and significant float built into the 20-year schedule to accommodate funding constraints, the team was only able to identify a few risk events that could impact schedule. These risks are outlined in Table 5.

Table 5 Schedule Opportunities

Segment	Functional Assignment	Event Risk Name	Detailed Description of Risk Event	Probability	Min Schedule (mo)	Most Likely Schedule (mo)	Max Schedule (mo)
1	CN+UT	Full Traffic Closures during Construction	Reconsider full closure options on interstate during construction; potentially leads to decrease cost and accelerated schedule; possible increase in user delay costs	0.5	6	9	12
2	CN+UT	Full Traffic Closures during Construction	Reconsider full closure options on interstate during construction; potentially leads to decrease cost and accelerated schedule; possible increase in user delay costs	0.5	6	9	12
3	CN+UT	Full Traffic Closures during Construction	Reconsider full closure options on interstate during construction; potentially leads to decrease cost and accelerated schedule; possible increase in user delay costs	0.25	6	9	12

The team recognizes that the availability of funding will greatly affect the project's cost. Obtaining funding sooner will reduce inflation and possibly gain more favorable market pricing, while delays in funding will do the opposite. If the project is expected to create a significant benefit for Detroit metropolitan area and Michigan, MDOT and the Detroit Metropolitan Planning Organization (MPO) may want to investigate opportunities to advance construction and save on these costs. For example, consider:

- Packaging projects opportunities to combine contracts to optimize size and sequencing to enhance competition and more favorable pricing
- Use of contractor incentives and alternative contracting methods such as A+B bidding, Design-Build, and Construction Manager as General Contractor (CMCG)
- Consider opportunities for innovative financing such as bonding or credit assistance

Because of the current development stage of the project and duration of the project, the project team agreed that it would be beneficial to analyze the effects of the schedule delay on the cost estimate. It was determined that a one-year delay in the current project schedule would increase project cost by approximately $81 million due to inflation.

Base Variability

The project team determined the base variability for construction using a weighted average method. This was based on feedback from the project team and subject matter experts about the current level of design and estimating trends at MDOT. For example, for major project elements in which little design had been completed, a higher base variability was identified. The total variability was then weighted based on the cost of that element to the total construction cost of the project. The weighted base variability was determined to be +/- 16.53%. These details are shown below in Table 6.

The schedule, ROW, and PE base variability were determined to be +/- 10% based on discussions with subject matter experts.

Table 6 Base Variability

	Level of Design Detail	Cost by Group	Base Variability	Weighted Base Variability
1. Removal	15.00%	$7,723,359	10%	0.07%
2. Earthwork	15.00%	$13,574,678	10%	0.12%
3. Pavement and Base Materials	40.00%	$73,579,773	10%	0.67%
4. Drainage and Erosion Control	15.00%	$50,155,645	20%	0.91%
5. Structures	10.00%	$717,401,780	15%	9.73%
6. Traffic	10.00%	$145,632,318	25%	3.29%
7. Miscellaneous Construction	15.00%	$51,719,944	15%	0.70%
8. Utility Relocation	15.00%	$46,027,872	25%	1.04%
		$1,105,815,369		**16.53%**

Market Conditions

The assumptions for the construction and ROW market conditions are shown in Table 7. For example, based on information from the MDOT project team and subject matter experts, it was assumed for Segment 3 there is a 4% probability that market conditions would cause construction costs to be 10% better than planned. Conversely, it was a 24% probability that construction cost would be 10% worse than planned. Logic follows that the analysis also includes the 72% probability that cost will be as planned in the current estimate. These assumptions were largely based on the anticipated material and labor availability in the Detroit metropolitan area at the time of letting for each segment of the project. The team considered other transportation projects that should be ongoing at the time of letting and trends in market conditions over the last few years. The market conditions for ROW were based on discussions with subject matter experts about recent real estate trends in the Detroit area. ROW market conditions are shown in Table 8.

Table 7 Base Construction Cost Market Conditions

	Better than Planned		Worse than Planned	
	Probability	**Impact**	**Probability**	**Impact**
Advanced Bridges	6%	10%	24%	10%
Segment 3	4%	10%	28%	10%
Segment 2	12%	10%	20%	10%
Segment 1	12%	10%	20%	10%

Table 8 Base ROW Cost Market Conditions

	Better than Planned		Worse than Planned	
	Probability	**Impact**	**Probability**	**Impact**
Advanced Bridges	5%	10%	5%	10%
Segment 3	5%	10%	5%	10%
Segment 2	10%	10%	10%	10%
Segment 1	10%	10%	10%	10%

Inflation

The inflation rate used in the analysis for the project was based on historical trends in construction costs. Based on data from the Bureau of the Labor Statistics, MDOT policy for the 5-year work plan, and inflation rates used for other major projects, it was determined that the short term inflation should be 5% and inflation over longer periods such as 6-20 years should be 3%. Thus, an inflation rate of 5% was used for advanced bridges phase of the project with a range of 2.5% to 4%. The inflation for all ROW costs and construction costs in segments 1, 2, and 3 was modeled as 3% with a range of 0% to 5.5%.

CONCLUSION

This probabilistic analysis resulted in a cost estimate at the 70% confidence level of $2.840 billion (YOE) for the I-94 Edsel Ford Freeway Rehabilitation Project. The 70%

confidence level is also the minimum amount of funding that must be shown for the approval of the initial Financial Plan. Any changes made to the cost estimate after the cost estimate review should be outlined in the initial Financial Plan. It is highly recommended that these costs be used in any project information conveyed to the public. Appendix C includes the entire report of inputs and results of this probability analysis.

APPENDICES

A – Cost Estimate Review Opening Presentation

MI I-94 Edsel Ford Opening Presentatior

B – Cost Estimate Review Closing Presentation

MI I-94 Edsel Ford Closing Presentation.

C – Crystal Ball Probability Analysis

MI I-94 CER CB Report.pdf

D – Cost Estimate Review Agenda

I-94 CER Agenda.pdf

E – Cost Estimate Review Sign-In Sheets

MI I-94 CER Sign-In Sheet.pdf

I-94 Edsel Ford Freeway Rehabilitation Project

Detroit, Michigan

Cost Estimate Review

April 26-29, 2011

Cost Estimate Review Objective

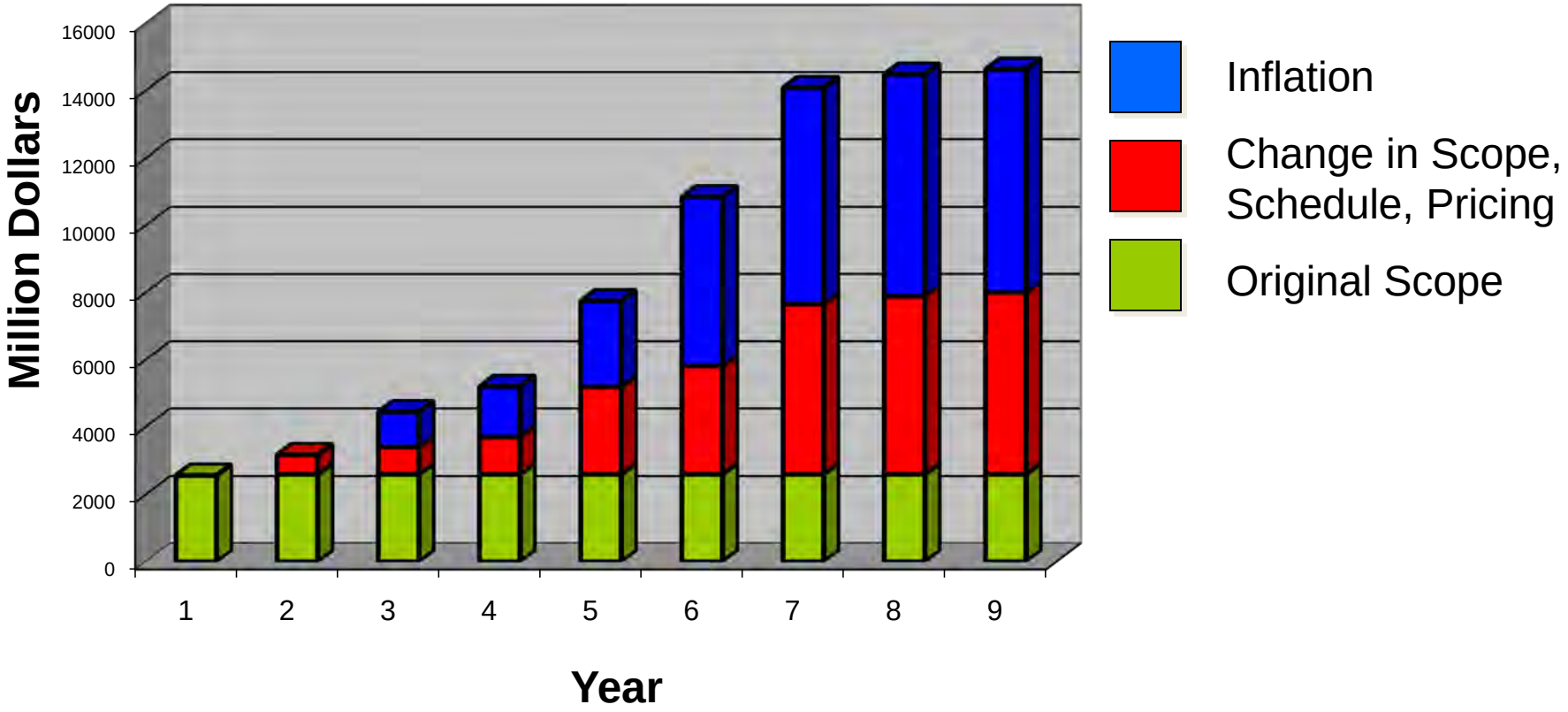
Conduct an unbiased risk-based review to verify the accuracy and reasonableness of the current total cost estimate to complete the

I-94 Edsel Ford Freeway Rehabilitation Project

and to develop a probability range for the cost estimate that represents the project's current stage of design.

Evolution of Cost for Boston Central Artery & Tunnel

"BIG DIG" Cost Estimate



Policy Directives

- First enacted by TEA-21
- Title 23 U.S.C 106(h)(3)(B)

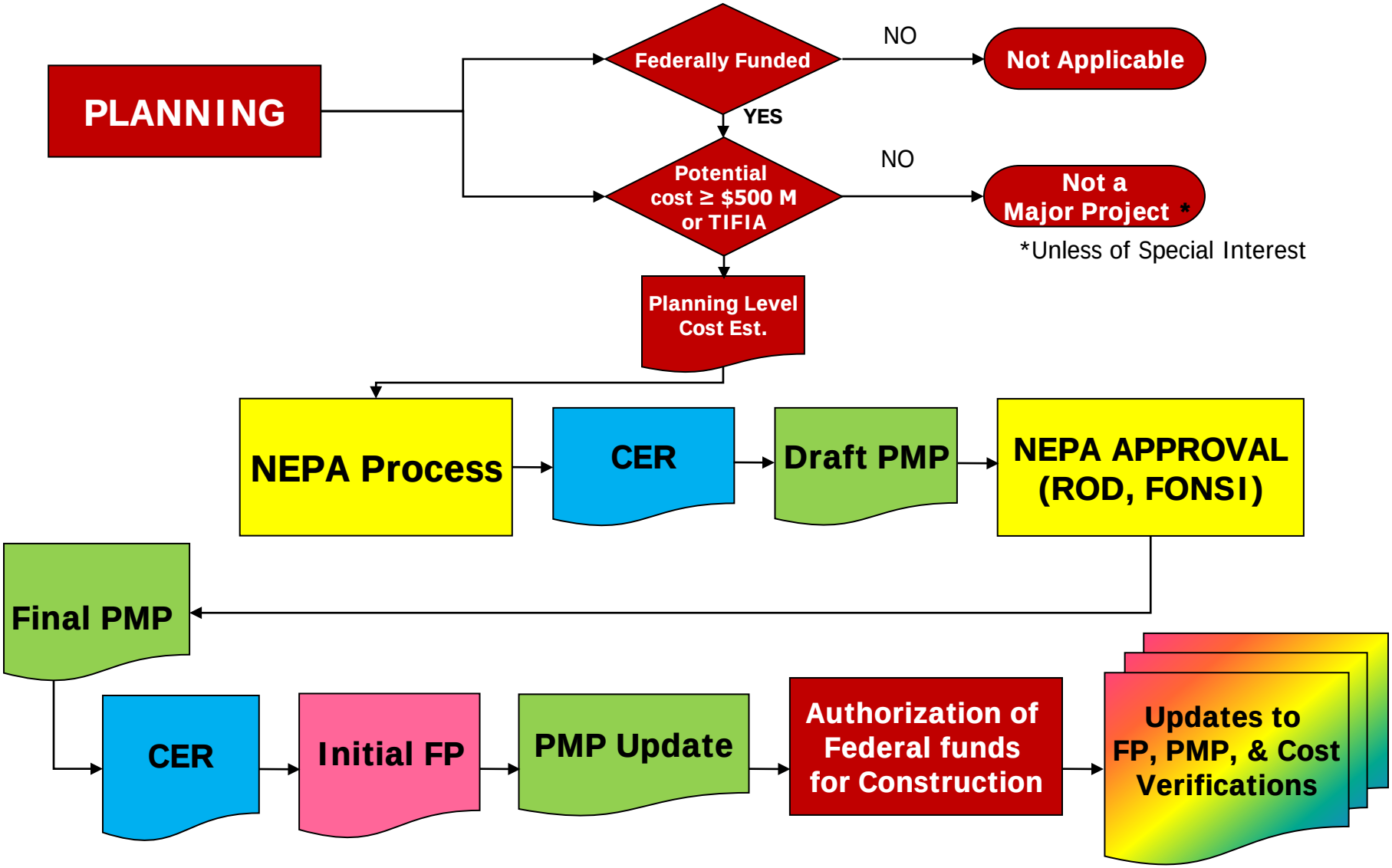
…based on reasonable assumptions, as determined by the Secretary, of future increases in the cost to complete the project…"

  - Secretary = FHWA
  - Reasonable assumptions = Risk based probabilistic approach

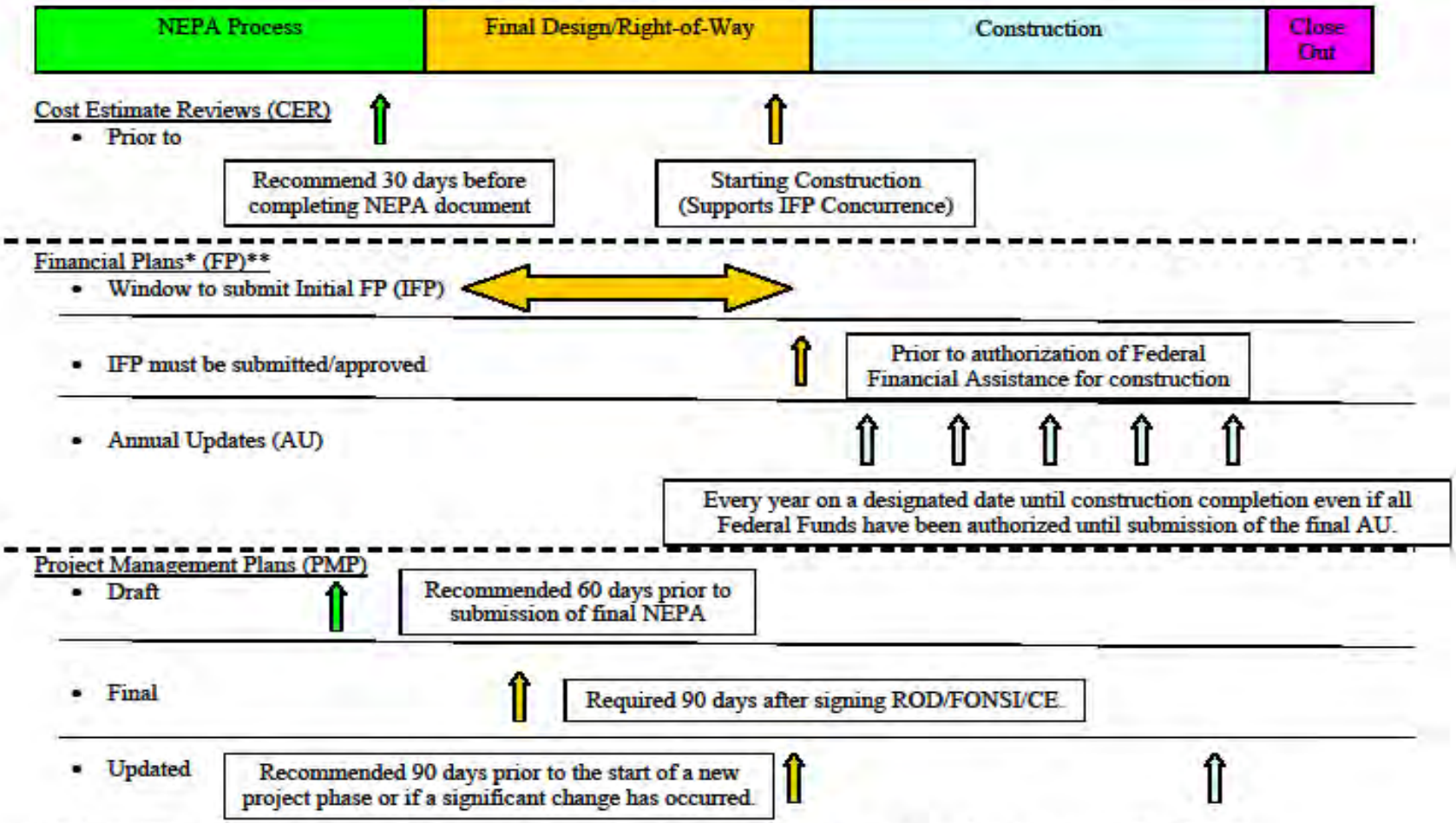
CERs & Financial Plans

- Financial Plans
  - Consider all costs – Engineering, Construction, ROW, Utilities…
    - *In Year of Expenditure (YOE) Dollars inflated to the mid-point of construction*
  - Required at the following thresholds:
    - **$500 Million or higher**
      Major Project – Requires concurrence from FHWA HQ
    - **$100 Million to $500 Million**
      Required, however review is at FHWA Division's discretion

Basic Major Project Process



Major Project Deliverable Timeline



* Only the FP requirements apply to the $100 - $500 million projects and they are not submitted unless requested by FHWA.
** For Design/Build projects the IFP is approved prior to the D/B Contract award.

FHWA Major Project Resources

FHWA Innovative Program Delivery Office

Website: http://www.fhwa.dot.gov/ipd/project_delivery/index.htm

- *FHWA Final Major Project Guidance*, January 2007
- *Major Project Program Cost Estimating Guidance*, January 2007
- *Financial Plan Guidance*, January 2007
- *Project Management Plan Guidance*, January 2009
- *Operational Independence and Non-Concurrent Construction Guidance*, December 2009
- Active Major Project Monthly Status (FOIS Output)

Review Agenda

I-94 Edsel Ford Freeway Rehabilitation

April 26-29, 2011

8:00 am – 4:30 pm

MDOT Offices – Lansing Transportation Service Center

<u>Tuesday, April 26</u>

- CER Introduction by FHWA
- Project Overview by Project Personnel
- Overview State Estimation Process
- Market Conditions
- Soft Costs – Administrative, Inflation
- Define Contingency, Project Risks, & Risk Register
- ROW
- Value Engineering & Detailed Engineering Reports
- Erosion Control, Drainage

Review Agenda (cont.)

Wednesday, April 27

- Utilities, Lighting, Pump Stations
- Enhancements, Noise Barriers
- Pavement, Structures
- ITS, Signing
- Contingencies, Engineering, Administration, Mobilization

Thursday, April 28

- Geotechnical, Retaining Walls
- Traffic Safety, Construction Signing, Traffic Control
- Financial Plan, Phasing Costs, Escalation
- Revisit Risk Register
- CER Team Working Session

Friday, April 29

- CER Closeout Presentation

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
  - Goal is to verify accuracy and reasonableness of estimate

Risk-based Probabilistic Approach

Review Participants

- ❖FHWA
  - Division Office
  - Headquarters Project Delivery Team
  - Resource Center
- ❖Michigan Department of Transportation

Pre-Review Webinar

April 14, 2011

- Overview CER process
- Project background
- Draft estimate
- Identify Risk events

Review Methodology

- **Verify Accuracy of Estimate**
  - Review major cost elements
  - Review allowances and/or contingencies
  - Adjust estimate as necessary Changes/Additions/Deletions
- **Discuss / Model**
  - **Base Variability**
  - **Market Conditions & Inflation**
  - **Key Schedule & Cost Risks**
    - Aggregate risk events
    - Identify key project global and contract specific risks
    - Establish risk event relationships
    - Develop assumptions for probability and impact for each risk event
- **Perform Monte Carlo simulation to generate a project estimate as forecast range**
- **Communicate Results**

Documentation Provided

- Project Cost Estimate
- Project Schedule
- Project Website
- Draft Project Management Plan
- Draft Initial Financial Plan
- ACTT Workshop Report (April 2007)
- I-94 Detailed Engineering Report – Opinion of Probable Cost (June 2010)

Review Baseline

Pre-Review Project Information

Total Cost (YOE): **$2.635 billion***

Total Cost (Current): **$ 1.766 billion***

Project Completion Date: **SFY 2032****

*Includes $20.5 million of prior costs

**Last construction package will be let in 2029

CER Concepts – Uncertainty

"We know it is going to happen"

Known Knowns

"We expect it to happen, but do not have enough information to quantify it yet."

Known Unknowns

Unknown Knowns

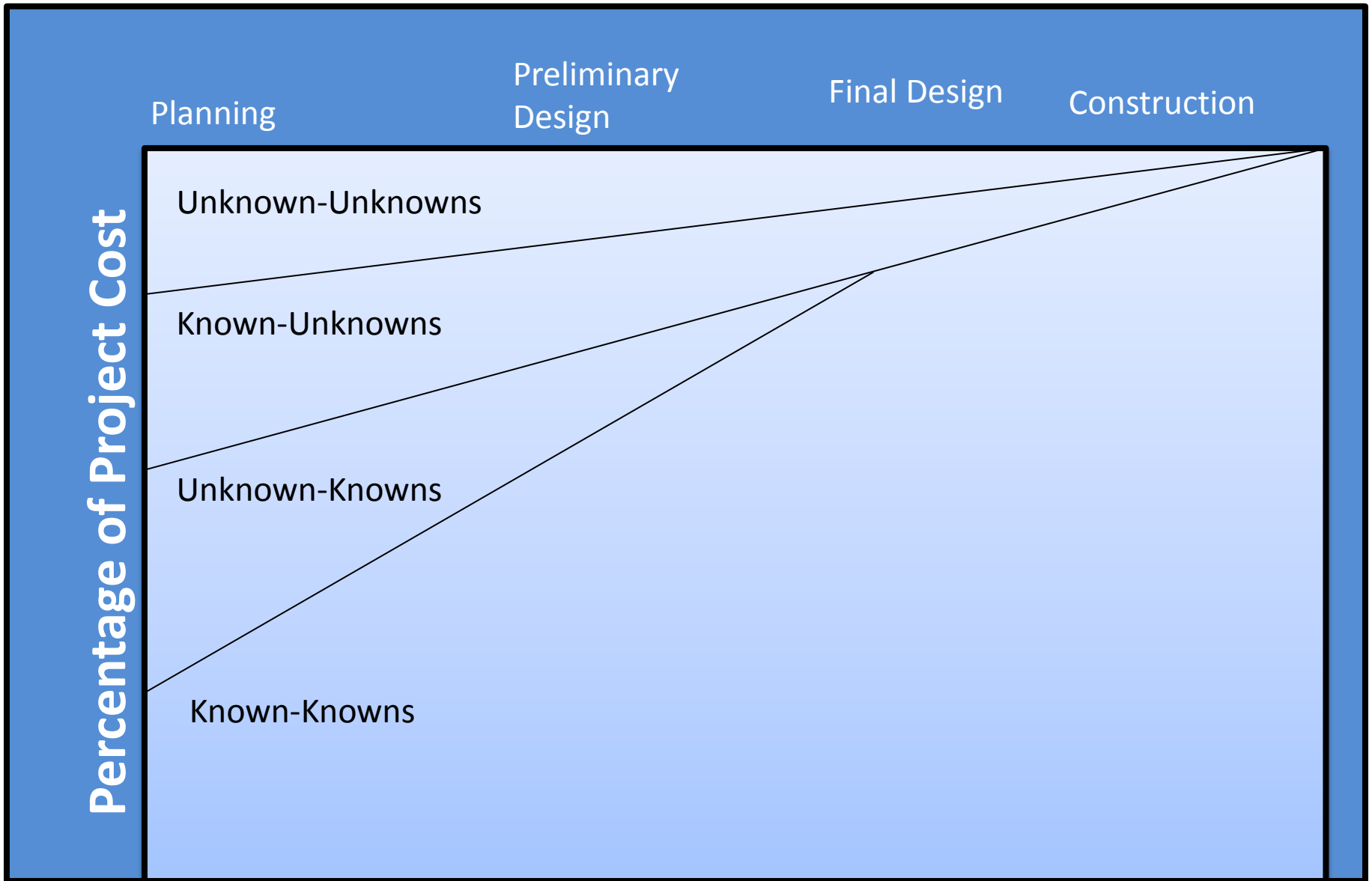
"It might happen, but at least we know about it"

Unknown Unknowns

"We didn't see that coming!"

CER Concepts – Uncertainty (cont.)

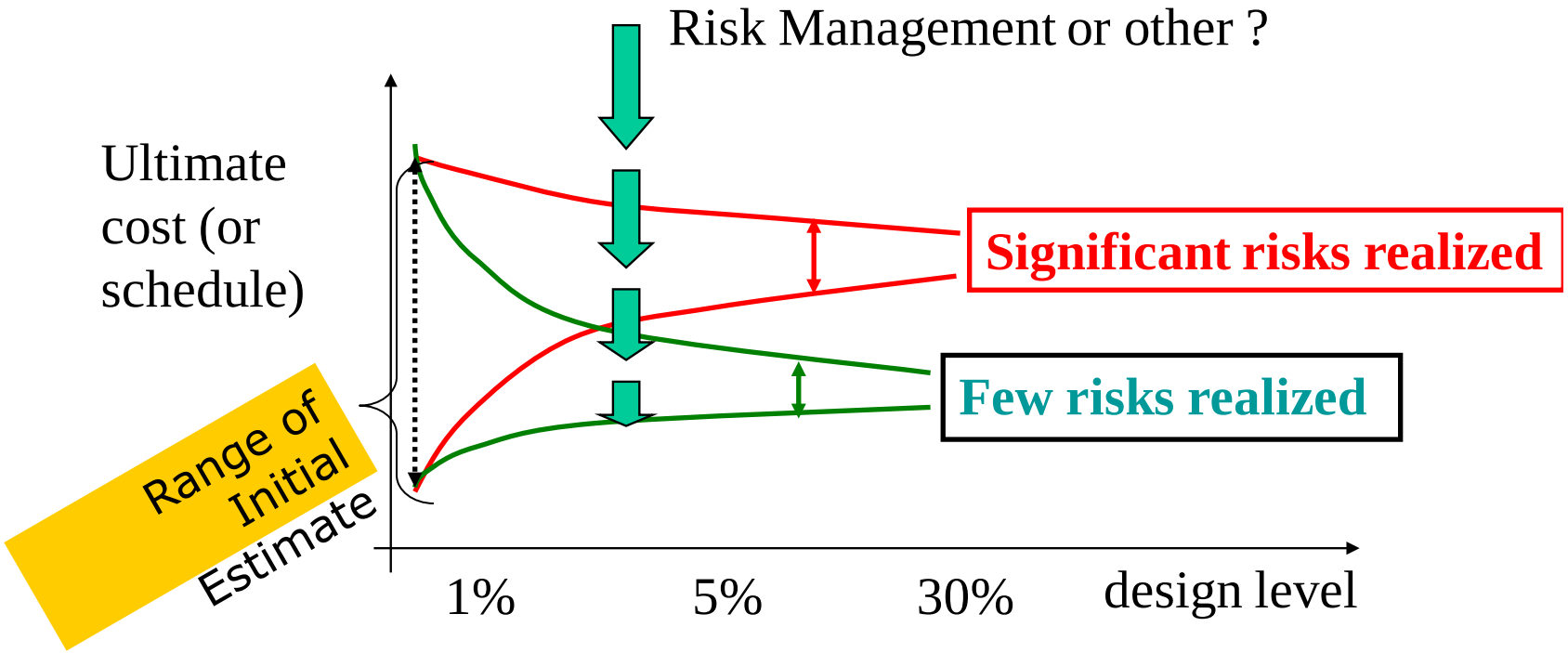
Principle 1 - Components of Cost Uncertainty



CER Concepts – Uncertainty (cont.)

Principle 2 – The Evolution of Uncertainty

Uncertainty Decreases with Design Development



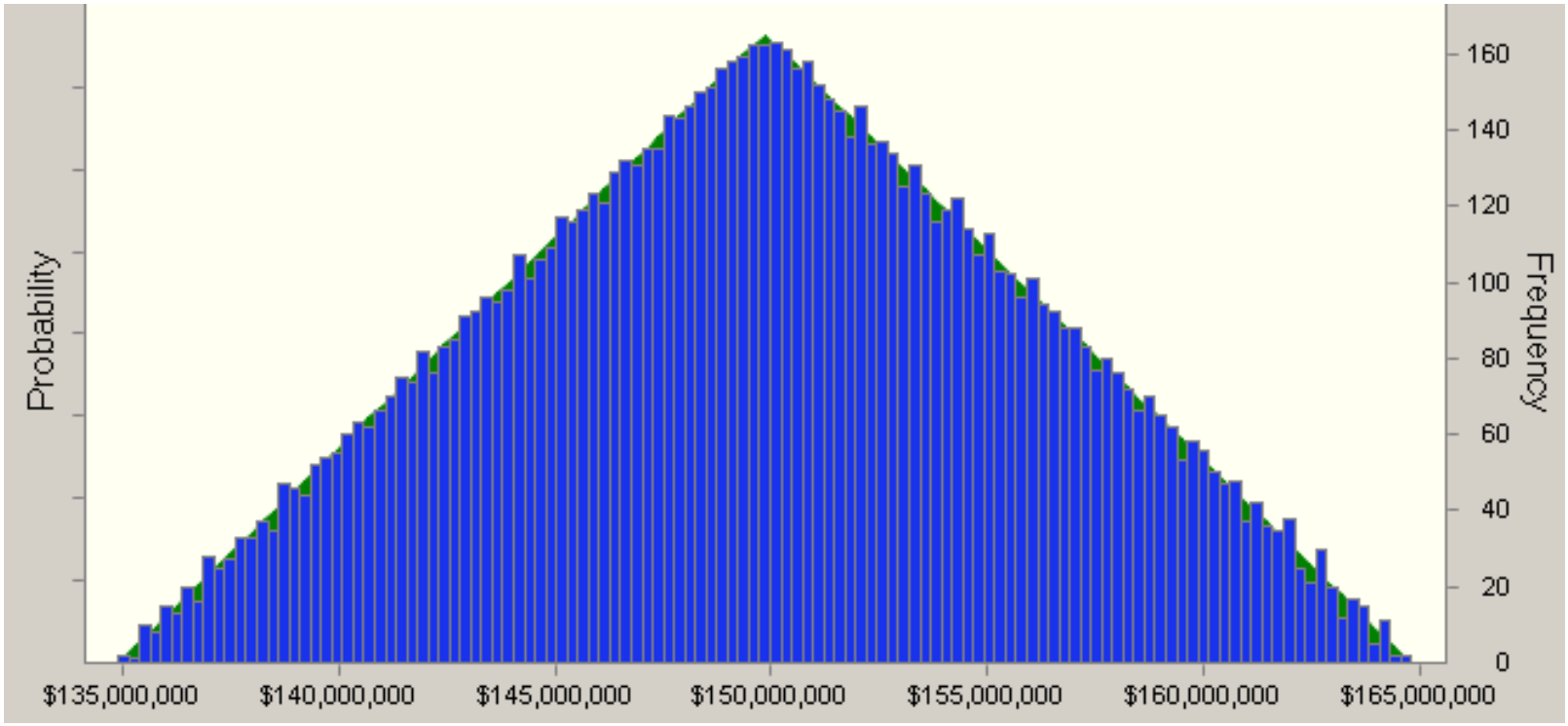
CER Concepts

Uncertainty = Variability + Risks

- Variability – inherent uncertainty not caused by risk events
- Risks – an uncertain event or condition that if it occurs has a negative or positive effect on project's objectives
  - Threats – negative impacts
  - Opportunities – positive impacts

CER Inputs - Variability

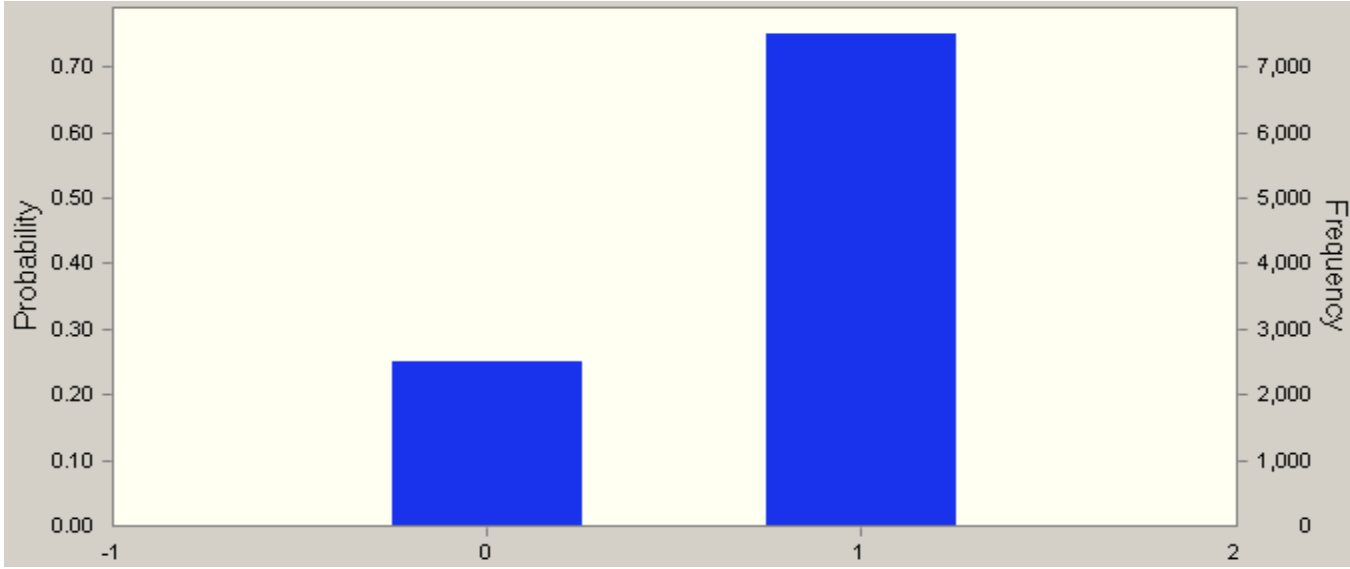
STRUCTURES



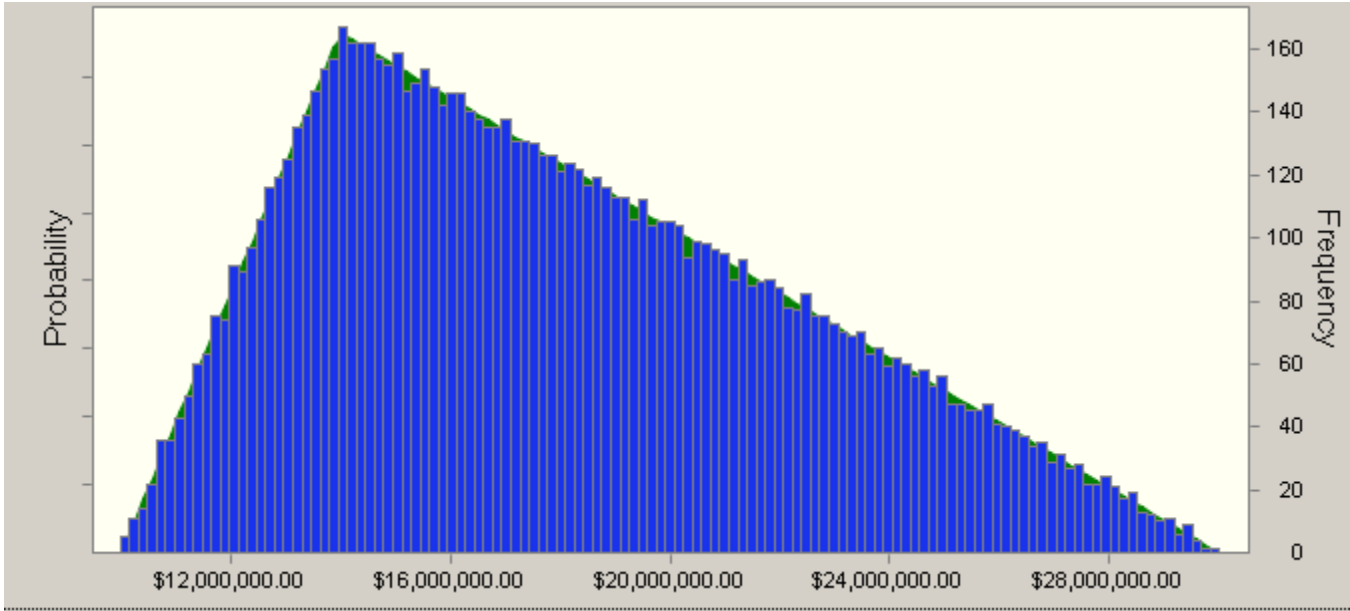
Triangular Distribution
Most Likely - $150 M
Minimum – $135 M
Maximum - $165 M

CER Inputs - Risk

Likelihood of Occurrence
75%



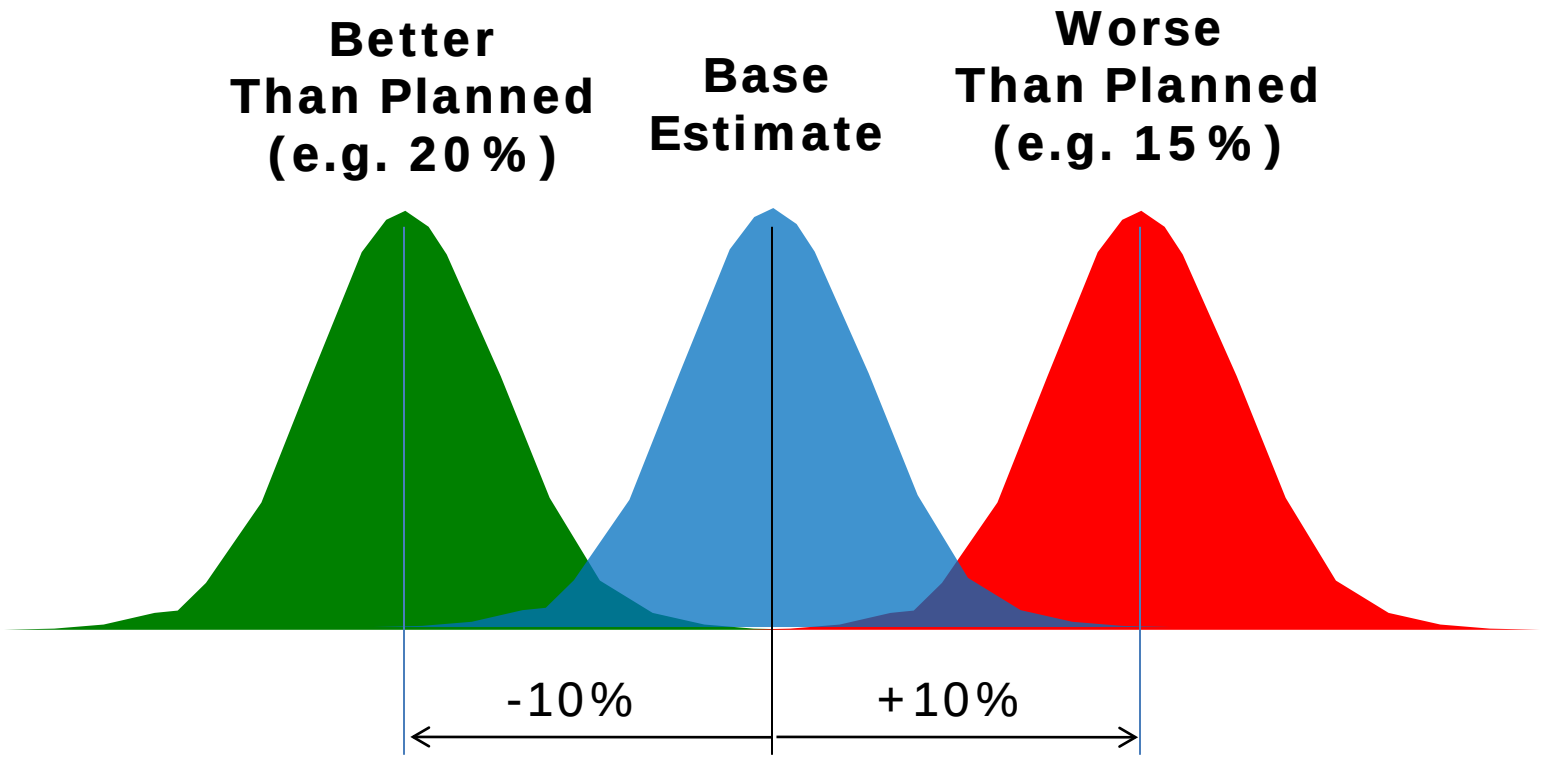
Impact of Occurrence
Triangular Distribution
Most Likely - $14 M
Minimum - $13 M
Maximum - $30 M



CER Concepts

- Inflation – increase in price over time
- Market Conditions – consequence of supply and demand factors which determine prices in a market economy
  - bidding environment at time of letting, i.e. number of bidders, available labor

CER Concepts - Market Conditions



CER Concepts

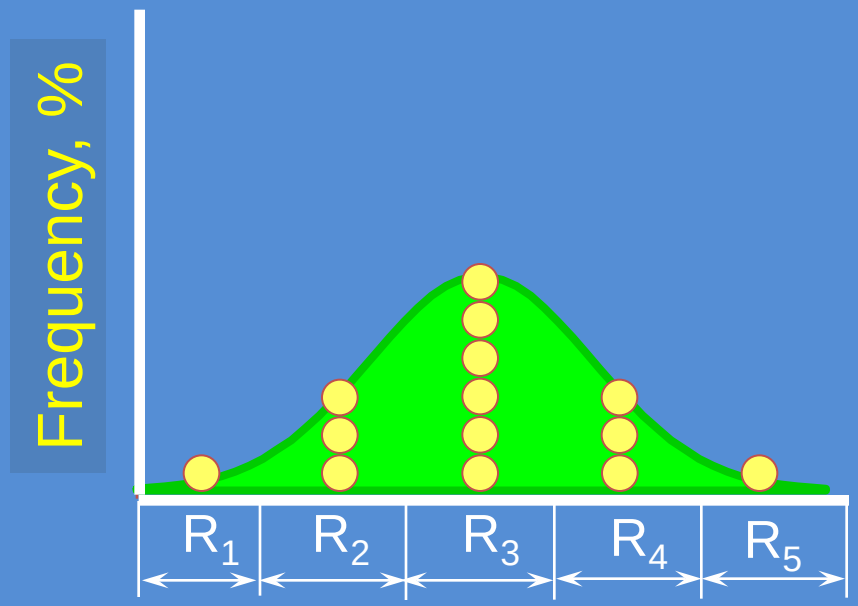
- Escalation – changes in price levels driven by underlying economic conditions
  - Includes the effects of, but differs from, inflation
  - Causes
    - Scope changes
    - Delivery/Procurement Approach
    - Engineering/Construction Complexities
    - Poor Estimating
    - Effects of Inflation
    - Market Conditions
    - Unforeseen events or conditions

Monte-Carlo Simulation

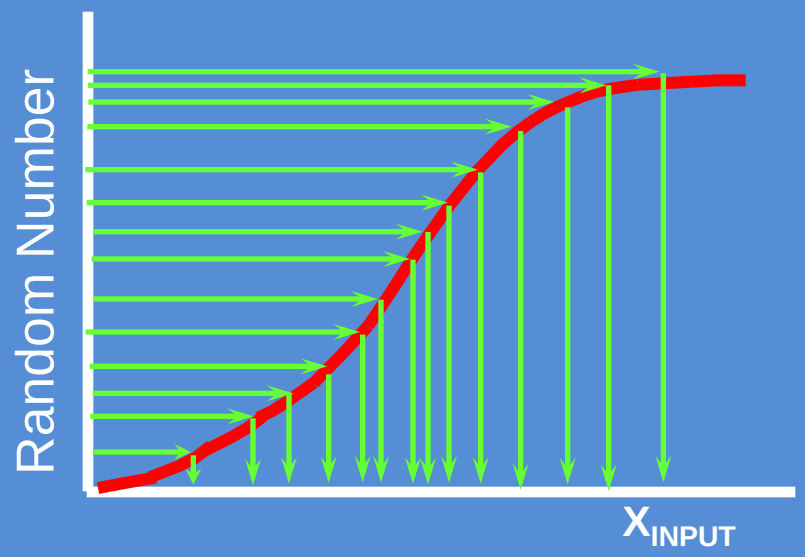
Random Numbers and Outputs

y = f(x) *or* y is a function of x

Outputs = f [Qty, Unit Cost, Contingency, Inflation Rate]



Outputs: Binned Results

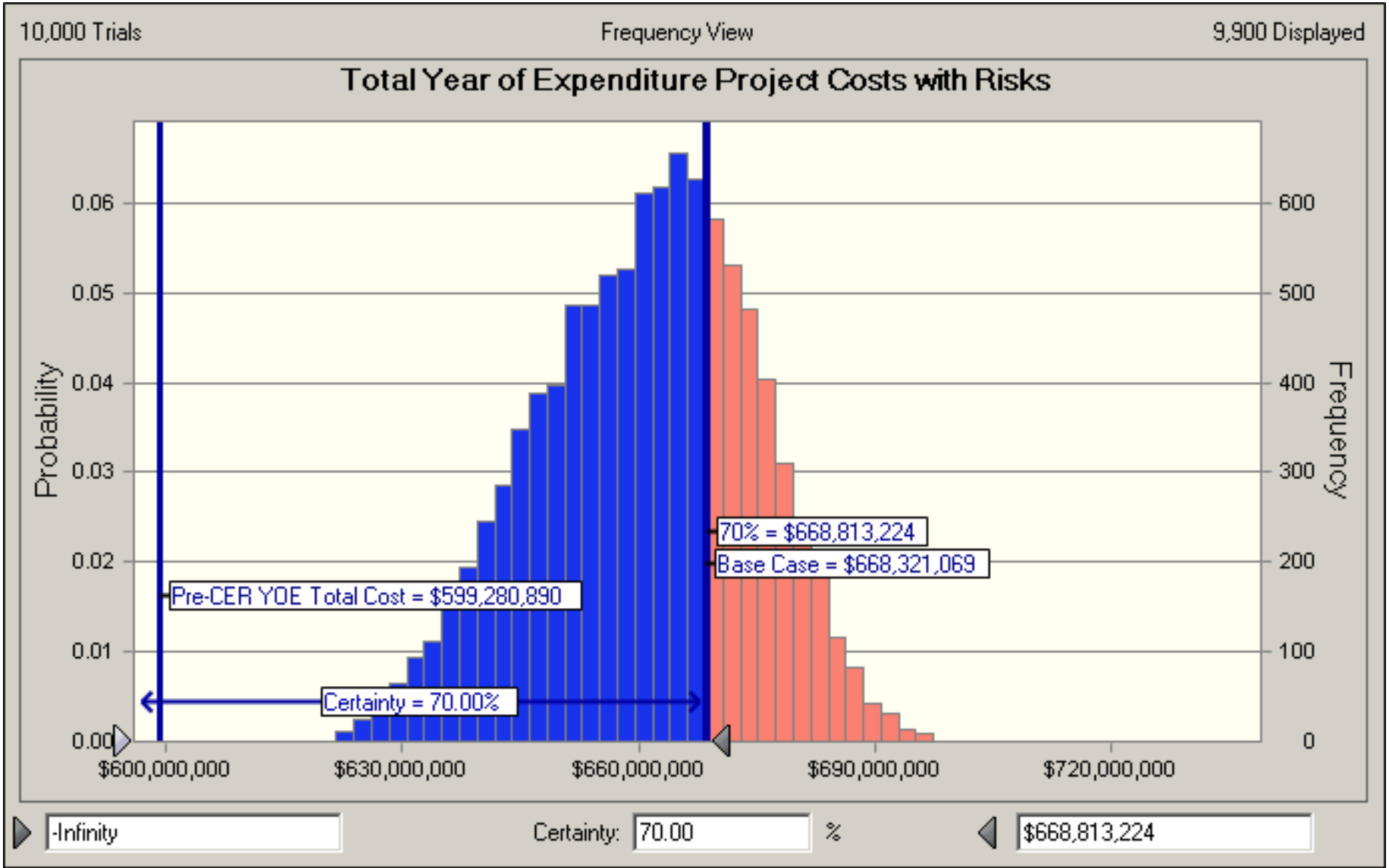


Inputs: Sampled Values

CER Outputs

- Review findings/recommendations
- Adjustments made to estimate during review
- Project cost estimate at 70% level of confidence
- Project cost schedule at 70% level of confidence
- Risk Register – Threats/Opportunities

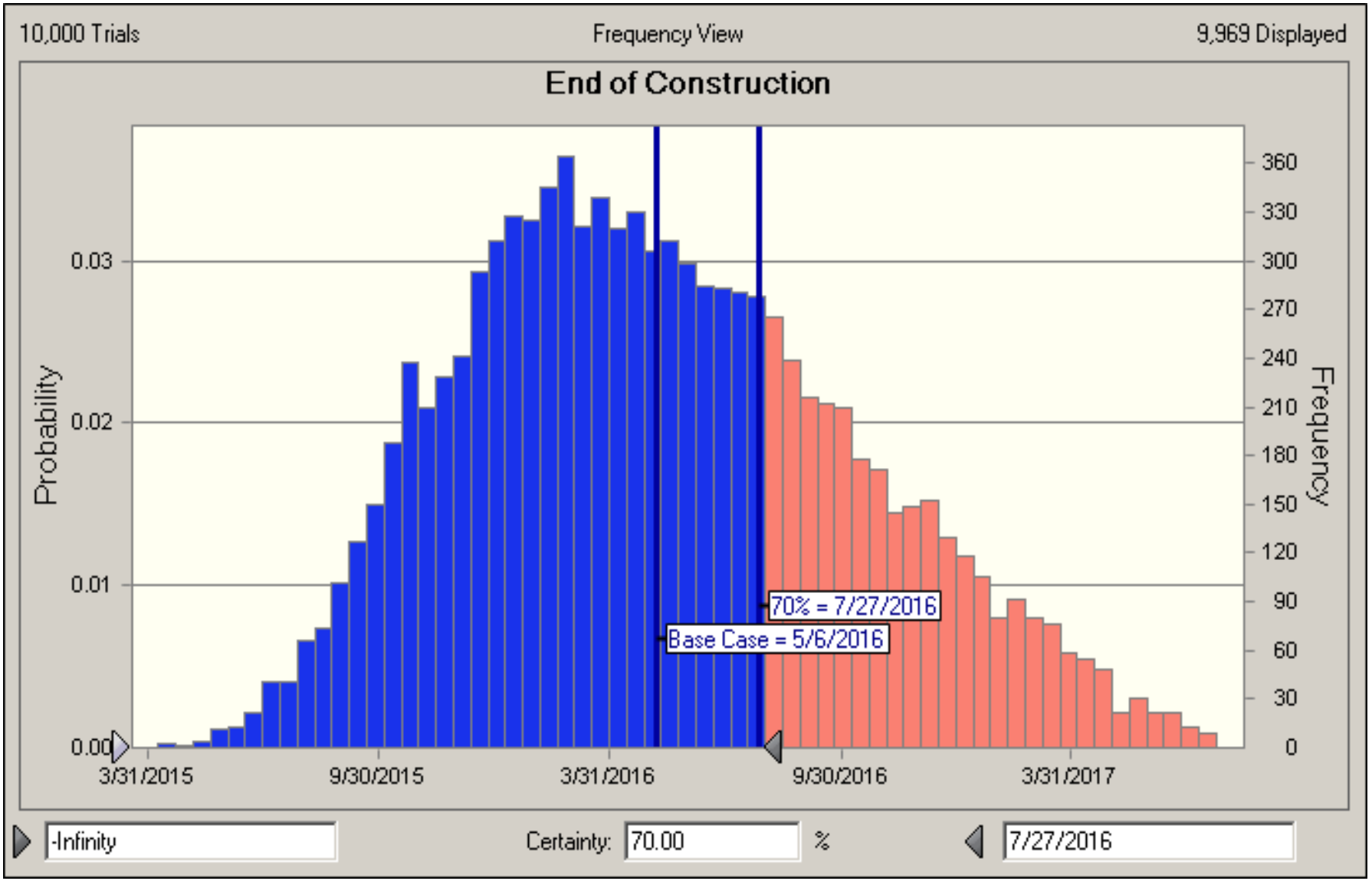
CER Outputs - Cost Forecast



CER Outputs - Cost Forecast

Percentile	Total Project Costs Forecast values
0%	$622,045,165
10%	$642,051,331
20%	$648,556,174
30%	$653,448,838
40%	$657,845,556
50%	$661,753,712
60%	$665,305,814
70%	$668,813,224
80%	$672,868,683
90%	$678,086,378
100%	$926,597,262

CER Outputs - Schedule Forecast



CER Outputs - Risk Register

9	Risk #	Risk Status	Risk Dependency	Guidance for Discrete Probability	Project Phase	Risk Location	Event Risk Name	Risk Type	Detailed Description of Risk Event (Specific, Measurable, Attributable, Relevant, Timebound) [SMART]	Risk Trigger	Probability (Bernoulli distribution)	Cost Impact	Correlation Prior Cost Risk	Cost Risk (Threat/ Opportunity)	Probable Cost Impact ($$$)
10	1				Pre-CN		Undetermined	Cost	Test	Bridge Type	1	$ 14,000,000	Nil	Threat	$ -
11	2	Active	Independent	Prob<1	CN+UT		Market	Cost	Market Conditions	Procurement	0.5	$ -	Nil	Threat	$ -
12	3	Active	ME	<=0.5	CN+UT		Market	Cost	Market	Procurement	0.5	$ -	Nil	Opportunity	$ -
13	3	Active	Independent	Prob<1	CN+UT		MS4 Stormwater	Cost	Storm sewer	Approved	0.2	$ 750,000	Nil	Threat	$ 150,000
14	4	Active	Independent	Prob<1	CN+UT		Design speed	Cost	Design and	FHWA	1	$ 20,000,000	Nil	Threat	$ 20,000,000
15	5	Active	Independent	Prob<1	CN+UT		Below 75 575 split	Cost	Design and	FHWA	0.4	$ 55,000,000	Nil	Threat	$ 22,000,000
16	6	Active	Independent	Prob<1	CN+UT		Geotech Bridge	Cost	Final geotech	Final Geotech	0.1	$ -	Nil	Opportunity	$ -
17	7	Active	ME	<=0.9	CN+UT		Geotech Bridge	Cost	Final geotech	Final Geotech	0.25	$ -	Nil	Threat	$ -
18	8	Active	Independent	Prob<1	CN+UT		ATC Innovation	Cost	ATC Innovtion in	Developer	1	$ -	Nil	Opportunity	$ -
19	9	Active	Independent	Prob<1	CN+UT		Design level	Cost	Currently at 30%	Develo	0.6	$ -	Nil	Opportunity	$ -
20	10	Active	ME	<=0.4	CN+UT		Design level	Cost	Currently at 30%	Develo	0.4	$ -	Nil	Threat	$ -
21	11	Active	Independent	Prob<1	CN+UT		Limited resources	Cost	Due to high volume	Develo	0.7	$ -	Nil	Threat	$ -
22	12	Active	Independent	Prob<1	CN+UT		Roadway Design	Cost	Currently at 30%	Develo	0.6	$ -	Nil	Threat	$ -
23	13	Active	ME	<=0.4	CN+UT		Roadway Design	Cost	Currently at 30%	Develo	0.4	$ -	Nil	Opportunity	$ -
24	14	Active	Independent	Prob<1	CN+UT		Utility risk	Cost	Underground	Developer	1	$ 9,379,843	Nil	Threat	$ 9,379,843
25	15	Active	Independent	Prob<1	Pre-CN		Delays due to	Schedule	Project is not	Lack of	0.5	$ -	Nil		$ -
26	16	Active	Independent	Prob<1	Pre-CN		PM 2.5 Air Quality	Schedule	EPA cannot take an	Project not in	0.5	$ -	Nil		$ -
27	17	Active	Independent	Prob<1	Pre-CN		Completion of	Schedule	Policy update will	New Policy	0.25	$ -	Nil		$ -
28	18	Active	Independent	Prob<1	Pre-CN		Potential	Schedule		Lawsuit			Nil		$ -
29	18	Active	Independent	Prob<1	CN+UT		Acceleration of	Schedule	Opportunity to	Developer	0.8		Nil		$ -
30	19														$ -

Risk Trigger
Event that indicates the risk is likely to occur. Used to determine when to implement the risk response strategy

CER Next Steps

- FHWA will prepare a final report documenting review findings.
  - Draft report for review within 30 days
  - Draft report will be e-mailed to Division Office
  - Division Office will review the draft and forward it to the State Project Team
  - Final report issued within 30 days after receipt of comments
  - Final report forwarded to the Division Office for distribution to the State Project Team
- FHWA uses the report for the review of the Initial Financial Plan
- Estimate review is a snapshot of the current estimate

I-94 Edsel Ford Freeway Rehabilitation Project

Questions?

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I-94 Edsel Ford Freeway Rehabilitation Project

Detroit, Michigan

Cost Estimate Review

April 26-29, 2011

Closing Presentation

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Cost Estimate Review Objective

Conduct an unbiased risk-based review to verify the accuracy and reasonableness of the current total cost estimate to complete the

MI-94 Edsel Ford Freeway Rehabilitation Project

and to develop a probability range for the cost estimate that represents the project's current stage of design.

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Review Agenda

I-94 Edsel Ford Freeway Rehabilitation Project

Tuesday, April 26

- CER Introduction by FHWA
- Project Overview by Project Personnel
- Overview State Estimation Process
- Market Conditions
- Inflation
- Discuss Contingency
- Soft Costs
- ROW

Review Agenda (cont.)

Wednesday April 27

- Utilities
- Environmental Issues
- Drainage
- ITS, Signing

Thursday April 28

- Pavements
- Geotechnical & Retaining Walls
- Maintenance of Traffic
- Contingency & Unidentified Risks

Friday April 29

- Preliminary Closeout

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
  - Goal is to verify accuracy and reasonableness of estimate

Risk-based Probabilistic Approach

Review Methodology

- **Review Participants**
  - ❖ FHWA
    - Division Office
    - Headquarters Project Delivery Team
    - Resource Center
  - ❖ Michigan Department of Transportation (MDOT)
  - ❖ Consultant – CH2M-HILL
- **Estimate Review**
  - ❖ Understand estimate development process
    - Discuss underlying assumptions of estimate

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Review Methodology (cont.)

- **Model Variation of Inputs**
  - ❖ Review major cost elements
  - ❖ Review contingencies
  - ❖ Develop probability assumption distributions
- **Evaluate and Model Key Schedule & Cost Risks**
  - ❖ Review project risks
  - ❖ Develop probability assumption distributions
- **Evaluate and Model Market Conditions & Inflation**
- **Perform Monte Carlo simulation to generate a project estimate forecast as a range**

Documentation Provided

- Project Cost Estimate
- Project Schedule
- Project Risks
- Draft Initial Financial Plan
- Draft Project Management Plan
- ACTT Workshop Report (April 2007)
- I-94 Detailed Engineering Report – Opinion of Probable Cost (June 2010)

Review Findings

- Detailed estimate for level of design
  - Development of Detailed Engineering Report
- MDOT Specs & Estimate Unit review of estimates for QC
- Estimate was updated in Year of Obligation dollars
- Use of conservative unit costs & contingency
- Project team and subject matter experts were familiar with project
- Use of preliminary VE Studies
- Incorporation of many ACTT recommendations

Base Estimate Results

Pre-Review Original Base Estimate

Base	$1,386 Million
Contingencies	$360 Million
Total	**$1,746 Million**

Post-Review New Base Estimate

Base	$1,386 Million
Net Estimate Changes	$212 Million
Probabilistic Risk	Risk Cost Range
Total	**$1,598 Million + Risk Cost Range**

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Estimate Adjustments

- Eliminated or Reduced Roadway & Structures Contingencies
  - Eliminated Total 35% Contingency – ($360 M)
  - Added 10% Bridge Allocated Contingency - $46 M
  - Added 35% Utility Allocated Contingency - $12 M
- Updated Metro Pavement Section – ($9 M)
- Added Early Completion Incentives - $25 M
- Added Construction Public Information - $ 30 M

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Estimate Adjustments (cont.)

- Increased Mobilization from 5% to 10%
- Increased Preliminary Engineering from 7% to 9.5%

  Includes additional 1% for overall program management
- Increased Construction Engineering from 7% to 11%

  Includes additional 1% for overall program management

Significant Cost Risks -Opportunities-

- Final agreement with RR could provide decrease in cost; potentially no shoofly would be needed
- Opportunities in cost associated with potential VECPs during construction
- Reconsider full closure options on interstate during construction; potentially leads to decrease cost and accelerated schedule; possible increase in user delay costs

Significant Cost Risks -Threats-

- Impacts to existing buildings and parking areas and provide access during construction; increased ROW costs
- Additional ROW to accommodate temporary tracks; includes cost for both RR in Segments 1 & 3
- Modifications to noise wall quantities may be necessary
- Additional pedestrian bridge may be necessitated by development in area

Significant Cost Risks -Threats- (cont.)

- Community jobs training (RCAR)
- Potential to decrease time to construct bridges, may be additional cost due to technology and ROW for offsite construction
- Structures (bridges & walls) risks such as longer/additional piling, high strength piling, ground improvements due to poor soil, and/or increased steel prices
- Additional storage capacity may be needed as final design progresses

Significant Cost Risks -Threats- (cont.)

- Some pump stations may need replacement instead of refurbishment
- Drainage design along service roads may change as design of service road progresses
- Potential damage during construction to the existing water and sewer systems
- Construction risks such as overruns and change orders

Significant Cost Risks -Threats- (cont.)

- Impacts of replacing existing slopes with secant pile walls
- Possibility of encountering hydrogen sulfide latent water
- Drill shafts may need to be used in some locations instead of driven piles to avoid utilities
- Possible usage of extended life pavements
- Potential future ITS technologies
- Innovative MOT techniques

Significant Schedule Risks -Opportunities-

- Reconsider full closure options on interstate during construction; potentially leads to accelerated schedule

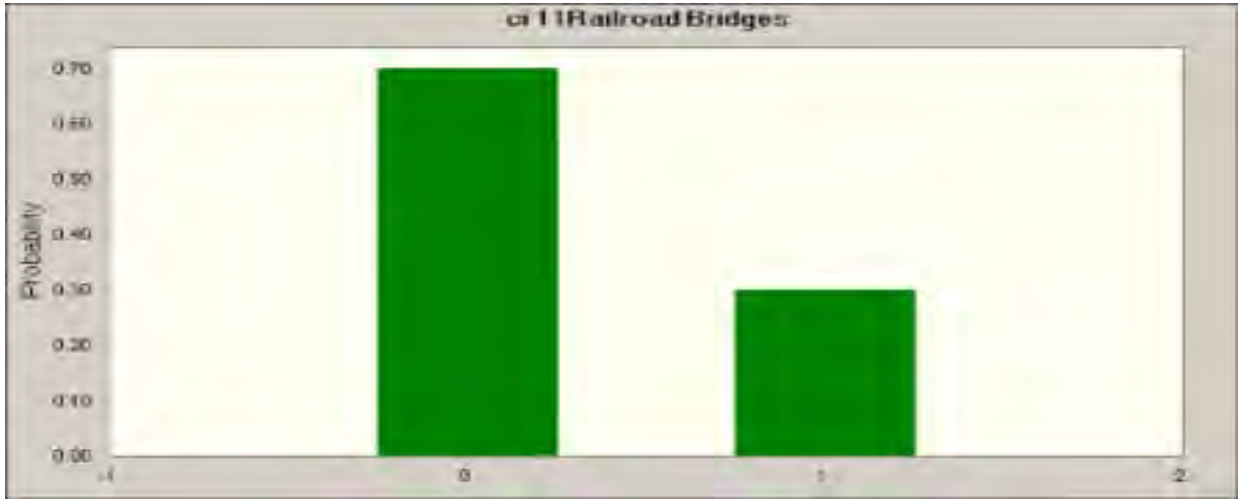
Example Risk Analysis

Railroad Bridges - Opportunity

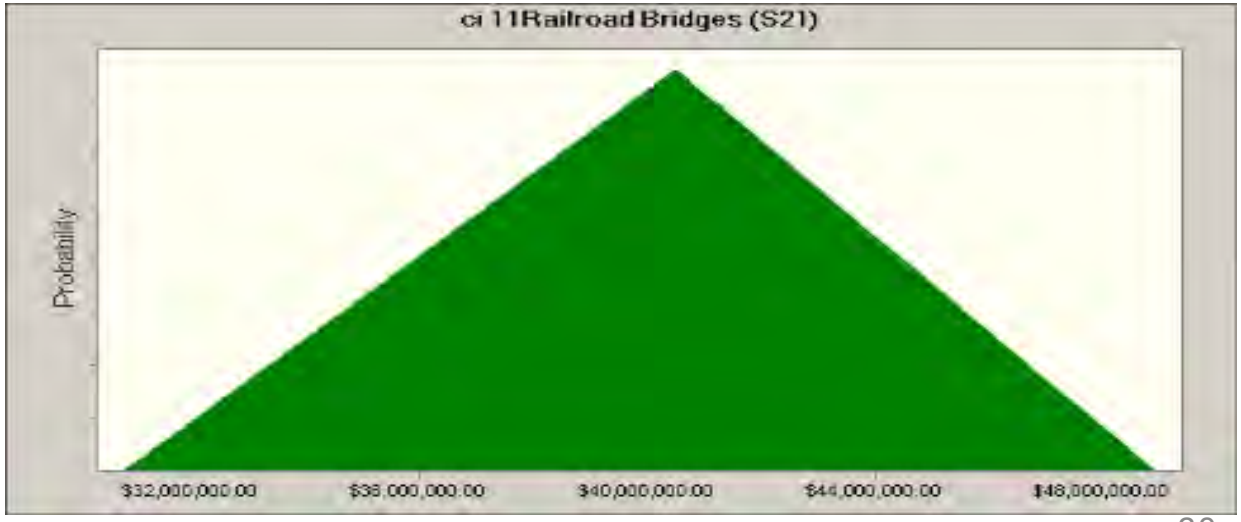
- Final agreement with RR could provide decrease in cost; potentially no shoofly would be needed
- Likelihood of Occurrence – 30%
- Risk Impact
  - Minimum $35,000,000
  - Most Likely $40,500,000
  - Maximum $45,000,000

Example Risk Analysis (cont.)

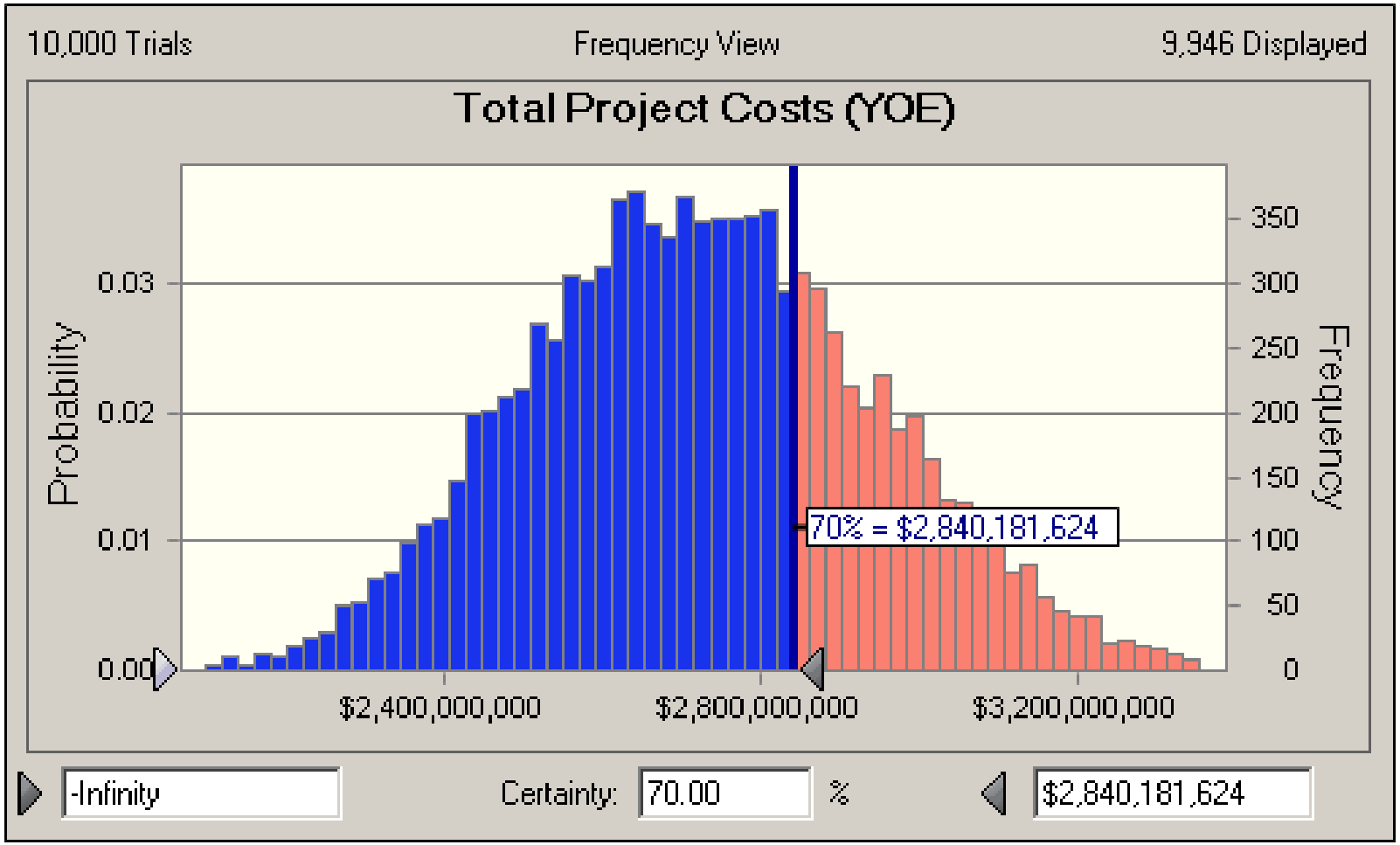
Likelihood of Occurrence
30%



Impact of Occurrence
Triangular Distribution
Minimum - $35 M
Maximum - $45 M



Total Project Costs in YOE



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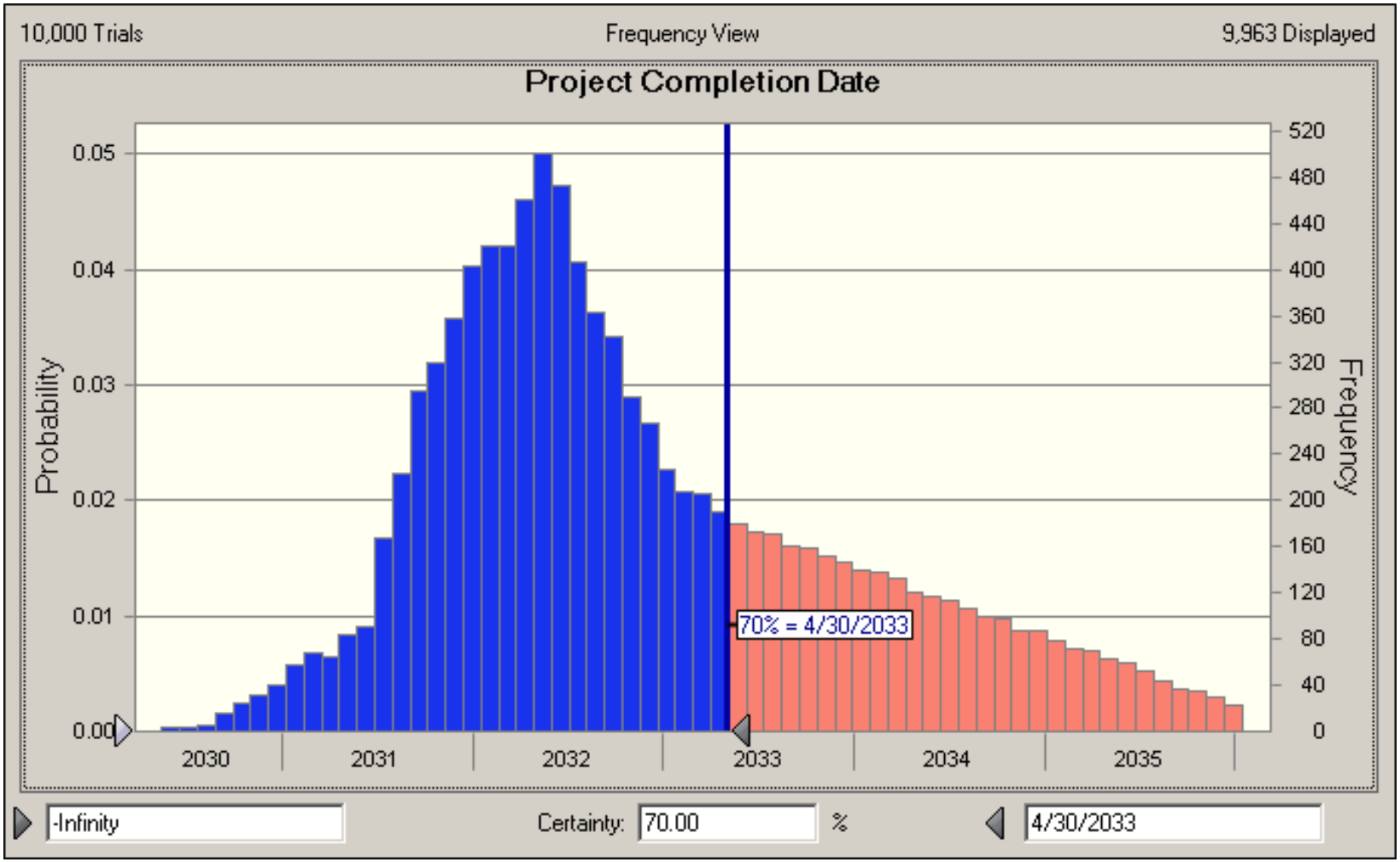
Total Project Cost (YOE) Percentile Ranking

Percentile	Forecast values
0%	$1,906,451,942
10%	$2,442,330,443
20%	$2,533,928,218
30%	$2,604,005,068
40%	$2,660,546,649
50%	$2,720,302,891
60%	$2,778,484,549
70%	$2,840,181,624
80%	$2,914,154,416
90%	$3,016,240,472
100%	$3,641,683,347

Date of Construction Completion



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Effect of Delay

1 Year of Delay ≈ $81 million

Recommendations

- Update estimates to reflect estimate changes made during review
- Revise estimate contingency to reflect risks and unknowns identified during review
- Consider innovative finance techniques

  - Advance total project construction

  - Bundle contracts to reduce user impacts and reduce costs
- Continue coordination w/ railroads to minimize or eliminate temporary runarounds

Recommendations

- Reconsider full mainline closures to reduce cost and shorten length of user impacts
- Establish procedures for risk-based estimation, especially for major projects
- Develop a plan to manage risks and opportunities
  - Continue updating estimate based on risk management
  - Maintain a risk register
- Consider the use of a Management Reserve after contract award

CER Next Steps

- FHWA will prepare a final report documenting review findings.
  - Draft report for review within 30 days
  - Draft report will be e-mailed to Division Office
  - Division Office will review the draft and forward it to the MDOT Project Team
  - Final report issued within 30 days after receipt of comments
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- FHWA uses the report for the review of the Initial Financial Plan
- Estimate review is a snapshot of the current estimate

I-94 Edsel Ford Freeway Rehabilitation Project

Questions?

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Crystal Ball Report - Full
Simulation started on 4/30/2011 at 1:24 PM
Simulation stopped on 4/30/2011 at 1:38 PM

Run preferences:	
Number of trials run	10,000
Latin Hypercube (size)	500
Seed	999
Precision control on	
Confidence level	95.00%
Run statistics:	
Total running time (sec)	826.53
Trials/second (average)	12
Random numbers per sec	1,670
Crystal Ball data:	
Assumptions	138
Correlations	47
Correlated groups	15
Decision variables	0
Forecasts	6

Forecasts

Worksheet: [MI I-94 CER Template 4-28-2011pm (3) with partial MC & schedule correlations.xlsm]YOE

Forecast: Market Conditions **Cell: C23**

Summary:
Entire range is from $(397,311,439) to $413,652,235
Base case is $0
After 10,000 trials, the std. error of the mean is $1,127,330

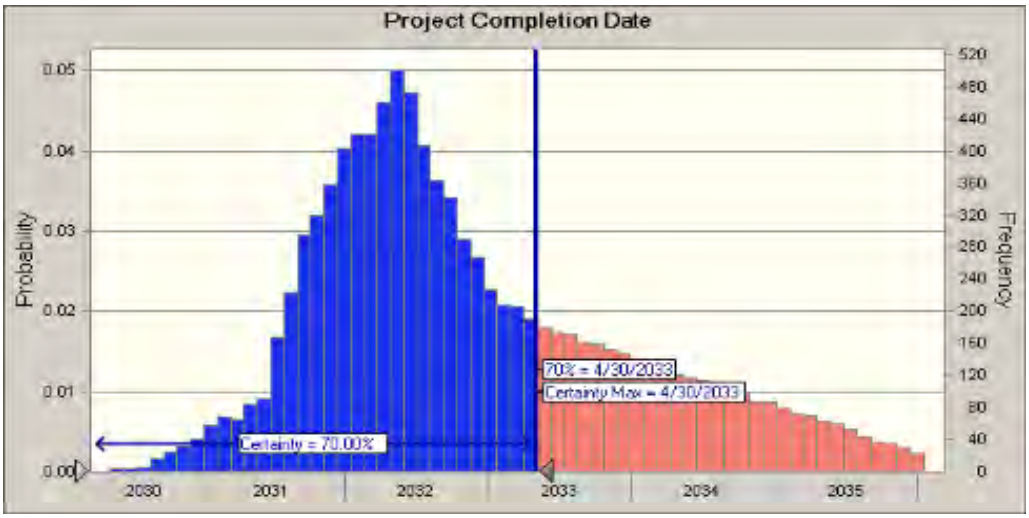
Statistics:	Forecast values
Trials	10,000
Base Case	$0
Mean	$19,209,037
Median	$20,754,618
Mode	---
Standard Deviation	$112,733,014
Variance	##################
Skewness	-0.0216
Kurtosis	2.89
Coeff. of Variability	5.87
Minimum	$(397,311,439)
Maximum	$413,652,235
Range Width	$810,963,674
Mean Std. Error	$1,127,330

Forecast: Market Conditions (cont'd) **Cell: C23**

Percentiles:	Forecast values
0%	$(397,311,439)
10%	$(128,407,408)
20%	$(76,641,982)
30%	$(41,082,974)
40%	$(9,404,755)
50%	$20,719,540
60%	$48,492,781
70%	$79,234,704
80%	$114,248,921
90%	$163,207,518
100%	$413,652,235

Forecast: Project Completion Date **Cell: K17**

Summary:
Certainty level is 70.00%
Certainty range is from -Infinity to 4/30/2033
Entire range is from 5/15/2030 to 5/14/2036
Base case is 6/11/2032
After 10,000 trials, the std. error of the mean is 4.08



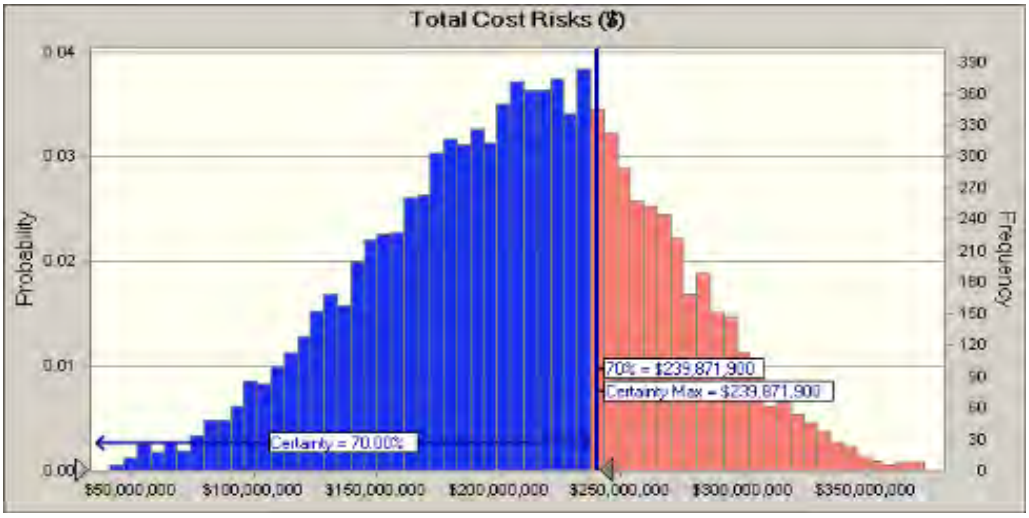
Statistics:	Forecast values
Trials	10,000
Base Case	6/11/2032
Mean	11/25/2032
Median	8/12/2032
Mode	---
Standard Deviation	408.37
Variance	166,763.87
Skewness	0.7460
Kurtosis	2.94
Coeff. of Variability	0.0084
Minimum	5/15/2030
Maximum	5/14/2036
Range Width	2,191.61
Mean Std. Error	4.08

Forecast: Project Completion Date (cont'd) **Cell: K17**

Percentiles:	Forecast values
0%	5/15/2030
10%	9/16/2031
20%	12/26/2031
30%	3/16/2032
40%	5/26/2032
50%	8/12/2032
60%	11/24/2032
70%	4/30/2033
80%	11/20/2033
90%	8/12/2034
100%	5/14/2036

Forecast: Total Cost Risks ($) **Cell: E17**

Summary:
Certainty level is 70.00%
Certainty range is from -Infinity to $239,871,900
Entire range is from $(12,523,247) to $393,563,575
Base case is $205,119,250
After 10,000 trials, the std. error of the mean is $591,815



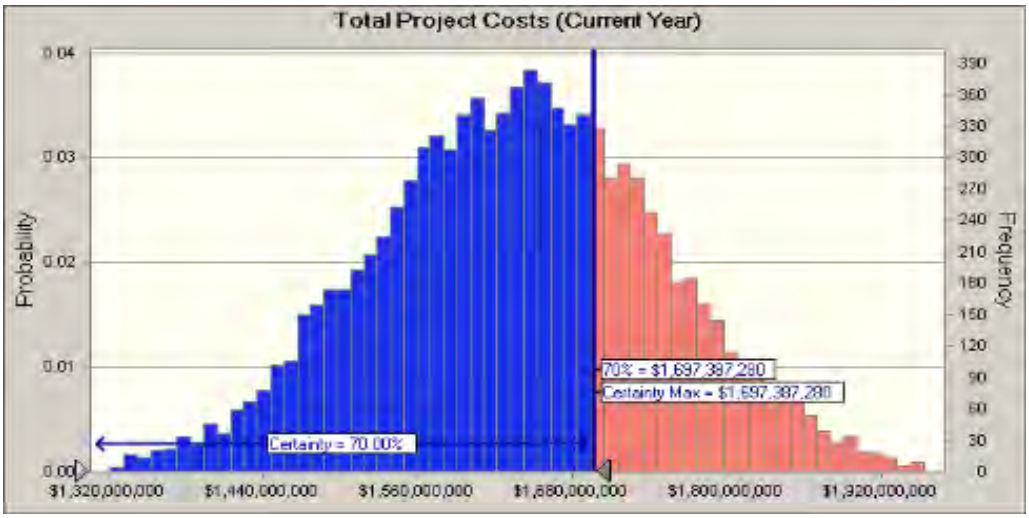
Statistics:	Forecast values
Trials	10,000
Base Case	$205,119,250
Mean	$207,394,428
Median	$210,020,952
Mode	---
Standard Deviation	$59,181,514
Variance	##################
Skewness	-0.1753
Kurtosis	2.89
Coeff. of Variability	0.2854
Minimum	$(12,523,247)
Maximum	$393,563,575
Range Width	$406,086,822
Mean Std. Error	$591,815

Forecast: Total Cost Risks ($) (cont'd) **Cell: E17**

Percentiles:	Forecast values
0%	$(12,523,247)
10%	$128,781,892
20%	$156,785,171
30%	$177,139,666
40%	$194,254,303
50%	$210,014,987
60%	$224,688,779
70%	$239,871,900
80%	$258,141,383
90%	$282,447,536
100%	$393,563,575

Forecast: Total Project Costs (Current Year) **Cell: D19**

Summary:
Certainty level is 70.00%
Certainty range is from -Infinity to $1,697,387,280
Entire range is from $1,220,841,137 to $2,031,804,811
Base case is $1,618,152,576
After 10,000 trials, the std. error of the mean is $1,127,330



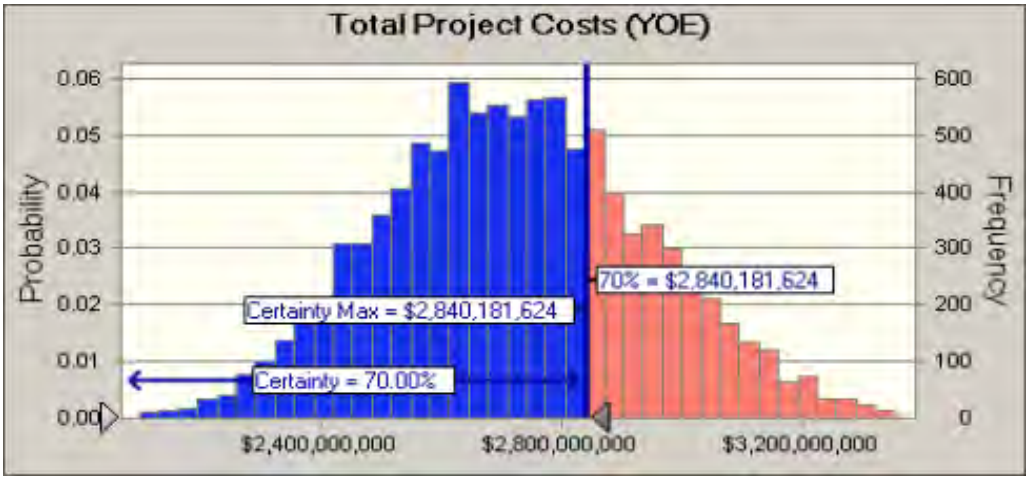
Statistics:	Forecast values
Trials	10,000
Base Case	$1,618,152,576
Mean	$1,637,361,613
Median	$1,638,907,194
Mode	---
Standard Deviation	$112,733,014
Variance	##################
Skewness	-0.0216
Kurtosis	2.89
Coeff. of Variability	0.0689
Minimum	$1,220,841,137
Maximum	$2,031,804,811
Range Width	$810,963,674
Mean Std. Error	$1,127,330

Forecast: Total Project Costs (Current Year) (cont'd) **Cell: D19**

Percentiles:	Forecast values
0%	$1,220,841,137
10%	$1,489,745,168
20%	$1,541,510,594
30%	$1,577,069,602
40%	$1,608,747,821
50%	$1,638,872,116
60%	$1,666,645,357
70%	$1,697,387,280
80%	$1,732,401,497
90%	$1,781,360,094
100%	$2,031,804,811

Forecast: Total Project Costs (YOE) **Cell: D20**

Summary:
Certainty level is 70.00%
Certainty range is from -Infinity to $2,840,181,624
Entire range is from $1,906,451,942 to $3,641,683,347
Base case is $2,645,409,690
After 10,000 trials, the std. error of the mean is $2,237,784



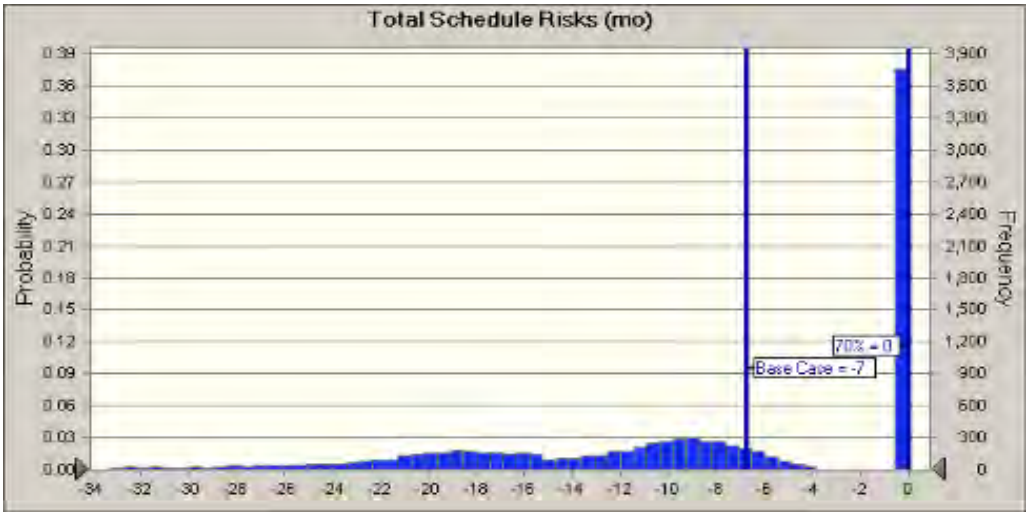
Statistics:	Forecast values
Trials	10,000
Base Case	$2,645,409,690
Mean	$2,725,968,724
Median	$2,720,319,648
Mode	---
Standard Deviation	$223,778,353
Variance	##################
Skewness	0.1473
Kurtosis	2.95
Coeff. of Variability	0.0821
Minimum	$1,906,451,942
Maximum	$3,641,683,347
Range Width	$1,735,231,404
Mean Std. Error	$2,237,784

Forecast: Total Project Costs (YOE) (cont'd) **Cell: D20**

Percentiles:	Forecast values
0%	$1,906,451,942
10%	$2,442,330,443
20%	$2,533,928,218
30%	$2,604,005,068
40%	$2,660,546,649
50%	$2,720,302,891
60%	$2,778,484,549
70%	$2,840,181,624
80%	$2,914,154,416
90%	$3,016,240,472
100%	$3,641,683,347

Forecast: Total Schedule Risks (mo) **Cell: I17**

Summary:
Entire range is from -37 to 0
Base case is -7
After 10,000 trials, the std. error of the mean is 0



Statistics:	Forecast values
Trials	10,000
Base Case	-7
Mean	-9
Median	-8
Mode	0
Standard Deviation	9
Variance	75
Skewness	-0.5869
Kurtosis	2.41
Coeff. of Variability	-0.9660
Minimum	-37
Maximum	0
Range Width	37
Mean Std. Error	0

Forecast: Total Schedule Risks (mo) (cont'd) **Cell: I17**

Percentiles:	Forecast values
0%	-37
10%	-21
20%	-18
30%	-13
40%	-10
50%	-8
60%	-6
70%	0
80%	0
90%	0
100%	0

End of Forecasts

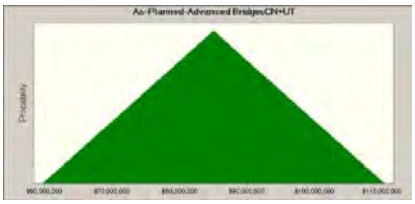
Assumptions

Worksheet: [MI I-94 CER Template 4-28-2011pm (3) with partial MC & schedule correlations.xlsm]BaseC

Assumption: As-Planned-Advanced BridgesCN+UT **Cell: L70**

Triangular distribution with parameters:

10%	$70,975,661	(=I53)
Likeliest	$85,000,792	(=J53)
90%	$99,025,923	(=K53)



Correlated with:	Coefficient
As-Planned-Advanced BridgesROW (L69)	0.80
As-Planned-Advanced BridgesPE (L68)	0.80

Assumption: As-Planned-Advanced BridgesPE **Cell: L68**

Triangular distribution with parameters:

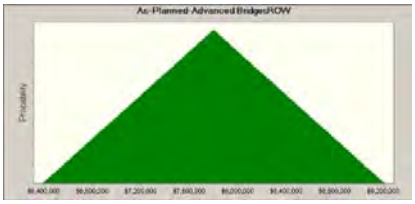
10%	$7,799,170	(=I51)
Likeliest	$8,665,744	(=J51)
90%	$9,532,318	(=K51)

Correlated with:	Coefficient
As-Planned-Advanced BridgesROW (L69)	0.80
As-Planned-Advanced BridgesCN+UT (L70)	0.80

Assumption: As-Planned-Advanced BridgesROW **Cell: L69**

Triangular distribution with parameters:

10%	$7,017,017	(=I52)
Likeliest	$7,796,686	(=J52)
90%	$8,576,355	(=K52)

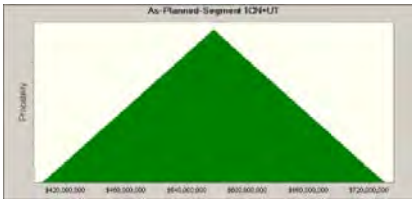


Correlated with:	Coefficient
As-Planned-Advanced BridgesCN+UT (L70)	0.80
As-Planned-Advanced BridgesPE (L68)	0.80

Assumption: As-Planned-Segment 1CN+UT **Cell: L79**

Triangular distribution with parameters:

10%	$472,712,680	(=I62)
Likeliest	$566,122,970	(=J62)
90%	$659,533,260	(=K62)



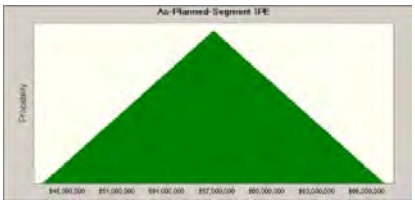
Correlated with:	Coefficient
As-Planned-Segment 1PE (L77)	0.80

Assumption: As-Planned-Segment 1PE **Cell: L77**

Triangular distribution with parameters:

10%	$51,112,439	(=I60)
Likeliest	$56,791,599	(=J60)
90%	$62,470,759	(=K60)

Assumption: As-Planned-Segment 1PE (cont'd) **Cell: L77**

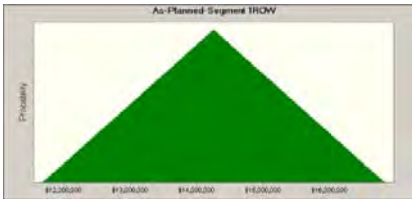


Correlated with:	Coefficient
As-Planned-Segment 1CN+UT (L79)	0.80
As-Planned-Segment 1ROW (L78)	0.80

Assumption: As-Planned-Segment 1ROW **Cell: L78**

Triangular distribution with parameters:

10%	$12,828,174	(=I61)
Likeliest	$14,253,527	(=J61)
90%	$15,678,880	(=K61)

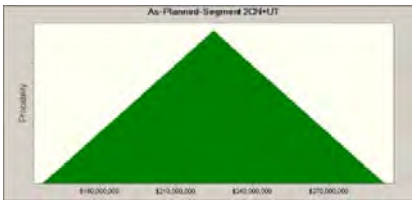


Correlated with:	Coefficient
As-Planned-Segment 1PE (L77)	0.80

Assumption: As-Planned-Segment 2CN+UT **Cell: L76**

Triangular distribution with parameters:

10%	$187,625,803	(=I59)
Likeliest	$224,701,561	(=J59)
90%	$261,777,319	(=K59)

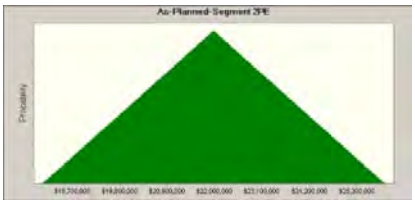


Correlated with:	Coefficient
As-Planned-Segment 2PE (L74)	0.80
As-Planned-Segment 2ROW (L75)	0.80

Assumption: As-Planned-Segment 2PE **Cell: L74**

Triangular distribution with parameters:

10%	$19,770,816	(=I57)
Likeliest	$21,967,573	(=J57)
90%	$24,164,330	(=K57)

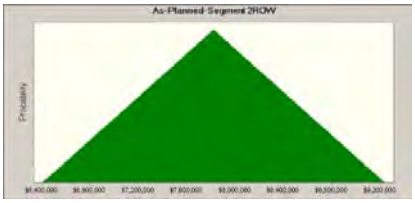


Correlated with:	Coefficient
As-Planned-Segment 2CN+UT (L76)	0.80
As-Planned-Segment 2ROW (L75)	0.80

Assumption: As-Planned-Segment 2ROW **Cell: L75**

Triangular distribution with parameters:

10%	$7,041,516	(=I58)
Likeliest	$7,823,907	(=J58)
90%	$8,606,298	(=K58)



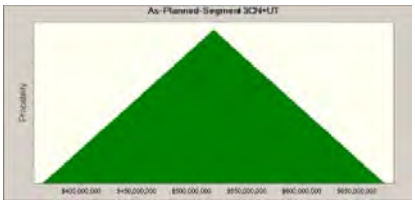
Correlated with:	Coefficient
As-Planned-Segment 2PE (L74)	0.80
As-Planned-Segment 2CN+UT (L76)	0.80

Assumption: As-Planned-Segment 3CN+UT **Cell: L73**

Triangular distribution with parameters:

10%	$433,903,476	(=I56)
Likeliest	$519,644,882	(=J56)
90%	$605,386,287	(=K56)

Assumption: As-Planned-Segment 3CN+UT (cont'd) **Cell: L73**

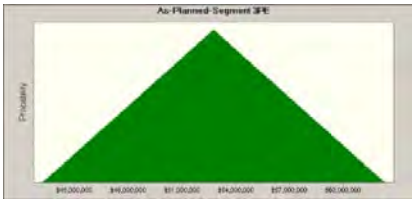


Correlated with:	Coefficient
As-Planned-Segment 3ROW (L72)	0.80
As-Planned-Segment 3PE (L71)	0.80

Assumption: As-Planned-Segment 3PE **Cell: L71**

Triangular distribution with parameters:

10%	$47,470,249	(=I54)
Likeliest	$52,744,721	(=J54)
90%	$58,019,193	(=K54)

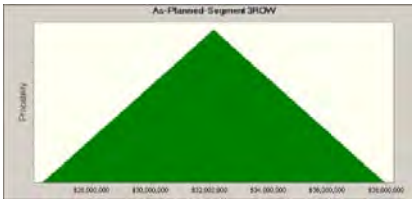


Correlated with:	Coefficient
As-Planned-Segment 3ROW (L72)	0.80
As-Planned-Segment 3CN+UT (L73)	0.80

Assumption: As-Planned-Segment 3ROW **Cell: L72**

Triangular distribution with parameters:

10%	$28,913,292	(=I55)
Likeliest	$32,125,880	(=J55)
90%	$35,338,468	(=K55)



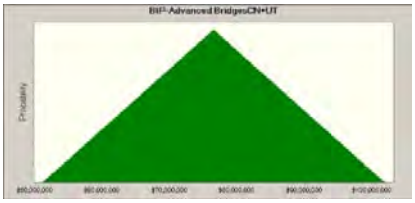
Assumption: As-Planned-Segment 3ROW (cont'd) **Cell: L72**

Correlated with:	Coefficient
As-Planned-Segment 3CN+UT (L73)	0.80
As-Planned-Segment 3PE (L71)	0.80

Assumption: BtP-Advanced BridgesCN+UT **Cell: K70**

Triangular distribution with parameters:

10%	$62,475,582	(=F53)
Likeliest	$76,500,713	(=G53)
90%	$90,525,843	(=H53)

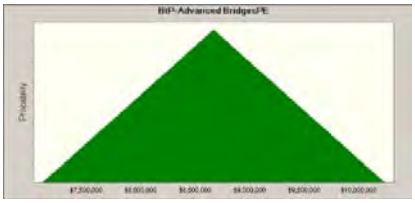


Correlated with:	Coefficient
BtP-Advanced BridgesROW (K69)	0.80
BtP-Advanced BridgesPE (K68)	0.80

Assumption: BtP-Advanced BridgesPE **Cell: K68**

Triangular distribution with parameters:

10%	$7,799,170	(=F51)
Likeliest	$8,665,744	(=G51)
90%	$9,532,318	(=H51)

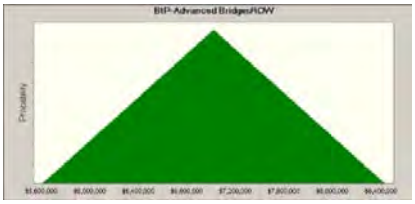


Correlated with:	Coefficient
BtP-Advanced BridgesROW (K69)	0.80
BtP-Advanced BridgesCN+UT (K70)	0.80

Assumption: BtP-Advanced BridgesROW **Cell: K69**

Triangular distribution with parameters:

10%	$6,237,349	(=F52)
Likeliest	$7,017,017	(=G52)
90%	$7,796,686	(=H52)

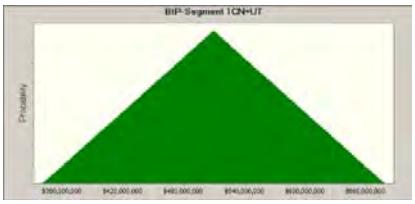


Correlated with:	Coefficient
BtP-Advanced BridgesPE (K68)	0.80
BtP-Advanced BridgesCN+UT (K70)	0.80

Assumption: BtP-Segment 1CN+UT **Cell: K79**

Triangular distribution with parameters:

10%	$416,100,383	(=F62)
Likeliest	$509,510,673	(=G62)
90%	$602,920,963	(=H62)



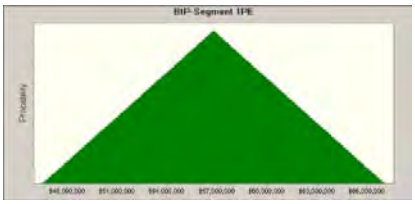
Correlated with:	Coefficient
BtP-Segment 1PE (K77)	0.80
BtP-Segment 1ROW (K78)	0.80

Assumption: BtP-Segment 1PE **Cell: K77**

Triangular distribution with parameters:

10%	$51,112,439	(=F60)
Likeliest	$56,791,599	(=G60)
90%	$62,470,759	(=H60)

Assumption: BtP-Segment 1PE (cont'd) **Cell: K77**

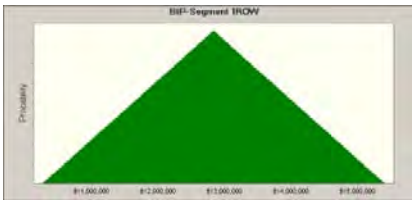


Correlated with:	Coefficient
BtP-Segment 1CN+UT (K79)	0.80
BtP-Segment 1ROW (K78)	0.80

Assumption: BtP-Segment 1ROW **Cell: K78**

Triangular distribution with parameters:

10%	$11,402,822	(=F61)
Likeliest	$12,828,174	(=G61)
90%	$14,253,527	(=H61)

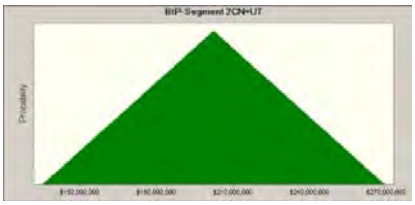


Correlated with:	Coefficient
BtP-Segment 1CN+UT (K79)	0.80
BtP-Segment 1PE (K77)	0.80

Assumption: BtP-Segment 2CN+UT **Cell: K76**

Triangular distribution with parameters:

10%	$165,155,647	(=F59)
Likeliest	$202,231,405	(=G59)
90%	$239,307,163	(=H59)



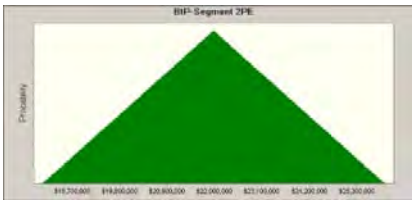
Assumption: BtP-Segment 2CN+UT (cont'd) **Cell: K76**

Correlated with:	Coefficient
BtP-Segment 2PE (K74)	0.80
BtP-Segment 2ROW (K75)	0.80

Assumption: BtP-Segment 2PE **Cell: K74**

Triangular distribution with parameters:

10%	$19,770,816	(=F57)
Likeliest	$21,967,573	(=G57)
90%	$24,164,330	(=H57)

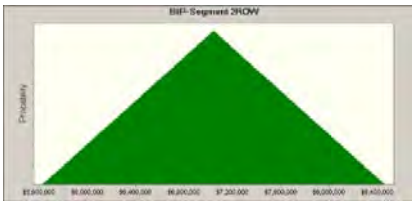


Correlated with:	Coefficient
BtP-Segment 2ROW (K75)	0.80
BtP-Segment 2CN+UT (K76)	0.80

Assumption: BtP-Segment 2ROW **Cell: K75**

Triangular distribution with parameters:

10%	$6,259,126	(=F58)
Likeliest	$7,041,516	(=G58)
90%	$7,823,907	(=H58)

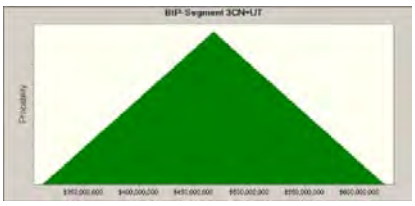


Correlated with:	Coefficient
BtP-Segment 2PE (K74)	0.80
BtP-Segment 2CN+UT (K76)	0.80

Assumption: BtP-Segment 3CN+UT **Cell: K73**

Triangular distribution with parameters:

10%	$381,938,988	(=F56)
Likeliest	$467,680,393	(=G56)
90%	$553,421,799	(=H56)

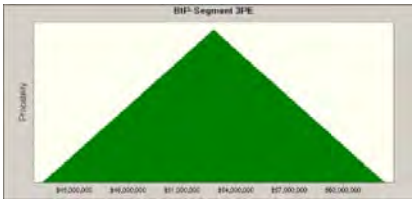


Correlated with:	Coefficient
BtP-Segment 3ROW (K72)	0.80
BtP-Segment 3PE (K71)	0.80

Assumption: BtP-Segment 3PE **Cell: K71**

Triangular distribution with parameters:

10%	$47,470,249	(=F54)
Likeliest	$52,744,721	(=G54)
90%	$58,019,193	(=H54)



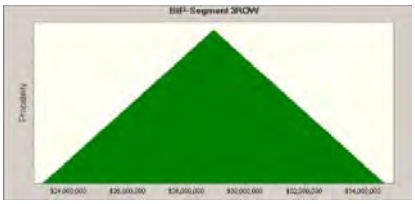
Correlated with:	Coefficient
BtP-Segment 3ROW (K72)	0.80
BtP-Segment 3CN+UT (K73)	0.80

Assumption: BtP-Segment 3ROW **Cell: K72**

Triangular distribution with parameters:

10%	$25,700,704	(=F55)
Likeliest	$28,913,292	(=G55)
90%	$32,125,880	(=H55)

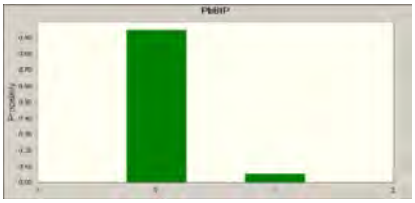
Assumption: BtP-Segment 3ROW (cont'd) **Cell: K72**



Correlated with:	Coefficient
BtP-Segment 3CN+UT (K73)	0.80
BtP-Segment 3PE (K71)	0.80

Assumption: PbBtP **Cell: I69**

Yes-No distribution with parameters:
Probability of Yes(1) 0.05 (=I69)



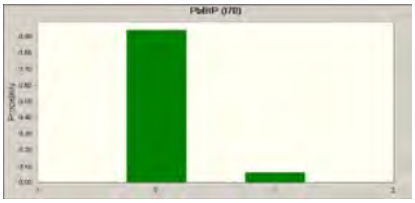
Assumption: PbBtP (I68) **Cell: I68**

Yes-No distribution with parameters:
Probability of Yes(1) 0.0 (=I68)

Assumption: PbBtP (I70) **Cell: I70**

Yes-No distribution with parameters:
Probability of Yes(1) 0.06 (=I70)

Assumption: PbBtP (I70) (cont'd) **Cell: I70**

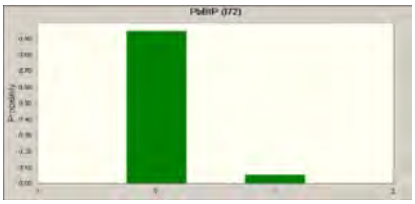


Assumption: PbBtP (I71) **Cell: I71**

Yes-No distribution with parameters:
Probability of Yes(1) 0.0 (=I71)

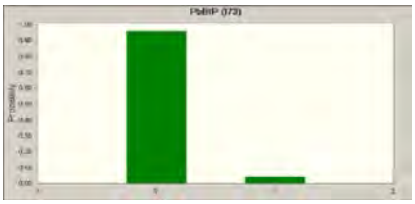
Assumption: PbBtP (I72) **Cell: I72**

Yes-No distribution with parameters:
Probability of Yes(1) 0.05 (=I72)



Assumption: PbBtP (I73) **Cell: I73**

Yes-No distribution with parameters:
Probability of Yes(1) 0.04 (=I73)

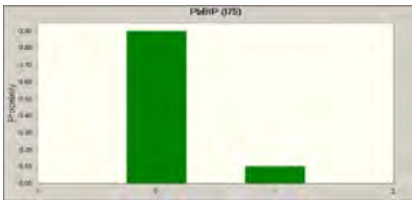


Assumption: PbBtP (I74) **Cell: I74**

Yes-No distribution with parameters:
Probability of Yes(1) 0.0 (=I74)

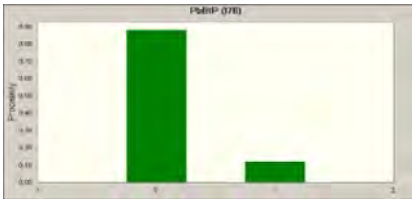
Assumption: PbBtP (I75) **Cell: I75**

Yes-No distribution with parameters:
Probability of Yes(1) 0.1 (=I75)



Assumption: PbBtP (I76) **Cell: I76**

Yes-No distribution with parameters:
Probability of Yes(1) 0.12 (=I76)



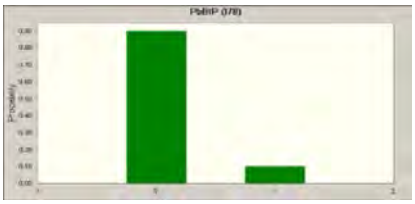
Assumption: PbBtP (I77) **Cell: I77**

Yes-No distribution with parameters:
Probability of Yes(1) 0.0 (=I77)

Assumption: PbBtP (I77) (cont'd) **Cell: I77**

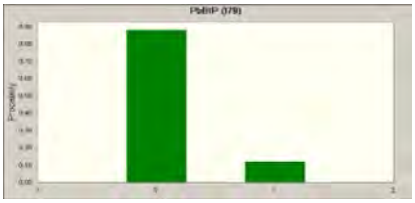
Assumption: PbBtP (I78) **Cell: I78**

Yes-No distribution with parameters:
Probability of Yes(1) 0.1 (=I78)



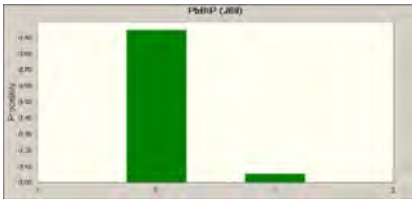
Assumption: PbBtP (I79) **Cell: I79**

Yes-No distribution with parameters:
Probability of Yes(1) 0.12 (=I79)



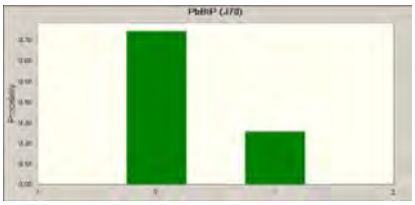
Assumption: PbBtP (J69) **Cell: J69**

Yes-No distribution with parameters:
Probability of Yes(1) 0.0526315789474 (=J69)



Assumption: PbBtP (J70) **Cell: J70**

Yes-No distribution with parameters:
Probability of Yes(1) 0.2553191489362 (=J70)

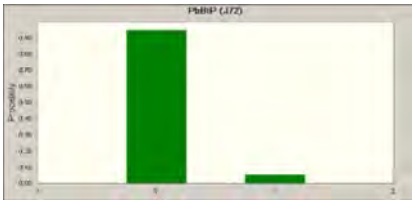


Assumption: PbBtP (J71) **Cell: J71**

Yes-No distribution with parameters:
Probability of Yes(1) 0.0 (=J71)

Assumption: PbBtP (J72) **Cell: J72**

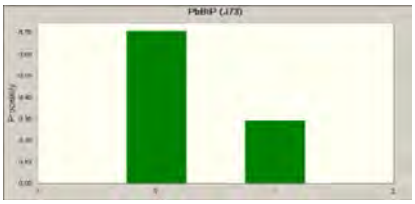
Yes-No distribution with parameters:
Probability of Yes(1) 0.0526315789474 (=J72)



Assumption: PbBtP (J73) **Cell: J73**

Yes-No distribution with parameters:
Probability of Yes(1) 0.2916666666667 (=J73)

Assumption: PbBtP (J73) (cont'd) **Cell: J73**

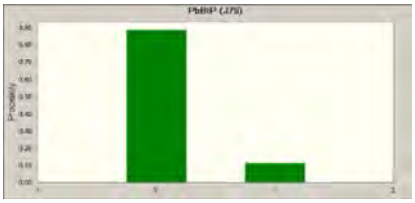


Assumption: PbBtP (J74) **Cell: J74**

Yes-No distribution with parameters:
Probability of Yes(1) 0.0 (=J74)

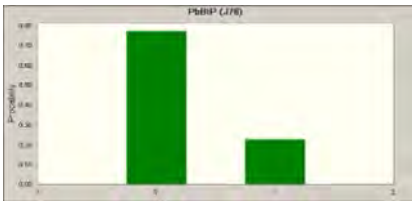
Assumption: PbBtP (J75) **Cell: J75**

Yes-No distribution with parameters:
Probability of Yes(1) 0.1111111111111 (=J75)



Assumption: PbBtP (J76) **Cell: J76**

Yes-No distribution with parameters:
Probability of Yes(1) 0.2272727272727 (=J76)

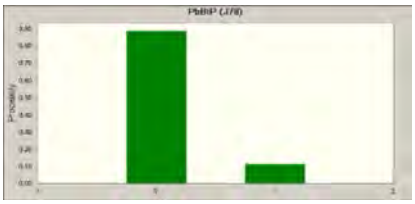


Assumption: PbBtP (J77) **Cell: J77**

Yes-No distribution with parameters:
Probability of Yes(1) 0.0 (=J77)

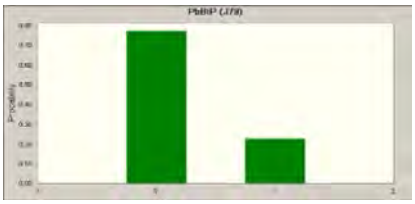
Assumption: PbBtP (J78) **Cell: J78**

Yes-No distribution with parameters:
Probability of Yes(1) 0.1111111111111 (=J78)



Assumption: PbBtP (J79) **Cell: J79**

Yes-No distribution with parameters:
Probability of Yes(1) 0.2272727272727 (=J79)



Assumption: PbWtP **Cell: J68**

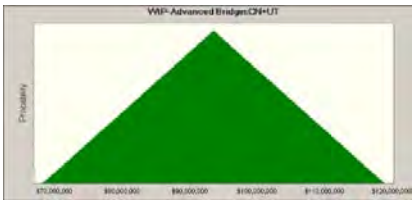
Yes-No distribution with parameters:
Probability of Yes(1) 0.0 (=J68)

Assumption: PbWtP (cont'd) **Cell: J68**

Assumption: WtP-Advanced BridgesCN+UT **Cell: M70**

Triangular distribution with parameters:

10%	$79,475,741	(=L53)
Likeliest	$93,500,871	(=M53)
90%	$107,526,002	(=N53)

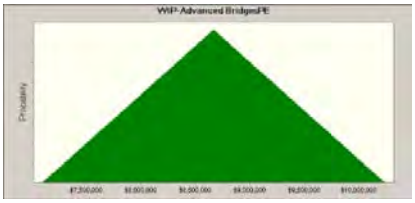


Correlated with:	Coefficient
WtP-Advanced BridgesROW (M69)	0.80

Assumption: WtP-Advanced BridgesPE **Cell: M68**

Triangular distribution with parameters:

10%	$7,799,170	(=L51)
Likeliest	$8,665,744	(=M51)
90%	$9,532,318	(=N51)

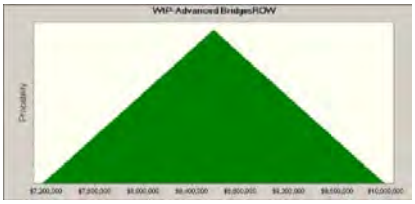


Correlated with:	Coefficient
WtP-Advanced BridgesROW (M69)	0.80

Assumption: WtP-Advanced BridgesROW **Cell: M69**

Triangular distribution with parameters:

10%	$7,796,686	(=L52)
Likeliest	$8,576,355	(=M52)
90%	$9,356,023	(=N52)

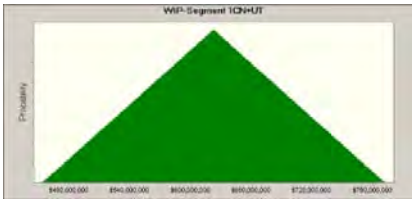


Correlated with:	Coefficient
WtP-Advanced BridgesCN+UT (M70)	0.80
WtP-Advanced BridgesPE (M68)	0.80

Assumption: WtP-Segment 1CN+UT **Cell: M79**

Triangular distribution with parameters:

10%	$529,324,977	(=L62)
Likeliest	$622,735,267	(=M62)
90%	$716,145,557	(=N62)



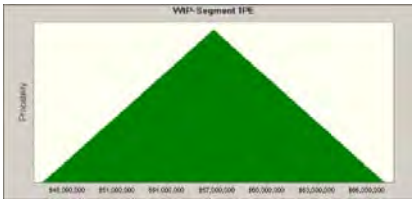
Correlated with:	Coefficient
WtP-Segment 1ROW (M78)	0.80
WtP-Segment 1PE (M77)	0.80

Assumption: WtP-Segment 1PE **Cell: M77**

Triangular distribution with parameters:

10%	$51,112,439	(=L60)
Likeliest	$56,791,599	(=M60)
90%	$62,470,759	(=N60)

Assumption: WtP-Segment 1PE (cont'd) **Cell: M77**

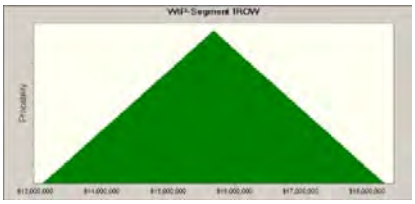


Correlated with:	Coefficient
WtP-Segment 1CN+UT (M79)	0.80
WtP-Segment 1ROW (M78)	0.80

Assumption: WtP-Segment 1ROW **Cell: M78**

Triangular distribution with parameters:

10%	$14,253,527	(=L61)
Likeliest	$15,678,880	(=M61)
90%	$17,104,232	(=N61)

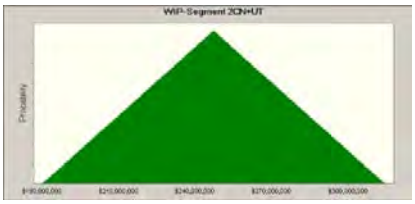


Correlated with:	Coefficient
WtP-Segment 1CN+UT (M79)	0.80
WtP-Segment 1PE (M77)	0.80

Assumption: WtP-Segment 2CN+UT **Cell: M76**

Triangular distribution with parameters:

10%	$210,095,960	(=L59)
Likeliest	$247,171,717	(=M59)
90%	$284,247,475	(=N59)



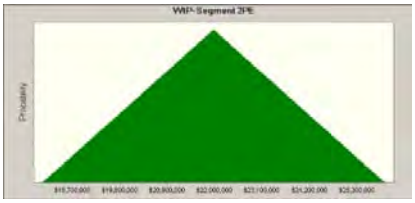
Assumption: WtP-Segment 2CN+UT (cont'd) **Cell: M76**

Correlated with:	Coefficient
WtP-Segment 3ROW (M72)	0.80
WtP-Segment 2ROW (M75)	0.80
WtP-Segment 2PE (M74)	0.80
WtP-Segment 3PE (M71)	0.80

Assumption: WtP-Segment 2PE **Cell: M74**

Triangular distribution with parameters:

10%	$19,770,816	(=L57)
Likeliest	$21,967,573	(=M57)
90%	$24,164,330	(=N57)

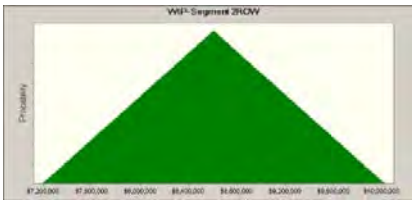


Correlated with:	Coefficient
WtP-Segment 2ROW (M75)	0.80
WtP-Segment 2CN+UT (M76)	0.80

Assumption: WtP-Segment 2ROW **Cell: M75**

Triangular distribution with parameters:

10%	$7,823,907	(=L58)
Likeliest	$8,606,298	(=M58)
90%	$9,388,688	(=N58)

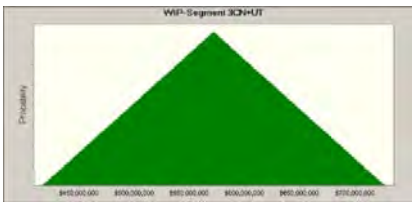


Correlated with:	Coefficient
WtP-Segment 2PE (M74)	0.80
WtP-Segment 2CN+UT (M76)	0.80

Assumption: WtP-Segment 3CN+UT **Cell: M73**

Triangular distribution with parameters:

10%	$485,867,964	(=L56)
Likeliest	$571,609,370	(=M56)
90%	$657,350,775	(=N56)

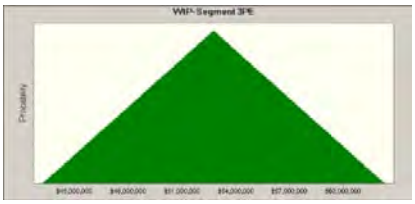


Correlated with:	Coefficient
WtP-Segment 3PE (M71)	0.80
WtP-Segment 3ROW (M72)	0.80

Assumption: WtP-Segment 3PE **Cell: M71**

Triangular distribution with parameters:

10%	$47,470,249	(=L54)
Likeliest	$52,744,721	(=M54)
90%	$58,019,193	(=N54)



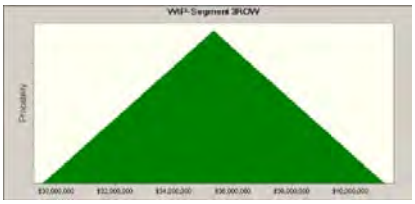
Correlated with:	Coefficient
WtP-Segment 3CN+UT (M73)	0.80
WtP-Segment 2CN+UT (M76)	0.80

Assumption: WtP-Segment 3ROW **Cell: M72**

Triangular distribution with parameters:

10%	$32,125,880	(=L55)
Likeliest	$35,338,468	(=M55)
90%	$38,551,056	(=N55)

Assumption: WtP-Segment 3ROW (cont'd) **Cell: M72**



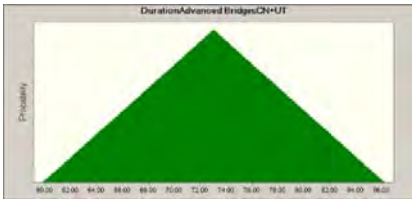
Correlated with:	Coefficient
WtP-Segment 2CN+UT (M76)	0.80
WtP-Segment 3CN+UT (M73)	0.80

Worksheet: [MI I-94 CER Template 4-28-2011pm (3) with partial MC & schedule correlations.xlsm]BaseS

Assumption: DurationAdvanced BridgesCN+UT **Cell: AF16**

Triangular distribution with parameters:

10%	65.70	(=AF16*(1-AG16))
Likeliest	73.00	(=AF16)
90%	80.30	(=AF16*(1+AG16))



Correlated with:	Coefficient
DurationAdvanced BridgesPE (AF14)	0.80

Assumption: DurationAdvanced BridgesPE **Cell: AF14**

Triangular distribution with parameters:

10%	43.80	(=AF14*(1-AG14))
Likeliest	48.67	(=AF14)
90%	53.53	(=AF14*(1+AG14))

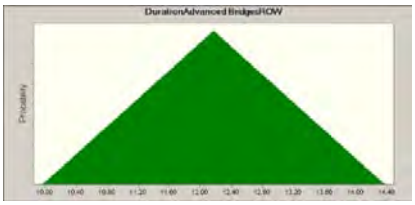
Assumption: DurationAdvanced BridgesPE (cont'd) **Cell: AF14**

Correlated with:	Coefficient
DurationAdvanced BridgesROW (AF15)	0.80
DurationAdvanced BridgesCN+UT (AF16)	0.80

Assumption: DurationAdvanced BridgesROW **Cell: AF15**

Triangular distribution with parameters:

10%	10.95	(=AF15*(1-AG15))
Likeliest	12.17	(=AF15)
90%	13.38	(=AF15*(1+AG15))

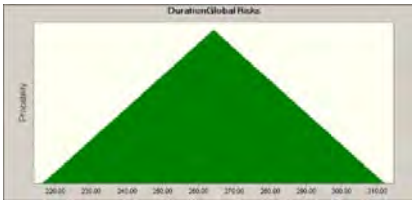


Correlated with:	Coefficient
DurationAdvanced BridgesPE (AF14)	0.80

Assumption: DurationGlobal Risks **Cell: AF13**

Triangular distribution with parameters:

10%	237.74	(=AF13*(1-AG13))
Likeliest	264.15	(=AF13)
90%	290.57	(=AF13*(1+AG13))

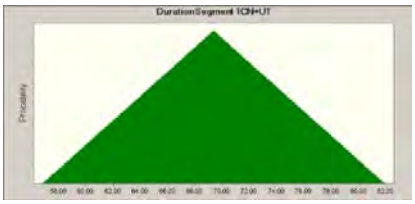


Correlated with:	Coefficient
DurationSegment 1CN+UT (AF25)	0.80

Assumption: DurationSegment 1CN+UT **Cell: AF25**

Triangular distribution with parameters:

10%	62.42	(=AF25*(1-AG25))
Likeliest	69.35	(=AF25)
90%	76.29	(=AF25*(1+AG25))

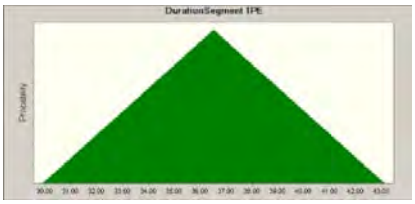


Correlated with:	Coefficient
DurationSegment 1ROW (AF24)	0.80
DurationSegment 1PE (AF23)	0.80
DurationGlobal Risks (AF13)	0.80

Assumption: DurationSegment 1PE **Cell: AF23**

Triangular distribution with parameters:

10%	32.85	(=AF23*(1-AG23))
Likeliest	36.50	(=AF23)
90%	40.15	(=AF23*(1+AG23))



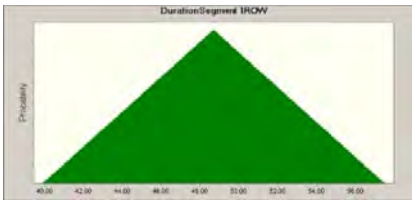
Correlated with:	Coefficient
DurationSegment 1CN+UT (AF25)	0.80
DurationSegment 1ROW (AF24)	0.80

Assumption: DurationSegment 1ROW **Cell: AF24**

Triangular distribution with parameters:

10%	43.80	(=AF24*(1-AG24))
Likeliest	48.67	(=AF24)
90%	53.53	(=AF24*(1+AG24))

Assumption: DurationSegment 1ROW (cont'd) **Cell: AF24**

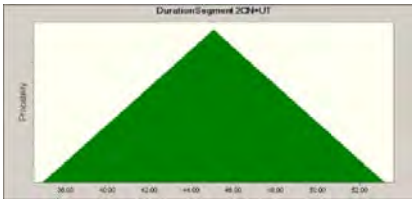


Correlated with:	Coefficient
DurationSegment 1CN+UT (AF25)	0.80
DurationSegment 1PE (AF23)	0.80

Assumption: DurationSegment 2CN+UT **Cell: AF22**

Triangular distribution with parameters:

10%	40.52	(=AF22*(1-AG22))
Likeliest	45.02	(=AF22)
90%	49.52	(=AF22*(1+AG22))

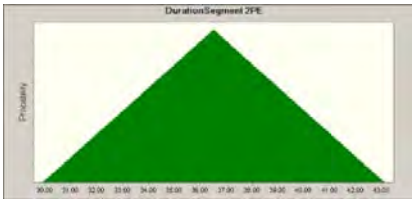


Correlated with:	Coefficient
DurationSegment 2PE (AF20)	0.80
DurationSegment 2ROW (AF21)	0.80

Assumption: DurationSegment 2PE **Cell: AF20**

Triangular distribution with parameters:

10%	32.85	(=AF20*(1-AG20))
Likeliest	36.50	(=AF20)
90%	40.15	(=AF20*(1+AG20))



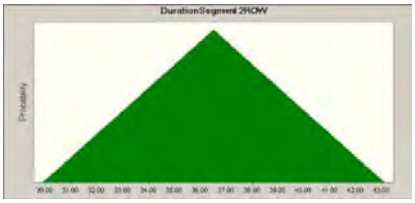
Assumption: DurationSegment 2PE (cont'd) **Cell: AF20**

Correlated with:	Coefficient
DurationSegment 2CN+UT (AF22)	0.80
DurationSegment 2ROW (AF21)	0.80

Assumption: DurationSegment 2ROW **Cell: AF21**

Triangular distribution with parameters:

10%	32.85	(=AF21*(1-AG21))
Likeliest	36.50	(=AF21)
90%	40.15	(=AF21*(1+AG21))

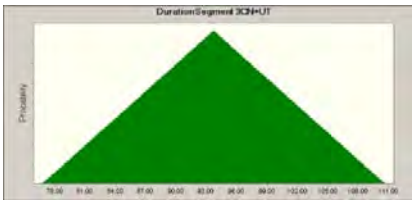


Correlated with:	Coefficient
DurationSegment 2CN+UT (AF22)	0.80
DurationSegment 2PE (AF20)	0.80

Assumption: DurationSegment 3CN+UT **Cell: AF19**

Triangular distribution with parameters:

10%	84.32	(=AF19*(1-AG19))
Likeliest	93.68	(=AF19)
90%	103.05	(=AF19*(1+AG19))

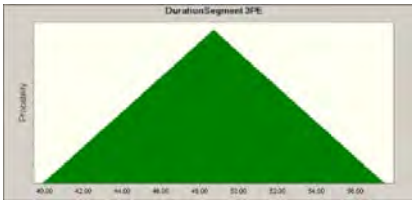


Correlated with:	Coefficient
DurationSegment 3PE (AF17)	0.80
DurationSegment 3ROW (AF18)	0.80

Assumption: DurationSegment 3PE **Cell: AF17**

Triangular distribution with parameters:

10%	43.80	(=AF17*(1-AG17))
Likeliest	48.67	(=AF17)
90%	53.53	(=AF17*(1+AG17))

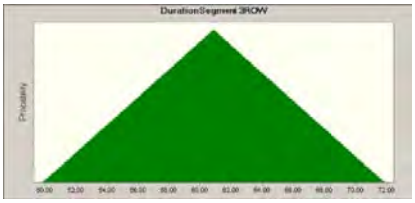


Correlated with:	Coefficient
DurationSegment 3CN+UT (AF19)	0.80
DurationSegment 3ROW (AF18)	0.80

Assumption: DurationSegment 3ROW **Cell: AF18**

Triangular distribution with parameters:

10%	54.75	(=AF18*(1-AG18))
Likeliest	60.83	(=AF18)
90%	66.92	(=AF18*(1+AG18))



Correlated with:	Coefficient
DurationSegment 3PE (AF17)	0.80
DurationSegment 3CN+UT (AF19)	0.80

Worksheet: [MI I-94 CER Template 4-28-2011pm (3) with partial MC & schedule correlations.xlsm]Risk F

Assumption: ci 10Additional ROW for RR in Segment 1 **Cell: S20**

Triangular distribution with parameters:

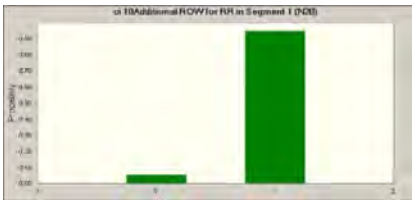
10%	$900,000	(=P20)
Likeliest	$1,500,000	(=Q20)
90%	$2,500,000	(=R20)

Assumption: ci 10Additional ROW for RR in Segment 1 (cont'd) **Cell: S20**

Assumption: ci 10Additional ROW for RR in Segment 1 (N20) **Cell: N20**

Yes-No distribution with parameters:

Probability of Yes(1)	0.95	(=N20)



Assumption: ci 11Railroad Bridges **Cell: N21**

Yes-No distribution with parameters:

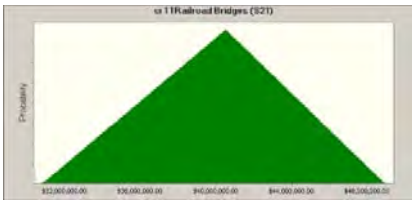
Probability of Yes(1)	0.3	(=N21)

Assumption: ci 11Railroad Bridges (S21) **Cell: S21**

Triangular distribution with parameters:

10%	$35,000,000.00	(=P21)
Likeliest	$40,500,000.00	(=Q21)
90%	$45,000,000.00	(=R21)

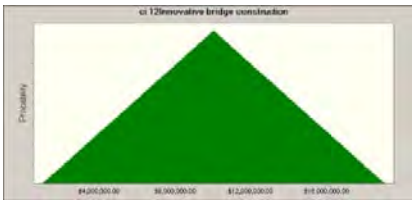
Assumption: ci 11Railroad Bridges (S21) (cont'd) **Cell: S21**



Assumption: ci 12Innovative bridge construction **Cell: S22**

Triangular distribution with parameters:

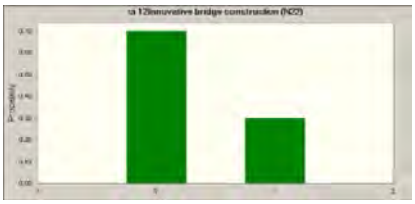
10%	$5,000,000.00	(=P22)
Likeliest	$10,000,000.00	(=Q22)
90%	$15,000,000.00	(=R22)



Assumption: ci 12Innovative bridge construction (N22) **Cell: N22**

Yes-No distribution with parameters:

Probability of Yes(1)	0.3	(=N22)

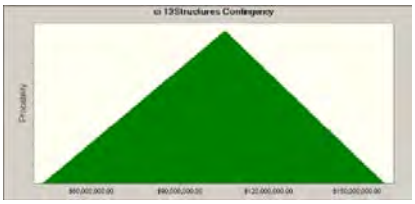


Assumption: ci 13Structures Contingency **Cell: S23**

Triangular distribution with parameters:

10%	$70,000,000.00	(=P23)
Likeliest	$105,000,000.00	(=Q23)
90%	$134,000,000.00	(=R23)

Assumption: ci 13Structures Contingency (cont'd) **Cell: S23**



Assumption: ci 13Structures Contingency (N23) **Cell: N23**

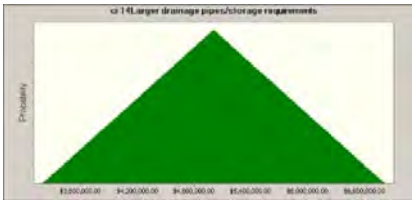
Yes-No distribution with parameters:

Probability of Yes(1)	1.0	(=N23)

Assumption: ci 14Larger drainage pipes/storage requirements **Cell: S24**

Triangular distribution with parameters:

10%	$4,000,000.00	(=P24)
Likeliest	$5,000,000.00	(=Q24)
90%	$6,000,000.00	(=R24)



Assumption: ci 14Larger drainage pipes/storage requirements (N24) **Cell: N24**

Yes-No distribution with parameters:

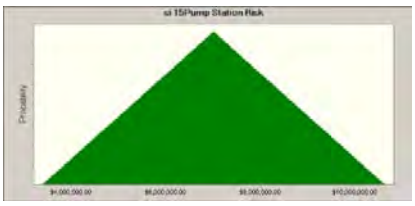
Probability of Yes(1)	0.75	(=N24)

Assumption: ci 14Larger drainage pipes/storage requirements (N24) (cont'd) **Cell: N24**

Assumption: ci 15Pump Station Risk **Cell: S25**

Triangular distribution with parameters:

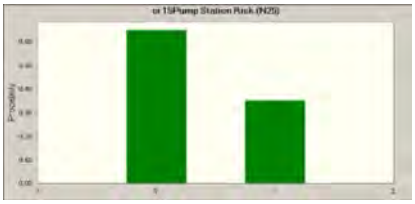
10%	$5,000,000.00	(=P25)
Likeliest	$7,000,000.00	(=Q25)
90%	$9,000,000.00	(=R25)



Assumption: ci 15Pump Station Risk (N25) **Cell: N25**

Yes-No distribution with parameters:

Probability of Yes(1)	0.35	(=N25)

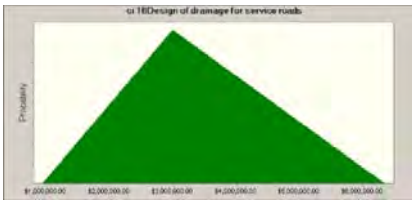


Assumption: ci 16Design of drainage for service roads **Cell: S26**

Triangular distribution with parameters:

10%	$2,000,000.00	(=P26)
Likeliest	$3,000,000.00	(=Q26)
90%	$5,000,000.00	(=R26)

Assumption: ci 16Design of drainage for service roads (cont'd) **Cell: S26**



Assumption: ci 16Design of drainage for service roads (N26) **Cell: N26**

Yes-No distribution with parameters:

Probability of Yes(1)	0.5	(=N26)

Assumption: ci 17Damage to existing DWSD **Cell: S27**

Triangular distribution with parameters:

10%	$1,000,000.00	(=P27)
Likeliest	$2,000,000.00	(=Q27)
90%	$3,000,000.00	(=R27)

Assumption: ci 17Damage to existing DWSD (N27) **Cell: N27**

Yes-No distribution with parameters:

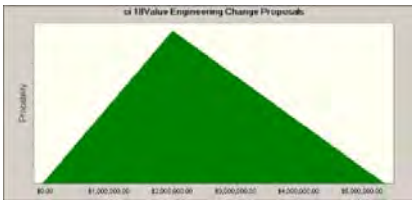
Probability of Yes(1)	0.35	(=N27)

Assumption: ci 17Damage to existing DWSD (N27) (cont'd) **Cell: N27**

Assumption: ci 18Value Engineering Change Proposals **Cell: S28**

Triangular distribution with parameters:

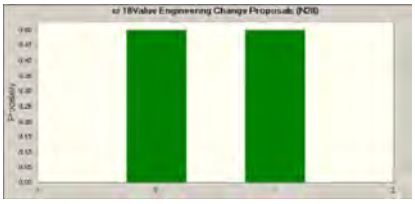
10%	$1,000,000.00	(=P28)
Likeliest	$2,000,000.00	(=Q28)
90%	$4,000,000.00	(=R28)



Assumption: ci 18Value Engineering Change Proposals (N28) **Cell: N28**

Yes-No distribution with parameters:

Probability of Yes(1)	0.5	(=N28)

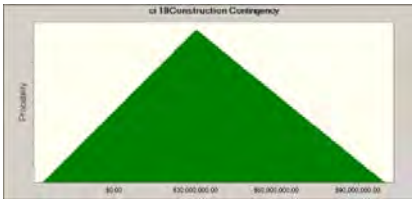


Assumption: ci 19Construction Contingency **Cell: S29**

Triangular distribution with parameters:

10%	$0.00	(=P29)
Likeliest	$30,000,000.00	(=Q29)
90%	$70,000,000.00	(=R29)

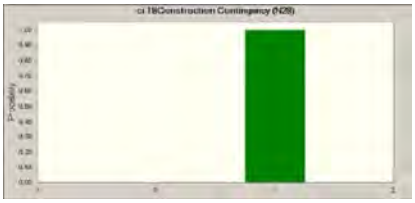
Assumption: ci 19Construction Contingency (cont'd) **Cell: S29**



Assumption: ci 19Construction Contingency (N29) **Cell: N29**

Yes-No distribution with parameters:

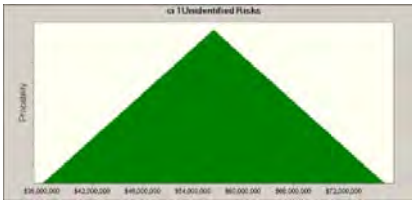
Probability of Yes(1)	1.0	(=N29)



Assumption: ci 1Unidentified Risks **Cell: S10**

Triangular distribution with parameters:

10%	$45,140,000	(=P10)
Likeliest	$56,425,000	(=Q10)
90%	$67,710,000	(=R10)

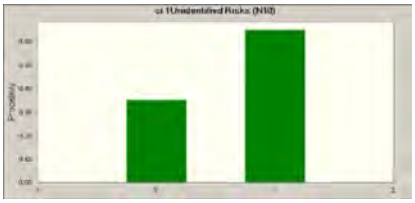


Assumption: ci 1Unidentified Risks (N10) **Cell: N10**

Yes-No distribution with parameters:

Probability of Yes(1)	0.65	(=N10)

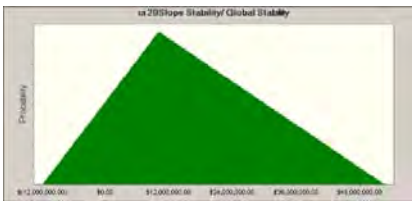
Assumption: ci 1Unidentified Risks (N10) (cont'd) **Cell: N10**



Assumption: ci 20Slope Stability/ Global Stability **Cell: S30**

Triangular distribution with parameters:

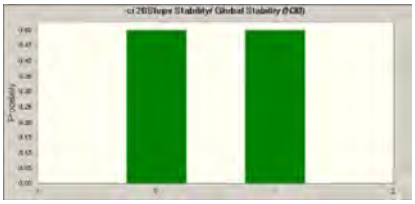
10%	$0.00	(=P30)
Likeliest	$10,000,000.00	(=Q30)
90%	$36,000,000.00	(=R30)



Assumption: ci 20Slope Stability/ Global Stability (N30) **Cell: N30**

Yes-No distribution with parameters:

Probability of Yes(1)	0.5	(=N30)

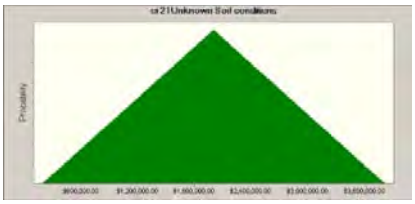


Assumption: ci 21Unknown Soil conditions **Cell: S31**

Triangular distribution with parameters:

10%	$1,000,000.00	(=P31)
Likeliest	$2,000,000.00	(=Q31)
90%	$3,000,000.00	(=R31)

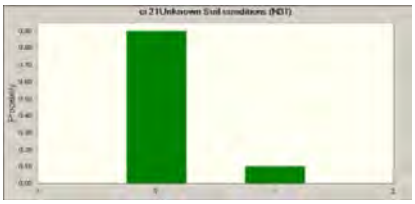
Assumption: ci 21Unknown Soil conditions (cont'd) **Cell: S31**



Assumption: ci 21Unknown Soil conditions (N31) **Cell: N31**

Yes-No distribution with parameters:

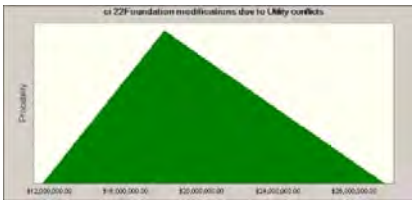
Probability of Yes(1)	0.1	(=N31)



Assumption: ci 22Foundation modifications due to Utility conflicts **Cell: S32**

Triangular distribution with parameters:

10%	$15,000,000.00	(=P32)
Likeliest	$18,000,000.00	(=Q32)
90%	$25,000,000.00	(=R32)

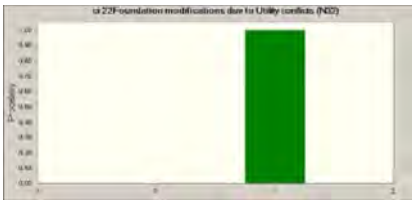


Assumption: ci 22Foundation modifications due to Utility conflicts (N32) **Cell: N32**

Yes-No distribution with parameters:

Probability of Yes(1)	1.0	(=N32)

Assumption: ci 22Foundation modifications due to Utility conflicts (N32) (cont'd) **Cell: N32**



Assumption: ci 23Pavement designs for longer life cycles **Cell: S33**

Triangular distribution with parameters:

10%	$4,000,000.00	(=P33)
Likeliest	$5,500,000.00	(=Q33)
90%	$7,500,000.00	(=R33)

Assumption: ci 23Pavement designs for longer life cycles (N33) **Cell: N33**

Yes-No distribution with parameters:

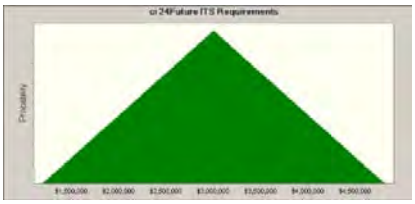
Probability of Yes(1)	0.6	(=N33)

Assumption: ci 24Future ITS Requirements **Cell: S34**

Triangular distribution with parameters:

10%	$2,000,000	(=P34)
Likeliest	$3,000,000	(=Q34)
90%	$4,000,000	(=R34)

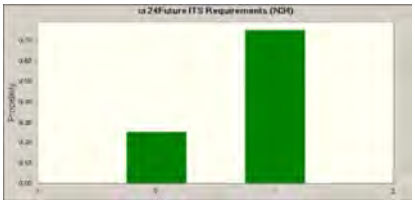
Assumption: ci 24Future ITS Requirements (cont'd) **Cell: S34**



Assumption: ci 24Future ITS Requirements (N34) **Cell: N34**

Yes-No distribution with parameters:

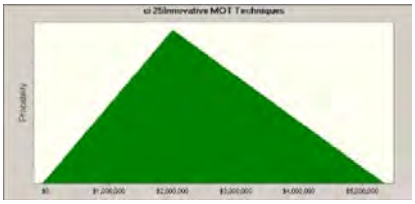
Probability of Yes(1)	0.75	(=N34)



Assumption: ci 25Innovative MOT Techniques **Cell: S35**

Triangular distribution with parameters:

10%	$1,000,000	(=P35)
Likeliest	$2,000,000	(=Q35)
90%	$4,000,000	(=R35)

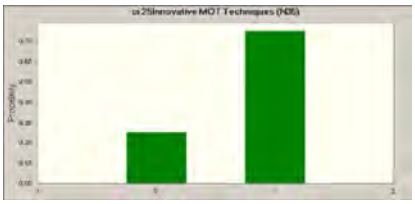


Assumption: ci 25Innovative MOT Techniques (N35) **Cell: N35**

Yes-No distribution with parameters:

Probability of Yes(1)	0.75	(=N35)

Assumption: ci 25Innovative MOT Techniques (N35) (cont'd) **Cell: N35**



Assumption: ci 26Full Traffic Closures during Construction **Cell: S36**

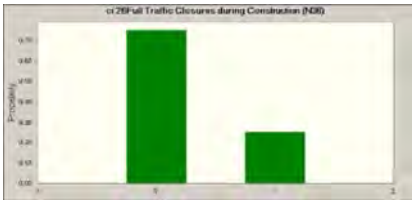
Triangular distribution with parameters:

10%	$13,000,000	(=P36)
Likeliest	$32,000,000	(=Q36)
90%	$52,000,000	(=R36)

Assumption: ci 26Full Traffic Closures during Construction (N36) **Cell: N36**

Yes-No distribution with parameters:

Probability of Yes(1)	0.25	(=N36)



Assumption: ci 27Full Traffic Closures during Construction **Cell: S37**

Triangular distribution with parameters:

10%	$5,500,000	(=P37)
Likeliest	$13,000,000	(=Q37)
90%	$22,000,000	(=R37)

Assumption: ci 27Full Traffic Closures during Construction (cont'd) **Cell: S37**

Assumption: ci 27Full Traffic Closures during Construction (N37) **Cell: N37**

Yes-No distribution with parameters:

Probability of Yes(1)	0.5	(=N37)

Assumption: ci 28Full Traffic Closures during Construction **Cell: S38**

Triangular distribution with parameters:

10%	$14,000,000	(=P38)
Likeliest	$35,000,000	(=Q38)
90%	$56,000,000	(=R38)

Assumption: ci 28Full Traffic Closures during Construction (N38) **Cell: N38**

Yes-No distribution with parameters:

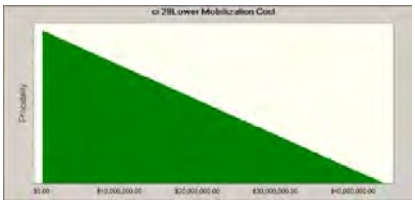
Probability of Yes(1)	0.5	(=N38)

Assumption: ci 28Full Traffic Closures during Construction (N38) (cont'd) **Cell: N38**

Assumption: ci 29Lower Mobilization Cost **Cell: S39**

Triangular distribution with parameters:

Minimum	$0.00	(=P39)
Likeliest	$0.00	(=Q39)
Maximum	$44,000,000.00	(=R39)



Assumption: ci 29Lower Mobilization Cost (N39) **Cell: N39**

Yes-No distribution with parameters:

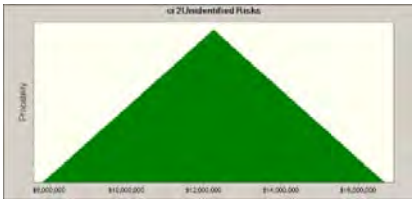
Probability of Yes(1)	0.35	(=N39)

Assumption: ci 2Unidentified Risks **Cell: S11**

Triangular distribution with parameters:

10%	$9,800,000	(=P11)
Likeliest	$12,250,000	(=Q11)
90%	$14,700,000	(=R11)

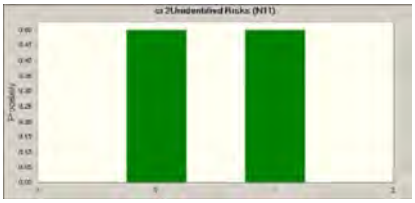
Assumption: ci 2Unidentified Risks (cont'd) **Cell: S11**



Assumption: ci 2Unidentified Risks (N11) **Cell: N11**

Yes-No distribution with parameters:

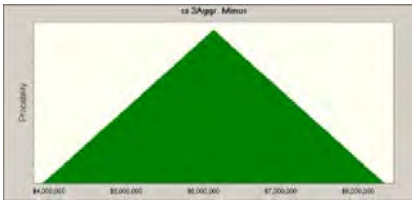
Probability of Yes(1)	0.5	(=N11)



Assumption: ci 3Aggr. Minor **Cell: S13**

Triangular distribution with parameters:

10%	$4,900,000	(=P13)
Likeliest	$6,125,000	(=Q13)
90%	$7,350,000	(=R13)

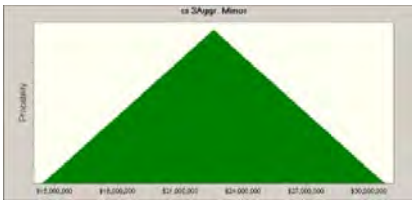


Assumption: ci 3Aggr. Minor **Cell: S12**

Triangular distribution with parameters:

10%	$18,056,000	(=P12)
Likeliest	$22,570,000	(=Q12)
90%	$27,084,000	(=R12)

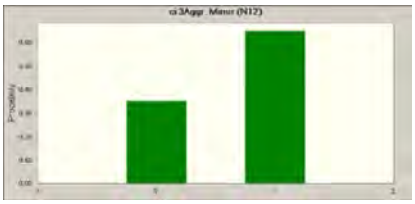
Assumption: ci 3Aggr. Minor (cont'd) **Cell: S12**



Assumption: ci 3Aggr. Minor (N12) **Cell: N12**

Yes-No distribution with parameters:

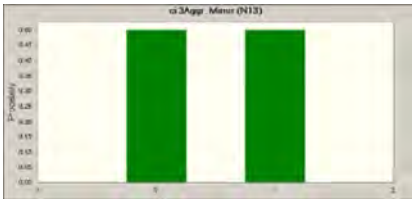
Probability of Yes(1)	0.65	(=N12)



Assumption: ci 3Aggr. Minor (N13) **Cell: N13**

Yes-No distribution with parameters:

Probability of Yes(1)	0.5	(=N13)

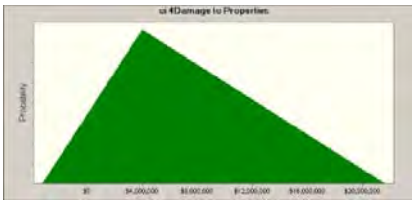


Assumption: ci 4Damage to Properties **Cell: S14**

Triangular distribution with parameters:

10%	$1,000,000	(=P14)
Likeliest	$4,000,000	(=Q14)
90%	$15,000,000	(=R14)

Assumption: ci 4Damage to Properties (cont'd) **Cell: S14**



Assumption: ci 4Damage to Properties (N14) **Cell: N14**

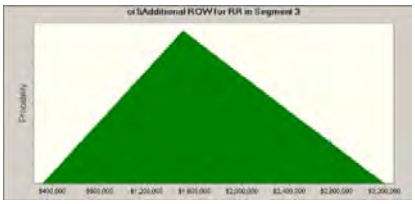
Yes-No distribution with parameters:

Probability of Yes(1)	0.75	(=N14)

Assumption: ci 5Additional ROW for RR in Segment 3 **Cell: S15**

Triangular distribution with parameters:

10%	$900,000	(=P15)
Likeliest	$1,500,000	(=Q15)
90%	$2,500,000	(=R15)

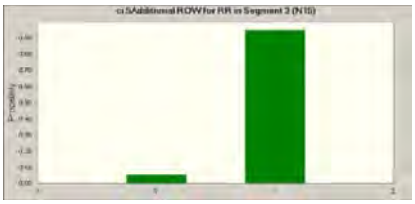


Assumption: ci 5Additional ROW for RR in Segment 3 (N15) **Cell: N15**

Yes-No distribution with parameters:

Probability of Yes(1)	0.95	(=N15)

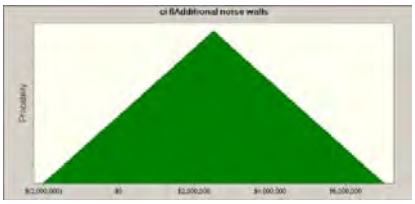
Assumption: ci 5Additional ROW for RR in Segment 3 (N15) (cont'd) **Cell: N15**



Assumption: ci 6Additional noise walls **Cell: S16**

Triangular distribution with parameters:

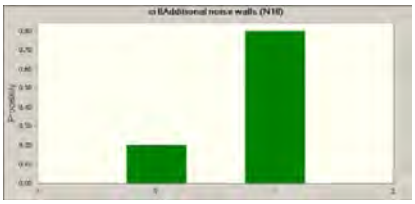
10%	$0	(=P16)
Likeliest	$2,500,000	(=Q16)
90%	$5,000,000	(=R16)



Assumption: ci 6Additional noise walls (N16) **Cell: N16**

Yes-No distribution with parameters:

Probability of Yes(1)	0.8	(=N16)

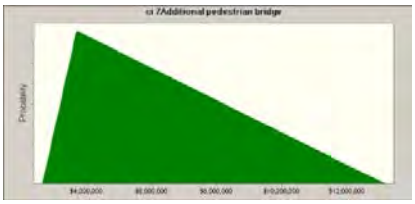


Assumption: ci 7Additional pedestrian bridge **Cell: S17**

Triangular distribution with parameters:

10%	$3,700,000	(=P17)
Likeliest	$3,700,000	(=Q17)
90%	$10,000,000	(=R17)

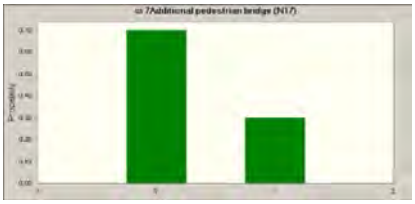
Assumption: ci 7Additional pedestrian bridge (cont'd) **Cell: S17**



Assumption: ci 7Additional pedestrian bridge (N17) **Cell: N17**

Yes-No distribution with parameters:

Probability of Yes(1)	0.3	(=N17)



Assumption: ci 8Skills Training **Cell: S18**

Triangular distribution with parameters:

10%	$4,000,000	(=P18)
Likeliest	$5,000,000	(=Q18)
90%	$6,000,000	(=R18)

Assumption: ci 8Skills Training (N18) **Cell: N18**

Yes-No distribution with parameters:

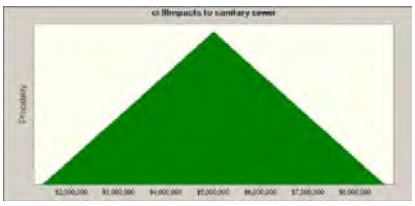
Probability of Yes(1)	1.0	(=N18)

Assumption: ci 8Skills Training (N18) (cont'd) **Cell: N18**

Assumption: ci 9Impacts to sanitary sewer **Cell: S19**

Triangular distribution with parameters:

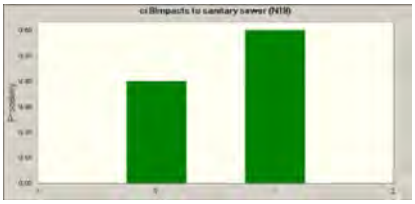
10%	$3,000,000	(=P19)
Likeliest	$5,000,000	(=Q19)
90%	$7,000,000	(=R19)



Assumption: ci 9Impacts to sanitary sewer (N19) **Cell: N19**

Yes-No distribution with parameters:

Probability of Yes(1)	0.6	(=N19)

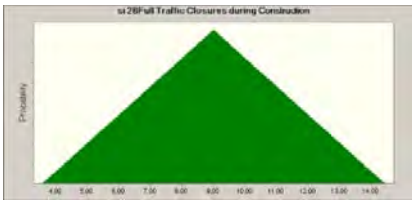


Assumption: si 26Full Traffic Closures during Construction **Cell: AA36**

Triangular distribution with parameters:

10%	6.00	(=X36)
Likeliest	9.00	(=Y36)
90%	12.00	(=Z36)

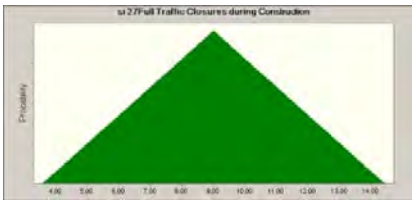
Assumption: si 26Full Traffic Closures during Construction (cont'd) **Cell: AA36**



Assumption: si 27Full Traffic Closures during Construction **Cell: AA37**

Triangular distribution with parameters:

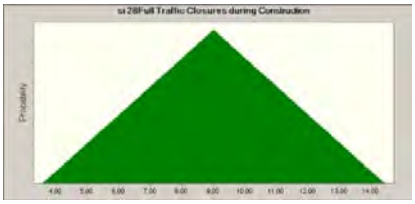
10%	6.00	(=X37)
Likeliest	9.00	(=Y37)
90%	12.00	(=Z37)



Assumption: si 28Full Traffic Closures during Construction **Cell: AA38**

Triangular distribution with parameters:

10%	6.00	(=X38)
Likeliest	9.00	(=Y38)
90%	12.00	(=Z38)

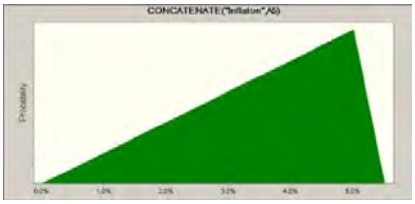


Worksheet: [MI I-94 CER Template 4-28-2011pm (3) with partial MC & schedule correlations.xlsm]YOE

Assumption: CONCATENATE("Inflaton",A5) **Cell: R5**

Triangular distribution with parameters:

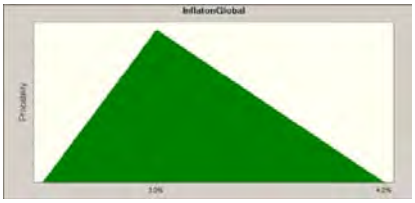
Minimum	0.0%	
Likeliest	5.0%	(=R5)
Maximum	5.5%	



Assumption: InflatonGlobal **Cell: R4**

Triangular distribution with parameters:

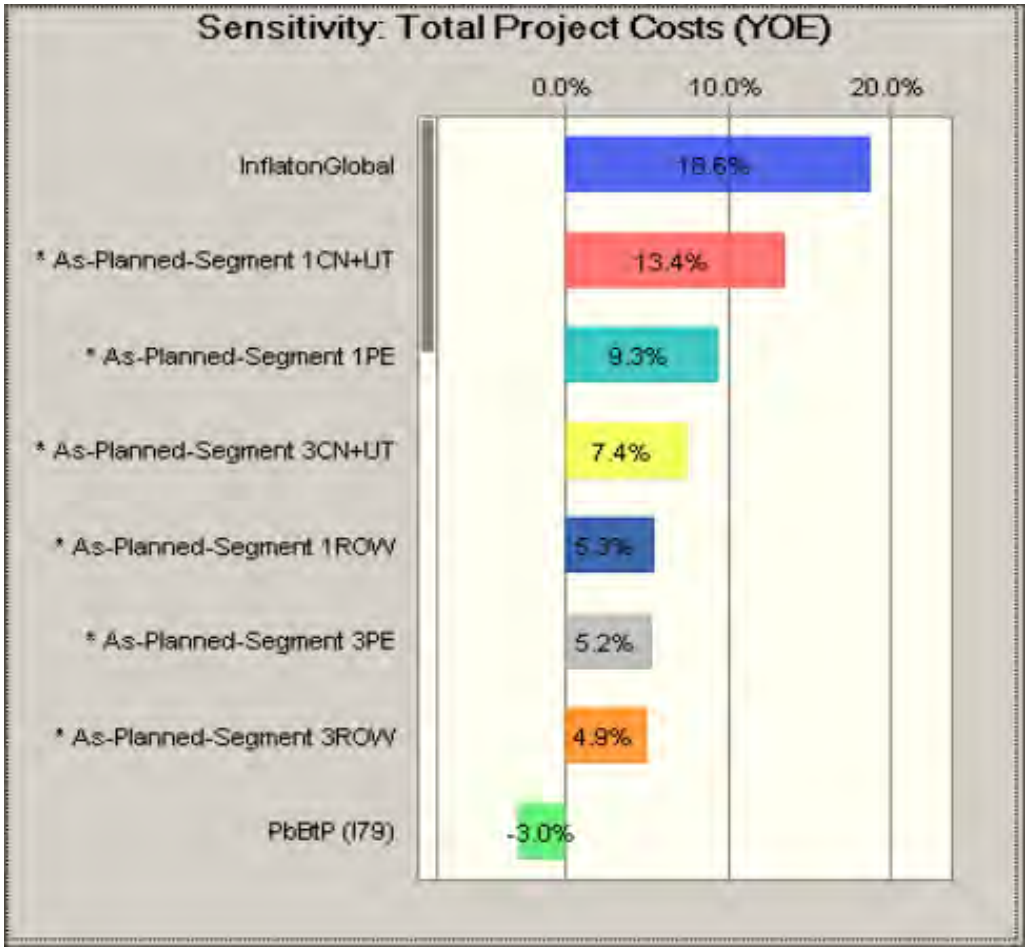
Minimum	2.5%	
Likeliest	3.0%	(=R4)
Maximum	4.0%	



End of Assumptions

Sensitivity Charts

No target forecast has been specified



End of Sensitivity Charts

COST ESTIMATE REVIEW FOR I-94 REHABILITATION PROJECT

Date: April 26 - 29, 2011

Tuesday, April 26, 2011

8:00-9:00	Introductions, CER Introduction by FHWA
9:00-9:30	Project Overview Review Project Scope, Current Status, Planned Construction Schedule and Phasing
9:30-10:30	Estimating Process, Overall Project Threats and Opportunities
10:30-11:00	Market Conditions
11:00-11:30	Soft Costs (Administrative, inflation, allowances)
1:00-1:30	Contingency/Risk Register Item
1:30-2:30	ROW
2:30-3:00	Excluded Costs
3:00-3:30	Value Engineering Estimate vs Detailed Engineering Report Estimate
3:30	Roadway Drainage and Erosion Control

Wednesday, April 27, 2011

8:00-9:30	Utilities, Lighting, Pump Stations
9:30-10:00	Enhancements, Noise Barriers
10:00-11:30	Pavement and Structures, Construction
1:00-2:00	ITS, Signing
2:00	Contingencies, Engineering, Administration, Mobilization

Thursday, April 28, 2011

8:00-9:00	Geotechnical and Retaining Walls
9:00-10:00	Traffic and Safety, Construction Signing and Traffic Control
10:00-11:30	Financial Plan, Phasing Costs, Escalation
1:00-2:30	Prepare Presentation and Report Findings
2:30	Presentation Dry Run

Friday, April 29, 2011

9:00-12:00 Closeout Presentation

FHWA Team Members:

Ryan Rizzo
Latoya Johnson
Craig Actis
Douglas Townes

MDOT Team Members:

Rhiannon Worgess-Carveth – Unit Prices
Paul Sander – ROW
Drainage – Erik Carlson
Utilities, Lighting, Pump Stations – Steve Urda
Structures – Phil Grotenhuis
Construction – Cedric Dargin
ITS – Michele Mueller
Construction Signing, Traffic Control – Georgina McDonald
Geotechnical – Dick Endres
Financial Plan, Phasing Escalation – Brenda Chapman, Mary Cumberworth, Rob Lippert, Bhavana Chandrayan, Dave Berridge

Consultant Team Members:

Steven Lynch – CH2M Hill

Location:

MDOT Lansing TSC
3101 Technology Blvd., Suite H
Lansing Mi. 48910
PH 517-324-2260

COST ESTIMATE REVIEW SIGN-IN SHEET

Project: I-94/Edsel Ford Freeway

State: Michigan | **Date:** April 25-29, 2010

Name	Agency	Title	E-Mail
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STEVE URDA	MDOT	~~MDOT~~ MUNICIPAL UTILS	URDAS@MICHIGAN.GOV
Erik Carlson	MDOT	MDOT-Hydraulics	carlsoner@ michigan.gov

COST ESTIMATE REVIEW SIGN-IN SHEET

Project: I-94/Edsel Ford Freeway

State: Michigan | **Date:** April 25-29, 2010

Name	Agency	Title	E-Mail
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Tom JAY	MDOT RE	REGION AGENT	JAYT@MICHIGAN.GOV
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I-94 Edsel Ford Freeway Project

Detroit, Michigan

FHWA Cost Estimate Review

November
2013

Final Report

MDOT
Michigan Department of Transportation

DEPARTMENT OF TRANSPORTATION
UNITED STATES OF AMERICA

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EXECUTIVE SUMMARY

The Federal Highway Administration (FHWA), the Michigan Department of Transportation (MDOT), and their consultants conducted a workshop to review the updated cost estimate for the I-94 Edsel Ford Freeway Project. The Cost Estimate Review (CER) workshop was held in Lansing, Michigan on November 18 – 20, 2013. This CER was a follow-up to the I-94 CER that was conducted April 26-29, 2011. The Final Report (without appendices) for the April 2011 I-94 CER is included in Appendix E.

The objective of the review was to verify the accuracy and reasonableness of the current project total cost estimate and schedule and to determine the minimum total project cost amount, in year of expenditure dollars that needs to be included in the project's Initial Finance Plan. Significant results of the review are as follows:

The MDOT pre-review estimate for the project was $2.847 billion Year of Expenditure (YOE) dollars. The anticipated completion date was State fiscal year 2036.

Approximately $97 million in net adjustments were made to the estimate during the week of the review. The modifications included cost increases for ROW, environmental commitments, mobilization, ITS, subgrade undercutting, construction change orders, drilled shafts to avoid utilities, and jobs skills training. Cost decrease modifications included reducing the cost estimates for the elements of the advanced bridges portion of the project to show these costs in 2013 dollars.

During the workshop, the over 25 cost and schedule risk events from the 2011 CER were reviewed by the team and updated as appropriate. Additional cost and schedule risks were identified and modeled. Consequently, $357 million in contingency (approximately 35% of construction costs) was removed from the base estimate and redistributed in the probabilistic and risk-based analysis. Based on this risk assessment the range of total project costs varies between $2.123 billion and $3.505 billion YOE dollars. The 70% level of confidence requires a budget of $2.913 billion YOE. This is the required baseline cost to be used in the major project financial plan to show adequate project funding.

The following recommendations are provided based on this review:

- Update estimate to reflect estimate changes made during review
- Continue to update and manage project risks through the risk register
- Use the 70% YOE amount of $2,912.7 as the minimum amount in the Initial Finance Plan
- Continue to explore opportunities to accelerate the project delivery timeline in order to reduce overall project costs

CHAPTER 1 – REVIEW PROCESS

REVIEW OBJECTIVE

The objective of the FHWA cost estimate review (CER) update for the I-94 Edsel Ford Freeway Project in Detroit, Michigan is to:

- Conduct an unbiased, risk-based evaluation to verify the accuracy and reasonableness of the current total cost and schedule estimates
- Develop a probability range for the cost and schedule estimate that represents the project's current stage of design
- Determine the total cost estimate amount for the project at the 70% level of confidence in Year of Expenditure (YOE) dollars, which represents the minimum amount that should be included in the project's Initial Finance Plan

BASIS OF REVIEW

The "Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users" (SAFETEA-LU) requires the financial plan for all Federal-aid projects with an estimated total cost of $500 million or more to be approved by the Secretary (i.e. FHWA) based on reasonable assumptions. The $500 million threshold includes all project costs, such as engineering, construction, right-of-way, utilities, construction engineering, and inflation. The FHWA has interpreted 'reasonable assumptions' to be a risk based analysis. The cost estimate review provides the risk based assessment and is used in the approval of the financial plan.

This is an independent review, but is not an independent FHWA estimate. The review team used an estimate provided in a spreadsheet by MDOT as the base.

REVIEW TEAM

The Review Team included individuals with a strong knowledge of the Project and/or of major project work, including discipline experts. Individuals with specific project expertise briefed the Team regarding technical details and the estimate development process. The Team discussed the critical components and assumptions of the estimate, as well as the consistency in estimate development across all project segments.

Quantities and unit costs were reviewed and verified with the discipline experts. Finally, they considered variability and risks which could affect various segments of the project.

The Review Team was comprised of the following members:

- FHWA
    - MI, CT and MO Division Offices
- MDOT
- Consultants – HNTB

The agenda and attendance sheet are provided in Appendix D.

DOCUMENTS REVIEWED

Documents reviewed prior to and during the workshop included:

- 2011 CER Report
- Updated Project Cost Estimate
- Updated Project Schedule
- Updated Project Risks
- Draft Initial Financial Plan

REVIEW METHODOLOGY

During the workshop, the FHWA staff participated in discussions to gain a better understanding of the project and its risks. The following general steps were followed:

- Verify Base Estimate
  - Understand project scope and the estimate development process
  - Discuss assumptions for contingencies and projected inflation rates
  - Review major cost elements
  - Identify Threats and Opportunities for various items (Risks)
- Consider Variation of Inputs
  - Develop market condition range for major cost elements
  - Model variation of inflation
  - Determine probability of occurrence and schedule and cost impacts for significant project threats and opportunities
  - Develop probability assumption distributions
- Perform Monte Carlo simulation to model variability and risk and generate likely range of project cost and schedule

The following discussion provides more detail about the concepts utilized during the review.

Verify Accuracy of Cost Estimate

The Review Team was provided an overview of the State's estimating process. This overview included understanding the scope of the project, stage of design and current cost estimating process used by the State. The overview also included a review of project documents. The Review Team interviewed the subject matter experts and verified the accuracy of the State's estimate for both quantity and unit cost for each major cost element. Where changes were needed these changes were recorded and the estimate updated. Additions or deletions were also recorded and the state's

estimate updated to reflect the change. Following the completion of the on-site review, any additional changes or corrections to the estimate were confirmed with the State.

Model Uncertainties

In general, uncertainties in the state's estimate can be described as those relating to base variability, cost and schedule risk events, and market risks. Each of these were discussed and modeled to reflect the total uncertainty associated with the state's estimate.

The Review Team discussed the uncertainties associated with Market Conditions at the time of letting. There is a strong relationship between the number of bidders and the cost of a project at the time of letting. Market condition is a measure of uncertainty that reflects the overall competitive bidding environment at the time of letting. Material and labor availability also affect market conditions. Market condition is applied to the base estimate using a binomial estimate of probability for better than planned and worse than planned bidding environments.

Base variability is a measure of uncertainty in a cost estimate and represents unknown-unknowns (i.e. estimate items that have not been thought of) and is typically represented using a symmetrical distribution about the base estimate.

The Review Team interviewed the State to define the components of contingency and establish the risk register for both cost and schedule risks. The risk register includes the event risk name, a description of the event, a probability measure of the likelihood the event will occur, as well as a probability distribution of costs if the event were to occur. The register also identifies if the risk event is a threat or opportunity for cost/schedule. Risk threats increase costs/schedule and opportunities decrease cost/schedule. A very important feature of the risk register is to establish the relationship of risk events. For example, some risks are mutually inclusive or mutually exclusive. Mutually inclusive means the risk event can only occur if the prior risk event occurs. Conversely, for a risk event to be mutually exclusive means that it can only occur if the prior risk event does not occur. Risk events can also be independent in which case the probability of occurrence is not dependent on any other risk event. Correlation determines how one risk event will sample relative to another risk event. Correlation should only be established when there is reason to suspect that a relationship exists and needs to be accounted for in the simulation.

After models were developed for market conditions, base variability, and risk events the Review Team utilized the Monte Carlo simulation to generate a probability based estimate of YOE Total Project Costs. A simulation is essentially a rigorous extension of a "what-if" or sensitivity analysis that uses randomly selected sets of values from the probability distributions representing uncertainty to calculate separate and discrete results. A single iteration within a simulation is the process of sampling from all input distributions and performing a single calculation to produce a deterministic result. It is important that each iteration represent a scenario, or outcome, that is possible. It is for this reason that the simulation outcomes be reviewed to ensure accuracy. The process of sampling from a probability distribution is repeated until the specified number of computer iterations is completed or until the simulation process converges. Simulation convergence is that point at which additional iterations do not significantly change the shape of the output distribution. The results of the simulation are arrayed in the form of a distribution covering all possible outcomes. The key benefit of this process is that probability is associated with costs.

Communicate Results

The last part of the review is to communicate the results. This is accomplished by providing a closeout presentation and final report to both State and FHWA Division leaders. At the end of the review the Review Team provides a closeout presentation that summarizes the review findings. The presentation identifies the review objectives and agenda, discusses the methodology, and highlights the results of the review including the pre/post workshop estimate results and identifies any estimate adjustments made during the review. The closeout presentation also identifies any significant cost and schedule risks, and provides a brief overview of recommendations by the Review Team. The closeout presentation for this review was given on November 20, 2013. The presentation is included in Appendix A.

It is important that everyone understand that the estimate review is a snapshot in time of the estimate. As the project continues to develop, it is expected that the estimate will change and be updated. Following the review if errors or omissions are identified and confirmed with the State these modifications will be incorporated into the final report.

The final report communicates all findings of the review to the State and Division and serves as the official document for the cost estimate review. As noted earlier the review results are used in the approval of the financial plan. Cost estimate review reports are maintained by the FHWA Project Delivery Team in Washington DC.

CHAPTER 2 – REVIEW SUMMARY

PROJECT BACKGROUND

Scope

The I-94 Edsel Ford Freeway project will reconstruct 6.7 miles of I-94 in the City of Detroit. The limits of the project begin east of the I-94/I-96 interchange and ends east of Conner Avenue. The scope includes widening of I-94 from three to four lanes in each direction, reconstruction of two system interchanges (I-94/M-10 and I-94/I-75), removal and/or replacement of 67 vehicle, pedestrian, and/or railroad bridges, reconstruction of various partial and full-service interchanges, and construction of continuous service drives along the corridor and through the interchanges.

Purpose and Need

As outlined in the project's 2004 Final Environmental Impact Statement (FEIS), the purpose of the I-94 Edsel Ford Freeway Project is "the improvement of the condition and capacity of the existing I-94 roadway and interchanges."

The planned improvements will allow this I-94 corridor to continue to fulfill intended functions of providing for the national and civil defense, and meeting the needs of local and interstate commerce. Deficiencies discussed in the environmental document include:

- A lack of capacity indicated by frequent congestion with stop-and-go conditions;
- Safety issues (above average crash rates) related to the lack of ramps, inadequate length of ramps, and the lack of adequate acceleration-deceleration lanes for merging and weaving traffic;
- Poor local traffic circulation due to the lack of continuous service drives;
- Aging bridge and pavement conditions;
- Limited accommodation of pedestrians and bicyclists; and
- Outdated design including the M-10/I-94 interchange having left- and right-hand on-ramps and off-ramps.

Project Segments

The overall project has been divided into four segments:

Advanced Bridges – This segment includes the reconstruction or replacement of 10 bridges along the corridor that have been identified based on prioritization of state of good repair and critical need. This segment is scheduled to begin in 2014.

Segment 3 – Chene Street to East of Conner Ave – This segment includes 3.8 miles of construction. The construction for this segment will begin in 2019.

Segment 2 – Cass Avenue to Chene Street – This 1.5 mile long design section includes the I-75 Interchange reconstruction. Construction is scheduled to begin in 2025.

Segment 1 – East of I-96 to Cass Avenue - This segment is 1.5 miles long and includes reconstruction of the M-10 Interchange. Construction of this segment begins 2030.

A map of the project is shown in Figure 1.

Figure 1 Map of the I-94 Edsel Ford Freeway Project

Schedule

The Final EIS was signed in December 2004 and the Record of Decision was signed in December 2005. MDOT began construction in the spring of 2013. The entire project is anticipated to be completed by the end of 2036.

REVIEW FINDINGS

During the 2011 review, the team found many examples of good estimating practices including:

- Detailed estimate for level of design
    - Development of Detailed Engineering Report
- MDOT Specification & Estimate Unit review of estimates for quality control
- Estimate was updated in Year of Obligation dollars
- Use of conservative unit costs & contingency
- Project team and subject matter experts were familiar with project
- Use of preliminary Value Engineering (VE) Studies
- Incorporation of many Accelerated Construction Technology Transfer (ACTT) workshop recommendations

These estimating practices remained an integral part of the 2013 updated project cost estimate, with the primary changes in the estimate between 2011 and 2013 being the updating of unit costs to be as current as possible for the 2013 estimate and 2013 CER.

ESTIMATE

The MDOT pre-review estimate for the project was $2.847 billion Year of Expenditure (YOE) dollars. The cost in 2013 dollars was $2.010 billion. It should be noted that these cost include $22 million that have already been incurred for the project during the planning, environmental, and early preliminary engineering phases.

During the review, revisions were made to the pre-review estimate. The sum of these changes increased the base estimate by $97 million in 2013 dollars. Revisions included the following modifications.

- Added ROW to Account for United Sound Recording Studios Building - $1 M
- Added Environmental Commitments Item - $ 1 M
- Increased Mobilization from 5% to 10% - $50 M

- Increased (doubled) ITS Estimate - $4 M
- New Line Item for Subgrade Undercutting - $3 M
- Add Line Item for Construction Change Orders - $30 M
- Added cost for drilled shafts to avoid utilities - $15 M
- Added Line Item for Job Skills Training - $5 M
- Reduced Advanced Bridges PE to reflect 2013 costs – ($1 M)
- Reduced Advanced Bridges ROW + UT to reflect 2013 costs – ($2 M)
- Reduced Advanced Bridges CON to reflect 2013 costs – ($9 M)

It should be noted that an additional $356 million in contingency (approximately 35% of construction costs) was removed from the base estimate and redistributed as part of the probabilistic and risk-based analysis that is discussed in Chapter 3.

REVIEW RECOMMENDATIONS

- Update estimate to reflect estimate changes made during review
- Continue to update and manage project risks through the risk register
- Use the 70% YOE amount of $2,912.7 as the minimum amount in the Initial Finance Plan
- Continue to explore opportunities to accelerate the project delivery timeline in order to reduce overall project costs

CHAPTER 3 – RISK ANALYSIS

Cost estimates, especially those for Major Projects, usually contain a degree of uncertainty due to unknowns and risks associated with the level of detail design completion. For this reason, it is logical to use a probabilistic approach and express the estimate as a range rather than a point value. During the cost estimate review, uncertainties in the project estimate such as base variability, inflation, market conditions, and risk events were modeled by the Team to reflect the opinions of the subject matter experts interviewed. The Team used the Monte-Carlo simulation to incorporate the uncertainties into forecast curves that represents a range of costs and completion dates for the Project.

FORECAST RESULTS FOR TOTAL PROJECT COSTS

Figure 2 shows the results of the simulation for the Project. The figure depicts the forecast curve for the Total Project Cost in the YOE dollars. These costs include construction, design/engineering, construction engineering, right-of-way, inflation, and allowances. The probable range of total project cost is shown by the blue shaded area, with the 70% level of confidence estimate at $2.913 billion. Alternatively, these results predict a 30% probability that total project costs will

exceed this value based on the underlying variation within the estimate.

Figure 2 – Probable range of Total Project Costs

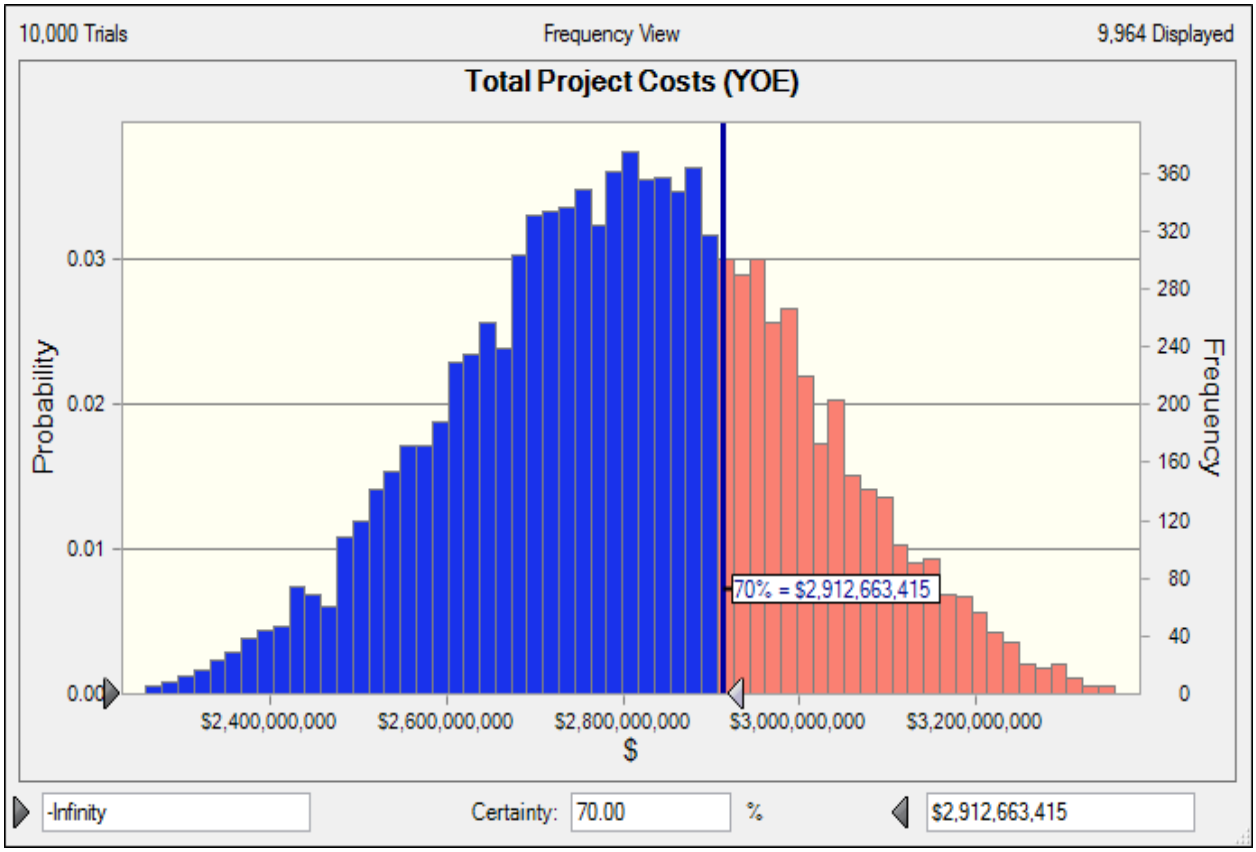

Table 1 demonstrates that the project cost range from $2.123 billion to $3.505 billion. The lower and higher ends of the variance are unlikely. The higher end at 100% reflects an occurrence where all significant risks will be realized, including those with a relatively low likelihood. This wide range of variation is due to the early design stage for the project. As design progresses closer to final design, this range should become narrower.

Table 1 Percentile Rankings of Total Project Costs in YOE Dollars.

Percentile	Forecast values
0%	$2,122,581,146
10%	$2,551,148,456
20%	$2,640,786,771
30%	$2,704,676,459
40%	$2,757,612,505
50%	$2,808,897,682
60%	$2,859,228,453
70%	$2,912,663,415
80%	$2,974,954,524
90%	$3,059,503,507
100%	$3,504,889,131

FORECAST RESULTS FOR PROJECT COMPLETION DATE

Figure 3 shows the forecast curve for the date of project completion. Based on a schedule base variability of +/- 10% and identified schedule risks, Figure 3 shows that there is a 70 percent probability that the project will be completed prior to December 2036. The figure also indicates a 30 percent probability of exceeding this date. The project schedule is mostly driven by funding availability. It should be noted that the schedule could be dramatically shortened should more funding become available in early years.

Advanced funding scenarios were not modeled. Table 2 displays the percentile rankings for the project completion date forecast. These results are only for informational purposes and are not required to be reported in the project's financial plan.

Figure 3 - Probable range of Total Schedule

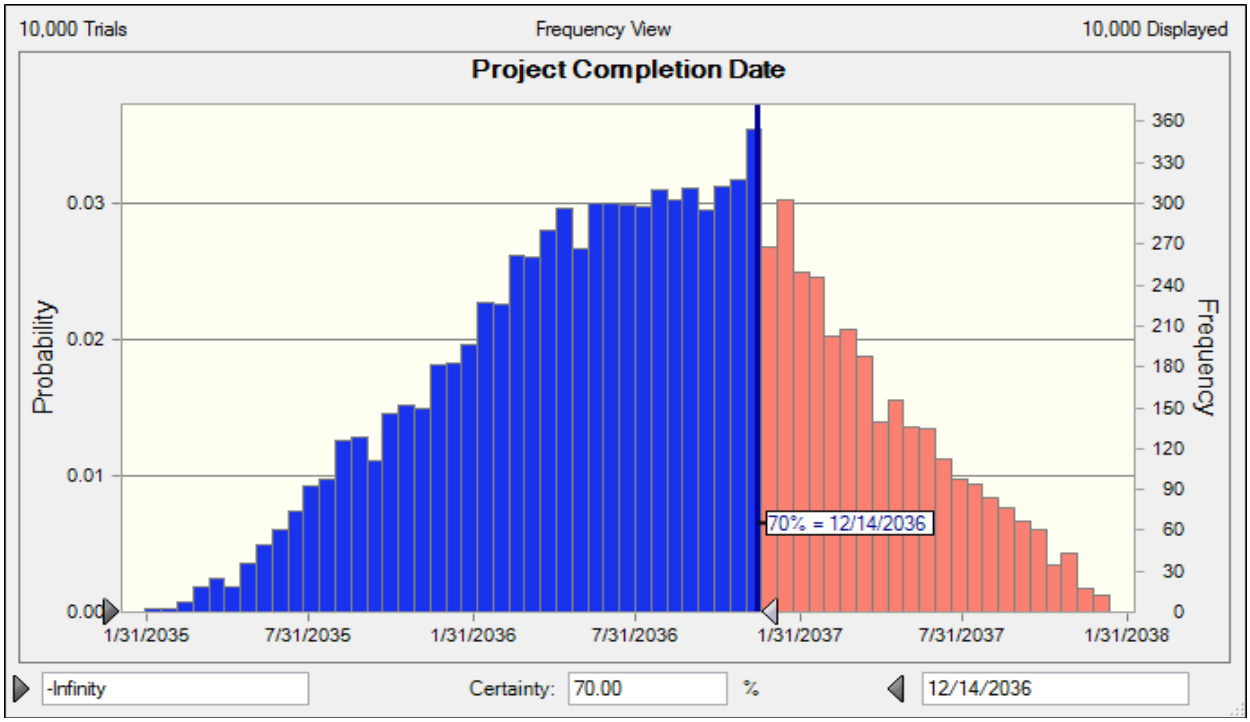

Table 2 – Percentile ranking of Total Project Schedule Completion Dates

Percentile	Forecast Values
0%	1/30/2035
10%	11/9/2035
20%	2/16/2036
30%	4/25/2036
40%	6/26/2036
50%	8/24/2036
60%	10/20/2036
70%	12/14/2036
80%	2/16/2037
90%	5/23/2037
100%	1/11/2038

PROBABILITY ASSUMPTIONS

The assumptions discussed below describe how the Team modeled the risk events, base variability, inflation, and market conditions that served as inputs for the results shown in the previous section of the report. As discussed in Chapter 1, the Monte Carlo analysis selects random inputs from these distributions to determine discrete values for
a given number of iterations. The model runs the simulation through 10,000 iterations and ranks the results to determine the likely range of cost and schedule for the project.

Risk - Threats and Opportunities

The purpose of the risk register is to identify significant cost and schedule risks in the estimate. In a traditional cost estimate, risks are often accounted for using estimates of contingency. The Review Team identified that 35% of construction cost ($356 million) had been designated as contingency in the pre-review base estimate to account for the level of design as recommended by the Association for the Advancement of Cost Estimating International (AACEI).

During the workshop, the over 25 cost and schedule risk events from the 2011 CER were reviewed by the team and updated as appropriate. The following risks that were included in the 2011 CER were transferred to the base estimate during the 2013 CER:

- Community jobs training
- Structures (bridges & walls) costs such as longer/additional piling, high strength piling, ground improvements due to poor soil, and/or increased steel prices
- Additional foundation costs for drilled shafts to avoid utilities

The following risks were identified and modeled as significant new cost opportunities:

- Use of Accelerated Bridge Construction for RR bridges
- Reduced shoulder widths on segment of M10 within the project limits
- Eliminate 1 of the 3+ mile long EB auxiliary lanes in Segment 3
- Consider non-continuous service roads at the system interchanges

The following risks were identified and modeled as significant new cost threats:

- Pavement design and construction to achieve 60-yr service life
- Bridge design and construction to achieve 100-yr service life
- Potential increase in ITS costs along the corridor
- Potential increase in traffic control and freight traffic maintenance along the corridor
- Potential increase in retaining wall costs to stay within existing ROW

No significant new schedule risks were identified and modeled during the 2013 CER.

The updated project risk register developed by the team during the 2013 CER is included in Appendix D.

Base Variability

The team determined that the weighted base variability of +/-16.53% from the 2011 CER was still valid. These details are shown below in Table 3.

The team also determined that the schedule, ROW, and PE base variability of +/-10% from the 2011 CER was still valid.

Table 3 Base Variability

	Level of Design Detail	Cost by Group	Base Variability	Weighted Base Variability
1. Removal*	15.00%	$7,723,359	10%	0.07%
2. Earthwork	15.00%	$13,574,678	10%	0.12%
3. Pavement and Base Materials	40.00%	$73,579,773	10%	0.67%
4. Drainage and Erosion Control	15.00%	$50,155,645	20%	0.91%
5. Structures	10.00%	$717,401,780	15%	9.73%
6. Traffic	10.00%	$145,632,318	25%	3.29%
7. Miscellaneous Construction	15.00%	$51,719,944	15%	0.70%
8. Utility Relocation	15.00%	$46,027,872	25%	1.04%
		$1,105,815,369		**16.53%**

* "Removal" includes clearing, and removal of existing drainage, guardrail, pavement, concrete barrier, sidewalk, and incidental items.

Market Conditions

The 2011 CER assumptions for the construction and ROW market conditions shown in Tables 4 and 5 were determined to still be valid for the 2013 CER.

Table 4 Base Construction Cost Market Conditions

	Better than Planned		Worse than Planned	
	Probability	**Impact**	**Probability**	**Impact**
Advanced Bridges	6%	10%	24%	10%
Segment 3	4%	10%	28%	10%
Segment 2	12%	10%	20%	10%
Segment 1	12%	10%	20%	10%

Table 5 Base ROW Cost Market Conditions

	Better than Planned		Worse than Planned	
	Probability	**Impact**	**Probability**	**Impact**
Advanced Bridges	5%	10%	5%	10%
Segment 3	5%	10%	5%	10%
Segment 2	10%	10%	10%	10%
Segment 1	10%	10%	10%	10%

Inflation

As MDOT has updated the unit prices for the project from the time of the 2011 CER to the 2013 CER, it was determined that inflation has been relatively flat in terms of its impact on the project's total cost estimate. With this information in combination with the inflation rates used for the 2011 CER it was determined that a flat 3% inflation rate would be used in the updated cost model, applied to all project segments and elements.

CONCLUSION

This probabilistic analysis resulted in a cost estimate at the 70% confidence level of $2.913 billion (YOE) for the I-94 Edsel Ford Freeway Project. The 70% confidence level is also the minimum amount of funding that must be shown for the approval of the initial Financial Plan. Any changes made to the cost estimate after the cost estimate review should be outlined in the initial Financial Plan. Appendix C includes the entire report of inputs and results of this probability analysis.

APPENDICES

A – Cost Estimate Review Closing Presentation

B – Crystal Ball Probability Analysis

C – Cost Estimate Template and Risk Register

D – Cost Estimate Review Agenda and Sign-In Sheets

E – 2011 CER Report

Att A

I-94 Edsel Ford Freeway Project

Detroit, Michigan

Cost Estimate Review Update

November 18-20, 2013

Closing Presentation

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Cost Estimate Review Update Objective

Conduct an updated unbiased risk-based review to verify the accuracy and reasonableness of the current total cost estimate to complete the

MI-94 Edsel Ford Freeway Project

and to develop a probability range for the cost estimate that represents the project's current stage of design.

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Att A

Review Update Agenda

I-94 Edsel Ford Freeway Project

Monday, November 18, 2013

12:30-12:45	Introductions, CER Introduction by FHWA
12:45-1:15	Project Overview Review Project Scope, Current Status, Planned Construction Schedule and Phasing
1:15-1:45	Estimating Process, Overall Project Threats and Opportunities
1:45-2:15	Market Conditions
2:15-2:30	Soft Costs (administrative, inflation, allowances), Excluded Costs
2:30-3:00	Contingency/Risk Register Item
3:00-3:30	ROW
3:30-4:00	Roadway Drainage and Erosion Control

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Review Update Agenda (cont.)

Tuesday, November 19, 2013

8:00-9:00	Utilities, Lighting, Pump Stations
9:00-9:30	Environmental Commitments, Enhancements, Noise Barriers
9:30 -10:30	Pavement and Structures, Construction
10:30-Lunch	Contingencies, Engineering, Administration, Mobilization
1:00-1:30	Geotechnical and Retaining Walls
1:30-2:30	Traffic and Safety, Construction Signing and Traffic Control
2:30 -3:30	Financial Plans, Phasing Costs, Escalation
3:30 -4:00	Prepare Draft Presentation and Report Findings

Wednesday, November 20, 2013

9:00	Closeout Presentation

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Basis of Review

- Review based on updated estimate 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
  - Goal is to verify accuracy and reasonableness of estimate

Risk-based Probabilistic Approach

Review Update Methodology

- **Review Participants**
  - ❖ FHWA
    - Division Offices – MI, CT & MO
  - ❖ Michigan Department of Transportation (MDOT)
  - ❖ Consultant – HNTB

- **Estimate Review**
  - ❖ Understand estimate updating process
    - Discuss underlying assumptions of estimate

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Review Update Methodology (cont.)

- **Model Variation of Inputs**
  - Review major cost elements
  - Review contingencies
  - Develop probability assumption distributions
- **Evaluate and Model Key Schedule & Cost Risks**
  - Review project risks
  - Develop probability assumption distributions
- **Evaluate and Model Market Conditions & Inflation**
- **Perform Monte Carlo simulation to generate a project estimate forecast as a range**

Documentation Provided

- 2011 CER Report
- Updated Project Cost Estimate
- Updated Project Schedule
- Project Risks
- Draft Initial Financial Plan

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Review Update Findings

- The estimate used for the 2011 CER was updated to include the most recent applicable unit costs.
- The project completion date has been extended through 2036 to match with funding availability.
- The base variability values determined in 2011 are still valid.
- The market condition values determined in 2011 are still valid.

Review Update Findings (cont)

- The updated unit costs between 2011 and 2013 indicate that inflation has been relatively flat.
- The team agreed to use a flat 3% inflation rate throughout the project life, applied to all segments and elements.
- HNTB's independent cost estimate tended to agree with and validate the updated cost estimate.
- The majority of the risks from 2011 are still valid. Risks that significantly changed from 2011, as well as new risks identified during this CER Update are listed later in this presentation.

Att A

Base Estimate Results - 2013

Pre-Review Original Base Estimate

Base	$1,652 Million
Contingencies	$356 Million
Total	**$2,008 Million**

Post-Review New Base Estimate

Base	$1,652 Million
Net Estimate Changes	$97 Million
Probabilistic Risk	Risk Cost Range
Total	**$1,749 Million + Risk Cost Range**

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Estimate Adjustments - 2013

- Added ROW to Account for United Sound Recording Studios Building - $1 M
- Added Environmental Commitments Item - $ 1 M
- Increased Mobilization from 5% to 10% - $50 M
- Increased (doubled) ITS Estimate - $4 M
- New Line Item for Subgrade Undercutting - $3 M
- Add Line Item for Construction Change Orders - $30 M
- Added cost for drilled shafts to avoid utilities - $15 M
- Added Line Item for Job Skills Training - $5 M

Net Adjustments this Page = $109 M

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Estimate Adjustments (cont)- 2013

- Reduced Advanced Bridges PE to reflect 2013 costs – ($1 M)
- Reduced Advanced Bridges ROW + UT to reflect 2013 costs – ($2 M)
- Reduced Advanced Bridges CON to reflect 2013 costs – ($9 M)

Net Adjustments this Page = ($12 M)

Net Adjustments this Page and Last = $97 M

Significant Cost Risks - 2013 Opportunities (new or changed from 2011)

- Use of Accelerated Bridge Construction for RR bridges.
- Reduced shoulder widths on segment of M10 within the project limits.
- Eliminate 1 of the 3+ mile long EB auxiliary lanes in Segment 3.
- Consider non-continuous service roads at the system interchanges.

Significant Cost Risks - 2013 Threats (new or changed from 2011)

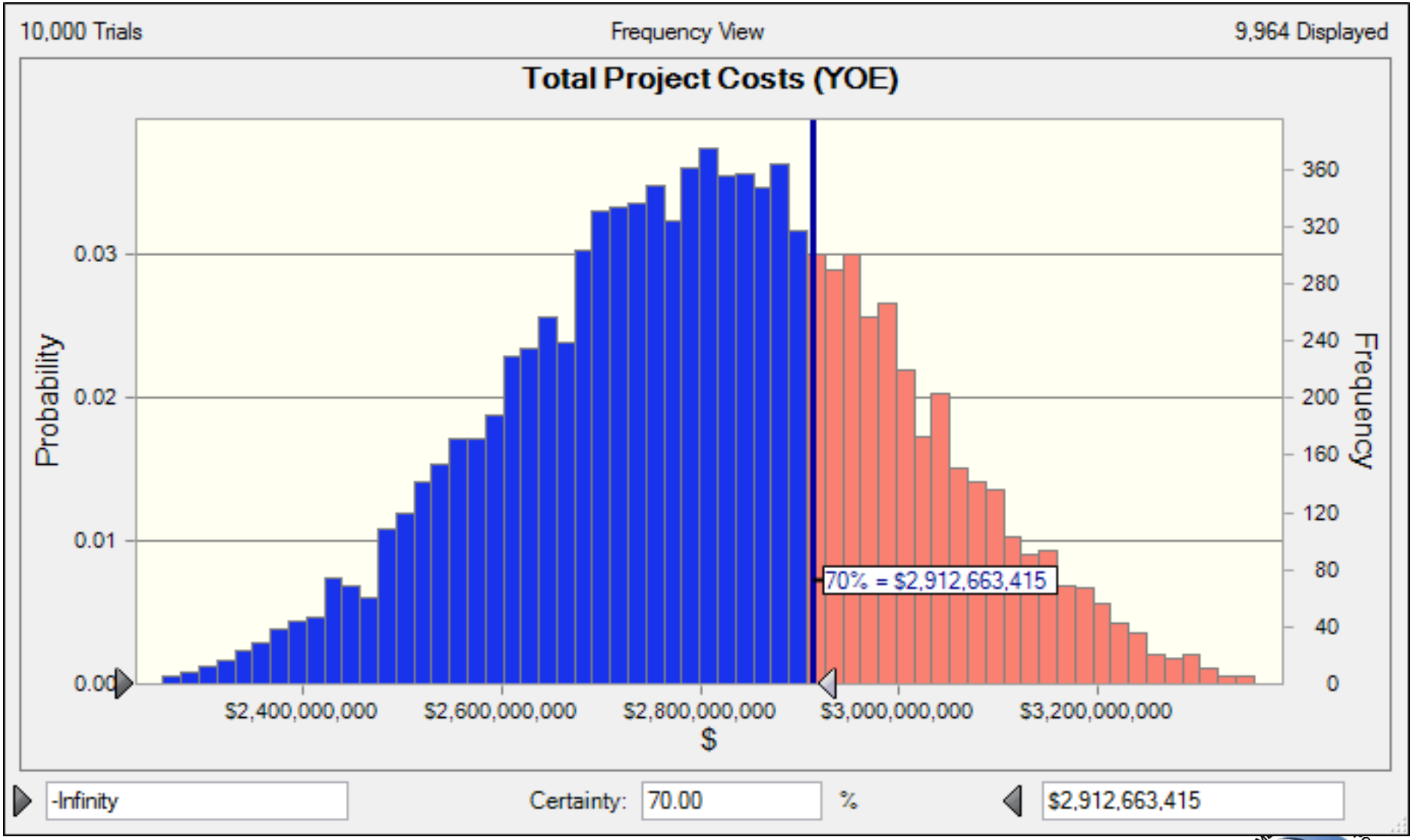
- Pavement design and construction to achieve 60-yr service life.
- Bridge design and construction to achieve 100-yr service life.
- Potential increase in ITS costs along the corridor.
- Potential increase in traffic control and freight traffic maintenance along the corridor.
- Potential increase in retaining wall costs to stay within existing ROW.

Cost Risks from the 2011 CER Transferred to the Base Estimate

- Community jobs training (RCAR).
- Structures (bridges & walls) costs such as longer/additional piling, high strength piling, ground improvements due to poor soil, and/or increased steel prices.
- Additional foundation costs for drilled shafts to avoid utilities.

Att A

Total Project Costs in YOE



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Att A

Total Project Cost (YOE) Percentile Ranking

Percentile	Forecast values
0%	$2,122,581,146
10%	$2,551,148,456
20%	$2,640,786,771
30%	$2,704,676,459
40%	$2,757,612,505
50%	$2,808,897,682
60%	$2,859,228,453
70%	$2,912,663,415
80%	$2,974,954,524
90%	$3,059,503,507
100%	$3,504,889,131

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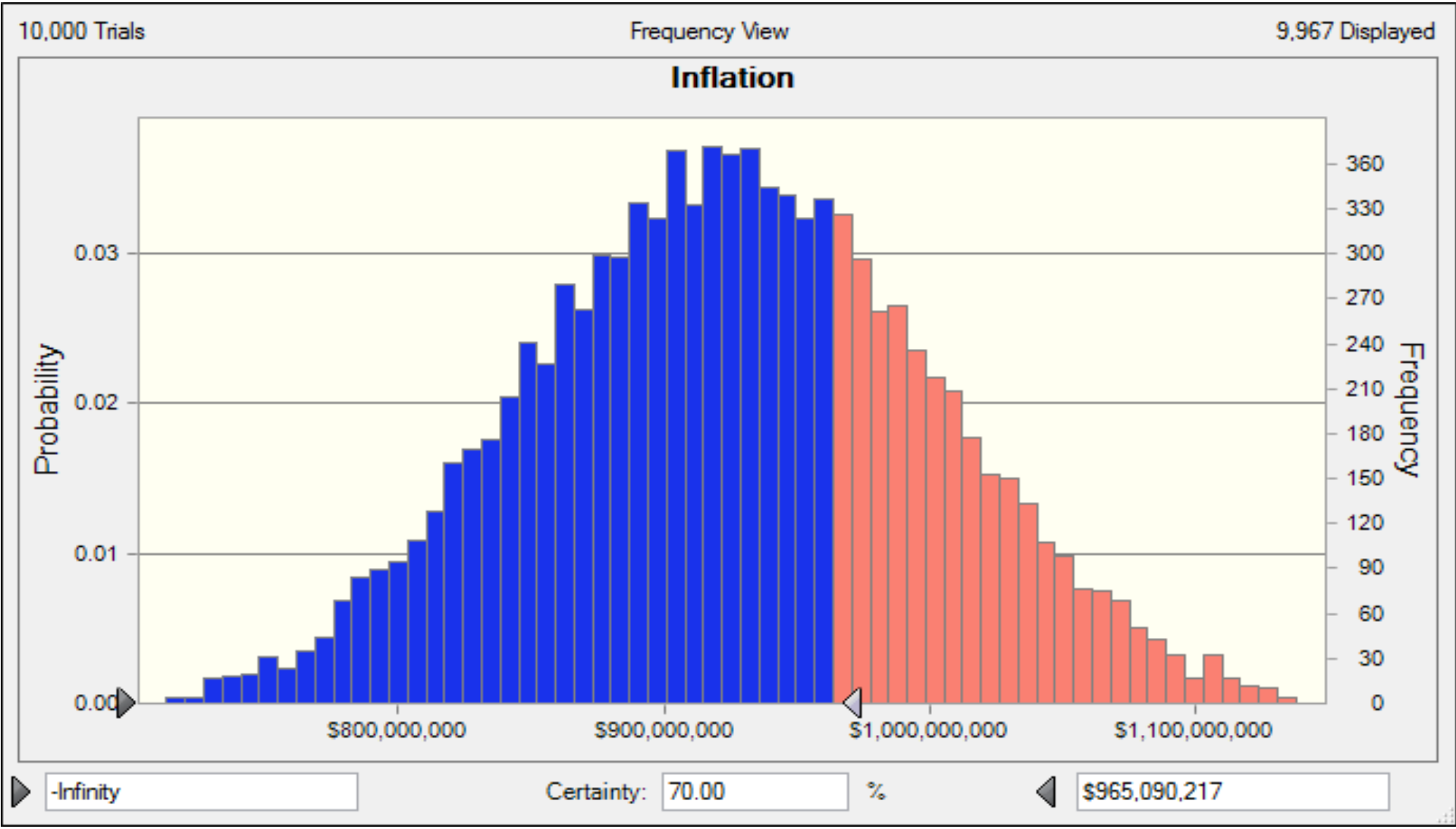
Att A

Inflation



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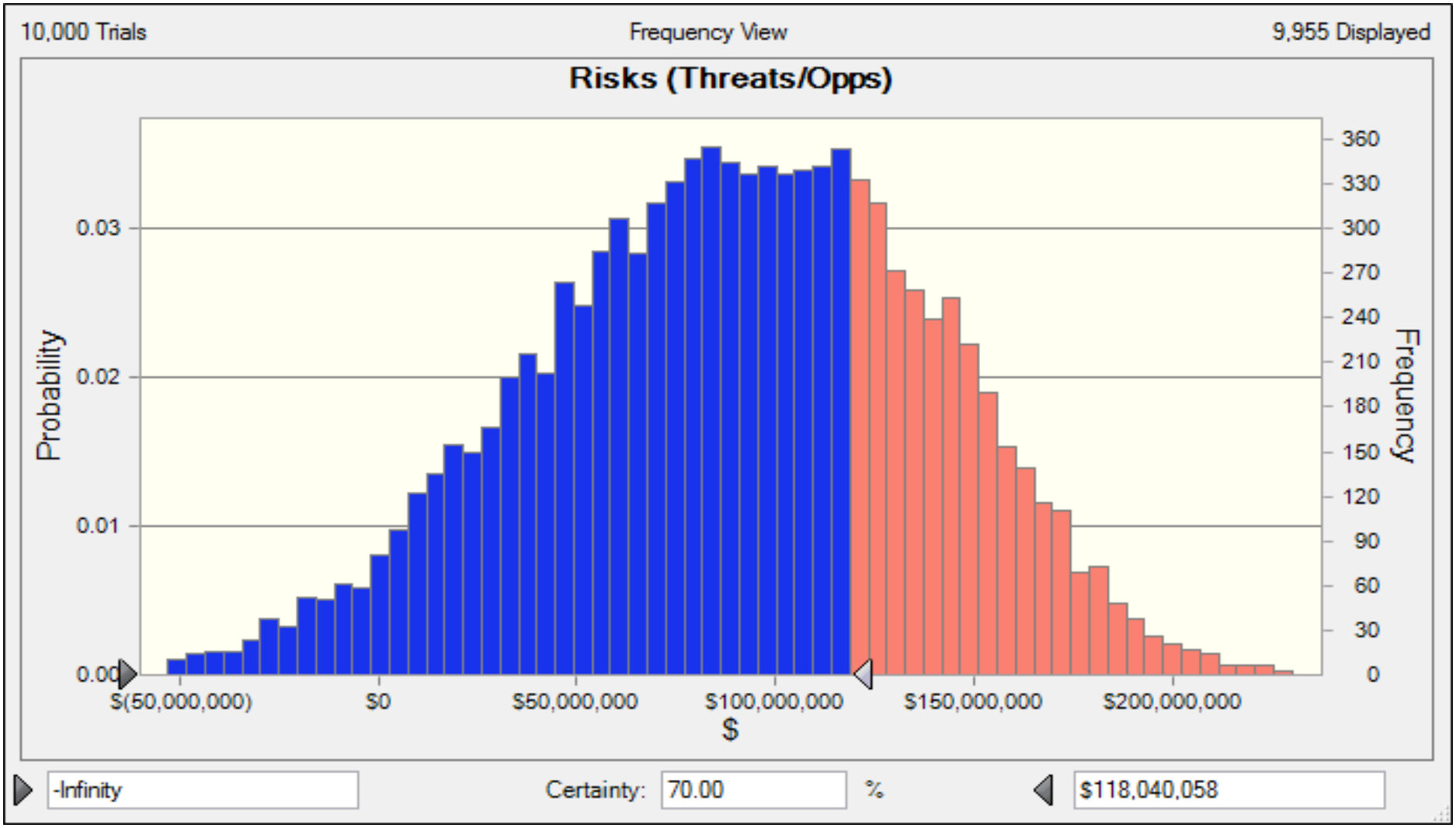
Att A

Risks



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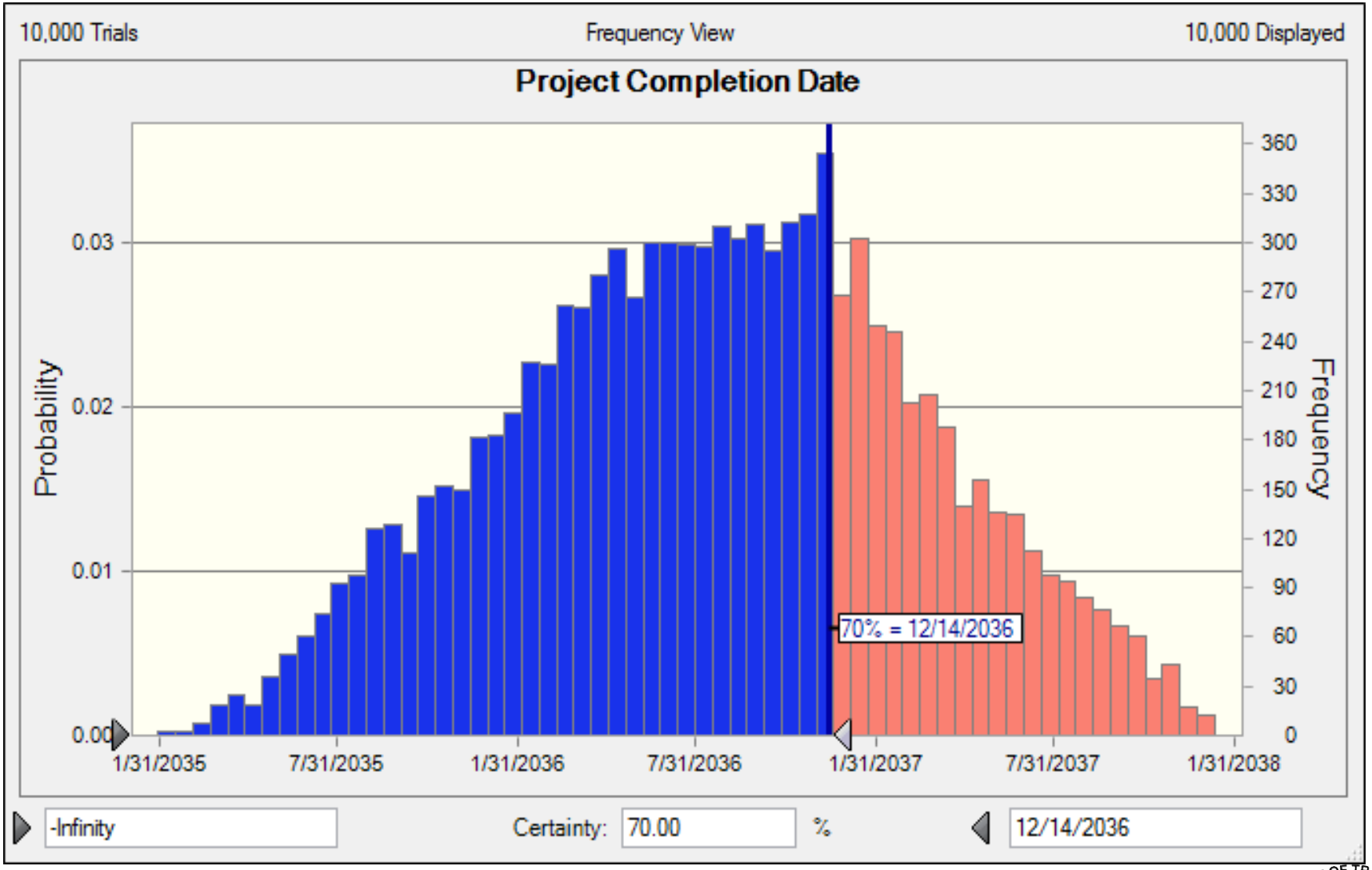
Att A

Date of Construction Completion



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Recommendations

- Continue to update and manage project risks through the risk register.
- Use the 70% YOE amount of $2,912.7 as the minimum amount in the Initial Finance Plan.
- Continue to explore opportunities to accelerate the project delivery timeline in order to reduce overall project costs.

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CER Next Steps

- FHWA will prepare a final report documenting review findings.
  - Draft report for review within 30 days
  - Draft report will be e-mailed to Division Office
  - Division Office will review the draft and forward it to the MDOT Project Team
  - Final report issued within 30 days after receipt of comments
  - Final report forwarded to the Division Office for distribution to the MDOT Project Team
- FHWA uses the report for the review of the Initial Financial Plan
- Estimate review is a snapshot of the current estimate

I-94 Edsel Ford Freeway Project

Questions?

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Crystal Ball Report - Full

Simulation started on 11/19/2013 at 7:01 PM
Simulation stopped on 11/19/2013 at 7:02 PM

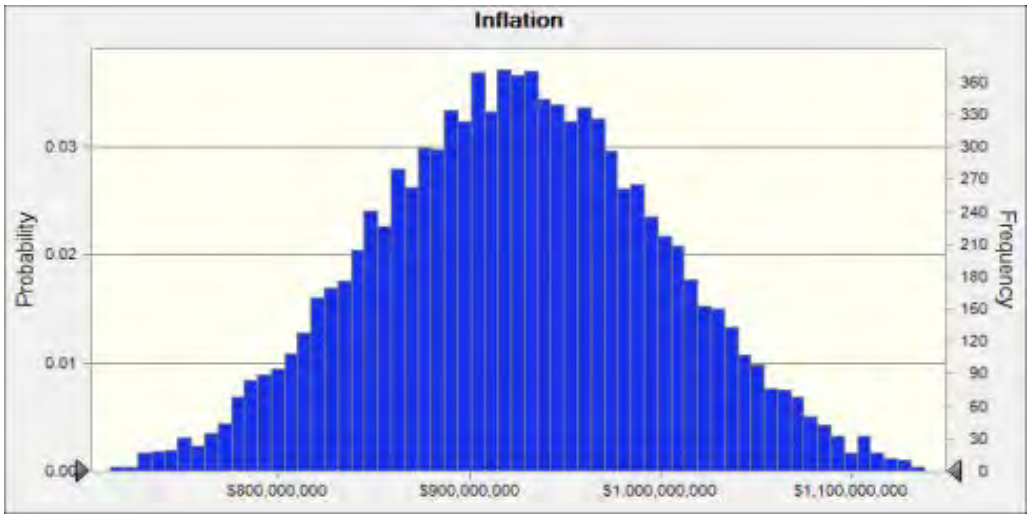
Run preferences:	
Number of trials run	10,000
Monte Carlo	
Random seed	
Precision control on	
Confidence level	95.00%
Run statistics:	
Total running time (sec)	59.40
Trials/second (average)	168
Random numbers per sec	19,696
Crystal Ball data:	
Assumptions	117
Correlations	4
Correlated groups	4
Decision variables	0
Forecasts	5

Forecasts

Worksheet: [Draft I-94 CER_LSW v4 11-19-2013 7pm.xlsm]YOE

Forecast: Inflation **Cell: C26**

Summary:
Entire range is from $645,203,364 to $1,196,838,306
Base case is $891,488,998
After 10,000 trials, the std. error of the mean is $758,076



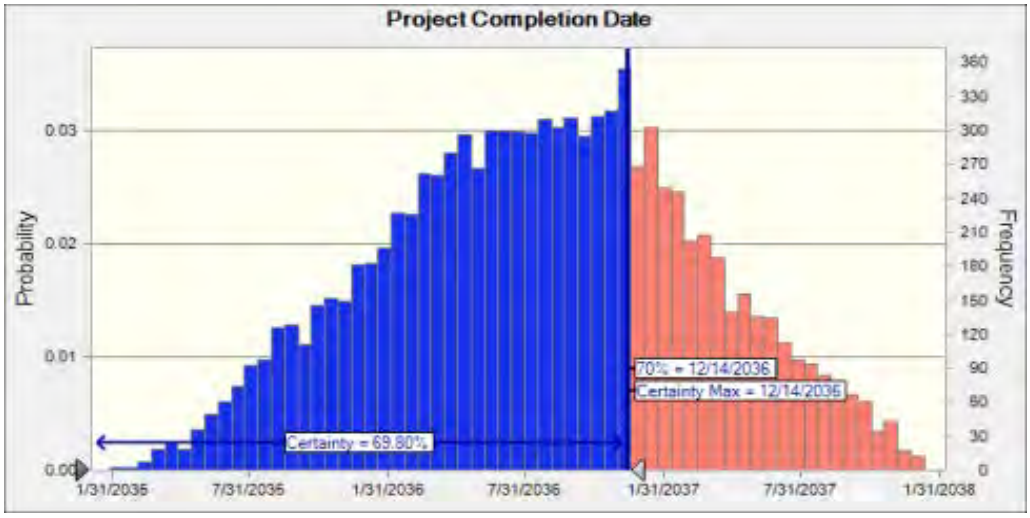
Statistics:	Forecast values
Trials	10,000
Base Case	$891,488,998
Mean	$925,157,179
Median	$924,956,488
Mode	---
Standard Deviation	$75,807,599
Variance	#################
Skewness	0.0345
Kurtosis	2.84
Coeff. of Variability	0.0819
Minimum	$645,203,364
Maximum	$1,196,838,306
Range Width	$551,634,942
Mean Std. Error	$758,076

Forecast: Inflation (cont'd) **Cell: C26**

Percentiles:	Forecast values
0%	$645,203,364
10%	$826,375,336
20%	$860,017,051
30%	$884,723,321
40%	$905,425,544
50%	$924,950,593
60%	$944,429,158
70%	$965,090,217
80%	$989,557,829
90%	$1,023,768,351
100%	$1,196,838,306

Forecast: Project Completion Date **Cell: C27**

Summary:
Certainty level is 69.80%
Certainty range is from -Infinity to 12/14/2036
Entire range is from 1/30/2035 to 1/11/2038
Base case is 8/18/2036
After 10,000 trials, the std. error of the mean is 2.09



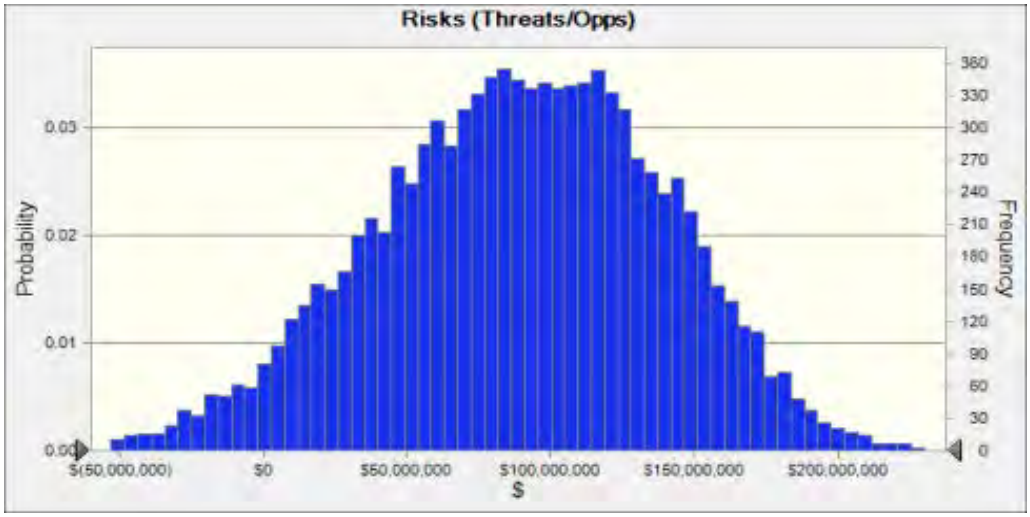
Statistics:	Forecast values
Trials	10,000
Base Case	8/18/2036
Mean	8/19/2036
Median	8/24/2036
Mode	---
Standard Deviation	208.88
Variance	43,632.42
Skewness	-0.0465
Kurtosis	2.46
Coeff. of Variability	0.0042
Minimum	1/30/2035
Maximum	1/11/2038
Range Width	1,076.74
Mean Std. Error	2.09

Forecast: Project Completion Date (cont'd) **Cell: C27**

Percentiles:	Forecast values
0%	1/30/2035
10%	11/9/2035
20%	2/16/2036
30%	4/25/2036
40%	6/26/2036
50%	8/24/2036
60%	10/20/2036
70%	12/14/2036
80%	2/16/2037
90%	5/23/2037
100%	1/11/2038

Forecast: Risks (Threats/Opps) **Cell: C23**

Summary:
Entire range is from $(98,953,296) to $256,230,149
Base case is $60,074,250
After 10,000 trials, the std. error of the mean is $505,019



Statistics:	Forecast values
Trials	10,000
Base Case	$60,074,250
Mean	$88,544,060
Median	$90,439,125
Mode	---
Standard Deviation	$50,501,943
Variance	#################
Skewness	-0.2354
Kurtosis	2.85
Coeff. of Variability	0.5704
Minimum	$(98,953,296)
Maximum	$256,230,149
Range Width	$355,183,444
Mean Std. Error	$505,019

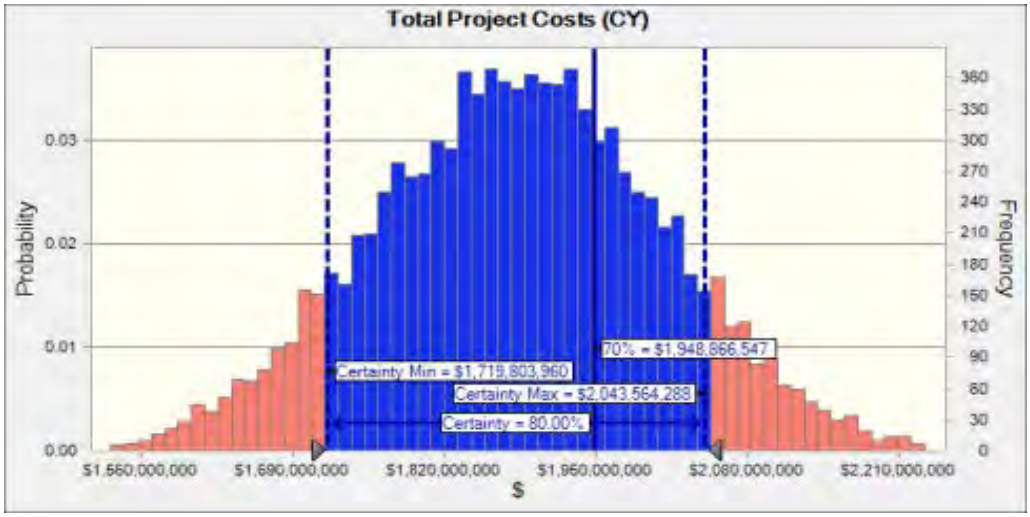
Forecast: Risks (Threats/Opps) (cont'd) **Cell: C23**

Percentiles:	Forecast values
0%	$(98,953,296)
10%	$20,939,094
20%	$45,363,888
30%	$62,531,185
40%	$77,337,947
50%	$90,418,193
60%	$104,358,393
70%	$118,040,058
80%	$132,724,393
90%	$151,887,862
100%	$256,230,149

Forecast: Total Project Costs (CY) **Cell: C24**

Includes base costs, prior costs, fixed costs, and risks

Summary:
Certainty level is 80.00%
Certainty range is from $1,719,803,960 to $2,043,564,288
Entire range is from $1,463,082,860 to $2,322,828,490
Base case is $1,831,509,472
After 10,000 trials, the std. error of the mean is $1,244,602



Statistics:	Forecast values
Trials	10,000
Base Case	$1,831,509,472
Mean	$1,882,978,519
Median	$1,884,578,139
Mode	---
Standard Deviation	$124,460,191
Variance	##################
Skewness	-0.0113
Kurtosis	2.82
Coeff. of Variability	0.0661
Minimum	$1,463,082,860
Maximum	$2,322,828,490
Range Width	$859,745,629
Mean Std. Error	$1,244,602

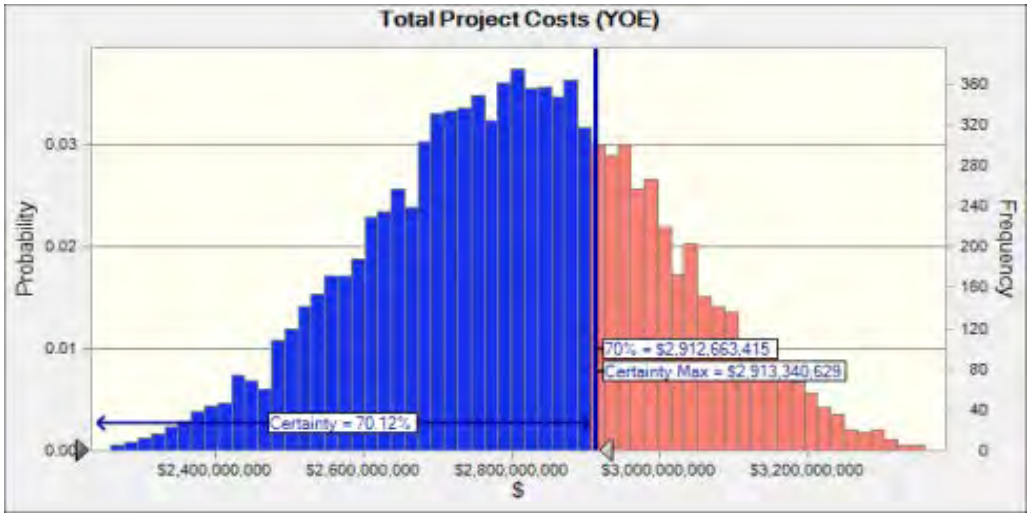
Forecast: Total Project Costs (CY) (cont'd) **Cell: C24**

Percentiles:	Forecast values
0%	$1,463,082,860
10%	$1,719,803,960
20%	$1,776,280,526
30%	$1,817,446,572
40%	$1,851,913,901
50%	$1,884,574,562
60%	$1,916,063,857
70%	$1,948,866,547
80%	$1,989,891,391
90%	$2,043,564,288
100%	$2,322,828,490

Forecast: Total Project Costs (YOE) **Cell: C25**

Includes base costs, prior costs, fixed costs, risks, and inflation

Summary:
Certainty level is 70.12%
Certainty range is from -Infinity to $2,913,340,629
Entire range is from $2,122,581,146 to $3,504,889,131
Base case is $2,722,998,470
After 10,000 trials, the std. error of the mean is $1,955,960



Statistics:	Forecast values
Trials	10,000
Base Case	$2,722,998,470
Mean	$2,808,135,698
Median	$2,808,951,668
Mode	---
Standard Deviation	$195,595,985
Variance	##################
Skewness	-0.0043
Kurtosis	2.82
Coeff. of Variability	0.0697
Minimum	$2,122,581,146
Maximum	$3,504,889,131
Range Width	$1,382,307,984
Mean Std. Error	$1,955,960

Forecast: Total Project Costs (YOE) (cont'd) **Cell: C25**

Percentiles:	Forecast values
0%	$2,122,581,146
10%	$2,551,148,456
20%	$2,640,786,771
30%	$2,704,676,459
40%	$2,757,612,505
50%	$2,808,897,682
60%	$2,859,228,453
70%	$2,912,663,415
80%	$2,974,954,524
90%	$3,059,503,507
100%	$3,504,889,131

End of Forecasts

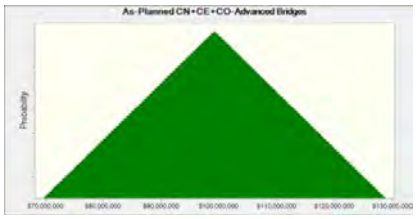
Assumptions

Worksheet: [Draft I-94 CER_LSW v4 11-19-2013 7pm.xlsm]BaseCost

Assumption: As-Planned CN+CE+CO-Advanced Bridges **Cell: L71**

Triangular distribution with parameters:

10%	$82,876,594	(=I54)
Likeliest	$99,253,406	(=J54)
90%	$115,630,218	(=K54)

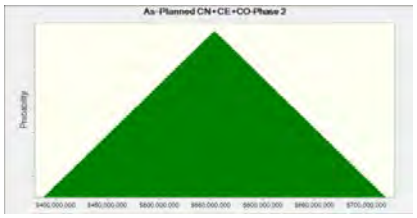


Correlated with:	Coefficient
As-Planned CN+CE+CO-Phase 3 (L80)	0.75

Assumption: As-Planned CN+CE+CO-Phase 2 **Cell: L74**

Triangular distribution with parameters:

10%	$462,096,719	(=I57)
Likeliest	$553,409,244	(=J57)
90%	$644,721,769	(=K57)

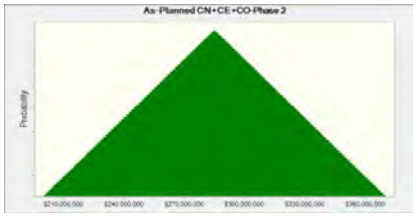


Assumption: As-Planned CN+CE+CO-Phase 2 **Cell: L77**

Triangular distribution with parameters:

10%	$237,989,540	(=I60)
Likeliest	$285,017,413	(=J60)
90%	$332,045,286	(=K60)

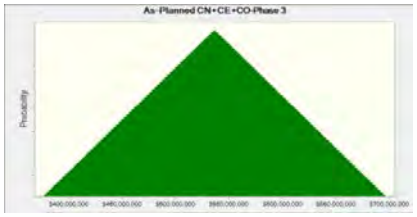
Assumption: As-Planned CN+CE+CO-Phase 2 (cont'd) **Cell: L77**



Assumption: As-Planned CN+CE+CO-Phase 3 **Cell: L80**

Triangular distribution with parameters:

10%	$447,837,881	(=I63)
Likeliest	$536,332,792	(=J63)
90%	$624,827,703	(=K63)



Correlated with:	Coefficient
As-Planned CN+CE+CO-Advanced Bridges (L71)	0.75

Assumption: As-Planned PE-Advanced Bridges **Cell: L69**

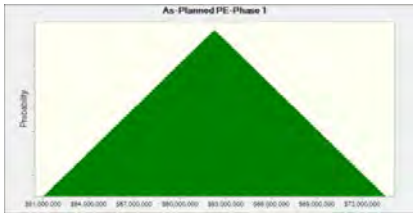
Triangular distribution with parameters:

10%	$24,242,496	(=I52)
Likeliest	$26,936,107	(=J52)
90%	$29,629,718	(=K52)

Assumption: As-Planned PE-Phase 1 **Cell: L72**

Triangular distribution with parameters:

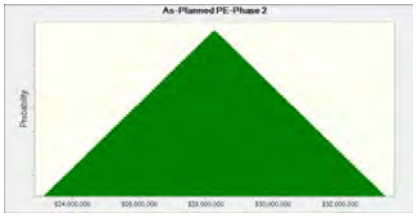
10%	$56,038,730	(=I55)
Likeliest	$62,265,256	(=J55)
90%	$68,491,781	(=K55)



Assumption: As-Planned PE-Phase 2 **Cell: L75**

Triangular distribution with parameters:

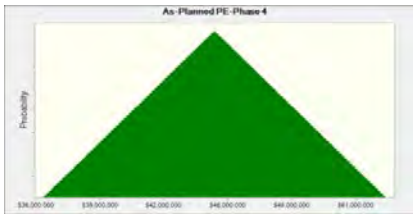
10%	$25,418,084	(=I58)
Likeliest	$28,242,316	(=J58)
90%	$31,066,548	(=K58)



Assumption: As-Planned PE-Phase 4 **Cell: L78**

Triangular distribution with parameters:

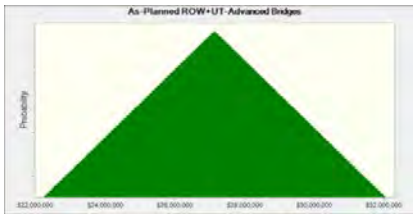
10%	$39,940,137	(=I61)
Likeliest	$44,377,930	(=J61)
90%	$48,815,722	(=K61)



Assumption: As-Planned ROW+UT-Advanced Bridges **Cell: L70**

Triangular distribution with parameters:

10%	$24,417,498	(=I53)
Likeliest	$27,130,553	(=J53)
90%	$29,843,608	(=K53)



Correlated with:	Coefficient
As-Planned ROW+UT-Phase 3 (L79)	0.75

Assumption: As-Planned ROW+UT-Phase 1 **Cell: L73**

Triangular distribution with parameters:

10%	$43,206,345	(=I56)
Likeliest	$48,007,050	(=J56)
90%	$52,807,755	(=K56)

Assumption: As-Planned ROW+UT-Phase 2 **Cell: L76**

Triangular distribution with parameters:

10%	$10,687,236	(=I59)
Likeliest	$11,874,707	(=J59)
90%	$13,062,178	(=K59)

Assumption: As-Planned ROW+UT-Phase 2 (cont'd) **Cell: L76**

Assumption: As-Planned ROW+UT-Phase 3 **Cell: L79**

Triangular distribution with parameters:

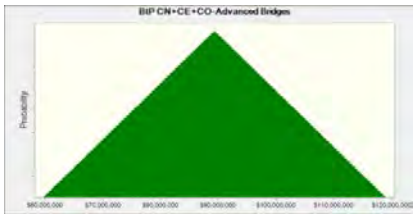
10%	$23,537,904	(=I62)
Likeliest	$26,153,227	(=J62)
90%	$28,768,550	(=K62)

Correlated with:	Coefficient
As-Planned ROW+UT-Advanced Bridges (L70)	0.75

Assumption: BtP CN+CE+CO-Advanced Bridges **Cell: K71**

Triangular distribution with parameters:

10%	$72,951,253	(=F54)
Likeliest	$89,328,065	(=G54)
90%	$105,704,877	(=H54)

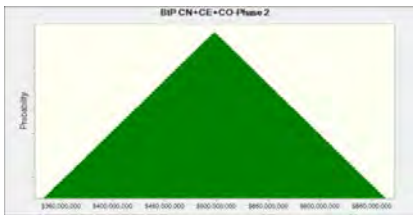


Correlated with:	Coefficient
BtP CN+CE+CO-Phase 3 (K80)	0.75

Assumption: BtP CN+CE+CO-Phase 2 **Cell: K74**

Triangular distribution with parameters:

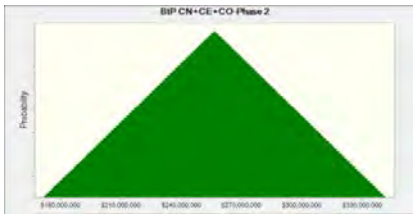
10%	$406,755,794	(=F57)
Likeliest	$498,068,320	(=G57)
90%	$589,380,845	(=H57)



Assumption: BtP CN+CE+CO-Phase 2 **Cell: K77**

Triangular distribution with parameters:

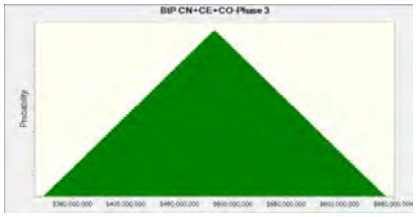
10%	$209,487,799	(=F60)
Likeliest	$256,515,672	(=G60)
90%	$303,543,545	(=H60)



Assumption: BtP CN+CE+CO-Phase 3 **Cell: K80**

Triangular distribution with parameters:

10%	$394,204,602	(=F63)
Likeliest	$482,699,513	(=G63)
90%	$571,194,423	(=H63)

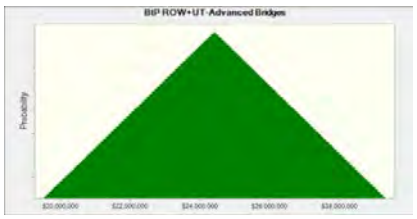


Correlated with:	Coefficient
BtP CN+CE+CO-Advanced Bridges (K71)	0.75

Assumption: BtP ROW+UT-Advanced Bridges **Cell: K70**

Triangular distribution with parameters:

10%	$21,704,442	(=F53)
Likeliest	$24,417,498	(=G53)
90%	$27,130,553	(=H53)



Assumption: BtP ROW+UT-Phase 1 **Cell: K73**

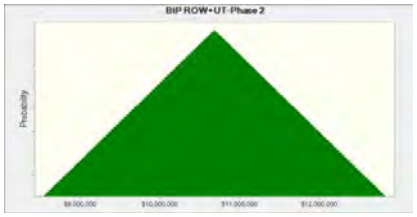
Triangular distribution with parameters:

10%	$38,405,640	(=F56)
Likeliest	$43,206,345	(=G56)
90%	$48,007,050	(=H56)

Assumption: BtP ROW+UT-Phase 2 **Cell: K76**

Triangular distribution with parameters:

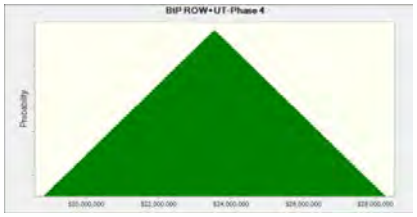
10%	$9,499,766	(=F59)
Likeliest	$10,687,236	(=G59)
90%	$11,874,707	(=H59)



Assumption: BtP ROW+UT-Phase 4 **Cell: K79**

Triangular distribution with parameters:

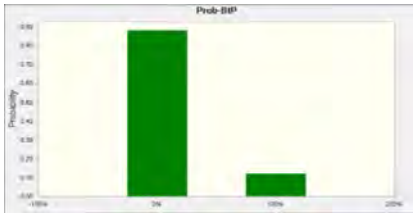
10%	$20,922,582	(=F62)
Likeliest	$23,537,904	(=G62)
90%	$26,153,227	(=H62)



Assumption: Prob-BtP **Cell: I80**

Yes-No distribution with parameters:

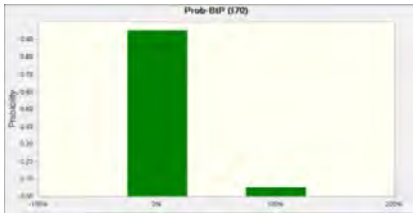
Probability of Yes(1)	0.12	(=D80)



Assumption: Prob-BtP (I70) **Cell: I70**

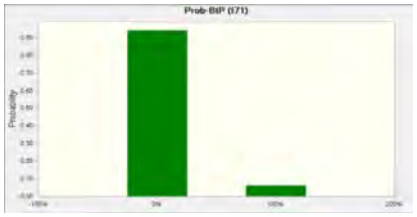
Yes-No distribution with parameters:

Probability of Yes(1)	0.05	(=D70)



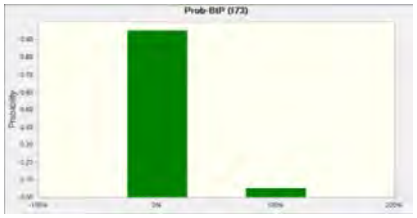
Assumption: Prob-BtP (I71) **Cell: I71**

Yes-No distribution with parameters:
Probability of Yes(1) 0.06 (=D71)



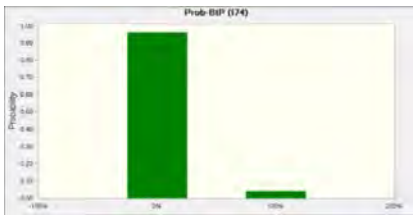
Assumption: Prob-BtP (I73) **Cell: I73**

Yes-No distribution with parameters:
Probability of Yes(1) 0.05 (=D73)



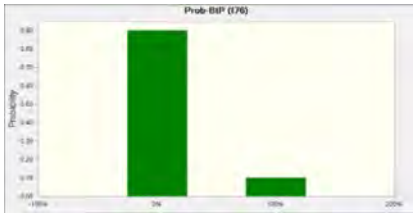
Assumption: Prob-BtP (I74) **Cell: I74**

Yes-No distribution with parameters:
Probability of Yes(1) 0.04 (=D74)



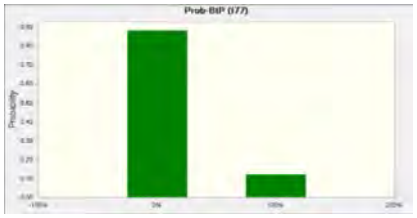
Assumption: Prob-BtP (I76) **Cell: I76**

Yes-No distribution with parameters:
Probability of Yes(1) 0.1 (=D76)



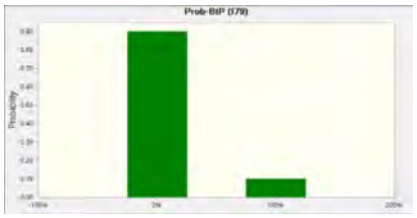
Assumption: Prob-BtP (I77) **Cell: I77**

Yes-No distribution with parameters:
Probability of Yes(1) 0.12 (=D77)



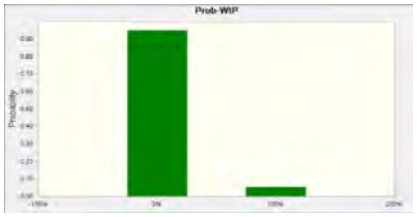
Assumption: Prob-BtP (I79) **Cell: I79**

Yes-No distribution with parameters:
Probability of Yes(1) 0.1 (=D79)



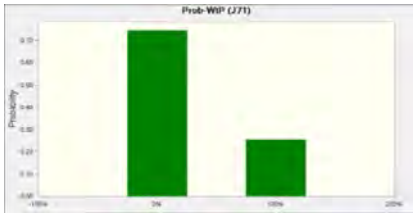
Assumption: Prob-WtP **Cell: J70**

Yes-No distribution with parameters:
Probability of Yes(1) 0.0526315789474 (=E70)



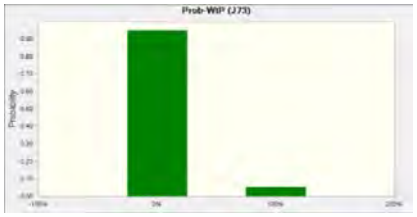
Assumption: Prob-WtP (J71) **Cell: J71**

Yes-No distribution with parameters:
Probability of Yes(1) 0.2553191489362 (=E71)



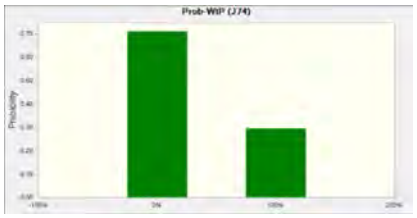
Assumption: Prob-WtP (J73) **Cell: J73**

Yes-No distribution with parameters:
Probability of Yes(1) 0.0526315789474 (=E73)



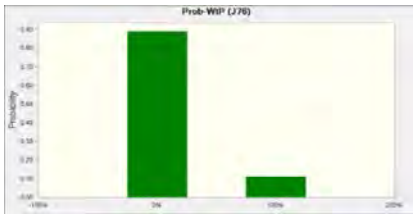
Assumption: Prob-WtP (J74) **Cell: J74**

Yes-No distribution with parameters:
Probability of Yes(1) 0.2916666666667 (=E74)



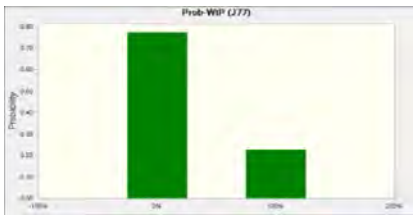
Assumption: Prob-WtP (J76) **Cell: J76**

Yes-No distribution with parameters:
Probability of Yes(1) 0.1111111111111 (=E76)



Assumption: Prob-WtP (J77) **Cell: J77**

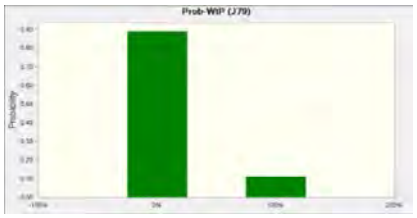
Yes-No distribution with parameters:
Probability of Yes(1) 0.2272727272727 (=E77)



Assumption: Prob-WtP (J79) **Cell: J79**

Yes-No distribution with parameters:

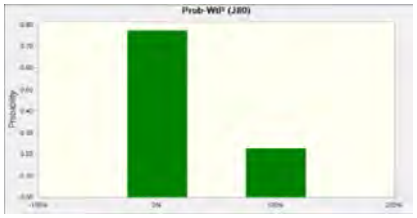
Probability of Yes(1)	0.1111111111111	(=E79)



Assumption: Prob-WtP (J80) **Cell: J80**

Yes-No distribution with parameters:

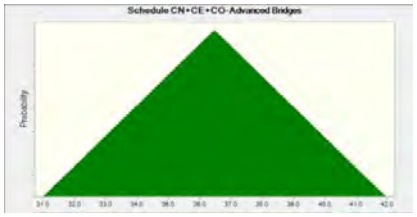
Probability of Yes(1)	0.2272727272727	(=E80)



Assumption: Schedule CN+CE+CO-Advanced Bridges **Cell: L17**

Triangular distribution with parameters:

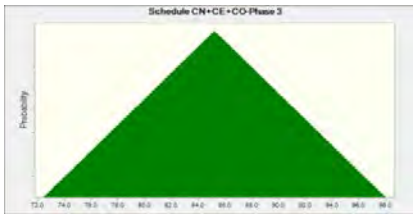
Minimum	31.0	(=J17*(1-K17))
Likeliest	36.5	(=J17)
Maximum	41.9	(=J17*(1+K17))



Assumption: Schedule CN+CE+CO-Phase 3 **Cell: L26**

Triangular distribution with parameters:

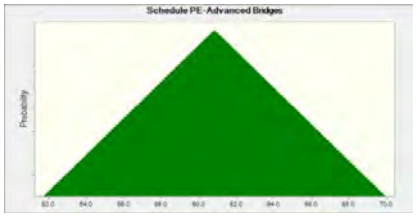
Minimum	72.4	(=J26*(1-K26))
Likeliest	85.2	(=J26)
Maximum	98.0	(=J26*(1+K26))



Assumption: Schedule PE-Advanced Bridges **Cell: L15**

Triangular distribution with parameters:

Minimum	51.7	(=J15*(1-K15))
Likeliest	60.8	(=J15)
Maximum	70.0	(=J15*(1+K15))



Assumption: Schedule PE-Phase 3 **Cell: L24**

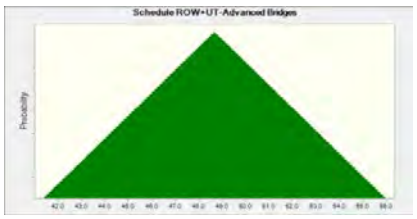
Triangular distribution with parameters:

Minimum	31.0	(=J24*(1-K24))
Likeliest	36.5	(=J24)
Maximum	41.9	(=J24*(1+K24))

Assumption: Schedule ROW+UT-Advanced Bridges **Cell: L16**

Triangular distribution with parameters:

Minimum	41.4	(=J16*(1-K16))
Likeliest	48.7	(=J16)
Maximum	56.0	(=J16*(1+K16))



Assumption: Schedule ROW+UT-Phase 3 **Cell: L25**

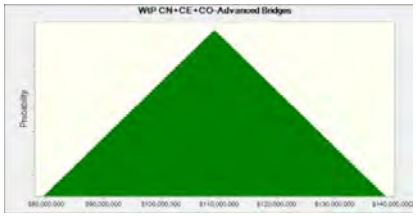
Triangular distribution with parameters:

Minimum	20.7	(=J25*(1-K25))
Likeliest	24.3	(=J25)
Maximum	27.9	(=J25*(1+K25))

Assumption: WtP CN+CE+CO-Advanced Bridges **Cell: M71**

Triangular distribution with parameters:

10%	$92,801,935	(=L54)
Likeliest	$109,178,747	(=M54)
90%	$125,555,559	(=N54)

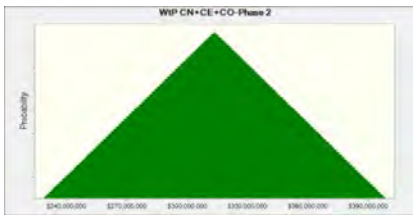


Correlated with:	Coefficient
WtP CN+CE+CO-Phase 3 (M80)	0.75

Assumption: WtP CN+CE+CO-Phase 2 **Cell: M77**

Triangular distribution with parameters:

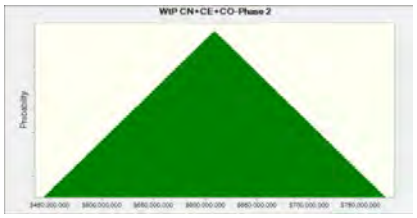
10%	$266,491,281	(=L60)
Likeliest	$313,519,154	(=M60)
90%	$360,547,027	(=N60)



Assumption: WtP CN+CE+CO-Phase 2 **Cell: M74**

Triangular distribution with parameters:

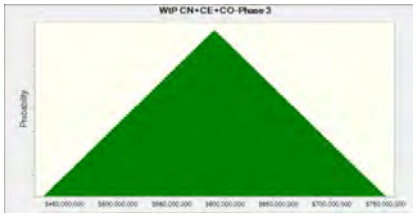
10%	$517,437,643	(=L57)
Likeliest	$608,750,168	(=M57)
90%	$700,062,694	(=N57)



Assumption: WtP CN+CE+CO-Phase 3 **Cell: M80**

Triangular distribution with parameters:

10%	$501,471,161	(=L63)
Likeliest	$589,966,071	(=M63)
90%	$678,460,982	(=N63)

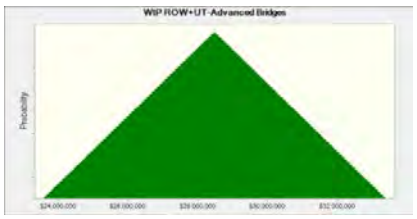


Correlated with:	Coefficient
WtP CN+CE+CO-Advanced Bridges (M71)	0.75

Assumption: WtP ROW+UT-Advanced Bridges **Cell: M70**

Triangular distribution with parameters:

10%	$25,774,025	(=L53)
Likeliest	$28,487,081	(=M53)
90%	$31,200,136	(=N53)



Assumption: WtP ROW+UT-Phase 1 **Cell: M73**

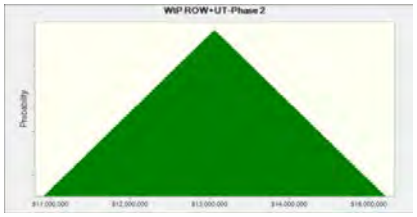
Triangular distribution with parameters:

10%	$48,007,050	(=L56)
Likeliest	$52,807,755	(=M56)
90%	$57,608,460	(=N56)

Assumption: WtP ROW+UT-Phase 2 **Cell: M76**

Triangular distribution with parameters:

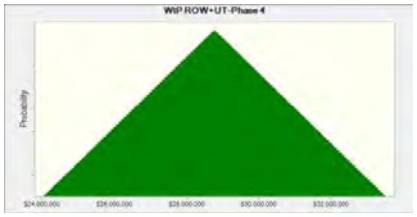
10%	$11,874,707	(=L59)
Likeliest	$13,062,178	(=M59)
90%	$14,249,648	(=N59)



Assumption: WtP ROW+UT-Phase 4 **Cell: M79**

Triangular distribution with parameters:

10%	$26,153,227	(=L62)
Likeliest	$28,768,550	(=M62)
90%	$31,383,872	(=N62)

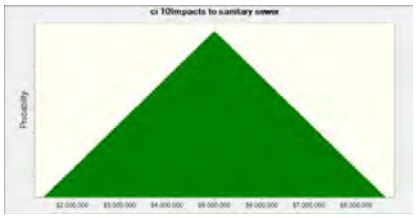


Worksheet: [Draft I-94 CER_LSW v4 11-19-2013 7pm.xlsm]Risk Register

Assumption: ci 10Impacts to sanitary sewer **Cell: S19**

Triangular distribution with parameters:

10%	$3,000,000	(=P19)
Likeliest	$5,000,000	(=Q19)
90%	$7,000,000	(=R19)

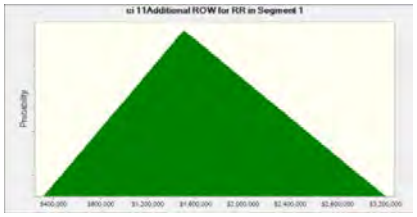


Assumption: ci 11Additional ROW for RR in Segment 1 **Cell: S20**

Triangular distribution with parameters:

10%	$900,000	(=P20)
Likeliest	$1,500,000	(=Q20)
90%	$2,500,000	(=R20)

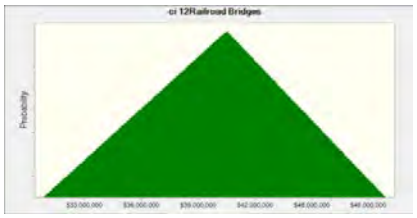
Assumption: ci 11Additional ROW for RR in Segment 1 (cont'd) **Cell: S20**



Assumption: ci 12Railroad Bridges **Cell: S21**

Triangular distribution with parameters:

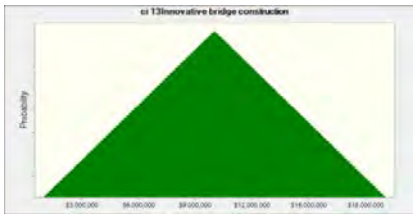
10%	$35,000,000	(=P21)
Likeliest	$40,500,000	(=Q21)
90%	$45,000,000	(=R21)



Assumption: ci 13Innovative bridge construction **Cell: S22**

Triangular distribution with parameters:

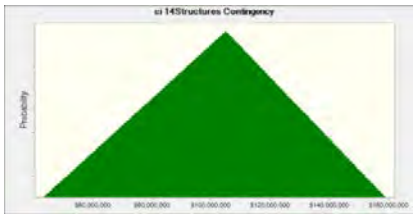
10%	$5,000,000	(=P22)
Likeliest	$10,000,000	(=Q22)
90%	$15,000,000	(=R22)



Assumption: ci 14Structures Contingency **Cell: S23**

Triangular distribution with parameters:

10%	$70,000,000	(=P23)
Likeliest	$105,000,000	(=Q23)
90%	$134,000,000	(=R23)



Assumption: ci 15Larger drainage pipes/storage requirements **Cell: S24**

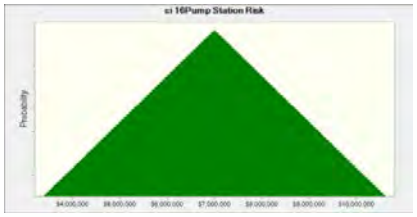
Triangular distribution with parameters:

10%	$4,000,000	(=P24)
Likeliest	$5,000,000	(=Q24)
90%	$6,000,000	(=R24)

Assumption: ci 16Pump Station Risk **Cell: S25**

Triangular distribution with parameters:

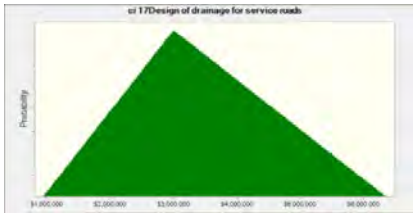
10%	$5,000,000	(=P25)
Likeliest	$7,000,000	(=Q25)
90%	$9,000,000	(=R25)



Assumption: ci 17Design of drainage for service roads **Cell: S26**

Triangular distribution with parameters:

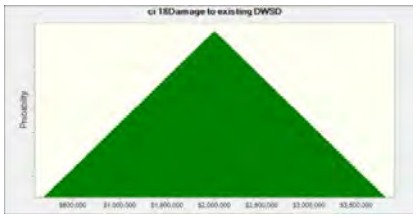
10%	$2,000,000	(=P26)
Likeliest	$3,000,000	(=Q26)
90%	$5,000,000	(=R26)



Assumption: ci 18Damage to existing DWSD **Cell: S27**

Triangular distribution with parameters:

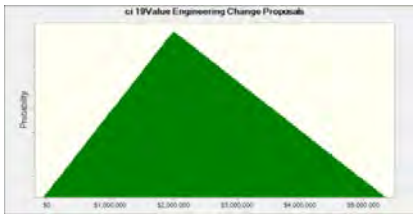
10%	$1,000,000	(=P27)
Likeliest	$2,000,000	(=Q27)
90%	$3,000,000	(=R27)



Assumption: ci 19Value Engineering Change Proposals **Cell: S28**

Triangular distribution with parameters:

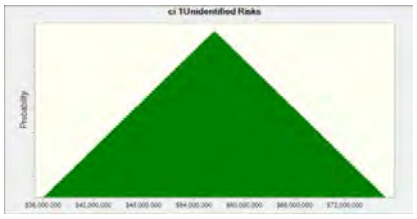
10%	$1,000,000	(=P28)
Likeliest	$2,000,000	(=Q28)
90%	$4,000,000	(=R28)



Assumption: ci 1Unidentified Risks **Cell: S10**

Triangular distribution with parameters:

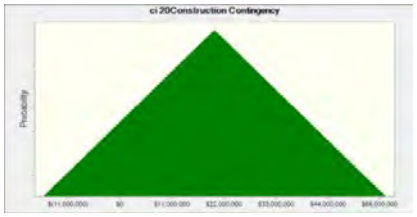
10%	$45,140,000	(=P10)
Likeliest	$56,425,000	(=Q10)
90%	$67,710,000	(=R10)



Assumption: ci 20Construction Contingency **Cell: S29**

Triangular distribution with parameters:

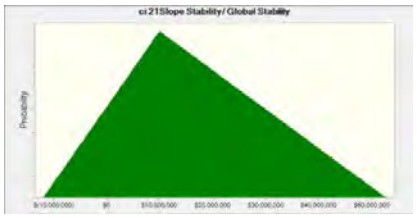
10%	$0	(=P29)
Likeliest	$20,000,000	(=Q29)
90%	$40,000,000	(=R29)



Assumption: ci 21Slope Stability/ Global Stability **Cell: S30**

Triangular distribution with parameters:

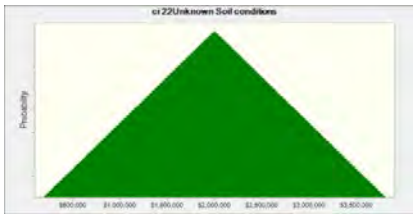
10%	$0	(=P30)
Likeliest	$10,000,000	(=Q30)
90%	$36,000,000	(=R30)



Assumption: ci 22Unknown Soil conditions **Cell: S31**

Triangular distribution with parameters:

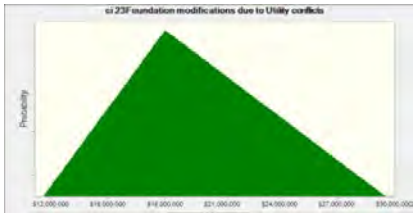
10%	$1,000,000	(=P31)
Likeliest	$2,000,000	(=Q31)
90%	$3,000,000	(=R31)



Assumption: ci 23Foundation modifications due to Utility conflicts **Cell: S32**

Triangular distribution with parameters:

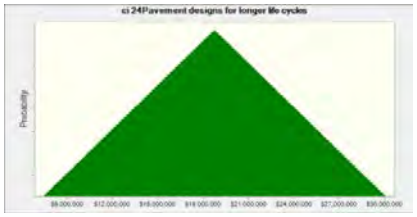
10%	$15,000,000	(=P32)
Likeliest	$18,000,000	(=Q32)
90%	$25,000,000	(=R32)



Assumption: ci 24Pavement designs for longer life cycles **Cell: S33**

Triangular distribution with parameters:

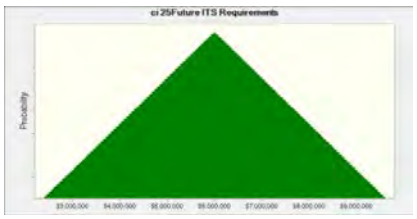
10%	$12,500,000	(=P33)
Likeliest	$18,750,000	(=Q33)
90%	$25,000,000	(=R33)



Assumption: ci 25Future ITS Requirements **Cell: S34**

Triangular distribution with parameters:

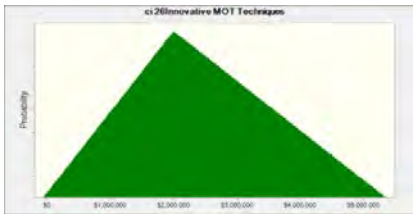
10%	$4,000,000	(=P34)
Likeliest	$6,000,000	(=Q34)
90%	$8,000,000	(=R34)



Assumption: ci 26Innovative MOT Techniques **Cell: S35**

Triangular distribution with parameters:

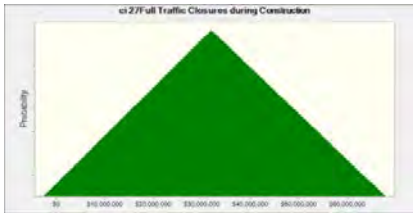
10%	$1,000,000	(=P35)
Likeliest	$2,000,000	(=Q35)
90%	$4,000,000	(=R35)



Assumption: ci 27Full Traffic Closures during Construction **Cell: S36**

Triangular distribution with parameters:

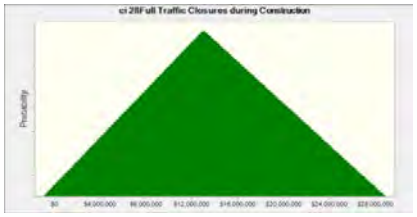
10%	$13,000,000	(=P36)
Likeliest	$32,000,000	(=Q36)
90%	$52,000,000	(=R36)



Assumption: ci 28Full Traffic Closures during Construction **Cell: S37**

Triangular distribution with parameters:

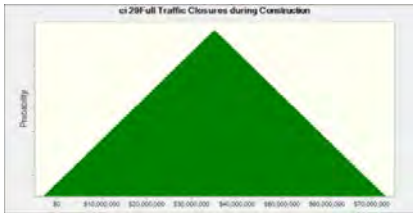
10%	$5,500,000	(=P37)
Likeliest	$13,000,000	(=Q37)
90%	$22,000,000	(=R37)



Assumption: ci 29Full Traffic Closures during Construction **Cell: S38**

Triangular distribution with parameters:

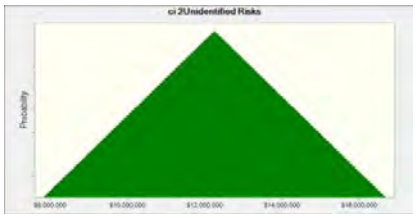
10%	$14,000,000	(=P38)
Likeliest	$35,000,000	(=Q38)
90%	$56,000,000	(=R38)



Assumption: ci 2Unidentified Risks **Cell: S11**

Triangular distribution with parameters:

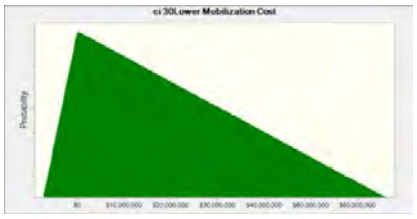
10%	$9,800,000	(=P11)
Likeliest	$12,250,000	(=Q11)
90%	$14,700,000	(=R11)



Assumption: ci 30Lower Mobilization Cost **Cell: S47**

Triangular distribution with parameters:

10%	$0	(=P47)
Likeliest	$0	(=Q47)
90%	$44,000,000	(=R47)



Assumption: ci 3Aggr. Minor **Cell: S12**

Triangular distribution with parameters:

10%	$18,056,000	(=P12)
Likeliest	$22,570,000	(=Q12)
90%	$27,084,000	(=R12)

Assumption: ci 4Aggr. Minor **Cell: S13**

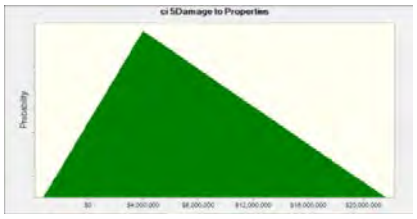
Triangular distribution with parameters:

10%	$4,900,000	(=P13)
Likeliest	$6,125,000	(=Q13)
90%	$7,350,000	(=R13)

Assumption: ci 5Damage to Properties **Cell: S14**

Triangular distribution with parameters:

10%	$1,000,000	(=P14)
Likeliest	$4,000,000	(=Q14)
90%	$15,000,000	(=R14)



Assumption: ci 6Additional ROW for RR in Segment 3 **Cell: S15**

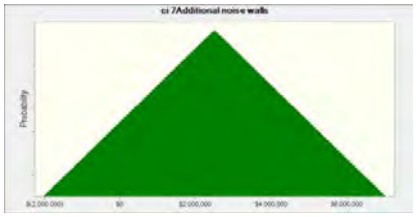
Triangular distribution with parameters:

10%	$900,000	(=P15)
Likeliest	$1,500,000	(=Q15)
90%	$2,500,000	(=R15)

Assumption: ci 7Additional noise walls **Cell: S16**

Triangular distribution with parameters:

10%	$0	(=P16)
Likeliest	$2,500,000	(=Q16)
90%	$5,000,000	(=R16)



Assumption: ci 8Additional pedestrian bridge **Cell: S17**

Triangular distribution with parameters:

10%	$3,700,000	(=P17)
Likeliest	$3,700,000	(=Q17)
90%	$10,000,000	(=R17)

Assumption: ci 9Skills Training **Cell: S18**

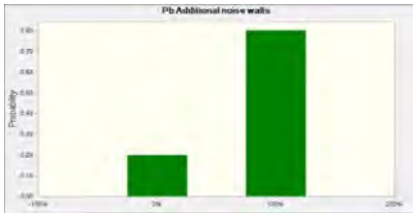
Triangular distribution with parameters:

10%	$4,000,000	(=P18)
Likeliest	$5,000,000	(=Q18)
90%	$6,000,000	(=R18)

Assumption: Pb Additional noise walls **Cell: N16**

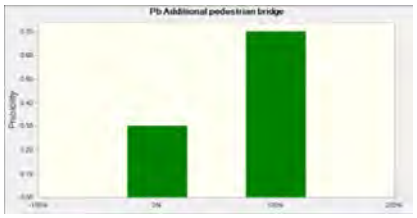
Yes-No distribution with parameters:

Probability of Yes(1)	0.8	(=N16)



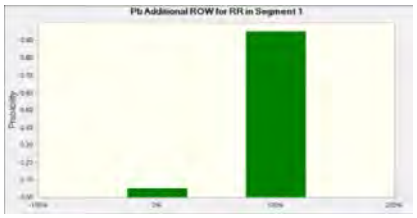
Assumption: Pb Additional pedestrian bridge **Cell: N17**

Yes-No distribution with parameters:
Probability of Yes(1) 0.7 (=N17)



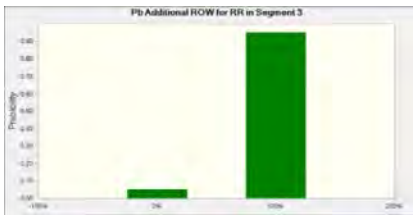
Assumption: Pb Additional ROW for RR in Segment 1 **Cell: N20**

Yes-No distribution with parameters:
Probability of Yes(1) 0.95 (=N20)



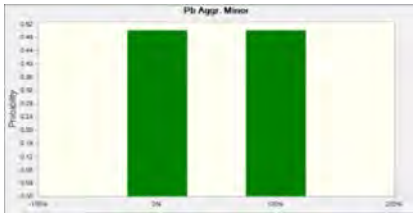
Assumption: Pb Additional ROW for RR in Segment 3 **Cell: N15**

Yes-No distribution with parameters:
Probability of Yes(1) 0.95 (=N15)



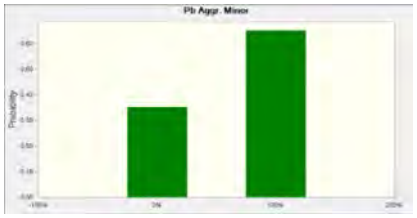
Assumption: Pb Aggr. Minor **Cell: N13**

Yes-No distribution with parameters:
Probability of Yes(1) 0.5 (=N13)



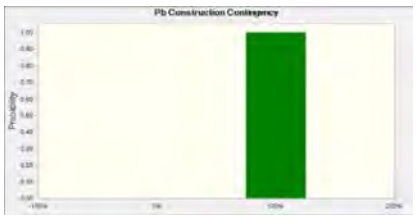
Assumption: Pb Aggr. Minor **Cell: N12**

Yes-No distribution with parameters:
Probability of Yes(1) 0.65 (=N12)



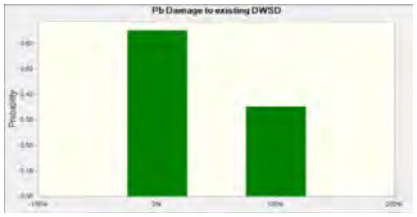
Assumption: Pb Construction Contingency **Cell: N29**

Yes-No distribution with parameters:
Probability of Yes(1) 1.0 (=N29)



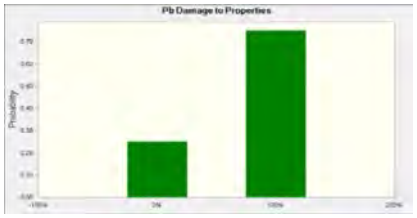
Assumption: Pb Damage to existing DWSD **Cell: N27**

Yes-No distribution with parameters:
Probability of Yes(1) 0.35 (=N27)



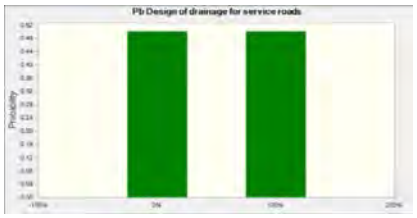
Assumption: Pb Damage to Properties **Cell: N14**

Yes-No distribution with parameters:
Probability of Yes(1) 0.75 (=N14)



Assumption: Pb Design of drainage for service roads **Cell: N26**

Yes-No distribution with parameters:
Probability of Yes(1) 0.5 (=N26)

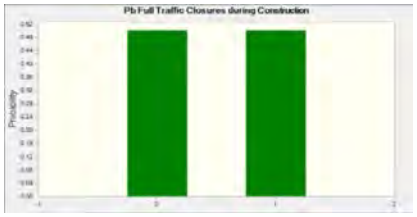


Assumption: Pb Foundation modifications due to Utility conflicts **Cell: N32**

Yes-No distribution with parameters:
Probability of Yes(1) 1.0 (=N32)

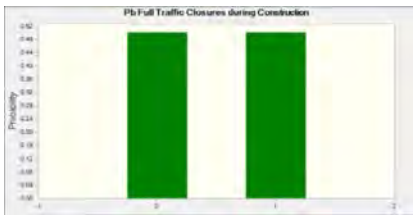
Assumption: Pb Full Traffic Closures during Construction **Cell: N37**

Yes-No distribution with parameters:
Probability of Yes(1) 0.5 (=N37)



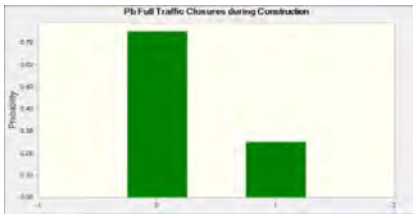
Assumption: Pb Full Traffic Closures during Construction **Cell: N38**

Yes-No distribution with parameters:
Probability of Yes(1) 0.5 (=N38)



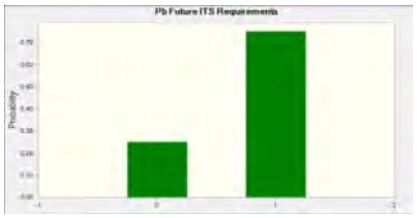
Assumption: Pb Full Traffic Closures during Construction **Cell: N36**

Yes-No distribution with parameters:
Probability of Yes(1) 0.25 (=N36)



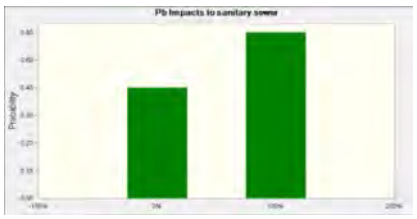
Assumption: Pb Future ITS Requirements **Cell: N34**

Yes-No distribution with parameters:
Probability of Yes(1) 0.75 (=N34)



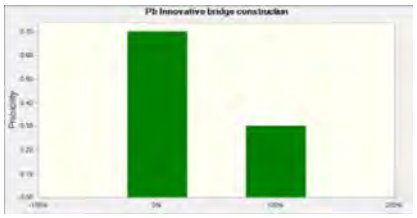
Assumption: Pb Impacts to sanitary sewer **Cell: N19**

Yes-No distribution with parameters:
Probability of Yes(1) 0.6 (=N19)



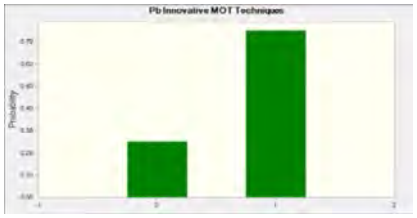
Assumption: Pb Innovative bridge construction **Cell: N22**

Yes-No distribution with parameters:
Probability of Yes(1) 0.3 (=N22)



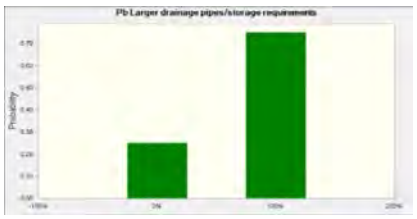
Assumption: Pb Innovative MOT Techniques **Cell: N35**

Yes-No distribution with parameters:
Probability of Yes(1) 0.75 (=N35)



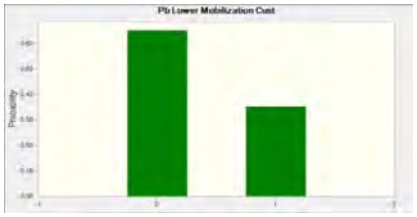
Assumption: Pb Larger drainage pipes/storage requirements **Cell: N24**

Yes-No distribution with parameters:
Probability of Yes(1) 0.75 (=N24)



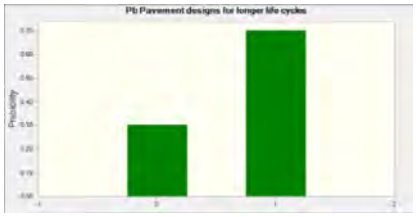
Assumption: Pb Lower Mobilization Cost **Cell: N47**

Yes-No distribution with parameters:
Probability of Yes(1) 0.35 (=N47)



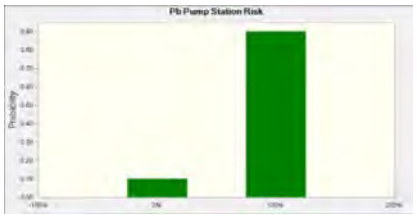
Assumption: Pb Pavement designs for longer life cycles **Cell: N33**

Yes-No distribution with parameters:
Probability of Yes(1) 0.7 (=N33)



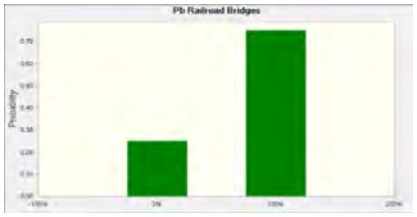
Assumption: Pb Pump Station Risk **Cell: N25**

Yes-No distribution with parameters:
Probability of Yes(1) 0.9 (=N25)



Assumption: Pb Railroad Bridges **Cell: N21**

Yes-No distribution with parameters:
Probability of Yes(1) 0.75 (=N21)

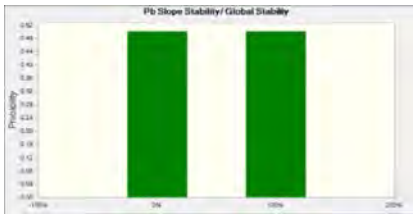


Assumption: Pb Skills Training **Cell: N18**

Yes-No distribution with parameters:
Probability of Yes(1) 1.0 (=N18)

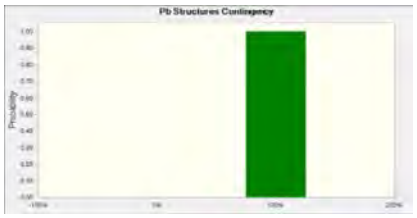
Assumption: Pb Slope Stability/ Global Stability **Cell: N30**

Yes-No distribution with parameters:
Probability of Yes(1) 0.5 (=N30)



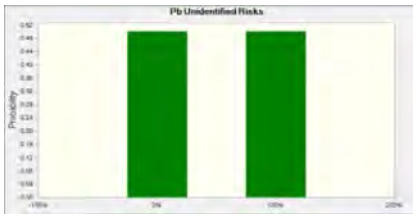
Assumption: Pb Structures Contingency **Cell: N23**

Yes-No distribution with parameters:
Probability of Yes(1) 1.0 (=N23)



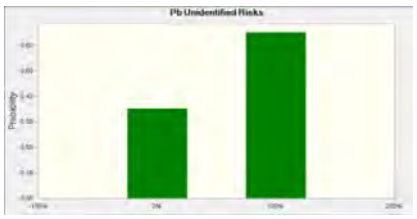
Assumption: Pb Unidentified Risks **Cell: N11**

Yes-No distribution with parameters:
Probability of Yes(1) 0.5 (=N11)



Assumption: Pb Unidentified Risks **Cell: N10**

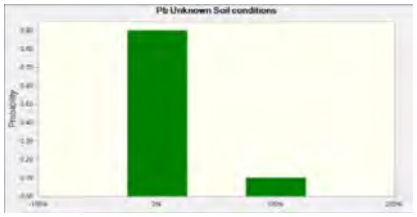
Yes-No distribution with parameters:
Probability of Yes(1) 0.65 (=N10)



Assumption: Pb Unknown Soil conditions **Cell: N31**

Yes-No distribution with parameters:

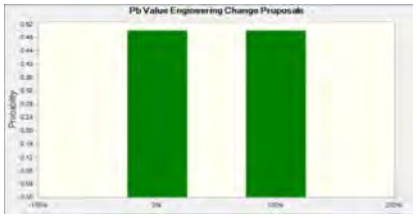
Probability of Yes(1)	0.1	(=N31)



Assumption: Pb Value Engineering Change Proposals **Cell: N28**

Yes-No distribution with parameters:

Probability of Yes(1)	0.5	(=N28)



Assumption: si 27Full Traffic Closures during Construction **Cell: AA36**

Triangular distribution with parameters:

Minimum	6.00	(=X36)
Likeliest	9.00	(=Y36)
Maximum	12.00	(=Z36)

Assumption: si 28Full Traffic Closures during Construction **Cell: AA37**

Triangular distribution with parameters:

Minimum	6.00	(=X37)
Likeliest	9.00	(=Y37)
Maximum	12.00	(=Z37)

Assumption: si 29Full Traffic Closures during Construction **Cell: AA38**

Triangular distribution with parameters:

Minimum	6.00	(=X38)
Likeliest	9.00	(=Y38)
Maximum	12.00	(=Z38)

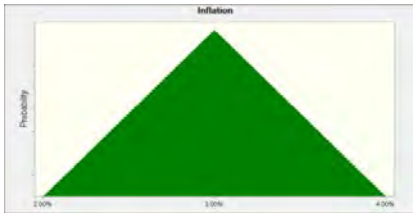
Worksheet: [Draft I-94 CER_LSW v4 11-19-2013 7pm.xlsm]YOE

Assumption: Inflation **Cell: Z8**

Triangular distribution with parameters:

Minimum	2.00%	(=Z8-1%)
Likeliest	3.00%	(=Z8)
Maximum	4.00%	(=Z8+1%)

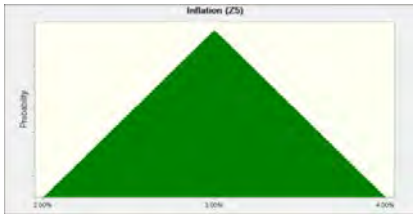
Assumption: Inflation (cont'd) **Cell: Z8**



Assumption: Inflation (Z5) **Cell: Z5**

Triangular distribution with parameters:

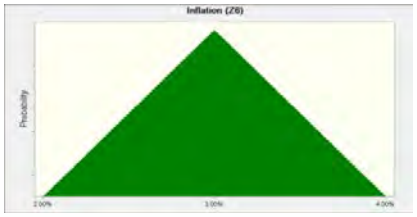
Minimum	2.00%	(=Z5-1%)
Likeliest	3.00%	(=Z5)
Maximum	4.00%	(=Z5+1%)



Assumption: Inflation (Z6) **Cell: Z6**

Triangular distribution with parameters:

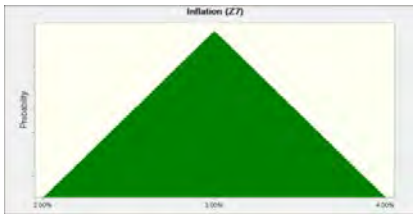
Minimum	2.00%	(=Z6-1%)
Likeliest	3.00%	(=Z6)
Maximum	4.00%	(=Z6+1%)



Assumption: Inflation (Z7) **Cell: Z7**

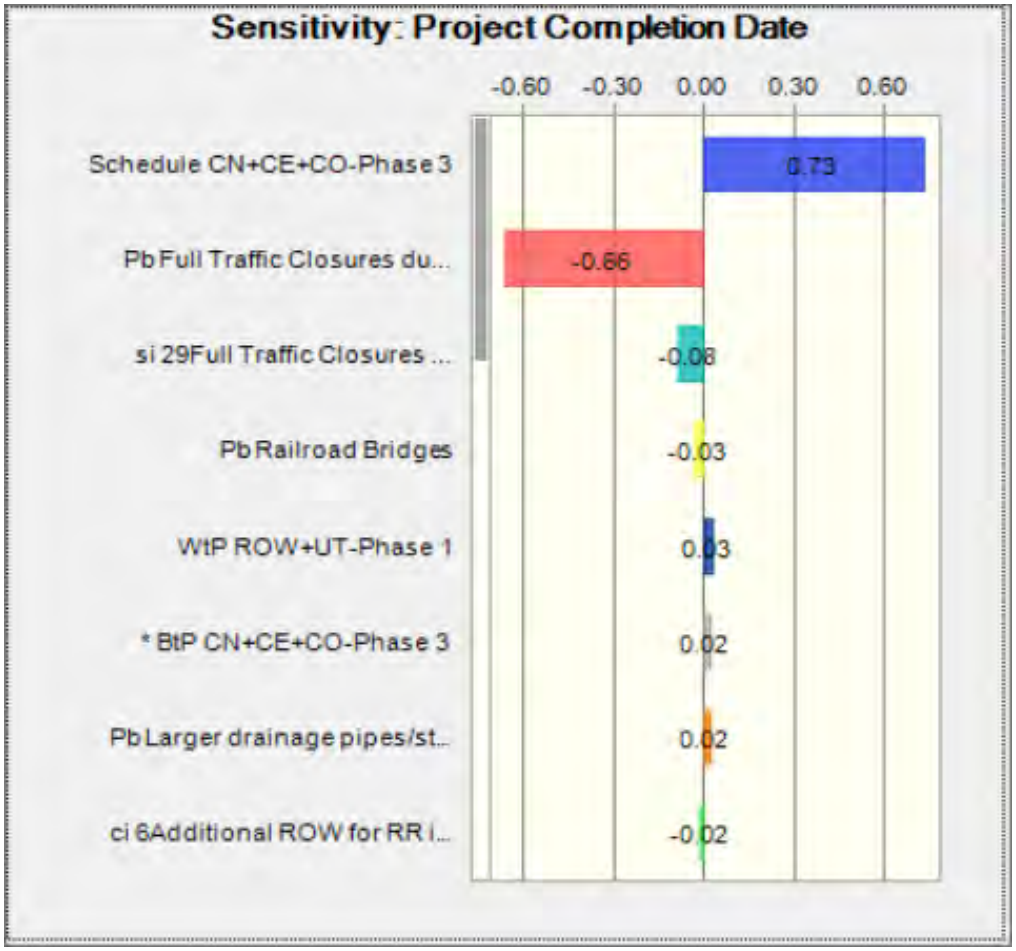
Triangular distribution with parameters:

Minimum	2.00%	(=Z7-1%)
Likeliest	3.00%	(=Z7)
Maximum	4.00%	(=Z7+1%)

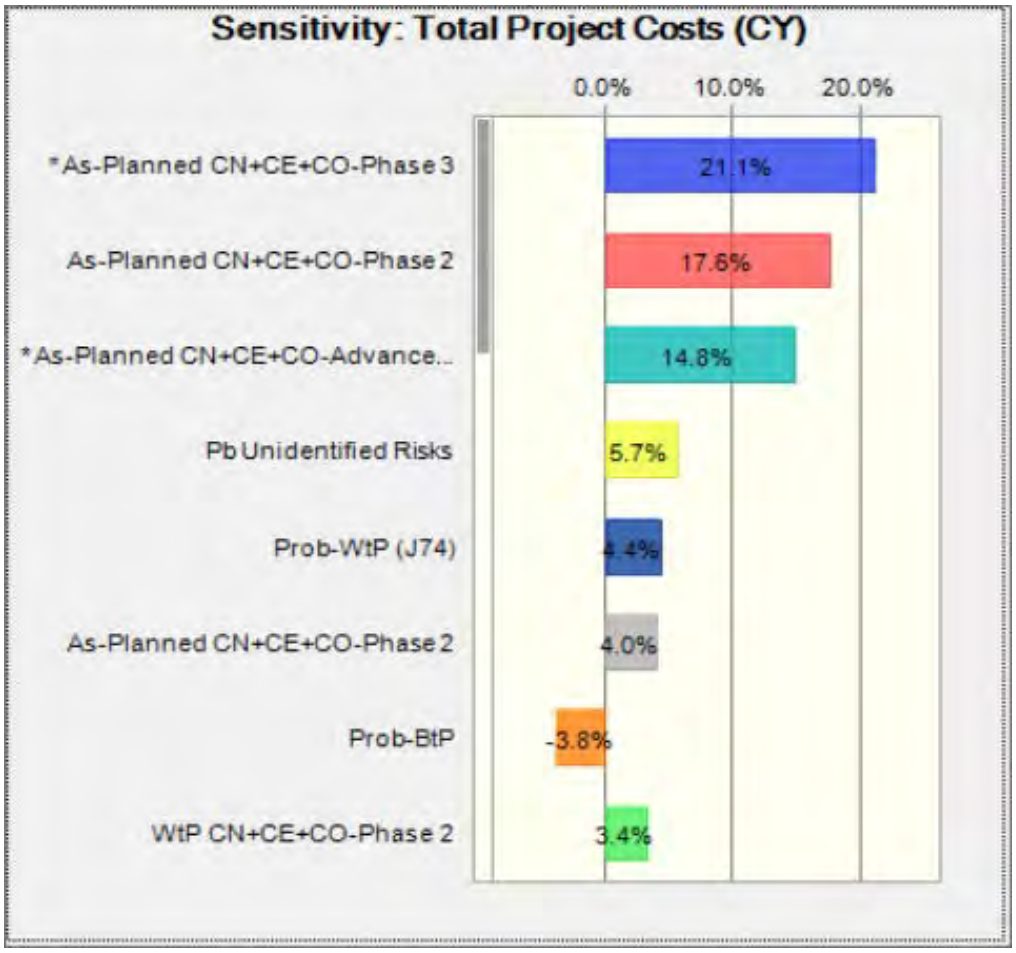


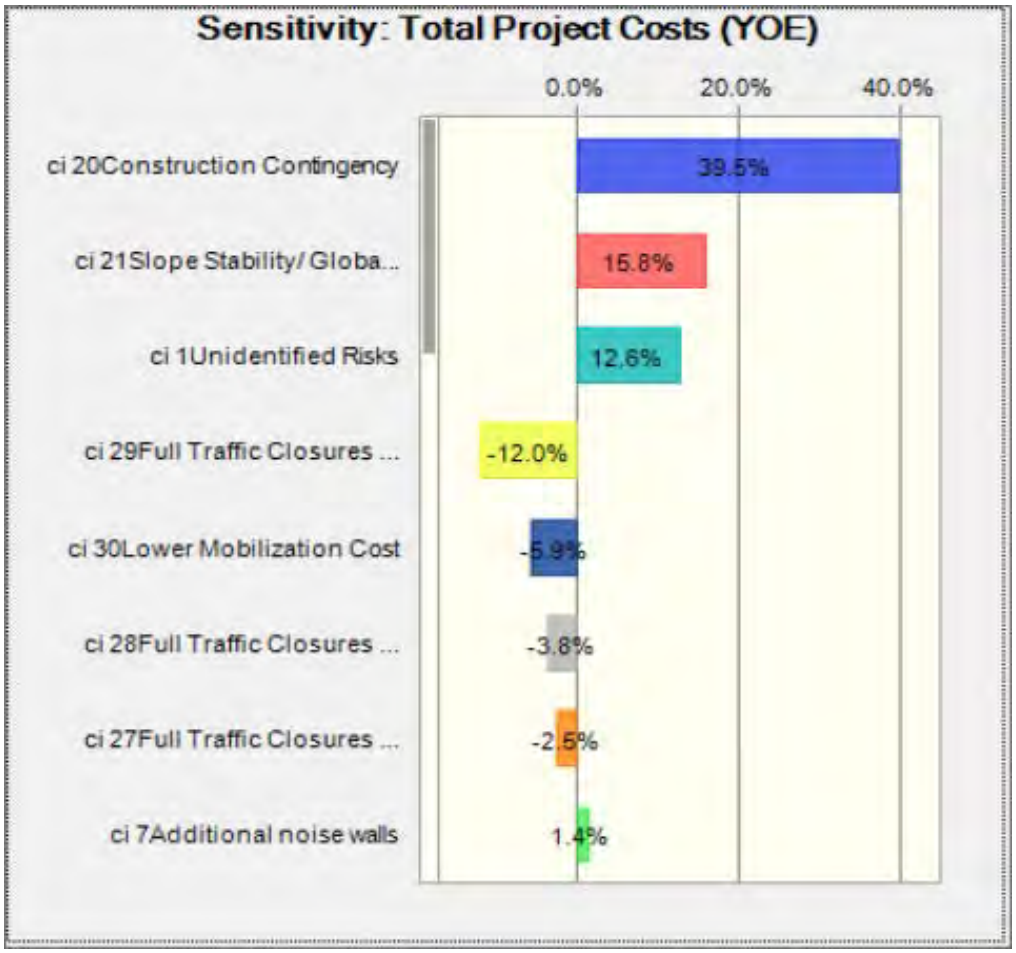
End of Assumptions

Sensitivity Charts



No target forecast has been specified


Sensitivity: Total Project Costs (CY)
0.0%
10.0%
20.0%
*As-Planned CN+CE+CO-Phase 3
21.1%
As-Planned CN+CE+CO-Phase 2
17.6%
*As-Planned CN+CE+CO-Advance...
14.8%
Pb Unidentified Risks
5.7%
Prob-WtP (J74)
4.4%
As-Planned CN+CE+CO-Phase 2
4.0%
Prob-BtP
-3.8%
WtP CN+CE+CO-Phase 2
3.4%



End of Sensitivity Charts

Project Information

Project Title:	I-94 Edsel Ford Freeway	
State	MI	
Team	My Team	
Review Date (From To):	11/17/2013	11/20/2013
Last Review Date (From To):	4/26/2011	4/30/2011
Estimate Date:	10/2/2013	
Prior Costs:	$ 22,435,222	
Fixed Costs:	$ -	

Base Estimate and Variability:

********** CopyValue ********** PasteValues

Lookup	Functional Class	Phase	Base Estimate	Prog Dev Contingency	Base Estimate w/o Contingency	Base Variability (%)	Base Variability ($)	Base Sched Start	Schedule Duration	Duration Variability	Schedule Value
PE-Advanced Bri	PE	Advanced Bridges	$ 26,936,107		$ 26,936,107	10%	$ 2,693,611	1/1/2014	60.8	15%	60.8
ROW+UT-Advan	ROW+UT	Advanced Bridges	$ 27,130,553		$ 27,130,553	10%	$ 2,713,055	1/1/2014	48.7	15%	48.7
CN+CE+CO-Adva	CN+CE+CO	Advanced Bridges	$ 99,253,406		$ 99,253,406	17%	$ 16,376,812	1/1/2017	36.5	15%	36.5
PE-Phase 1	PE	Phase 1	$ 62,265,256		$ 62,265,256	10%	$ 6,226,526	9/1/2011	97.4	15%	97.4
ROW+UT-Phase	ROW+UT	Phase 1	$ 48,007,050		$ 48,007,050	10%	$ 4,800,705	9/1/2014	24.3	15%	24.3
CN+CE+CO-Phas	CN+CE+CO	Phase 1	$ 698,999,443	$ 145,590,199	$ 553,409,244	17%	$ 91,312,525	3/1/2015	60.8	15%	60.8
PE-Phase 2	PE	Phase 2	$ 28,242,316		$ 28,242,316	10%	$ 2,824,232	9/1/2011	60.8	15%	60.8
ROW+UT-Phase	ROW+UT	Phase 2	$ 11,874,707		$ 11,874,707	10%	$ 1,187,471	9/1/2014	12.1	15%	12.1
CN+CE+CO-Phas	CN+CE+CO	Phase 2	$ 344,811,399	$ 59,793,986	$ 285,017,413	17%	$ 47,027,873	3/1/2015	36.5	15%	36.5
PE-Phase 3	PE	Phase 3	$ 44,377,930		$ 44,377,930	10%	$ 4,437,793	1/1/2029	36.5	15%	36.5
ROW+UT-Phase	ROW+UT	Phase 3	$ 26,153,227		$ 26,153,227	10%	$ 2,615,323	1/1/2029	24.3	15%	24.3
CN+CE+CO-Phas	CN+CE+CO	Phase 3	$ 687,682,539	$ 151,349,747	$ 536,332,792	17%	$ 88,494,911	1/1/2030	85.2	15%	85.2
		Total	$ 2,105,733,932	$ 356,733,932	$ 1,749,000,000		$ 270,710,836				
		Less Contingency	$ 356,733,932								
		Subtotal CY	$ 1,749,000,000								
		Total CY w/ prior & fixed costs (no contingency)	$ 1,771,435,222		Total Cost Estimate (includes all phases, prior & fixed cost, & contingency)	$ 2,484,903,086					

Market Conditions: Probability (i.e. likelihood)

Lookup	Functional Class	Phase	Probability BtP	Probability As-Planned	Probability WtP	Pcalcs BtP	Pcalcs As-Planned	Pcalcs WtP
PE-Advanced Bri	PE	Advanced Bridges	0%	100%	0%	0%	100%	0%
ROW+UT-Advan	ROW+UT	Advanced Bridges	5%	90%	5%	5%	90%	5%
CN+CE+CO-Adva	CN+CE+CO	Advanced Bridges	6%	70%	24%	6%	68%	26%
PE-Phase 1	PE	Phase 1	0%	100%	0%	0%	100%	0%
ROW+UT-Phase	ROW+UT	Phase 1	5%	90%	5%	5%	90%	5%
CN+CE+CO-Phas	CN+CE+CO	Phase 1	4%	68%	28%	4%	67%	29%
PE-Phase 2	PE	Phase 2	0%	100%	0%	0%	100%	0%
ROW+UT-Phase	ROW+UT	Phase 2	10%	80%	10%	10%	79%	11%
CN+CE+CO-Phas	CN+CE+CO	Phase 2	12%	76%	12%	12%	65%	23%
PE-Phase 3	PE	Phase 3	0%	100%	0%	0%	100%	0%
ROW+UT-Phase	ROW+UT	Phase 3	10%	80%	10%	10%	79%	11%
CN+CE+CO-Phas	CN+CE+CO	Phase 3	12%	68%	20%	12%	65%	23%

Market Conditions: Impact (i.e. offset from base)

Lookup	Project Phase/Eleme	Functional Assignment	Impact (% Offset from Base) BtP	Impact (% Offset from Base) WtP	Inputs for Impact Distribution Curves (Better than Planned, As-Planned, Worse than Planned): BtP 10%	BtP ML	BtP 90%	AsPlanned 10%	AsPlanned ML	AsPlanned 90%	WtP 10%	WtP ML	WtP 90%
PE-Advanced Bri	PE	Advanced Bridges	0%	0%	$ 24,242,496	$ 26,936,107	$ 29,629,718	$ 24,242,496	$ 26,936,107	$ 29,629,718	$ 24,242,496	$ 26,936,107	$ 29,629,718
ROW+UT-Advan	ROW+UT	Advanced Bridges	10%	5%	$ 21,704,442	$ 24,417,498	$ 27,130,553	$ 24,417,498	$ 27,130,553	$ 29,843,608	$ 25,774,025	$ 28,487,081	$ 31,200,136
CN+CE+CO-Adva	CN+CE+CO	Advanced Bridges	10%	10%	$ 72,951,253	$ 89,328,065	$ 105,704,877	$ 82,876,594	$ 99,253,406	$ 115,630,218	$ 92,801,935	$ 109,178,747	$ 125,555,559
PE-Phase 1	PE	Phase 1	0%	0%	$ 56,038,730	$ 62,265,256	$ 68,491,781	$ 56,038,730	$ 62,265,256	$ 68,491,781	$ 56,038,730	$ 62,265,256	$ 68,491,781
ROW+UT-Phase	ROW+UT	Phase 1	10%	10%	$ 38,405,640	$ 43,206,345	$ 48,007,050	$ 43,206,345	$ 48,007,050	$ 52,807,755	$ 48,007,050	$ 52,807,755	$ 57,608,460
CN+CE+CO-Phas	CN+CE+CO	Phase 1	10%	10%	$ 406,755,794	$ 498,068,320	$ 589,380,845	$ 462,096,719	$ 553,409,244	$ 644,721,769	$ 517,437,643	$ 608,750,168	$ 700,062,694
PE-Phase 2	PE	Phase 2	0%	0%	$ 25,418,084	$ 28,242,316	$ 31,066,548	$ 25,418,084	$ 28,242,316	$ 31,066,548	$ 25,418,084	$ 28,242,316	$ 31,066,548
ROW+UT-Phase	ROW+UT	Phase 2	10%	10%	$ 9,499,766	$ 10,687,236	$ 11,874,707	$ 10,687,236	$ 11,874,707	$ 13,062,178	$ 11,874,707	$ 13,062,178	$ 14,249,648
CN+CE+CO-Phas	CN+CE+CO	Phase 2	10%	10%	$ 209,487,799	$ 256,515,672	$ 303,543,545	$ 237,989,540	$ 285,017,413	$ 332,045,286	$ 266,491,281	$ 313,519,154	$ 360,547,027
PE-Phase 3	PE	Phase 3	0%	0%	$ 39,940,137	$ 44,377,930	$ 48,815,722	$ 39,940,137	$ 44,377,930	$ 48,815,722	$ 39,940,137	$ 44,377,930	$ 48,815,722
ROW+UT-Phase	ROW+UT	Phase 3	10%	10%	$ 20,922,582	$ 23,537,904	$ 26,153,227	$ 23,537,904	$ 26,153,227	$ 28,768,550	$ 26,153,227	$ 28,768,550	$ 31,383,872
CN+CE+CO-Phas	CN+CE+CO	Phase 3	10%	10%	$ 394,204,602	$ 482,699,513	$ 571,194,423	$ 447,837,881	$ 536,332,792	$ 624,827,703	$ 501,471,161	$ 589,966,071	$ 678,460,982

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Market Condition "Values" Carry Forward to YOE Sheet

Lookup	Project Phase/Eleme	Functional Assignment	Copy Prob-BtP	Copy Prob-WtP	Copy BtP	Copy As-Planned	Copy WtP	Paste Values Prob-BtP	Paste Values Prob-WtP	Paste Values BtP	Paste Values As-Planned	Paste Values WtP	Value
PE-Advanced Bri	PE	Advanced Bridges	0%	0%	$ 26,936,107	$ 26,936,107	$ 26,936,107	0%	0%	$ 26,936,107	$ 26,936,107	$ 26,936,107	$ 26,936,107
ROW+UT-Advan	ROW+UT	Advanced Bridges	5%	5%	$ 24,417,498	$ 27,130,553	$ 28,487,081	5%	5%	$ 24,417,498	$ 27,130,553	$ 28,487,081	$ 27,130,553
CN+CE+CO-Adva	CN+CE+CO	Advanced Bridges	6%	26%	$ 89,328,065	$ 99,253,406	$ 109,178,747	6%	26%	$ 89,328,065	$ 99,253,406	$ 109,178,747	$ 99,253,406
PE-Phase 1	PE	Phase 1	0%	0%	$ 62,265,256	$ 62,265,256	$ 62,265,256	0%	0%	$ 62,265,256	$ 62,265,256	$ 62,265,256	$ 62,265,256
ROW+UT-Phase	ROW+UT	Phase 1	5%	5%	$ 43,206,345	$ 48,007,050	$ 52,807,755	5%	5%	$ 43,206,345	$ 48,007,050	$ 52,807,755	$ 48,007,050
CN+CE+CO-Phas	CN+CE+CO	Phase 1	4%	29%	$ 498,068,320	$ 553,409,244	$ 608,750,168	4%	29%	$ 498,068,320	$ 553,409,244	$ 608,750,168	$ 553,409,244
PE-Phase 2	PE	Phase 2	0%	0%	$ 28,242,316	$ 28,242,316	$ 28,242,316	0%	0%	$ 28,242,316	$ 28,242,316	$ 28,242,316	$ 28,242,316
ROW+UT-Phase	ROW+UT	Phase 2	10%	11%	$ 10,687,236	$ 11,874,707	$ 13,062,178	10%	11%	$ 10,687,236	$ 11,874,707	$ 13,062,178	$ 11,874,707
CN+CE+CO-Phas	CN+CE+CO	Phase 2	12%	23%	$ 256,515,672	$ 285,017,413	$ 313,519,154	12%	23%	$ 256,515,672	$ 285,017,413	$ 313,519,154	$ 285,017,413
PE-Phase 3	PE	Phase 3	0%	0%	$ 44,377,930	$ 44,377,930	$ 44,377,930	0%	0%	$ 44,377,930	$ 44,377,930	$ 44,377,930	$ 44,377,930
ROW+UT-Phase	ROW+UT	Phase 3	10%	11%	$ 23,537,904	$ 26,153,227	$ 28,768,550	10%	11%	$ 23,537,904	$ 26,153,227	$ 28,768,550	$ 26,153,227
CN+CE+CO-Phas	CN+CE+CO	Phase 3	12%	23%	$ 482,699,513	$ 536,332,792	$ 589,966,071	12%	23%	$ 482,699,513	$ 536,332,792	$ 589,966,071	$ 536,332,792
													$ 1,749,000,000

Attachment C

Lookup	Functional Class	Phase	Start	End	Phase Duration (mo)	Duration to Mid-Point (mo)	Mid-Point Date	YOE
PE-Advanced Bridges	PE	Advanced Bri	1/1/2014	12/31/2018	60.8	33.5	7/1/2016	$ 29,653,960
ROW+UT-Advanced Br	ROW+UT	Advanced Bri	1/1/2014	12/31/2017	48.7	27.4	1/1/2016	$ 29,868,026
CN+CE+CO-Advanced	CN+CE+CO	Advanced Bri	1/1/2017	12/31/2019	36.5	57.8	7/2/2018	$ 115,922,500
PE-Phase 1	PE	Phase 1	1/1/2018	12/31/2025	97.4	100.4	12/31/2021	$ 79,465,711
ROW+UT-Phase 1	ROW+UT	Phase 1	1/1/2022	12/30/2023	24.3	112.6	12/31/2022	$ 63,106,812
CN+CE+CO-Phase 1	CN+CE+CO	Phase 1	1/1/2021	12/31/2025	60.8	118.7	7/2/2023	$ 946,422,974
PE-Phase 2	PE	Phase 2	1/1/2025	12/31/2029	60.8	167.4	7/2/2027	$ 43,038,552
ROW+UT-Phase 2	ROW+UT	Phase 2	1/1/2025	12/31/2025	12.1	143.0	7/2/2025	$ 17,057,124
CN+CE+CO-Phase 2	CN+CE+CO	Phase 2	1/1/2027	12/31/2029	36.5	179.6	7/1/2028	$ 541,222,923
PE-Phase 3	PE	Phase 3	1/1/2029	12/31/2031	36.5	203.9	7/2/2030	$ 73,898,573
ROW+UT-Phase 3	ROW+UT	Phase 3	1/1/2029	12/31/2030	24.3	197.8	12/31/2029	$ 42,282,151
CN+CE+CO-Phase 3	CN+CE+CO	Phase 3	1/1/2030	12/31/2036	85.2	240.4	7/2/2033	$ 1,251,320,872
								$ 3,233,260,178
								$ 1,127,526,245
								$ 3,255,695,400
PE-Projectwide	PE	Projectwide	1/1/2014	12/31/2031	219.1	112.5833333	12/31/2022	
ROW+UT-Projectwide	ROW+UT	Projectwide	1/1/2014	12/31/2030	206.9	106.5	7/2/2022	
CN+CE+CO-Projectwid	CN+CE+CO	Projectwide	1/1/2017	12/31/2036	243.5	161.3	1/1/2027	

Total Project Cost (YOE) excluding risk, base variability, prior costs, or fixed costs

Inflation

Total Project Cost (YOE) includes prior costs, or fixed costs, but no probabilistic analysis (base variability, risk, & market conditions)

Risk #	Risk Status	Risk Dependency	Guidance for Discrete Probability	Functional Assignment	Phase	YOE Lookup	Event Risk Name	Risk Type	Detailed Description of Risk Event (Specific, Measurable, Attributable, Relevant, Timebound) [SMART]	Proposed Mitigation Action	Probability	Probability (Calcs.)	Probability (HardCode)	Assumption Name	10% Cost	Most Likely Cost	90% Cost	Impact Cost	Correlation Prior Cost Risk	Cost Risk (Threat/ Opportunity)	Probable Cost Impact ($$$)	Assumption Name	10% Schedule (Mo)	Most Likely Schedule (Mo)	90% Schedule (Mo)	Schedule Impact	Schedule Risk (Threat/ Opportunity)	Correlation (Cost/ Duration)	Parallel Events	Parallel Risks	Logical	Logical	Probable Schedule Impact (Mo)
													**********					**********			$ 60,074,250						*********						-11.25
1	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Unidentified Risks	Cost	Threats not identified		65%	65%	65%	ci 1Unidentified Risks	$ 45,140,000	$ 56,425,000	$ 67,710,000	$ 56,425,000		Threat	$ 36,676,250	si 1Unidentified Risks									0		0
2	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Unidentified Risks	Cost	Opportunities not identified		50%	50%	50%	ci 2Unidentified Risks	$ 9,800,000	$ 12,250,000	$ 14,700,000	$ 12,250,000	Nil	Opportunity	$ (6,125,000)	si 2Unidentified Risks									0		0
3	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Aggr. Minor	Cost	Threats Aggr minor		65%	65%	65%	ci 3Aggr. Minor	$ 18,056,000	$ 22,570,000	$ 27,084,000	$ 22,570,000	Nil	Threat	$ 14,670,500	si 3Aggr. Minor									0		0
4	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Aggr. Minor	Cost	Opp Aggr. Minor		50%	50%	50%	ci 4Aggr. Minor	$ 4,900,000	$ 6,125,000	$ 7,350,000	$ 6,125,000	Nil	Opportunity	$ (3,062,500)	si 4Aggr. Minor									0		0
5	Active	Independent	Prob<1	ROW+UT	Phase 1	ROW+UT-Phase 1	Damage to Properties	Cost	Impacts to existing buildings and parking areas and provide access during construction; increased ROW costs; pertains to properties geographically in Segment 2, but construction included in Segment 3		75%	75%	75%	ci 5Damage to Propert	$ 1,000,000	$ 4,000,000	$ 15,000,000	$ 4,000,000	Nil	Threat	$ 3,000,000	si 5Damage to Properties									0		0
6	Active	Independent	Prob<1	ROW+UT	Phase 1	ROW+UT-Phase	Additional ROW for RR in Segment 3	Cost	Additional ROW to accommodate temporary tracks; includes cost for both RR in Segment 3		95%	95%	95%	ci 6Additional ROW fo	$ 900,000	$ 1,500,000	$ 2,500,000	$ 1,500,000	Nil	Threat	$ 1,425,000	si 6Additional ROW for RR in Segment 3									0		0
7	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Additional noise walls	Cost	Modifications to noise wall quantities may be necessary		80%	80%	80%	ci 7Additional noise w	$ -	$ 2,500,000	$ 5,000,000	$ 2,500,000		Threat	$ 2,000,000	si 7Additional noise walls									0		0
8	Active	Independent	Prob<1	CN+CE+CO	Phase 3	CN+CE+CO-Phase	Additional pedestrian bridge	Cost	Additional pedestrian bridge may be necessitated by development in area		70%	70%	70%	ci 8Additional pedestr	$ 3,700,000	$ 3,700,000	$ 10,000,000	$ 3,700,000		Threat	$ 2,590,000	si 8Additional pedestrian bridge									0		0
9	Retired	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Skills Training	Cost	Community jobs training (RCAR)		100%	100%	100%	ci 9Skills Training	$ 4,000,000	$ 5,000,000	$ 6,000,000	$ 5,000,000		Threat	$ -	si 9Skills Training									0		0
10	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Impacts to sanitary sewer	Cost	Final design/construction impacts necessitate replacement of sanitary sewer		60%	60%	60%	ci 10Impacts to sanita	$ 3,000,000	$ 5,000,000	$ 7,000,000	$ 5,000,000		Threat	$ 3,000,000	si 10Impacts to sanitary sewer									0		0
11	Active	Independent	Prob<1	ROW+UT	Phase 3	ROW+UT-Phase	Additional ROW for RR in Segment 1	Cost	Additional ROW to accommodate temporary tracks		95%	95%	95%	ci 11Additional ROW f	$ 900,000	$ 1,500,000	$ 2,500,000	$ 1,500,000	Nil	Threat	$ 1,425,000	si 11Additional ROW for RR in Segment 1									0		0
12	Active	ME	<=0.05	CN+CE+CO	Phase 3	CN+CE+CO-Phase	Railroad Bridges	Cost	Final agreement with RR could provide decrease in cost; potentially no shoofly would be needed		30%	600%	75%	ci 12Railroad Bridges	$ 35,000,000	$ 40,500,000	$ 45,000,000	$ 40,500,000		Opportunity	$ (30,375,000)	si 12Railroad Bridges									0		0
13	Active	Independent	Prob<1	CN+CE+CO	Phase 3	CN+CE+CO-Phase	Innovative bridge construction	Cost	Potential to decrease time to construct bridges, may be additional cost due to technology and ROW for offsite construction		30%	30%	30%	ci 13Innovative bridge	$ 5,000,000	$ 10,000,000	$ 15,000,000	$ 10,000,000		Threat	$ 3,000,000	si 13Innovative bridge construction									0		0
14	Retired	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Structures Contingency	Cost	Structures (bridges & walls) risks such as longer/additional piling, high strength piling, ground improvements due to poor soil, and/or increased steel prices		100%	100%	100%	ci 14Structures Contin	$ 70,000,000	$ 105,000,000	$ 134,000,000	$ 105,000,000		Threat	$ -	si 14Structures Contingency									0		0
15	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Larger drainage pipes/storage requirements	Cost	Additional storage capacity may be needed as final design progresses		75%	75%	75%	ci 15Larger drainage p	$ 4,000,000	$ 5,000,000	$ 6,000,000	$ 5,000,000		Threat	$ 3,750,000	si 15Larger drainage pipes/storage requirements									0		0
16	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Pump Station Risk	Cost	Some pump stations may need replacement instead of refurbishment; estimate only assumes foundations 3 ft below pump station		90%	90%	90%	ci 16Pump Station Ris	$ 5,000,000	$ 7,000,000	$ 9,000,000	$ 7,000,000		Threat	$ 6,300,000	si 16Pump Station Risk									0		0
17	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Design of drainage for service roads	Cost	Drainage design along service roads may change as design of service road progresses		50%	50%	50%	ci 17Design of drainag	$ 2,000,000	$ 3,000,000	$ 5,000,000	$ 3,000,000		Threat	$ 1,500,000	si 17Design of drainage for service roads									0		0
18	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Damage to existing DWSD	Cost	Potential damage during construction to the existing water and sewer systems		35%	35%	35%	ci 18Damage to existi	$ 1,000,000	$ 2,000,000	$ 3,000,000	$ 2,000,000		Threat	$ 700,000	si 18Damage to existing DWSD									0		0
19	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Value Engineering Change Proposals	Cost	Opportunities in cost associated with potential VECPs during construction		50%	50%	50%	ci 19Value Engineerin	$ 1,000,000	$ 2,000,000	$ 4,000,000	$ 2,000,000		Opportunity	$ (1,000,000)	si 19Value Engineering Change Proposals									0		0
20	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Construction Contingency	Cost	Construction risks such as overruns and change orders; may include risks such as construction accidents, vehicle accidents, electrical issues, security/safety issues; new construction methods such as secant pile walls		100%	100%	100%	ci 20Construction Con	$ -	$ 20,000,000	$ 40,000,000	$ 30,000,000		Threat	$ 30,000,000	si 20Construction Contingency									0		0
21	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Slope Stability/ Global Stability	Cost	Impacts of replacing existing slopes with secant pile walls; current estimate based on older surveys		50%	50%	50%	ci 21Slope Stability/ Gl	$ -	$ 10,000,000	$ 36,000,000	$ 10,000,000		Threat	$ 5,000,000	si 21Slope Stability/ Global Stability									0		0
22	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Unknown Soil conditions	Cost	Possibility of encountering hydrogen sulfide latent water		10%	10%	10%	ci 22Unknown Soil co	$ 1,000,000	$ 2,000,000	$ 3,000,000	$ 2,000,000		Threat	$ 200,000	si 22Unknown Soil conditions									0		0
23	Retired	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Foundation modifications due to Utility conflicts	Cost	Drill shafts may need to be used in some locations instead of driven piles to avoid utilities (bridges & walls)		100%	100%	100%	ci 23Foundation mod	$ 15,000,000	$ 18,000,000	$ 25,000,000	$ 18,000,000		Threat	$ -	si 23Foundation modifications due to Utility conflicts									0		0
24	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Pavement designs for longer life cycles	Cost	Possible usage of extended life pavements; techniques may include stabilized cement base, non-corrosive dowel bars to reduce maintenance requirements and user costs in the future		0.70	70%	0.7	ci 24Pavement design	$12,500,000	$18,750,000	$25,000,000	$9,500,000		Threat	$ 3,850,000	si 24Pavement designs for longer life cycles									0		0
25	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Future ITS Requirements	Cost	Potential of future ITS technologies at time of actual construction		0.75	75%	0.75	ci 25Future ITS Requi	$4,000,000	$6,000,000	$8,000,000	$6,000,000		Threat	$ 4,500,000	si 25Future ITS Requirements									0		0
26	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Innovative MOT Techniques	Cost	Innovative MOT techniques; Includes additional cost for innovative techniques such as moveable barrier systems, performing traffic models during construction		0.75	75%	0.75	ci 26Innovative MOT T	$1,000,000	$2,000,000	$4,000,000	$2,000,000		Threat	$ 1,500,000	si 26Innovative MOT Techniques									0		0
27	Active	Independent	Prob<1	CN+CE+CO	Phase 1	CN+CE+CO-Phase	Full Traffic Closures during Construction	Cost/ Schedule	Reconsider full closure options on interstate during construction; potentially leads to decrease cost and accelerated schedule; possible increase in user delay costs		0.25	25%	0.25	ci 27Full Traffic Closu	$13,000,000	$32,000,000	$52,000,000	$32,000,000		Opportunity	$ (8,000,000)	si 27Full Traffic Closu	6	9	12	9	Opportunity				-2.25		-2.25
28	Active	Independent	Prob<1	CN+CE+CO	Phase 2	CN+CE+CO-Phase	Full Traffic Closures during Construction	Cost/ Schedule	Reconsider full closure options on interstate during construction; potentially leads to decrease cost and accelerated schedule; possible increase in user delay costs		0.50	50%	0.5	ci 28Full Traffic Closu	$5,500,000	$13,000,000	$22,000,000	$13,000,000		Opportunity	$ (6,500,000)	si 28Full Traffic Closu	6	9	12	9	Opportunity				-4.5		-4.5
29	Active	Independent	Prob<1	CN+CE+CO	Phase 3	CN+CE+CO-Phase	Full Traffic Closures during Construction	Cost/ Schedule	Reconsider full closure options on interstate during construction; potentially leads to decrease cost and accelerated schedule; possible increase in user delay costs		0.50	50%	0.5	ci 29Full Traffic Closu	$14,000,000	$35,000,000	$56,000,000	$35,000,000		Opportunity	$ (17,500,000)	si 29Full Traffic Closu	6	9	12	9	Opportunity				-4.5		-4.5
	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Contaminated Soils	Cost	Contaminated soils may be encountered at various locations throughout the project		0.50	50%	0.5	ci Contaminated Soils	$0	$13,000,000	$26,000,000	$13,000,000		Threat	$ 6,500,000	si Contaminated Soils											
	Active	Independent	Prob<1	CN+CE+CO	Phase 1	CN+CE+CO-Phase	Reduction in Auxillary Lanes	Cost	Reevalatue the traffic data to look at reduction in the number of Auxiallary Lanes		0.80	80%	0.8	ci Reduction in Auxilla	$10,000,000	$17,000,000	$20,000,000	$17,000,000		Opportunity	$ (13,600,000)	si Reduction in Auxillary Lanes											
	Active	Independent	Prob<1	CN+CE+CO	Phase 1	CN+CE+CO-Phase	Reduction in Service Lanes	Cost	Reduction in Service Road Connections in the M10 area		0.25	25%	0.25	ci Reduction in Servic	$30,000,000	$59,000,000	$70,000,000	$59,000,000		Opportunity	$ (14,750,000)	si Reduction in Service Lanes											
	Active	Independent	Prob<1	CN+CE+CO	Phase 1	CN+CE+CO-Phase	Reduction in Cost for railroad brideges	Cost	Possibility of using ABC construction techniques		0.30	30%	0.3	ci Reduction in Cost fo	$30,000,000	$35,000,000	$40,000,000	$35,000,000		Opportunity	$ (10,500,000)	si Reduction in Cost for railroad brideges											
	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Change in retaining wall type	Cost	Change in retaining wall type for certain areas where right of way will be an issue.		0.70	70%	0.7	ci Change in retaining	$10,000,000	$20,000,000	$30,000,000	$20,000,000		Threat	$ 14,000,000	si Change in retaining wall type											
	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	100 Yr Bridge life goal	Cost	The goal of the project is to update the bridges in the project to a service life of 100 years.		0.70	70%	0.7	ci 100 Yr Bridge life go	$10,000,000	$22,000,000	$35,000,000	$22,000,000		Threat	$ 15,400,000	si 100 Yr Bridge life goal											
	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Increase in traffic control needs	Cost	Traffic Control Cost increases to maintain traffic		0.80	80%	0.8	ci Increase in traffic co	$20,000,000	$30,000,000	$40,000,000	$30,000,000		Threat	$ 24,000,000	si Increase in traffic control needs											
	Active	Independent	Prob<1	CN+CE+CO	Phase 3	CN+CE+CO-Phase	Reduced shoulder on M10	Cost			0.90	90%	0.9	ci Reduced shoulder o	$10,000,000	$15,000,000	$20,000,000	$15,000,000		Opportunity	$ (13,500,000)	si Reduced shoulder on M10											
30	Active	Independent	Prob<1	CN+CE+CO	Projectwide	CN+CE+CO-Proje	Lower Mobilization Cost	Cost	Lower mobilization costs; typically mobilization cost estimated at 10% of construction costs		0.35	35%	0.35	ci 30Lower Mobilizati	0	0	$44,000,000	$0		Opportunity	$ -	si 30Lower Mobilization Cost									0		0

Attachment C

Risk Reg Lookup	Functional Assignment	Phase	Project Costs: Base (Market Cond)	Risks	Total	Project Schedule (Mo): Start	Base	Risks	Total	Projected End	Point	Mid-Point Duration (Mo)	Mid-Point Date	Begin Inflation Date	Inflation: Duration (Mo)	Duration (yrs)	Factor	$ 2,700,563,248 YOE
PE-Advanced	PE	Advanced Bridges	$ 26,936,107	$ -	$ 26,936,107	1/1/2014	60.8	0.00	60.8	12/31/2018	0.5	30	7/14/2016	10/2/2013	33.4	2.8	108.6%	$ 29,251,685
ROW+UT-	ROW+UT	Advanced Bridges	$ 27,130,553	$ -	$ 27,130,553	1/1/2014	48.7	0.00	48.7	12/31/2017	0.5	24	1/11/2016	10/2/2013	27.3	2.3	107.0%	$ 29,021,917
CN+CE+CO-	CN+CE+CO	Advanced Bridges	$ 99,253,406	$ -	$ 99,253,406	1/1/2017	36.5	0.00	36.5	12/31/2019	0.5	18	7/9/2018	10/2/2013	57.3	4.8	115.2%	$ 114,294,436
PE-Phase 1	PE	Phase 1	$ 62,265,256	$ -	$ 62,265,256	1/1/2018	97.4	0.00	97.4	12/31/2025	0.5	49	1/20/2022	10/2/2013	99.7	8.3	127.8%	$ 79,589,808
ROW+UT-Phase 1	ROW+UT	Phase 1	$ 48,007,050	$ 4,425,000	$ 52,432,050	1/1/2022	24.3	0.00	24.3	12/30/2023	0.5	12	1/5/2023	10/2/2013	111.2	9.3	131.5%	$ 68,946,276
CN+CE+CO-Phase 1	CN+CE+CO	Phase 1	$ 553,409,244	$ (46,850,000)	$ 506,559,244	1/1/2021	60.8	-2.25	58.6	10/24/2025	0.5	29	6/10/2023	10/2/2013	116.3	9.7	133.2%	$ 674,645,312
PE-Phase 2	PE	Phase 2	$ 28,242,316	$ -	$ 28,242,316	1/1/2025	60.8	0.00	60.8	12/31/2029	0.5	30	7/15/2027	10/2/2013	165.5	13.8	150.3%	$ 42,454,707
ROW+UT-Phase 2	ROW+UT	Phase 2	$ 11,874,707	$ -	$ 11,874,707	1/1/2025	12.1	0.00	12.1	12/31/2025	0.5	6	7/4/2025	10/2/2013	141.2	11.8	141.6%	$ 16,810,761
CN+CE+CO-Phase 2	CN+CE+CO	Phase 2	$ 285,017,413	$ (6,500,000)	$ 278,517,413	1/1/2027	36.5	-4.50	32.0	8/18/2029	0.5	16	5/1/2028	10/2/2013	175.1	14.6	153.9%	$ 428,654,619
PE-Phase 3	PE	Phase 3	$ 44,377,930	$ -	$ 44,377,930	1/1/2029	36.5	0.00	36.5	12/31/2031	0.5	18	7/9/2030	10/2/2013	201.4	16.8	164.2%	$ 72,860,711
ROW+UT-Phase 3	ROW+UT	Phase 3	$ 26,153,227	$ 1,425,000	$ 27,578,227	1/1/2029	24.3	0.00	24.3	12/31/2030	0.5	12	1/5/2030	10/2/2013	195.3	16.3	161.7%	$ 44,600,620
CN+CE+CO-Phase 3	CN+CE+CO	Phase 3	$ 536,332,792	$ (55,785,000)	$ 480,547,792	1/1/2030	85.2	-4.50	80.7	8/18/2036	0.5	40	5/12/2033	10/2/2013	235.5	19.6	178.6%	$ 858,086,679
PE-Projectwide	PE	Projectwide		$ -	$ -	1/1/2014	219.1	0.00	219.1	12/31/2031	0.5	110	2/15/2023	10/2/2013	112.5	9.4	131.9%	$ -
ROW+UT-	ROW+UT	Projectwide		$ -	$ -	1/1/2014	206.9	0.00	206.9	12/31/2030	0.5	103	8/14/2022	10/2/2013	106.5	8.9	130.0%	$ -
CN+CE+CO-	CN+CE+CO	Projectwide		$ 163,359,250	$ 163,359,250	1/1/2017	239.0	0.0	239.0	8/18/2036	0.5	119	12/14/2026	10/2/2013	158.5	13.2	147.7%	$ 241,345,718
		Total	$ 1,749,000,000	$ 60,074,250	$ 1,809,074,250					8/18/2036								

Prior Costs	$ 22,435,222.00
Fixed Costs	$ -
Base Costs (CY) - no prior costs	$ 1,749,000,000
Risks (Threats/Opps)	$ 60,074,250
Total Project Costs (CY)	$ 1,831,509,472
Total Project Costs (YOE)	$ 2,722,998,470
Inflation	$ 891,488,998
Project Completion Date	8/18/2036

Functional Assignment

Year	PE: Annual Inflation	PE: Cumulative Factor	ROW+UT: Annual Inflation	ROW+UT: Cumulative Factor	CN+CE+CO: Annual Inflation	CN+CE+CO: Cumulative Factor
2013	3.00%	100.75%	3.00%	100.75%	3.00%	100.75%
2014	3.00%	103.77%	3.00%	103.77%	3.00%	103.77%
2015	3.00%	106.88%	3.00%	106.88%	3.00%	106.88%
2016	3.00%	110.09%	3.00%	110.09%	3.00%	110.09%
2017	3.00%	113.39%	3.00%	113.39%	3.00%	113.39%
2018	3.00%	116.79%	3.00%	116.79%	3.00%	116.79%
2019	3.00%	120.30%	3.00%	120.30%	3.00%	120.30%
2020	3.00%	123.91%	3.00%	123.91%	3.00%	123.91%
2021	3.00%	127.62%	3.00%	127.62%	3.00%	127.62%
2022	3.00%	131.45%	3.00%	131.45%	3.00%	131.45%
2023	3.00%	135.40%	3.00%	135.40%	3.00%	135.40%
2024	3.00%	139.46%	3.00%	139.46%	3.00%	139.46%
2025	3.00%	143.64%	3.00%	143.64%	3.00%	143.64%
2026	3.00%	147.95%	3.00%	147.95%	3.00%	147.95%
2027	3.00%	152.39%	3.00%	152.39%	3.00%	152.39%
2028	3.00%	156.96%	3.00%	156.96%	3.00%	156.96%
2029	3.00%	161.67%	3.00%	161.67%	3.00%	161.67%
2030	3.00%	166.52%	3.00%	166.52%	3.00%	166.52%
2031	3.00%	171.52%	3.00%	171.52%	3.00%	171.52%
2032	3.00%	176.66%	3.00%	176.66%	3.00%	176.66%
2033	3.00%	181.96%	3.00%	181.96%	3.00%	181.96%
2034	3.00%	187.42%	3.00%	187.42%	3.00%	187.42%
2035	3.00%	193.04%	3.00%	193.04%	3.00%	193.04%
2036	3.00%	198.83%	3.00%	198.83%	3.00%	198.83%
2037	3.00%	204.80%	3.00%	204.80%	3.00%	204.80%

Attachment D

COST ESTIMATE REVIEW II FOR I-94 REHABILITATION PROJECT

Date: November 18 - 20, 2013
MDOT Horatio S. Earl Learning Center
Lake Superior Room

Monday, November 18, 2013

12:30-12:45	Introductions, CER Introduction by FHWA
12:45-1:15	Project Overview Review Project Scope, Current Status, Planned Construction Schedule and Phasing
1:15-1:45	Estimating Process, Overall Project Threats and Opportunities
1:45-2:15	Market Conditions
2:15-2:30	Soft Costs (administrative, inflation, allowances), Excluded Costs
2:30-3:00	Contingency/Risk Register Item
3:00-3:30	ROW
3:30-4:00	Roadway Drainage and Erosion Control

Tuesday, November 19, 2013

8:00-9:00	Utilities, Lighting, Pump Stations
9:00-9:30	Environmental Commitments, Enhancements, Noise Barriers
9:30 -10:30	Pavement and Structures, Construction
10:30-Lunch	Contingencies, Engineering, Administration, Mobilization
1:00-1:30	Geotechnical and Retaining Walls
1:30-2:30	Traffic and Safety, Construction Signing and Traffic Control
2:30 -3:30	Financial Plans, Phasing Costs, Escalation
3:30 -4:00	Prepare Draft Presentation and Report Findings

Wednesday, November 20, 2013

9:00-12:00	Closeout Presentation

I-94 Edsel Ford Freeway Rehabilitation Project

Detroit, Michigan

FHWA Cost Estimate Review

April 2011

Final Report

MDOT
Michigan Department of Transportation

DEPARTMENT OF TRANSPORTATION
UNITED STATES OF AMERICA

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EXECUTIVE SUMMARY

The Federal Highway Administration (FHWA), the Michigan Department of Transportation (MDOT), and their consultants conducted a workshop to review the cost estimate for the I-94 Edsel Ford Freeway Rehabilitation Project. The workshop was held at the Lansing Transportation Service Center in Lansing, Michigan on April 26-29, 2011. The closeout presentation was conducted via webinar on May 4, 2011. The objective of the review was to verify the accuracy and reasonableness of the current project total cost estimate and schedule and to develop a probability range for the cost estimate that represents the project's current stage of development. Significant results of the review are as follows:

The MDOT pre-review estimate for the project was $2.635 billion Year of Expenditure (YOE) dollars. The anticipated completion date was State fiscal year 2032.

Approximately $212 million in net adjustments were made to the estimate during the week of the review. The modifications included increases to the allowances for mobilization, construction engineering and preliminary engineering, as well as additional line items for early completion incentives, public information activities during construction, and contingencies allocated for structures and utility items.

Several good practices were identified during the review by the team including:

- Detailed estimate for level of design
    - Development of Detailed Engineering Report
- MDOT Specification & Estimate Unit review of estimates for quality control
- Estimate was updated in Year of Obligation dollars
- Use of conservative unit costs & contingency
- Project team and subject matter experts were familiar with project
- Use of preliminary Value Engineering (VE) Studies
- Incorporation of many Accelerated Construction Technology Transfer (ACTT) workshop recommendations

During the week of the review over 25 cost and schedule risk events were identified and quantified for the project by the team. Consequently, $360 million in contingency (35% of construction costs) was removed from the base estimate and redistributed in the probabilistic and risk-based analysis. Based on this risk assessment the range of total project costs varies between $1.906 billion and $3.064 billion YOE dollars. The 70%

level of confidence requires a budget of $2.840 billion YOE. This is the required baseline cost to be used in the major project financial plan to show adequate project funding.

The following recommendations are provided based on this review:

- Update estimates to reflect estimate changes made during review
- Revise estimate contingency to reflect risks and unknowns identified during review
- Consider innovative finance techniques
    - Advance total project construction
    - Bundle contracts to reduce user impacts and reduce costs
- Continue coordination with railroads to minimize or eliminate temporary runarounds
- Reconsider full mainline closures to reduce cost and shorten length of user impacts
- Establish procedures for risk-based estimation, especially for major projects
- Develop a plan to manage risks and opportunities
    - Continue updating estimate based on risk management
    - Maintain a risk register
- Consider the use of a Management Reserve after contract award

CHAPTER 1 – REVIEW PROCESS

REVIEW OBJECTIVE

The objective of the FHWA cost estimate review for the I-94 Edsel Ford Freeway Rehabilitation Project in Detroit, Michigan is to:

- Conduct an unbiased, risk-based evaluation to verify the accuracy and reasonableness of the current total cost and schedule estimates
- Develop a probability range for the cost and schedule estimate that represents the project's current stage of design.

BASIS OF REVIEW

The "Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users" (SAFETEA-LU) requires the financial plan for all Federal-aid projects with an estimated total cost of $500 million or more to be approved by the Secretary (i.e. FHWA) based on reasonable assumptions. The $500 million threshold includes all project costs, such as engineering, construction, right-of-way, utilities, construction engineering, and inflation. The FHWA has interpreted 'reasonable assumptions' to be a risk based analysis. The cost estimate review provides the risk based assessment and is used in the approval of the financial plan.

This is an independent review, but does not use an independent FHWA estimate. The review team used an estimate provided in a spreadsheet by MDOT as the base.

REVIEW TEAM

The Review Team included individuals with a strong knowledge of the Project and/or of major project work, including discipline experts. Individuals with specific project expertise briefed the Team regarding technical details and the estimate development process. The Team discussed the critical components and assumptions of the estimate, as well as the consistency in estimate development across all project segments.

Quantities and unit costs were reviewed and verified with the discipline experts. Finally, they considered variability and risks which could affect various segments of the project.

The Review Team was comprised of the following members:

- FHWA
    - Division Office
    - Headquarters Project Delivery Team
    - Resource Center
- MDOT
- Consultants – CH2M-Hill

The agenda and attendance sheet are provided in Appendices D and E.

DOCUMENTS REVIEWED

Documents reviewed prior to and during the workshop included:

- Project Cost Estimate
- Project Schedule
- Project Risks
- Draft Initial Financial Plan
- Draft Project Management Plan
- Accelerated Construction Technology Transfer (ACTT) Workshop Report (April 2007)
- I-94 Detailed Engineering Report – Opinion of Probable Cost (June 2010)

REVIEW METHODOLOGY

During the study, the FHWA staff participated in discussions to gain a better understanding of the project and its risks. The following general steps were followed:

- Verify Base Estimate
  - Understand project scope and the estimate development process
  - Discuss assumptions for contingencies and projected inflation rates
  - Review major cost elements
  - Identify Threats and Opportunities for various items (Risks)
- Consider Variation of Inputs
  - Develop market condition range for major cost elements
  - Model variation of inflation
  - Determine probability of occurrence and schedule and cost impacts for significant project threats and opportunities
  - Develop probability assumption distributions
- Perform Monte Carlo simulation to model variability and risk and generate likely range of project cost and schedule

The following discussion provides more detail about the concepts utilized during the review.

Verify Accuracy of Cost Estimate

The Review Team was provided an overview of the State's estimating process. This overview included understanding the scope of the project, stage of design and current cost estimating process used by the State. The overview also included a review of

project documents. The Review Team interviewed the subject matter experts and verified the accuracy of the State's estimate for both quantity and unit cost for each major cost element. Where changes were needed these changes were recorded and the estimate updated. Additions or deletions were also recorded and the state's estimate updated to reflect the change. Following the completion of the on-site review, any additional changes or corrections to the estimate were confirmed with the State.

Model Uncertainties

In general, uncertainties in the state's estimate can be described as those relating to base variability, cost and schedule risk events, and market risks. Each of these were discussed and modeled to reflect the total uncertainty associated with the state's estimate.

The Review Team discussed the uncertainties associated with Market Conditions at the time of letting. There is a strong relationship between the number of bidders and the cost of a project at the time of letting. Market condition is a measure of uncertainty that reflects the overall competitive bidding environment at the time of letting. Material and labor availability also affect market conditions. Market condition is applied to the base estimate using a binomial estimate of probability for better than planned and worse than planned bidding environments.

Base variability is a measure of uncertainty in a cost estimate and represents unknown-unknowns (i.e. estimate items that have not been thought of) and is typically represented using a symmetrical distribution about the base estimate.

The Review Team interviewed the State to define the components of contingency and establish the risk register for both cost and schedule risks. The risk register includes the event risk name, a description of the event, a probability measure of the likelihood the event will occur, as well as a probability distribution of costs if the event were to occur. The register also identifies if the risk event is a threat or opportunity for cost/schedule. Risk threats increase costs/schedule and opportunities decrease cost/schedule. A very important feature of the risk register is to establish the relationship of risk events. For example, some risks are mutually inclusive or mutually exclusive. Mutually inclusive means the risk event can only occur if the prior risk event occurs. Conversely, for a risk event to be mutually exclusive means that it can only occur if the prior risk event does not occur. Risk events can also be independent in which case the probability of occurrence is not dependent on any other risk event. Correlation determines how one risk event will sample relative to another risk event. Correlation should only be established when there is reason to suspect that a relationship exists and needs to be accounted for in the simulation.

After models were developed for market conditions, base variability, and risk events the Review Team utilized the Monte Carlo simulation to generate a probability based estimate of YOE Total Project Costs. A simulation is essentially a rigorous extension of a “what-if” or sensitivity analysis that uses randomly selected sets of values from the probability distributions representing uncertainty to calculate separate and discrete results. A single iteration within a simulation is the process of sampling from all input distributions and performing a single calculation to produce a deterministic result. It is important that each iteration represent a scenario, or outcome, that is possible. It is for this reason that the simulation outcomes be reviewed to ensure accuracy. The process of sampling from a probability distribution is repeated until the specified number of computer iterations is completed or until the simulation process converges. Simulation convergence is that point at which additional iterations do not significantly change the shape of the output distribution. The results of the simulation are arrayed in the form of a distribution covering all possible outcomes. The key benefit of this process is that probability is associated with costs.

Communicate Results

The last part of the review is to communicate the results. This is accomplished by providing a closeout presentation and final report to both State and FHWA Division leaders. At the end of the review the Review Team provides a closeout presentation that summarizes the review findings. The presentation identifies the review objectives and agenda, discusses the methodology, and highlights the results of the review including the pre/post workshop estimate results and identifies any estimate adjustments made during the review. The closeout presentation also identifies any significant cost and schedule risks, and provides a brief overview of recommendations by the Review Team. The closeout presentation for this review was given on May 4, 2011 via webinar. The presentation is included in Appendix B.

It is important that everyone understand that the estimate review is a snapshot in time of the estimate. As the project continues to develop, it is expected that the estimate will change and be updated. Following the review if errors or omissions are identified and confirmed with the State these modifications will be incorporated into the final report.

The final report communicates all findings of the review to the State and Division and serves as the official document for the cost estimate review. As noted earlier the review results are used in the approval of the financial plan. Cost estimate review reports are maintained by the FHWA Project Delivery Team in Washington DC.

CHAPTER 2 – REVIEW SUMMARY

PROJECT BACKGROUND

Scope
The I-94 Edsel Ford Freeway Rehabilitation project will reconstruct 6.7 miles of I-94 in the City of Detroit. The limits of the project begin east of the I-94/I-96 interchange and ends east of Conner Avenue. The scope includes widening of I-94 from three to four lanes in each direction, reconstruction of two system interchanges (I-94/M-10 and I-94/I-75), removal and/or replacement of 67 vehicle, pedestrian, and/or railroad bridges, reconstruction of various partial and full-service interchanges, and construction of continuous service drives along the corridor and through the interchanges.

Purpose and Need
As outlined in the project's 2004 Final Environmental Impact Statement (FEIS), the purpose of the I-94 Edsel Ford Freeway Rehabilitation Project is "the improvement of the condition and capacity of the existing I-94 roadway and interchanges."

The planned improvements will allow this I-94 corridor to continue to fulfill intended functions of providing for the national and civil defense, and meeting the needs of local and interstate commerce. Deficiencies discussed in the environmental document include:

- A lack of capacity indicated by frequent congestion with stop-and-go conditions;
- Safety issues (above average crash rates) related to the lack of ramps, inadequate length of ramps, and the lack of adequate acceleration-deceleration lanes for merging and weaving traffic;
- Poor local traffic circulation due to the lack of continuous service drives;
- Aging bridge and pavement conditions;
- Limited accommodation of pedestrians and bicyclists; and
- Outdated design including the M-10/I-94 interchange having left- and right-hand on-ramps and off-ramps.

Project Segments
The overall project has been divided into four segments:

Advanced Bridges – This segment includes the reconstruction or replacement of 10 bridges along the corridor that have been identified based on prioritization of state of good repair and critical need. This segment is scheduled to begin in 2012.

Segment 3 – East of I-96 to Cass Avenue – This segment includes 3.8 miles of construction. The construction for this segment will begin in 2018.

Segment 2 – Cass Avenue to Chene Street – This 1.5 mile long design section includes the I-75 Interchange reconstruction. Construction is scheduled to begin in 2023.

Segment 1 – Chene Street to East of Conner Ave - This segment is 1.5 miles long and includes reconstruction of the M-10 Interchange. Construction of this segment begins 2027.

A map of the project is shown in Figure 1.

Figure 1 Map of the I-94 Edsel Ford Freeway Rehabilitation Project

Schedule
The Final EIS was signed in December 2004 and the Record of Decision was signed in December 2005. MDOT intends to begin construction in summer 2012. The entire project is anticipated to be completed in summer 2032.

REVIEW FINDINGS

During the review, the team found many examples of good estimating practices including:

- Detailed estimate for level of design
    - Development of Detailed Engineering Report
- MDOT Specification & Estimate Unit review of estimates for quality control
- Estimate was updated in Year of Obligation dollars
- Use of conservative unit costs & contingency
- Project team and subject matter experts were familiar with project
- Use of preliminary Value Engineering (VE) Studies
- Incorporation of many Accelerated Construction Technology Transfer (ACTT) workshop recommendations

ESTIMATE

The MDOT pre-review estimate for the project was $2.635 billion Year of Expenditure (YOE) dollars. The cost in 2010 dollars was $1.766 billion. It should be noted that these cost include $20.5 million that have already been incurred for the project during the planning, environmental, and early preliminary engineering phases.

During the review, revisions were made to the pre-review estimate. The sum of these changes increased the base estimate by $212 million in 2011 dollars. Details of all changes can be seen by comparing the pre- and post review cost estimate spreadsheets. Revisions included the following modifications.

- Eliminated or Reduced Roadway & Structures Contingencies
    - Added 10% Bridge Allocated Contingency - $46 million
    - Added 35% Utility Allocated Contingency - $12 million
- Updated Metro Pavement Section - ($9 million)
- Added Early Completion Incentives - $25 million

- Added Construction Public Information - $ 30 million
- Increased Mobilization from 5% to 10% - $50 million
- Decreased Program Management and Administration from 3% to 0% - ($ 43 million)
  - Distributed in Preliminary Engineering and Construction Engineering line items
- Increased Preliminary Engineering from 7% to 9.5% - $39 million
  - Includes additional 1% for overall program management
- Increased Construction Engineering from 7% to 11% - $62 million
  - Includes additional 1% for overall program management

It should be noted that an additional $360 million in contingency (35% of construction costs) was removed from the base estimate and redistributed as part of the probabilistic and risk-based analysis that is discussed in Chapter 3.

REVIEW RECOMMENDATIONS

- Update estimates to reflect estimate changes made during review
- Revise estimate contingency to reflect risks and unknowns identified during review
- Consider innovative finance techniques
  - Advance total project construction
  - Bundle contracts to reduce user impacts and reduce costs
- Continue coordination with railroads to minimize or eliminate temporary runarounds
- Reconsider full mainline closures to reduce cost and shorten length of user impacts
- Establish procedures for risk-based estimation, especially for major projects
- Develop a plan to manage risks and opportunities
  - Continue updating estimate based on risk management
  - Maintain a risk register

- Consider the use of a Management Reserve after contract award

CHAPTER 3 – RISK ANALYSIS

Cost estimates, especially those for Major Projects, usually contain a degree of uncertainty due to unknowns and risks associated with the level of detail design completion. For this reason, it is logical to use a probabilistic approach and express the estimate as a range rather than a point value. During the cost estimate review, uncertainties in the project estimate such as base variability, inflation, market conditions, and risk events were modeled by the Team to reflect the opinions of the subject matter experts interviewed. The Team used the Monte-Carlo simulation to incorporate the uncertainties into forecast curves that represents a range of costs and completion dates for the Project.

FORECAST RESULTS FOR TOTAL PROJECT COSTS

Figure 2 shows the results of the simulation for the Project. The figure depicts the forecast curve for the Total Project Cost in the YOE dollars. These costs include construction, design/engineering, construction engineering, right-of-way, inflation, and allowances. The probable range of total project cost is shown by the blue shaded area, with the 70% level of confidence estimate at $2.840 billion. Alternatively, these results predict a 30% probability that total project costs will exceed this value based on the underlying variation within the estimate.

Figure 2 – Probable range of Total Project Costs

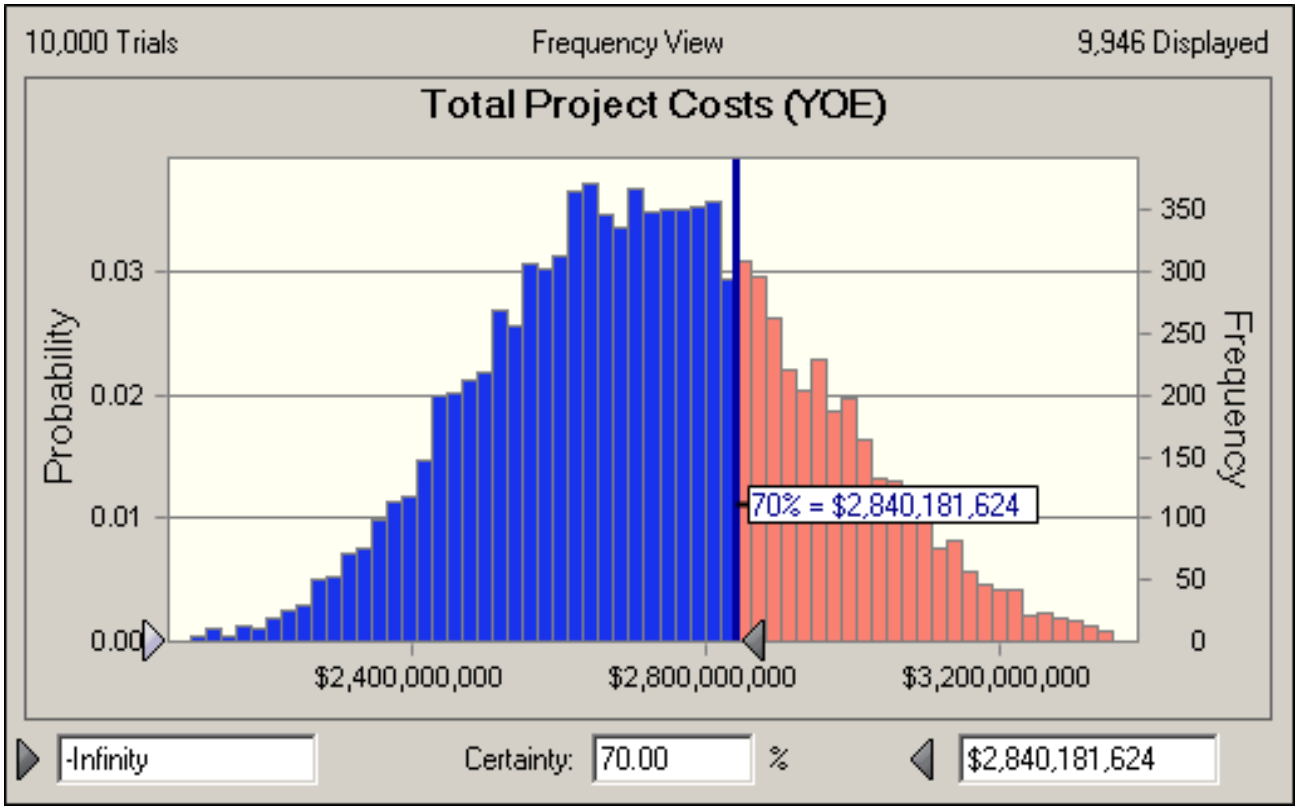

Table 1 demonstrates that the project cost range from $1.906 billion to $3.642 billion. The lower and higher ends of the variance are unlikely. The higher end at 100% reflects an occurrence where all significant risks will be realized, including those with a relatively low likelihood. This wide range of variation is due to the early design stage for the project. As design progresses closer to final design, this range should become narrower. The 70% estimate is greater than the pre-review base value of $2.635 billion by approximately 6% and the pre-review estimate is close to the 35% confidence level as seen from Table 1. It is highly recommended this range of costs be presented in any project information to provide the public with the sense of variability and uncertainty.

Table 1 Percentile Rankings of Total Project Costs in YOE Dollars.

Percentile	Forecast values
0%	$1,906,451,942
10%	$2,442,330,443
20%	$2,533,928,218
30%	$2,604,005,068
40%	$2,660,546,649
50%	$2,720,302,891
60%	$2,778,484,549
70%	$2,840,181,624
80%	$2,914,154,416
90%	$3,016,240,472
100%	$3,641,683,347

FORECAST RESULTS FOR PROJECT COMPLETION DATE

Figure 3 shows the forecast curve for the date of project completion. Based on a schedule base variability of +/- 10% and identified schedule risks, Figure 3 shows that there is a 70 percent probability that the project will be completed prior to April 2033. The figure also indicates a 30 percent probability of exceeding this date. The project schedule is mostly driven by funding availability. It should be noted that the schedule could be dramatically shortened should more funding become available in early years.

Advanced funding scenarios were not modeled. Table 2 displays the percentile rankings for the project completion date forecast. These results are only for informational purposes and are not required to be reported in the project's financial plan.

Figure 3 - Probable range of Total Schedule

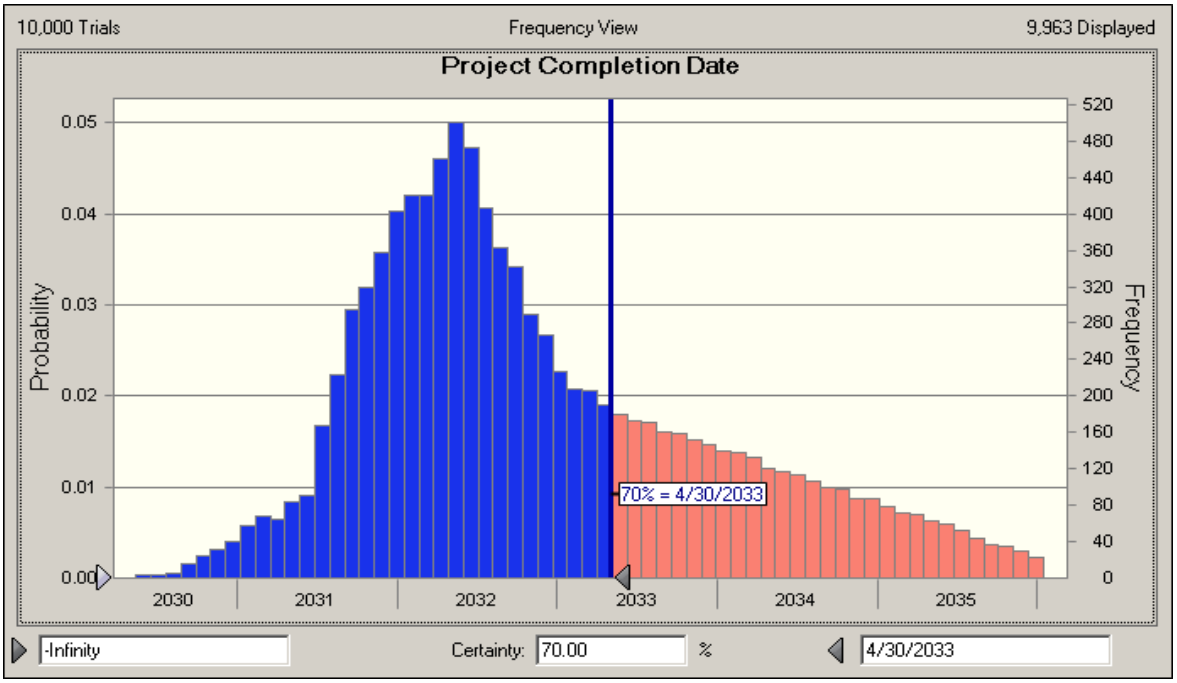

Table 2 – Percentile ranking of Total Project Schedule Completion Dates

Percentile	Forecast Values
0%	5/15/2030
10%	9/16/2031
20%	12/26/2031
30%	3/16/2032
40%	5/26/2032
50%	8/12/2032
60%	11/24/2032
70%	4/30/2033
80%	11/20/2033
90%	8/12/2034
100%	5/14/2036

PROBABILITY ASSUMPTIONS

The assumptions discussed below describe how the Team modeled the risk events, base variability, inflation, and market conditions that served as inputs for the results shown in the previous section of the report. As discussed in Chapter 1, the Monte Carlo analysis selects random inputs from these distributions to determine discrete values for a given number of iterations. The model runs the simulation through 10,000 iterations and ranks the results to determine the likely range of cost and schedule for the project.

Risk - Threats and Opportunities

The purpose of the risk register is to identify significant cost and schedule risks in the estimate. In a traditional cost estimate, risks are often accounted for using estimates of contingency. The Review Team identified that 35% of construction cost ($360 million) had been designated as contingency in the pre-review base estimate to account for the level of design as recommended by the Association for the Advancement of Cost Estimating International (AACEI). During the review subject matter experts were interviewed to break out the components of contingency as explicit risk events into a risk register. The risk events for cost and schedule are identified in Tables 3, 4, and 5.

The team identified and discussed risks to the project in terms of threats and opportunities. For purposes of this review, a threat is a risk event that can add to the cost and/or schedule of the project and an opportunity is an event that can reduce the cost and/or accelerate the schedule.

These risks were described and quantified in a risk register during the review. For example, the team identified that there is a possible opportunity related to the final agreements with the railroad companies along the corridor in Segment 1. Based on a final agreement, potentially no shoofly or runaround will be needed to accommodate railroad operations during construction. The realization of this opportunity will lead to a decrease in the construction cost associated with the temporary bridge structure. The team identified a 30% likelihood that the opportunity could occur. Additionally, if the risk event occurred there would be a most likely savings of $40.5 million and a minimum and maximum savings of $35 million and $45 million, respectively.

The risk events were also categorized as either a global risk or a segment specific risk. Global risks are those risks that are not specific to one segment of the project and occur throughout the 20-year duration of the project's construction. In addition to specific project risks that were identified, the Team also modeled risks to account for unidentified and aggregate minor risks. To model unidentified risk, the team considered the characteristics and complexity of this project and estimated the possibility of additional risk (unknown-unknowns) that are typical in similar projects. To capture the impact of aggregate minor or less significant risks to the project, the team considered less costly risks that had been identified during the review. This included risks associated with surplus/excess property, vibration mitigation, and cultural environment enhancements and/or mitigation.

Table 3 Cost Threats

Segment	Functional Assignment	Event Risk Name	Detailed Description of Risk Event	Probability	Min Cost	Most Likely Cost	Max Cost
1	CN+UT	Additional pedestrian bridge	Additional pedestrian bridge may be necessitated by development in area	0.3	$3.7 M	$3.7 M	$10 M
1	ROW	Additional ROW for RR	Additional ROW to accommodate temporary tracks	0.95	$0.9 M	$1.5 M	$2.5 M
1	CN+UT	Innovative bridge construction	Potential to decrease time to construct bridges, may be additional cost due to technology and ROW for offsite construction	0.3	$5 M	$10 M	$15 M
3	ROW	Damages to ROW	Impacts to existing buildings and parking areas and provide access during construction	0.75	$1 M	$4 M	$15 M
3	ROW	Additional ROW for RR in Segment 3	Additional ROW to accommodate temporary tracks; includes cost for both RRs in Segment 3	0.95	$0.9 M	$1.5 M	$2.5 M
Global	CN+UT	Unidentified Risks	Threats not identified	0.65	$45 M	$56 M	$68 M
Global	CN+UT	Aggregate Minor	Threats aggregate minor	0.65	$18 M	$22.6 M	$27 M
Global	CN+UT	Additional noise walls	Modifications to noise wall quantities may be necessary	0.8	$0	$2.5 M	$5 M
Global	CN+UT	Skills Training	Community jobs training (RCAR)	1	$4 M	$5 M	$6 M
Global	CN+UT	Impacts to sanitary sewer	Final design/construction impacts necessitate replacement of sanitary sewer	0.6	$3 M	$5 M	$7 M
Global	CN+UT	Structures Contingency	Structures (bridges & walls) contingency to cover risks such as longer/additional piling, high strength piling, ground improvements due to poor soil, and/or increased steel prices	1	$70 M	$105 M	$134 M
Global	CN+UT	Larger drainage pipes/storage requirements	Additional storage capacity may be needed as final design progresses; cost for hydrodynamic separators	0.75	$4 M	$5 M	$6 M

Table 3 Cost Threats (con't)

Segment	Functional Assignment	Event Risk Name	Detailed Description of Risk Event	Probability	Min Cost	Most Likely Cost	Max Cost
Global	CN+UT	Pump Station Risk	Some pump stations may need to be replacement instead of refurbishment; estimate only assumes foundations 3 ft below pump station	0.35	$5 M	$7 M	$9 M
Global	CN+UT	Design of drainage for service roads	Drainage design along service roads may change as design of service road progresses	0.5	$2 M	$3 M	$5 M
Global	CN+UT	Damage to existing DWSD infrastructure	Potential damage during construction to the existing water and sewer system	0.35	$1 M	$2 M	$3 M
Global	CN+UT	Construction Contingency	Includes costs associated with overruns and change orders; may include risks such as construction accidents, vehicle accidents, electrical issues, security/safety issues; new construction methods such as secant pile walls	1	$0	$30 M	$70 M
Global	CN+UT	Slope Stability/ Global Stability	Impacts of replacing existing slopes with secant pile walls; current estimate based on older surveys	0.5	$0	$10 M	$36 M
Global	CN+UT	Unknown Soil conditions	Possibility of encountering hydrogen sulfide latent water	0.1	$1 M	$2 M	$3 M
Global	CN+UT	Foundation modifications due to Utility conflicts	Drill shafts may need to be used in some locations instead of drill shafts to avoid utilities (bridges & walls)	1	$15 M	$18 M	$25 M
Global	CN+UT	Pavement design for longer life cycles	Possible usage of enhanced pavement methods such as stabilized cement base, non-corrosive dowel bars to reduce maintenance requirements and user costs in the future	0.6	$4 M	$5.5 M	$7.5 M
Global	CN+UT	Additional ITS Requirements	Potential future ITS technologies	0.75	$2 M	$3 M	$4 M
Global	CN+UT	Innovative traffic control methods	Includes cost for innovative maintenance of traffic techniques (MOT) such as moveable barrier systems, traffic models performed during construction	0.75	$1 M	$2 M	$4 M

Table 4 Cost Opportunities

Segment	Functional Assignment	Event Risk Name	Detailed Description of Risk Event	Probability	Min Cost	Most Likely Cost	Max Cost
1	CN+UT	Railroad Bridges	Final agreement with railroads could provide decrease in cost; potentially no shoofly would be needed	0.3	$35 M	$40.5 M	$45 M
1	CN+UT	Full Traffic Closures during Construction	Reconsider full closure options on interstate during construction; potentially leads to decrease cost and accelerated schedule; possible increase in user delay costs	0.5	$14 M	$35 M	$56 M
2	CN+UT	Full Traffic Closures during Construction	Reconsider full closure options on interstate during construction; potentially leads to decrease cost and accelerated schedule; possible increase in user delay costs	0.5	$5.5 M	$13 M	$22 M
3	CN+UT	Full Traffic Closures during Construction	Reconsider full closure options on interstate during construction; potentially leads to decrease cost and accelerated schedule; possible increase in user delay costs	0.25	$13 M	$32 M	$52 M
Global	CN+UT	Unidentified Risks	Opportunities not identified	0.5	$9.8 M	$12 M	$14.7 M
Global	CN+UT	Aggregate Minor	Opportunity aggregate Minor	0.5	$4.9 M	$6 M	$7.4 M
Global	CN+UT	Value Engineering Change Proposals (VECP)	Opportunities in cost associated with VECPs during construction	0.5	$1 M	$2 M	$4 M
Global	CN+UT	Lower Mobilization Cost	Lower mobilization costs; typically mobilization cost estimated at 10% of construction costs	0.35	$0	$0	$44 M

Schedule Analysis

In the schedule analysis, only schedule risks were identified that may impact the critical path for the project. Due to the current packaging of the project into four segments and 26 construction contracts and significant float built into the 20-year schedule to accommodate funding constraints, the team was only able to identify a few risk events that could impact schedule. These risks are outlined in Table 5.

Table 5 Schedule Opportunities

Segment	Functional Assignment	Event Risk Name	Detailed Description of Risk Event	Probability	Min Schedule (mo)	Most Likely Schedule (mo)	Max Schedule (mo)
1	CN+UT	Full Traffic Closures during Construction	Reconsider full closure options on interstate during construction; potentially leads to decrease cost and accelerated schedule; possible increase in user delay costs	0.5	6	9	12
2	CN+UT	Full Traffic Closures during Construction	Reconsider full closure options on interstate during construction; potentially leads to decrease cost and accelerated schedule; possible increase in user delay costs	0.5	6	9	12
3	CN+UT	Full Traffic Closures during Construction	Reconsider full closure options on interstate during construction; potentially leads to decrease cost and accelerated schedule; possible increase in user delay costs	0.25	6	9	12

The team recognizes that the availability of funding will greatly affect the project's cost. Obtaining funding sooner will reduce inflation and possibly gain more favorable market pricing, while delays in funding will do the opposite. If the project is expected to create a significant benefit for Detroit metropolitan area and Michigan, MDOT and the Detroit Metropolitan Planning Organization (MPO) may want to investigate opportunities to advance construction and save on these costs. For example, consider:

- Packaging projects opportunities to combine contracts to optimize size and sequencing to enhance competition and more favorable pricing
- Use of contractor incentives and alternative contracting methods such as A+B bidding, Design-Build, and Construction Manager as General Contractor (CMCG)
- Consider opportunities for innovative financing such as bonding or credit assistance

Because of the current development stage of the project and duration of the project, the project team agreed that it would be beneficial to analyze the effects of the schedule delay on the cost estimate. It was determined that a one-year delay in the current project schedule would increase project cost by approximately $81 million due to inflation.

Base Variability

The project team determined the base variability for construction using a weighted average method. This was based on feedback from the project team and subject matter experts about the current level of design and estimating trends at MDOT. For example, for major project elements in which little design had been completed, a higher base variability was identified. The total variability was then weighted based on the cost of that element to the total construction cost of the project. The weighted base variability was determined to be +/- 16.53%. These details are shown below in Table 6.

The schedule, ROW, and PE base variability were determined to be +/- 10% based on discussions with subject matter experts.

Table 6 Base Variability

	Level of Design Detail	Cost by Group	Base Variability	Weighted Base Variability
1. Removal	15.00%	$7,723,359	10%	0.07%
2. Earthwork	15.00%	$13,574,678	10%	0.12%
3. Pavement and Base Materials	40.00%	$73,579,773	10%	0.67%
4. Drainage and Erosion Control	15.00%	$50,155,645	20%	0.91%
5. Structures	10.00%	$717,401,780	15%	9.73%
6. Traffic	10.00%	$145,632,318	25%	3.29%
7. Miscellaneous Construction	15.00%	$51,719,944	15%	0.70%
8. Utility Relocation	15.00%	$46,027,872	25%	1.04%
		$1,105,815,369		**16.53%**

Market Conditions

The assumptions for the construction and ROW market conditions are shown in Table 7. For example, based on information from the MDOT project team and subject matter experts, it was assumed for Segment 3 there is a 4% probability that market conditions would cause construction costs to be 10% better than planned. Conversely, it was a 24% probability that construction cost would be 10% worse than planned. Logic follows that the analysis also includes the 72% probability that cost will be as planned in the current estimate. These assumptions were largely based on the anticipated material and labor availability in the Detroit metropolitan area at the time of letting for each segment of the project. The team considered other transportation projects that should be ongoing at the time of letting and trends in market conditions over the last few years. The market conditions for ROW were based on discussions with subject matter experts about recent real estate trends in the Detroit area. ROW market conditions are shown in Table 8.

Table 7 Base Construction Cost Market Conditions

	Better than Planned		Worse than Planned	
	Probability	**Impact**	**Probability**	**Impact**
Advanced Bridges	6%	10%	24%	10%
Segment 3	4%	10%	28%	10%
Segment 2	12%	10%	20%	10%
Segment 1	12%	10%	20%	10%

Table 8 Base ROW Cost Market Conditions

	Better than Planned		Worse than Planned	
	Probability	**Impact**	**Probability**	**Impact**
Advanced Bridges	5%	10%	5%	10%
Segment 3	5%	10%	5%	10%
Segment 2	10%	10%	10%	10%
Segment 1	10%	10%	10%	10%

Inflation

The inflation rate used in the analysis for the project was based on historical trends in construction costs. Based on data from the Bureau of the Labor Statistics, MDOT policy for the 5-year work plan, and inflation rates used for other major projects, it was determined that the short term inflation should be 5% and inflation over longer periods such as 6-20 years should be 3%. Thus, an inflation rate of 5% was used for advanced bridges phase of the project with a range of 2.5% to 4%. The inflation for all ROW costs and construction costs in segments 1, 2, and 3 was modeled as 3% with a range of 0% to 5.5%.

CONCLUSION

This probabilistic analysis resulted in a cost estimate at the 70% confidence level of $2.840 billion (YOE) for the I-94 Edsel Ford Freeway Rehabilitation Project. The 70%

confidence level is also the minimum amount of funding that must be shown for the approval of the initial Financial Plan. Any changes made to the cost estimate after the cost estimate review should be outlined in the initial Financial Plan. It is highly recommended that these costs be used in any project information conveyed to the public. Appendix C includes the entire report of inputs and results of this probability analysis.

APPENDICES

A – Cost Estimate Review Opening Presentation

MI I-94 Edsel Ford Opening Presentatior

B – Cost Estimate Review Closing Presentation

MI I-94 Edsel Ford Closing Presentation.

C – Crystal Ball Probability Analysis

MI I-94 CER CB Report.pdf

D – Cost Estimate Review Agenda

I-94 CER Agenda.pdf

E – Cost Estimate Review Sign-In Sheets

MI I-94 CER Sign-In Sheet.pdf

I-94 Ford Freeway Modernization Project Initial Financial Plan

INFLATED BASE YEAR COSTS, by State Fiscal Year

Combined Segments

Cost Start Year 2010
IFP Preparation SFY 2014
Current Fiscal Year 2014

Major Project Cost Elements	Annual Inflation / Escalation Rate	Current Year Cost Estimate to Complete	Inflation Cost	Total Y.O.E. Cost	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
# of years to inflate from base year		2014			0	0	0	0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Advanced Bridges																															
Owners Representative	3%	14,225,317	774,683	15,000,000	-	-	-	-	4,000,000	2,500,000	3,000,000	4,000,000	1,500,000																		
Preliminary Engineering/Bridge	3%	14,181,635	89,210	14,270,845	1,470,845	-	-	-	12,000,000				800,000																		
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	19,121,370	928,630	20,050,000	-	-	-	-	1,500,000	10,050,000	3,500,000	5,000,000																			
CE	3%	6,947,738	622,308	7,570,046	-	-	-	-	953,750			4,746,547	1,449,749	420,000																	
Construction	3%	92,305,668	8,267,806	100,573,474	-	-	-	-	12,671,250			63,061,273	19,260,951	5,580,000																	
Risks and Opportunities	3%	-	-	-	-	-	-	-																							
Utilities	3%	8,009,183	777,620	8,786,803	-	-	-	-	-			7,586,803.47	1,199,999																		
TOTAL		**154,790,911**	**11,460,258**	**166,251,169**	**1,470,845**	**-**	**-**	**-**	**31,125,000**	**12,550,000**	**6,500,000**	**84,394,623**	**24,210,700**	**6,000,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Segment 3																															
Owners Representative	3%	21,500,000	5,432,426	26,932,426	-	-	-	-					2,251,018	3,477,822	1,791,078	3,689,621	5,700,465	3,914,320	4,031,750	2,076,351											
Preliminary Engineering/Bridge	3%	39,309,352	4,933,670	44,243,022	-	-	-	-	-				44,243,022																		
Preliminary Engineering/Road	3%	-	-	-		-	-	-																							
Right-of-Way	3%	32,125,880	6,254,799	38,380,679		-	-	-	-				20,034,744				11,509,748	6,836,187													
CE	3%	39,309,352	10,365,821	49,675,173		-	-	-	-	-	-			10,847,751		12,692,920	2,382,307	11,998,329	2,948,552	8,805,313											
Construction	3%	569,309,928	150,165,698	719,475,626		-	-	-	-	-	-			160,267,640		178,801,747	33,740,764	174,347,443	43,150,719	129,167,313											
Risks and Opportunities	3%	41,656,753	10,972,489	52,629,242		-	-	-					8,683,665		3,780,676	6,523,549	10,387,515	2,593,361	16,507,775	4,152,702											
Utilities	3%	15,881,170	4,568,169	20,449,339	-	-	-	-	-	-	-			811,492			11,192,458	5,559,926		2,885,463											
TOTAL		**759,092,435**	**192,693,072**	**951,785,507**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**75,212,449**	**175,404,705**	**5,571,755**	**201,707,837**	**74,913,258**	**205,249,566**	**66,638,795**	**147,087,142**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Segment 2																															
Owners Representative	3%	11,500,000	5,440,517	16,940,517	-	-	-	-												2,076,351	1,425,761	7,342,669	4,537,769	1,557,967							
Preliminary Engineering/Bridge	3%	15,878,596	6,101,094	21,979,690	-	-	-	-		-	-	-	-							21,979,690											
Preliminary Engineering/Road	3%	265,781	102,122	367,903	-	-	-	-		-										367,903											
Right-of-Way	3%	7,823,907	3,006,210	10,830,117	-	-	-	-	-	-	-	-	-							10,830,117											
CE	3%	16,144,377	7,945,485	24,089,862	-	-	-	-	-	-	-	-	-	-	-	-				2,277,177	-	11,016,420	3,528,192	7,268,073							
Construction	3%	236,990,405	116,718,680	353,709,085	-	-	-	-	-	-	-	-	-	-	-	-				32,502,281		162,161,867	51,975,470	107,069,467							
Risks and Opportunities	3%	42,250,142	21,982,857	64,232,999	-	-	-	-					-	-	-	-				1,684,997		11,498,168	22,654,185	28,395,648							
Utilities	3%	4,050,800	1,820,128	5,870,928	-	-	-	-	-		-		-	-	-	-				1,277,648		4,593,280									
TOTAL		**334,904,008**	**163,117,092**	**498,021,100**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**72,996,164**	**1,425,761**	**196,612,403**	**82,695,615**	**144,291,156**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Segment 1																															
Owners Representative	3.1%	2,000,000	1,161,622	3,161,622	-	-	-	-																3,161,622							
Preliminary Engineering/Bridge	3.1%	10,844,695	7,378,086	18,222,781	-	-	-	-	-	-					-	-	-	-	-	-						18,222,781					
Preliminary Engineering/Road	3.1%	30,019,737	18,533,041	48,552,778	-	-	-	-	-	-					-	-	-	-	-	-				12,060,563	36,492,215						
Right-of-Way	3.1%	15,253,527	9,176,801	24,430,328	-	-	-	-	-						-	-	-	-	-	-				13,874,769	10,555,559						
CE	3.1%	40,864,432	32,886,789	73,751,221	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-					1,047,463	11,739,974	12,800,635	12,797,531	12,781,935	12,818,828	9,764,855
Construction	3.1%	596,841,740	481,028,709	1,077,870,449	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-					15,538,178	165,480,596	187,493,283	187,447,830	187,219,378	189,838,169	144,853,015
Risks and Opportunities	3.1%	21,180,832	12,917,237	34,098,069	-	-	-	-																23,712,167	-	10,385,903	-	-	-	-	-
Utilities	3.1%	10,899,700	6,330,667	17,230,367	-	-	-	-		-	-	-			-	-	-	-	-	-				17,230,367							
TOTAL		**727,904,663**	**569,412,953**	**1,297,317,616**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**70,039,488**	**63,633,415**	**205,829,254**	**200,293,918**	**200,245,361**	**200,001,313**	**202,656,998**	**154,617,869**
Total by Element																															
Owners Representative		49,225,317	12,809,248	62,034,565	-	-	-	-	4,000,000	2,500,000	3,000,000	4,000,000	3,751,018	3,477,822	1,791,078	3,689,621	5,700,465	3,914,320	4,031,750	4,152,702	1,425,761	7,342,669	4,537,769	4,719,590	-	-	-	-	-	-	-
Preliminary Engineering/Bridge		80,214,278	18,502,061	98,716,339	1,470,845	-	-	-	12,000,000	-	-	-	45,043,022	-	-	-	-	-	-	21,979,690	-	-	-	-	-	18,222,781	-	-	-	-	-
Preliminary Engineering/Road		30,285,518	18,635,163	48,920,681	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	367,903	-	-	-	12,060,563	36,492,215	-	-	-	-	-	-
Right-of-Way		74,324,684	19,366,440	93,691,124	-	-	-	-	1,500,000	10,050,000	3,500,000	5,000,000	20,034,744	-	-	-	11,509,748	6,836,187	-	10,830,117	-	-	-	13,874,769	10,555,559	-	-	-	-	-	-
CE		103,265,899	51,820,403	155,086,302	-	-	-	-	953,750	-	-	4,746,547	1,449,749	11,267,751	-	12,692,920	2,382,307	11,998,329	2,948,552	11,082,490	-	11,016,420	3,528,192	7,268,073	1,047,463	11,739,974	12,800,635	12,797,531	12,781,935	12,818,828	9,764,855
Construction		1,495,447,741	756,180,894	2,251,628,635	-	-	-	-	12,671,250	-	-	63,061,273	19,260,951	165,847,641	-	178,801,747	33,740,764	174,347,443	43,150,719	161,669,593	-	162,161,867	51,975,470	107,069,467	15,538,178	165,480,596	187,493,283	187,447,830	187,219,378	189,838,169	144,853,015
Risks and Opportunities		105,087,727	45,872,583	150,960,310	-	-	-	-	-	-	-	-	8,683,665	-	3,780,676	6,523,549	10,387,515	2,593,361	16,507,775	5,837,699	-	11,498,168	22,654,185	52,107,815	-	10,385,903	-	-	-	-	-
Utilities		38,840,853	13,496,583	52,337,436	-	-	-	-	-	-	-	7,586,803	1,199,999	811,492	-	-	11,192,458	5,559,926	-	4,163,111	-	4,593,280	-	17,230,367	-	-	-	-	-	-	-
GRAND TOTAL		**1,976,692,017**	**936,683,375**	**2,913,375,392**	**1,470,845**	**-**	**-**	**-**	**31,125,000**	**12,550,000**	**6,500,000**	**84,394,623**	**99,423,149**	**181,404,706**	**5,571,755**	**201,707,837**	**74,913,258**	**205,249,566**	**66,638,795**	**220,083,306**	**1,425,761**	**196,612,403**	**82,695,615**	**214,330,645**	**63,633,415**	**205,829,254**	**200,293,918**	**200,245,361**	**200,001,313**	**202,656,998**	**154,617,869**
Total by Segment																															
Advanced Bridges		154,790,911	11,460,258	166,251,169	1,470,845	-	-	-	31,125,000	12,550,000	6,500,000	84,394,623	24,210,700	6,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Segment 3		759,092,435	192,693,072	951,785,507	-	-	-	-	-	-	-	-	75,212,449	175,404,705	5,571,755	201,707,837	74,913,258	205,249,566	66,638,795	147,087,142	-	-	-	-	-	-	-	-	-	-	-
Segment 2		334,904,008	163,117,092	498,021,100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	72,996,164	1,425,761	196,612,403	82,695,615	144,291,156	-	-	-	-	-	-	-
Segment 1		727,904,663	569,412,953	1,297,317,616	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	70,039,488	63,633,415	205,829,254	200,293,918	200,245,361	200,001,313	202,656,998	154,617,869
GRAND TOTAL		**1,976,692,017**	**936,683,375**	**2,913,375,392**	**1,470,845**	**0**	**0**	**0**	**31,125,000**	**12,550,000**	**6,500,000**	**84,394,623**	**99,423,149**	**181,404,706**	**5,571,755**	**201,707,837**	**74,913,258**	**205,249,566**	**66,638,795**	**220,083,306**	**1,425,761**	**196,612,403**	**82,695,615**	**214,330,645**	**63,633,415**	**205,829,254**	**200,293,918**	**200,245,361**	**200,001,313**	**202,656,998**	**154,617,869**
IFP Cumulative Cost					**1,470,845**	**1,470,845**	**1,470,845**	**1,470,845**	**32,595,845**	**45,145,845**	**51,645,845**	**136,040,468**	**235,463,618**	**416,868,323**	**422,440,078**	**624,147,915**	**699,061,173**	**904,310,739**	**970,949,534**	**1,191,032,840**	**1,192,458,601**	**1,389,071,005**	**1,471,766,620**	**1,686,097,265**	**1,749,730,679**	**1,955,559,933**	**2,155,853,851**	**2,356,099,211**	**2,556,100,525**	**2,758,757,522**	**2,913,375,392**

I-94 Ford Freeway Modernization Poject Initial Financial Plan

INFLATED BASE YEAR COSTS, by State Fiscal Year

Advanced Bridges

Cost Start Year	**2010**
IFP Preparation SFY	**2014**
Current Fiscal Year	**2014**

Major Project Cost Elements	Annual Inflation / Escalation Rate	Current Year Cost Estimate to Complete	Inflation Cost	Total Y.O.E. Cost	State and Federal Fiscal Year 2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
# of years to inflate from base year		2014			0	0	0	0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
AB#1 Gratiot																															
Owners Representative	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	1,470,845	-	1,470,845	1,470,845	-	-	-																							
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	-	-	-	-	-	-	-																							
CE	3%	667,136	61,862	728,997	-	-	-	-	-		-	728,997																			
Construction	3%	8,863,377	821,874	9,685,251	-	-	-	-	-		-	9,685,251																			
Utilities	3%	1,242,903	115,251	1,358,154	-	-	-	-	-		-	1,358,154																			
TOTAL		**12,244,261**	**998,987**	**13,243,248**	**1,470,845**	**-**	**-**	**-**	**-**	**-**	**-**	**11,772,403**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
AB#3 MT. Elliot																															
Owners Representative	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	2,200,000	-	2,200,000	-	-	-	-	2,200,000																						
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	1,650,485	49,515	1,700,000	-	-	-	-	-	1,700,000																					
CE	3%	1,148,656	106,511	1,255,167	-	-	-	-		-		1,255,167	-																		
Construction	3%	15,260,716	1,415,080	16,675,796	-	-	-	-		-		16,675,796	-																		
Utilities	3%	758,332	70,318	828,650	-	-	-	-		-		828,650	-																		
TOTAL		**21,018,189**	**1,641,424**	**22,659,613**	**-**	**-**	**-**	**-**	**2,200,000**	**1,700,000**	**-**	**18,759,614**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
AB#4 Second Avenue																															
Owners Representative	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	1,300,000	-	1,300,000	-	-	-	-	1,300,000																						
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	1,650,485	49,515	1,700,000	-	-	-	-	-	1,700,000																					
CE	3%	1,526,463	141,544	1,668,008	-	-	-	-		-		1,668,008																			
Construction	3%	20,280,158	1,880,518	22,160,676	-	-	-	-		-		22,160,676																			
Utilities	3%	1,098,170	101,830	1,200,000	-	-	-	-		-		1,200,000																			
TOTAL		**25,855,276**	**2,173,407**	**28,028,683**	**-**	**-**	**-**	**-**	**1,300,000**	**1,700,000**	**-**	**25,028,684**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
AB#5 Chene & Concord																															
Owners Representative	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	2,400,000	-	2,400,000	-	-	-	-	2,400,000																						
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	970,874	29,126	1,000,000	-	-	-	-	-	1,000,000																					
CE	3%	854,636	107,264	961,901	-	-	-	-		-	-	-	961,901																		
Construction	3%	11,354,453	1,425,084	12,779,537	-	-	-	-		-	-	-	12,779,537																		
Utilities	3%	1,066,184	133,815	1,199,999	-	-	-	-		-	-	-	1,199,999																		
TOTAL		**16,646,147**	**1,695,290**	**18,341,437**	**-**	**-**	**-**	**-**	**2,400,000**	**1,000,000**	**-**	**-**	**14,941,437**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
AB#6 Cadillac & Cass																															
Owners Representative	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	2,300,000	-	2,300,000	-	-	-	-	2,300,000	-																					
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	1,456,311	43,689	1,500,000	-	-	-	-	-	1,500,000																					
CE	3%	682,210	63,259	745,470	-	-	-	-		-	-	745,470	-																		
Construction	3%	9,063,653	840,445	9,904,098	-	-	-	-		-	-	9,904,098	-																		
Utilities	3%	1,921,797	178,202	2,099,999	-	-	-	-		-	-	2,099,999	-																		
TOTAL		**15,423,971**	**1,125,596**	**16,549,567**	**-**	**-**	**-**	**-**	**2,300,000**	**1,500,000**	**-**	**12,749,567**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
AB#7 Brush & French																															
Owners Representative	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	2,300,000	-	2,300,000	-	-	-	-	2,300,000																						
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	2,087,379	62,621	2,150,000	-	-	-	-	-	2,150,000																					
CE	3%	752,591	84,163	836,753	-	-	-	-		-	-	348,905	487,848	-																	
Construction	3%	9,998,704	1,118,161	11,116,866	-	-	-	-		-	-	4,635,451	6,481,415	-																	
Utilities	3%	1,921,797	178,203	2,100,000	-	-	-	-		-	-	2,100,000	-																		
TOTAL		**17,060,471**	**1,443,148**	**18,503,619**	**-**	**-**	**-**	**-**	**2,300,000**	**2,150,000**	**-**	**7,084,356**	**6,969,263**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Woodward Bridge																															
Owners Representative	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	1,500,000	-	1,500,000	-	-	-	-	1,500,000																						
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	-	-	-	-	-	-	-																							
CE	3%	953,750	-	953,750	-	-	-	-	953,750																						
Construction	3%	12,671,250	-	12,671,250	-	-	-	-	12,671,250																						
Risks and Opportunities	3%	-	-	-	-	-	-	-																							
Utilities	3%	-	-	-	-	-	-	-																							
TOTAL		**15,125,000**	**-**	**15,125,000**	**-**	**-**	**-**	**-**	**15,125,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Trumbell Bridge																															
Owners Representative	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	710,790	89,210	800,000	-	-	-	-		-			800,000																		
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	-	-	-	-	-	-	-																							
CE	3%	362,296	57,704	420,000	-	-	-	-			-		-	420,000																	
Construction	3%	4,813,357	766,643	5,580,000	-	-	-	-			-			5,580,000																	
Risks and Opportunities	3%	-	-	-	-	-	-	-																							
Utilities	3%	-	-	-	-	-	-	-																							
TOTAL		**5,886,443**	**913,558**	**6,800,001**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**800,000**	**6,000,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Major Project Cost Elements	Annual Inflation / Escalation Rate	Current Year Cost Estimate to Complete	Inflation Cost	Total Y.O.E. Cost	State and Federal Fiscal Year 2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Owners Representative Contract																															
Owners Representative	3%	14,225,317	774,683	15,000,000	-	-	-	-	4,000,000	2,500,000	3,000,000	4,000,000	1,500,000																		
Preliminary Engineering/Bridge	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	-	-	-	-	-	-	-																							
CE	3%	-	-	-	-	-	-	-	-	-	-	-	-																		
Construction	3%	-	-	-	-	-	-	-																							
Risks and Opportunities	3%	-	-	-	-	-	-	-																							
Utilities	3%	-	-	-	-	-	-	-																							
TOTAL		**14,225,317**	**774,683**	**15,000,000**	**-**	**-**	**-**	**-**	**4,000,000**	**2,500,000**	**3,000,000**	**4,000,000**	**1,500,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Opportunity Buys (ROW)																															
Owners Representative	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	11,305,836	694,164	12,000,000	-	-	-	-	1,500,000	2,000,000	3,500,000	5,000,000																			
CE	3%	-	-	-	-	-	-	-																							
Construction	3%	-	-	-	-	-	-	-																							
Risks and Opportunities	3%	-	-	-	-	-	-	-																							
Utilities	3%	-	-	-	-	-	-	-																							
TOTAL		**11,305,836**	**694,164**	**12,000,000**	**-**	**-**	**-**	**-**	**1,500,000**	**2,000,000**	**3,500,000**	**5,000,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Risks and Opportunities																															
Owners Representative	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	-	-	-	-	-	-	-																							
CE	3%	-	-	-	-	-	-	-																							
Construction	3%	-	-	-	-	-	-	-																							
Risks and Opportunities	3%	-	-	-	-	-	-	-																							
Utilities	3%	-	-	-	-	-	-	-																							
TOTAL		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		-																													
Total by Element																															
Owners Representative	3%	14,225,317		15,000,000	-	-	-	-	4,000,000	2,500,000	3,000,000	4,000,000	1,500,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Preliminary Engineering/Bridge	3%	14,181,635		14,270,845	1,470,845	-	-	-	12,000,000	-	-	-	800,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Preliminary Engineering/Road	3%	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Right-of-Way	3%	19,121,370		20,050,000	-	-	-	-	1,500,000	10,050,000	3,500,000	5,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CE	3%	6,947,738		7,570,046	-	-	-	-	953,750	-	-	4,746,547	1,449,749	420,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Construction	3%	92,305,668		100,573,474	-	-	-	-	12,671,250	-	-	63,061,273	19,260,951	5,580,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Risks and Opportunities	3%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Utilities	3%	8,009,183		8,786,802	-	-	-	-	-	-	-	7,586,803	1,199,999	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GRAND TOTAL		**154,790,911**	**11,460,257**	**166,251,168**	**1,470,845**	**-**	**-**	**-**	**31,125,000**	**12,550,000**	**6,500,000**	**84,394,623**	**24,210,700**	**6,000,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Total by Segment																															
AB#1 Gratiot		12,244,261	998,987	13,243,248	1,470,845	-	-	-	-	-	-	11,772,403	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AB#2 Van Dyke OINCC		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AB#3 MT. Elliot		21,018,189	1,641,424	22,659,613	-	-	-	-	2,200,000	1,700,000	-	18,759,614	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AB#4 Second Avenue		25,855,276	2,173,407	28,028,683	-	-	-	-	1,300,000	1,700,000	-	25,028,684	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AB#5 Chene & Concord		16,646,147	1,695,290	18,341,437	-	-	-	-	2,400,000	1,000,000	-	-	14,941,437	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AB#6 Cadillac & Cass		15,423,971	1,125,596	16,549,567	-	-	-	-	2,300,000	1,500,000	-	12,749,567	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AB#7 Brush & French		17,060,471	1,443,148	18,503,619	-	-	-	-	2,300,000	2,150,000	-	7,084,356	6,969,263	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Woodward Bridge		15,125,000	-	15,125,000	-	-	-	-	15,125,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trumbell Bridge		5,886,443	913,558	6,800,001	-	-	-	-	-	-	-	-	800,000	6,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Owners Representative Contract		14,225,317	774,683	15,000,000	-	-	-	-	4,000,000	2,500,000	3,000,000	4,000,000	1,500,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Opportunity Buys (ROW)		11,305,836	694,164	12,000,000	-	-	-	-	1,500,000	2,000,000	3,500,000	5,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Risks and Opportunities		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GRAND TOTAL		**154,790,911**	**11,460,257**	**166,251,168**	**1,470,845**	**0**	**0**	**0**	**31,125,000**	**12,550,000**	**6,500,000**	**84,394,623**	**24,210,700**	**6,000,000**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
IFP Cumulative Cost					**1,470,845**	**1,470,845**	**1,470,845**	**1,470,845**	**32,595,845**	**45,145,845**	**51,645,845**	**136,040,468**	**160,251,168**	**166,251,168**	**166,251,168**	**166,251,168**	**166,251,168**	**166,251,168**	**166,251,168**	**166,251,168**	**166,251,168**	**166,251,168**	**166,251,168**	**166,251,168**	**166,251,168**	**166,251,168**	**166,251,168**	**166,251,168**	**166,251,168**	**166,251,168**	**166,251,168**

I-94 Edsel Ford Freeway Initial Financial Plan

INFLATED BASE YEAR COSTS, by State Fiscal Year

Segment 3

Cost Start Year 2010
IFP Preparation SFY 2014
Current Fiscal Year 2014

Major Project Cost Elements	Annual Inflation / Escalation Rate	Current Year Cost Estimate to Complete	Inflation Cost	Total Y.O.E. Cost	State & Federal Fiscal Year 2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
# of years to inflate from base year		2014			0	0	0	0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
#1 Dequindre																															
Preliminary Engineering	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	11,696,707	1,468,040	13,164,747	-	-	-	-		-		-	13,164,747																		
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	8,719,447	1,094,367	9,813,814	-	-	-	-		-		-	9,813,814																		
CE	3%	11,696,707	2,028,139	13,724,846	-	-	-	-					-	10,847,751	-	2,877,095															
Construction	3%	172,810,343	29,964,282	202,774,625	-	-	-	-					-	160,267,640	-	42,506,985															
Utilities	3%	700,000	111,492	811,492	-	-	-	-					-	811,492	-																
TOTAL		**205,623,204**	**34,666,320**	**240,289,524**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**22,978,561**	**171,926,884**	**-**	**45,384,080**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
#2 St Aubin & Frontenac																															
Preliminary Engineering	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	7,981,165	1,001,707	8,982,872		-	-	-		-		-	8,982,872	-		-															
Preliminary Engineering/Road	3%	-	-	-		-	-	-				-	-	-		-															
Right-of-Way	3%	9,081,164	1,139,766	10,220,930		-	-	-		-		-	10,220,930	-		-															
CE	3%	7,981,165	1,834,661	9,815,826		-	-	-						-	-	9,815,826	-														
Construction	3%	110,820,114	25,474,648	136,294,762		-	-	-						-	-	136,294,762	-														
Utilities	3%	7,573,430	2,020,365	9,593,795	-	-	-	-						-	-	-	9,593,795														
TOTAL		**143,437,038**	**31,471,146**	**174,908,184**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**19,203,802**	**-**	**-**	**146,110,588**	**9,593,795**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
#3 Frontenac, Burns, Conner																															
Preliminary Engineering	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	1,880,615	236,034	2,116,649	-	-	-	-			-		2,116,649		-	-	-														
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	2,339,270	624,047	2,963,317	-	-	-	-			-		-		-		2,963,317														
CE	3%	1,880,615	501,692	2,382,307	-	-	-	-							-	-	2,382,307	-													
Construction	3%	26,635,271	7,105,493	33,740,764	-	-	-	-							-	-	33,740,764	-													
Utilities	3%	1,262,000	336,664	1,598,664	-	-	-	-							-	-	1,598,664	-													
TOTAL		**33,997,771**	**8,803,930**	**42,801,701**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2,116,649**	**-**	**-**	**-**	**40,685,052**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
#4 Pedestrian Bridges																															
Preliminary Engineering	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	1,677,855	210,586	1,888,441	-	-	-	-				-	1,888,441			-	-	-													
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	5,239,368	1,596,819	6,836,187	-	-	-	-				-	-				-	6,836,187													
CE	3%	1,677,855	511,365	2,189,220	-	-	-	-							-	-	-	2,189,220													
Construction	3%	24,889,502	7,585,653	32,475,155	-	-	-	-							-	-	-	32,475,155													
Utilities	3%	-	-	-	-	-	-	-																							
TOTAL		**33,484,580**	**9,904,422**	**43,389,002**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1,888,441**	**-**	**-**	**-**	**-**	**41,500,562**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
#5 Gratiot Ramps																															
Preliminary Engineering	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	1,659,614	208,296	1,867,910	-	-	-	-				-	1,867,910			-	-	-													
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	4,445,834	1,186,015	5,631,849	-	-	-	-				-	-			-	5,631,849	-													
CE	3%	1,659,614	505,806	2,165,420	-	-	-	-							-	-		2,165,420													
Construction	3%	22,488,116	6,853,775	29,341,891	-	-	-	-							-	-		29,341,891													
Utilities	3%	2,130,800	649,411	2,780,211	-	-	-	-							-	-		2,780,211													
TOTAL		**32,383,978**	**9,403,303**	**41,787,281**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1,867,910**	**-**	**-**	**-**	**5,631,849**	**34,287,521**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
#6 Norfolk Southern & Conrail																															
Preliminary Engineering	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	2,567,251	322,213	2,889,464	-	-	-	-				-	2,889,464			-		-													
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	-	-	-	-	-	-	-																							
CE	3%	2,567,251	782,429	3,349,680	-	-	-	-							-	-		3,349,680													
Construction	3%	38,082,899	11,606,646	49,689,545	-	-	-	-							-	-		49,689,545													
Utilities	3%	-	-	-	-	-	-	-																							
TOTAL		**43,217,401**	**12,711,288**	**55,928,689**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2,889,464**	**-**	**-**	**-**	**-**	**53,039,226**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
#7 Frontenac & Norcorss																															
Preliminary Engineering	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	5,485,000	688,416	6,173,416	-	-	-	-				-	6,173,416				-	-	-	-											
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-										-													
Right-of-Way	3%	1,750,055	466,862	2,216,917	-	-	-	-				-	-			-	2,216,917	-	-	-											
CE	3%	5,485,000	1,757,561	7,242,561	-	-	-	-								-	-	4,294,009	2,948,553	-											
Construction	3%	80,270,468	25,721,103	105,991,571	-	-	-	-								-	-	62,840,852	43,150,719	-											
Utilities	3%	2,130,420	649,295	2,779,715	-	-	-	-								-	-	2,779,715	-	-											
TOTAL		**95,120,943**	**29,283,237**	**124,404,180**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**6,173,416**	**-**	**-**	**-**	**2,216,917**	**69,914,576**	**46,099,271**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
#8 Pump Stations																															
Preliminary Engineering	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	1,166,298	146,381	1,312,679	-	-	-	-				-	1,312,679					-	-	-		-									
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	-	-	-	-	-	-	-																							
CE	3%	1,166,298	448,131	1,614,429	-	-	-	-								-		-	-	1,614,429		-									
Construction	3%	17,301,006	6,647,633	23,948,639	-	-	-	-								-		-	-	23,948,639		-									
Utilities	3%	-	-	-	-	-	-	-																							
TOTAL		**19,633,602**	**7,242,144**	**26,875,746**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1,312,679**	**-**	**-**	**-**	**-**	**-**	**-**	**25,563,068**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
#9 Temporary Widening																															
Preliminary Engineering	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	149,748	18,795	168,543	-	-	-	-					168,543					-	-	-		-									
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	-	-	-	-	-	-	-																							
CE	3%	149,748	57,538	207,286	-	-	-	-								-		-	-	207,286		-									
Construction	3%	2,221,387	853,532	3,074,919	-	-	-	-								-		-	-	3,074,919		-									
Utilities	3%	-	-	-	-	-	-	-																							
TOTAL		**2,520,883**	**929,865**	**3,450,748**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**168,543**	**-**	**-**	**-**	**-**	**-**	**-**	**3,282,205**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Major Project Cost Elements	Annual Inflation / Escalation Rate	Current Year Cost Estimate to Complete	Inflation Cost	Total Y.O.E. Cost	State & Federal Fiscal Year 2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
#10 Frontenac & Connor																															
Preliminary Engineering	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	5,045,099	633,204	5,678,303	-	-	-	-					5,678,303						-	-	-			-	-						
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	550,742	146,921	697,663	-	-	-	-					-	-		-	697,663		-	-	-			-	-						
CE	3%	5,045,099	1,938,498	6,983,597	-	-	-	-								-			-	6,983,597	-			-	-						
Construction	3%	73,790,822	28,352,933	102,143,755	-	-	-	-								-			-	102,143,755	-			-	-						
Utilities	3%	2,084,520	800,943	2,885,463	-	-	-	-								-			-	2,885,463	-			-	-						
TOTAL		**86,516,282**	**31,872,500**	**118,388,782**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**5,678,303**	**-**	**-**	**-**	**697,663**	**-**	**-**	**112,012,815**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Owners Rep Contract																															
Preliminary Engineering	3%	21,500,000	5,432,425	26,932,425	-	-	-	-					2,251,018	3,477,822	1,791,078	3,689,622	5,700,465	3,914,320	4,031,749	2,076,351											
Preliminary Engineering/Bridge	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-					-	-	-	-	-	-	-												
Right-of-Way	3%	-	-	-	-	-	-	-																							
CE	3%	-	-	-	-	-	-	-																							
Construction	3%	-	-	-	-	-	-	-																							
Risks and Opportunities	3%	-	-	-	-	-	-	-																							
Utilities	3%	-	-	-	-	-	-	-																							
TOTAL		**21,500,000**	**5,432,425**	**26,932,425**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2,251,018**	**3,477,822**	**1,791,078**	**3,689,622**	**5,700,465**	**3,914,320**	**4,031,749**	**2,076,351**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Risks and Opportunities																															
Preliminary Engineering	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	-	-	-	-	-	-	-																							
CE	3%	-	-	-	-	-	-	-																							
Construction	3%	-	-	-	-	-	-	-																							
Risks and Opportunities	3%	41,656,753	10,972,489	52,629,242	-	-	-	-					8,683,665	-	3,780,676	6,523,549	10,387,515	2,593,361	16,507,775	4,152,702											
Utilities	3%	-	-	-	-	-	-	-																							
TOTAL		**41,656,753**	**10,972,489**	**52,629,242**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**8,683,665**	**-**	**3,780,676**	**6,523,549**	**10,387,515**	**2,593,361**	**16,507,775**	**4,152,702**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Total by Element																															
Preliminary Engineering	3%	21,500,000	5,432,425	26,932,425	-	-	-	-	-	-	-	-	2,251,018	3,477,822	1,791,078	3,689,622	5,700,465	3,914,320	4,031,749	2,076,351	-	-	-	-	-	-	-	-	-	-	-
Preliminary Engineering/Bridge	3%	39,309,352	4,933,670	44,243,022	-	-	-	-	-	-	-	-	44,243,022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Right-of-Way	3%	32,125,880	6,254,799	38,380,679	-	-	-	-	-	-	-	-	20,034,745	-	-	-	11,509,748	6,836,187	-	-	-	-	-	-	-	-	-	-	-	-	-
CE	3%	39,309,352	10,365,821	49,675,173	-	-	-	-	-	-	-	-	-	10,847,751	-	12,692,921	2,382,307	11,998,329	2,948,553	8,805,312	-	-	-	-	-	-	-	-	-	-	-
Construction	3%	569,309,928	150,165,698	719,475,626	-	-	-	-	-	-	-	-	-	160,267,640	-	178,801,747	33,740,764	174,347,443	43,150,719	129,167,313	-	-	-	-	-	-	-	-	-	-	-
Risks and Opportunities	3%	41,656,753	10,972,489	52,629,242	-	-	-	-	-	-	-	-	8,683,665	-	3,780,676	6,523,549	10,387,515	2,593,361	16,507,775	4,152,702	-	-	-	-	-	-	-	-	-	-	-
Utilities	3%	15,881,170	4,568,169	20,449,339	-	-	-	-	-	-	-	-	-	811,492	-	-	11,192,458	5,559,926	-	2,885,463	-	-	-	-	-	-	-	-	-	-	-
GRAND TOTAL		**759,092,435**	**192,693,071**	**951,785,506**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**75,212,449**	**175,404,706**	**5,571,755**	**201,707,838**	**74,913,257**	**205,249,565**	**66,638,795**	**147,087,141**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Total by Segment																															
#1 Dequindre		205,623,204	34,666,320	240,289,524	-	-	-	-	-	-	-	-	22,978,561	171,926,884	-	45,384,080	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
#2 St Aubin & Frontenac		143,437,038	31,471,146	174,908,184	-	-	-	-	-	-	-	-	19,203,802	-	-	146,110,588	9,593,795	-	-	-	-	-	-	-	-	-	-	-	-	-	-
#3 Frontenac, Burns, Conner		33,997,771	8,803,930	42,801,701	-	-	-	-	-	-	-	-	2,116,649	-	-	-	40,685,052	-	-	-	-	-	-	-	-	-	-	-	-	-	-
#4 Pedestrian Bridges		33,484,580	9,904,422	43,389,002	-	-	-	-	-	-	-	-	1,888,441	-	-	-	-	41,500,562	-	-	-	-	-	-	-	-	-	-	-	-	-
#5 Gratiot Ramps		32,383,978	9,403,303	41,787,281	-	-	-	-	-	-	-	-	1,867,910	-	-	-	5,631,849	34,287,521	-	-	-	-	-	-	-	-	-	-	-	-	-
#6 Norfolk Southern & Conrail		43,217,401	12,711,288	55,928,689	-	-	-	-	-	-	-	-	2,889,464	-	-	-	-	53,039,226	-	-	-	-	-	-	-	-	-	-	-	-	-
#7 Frontenac & Norcorss		95,120,943	29,283,237	124,404,180	-	-	-	-	-	-	-	-	6,173,416	-	-	-	2,216,917	69,914,576	46,099,271	-	-	-	-	-	-	-	-	-	-	-	-
#8 Pump Stations		19,633,602	7,242,144	26,875,746	-	-	-	-	-	-	-	-	1,312,679	-	-	-	-	-	-	25,563,068	-	-	-	-	-	-	-	-	-	-	-
#9 Temporary Widening		2,520,883	929,865	3,450,748	-	-	-	-	-	-	-	-	168,543	-	-	-	-	-	-	3,282,205	-	-	-	-	-	-	-	-	-	-	-
#10 Frontenac & Connor		86,516,282	31,872,500	118,388,782	-	-	-	-	-	-	-	-	5,678,303	-	-	-	697,663	-	-	112,012,815	-	-	-	-	-	-	-	-	-	-	-
Owners Rep Contract		21,500,000	5,432,425	26,932,425	-	-	-	-	-	-	-	-	2,251,018	3,477,822	1,791,078	3,689,622	5,700,465	3,914,320	4,031,749	2,076,351	-	-	-	-	-	-	-	-	-	-	-
Risks and Opportunities		41,656,753	10,972,489	52,629,242	-	-	-	-	-	-	-	-	8,683,665	-	3,780,676	6,523,549	10,387,515	2,593,361	16,507,775	4,152,702	-	-	-	-	-	-	-	-	-	-	-
GRAND TOTAL		**759,092,435**	**192,693,071**	**951,785,506**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**75,212,449**	**175,404,706**	**5,571,755**	**201,707,838**	**74,913,257**	**205,249,565**	**66,638,795**	**147,087,141**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
IFP Cumulative Cost					**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**75,212,449**	**250,617,155**	**256,188,910**	**457,896,748**	**532,810,005**	**738,059,570**	**804,698,366**	**951,785,506**	**951,785,506**	**951,785,506**	**951,785,506**	**951,785,506**	**951,785,506**	**951,785,506**	**951,785,506**	**951,785,506**	**951,785,506**	**951,785,506**	**951,785,506**

I-94 Ford Freeway Modernization Project Initial Financial Plan

INFLATED BASE YEAR COSTS, by State Fiscal Year

Segment 2

Cost Start Year 2010
IFP Preparation SFY 2014
Current Fiscal Year 2014

Major Project Cost Elements	Annual Inflation / Escalation	Current Year Cost Estimate to Complete	Inflation Cost	Total Y.O.E. Cost	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
# of years to inflate from base year		2014			0	0	0	0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
#11 Between Cass & I-75																															
Owners Representative	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	1,379,301	529,974	1,909,275	-	-	-	-							-					1,909,275		-									
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-												-		-									
Right-of-Way	3%	1,058	407	1,465	-	-	-	-								-				1,465		-									
CE	3%	1,379,301	529,974	1,909,275	-	-	-	-										-		1,909,275		-									
Construction	3%	19,537,717	7,507,053	27,044,770	-	-	-	-										-		27,044,770		-									
Risks and Opportunities	3%	-	-	-	-	-	-	-																							
Utilities	3%	923,000	354,648	1,277,648	-	-	-	-										-		1,277,648		-									
TOTAL		**23,220,377**	**8,922,055**	**32,142,432**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**32,142,432**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
#12 Brush & Russell																															
Owners Representative	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	11,662,749	4,481,223	16,143,972		-	-	-								-				16,143,972		-	-								
Preliminary Engineering/Road	3%	-	-	-		-	-	-																							
Right-of-Way	3%	6,215,354	2,388,150	8,603,504		-	-	-									-			8,603,504		-									
CE	3%	11,662,749	5,984,371	17,647,120		-	-	-											-			6,850,856	3,528,191	7,268,073							
Construction	3%	171,809,542	88,158,637	259,968,179		-	-	-											-			100,923,242	51,975,470	107,069,467							
Risks and Opportunities	3%	-	-	-		-	-	-																							
Utilities	3%	2,232,800	1,046,142	3,278,942	-	-	-	-											-			3,278,942	-								
TOTAL		**203,583,194**	**102,058,523**	**305,641,717**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**24,747,476**	**-**	**111,053,040**	**55,503,660**	**114,337,540**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
#13 Second Ave & Russell																															
Owners Representative	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	2,836,546	1,089,897	3,926,443	-	-	-	-									-			3,926,443			-	-							
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	1,607,495	617,654	2,225,149	-	-	-	-										-		2,225,149			-	-							
CE	3%	2,836,546	1,329,017	4,165,563	-	-	-	-												-		4,165,563	-	-							
Construction	3%	41,700,524	19,538,101	61,238,625	-	-	-	-												-		61,238,625	-	-							
Risks and Opportunities	3%	-	-	-	-	-	-	-																							
Utilities	3%	895,000	419,338	1,314,338	-	-	-	-												-		1,314,338	-	-							
TOTAL		**49,876,111**	**22,994,008**	**72,870,119**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**6,151,592**	**-**	**66,718,526**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
#14 Rehab I-75																															
Owners Representative	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Road	3%	265,781	102,122	367,903	-	-	-	-									-			367,903			-	-							
Right-of-Way	3%	-	-	-	-	-	-	-																							
CE	3%	265,781	102,122	367,903	-	-	-	-												367,903			-	-							
Construction	3%	3,942,622	1,514,889	5,457,511	-	-	-	-												5,457,511			-	-							
Risks and Opportunities	3%	-	-	-	-	-	-	-																							
Utilities	3%	-	-	-	-	-	-	-																							
TOTAL		**4,474,184**	**1,719,133**	**6,193,317**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**6,193,317**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Owners Rep Contract																															
Owners Representative	3%	11,500,000	5,440,517	16,940,517	-	-	-	-												2,076,351	1,425,761	7,342,669	4,537,769	1,557,967	-						
Preliminary Engineering/Bridge	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	-	-	-	-	-	-	-																							
CE	3%	-	-	-	-	-	-	-																							
Construction	3%	-	-	-	-	-	-	-																							
Risks and Opportunities	3%	-	-	-	-	-	-	-																							
Utilities	3%	-	-	-	-	-	-	-																							
TOTAL		**11,500,000**	**5,440,517**	**16,940,517**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2,076,351**	**1,425,761**	**7,342,669**	**4,537,769**	**1,557,967**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Risks and Opportunities																															
Owners Representative	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3%	-	-	-	-	-	-	-																							
Preliminary Engineering/Road	3%	-	-	-	-	-	-	-																							
Right-of-Way	3%	-	-	-	-	-	-	-																							
CE	3%	-	-	-	-	-	-	-																							
Construction	3%	-	-	-	-	-	-	-																							
Risks and Opportunities	3%	42,250,142	21,982,856	64,232,998	-	-	-	-												1,684,998		11,498,168	22,654,185	28,395,648							
Utilities	3%	-	-	-	-	-	-	-																							
TOTAL		**42,250,142**	**21,982,856**	**64,232,998**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1,684,998**	**-**	**11,498,168**	**22,654,185**	**28,395,648**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Total by Element																															
Owners Representative	3%	11,500,000	5,440,517	16,940,517	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,076,351	1,425,761	7,342,669	4,537,769	1,557,967	-	-	-	-	-	-	-
Preliminary Engineering/Bridge	3%	15,878,596	6,101,094	21,979,690	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21,979,690	-	-	-	-	-	-	-	-	-	-	-
Preliminary Engineering/Road	3%	265,781	102,122	367,903	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	367,903	-	-	-	-	-	-	-	-	-	-	-
Right-of-Way	3%	7,823,907	3,006,210	10,830,117	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10,830,117	-	-	-	-	-	-	-	-	-	-	-
CE	3%	16,144,377	7,945,485	24,089,862	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,277,178	-	11,016,419	3,528,191	7,268,073	-	-	-	-	-	-	-
Construction	3%	236,990,405	116,718,680	353,709,085	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32,502,281	-	162,161,867	51,975,470	107,069,467	-	-	-	-	-	-	-
Risks and Opportunities	3%	42,250,142	21,982,856	64,232,998	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,684,998	-	11,498,168	22,654,185	28,395,648	-	-	-	-	-	-	-
Utilities	3%	4,050,800	1,820,128	5,870,928	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,277,648	-	4,593,280	-	-	-	-	-	-	-	-	-
GRAND TOTAL		**334,904,008**	**163,117,092**	**498,021,100**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**72,996,166**	**1,425,761**	**196,612,403**	**82,695,614**	**144,291,156**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Total by Segment																															
#11 Between Cass & I-75		23,220,377	8,922,055	32,142,432	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32,142,432	-	-	-	-	-	-	-	-	-	-	-
#12 Brush & Russell		203,583,194	102,058,523	305,641,717	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24,747,476	-	111,053,040	55,503,660	114,337,540	-	-	-	-	-	-	-
#13 Second Ave & Russell		49,876,111	22,994,008	72,870,119	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6,151,592	-	66,718,526	-	-	-	-	-	-	-	-	-
#14 Rehab I-75		4,474,184	1,719,133	6,193,317	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6,193,317	-	-	-	-	-	-	-	-	-	-	-
Owners Rep Contract		11,500,000	5,440,517	16,940,517	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,076,351	1,425,761	7,342,669	4,537,769	1,557,967	-	-	-	-	-	-	-
Risks and Opportunities		42,250,142	21,982,856	64,232,998	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,684,998	-	11,498,168	22,654,185	28,395,648	-	-	-	-	-	-	-
GRAND TOTAL		**334,904,008**	**163,117,092**	**498,021,100**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**72,996,166**	**1,425,761**	**196,612,403**	**82,695,614**	**144,291,156**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
IFP Cumulative Cost					**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**72,996,166**	**74,421,926**	**271,034,330**	**353,729,944**	**498,021,100**	**498,021,100**	**498,021,100**	**498,021,100**	**498,021,100**	**498,021,100**	**498,021,100**	**498,021,100**

I-94 Ford Freeway Modernization Project Initial Financial Plan

INFLATED BASE YEAR COSTS, by State Fiscal Year
Segment 1
Cost Start Year 2010
IFP Preparation SFY 2014
Current Fiscal Year 2014

Major Project Cost Elements	Annual Inflation / Escalation Rate	Current Year Cost Estimate to Complete	Inflation Cost	Total Y.O.E. Cost	Federal and State Fiscal Year 2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
# of years to inflate from base year		2014			0	0	0	0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Cross Streets																															
Owners Rep Contract	3.1%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3.1%	-	-	-	-	-	-	-																							
Preliminary Engineering/Road	3.1%	5,327,040	3,094,004	8,421,044	-	-	-	-											-					8,421,044							
Right-of-Way	3.1%	5,733,731	3,330,215	9,063,946	-	-	-	-											-					9,063,946							
CE	3.1%	5,327,040	3,624,201	8,951,241	-	-	-	-														-		-		8,951,241					
Construction	3.1%	74,880,943	50,944,542	125,825,485	-	-	-	-														-		-		125,825,485					
Utilities	3.1%	4,141,000	2,405,139	6,546,139	-	-	-	-														-		6,546,139							
TOTAL		**95,409,754**	**63,398,101**	**158,807,855**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**24,031,128**	**-**	**134,776,727**	**-**	**-**	**-**	**-**	**-**
Rehab Pump Stations																															
Owners Rep Contract	3.1%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3.1%	-	-	-		-	-	-																							
Preliminary Engineering/Road	3.1%	642,687	373,280	1,015,967		-	-	-											-					1,015,967							
Right-of-Way	3.1%	-	-	-		-	-	-																							
CE	3.1%	642,687	404,775	1,047,462		-	-	-														-		-	1,047,462						
Construction	3.1%	9,533,699	6,004,479	15,538,178		-	-	-														-		-	15,538,178						
Utilities	3.1%	-	-	-	-	-	-	-																-							
TOTAL		**10,819,073**	**6,782,533**	**17,601,606**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1,015,967**	**16,585,639**	**-**	**-**	**-**	**-**	**-**	**-**
CN Rail & Conrail Bridges																															
Owners Rep Contract	3.1%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3.1%	10,844,695	7,378,086	18,222,781	-	-	-	-												-				-		18,222,781			-		
Preliminary Engineering/Road	3.1%	-	-	-	-	-	-	-																							
Right-of-Way	3.1%	3,043,263	1,767,561	4,810,824	-	-	-	-												-				4,810,824							
CE	3.1%	10,844,695	10,038,580	20,883,275	-	-	-	-															-		-					11,118,420	9,764,855
Construction	3.1%	160,871,485	148,913,483	309,784,968	-	-	-	-															-		-					164,931,953	144,853,015
Utilities	3.1%	-	-	-	-	-	-	-																	-						
TOTAL		**185,604,138**	**168,097,710**	**353,701,848**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**4,810,824**	**-**	**18,222,781**	**-**	**-**	**-**	**176,050,373**	**154,617,870**
Between I-96 and Trumbull																															
Owners Rep Contract	3.1%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3.1%	-	-	-	-	-	-	-																							
Preliminary Engineering/Road	3.1%	1,659,624	963,928	2,623,552	-	-	-	-												-				2,623,552	-	-					
Right-of-Way	3.1%	-	-	-	-	-	-	-																-	-	-					
CE	3.1%	1,659,624	1,129,110	2,788,734	-	-	-	-																-	-	2,788,734	-	-	-	-	-
Construction	3.1%	23,599,449	16,055,662	39,655,111	-	-	-	-																-	-	39,655,111	-	-	-	-	-
Utilities	3.1%	2,055,350	1,193,770	3,249,120	-	-	-	-																3,249,120		-					
TOTAL		**28,974,047**	**19,342,470**	**48,316,517**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**5,872,672**	**-**	**42,443,845**	**-**	**-**	**-**	**-**	**-**
Service Drives-Trumbell & Cass																															
Owners Rep Contract	3.1%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3.1%	-	-	-	-	-	-	-																							
Preliminary Engineering/Road	3.1%	22,390,386	14,101,829	36,492,215	-	-	-	-													-			-	36,492,215						
Right-of-Way	3.1%	6,476,533	4,079,026	10,555,559	-	-	-	-														-		-	10,555,559						
CE	3.1%	22,390,386	17,690,124	40,080,510	-	-	-	-																-		-	12,800,634	12,797,531	12,781,934	1,700,410	
Construction	3.1%	327,956,164	259,110,543	587,066,707	-	-	-	-																-		-	187,493,283	187,447,830	187,219,378	24,906,217	
Utilities	3.1%	4,703,350	2,731,758	7,435,108	-	-	-	-																7,435,108							
TOTAL		**383,916,819**	**297,713,279**	**681,630,098**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**7,435,108**	**47,047,774**	**-**	**200,293,917**	**200,245,361**	**200,001,312**	**26,606,626**	**-**
Owners Rep Contract																															
Owners Rep Contract	3.1%	2,000,000	1,161,622	3,161,622	-	-	-	-																3,161,622							
Preliminary Engineering/Bridge	3.1%	-	-	-	-	-	-	-																							
Preliminary Engineering/Road	3.1%	-	-	-	-	-	-	-																							
Right-of-Way	3.1%	-	-	-	-	-	-	-																							
CE	3.1%	-	-	-	-	-	-	-																							
Construction	3.1%	-	-	-	-	-	-	-																							
Risks and Opportunities	3.1%	-	-	-	-	-	-	-																							
Utilities	3.1%	-	-	-	-	-	-	-																							
TOTAL		**2,000,000**	**1,161,622**	**3,161,622**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3,161,622**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Risks and Opportunities																															
Owners Rep Contract	3.1%	-	-	-	-	-	-	-																							
Preliminary Engineering/Bridge	3.1%	-	-	-	-	-	-	-																							
Preliminary Engineering/Road	3.1%	-	-	-	-	-	-	-																							
Right-of-Way	3.1%	-	-	-	-	-	-	-																							
CE	3.1%	-	-	-	-	-	-	-																							
Construction	3.1%	-	-	-	-	-	-	-																							
Risks and Opportunities	3.1%	21,180,832	12,917,237	34,098,069	-	-	-	-																23,712,167		10,385,903					
Utilities	3.1%	-	-	-	-	-	-	-																							
TOTAL		**21,180,832**	**12,917,237**	**34,098,069**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**23,712,167**	**-**	**10,385,903**	**-**	**-**	**-**	**-**	**-**
		-																													
Total by Element																															
Owners Rep Contract	3.1%	2,000,000	1,161,622	3,161,622	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,161,622	-	-	-	-	-	-	-
Preliminary Engineering/Bridge	3.1%	10,844,695	7,378,086	18,222,781	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18,222,781	-	-	-	-	-
Preliminary Engineering/Road	3.1%	30,019,737	18,533,041	48,552,778	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12,060,563	36,492,215	-	-	-	-	-	-
Right-of-Way	3.1%	15,253,527	9,176,801	24,430,328	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13,874,770	10,555,559	-	-	-	-	-	-
CE	3.1%	40,864,432	32,886,789	73,751,221	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,047,462	11,739,975	12,800,634	12,797,531	12,781,934	12,818,830	9,764,855
Construction	3.1%	596,841,740	481,028,709	1,077,870,449	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15,538,178	165,480,597	187,493,283	187,447,830	187,219,378	189,838,170	144,853,015
Utilities	3.1%	10,899,700	6,330,667	17,230,367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17,230,367	-	-	-	-	-	-	-
GRAND TOTAL		**727,904,663**	**569,412,953**	**1,297,317,616**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**70,039,488**	**63,633,413**	**205,829,255**	**200,293,917**	**200,245,361**	**200,001,312**	**202,656,999**	**154,617,870**
Total by Segment																															
Cross Streets		95,409,754	63,398,101	158,807,855	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24,031,128	-	134,776,727	-	-	-	-	-
Rehab Pump Stations		10,819,073	6,782,533	17,601,606	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,015,967	16,585,639	-	-	-	-	-	-
CN Rail & Conrail Bridges		185,604,138	168,097,710	353,701,848	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,810,824	-	18,222,781	-	-	-	176,050,373	154,617,870
Between I-96 and Trumbull		28,974,047	19,342,470	48,316,517	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5,872,672	-	42,443,845	-	-	-	-	-
Service Drives-Trumbell & Cass		383,916,819	297,713,279	681,630,098	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7,435,108	47,047,774	-	200,293,917	200,245,361	200,001,312	26,606,626	-
Owners Rep Contract		2,000,000	1,161,622	3,161,622	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,161,622	-	-	-	-	-	-	-
Risks and Opportunities		21,180,832	12,917,237	34,098,069	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23,712,167	-	10,385,903	-	-	-	-	-
GRAND TOTAL		**727,904,663**	**569,412,953**	**1,297,317,616**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**70,039,488**	**63,633,413**	**205,829,255**	**200,293,917**	**200,245,361**	**200,001,312**	**202,656,999**	**154,617,870**
IFP Cumulative Cost					**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**70,039,488**	**133,672,901**	**339,502,156**	**539,796,074**	**740,041,435**	**940,042,747**	**1,142,699,746**	**1,297,317,616**

I-94 Detailed Engineering Report

Conceptual Base Plans

I-96 to Conner
Leng 6.7 Miles

Prepared By: CH2M HILL
Std. Specs for Co 2003
Date: Dec-4-13
Time: 7:36:13 AM

CONTRACT SUMMARY BY SEGMENT

Letting Month/Year	Apr-00	Apr-00	Apr-00	Apr-00	Apr-00	Apr-00	Apr-00	
Duration (Months)	9	9	15	15	15	15	15	
Package	Advanced Bridge 1	Advanced Bridge 2	Advanced Bridge 3	Advanced Bridge 4	Advanced Bridge 5	Advanced Bridge 6	Advanced Bridge 7	
Segment	ADV	ADV	ADV	ADV	ADV	ADV	ADV	Totals
Project Description	Gratiot (M-3)	Van Dyke (M-53)	Mt. Elliot	2nd Avenue	Chene and Concord	Cadillac and Cass	Brush and French	Advanced Contracts
I. RIGHT-OF-WAY								
Right-of-Way	$592,550	$17,875	$1,440,807	$1,607,387	$728,236	$832,928	$2,576,903	$7,796,686
Contingency	$0	$0	$0	$0	$0	$0	$0	$0
I. RIGHT-OF-WAY TOTALS	$592,550	$17,875	$1,440,807	$1,607,387	$728,236	$832,928	$2,576,903	$7,796,686
II. CONSTRUCTION								
1. Removal								
Clearing	$552	$736	$3,910	$920	$1,104	$414	$828	$8,464
Drainage Removal	$4,535	$12,260	$14,950	$20,345	$16,360	$9,545	$9,507	$87,502
Guardrail Removal	$60	$0	$0	$0	$0	$83	$0	$143
Pavement Removal	$62,609	$37,134	$59,414	$111,937	$38,142	$28,600	$34,880	$372,716
Concrete Barrier Removal	$0	$0	$3,596	$2,521	$0	$420	$0	$6,537
Sidewalk Removal	$17,433	$12,064	$22,900	$28,962	$8,496	$8,038	$11,960	$109,853
Incidental Removals	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$85,189	$62,194	$104,770	$164,685	$64,102	$47,100	$57,175	$585,215
2. Earthwork								
Excavation	$59,960	$22,064	$39,040	$160,929	$0	$37,770	$0	$319,763
Embankment	$18,160	$1,830	$14,115	$62,455	$0	$2,913	$0	$99,473
Incidental Earthwork	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$78,120	$23,894	$53,155	$223,384	$0	$40,683	$0	$419,236
3. Pavement and Base Materials								
Subbase	$355,023	$207,036	$184,104	$111,903	$108,369	$58,355	$98,055	$1,122,845
Aggregate Base	$0	$0	$0	$0	$0	$0	$0	$0
Open Graded Drainage Course	$108,530	$60,877	$112,127	$216,395	$66,182	$49,769	$57,349	$671,229
Pavement	$557,840	$307,496	$551,722	$1,007,706	$363,280	$269,409	$313,652	$3,371,105
Conc Quality Assurance	$34,361	$19,796	$35,425	$65,455	$22,519	$17,524	$20,111	$215,191
Incidental Pavement and Base Materials	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$1,055,754	$595,205	$883,378	$1,401,459	$560,350	$395,057	$489,167	$5,380,370
4. Drainage and Erosion Control								
Underdrain	$30,011	$26,128	$29,121	$58,880	$10,305	$22,123	$11,531	$188,099
Storm Sewer	$96,163	$149,008	$205,696	$358,984	$177,630	$109,045	$102,794	$1,199,320
Pump Stations	$0	$0	$0	$0	$0	$0	$0	$0
Erosion Control	$14,301	$13,932	$20,158	$44,887	$13,155	$12,030	$8,003	$126,466
Incidental Drainage	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$140,475	$189,068	$254,975	$462,751	$201,090	$143,198	$122,328	$1,513,885
5. Structures								
Structure Removal	$890,624	$476,952	$542,127	$489,188	$643,552	$788,144	$593,712	$4,424,299
Bridge Rehabilitation	$0	$0	$0	$0	$0	$0	$0	$0
Highway Bridges	$6,388,584	$3,253,850	$7,319,520	$4,273,920	$4,984,719	$4,824,500	$4,963,076	$36,008,169
Pedestrian Bridges	$0	$0	$0	$0	$0	$0	$0	$0
Railroad Bridges	$0	$0	$0	$0	$0	$0	$0	$0
Retaining Wall Removal	$0	$0	$0	$0	$0	$0	$0	$0
Retaining Walls	$0	$0	$0	$5,151,939	$0	$0	$0	$5,151,939
Noise Walls	$0	$0	$0	$0	$0	$0	$0	$0
Aesthetics	$291,168	$149,232	$314,466	$396,602	$225,131	$224,506	$222,272	$1,823,377
Incidental Structural	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$7,570,376	$3,880,034	$8,176,113	$10,311,649	$5,853,402	$5,837,150	$5,779,060	$47,407,784
6. Traffic								
Maintaining Traffic	$620,566	$320,763	$657,377	$843,447	$467,023	$457,539	$457,888	$3,824,603
Off-Site Traffic Mitigation Projects	$401,846	$213,768	$426,258	$565,377	$300,552	$290,843	$290,148	$2,488,792
Signing and Pavement Marking	$84,460	$47,616	$70,670	$112,117	$44,828	$31,605	$39,133	$430,429
Freeway Signing Bridges	$100,000	$100,000	$100,000	$100,000	$200,000	$200,000	$100,000	$900,000
Traffic Signals	$250,000	$250,000	$250,000	$125,000	$375,000	$375,000	$500,000	$2,125,000
MITS	$0	$0	$0	$0	$0	$0	$0	$0
Incidental Traffic	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$1,456,872	$932,147	$1,504,305	$1,745,941	$1,387,403	$1,354,987	$1,387,169	$9,768,824
7. Miscellaneous Construction								
Sidewalk	$54,993	$47,682	$66,567	$144,363	$42,189	$38,508	$43,239	$437,541
Curb, Curb & Gutter and Valley Gutter	$74,385	$40,748	$90,211	$157,038	$44,908	$42,571	$45,325	$495,186
Concrete Barrier	$0	$0	$0	$0	$0	$0	$0	$0
Guardrail and Attenuators	$0	$0	$0	$0	$0	$0	$0	$0
Freeway Lighting	$0	$0	$0	$0	$0	$0	$0	$0
Fencing	$4,800	$7,360	$4,160	$15,632	$10,560	$8,805	$6,560	$57,877
Landscaping	$0	$0	$0	$0	$0	$0	$0	$0
Contamination and Remediation	$76,508	$74,537	$107,846	$240,147	$70,382	$64,358	$42,815	$676,593
Incidental Miscellaneous Construction	$0	$0	$0	$0	$0	$0	$0	$0
Global Construction Risk, 2013 CER								
TOTALS	$210,686	$170,327	$268,784	$557,180	$168,039	$154,242	$137,939	$1,667,197
8. Utility Relocation								
Public Lighting Department	$723,000	$223,000	$442,000	$425,000	$323,000	$247,000	$291,000	$2,674,000
Major Relocation - Water	$0	$0	$320,000	$44,000	$0	$0	$0	$364,000
Incidental Relocation - Water	$0	$0	$32,000	$4,400	$0	$0	$0	$36,400
Major Relocation - Sanitary	$0	$43,000	$31,500	$0	$97,000	$0	$0	$171,500
Incidental Relocation - Sanitary	$0	$4,300	$3,150	$0	$9,700	$0	$0	$17,150
Incidental Utility Relocation	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$723,000	$270,300	$828,650	$473,400	$429,700	$247,000	$291,000	$3,263,050
9. Mobilization								
Roadway Mobilization	$375,010	$224,314	$389,802	$502,880	$281,068	$238,227	$248,478	$2,259,779
Structure Mobilization	$757,038	$388,003	$817,611	$1,031,165	$585,340	$583,715	$577,906	$4,740,778
TOTALS	$1,132,048	$612,317	$1,207,413	$1,534,045	$866,408	$821,942	$826,384	$7,000,557
10. Contingency								
Roadway Contingency	$937,524	$560,784	$974,504	$1,257,200	$702,671	$595,567	$621,195	$0
Structure Contingency	$1,892,594	$970,009	$2,044,028	$2,577,912	$1,463,351	$1,459,288	$1,444,765	$0
TOTALS	$2,830,118	$1,530,793	$3,018,532	$3,835,112	$2,166,022	$2,054,855	$2,065,960	$0
II. CONSTRUCTION TOTALS	$15,282,638	$8,266,279	$16,300,075	$20,709,606	$11,696,516	$11,096,214	$11,156,182	$77,006,118
III. ENGINEERING AND MANAGEMENT								
Preliminary Engineering	$1,069,785	$578,640	$1,141,005	$1,449,672	$818,756	$776,735	$780,933	$6,615,526
Construction Engineering	$1,069,785	$578,640	$1,141,005	$1,449,672	$818,756	$776,735	$780,933	$6,615,526
III. ENGINEERING AND MANAG TOTALS	$2,139,570	$1,157,280	$2,282,010	$2,899,344	$1,637,512	$1,553,470	$1,561,866	$13,231,052
IV. TOTAL ESTIMATED COST	$18,014,758	$9,441,434	$20,022,892	$25,216,337	$14,062,264	$13,482,612	$15,294,951	$98,033,856

Letting Month/Year	Apr-01	Apr-01	Apr-01	Apr-01	Apr-01	Apr-01	Apr-02	Apr-02	Jul-02	Apr-03	
Duration (Months)	43	44	24	32	20	24	20	32	6	32	
Package	Construction 1	Construction 2	Construction 3	Construction 4	Construction 5	Construction 6	Construction 7	Construction 8	Construction 9	Construction 10	
Segment	3	3	3	3	3	3	3	3	3	3	Totals
Project Description	Dequindre Bridge, including WB to I-75, and vicinity streets/bridges between I-75 and Chene	I-94 between St. Aubin and Frontenac, vicinity streets between St. Aubin and Frontenac; E. Grand Bridge	Frontenac, Burns, Conner, and Barrett bridges	Pedestrian bridges at Helen, Townsend, Seminole, Rohns, Springfield and Malcolm	Gratiot ramps and vicinity streets	Norfolk Southern and Conrail bridges (Part-width construction)	I-94 EB and vicinity streets between Frontenac and Norcross	Reconstruct all pump stations between Woodward and Conner	Temporary widening along I-94 WB between Frontenac and Norcross	I-94 WB and vicinity streets between Frontenac and Connor	Segment 3
I. RIGHT-OF-WAY											
Right-of-Way	$8,719,447	$9,081,164	$2,339,270	$5,239,368	$4,445,834	$0	$1,750,055	$0	$0	$550,742	$32,125,880
Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
I. RIGHT-OF-WAY TOTALS	$8,719,447	$9,081,164	$2,339,270	$5,239,368	$4,445,834	$0	$1,750,055	$0	$0	$550,742	$32,125,880
II. CONSTRUCTION											
1. Removal											
Clearing	$4,324	$38,502	$6,256	$0	$11,914	$0	$14,214	$0	$0	$12,420	$87,630
Drainage Removal	$0	$245,249	$36,161	$0	$37,653	$0	$209,612	$0	$0	$106,319	$634,994
Guardrail Removal	$749	$2,091	$281	$0	$3,470	$0	$1,278	$0	$0	$1,179	$9,048
Pavement Removal	$69,701	$849,060	$179,807	$0	$146,943	$0	$574,290	$0	$69,750	$529,290	$2,418,841
Concrete Barrier Removal	$9,748	$108,614	$0	$0	$1,015	$0	$151,874	$0	$0	$25,961	$297,212
Sidewalk Removal	$5,161	$123,169	$38,493	$0	$23,530	$0	$27,040	$0	$0	$21,080	$238,473
Incidental Removals	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$89,683	$1,366,685	$260,998	$0	$224,525	$0	$978,308	$0	$69,750	$696,249	$3,686,198
2. Earthwork											
Excavation	$228,328	$5,344,736	$122,960	$0	$743,272	$0	$2,282,128	$0	$284,440	$2,295,008	$11,300,872
Embankment	$71,960	$465,000	$55,265	$0	$93,610	$0	$64,190	$0	$0	$48,795	$798,820
Incidental Earthwork	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$300,288	$5,809,736	$178,225	$0	$836,882	$0	$2,346,318	$0	$284,440	$2,343,803	$12,099,692
3. Pavement and Base Materials											
Subbase	$224,829	$2,459,610	$695,529	$0	$519,849	$0	$1,328,607	$0	$0	$1,359,864	$6,588,288
Aggregate Base	$0	$0	$0	$0	$0	$0	$0	$0	$145,000	$0	$145,000
Open Graded Drainage Course	$163,979	$1,926,978	$309,812	$0	$348,365	$0	$1,304,158	$0	$0	$1,299,843	$5,353,135
Pavement	$819,603	$9,495,678	$1,656,021	$0	$1,677,501	$0	$6,326,278	$0	$386,100	$6,194,143	$26,555,324
Conc Quality Assurance	$51,380	$589,640	$105,143	$144	$107,065	$0	$426,913	$0	$0	$353,608	$1,633,893
Incidental Pavement and Base Materials	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$1,259,791	$14,471,906	$2,766,505	$144	$2,652,780	$0	$9,385,956	$0	$531,100	$9,207,458	$40,275,640
4. Drainage and Erosion Control											
Underdrain	$0	$639,695	$90,661	$0	$159,957	$0	$504,641	$0	$0	$481,067	$1,876,021
Storm Sewer	$0	$6,046,615	$463,190	$0	$662,110	$0	$5,081,566	$0	$310,280	$1,170,967	$13,734,728
Pump Stations	$0	$0	$0	$0	$0	$0	$0	$7,899,896	$0	$0	$7,899,896
Erosion Control	$21,020	$874,723	$51,245	$0	$116,126	$0	$555,277	$552,993	$41,630	$279,709	$2,492,723
Incidental Drainage	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$21,020	$7,561,033	$605,096	$0	$938,193	$0	$6,141,484	$8,452,889	$351,910	$1,931,743	$26,003,368
5. Structures											
Structure Removal	$1,302,596	$1,304,724	$1,498,168	$296,000	$362,145	$0	$0	$0	$0	$0	$4,763,633
Bridge Rehabilitation	$63,079,500	$0	$0	$0	$0	$0	$0	$0	$0	$0	$63,079,500
Highway Bridges	$26,399,550	$4,243,460	$9,056,480	$0	$0	$0	$0	$0	$0	$0	$39,699,490
Pedestrian Bridges	$0	$0	$0	$14,944,412	$0	$0	$0	$0	$0	$0	$14,944,412
Railroad Bridges	$7,036,114	$0	$0	$0	$0	$23,323,036	$0	$0	$0	$0	$30,359,150
Retaining Wall Removal	$0	$308,580	$0	$0	$0	$0	$0	$0	$0	$0	$308,580
Retaining Walls	$4,578,982	$23,230,561	$0	$0	$7,275,758	$0	$22,826,949	$0	$0	$26,930,148	$84,842,398
Noise Walls	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Aesthetics	$4,095,870	$1,163,493	$422,186	$609,616	$305,516	$932,921	$913,078	$0	$0	$1,077,206	$9,519,886
Incidental Structural	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$106,492,612	$30,250,818	$10,976,834	$15,850,028	$7,943,419	$24,255,957	$23,740,027	$0	$0	$28,007,354	$247,517,049
6. Traffic											
Maintaining Traffic	$8,049,935	$2,992,407	$961,588	$1,188,759	$728,395	$1,819,197	$2,249,800	$0	$26,555	$2,560,924	$20,577,560
Off-Site Traffic Mitigation Projects	$4,867,353	$2,675,708	$665,445	$713,258	$566,811	$1,091,518	$1,916,644	$380,380	$55,674	$1,898,397	$14,831,188
Signing and Pavement Marking	$100,783	$1,157,752	$221,320	$12	$212,222	$0	$750,876	$0	$42,488	$736,597	$3,222,050
Freeway Signing Bridges	$800,000	$700,000	$0	$0	$100,000	$0	$600,000	$0	$0	$600,000	$2,800,000
Traffic Signals	$250,000	$875,000	$1,250,000	$0	$0	$0	$0	$0	$0	$0	$2,375,000
MITS	$0	$321,264	$0	$0	$0	$0	$1,765,781	$0	$0	$1,765,781	$3,852,826
Incidental Traffic	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$14,068,071	$8,722,131	$3,098,353	$1,902,029	$1,607,428	$2,910,715	$7,283,101	$380,380	$124,717	$7,561,699	$47,658,624
7. Miscellaneous Construction											
Sidewalk	$43,806	$368,898	$200,025	$2,880	$142,506	$0	$145,848	$0	$0	$129,021	$1,032,984
Curb, Curb & Gutter and Valley Gutter	$124,829	$1,246,012	$246,813	$0	$321,287	$0	$746,944	$0	$0	$748,986	$3,434,871
Concrete Barrier	$39,362	$682,211	$0	$0	$0	$0	$1,319,195	$0	$0	$0	$2,040,768
Guardrail and Attenuators	$21,800	$39,820	$0	$0	$16,000	$0	$15,000	$0	$0	$17,340	$109,960
Freeway Lighting	$476,000	$738,000	$0	$0	$18,000	$0	$1,289,000	$0	$0	$19,000	$2,540,000
Fencing	$24,960	$196,320	$31,680	$0	$108,960	$0	$0	$0	$0	$143,680	$505,600
Landscaping	$0	$750,000	$0	$0	$0	$0	$550,000	$550,000	$0	$0	$1,850,000
Contamination and Remediation	$112,458	$4,679,769	$274,162	$0	$621,276	$0	$2,970,731	$2,958,511	$222,723	$1,496,441	$13,336,071
Incidental Miscellaneous Construction	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Global Construction Risk, 2013 CER	$6,414,525	$4,376,905	$1,031,338	$920,143	$910,140	$1,407,891	$3,043,739	$639,603	$82,123	$2,802,495	$21,628,901
TOTALS	$7,257,740	$13,077,935	$1,784,018	$923,023	$2,138,169	$1,407,891	$10,080,457	$4,148,114	$304,846	$5,356,963	$46,479,155
8. Utility Relocation											
Public Lighting Department	$700,000	$2,875,000	$1,262,000	$0	$1,022,000	$0	$885,000	$0	$0	$937,000	$7,681,000
Major Relocation - Water	$0	$2,970,800	$0	$0	$1,008,000	$0	$993,400	$0	$0	$935,400	$5,907,600
Incidental Relocation - Water	$0	$297,080	$0	$0	$100,800	$0	$99,340	$0	$0	$93,540	$590,760
Major Relocation - Sanitary	$0	$1,300,500	$0	$0	$0	$0	$138,800	$0	$0	$107,800	$1,547,100
Incidental Relocation - Sanitary	$0	$130,050	$0	$0	$0	$0	$13,880	$0	$0	$10,780	$154,710
Incidental Utility Relocation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$700,000	$7,573,430	$1,262,000	$0	$2,130,800	$0	$2,130,420	$0	$0	$2,084,520	$15,881,170
9. Mobilization											
Roadway Mobilization	$1,728,207	$5,420,595	$892,386	$190,505	$961,864	$291,072	$3,430,231	$1,234,178	$158,464	$2,537,994	$16,845,496
Structure Mobilization	$10,649,261	$3,025,082	$1,097,683	$1,585,003	$794,342	$2,425,596	$2,374,003	$0	$0	$2,800,735	$24,751,705
TOTALS	$12,377,468	$8,445,677	$1,990,069	$1,775,508	$1,756,206	$2,716,668	$5,804,234	$1,234,178	$158,464	$5,338,729	$41,597,201
10. Contingency											
Roadway Contingency	$4,320,517	$13,551,488	$2,230,964	$476,263	$2,404,659	$727,679	$8,575,576	$3,085,445	$396,160	$6,344,985	$42,113,736
Structure Contingency	$26,623,153	$7,562,705	$2,744,209	$3,962,507	$1,985,855	$6,063,989	$5,935,007	$0	$0	$7,001,839	$61,879,264
TOTALS	$30,943,670	$21,114,193	$4,975,173	$4,438,770	$4,390,514	$6,791,668	$14,510,583	$3,085,445	$396,160	$13,346,824	$103,993,000
II. CONSTRUCTION TOTALS	$173,510,343	$118,393,544	$27,897,271	$24,889,502	$24,618,916	$38,082,899	$82,400,888	$17,301,006	$2,221,387	$75,875,342	$585,191,097
III. ENGINEERING AND MANAGEMENT											
Preliminary Engineering	$11,696,707	$7,981,165	$1,880,615	$1,677,855	$1,659,614	$2,567,251	$5,485,000	$1,166,298	$149,748	$5,045,099	$39,309,352
Construction Engineering	$11,696,707	$7,981,165	$1,880,615	$1,677,855	$1,659,614	$2,567,251	$5,485,000	$1,166,298	$149,748	$5,045,099	$39,309,352
III. ENGINEERING AND MANAG TOTALS	$23,393,414	$15,962,330	$3,761,230	$3,355,710	$3,319,228	$5,134,502	$10,970,000	$2,332,596	$299,496	$10,090,198	$78,618,704
IV. TOTAL ESTIMATED COST	$205,623,204	$143,437,038	$33,997,771	$33,484,580	$32,383,978	$43,217,401	$95,120,943	$19,633,602	$2,520,883	$86,516,282	$695,935,681

Letting Month/Year	Apr-03	Apr-03	Apr-05	Apr-05		Apr-06	Jul-06	Apr-07	Apr-07	Apr-07		
Duration (Months)	13	36	22	22		20	20	40	44	44		
Package	Construction 11	Construction 12	Construction 13	Construction 14		Construction 15	Construction 16	Construction 17	Construction 18	Construction 19		
Segment	1 & 2	2	1&2	2	Totals	1	1	1	1	1	Totals	
Project Description	Cross streets, and various retaining walls and service drives between Cass and I-75	I-94, I-75 ramps, and various service drives between Brush and Russell	I-94 between 2nd and Russell; M-10 NB to EB ramp; Woodward Ave.	Rehabilitate I-75	Segment 2	Cross streets, various, between I-96 and Trumbull; Grand River, Linwood, 14th, Rosa Parks and Trumbull bridges	Rehabilitate Pump Stations	CN Rail and Conrail bridges over I-94 and M-10	I-94 and adjacent ramps between I-96 and Trumbull	I-94, M-10, adjacent ramps, and various service drives between Trumbull and Cass	Segment 1	
I. RIGHT-OF-WAY												
Right-of-Way	$1,058	$6,215,354	$1,607,495	$0	$7,823,907	$5,733,731	$0	$3,043,263	$0	$6,476,533	$15,253,527	$63,000,000
Contingency	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
I. RIGHT-OF-WAY TOTALS	$1,058	$6,215,354	$1,607,495	$0	$7,823,907	$5,733,731	$0	$3,043,263	$0	$6,476,533	$15,253,527	$63,000,000
II. CONSTRUCTION												
1. Removal												
Clearing	$5,014	$25,530	$5,152	$0	$35,696	$10,764	$0	$0	$4,922	$36,156	$51,842	$183,632
Drainage Removal	$9,642	$70,010	$85,420	$0	$165,072	$70,010	$0	$0	$85,245	$346,494	$501,749	$1,389,317
Guardrail Removal	$212	$1,717	$330	$0	$2,259	$938	$0	$0	$251	$2,339	$3,528	$14,978
Pavement Removal	$79,613	$543,600	$393,050	$0	$1,016,263	$226,799	$0	$0	$331,822	$1,228,304	$1,786,925	$5,594,745
Concrete Barrier Removal	$1,867	$166,031	$101,631	$0	$269,529	$2,618	$0	$0	$129,371	$369,393	$501,382	$1,074,660
Sidewalk Removal	$16,009	$58,624	$13,521	$0	$88,154	$52,750	$0	$0	$0	$0	$52,750	$489,230
Incidental Removals	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$112,357	$865,512	$599,104	$0	$1,576,973	$363,879	$0	$0	$551,611	$1,982,686	$2,898,176	$8,746,562
2. Earthwork												
Excavation	$472,058	$0	$1,482,941	$0	$1,954,999	$735,112	$0	$0	$1,533,066	$3,609,287	$5,877,465	$19,453,099
Embankment	$42,464	$0	$216,588	$0	$259,052	$76,144	$0	$0	$64,708	$275,679	$416,531	$1,573,876
Incidental Earthwork	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$514,522	$0	$1,699,529	$0	$2,214,051	$811,256	$0	$0	$1,597,774	$3,884,966	$6,293,996	$21,026,975
3. Pavement and Base Materials												
Subbase	$231,782	$1,359,333	$839,478	$0	$2,430,593	$207,949	$0	$0	$346,706	$1,112,514	$1,667,169	$11,808,895
Aggregate Base	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$145,000
Open Graded Drainage Course	$158,067	$1,005,159	$879,680	$0	$2,042,906	$415,697	$0	$0	$955,827	$2,754,422	$4,125,946	$12,193,216
Pavement	$800,912	$4,548,049	$4,764,291	$2,021,015	$12,134,267	$2,177,419	$0	$0	$4,631,387	$13,007,107	$19,815,913	$61,876,609
Conc Quality Assurance	$51,776	$316,284	$298,644	$53,539	$720,243	$139,336	$0	$0	$282,237	$860,707	$1,282,280	$3,851,607
Incidental Pavement and Base Materials	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$1,242,537	$7,228,825	$6,782,093	$2,074,554	$17,328,009	$2,940,401	$0	$0	$6,216,157	$17,734,750	$26,891,308	$89,875,327
4. Drainage and Erosion Control												
Underdrain	$65,404	$403,045	$292,977	$0	$761,426	$217,155	$0	$0	$274,465	$1,730,816	$2,222,436	$5,047,982
Storm Sewer	$504,310	$1,549,109	$1,816,407	$251,160	$4,120,986	$2,329,667	$0	$0	$840,100	$8,433,159	$11,602,926	$30,657,960
Pump Stations	$0	$0	$115,000	$0	$115,000	$115,000	$4,556,275	$0	$0	$115,000	$4,786,275	$12,801,171
Erosion Control	$75,897	$136,651	$274,674	$17,581	$504,803	$243,115	$318,939	$0	$189,864	$991,476	$1,743,394	$4,867,386
Incidental Drainage	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$645,611	$2,088,805	$2,499,058	$268,741	$5,502,215	$2,904,937	$4,875,214	$0	$1,304,429	$11,270,451	$20,355,031	$53,374,499
5. Structures												
Structure Removal	$1,440,636	$4,260,193	$809,592	$0	$6,510,421	$2,084,656	$0	$0	$0	$7,795,540	$9,880,196	$25,578,549
Bridge Rehabilitation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$63,079,500
Highway Bridges	$0	$68,209,541	$4,172,630	$0	$72,382,171	$16,302,144	$0	$0	$0	$99,312,782	$115,614,926	$263,704,756
Pedestrian Bridges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,716,220	$4,716,220	$19,660,632
Railroad Bridges	$0	$0	$0	$0	$0	$0	$0	$91,864,256	$0	$0	$91,864,256	$122,223,406
Retaining Wall Removal	$0	$206,640	$24,300	$0	$230,940	$0	$0	$41,400	$125,340	$357,180	$523,920	$1,063,440
Retaining Walls	$7,146,567	$13,572,050	$4,217,676	$0	$24,936,293	$17,194,321	$0	$6,616,556	$0	$39,833,097	$63,643,974	$178,574,604
Noise Walls	$0	$3,297,400	$0	$0	$3,297,400	$0	$0	$0	$0	$445,000	$445,000	$3,742,400
Aesthetics	$343,488	$3,541,833	$368,968	$0	$4,254,289	$1,423,245	$0	$3,940,888	$5,014	$6,098,393	$11,467,540	$27,065,092
Incidental Structural	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$8,930,691	$93,087,657	$9,593,166	$0	$111,611,514	$37,004,366	$0	$102,463,100	$130,354	$158,558,212	$298,156,032	$704,692,379
6. Traffic												
Maintaining Traffic	$731,929	$7,268,016	$1,058,592	$103,728	$9,162,265	$2,922,348	$0	$7,684,733	$320,584	$12,778,603	$23,706,268	$57,270,696
Off-Site Traffic Mitigation Projects	$515,057	$4,602,186	$952,783	$105,448	$6,175,474	$1,981,118	$219,385	$4,610,840	$441,015	$8,704,398	$15,956,756	$39,452,210
Signing and Pavement Marking	$99,403	$578,306	$542,567	$165,964	$1,386,240	$235,232	$0	$0	$497,293	$1,418,780	$2,151,305	$7,190,024
Freeway Signing Bridges	$0	$700,000	$1,000,000	$0	$1,700,000	$0	$0	$0	$700,000	$1,400,000	$2,100,000	$7,500,000
Traffic Signals	$0	$625,000	$250,000	$0	$875,000	$750,000	$0	$0	$0	$1,375,000	$2,125,000	$7,500,000
MITS	$0	$0	$1,565,723	$0	$1,565,723	$0	$0	$0	$1,927,885	$663,806	$2,591,691	$8,010,240
Incidental Traffic	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$1,346,389	$13,773,508	$5,369,665	$375,140	$20,864,702	$5,888,698	$219,385	$12,295,573	$3,886,777	$26,340,587	$48,631,020	$126,923,170
7. Miscellaneous Construction												
Sidewalk	$65,168	$252,051	$98,434	$0	$415,653	$281,255	$0	$0	$0	$528,236	$809,491	$2,695,669
Curb, Curb & Gutter and Valley Gutter	$169,431	$924,004	$444,611	$0	$1,538,046	$328,055	$0	$0	$471,387	$1,752,241	$2,551,683	$8,019,786
Concrete Barrier	$0	$601,568	$665,544	$0	$1,267,112	$0	$0	$0	$541,961	$1,926,552	$2,468,513	$5,776,393
Guardrail and Attenuators	$4,000	$133,680	$17,910	$0	$155,590	$8,000	$0	$0	$0	$141,681	$149,681	$415,231
Freeway Lighting	$10,000	$1,856,000	$346,000	$0	$2,212,000	$0	$0	$0	$790,000	$2,100,000	$2,890,000	$7,642,000
Fencing	$51,026	$139,840	$36,736	$0	$227,602	$113,277	$0	$0	$587	$307,195	$421,059	$1,212,138
Landscaping	$175,000	$500,000	$0	$0	$675,000	$285,000	$0	$0	$0	$900,000	$1,185,000	$3,710,000
Contamination and Remediation	$406,047	$731,082	$1,469,505	$94,059	$2,700,693	$1,300,668	$1,706,325	$0	$1,015,771	$5,304,396	$9,327,160	$26,040,517
Incidental Miscellaneous Construction	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Global Construction Risk, 2013 CER	$756,415	$6,431,643	$1,573,444	$145,755	$8,907,257	$2,921,372	$352,452	$5,947,277	$945,886	$12,296,855	$22,463,842	$53,000,000
TOTALS	$1,637,087	$11,569,868	$4,652,184	$239,814	$18,098,953	$5,237,627	$2,058,777	$5,947,277	$3,765,592	$25,257,156	$42,266,429	$108,511,734
8. Utility Relocation												
Public Lighting Department	$593,000	$1,454,000	$752,000	$0	$2,799,000	$1,600,000	$0	$0	$0	$3,165,000	$4,765,000	$17,919,000
Major Relocation - Water	$300,000	$627,000	$84,500	$0	$1,011,500	$1,260,000	$0	$0	$1,280,000	$1,117,000	$3,657,000	$10,940,100
Incidental Relocation - Water	$30,000	$62,700	$8,450	$0	$101,150	$126,000	$0	$0	$128,000	$111,700	$365,700	$1,094,010
Major Relocation - Sanitary	$0	$81,000	$45,500	$0	$126,500	$1,050,000	$0	$0	$588,500	$281,500	$1,920,000	$3,765,100
Incidental Relocation - Sanitary	$0	$8,100	$4,550	$0	$12,650	$105,000	$0	$0	$58,850	$28,150	$192,000	$376,510
Incidental Utility Relocation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$923,000	$2,232,800	$895,000	$0	$4,050,800	$4,141,000	$0	$0	$2,055,350	$4,703,350	$10,899,700	$34,094,720
9. Mobilization												
Roadway Mobilization	$566,509	$3,132,768	$2,042,319	$281,249	$6,022,845	$1,936,643	$680,092	$1,229,557	$1,743,180	$7,837,709	$13,427,181	$38,555,301
Structure Mobilization	$893,069	$9,208,766	$959,317	$0	$11,061,152	$3,700,437	$0	$10,246,310	$13,035	$15,855,821	$29,815,603	$70,369,238
TOTALS	$1,459,578	$12,341,534	$3,001,636	$281,249	$17,083,997	$5,637,080	$680,092	$11,475,867	$1,756,215	$23,693,530	$43,242,784	$108,924,539
10. Contingency												
Roadway Contingency	$1,416,272	$7,831,919	$5,105,797	$703,124	$15,057,112	$4,841,607	$1,700,231	$3,073,893	$4,357,951	$19,594,273	$33,567,955	$90,738,803
Structure Contingency	$2,232,673	$23,021,914	$2,398,292	$0	$27,652,879	$9,251,092	$0	$25,615,775	$32,589	$39,639,553	$74,539,009	$164,071,152
TOTALS	$3,648,945	$30,853,833	$7,504,089	$703,124	$42,709,991	$14,092,699	$1,700,231	$28,689,668	$4,390,540	$59,233,826	$108,106,964	$254,809,955
II. CONSTRUCTION TOTALS	$20,460,717	$174,042,342	$42,595,524	$3,942,622	$241,041,205	$79,021,943	$9,533,699	$160,871,485	$25,654,799	$332,659,514	$607,741,440	$1,510,979,860
III. ENGINEERING AND MANAGEMENT												
Preliminary Engineering	$1,379,301	$11,662,749	$2,836,546	$265,781	$16,144,377	$5,327,040	$642,687	$10,844,695	$1,659,624	$22,390,386	$40,864,432	$102,933,687
Construction Engineering	$1,379,301	$11,662,749	$2,836,546	$265,781	$16,144,377	$5,327,040	$642,687	$10,844,695	$1,659,624	$22,390,386	$40,864,432	$102,933,687
III. ENGINEERING AND MANAG TOTALS	$2,758,602	$23,325,498	$5,673,092	$531,562	$32,288,754	$10,654,080	$1,285,374	$21,689,390	$3,319,248	$44,780,772	$81,728,864	$205,867,374
IV. TOTAL ESTIMATED COST	$23,220,377	$203,583,194	$49,876,111	$4,474,184	$281,153,866	$95,409,754	$10,819,073	$185,604,138	$28,974,047	$383,916,819	$704,723,831	$1,779,847,234