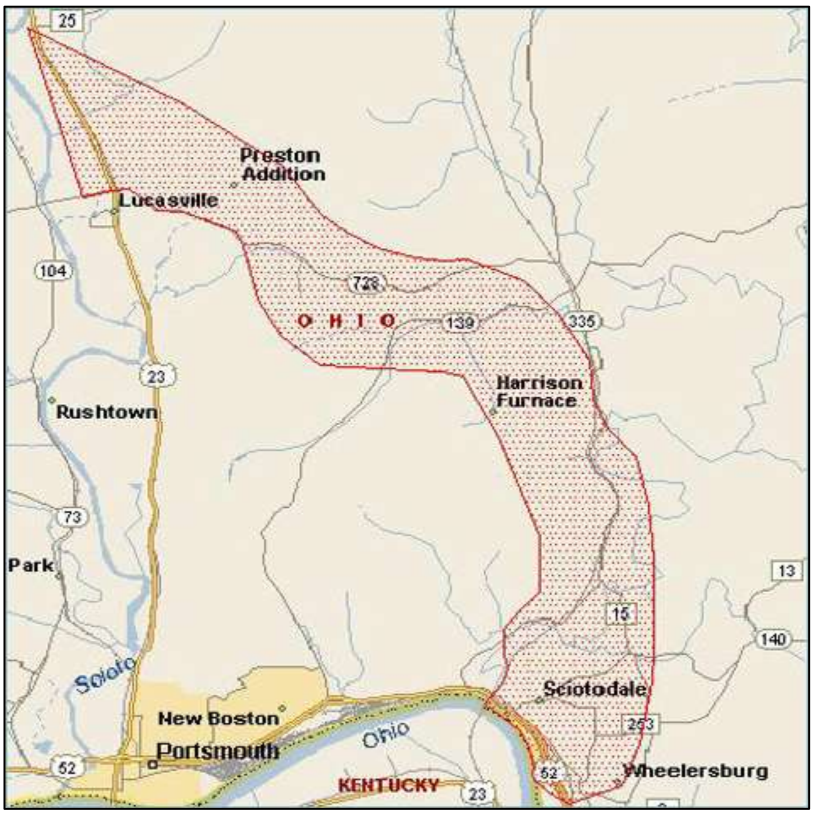
823 Portsmouth Bypass

An Appalachian Development Highway

PORTSMOUTH BYPASS

FHWA COST ESTIMATE REVIEW

May 2011



Final Report

Prepared by

ATKINS

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EXECUTIVE SUMMARY

A review team (Team) of the Federal Highway Administration (FHWA), the Ohio Department of Transportation (ODOT), and their consultants conducted a Cost Estimate Review (CER) workshop to review the cost and schedule estimates for the SCI- 823, Portsmouth Bypass project. The workshop was held in Columbus, Ohio from March 14 through March 17, 2011. The objective of the review was to verify the accuracy and reasonableness of the current project total cost estimate and schedule 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:

After including right-of-way acquisition costs and design and engineering costs to the pre-CER estimate, the estimate was only adjusted to include the risk of change orders during construction. After running the totals of these costs and including a 5% annual inflation, the estimate was at $569 million, near the 90% confidence level. Utilizing inflation probability with 3.5% being the likeliest average inflation, the 70% probability range resulted at $549.8 million, which is the minimum required by the FHWA for approval of the Financial Plan. Following the above discussion, the resulting values of the study area as follows:

Description	Estimated Project Cost
Pre CER Estimate (Present Day)	$354.9
With ROW, Design, and Risks (Present Day)	$431.3
Inclusion of Escalation at ODOT recommended 5% per year (YOE: Year of Expenditure)	$569.0
70% confidence level (Year of Expenditure)	$549.8

FIGURE 1: CER Results

The probability range that resulted in the 70% confidence level of $549.8 million in year of expenditure dollars is shown in the following Figure 2, with a resulting range of potential project costs from below $500 million to above $600 million, based on the potential impact of project risks and market conditions.

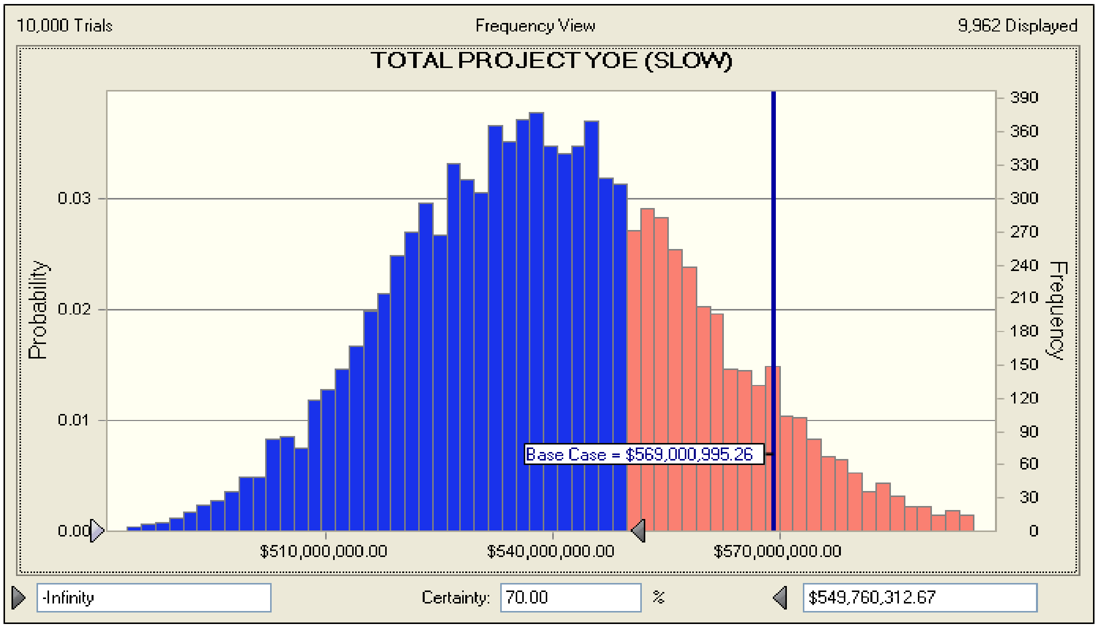


FIGURE 2: Probability Curve for "Slow" project phasing

Figure 2 demonstrates the 70% certainty level for the results of the "Monte-Carlo" probability runs. The approximate 70% level is at $549.8 million and is shown in the dark blue area on the left side of the curve. This means that based on the team's assessment of the project costs and risks, they consider a 70% probability that the resulting project year of expenditure costs will be at $549.8 million or below, and a 30% chance it could be higher than this value, shown by the area in lighter red on the right side of the curve.

The "Base Case" of approximately $569 million shown as the vertical line is the project run with an average yearly inflation of 5%, which was considered by the team to be on the higher side of possibility for average annual construction inflation, which is why the base case is near the higher probability range in the curve.

The values for Figures 1 and 2 are based on the a schedule alternative with the 3 project phases built in series, with Phase 1 being constructed in 3 years(2012-2014), Phase 2 following the completion of Phase 1 for 5 years (2015 – 2019) and Phase 3 following the completion of Phase 2 for 5 years (2020-2024).

The review team discussed other potential phasing scenarios for the project that could occur, based primarily on funding and priority decisions made in the future. The following Figure 3 depicts two other phasing scenarios where there is an opportunity to complete the total project earlier and take advantage of potential savings on the costs related to inflation.

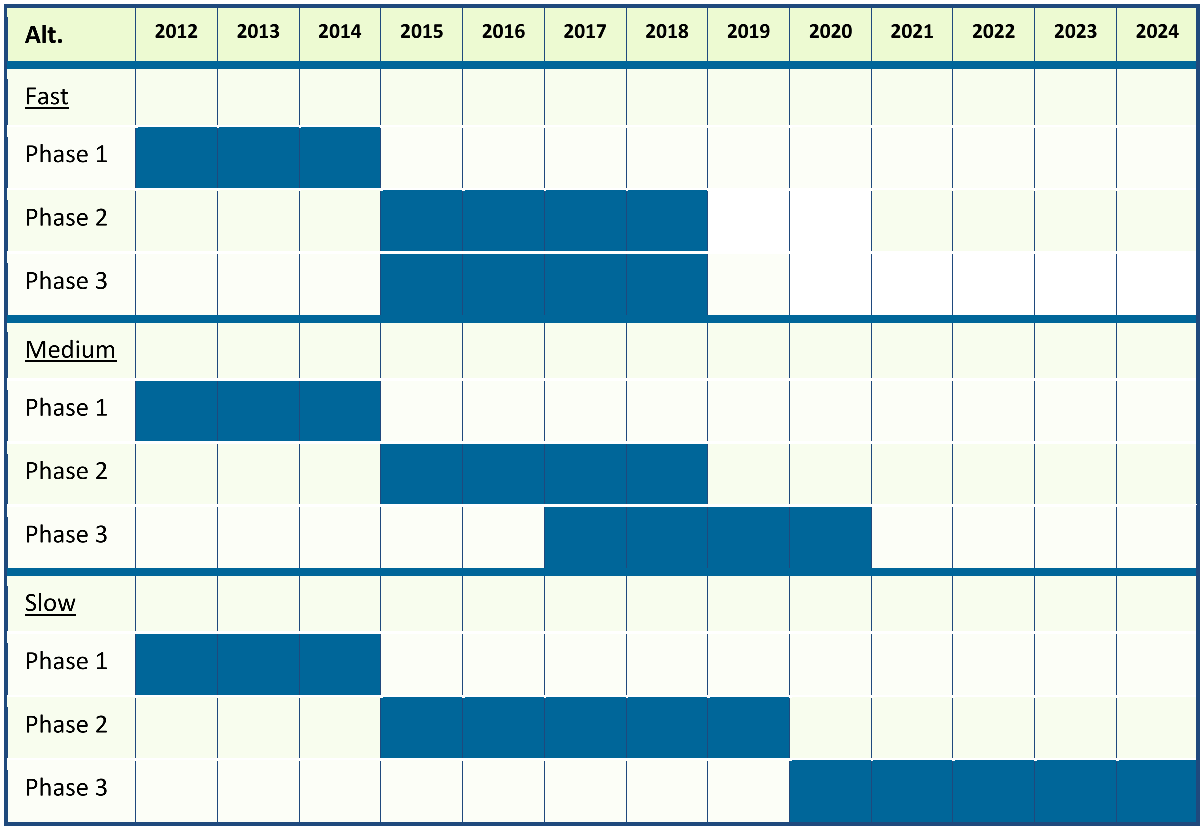


FIGURE 3: Project Phasing Alternatives Schedule

Figure 3 demonstrates that the Review Team considered there are opportunities for the project schedule to be advanced. The "Slow" alternative shown in Figure 3 is the base alternative that was used for the Figure 2 probability curve. There was discussion of a risk that this Slow alternative could be extended further into the future based on funding and other issues that could impact the final design and right-of-way acquisition for Phases 2 and 3.

The potential schedule advancement scenarios resulted in the "Medium" and "Fast" phasing alternatives shown in Figure 3. The Medium depicts Phase 3 starting midway through the construction of Phase 2. It also has a shorter duration than the Slow alternative for Phases 2 and 3, with both being shortened from 5 to 4 years. This is based on the opportunity for the contractor to provide multiple earthwork crews to increase excavation production rates, in addition to having the potential advantage of the Phase 1 contractor being able to minimize mobilization and have knowledge of existing corridor conditions. The Fast alternative also has potentially shorter Phase 2 and 3 construction durations than the Slow alternative, and assumes that Phases 2 and 3 are let for construction concurrently.

These phasing alternatives result in potential significant estimated inflation savings to the project when using year-of-expenditure values, as shown in the following Figure 4.

Description	Fast	Medium	Slow
Base Cost	431.3	431.3	431.3
Inflation	85.7	101.6	137.7
Total Cost (YOE)	517.0	532.9	569.0
Cost Savings	52.0	36.1	--
70% Confidence (YOE)	507.1	518.5	549.8
Total Project Time	7 years	9 years	13 years
Time Saved from "Slow"	6 years	4 years	---

FIGURE 4: Project Phasing Alternatives Estimated Costs ($ in Millions)

Figure 4 demonstrates that there could be an opportunity for cost savings in the range of up to $52.0 million if the "Fast" alternative is used for the project. The Team concurred that the likeliest current scenario was for the "Slow" alternative to be utilized, thus utilizing the 70% confidence level of $549.8 million as the recommended value for the Initial Finance Plan (IFP).

The Team reviewed the project and determined the greatest risks to the project in the terms of threats (those risks that would likely increase the project costs) and opportunities (those risks that would likely decrease the project costs). The following are the threats and opportunities identified:

Threats

- Future inflation & funding availability
- Not able to have continuity of lettings
- Topography, difficult access and potential long haul distances (10,000 feet +)
- Critical permit delays, endangered species (Phase 1)
- Availability for disposal of waste material
- Instability of oil prices
- Other large competing projects
- Need to pre-drill for wick drains & settlement of soils delay (on critical path)
- Utilities not relocated in time
- General bridge issues (tall piers)

- Acquisition on Phase 2 & 3
- Capacity of Excavation Contractor

<u>Opportunities</u>

- Sell contracts sooner
- Economies of scale due to very large volumes
- Contractor could complete project up to 6 years sooner
- Easy access to wick drain locations
- Maximizing the use of on-site disposal areas
- Economy and market conditions (inflation lower than budgeted)
- Contingencies for design and construction may not be fully utilized

The threats and opportunities are further described in the body of the report. Aside from risk of the phasing and the overall project duration, the other predominant risks are related to the topography of the corridor that requires significant clearing, excavation, hauling of earthwork and several bridges with high piers.

<u>Recommendations</u>

This review includes the following recommendations, which are typical next steps following a CER at this stage of a project:

- Manage threats / opportunities through a risk management plan
- Manage project scope and contingencies available
- Update cost estimates frequently with any major changes in scope and market conditions
- Manage ROW costs and Utility coordination
- Expedite construction letting to take advantage of market conditions
- Manage project schedules to identify and mitigate delays in advance (Permits, ROW, Utilities, Construction)
- Track inflation and update estimates as required

CHAPTER 1 – REVIEW SUMMARY

INTRODUCTION

A review team (Team) of the Federal Highway Administration (FHWA), the Ohio Department of Transportation (ODOT), and their consultants conducted a Cost Estimate Review (CER) workshop to review the cost and schedule estimates for the Portsmouth Bypass Project. The workshop was held in Columbus, Ohio from March 14 – 17, 2011. This document summarizes and reports the results of this review. Appendix B of this report includes the Team's close-out presentation provided on March 17, 2011 to Ohio DOT management and the Review Team.

REVIEW OBJECTIVE

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

BASIS OF REVIEW

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) (Pub.L. 109-59, 119 Stat. 1144) requires the financial plan for all Federal-aid projects with an estimated total cost of $500,000,000 or more to be approved by the Secretary (i.e. FHWA) based on reasonable assumptions. The $500,000,000 threshold includes all project costs (Engineering, Construction, Right-of-Way, Utilities, Construction Engineering, Inflation, etc.). The FHWA has interpreted reasonable assumptions to be a risk based analysis. Projects that are $100- $500 million are subject to review at the discretion of the FHWA Division Office. The cost estimate reviews are required to provide the risk based assessment of the estimate and are used in the approval of the financial plan.

BACKGROUND AND HISTORY

The following pages on background and history of the project are excerpted from the Ohio DOT Portsmouth Bypass website:

OVERVIEW/HISTORY

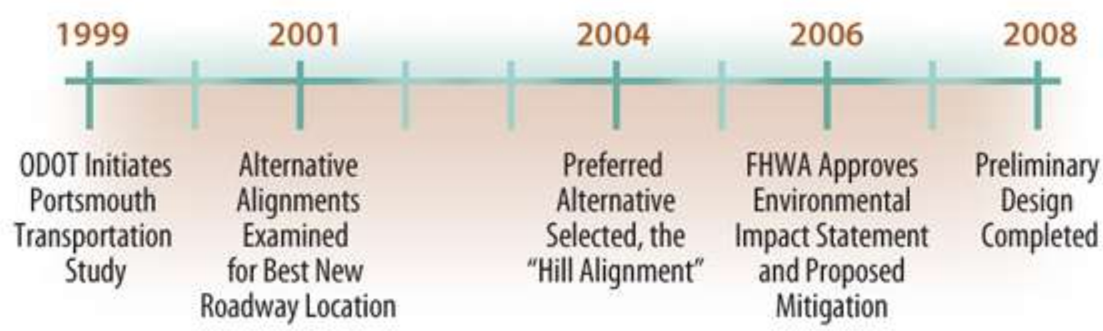


FIGURE 5: Historical Timeline

In 1999, the Ohio Department of Transportation (ODOT) initiated a planning study within the Portsmouth area called the Portsmouth Transportation Study. This study investigated the transportation and economic needs of the area and examined several alternative transportation improvements to see which concept would best address these needs. The study recommended the Airport Bypass concept, a new 16-mile freeway from U.S. Route 52 east of New Boston to U.S. Route 23 north of Lucasville. No specific alignment was suggested by the feasibility study, with a one-mile wide, sixteen-mile long corridor recommended for more detailed analysis to determine the best location for the new route.

The Airport Bypass concept was chosen to improve regional mobility and increase the potential for economic development within the region. The study found that this new highway would reduce the travel time between Wheelersburg to Lucasville by approximately 16 minutes. A motorist making that trip twice each workday would save nearly 140 hours per year. With over 17,000 vehicles per day currently making this trip, that would add up to more than 1.5 million hours saved by motorists each year. More importantly, the feasibility study concluded that the proposed bypass would provide access to potential development areas and would increase Scioto County's chances of attracting new business investments.

In the fall of 2001, ODOT began the project development phase that was designed to examine the impacts and benefits of multiple alternative alignments to determine the best location for the new roadway. In 2004, it was determined that the preferred alternative was the "Hill Alignment" that called for the new roadway to be built primarily along the mountains.

The proposed roadway will be a new four-lane, limited access freeway, approximately 16 miles in length, bypassing approximately 26 miles of US 52 and US 23 through Portsmouth, Ohio. The new roadway will include interchanges with US 52, SR 140, a relocated Shumway Hollow Road accessing the Scioto County Airport, Lucasville-Minford Road, and US 23.

In June of 2006, the Federal Highway Administration formally approved the environmental impact statement and proposed mitigation by approving the Record of Decision (ROD). This action indicates that all National Environmental Policy Act requirements have been met for this alternative.

With the approval of the environmental document (ROD), ODOT began purchasing some of the right-of-way needed for parcels labeled as "Total Takes". "Total Takes" are properties in which the entire parcel is needed for the project, not just a portion of it. Preliminary design for the preferred "Hill Alternative" was completed in the summer of 2008. Due to funding constraints, ODOT has decided to build the freeway in three phases. Each phase is detailed below.

Phase 1:

This phase is approximately 3.0 miles long and extends from relocated Shumway Hollow Road to Lucasville-Minford Road. Once construction of this phase is complete, the freeway will be open between these two roadways.

Phase 2:

This phase is approximately 7.4 miles long and extends from the end of Phase 1 at Lucasville-Minford Road to US 23. Once construction of this phase is complete, the freeway will be open between relocated Shumway-Hollow Road and US 23.

Phase 3:

This phase is approximately 5.6 miles long and extends from US 52 to the end of Phase 1 at relocated Shumway-Hollow Road. Once construction of this phase is complete, the freeway will be open between US 52 and US 23.

The corridor map depicting these three phases is shown on the following page.

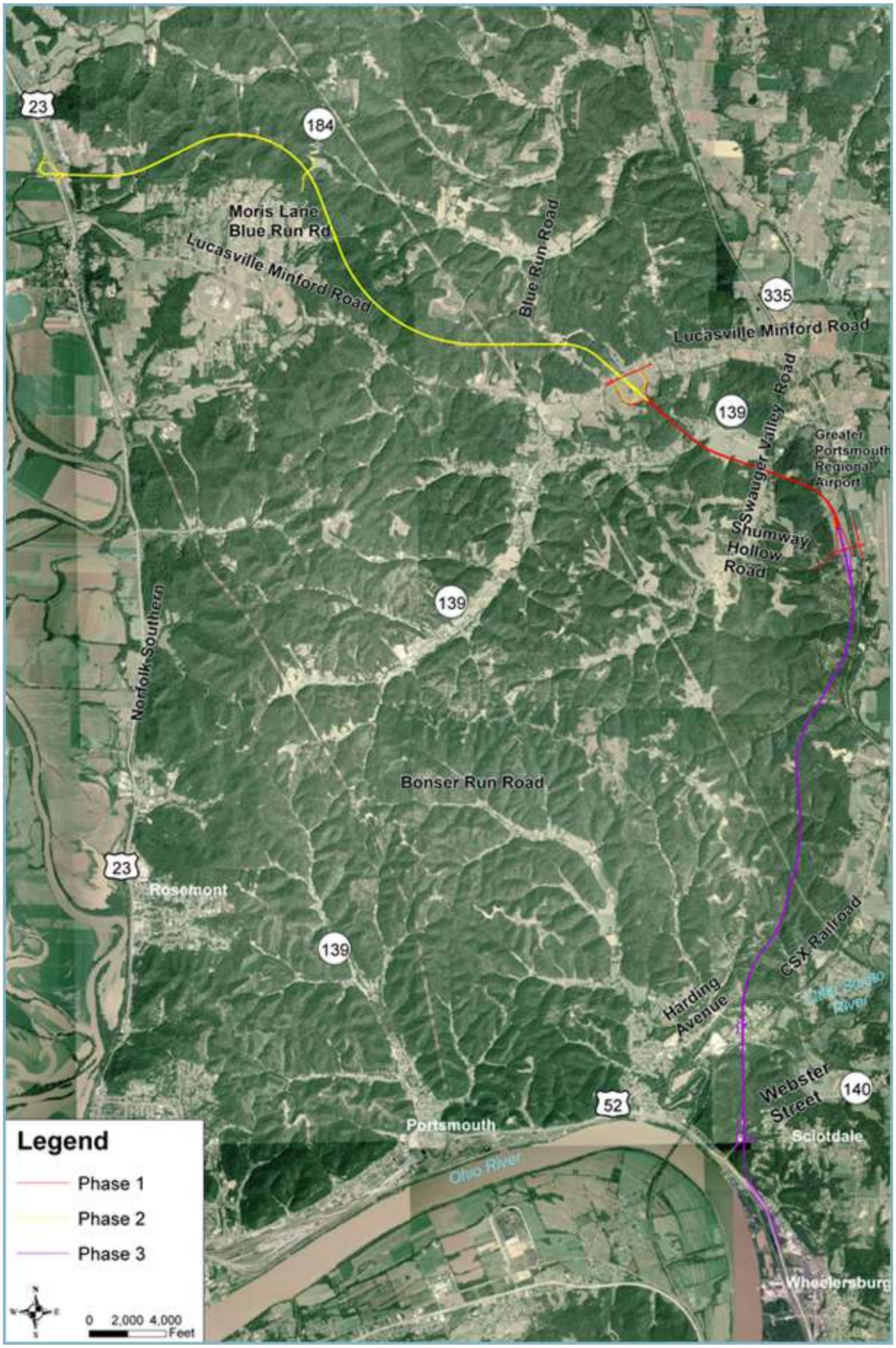
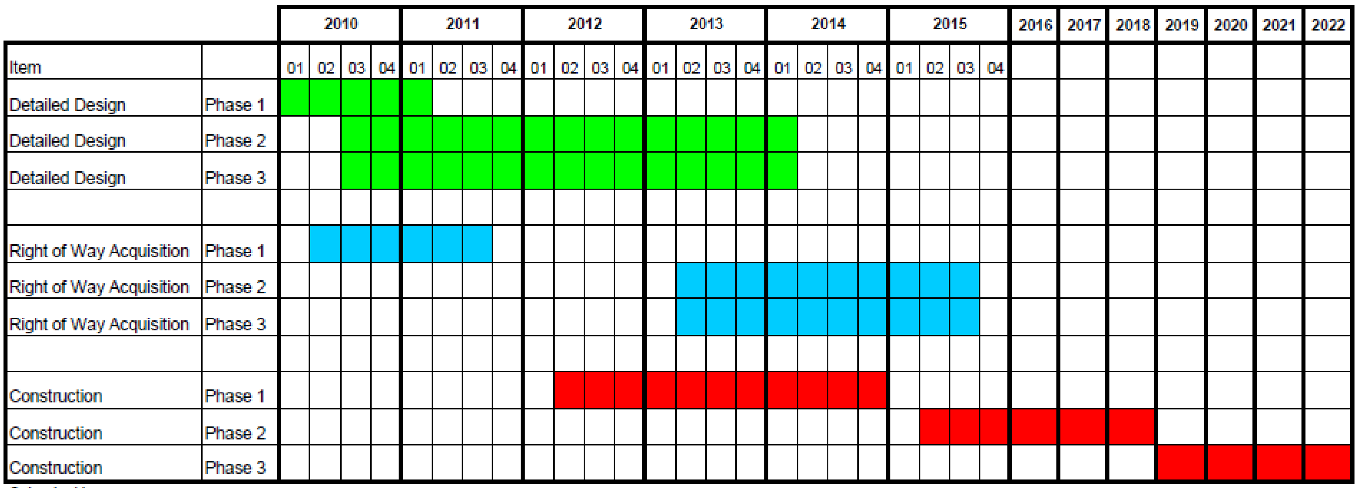


FIGURE 6: Project Location Map

SCHEDULE

Schedule

Portsmouth ByPass
Project Schedule
10/4/2010



Calendar Year

Note: Schedule is subject to change based upon several factors including the availability of funding and design revisions during detailed design phase.

FIGURE 7a: Project Schedule

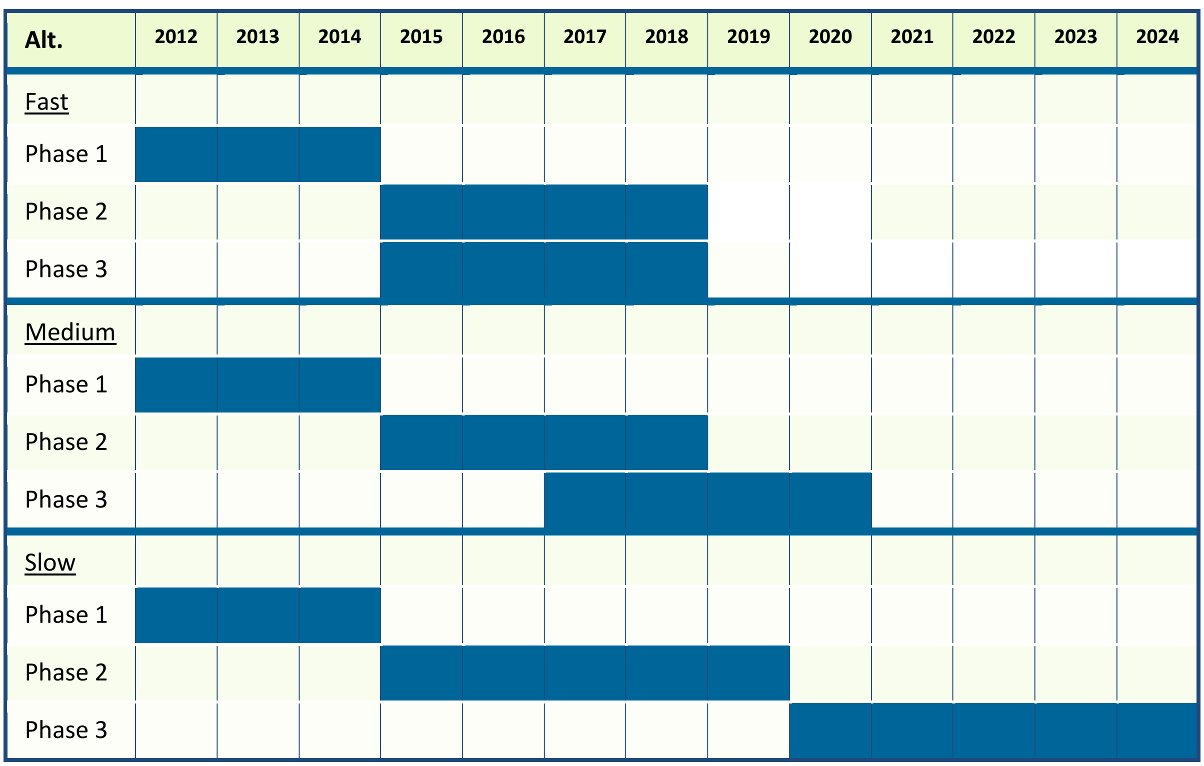


FIGURE 7b: Cost Estimate Review Schedule Alternatives

Figure 7a on the previous page is the schedule presented by the ODOT project manager during the initial day of the study. It demonstrates that the completion of detailed design and right-of-way acquisition for Sections 2 and 3 push earliest construction start for those sections to 2015. Based on this information, the team discussed 3 potential scenarios for construction of the phasing that is shown in Figure 7b, and that was used as a basis for the CER. These alternatives show potential construction completion in 2024, 2020 and 2018 for the “Fast”, “Medium” and “Slow” alternatives respectively, versus the ODOT scheduled completion of 2018. All of these scenarios are highly based on funding and other decisions, and the team agreed that the likeliest phasing scenario at this stage of the project is the “Slow” alternative with a planned completion in 2024. This schedule was used for the Figure 2 probability run in the Executive Summary of this report.

ESTIMATE ADJUSTMENTS

During the review, only minor adjustments were made to the base estimate received prior to the CER review. These were primarily for elements that have been priced by ODOT, but were not included in the construction cost estimate:

Pre-CER Present Day Cost Estimate:	$354.9 M
Addition of Right-of-Way Acquisition:	$ 23.6 M
Addition of Preliminary and Final Engineering:	$ 37.0 M
CER Present Day Cost Estimate:	$415.5 M
Allowance for potential construction changes:	$ 15.8 M
CER Present Day completion estimate	$431.3 M

The above present day cost estimates appeared to be in a reasonable range when adding the allowance for additional costs related to owner responsible changes during construction.

ESTIMATE SUMMARY

The $431.3 million CER Present Day cost estimate was then updated to “Year of Expenditure” (YOE) by adding an ODOT recommended 5% per year for inflation. This resulted in a YOE total project cost of $569 million (including final design, construction engineering, construction contingency and inflation). This $569 million YOE estimate was based on the “Slow” schedule alternative shown in Figure 7b.

Cost estimates, especially those for Major Projects; contain a degree of uncertainty due to market conditions and 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. To express the estimate as a range, risks and opportunities were developed and the review team selected assumption ranges that best modeled the probabilistic cost impacts based on the uncertainty associated with those risks and opportunities. The assumption ranges were incorporated into a Monte-Carlo program to develop forecast curves that represent a cost estimate range for the Project as shown in the following graphic:

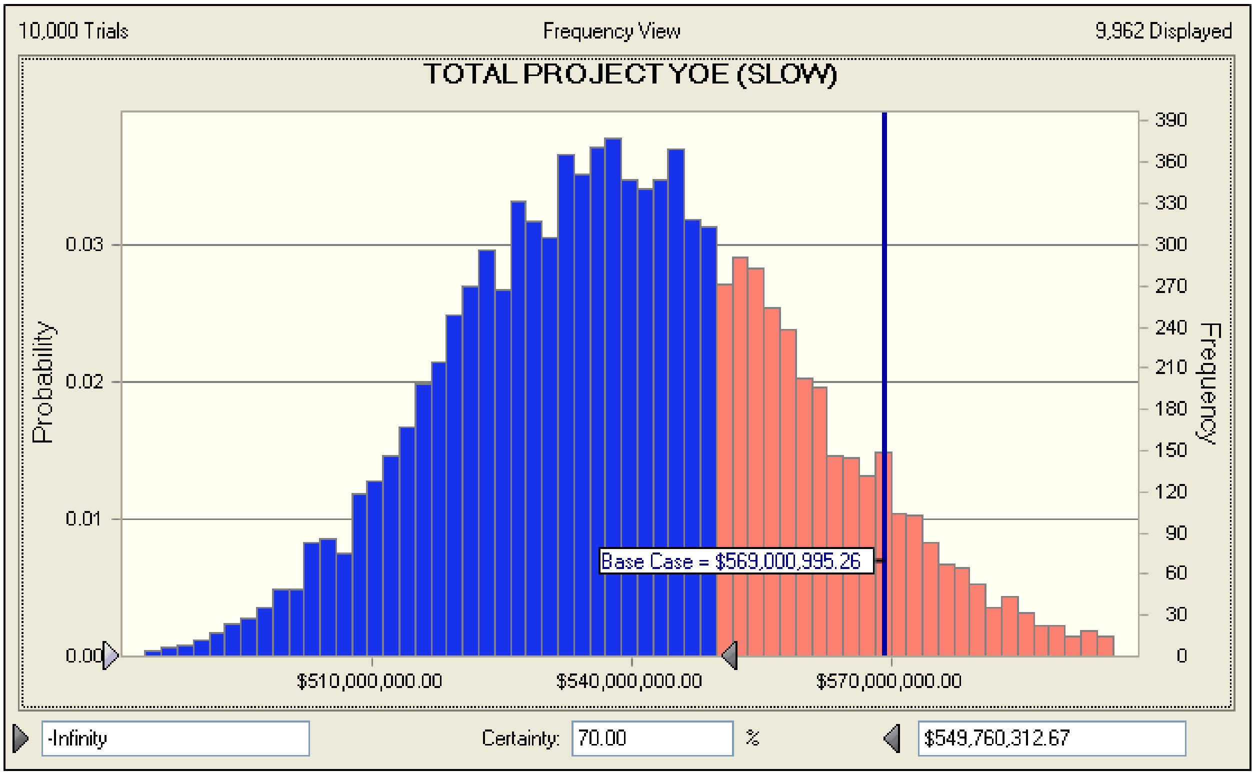


Figure 8. Distribution of Total Project YOE Costs; SLOW alternative

Figure 8 demonstrates the results of the simulation and notes the CER estimate "Base Case" of $569.0 Million and the minimum 70% probability guidance ($549.8 Million). These costs include construction, design/engineering, construction engineering, right-of-way, inflation and contingencies (expressed in YOE dollars), and depict the following:

- The certainty in Figure 8, shown by the blue shaded (darker shade on left) area, represents a forecasted 70% probability that the total cost for the cost will be less than $549.8 million dollars.
- The red shaded area (lighter shade on right) of the graph represents a forecasted 30% probability that total project costs will exceed $549.8 million based on the underlying threats within the estimate.
- The CER result base case of $569.0 million.
- The 70% minimum $549.8 million is lower than the base case estimate by approximately $19.2 million dollars, a 3.5% difference.

The range of values for the probability results in Figure 8 are as follows:

Percentile	Forecast values
0%	$476,194,232.58
10%	**$514,444,983.29**
20%	$522,398,909.43
30%	$528,501,434.52
40%	$533,928,672.94
50%	$538,899,565.80
60%	$544,206,529.76
70%	**$549,760,312.67**
80%	$556,406,668.04
90%	**$565,985,906.44**
100%	$610,172,756.35

Figure 9: Probability Percentiles (Slow Alternative)

The range of forecast values shown in Figure 9 has a spread of approximately 28% from the 0 to 100 percentile forecast values, and a range of near 10% from the 10 to 90 percentile forecast values, demonstrating that the most significant risks and opportunities are at the outer ends of the spectrum with a relatively low probability of occurrence.

INFLATION

The difference between the CER estimate base case of $569.0 Million and the minimum 70% probability guidance ($549.8 Million) is inflation, with the base case calculated on a 5% per year inflation rate, and the probability based on the following inflation model:

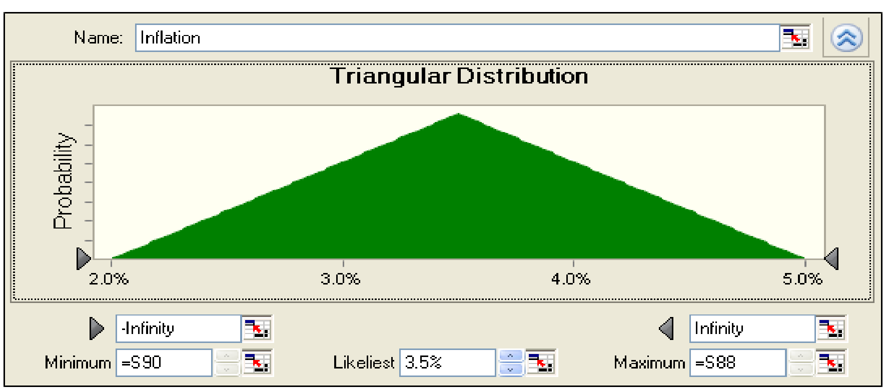


Figure 10: Average yearly inflation model

The Figure 10 inflation model was based on the current industry inflation being relatively low, and the volume of construction being a significant factor in this low. The Engineering News Record (ENR) Construction Cost Index was checked for the average inflation of the past 15 years which has been approximately 3.3%. Review of the Ohio DOT average yearly inflation since 2004 and their current Business Plan (see excerpt in Appendix F) shows that this model is between the low and mid-range ODOT forecasts and does not reach the high-end forecasts. For this reason the 70% probability guidance of $549.8 Million is considered as the lowest amount to show in the IFP.

The inflation calculations used for the overall inflation assumptions are based on the Figure 10 yearly inflation values compounded yearly to the midpoint of construction for each of the alternatives as follows:

Alternative / Phase (midpoint of construction)	Yearly Low Range (2%)	Yearly Mid Range (3.5%)	Yearly High Range (5%)
FAST			
Phase 1 (mid 2013)	5.1%	9.0%	13.0%
Phase 2 (start of 2017)	12.6%	22.9%	34.0%
Phase 3 (start of 2017)	12.6%	22.9%	34.0%
MEDIUM			
Phase 1 (mid 2013)	5.1%	9.0%	13.0%
Phase 2 (start of 2017)	12.6%	22.9%	34.0%
Phase 3 (start of 2022)	17.2%	31.7%	47.7%
SLOW			
Phase 1 (mid 2013)	5.1%	9.0%	13.0%
Phase 2 (mid 2017)	14.2%	26.0%	39.6%
Phase 3 (mid 2022)	26.0%	49.6%	78.1%

Figure 11: Cumulative Project inflation model

The above cumulative inflation amounts are the values utilized in the inflation model calculations for the probability curves shown in Appendix C, and are based on the yearly inflation ranges in the table. The inflation is intended to best represent the potential average inflation from present day 2011 to the midpoint of construction for each of the alternatives. The differences in the inflation values projected for Phase 3 in each of the Alternatives (Fast 34%; Medium 47.7% and Slow 78.1%) demonstrate how the potential cost for each of the alternatives can vary greatly based on the start date of the Phases, particularly Phase 3.

CONTRIBUTION TO VARIANCE

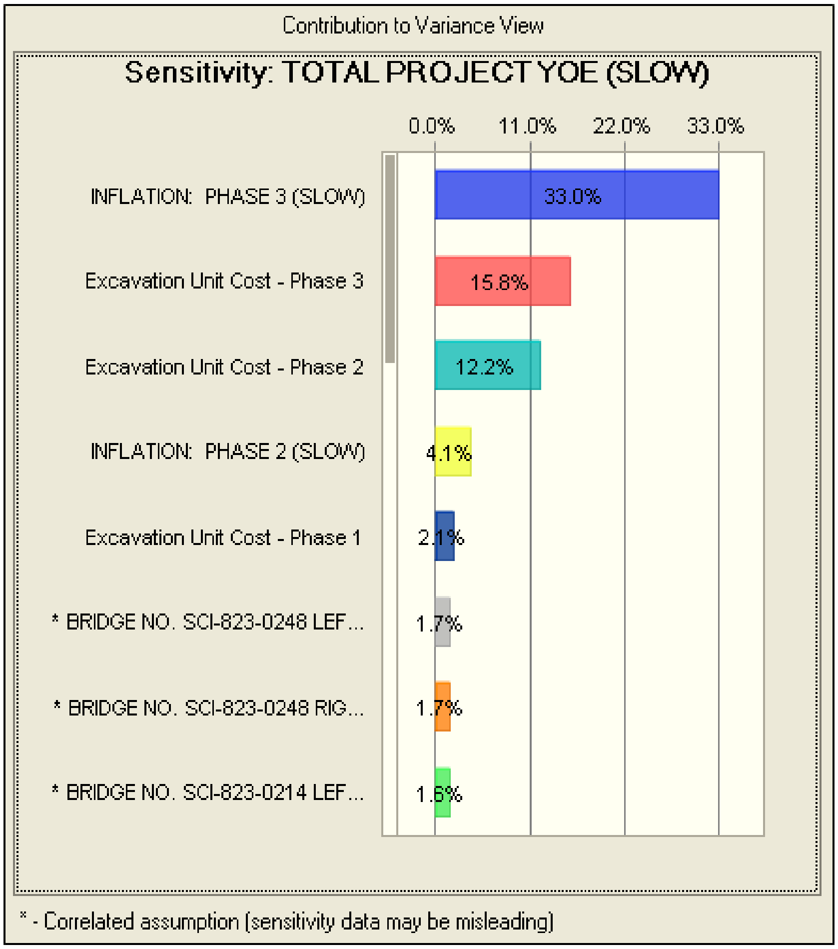


Figure 12: Contribution to Variance

Figure 12 demonstrates the items that have the greatest contribution to variance in the probability runs. Phase 3 inflation is the greatest, considering that in the “Slow” alternative Phase 3 construction does not begin until the year 2020. Excavation is the next major contributor, with both Phases 2 and 3 having large excavation volumes and some unit price uncertainty as demonstrated in the probability assumption in the next section. After Phase 2 inflation and Phase 1 excavation, the major contributors are the bridge structures, considering the risks and potential for large variances with the high columns for many of the bridges. The bridges with the highest contribution to variance are the two bridges over SR335 and the Little Scioto River in Phase 3. The probability assumptions for the major bridge items are also shown in the following section.

PROBABILITY ASSUMPTIONS

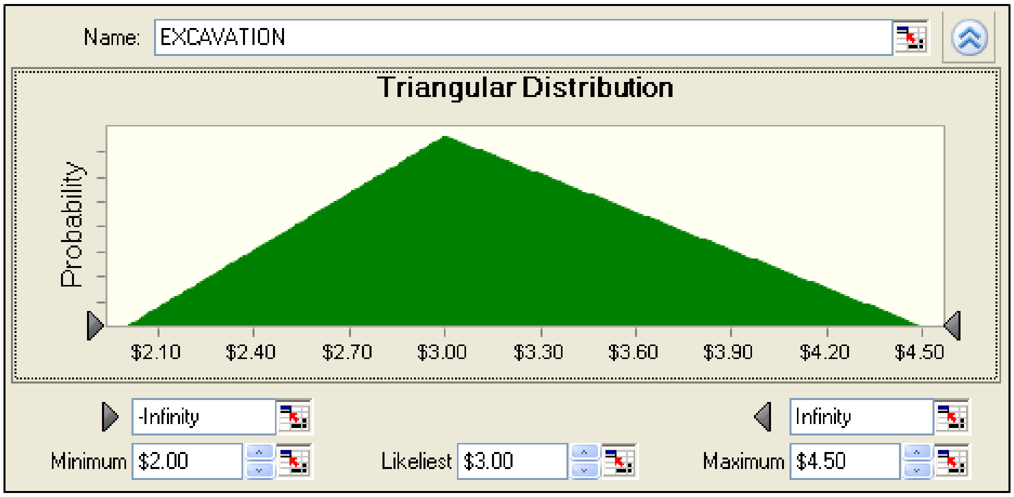


Figure 13: Excavation Unit Price Probability Assumption (all phases)

Figure 13 shows that the team considered there could be a large range in the unit prices bid for excavation on the project. The likeliest value was arrived at considering recent excavation bids and the consideration of the large volumes of material to be excavated, particularly in Sections 2 and 3. The unit prices in the base estimate were $3.35 per cubic yard (CY) for Sections 1 and 2, and $2.40 per CY for Section 3.

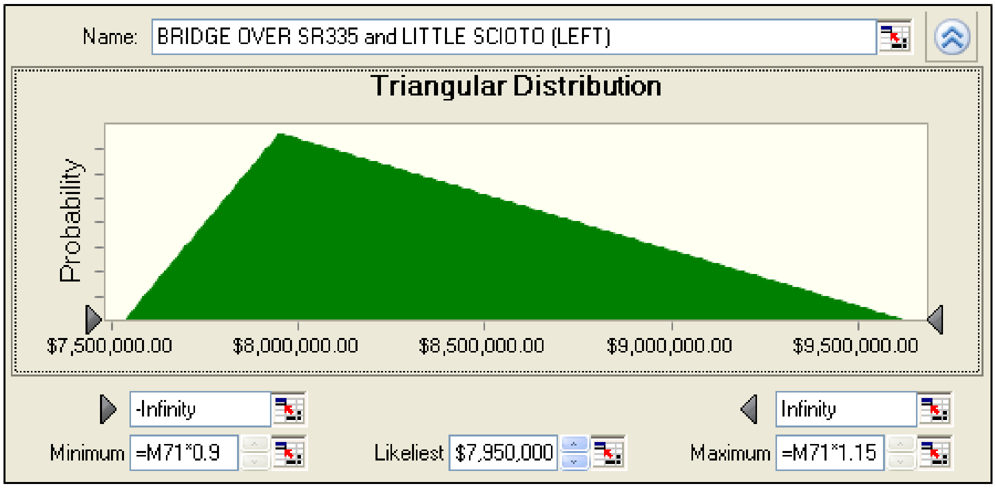


Figure 14: Bridge over SR335 and the Little Scioto River

The bridges over SR335 and the Little Scioto River in Section 3 of the project were considered by the team to have risk as a result of having high piers, tying into mountainous terrain, and one of the bridges having a unique abutment with drilled shafts. Each of these bridges was modeled to demonstrate that there is more likelihood that a bid would exceed the estimated cost as a result of these risks.

There are multiple other probability assumptions that are included in the report appendix, with the assumptions shown above being the most influential on the probability range of the cost estimate.

THREATS AND OPPORTUNITIES

The following are those risks that were identified during the session, and were considered when modeling the probability assumptions. More detail on these can be seen in the excerpt from the "risk register" as shown in Appendix B.

Threats

1. **Future inflation & funding availability**: The team considered that this item is the most critical at this time of the project. The unknown of inflation combined with the unknown of the funding of Sections 2 and 3 will have a high impact of the total project costs.

2. **Not able to have continuity of lettings**: Should the Phase 2 and Phase 3 not be able to be completed in sequence or overlap with the completion of Phase 1, then there will be no opportunity for contractors to lower bids due to minimizing mobilization.

3. **Topography, difficult access and potential long haul distances (10,000 feet +)**: These threats are considered to potentially have an impact on the unit prices for the clearing, excavation and disposal of material not able to be used on site.

4. **Critical permit delays, endangered species (Phase 1)**: There is risk that an endangered species (bat) could be spotted in the construction limits causing delay by not being able to obtain the U.S. Fish and Wildlife permit required to get the U.S. Army Corps of Engineer's permit.

5. **Availability for disposal of waste material**: There is a threat that excess material not able to be used on-site will have to be trucked long distances for disposal, including requiring permits for the off-site disposal areas.

6. **Instability of oil prices**: There is a threat that current instability in the Middle East will create increases in oil prices and instability of potential future prices of oil products based material, such as asphalt.

7. **Other large competing projects**: The volume of construction in the Ohio area at the time of bid will have an impact on bids, and could increase them if there are large competing projects.

8. **Need to pre-drill for wick drains & settlement of soils delay (on critical path)**: Based on stiffness of the soils, there is a threat that pre-drilling may be required for installation of the wick drains.

9. **Utilities not relocated in time**: There is a minor threat that utility companies will not have their utilities relocated in a timely manner, which could impact and delay construction.

10. **General bridge issues (tall piers)**: Several bridges have tall piers which are seen as a cost risk. There are also unique abutments, drilled shaft footings, straddle bents, and railroad coordination.

11. **Right-of-Way Acquisition on Phase 2 & 3**: The ROW acquisition on phases 2 and 3 will be on the critical path to the bidding of these phases.

12. **Capacity of Excavation Contractor**: there is a threat that a contractor with limited equipment for excavation may have difficulty meeting the construction schedule which may cause a litigious environment and/or impact other project phases.

Opportunities

1. **Sell contracts sooner**: As discussed earlier in the report, there are opportunities to begin Phase 2 near the completion of Phase 1, and to begin Phase 3 concurrent with Phase 2 if funding is available. This would likely have a large impact by reducing overall price inflation for the project.

2. **Economies of scale due to large volumes**: This is likely one of the largest roadway excavation projects in Ohio history. There is an opportunity for contractors to bid competitive prices due to the large volumes.

3. **Contractor could complete project up to 6 years sooner**: Should funding be available for the optimal phasing of the project, the opportunity to complete Phase 3 up to 6 years earlier could provide significant savings.

4. **Easy access to wick drain locations**: The team noted that the wick drain locations are generally in locations with relatively easy access which should provide an opportunity for competitive prices from contractors.

5. **Maximizing the use of on-site disposal areas**: There is a significant opportunity for contractors to utilize excavated material on-site or near the site to reduce their bids.

6. **Economy and market conditions (inflation lower than budgeted)**: Although inflation has been volatile from 2003 to 2010, there is an opportunity that inflation may remain relatively low for the next several years and reduce the impact of inflation on the project.

7. **Contingencies for design and construction may not be fully utilized**: There are design contingencies in the estimates at 5% for Phase 1 and 15% for Phases 2 and 3,

intended to cover any design changes prior to bid. There is also an allowance of 5% for changes during construction. There is an opportunity for the project to be managed to not require some of these contingency amounts.

REVIEW RECOMMENDATIONS

This review includes the following recommendations, which are typical next steps following a CER at this stage of a project:

- Manage threats / opportunities through a risk management plan
- Manage project scope and contingencies available
- Update cost estimates frequently with any major changes in scope and market conditions
- Manage ROW costs and Utility coordination
- Expedite construction letting to take advantage of market conditions
- Manage project schedules to identify and mitigate delays in advance (Permits, ROW, Utilities, Construction)
- Track inflation and update estimates as required

SUPPLEMENTAL PROBABILITY EVALUATIONS FOR SCHEDULE ALTERNATIVES

As noted in Figures 4 and 7b, there were two addition schedule alternatives that were discussed by the team, and separate inflation analysis was performed on these two alternatives. These alternatives were named “Medium” and “Fast” based on respective project forecast completion dates of 2020 and 2018 respectively, versus the “Slow” alternative forecast completion date of 2024.

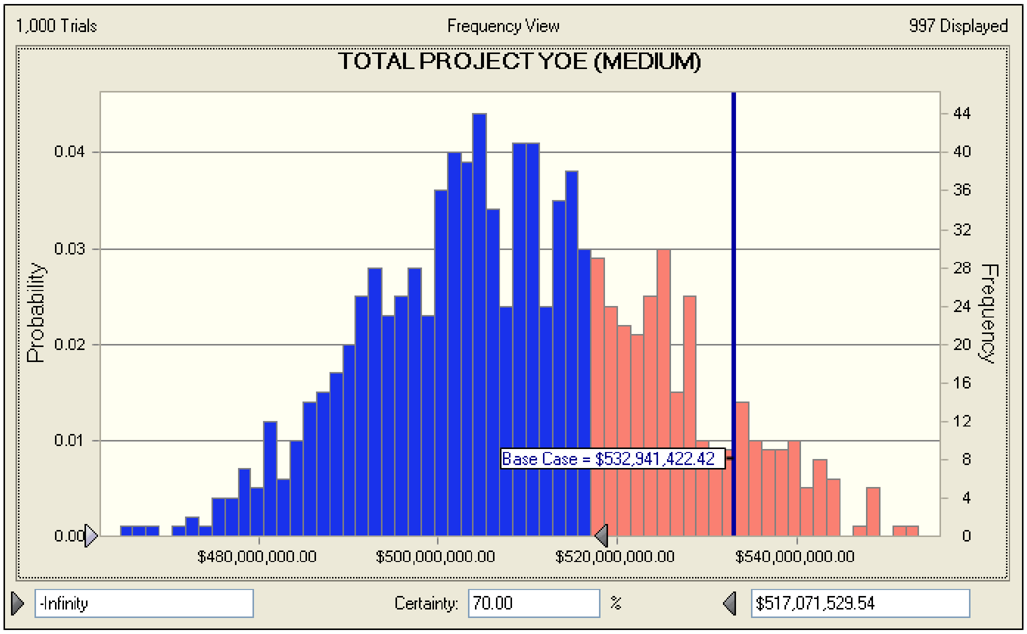


Figure 15: Distribution of Total Project YOE costs: "Medium" Alternative

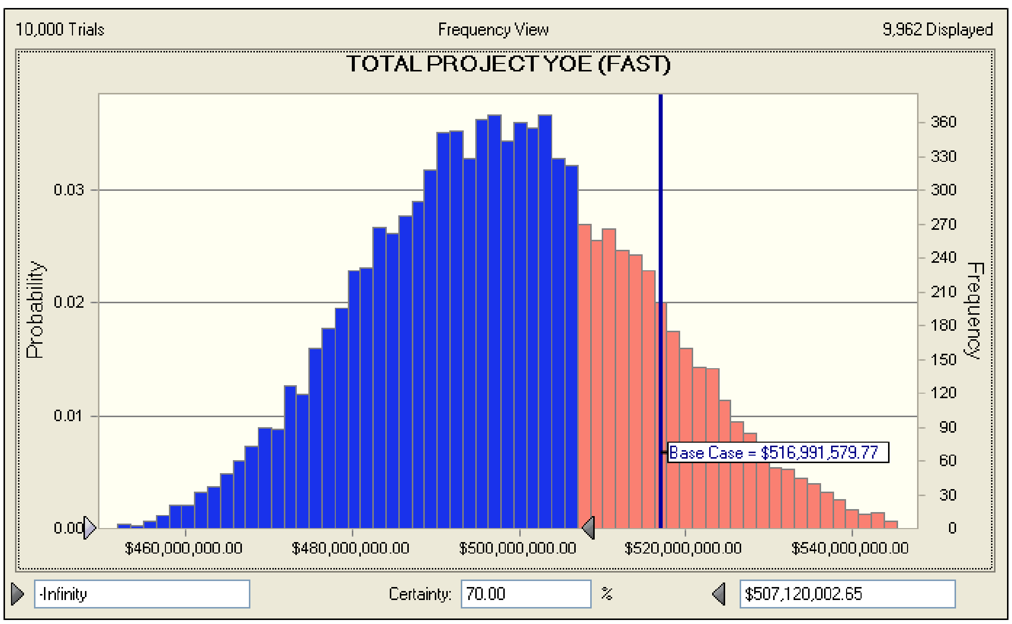


Figure 16: Distribution of Total Project YOE costs: "Fast" Alternative

The same escalation probability assumption curve shown in Figure 11 was utilized for all of the schedule alternatives. The Medium and Fast alternatives demonstrate the potential difference in year of expenditure (YOE) costs if the project phasing is accelerated. The Fast alternative results in a 70% confidence level of $507 million and the Medium alternative is at $517 million versus the Slow alternative of $550 million.

The Base Case estimates for these alternatives are shown in Figure 2 and again as follows:

Fast Schedule Alternative Base Case: $517.0 Million

Medium Schedule Alternative Base Case: $532.9 Million

Slow Schedule Alternative Base Case: $569.0 Million

The alternatives clearly demonstrate the potential impact of inflation on the project phases. As noted earlier in the report, the Base Case estimates are based on the ODOT Business Plan yearly forecast mid-range inflation of 5%, while the 70% confidence level is based on inflation figures in the yearly range of 3.5%.

SUPPLEMENTAL PROBABILITY EVALUATIONS FOR PHASE 1 BID

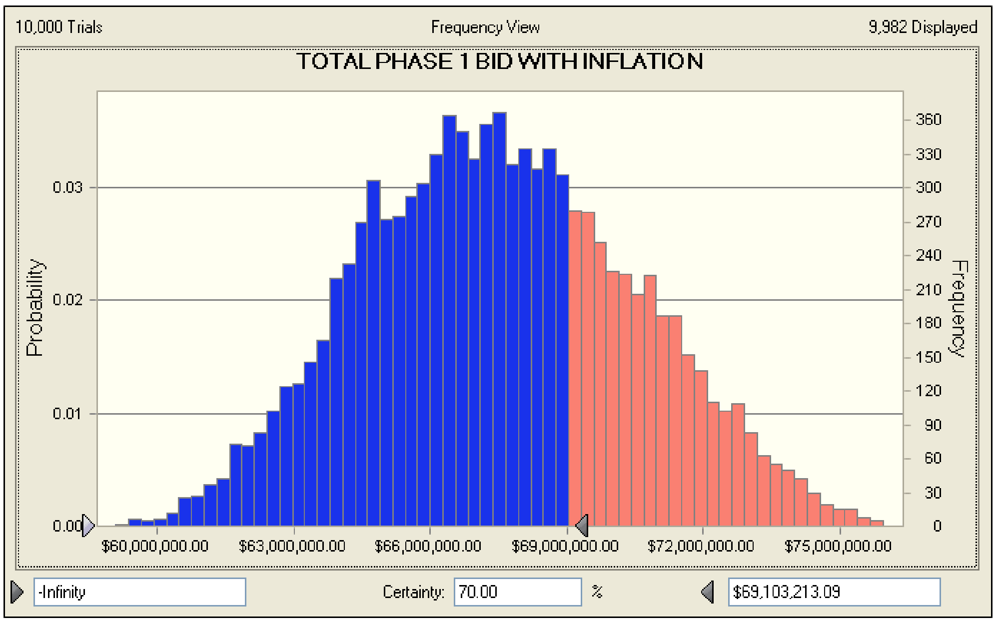


Figure 17: Distribution of Total Project YOE costs: Phase 1 Bid

Figure 17 depicts the probability results for the Phase 1 Construction Bid, with a 70% confidence level of $69.1 million. This includes the 5% design contingency for any changes prior to bid and includes the inflation contractors would likely include in their bids. The $69.1 million excludes any allowance for change orders during construction, and any non-contractor costs such as construction engineering and inspection and utility relocations performed by utility owners. The 10% and 90% confidence levels for the above distribution are $63.7 million and $71.5 million respectively.

CHAPTER 2 – REVIEW METHODOLOGY

STUDY OBJECTIVE

The objective of the review was to verify the accuracy and reasonableness of the current total cost estimate and schedule to complete the Project and to develop a probability range for the cost estimate that represents the stage of Project development.

REVIEW TEAM

The Project Review Team was developed with the intent of having individuals with a strong knowledge of the Project and/or of major project work and expertise in specific disciplines of the Project. This Review Team participated together throughout the workshop, and individuals with specific project expertise briefed the Review Team on that portion of the Project or estimate development process. The Review Team then was briefed on the development of the Project cost estimate quantities, unit prices, assumptions, opportunities and risks. The key team member sign-in sheets are included in the Appendix.

The Review Team was comprised of the following members:

- FHWA Division Office
    - FHWA Consultant (PBS&J)
- Ohio Department of Transportation (ODOT)
    - District 9
    - Planning, Geotechnical & Estimating
- ODOT Consultants
    - HDR
    - DLZ
    - CH2M Hill

DOCUMENTS REVIEWED

Documents provided by the project consultants to the Review Team prior to and during the workshop were:

- Project Cost Estimate
- Project Schedule
- Project Management Plan
- Project Background
- Project Finance Plan (Draft)Review Process
- Project Team input
    - FHWA, ODOT, and Project Consultants

METHODOLOGY

- Understanding the scope of the project
- Stage of design and date of estimates
- Estimates development process
- Evaluating any scope not included in detailed estimates
- Considering the Threats and Opportunities for various items
- Discussing, reviewing the projected schedule, inflation and contingencies
- Compiling the Total Project Estimates (Design, Construction, ROW, Utilities, Contingencies, Inflation, etc.)

THREATS AND OPPORTUNITIES ANALYSIS

- Reviewed major cost elements and how market conditions could impact these estimates
- Reviewed percentage adders to the base construction costs (contingencies, traffic control, mobilization, inflation, etc.)
- Developed impacts and probabilities for significant project threats and opportunities and captured these in a Risk Spreadsheet
- Developed probability assumption curves
- Performed Monte Carlo simulation to generate an estimated range

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
- Not an independent FHWA estimate
- Did not verify quantities and unit prices

CHAPTER 3 – PROBABILITY ANALYSIS

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

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

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

The outcome depicted in this final probability curve is typically stated in the following manner: "There is a 90% (or whatever percentage depicted) degree of certainty that the construction cost will be in a range from $x to $y, provided that our understandings and related assumptions do not change significantly between now and the end of construction." In order for this to work correctly the Review Team must supply the program with the probable range of construction costs for each assumption cell in the spreadsheet, and must supply an indicative characterization for the probability spread for each of these cells. This shows up in the form of probability distribution curves. The triangular probability curves are commonly used when relying on expert opinion. In the case of this workshop, the Review Team utilized a triangular probability distribution for the vast majority of assumption cells. The probability assumption curves shown in the Appendix depict how the Team considered modeling the major cost elements for this Project. Based on these assumption curves, the Monte Carlo analysis would select a random number for each of these curves and sum each random selection for the resulting probabilities. The probability assumption curves shown in this section are only those items that have a significant impact on the results of the analysis. The Appendix includes a PDF file of the probability assumption curves used for the Project estimate.

APPENDICES

APPENDIX A – WORKSHOP CLOSEOUT PRESENTATION

Cost Estimate Review

March 14-17, 2011
Columbus, Ohio

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

Basis of Review

Review based on estimates provided by the Team in advance

Review to determine the reasonableness of assumptions used in the estimate

Not an independent FHWA estimate:

- We did not verify quantities and unit prices
- Goal is to verify accuracy and reasonableness of estimate

Risk-based Probabilistic Approach Cost Estimate Review

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Cost Estimate Review & Financial Plans (23 U.S.C §106(h)(2))

Financial Plans are required for the following thresholds:

Over $100 Million Total Project Cost
Required, review is at FHWA Ohio Division's discretion

Over $500 Million Total Project Cost
Major Project – Requires concurrence from FHWA's Headquarters

Total Project Cost = **ALL COSTS** - Engineering, Construction, ROW, Utilities…
in Year of Expenditure (YOE) Dollars

"Cost to complete estimates based on reasonable assumptions as determined by the Secretary (FHWA)"

Reasonable assumptions = Risk based analysis

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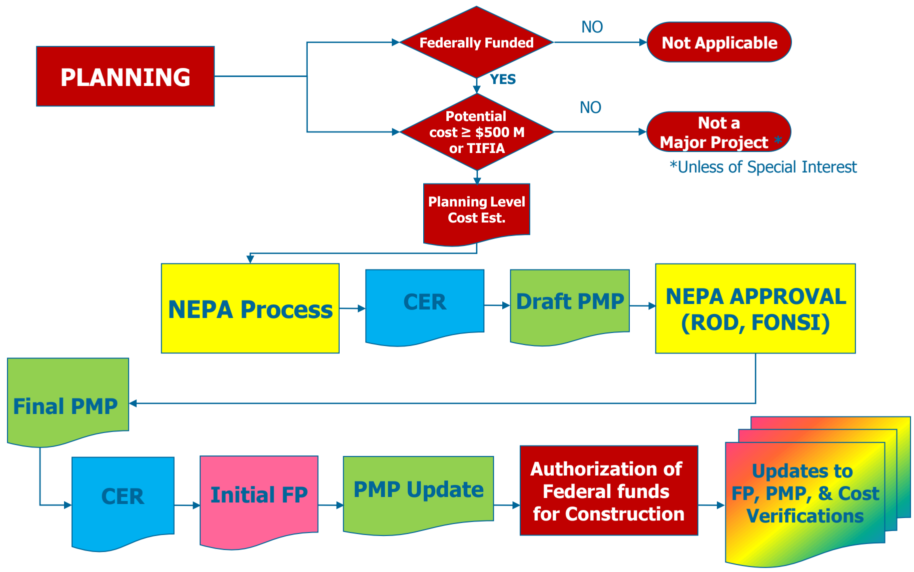
Basic Major Project Process



Review Participants

- FHWA
  - Division Office
  - FHWA Consultant (PBS&J)
- Ohio Department of Transportation (ODOT)
  - District 9
  - Planning, Geotechnical & Estimating
- ODOT Consultant (HDR, DLZ, CH2M)

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Agenda

Portsmouth Bypass Project Cost Estimate Review
March 14-17, 2011
8:00 am – 4:30 pm
ODOT Sign Shop, 1606 W. Broad St., Columbus, Ohio

Monday – March 14
Cost Estimate Review (CER) Introduction by FHWA
Discuss Overview by Project Consultant
Overview of State Estimation Process
Start Item Cost Review of:
A.) Roadway, Drainage, Storm Water, Geotechnical
B.) Bridges, Retaining Walls, Geotechnical

Agenda (cont.)

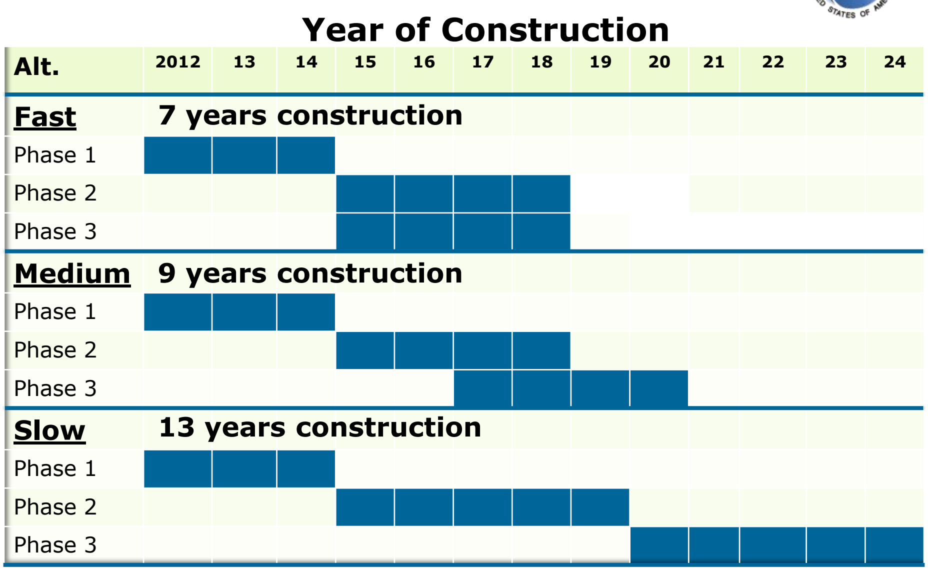
Tuesday – March 15
Traffic Issues, Construction & Access Issues
Environment & Resources Issues
ROW, Utilities, Hazardous Mat., RR, Other
Indirect Utilities & ROW Issues
Delivery, Non-Traditional, CSD, Design, CE&I, Other
Risk & Opportunities

Wednesday – March 16
Inflation, Contingency, Project Phasing & YOE (midpoints).

Thursday – March 17
Draft Presentation to Project Team
Closeout Presentation

Schedule

Project Schedule Alternatives



Comparison of Expediting Project Delivery

	Fast	Medium	Slow
Base Cost	431.3	431.3	431.3
Inflation	85.7	101.6	137.7
Total Cost (YOE)	517.0	532.9	569.0
Cost Save.	52.0	36.1	--
70% Confidence	507.1	518.5	549.8
Time	7 years	9 years	13 years
Time Saved	6 years	4 years	---

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Estimate Adjustments Needed

(in random order)

Added Const. Change Orders (CCO) risk	$ 15.9 million
Added preliminary and final engineering	$ 37.0 million
Right of Way Acquisition	$ 23.6 million
==================================	
Total	$76.5 million

Per ODOT procedures the engineering and ROW costs were added to the Phase 1 estimate to match ODOT's ELLIS system.

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Cost Estimate Review (CER) Present Day Cost Adjustments

(Dollars below shown in Millions)

	Phase 1	Phase 2	Phase 3	Total
Pre-Review	67.6	146.6	140.7	354.9
Post Review*	132.1	152.7	146.5	431.3
Difference	64.5	6.1	5.8	76.5

* Post review accounts for adjustments during the review

Review Methodology

1. **Estimate Review**
   - Overview Estimate development process
   - Ensure estimate accounts for complete project scope
   - Major cost drivers for estimate were included
     - Line item large costs, contingencies, inflation rates
     - ROW, Utilities, Design, Construction Management
   - Threats and Opportunities for various items
2. **Threats and Opportunities Analysis**
   - Reviewed/discussed major elements
   - Develop probability assumption distributions
3. **Performed Monte Carlo simulation to generate a probability based project estimate forecast**

Threats

- Future inflation & funding availability
- Not able to have continuity of lettings
- Topography, difficult access and potential long haul distances (10,000 feet +)
- Critical permit delays, endangered species (Phase 1)
- Availability for disposal of waste material
- Instability of oil prices
- Other large competing projects
- Need to pre-drill for wick drains & settlement of soils delay (on critical path)
- Utilities not relocated in time
- General bridge issues (very tall piers)
- Acquisition on Phase 2 & 3
- Capacity of Excavation Contractor

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Opportunities

- Sell contracts sooner
- Economies of scale due to very large volumes
- Contractor could complete project up to 6 years sooner
- Easy access to wick drain locations
- Maximizing the use of on site disposal areas
- Economy and market conditions (inflation lower than budgeted)
- Contingencies for design and construction may not be fully utilized

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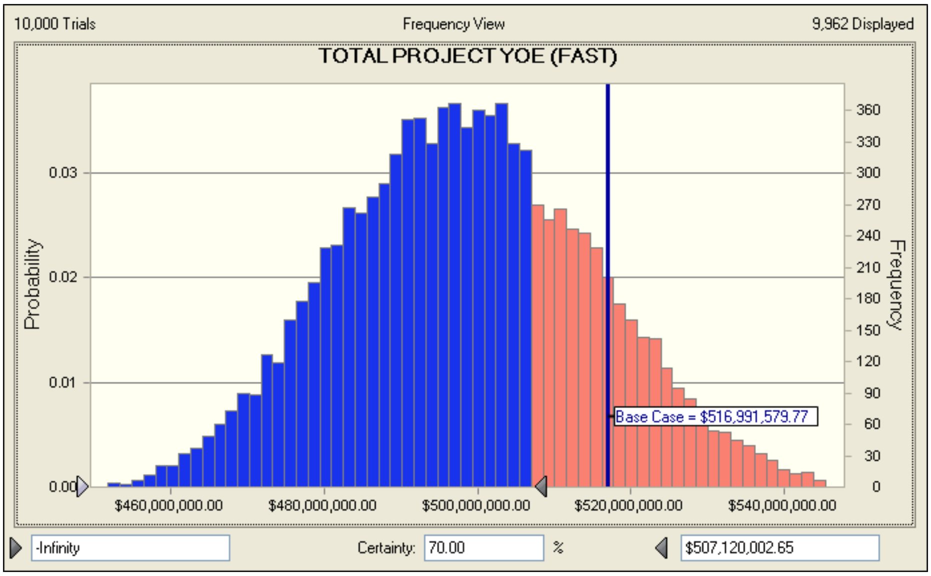
Monte Carlo Output

YOE Fast

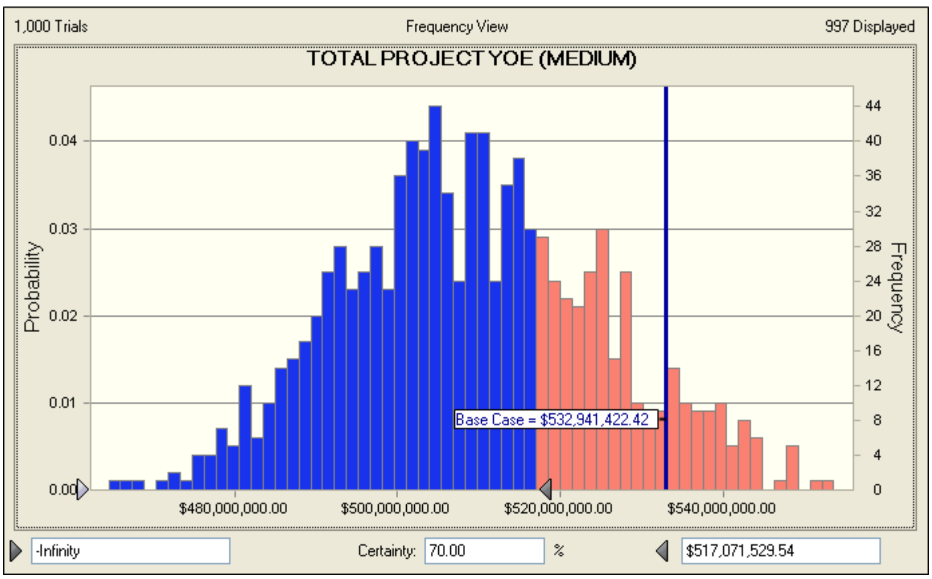


YOE Fast

Percentile	Forecast values
0%	$440,785,693.55
10%	$477,121,886.17
20%	$484,025,658.67
30%	$489,431,861.13
40%	$493,900,403.03
50%	$498,250,152.04
60%	$502,585,415.98
70%	**$507,120,002.65**
80%	$512,988,783.41
90%	$520,590,376.78
100%	$560,548,557.80

43 million (8%)

YOE Medium

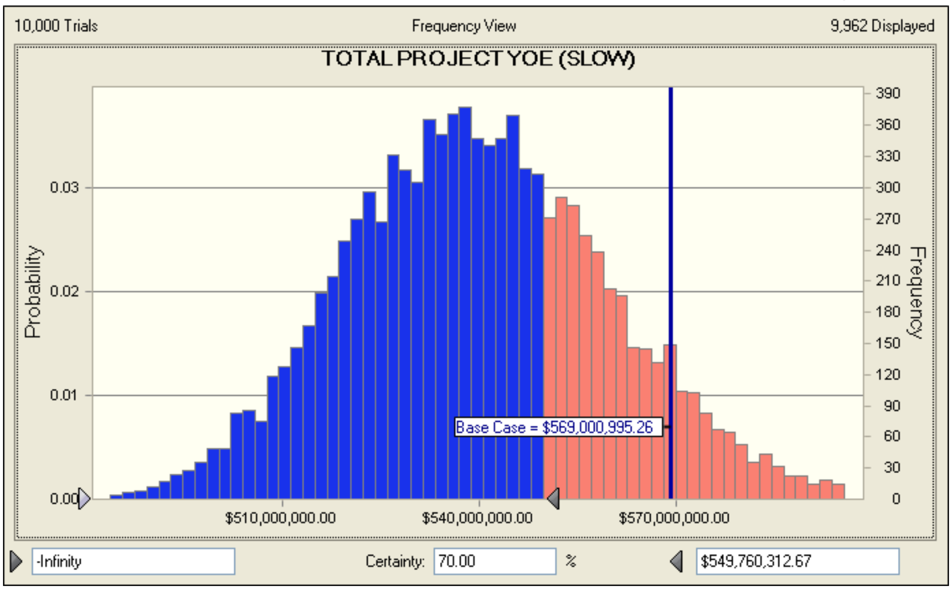


YOE Medium

Percentile	Forecast values
0%	$465,111,474.61
10%	**$489,008,746.98**
20%	$495,782,243.76
30%	$500,945,546.97
40%	$505,481,506.55
50%	$509,623,217.13
60%	$513,878,823.38
70%	**$518,466,426.47**
80%	$523,895,732.51
90%	**$530,976,996.15**
100%	$575,826,491.33

42 million (8%)

YOE Slow



YOE Slow

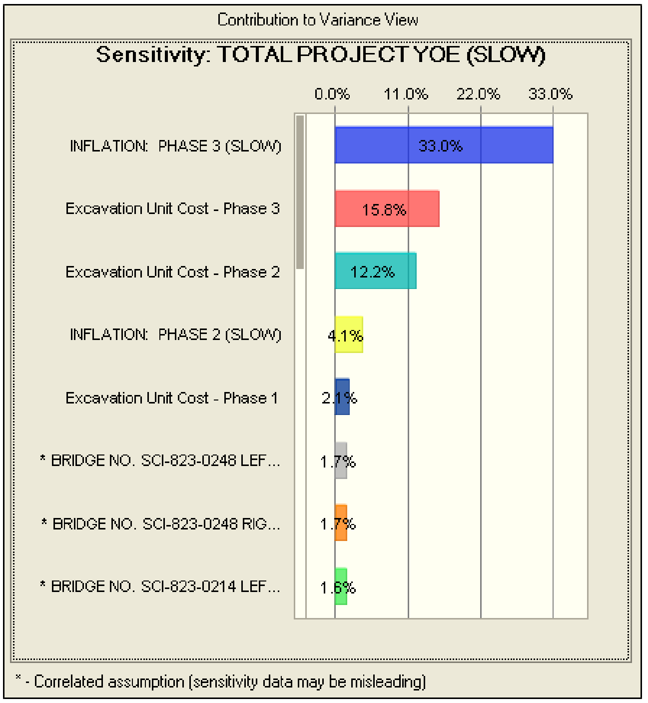
Percentile	Forecast values
0%	$476,194,232.58
10%	**$514,444,983.29**
20%	$522,398,909.43
30%	$528,501,434.52
40%	$533,928,672.94
50%	$538,899,565.80
60%	$544,206,529.76
70%	**$549,760,312.67**
80%	$556,406,668.04
90%	**$565,985,906.44**
100%	$610,172,756.35

51 million (10%)

Escalation Information

- For modeling utilized the following:
  - High end per year = 5% average
  - Medium per year = 3.5% average
  - Low per year = 2% average
- ENR Construction Cost Index
  - Last 15 year average = 3.2%
  - Long term state DOT averages ~ 2 to 4%

Sensitivity: Items with impact



Cost Estimate Review Draft Recommendations

- Manage threats / opportunities through a risk management plan
- Manage project scope and contingencies available
- Update cost estimates frequently with any major changes in scope and market conditions
- Manage ROW costs and Utility coordination
- Advance construction letting to take advantage of market conditions
- Manage project schedules to identify and mitigate delays in advance (Permits, ROW, Utilities, Construction)
- Track inflation and update estimates as required

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Cost Estimate Review

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 Team
  - ❖ Final report within 30 days after receipt of comments will be forwarded to the Division Office for distribution to the Team
- FHWA uses the report for the review of the Initial Financial Plan
- Estimate review is a snapshot of the current estimate

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APPENDIX B – RISK REGISTER

Portsmouth Bypass
Risk Register
Condensed for Report: Entire Excel file provided to ODOT

Index	Functional Assignment	Event Risk Name	Threat/Opportunity	Description	Schedule notes
1	Earthwork	High volume	Opportunity	A contractor that has extremely high volumes and is able to utilize equipment continuously could bid lower prices.	Opp. for phase 2 and 3 if bid in sequence with some overlap; 24 months is based on a total of a 8 yr project duration vs. 10 years if the 3 contracts are in series.
2	Earthwork	Schedule (funding)	Threat	If contracts are not in series, Phase 1 contractor would not be able to utilize already mobilized resources	
3	Earthwork	Access & Terrain	Threat	Several locations are difficult to access and have moutainous terrain	
4	Wick Drains	Easy Access	Opportunity	Easy access to wick drain locations	
5	Wick Drains	Pre-drilling	Threat	If pre-drilling is necessary based on stiffness of the soils	
6	Embankment	Haul Distances	Threat	Large Haul distances with difficult terrain and accessibility	
7	Roadway Misc / W	Utilize waste material	Opportunity	Utilize waste material for filling excess adjacent parcels; upper portions of cut valleys; load on railroads or barges for transport; floodplain devt.	No anticipate delay to dispose of waste
	Roadway Misc / W	Increased earthwork resources	Opportunity	Contractor utilizes additional crews to accelerate earthwork and save time on schedule	Contractor could accelerate with any of the 3 projects. Could save 12 to 18 months on Phases 2 and 3
8	Roadway Misc / W	Large haul distance to dispose	Threat	Only availability to dispose waste requires a large haul distance	
9	GRANULAR MATERIAL, TYPE C	Utilize on-site material	Opportunity	Process material excavated on-site to utilize for granular fill	
10	ASPHALT CONCRETE BASE, PG64-22	Oil Price escalation	Threat	Current instability in the Middle East is creating increases in oil prices and instability of potential future prices	
11	AGGREGATE BASE	Process agg base on site	Opportunity	Contractor determines method to utilize excavated rock to crush and utilize	
12	CLEARING AND GRUBBING	Pre-cut timber	Opportunity	Could pre-cut timber to sell; landowner may do the same prior to sale	Could have savings on Phases 2 and 3 if pre-cutting occurs. Can only cut in September through March.
13	CLEARING AND GRUBBING	Pre-cut timber	Threat	If timber is not pre-cut; Ph 1 contractor would not be able to cut from Mar - Aug.	Will require a bid contract for tree cutting prior to April 2012. Only issue that would prevent that is locating endangered bats
13	Retaining Walls, N	Geotechnical	Threat	Prevent potential settlement	
14	Bridges	Ph 3 Bridge over Little Scioto	Threat	Bridge over flood plain has very high piers (ties into mountainous terrain)	
15	Bridges	Ph 3 Bridge over Little Scioto Abutment	Threat	Unique 30' - 50' high abutment with drilled shafts	
16	Bridges	Ph 3 over Ohio River Road piers	Threat	Straddle bent pier construction somewhat unique in Ohio	
17	Bridges	Ph 3 over CSX RR	Threat	Constructibility around the RR ROW	

Portsmouth Bypass
Risk Register
Condensed for Report: Entire Excel file provided to ODOT

Index	Functional Assignment	Event Risk Name	Threat/Opportunity	Description	Schedule notes
18	Bridges	Ph 2 over Norfolk Southern	Threat	Structures over NS RR on 70-80 degree skew; complicated erection - likely addtl crane	
19	Bridges	Ph 2 over Morris Lane Blue Run	Threat	Abutments on very high fill slopes with slope trtmt and very high piers with complex erection.	
20	Retaining Walls, N	Stage 2	Threat	Staged construction required for ret walls. Time will be reqd for proper consolidation between the stages. Likely will not be on the critical path.	
21	Erosion Control	Other Erosion Control for Phases 2 and 3	Threat	Permanent erosion control related to drainage, such as at culvert ends is not developed in enough detail for pricing in Phases 2 and 3	
22	Stream Restoratio	Conservation Easements through property purchase	Opportunity	Purchase properties to ensure preservation of the streams in lieu of providing restoration	
23	ROW Acquisition	Unpredictable jury awards / increasing markets for latter Phases	Threat	Unpredictable jury awards / increasing markets for latter Phases	
24	Utility Relocations	Utilities relocated in time in interchanges (not in ODOT control): High Transmission lines	Threat	Utilities relocated in time in interchanges (not in ODOT control)	likely not a delay factor even if utilities have an issue. For Phase 2 letting in 2014, there is a concern that the AEP transmission line would not be relocated in time for construction.
25	Phase 1 Proximity	County Airport	Threat	Coordination to ensure there are no airport restrictions that could impact the construction schedule	
26	Drainage	8' x 8' Box Culvert	Threat	Difficult Access	
27	Drainage	8' x 8' Box Culvert	Threat	Cost Risk for unique culvert construction	
28	Drainage	Culverts	Threat	Lining or coating due to concern with rusting (lengthen life of pipe)	
29	Bridges	Potential Flooding at the river Scioto	Threat	Schedule delay due to abnormal flooding	Very unlikely chance of occurrence
30	Permits	Potential delay due to permit issues	Threat	Env issues (endangered species) need to be resolve to get USFW permit to obtain the USACE 401 permit	Locating an endangered species (bat) could cause a delay, but the project team is working on mitigation (OES).

APPENDIX C – CRYSTAL BALL PROBABILITY ASSUMPTIONS

Crystal Ball Report - Assumptions

No Simulation Data

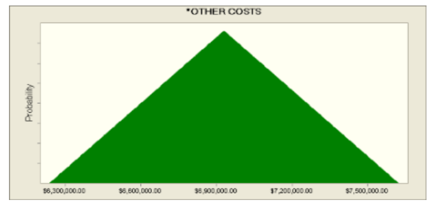
Assumptions

Worksheet: [GroupingSCI-823-Portsmouth Bypass Cost Estimate FINAL.xlsx]All Phases

Assumption: *OTHER COSTS — Cell: E77

Triangular distribution with parameters:

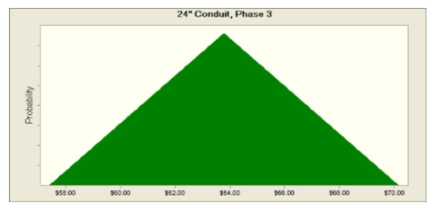
Minimum	$6,236,610.13
Likeliest	$6,929,566.81
Maximum	$7,622,523.49



Assumption: 24" Conduit, Phase 3 — Cell: M19

Triangular distribution with parameters:

Minimum	$57.40
Likeliest	$63.78
Maximum	$70.16

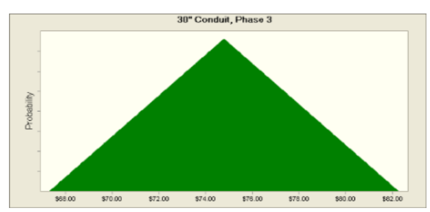


Correlated with:	Coefficient
30" Conduit, Phase 3 (M21)	1.00
42" Conduit, Phase 3 (M23)	1.00
72" Conduit, Phase 3 (M28)	1.00
84" Conduit, Phase 3 (M30)	1.00
78" Conduit, Phase 3 (M29)	1.00
36" Conduit, Phase 3 (M22)	1.00
48" Conduit, Phase 3 (M24)	1.00
60" Conduit, Phase 3 (M26)	1.00

Assumption: 30" Conduit, Phase 3 — Cell: M21

Triangular distribution with parameters:

Minimum	$67.30
Likeliest	$74.78
Maximum	$82.26



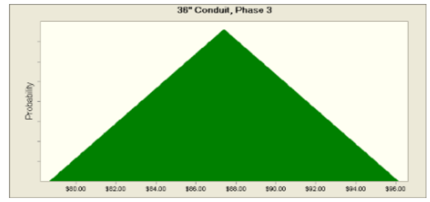
Correlated with:	Coefficient
24" Conduit, Phase 3 (M19)	1.00

* Other costs include all items that could not be grouped into the categories on this spreadsheet. Some examples are removals, undercut and granular material, geotechnical quantities such as pre-splitting and hydrologist, aggregate drains, fence, rumble strips, other striping, and various others.

Assumption: 36" Conduit, Phase 3 **Cell: M22**

Triangular distribution with parameters:

Minimum	$78.66
Likeliest	$87.40
Maximum	$96.14

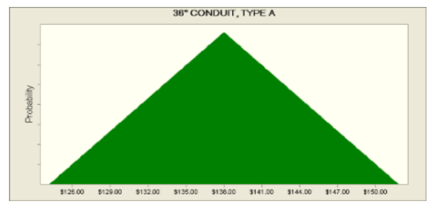


Correlated with:	Coefficient
24" Conduit, Phase 3 (M19)	1.00

Assumption: 36" CONDUIT, TYPE A **Cell: I22**

Triangular distribution with parameters:

Minimum	$124.20
Likeliest	$138.00
Maximum	$151.80

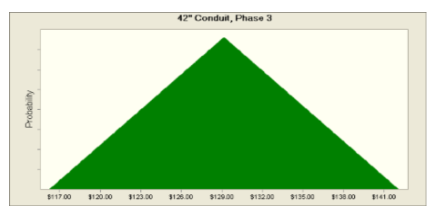


Correlated with:	Coefficient
54" CONDUIT, TYPE A (I25)	1.00
60" CONDUIT, TYPE A (I26)	1.00
72" CONDUIT, TYPE A (I28)	1.00
48" CONDUIT, TYPE A (I24)	1.00
66" CONDUIT, TYPE A (I27)	1.00

Assumption: 42" Conduit, Phase 3 **Cell: M23**

Triangular distribution with parameters:

Minimum	$116.24
Likeliest	$129.15
Maximum	$142.07

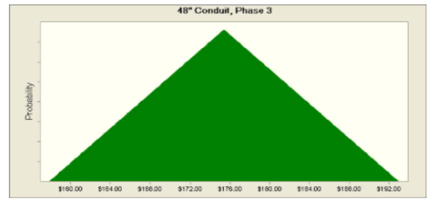


Correlated with:	Coefficient
24" Conduit, Phase 3 (M19)	1.00

Assumption: 48" Conduit, Phase 3 **Cell: M24**

Triangular distribution with parameters:

Minimum	$157.86
Likeliest	$175.40
Maximum	$192.94

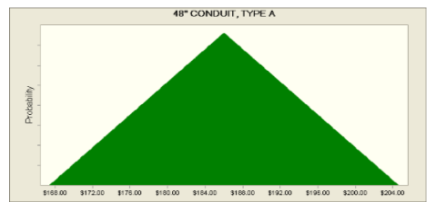


Correlated with:	Coefficient
24" Conduit, Phase 3 (M19)	1.00

Assumption: 48" CONDUIT, TYPE A **Cell: I24**

Triangular distribution with parameters:

Minimum	$167.40
Likeliest	$186.00
Maximum	$204.60

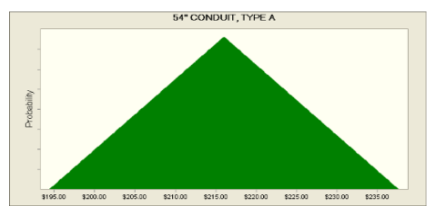


Correlated with:	Coefficient
36" CONDUIT, TYPE A (I22)	1.00

Assumption: 54" CONDUIT, TYPE A **Cell: I25**

Triangular distribution with parameters:

Minimum	$194.40
Likeliest	$216.00
Maximum	$237.60

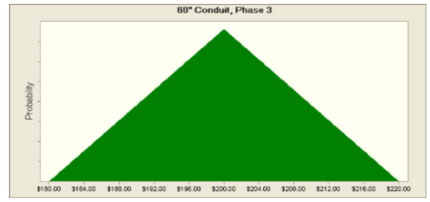


Correlated with:	Coefficient
36" CONDUIT, TYPE A (I22)	1.00

Assumption: 60" Conduit, Phase 3 **Cell: M26**

Triangular distribution with parameters:

Minimum	$180.00
Likeliest	$200.00
Maximum	$220.00

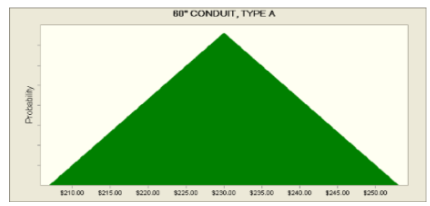


Correlated with:	Coefficient
24" Conduit, Phase 3 (M19)	1.00

Assumption: 60" CONDUIT, TYPE A **Cell: I26**

Triangular distribution with parameters:

Minimum	$207.00
Likeliest	$230.00
Maximum	$253.00

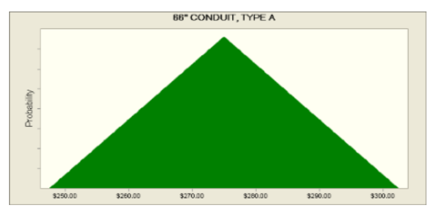


Correlated with:	Coefficient
36" CONDUIT, TYPE A (I22)	1.00

Assumption: 66" CONDUIT, TYPE A **Cell: I27**

Triangular distribution with parameters:

Minimum	$247.50
Likeliest	$275.00
Maximum	$302.50

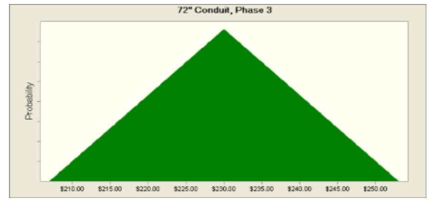


Correlated with:	Coefficient
36" CONDUIT, TYPE A (I22)	1.00

Assumption: 72" Conduit, Phase 3 **Cell: M28**

Triangular distribution with parameters:

Minimum	$207.00
Likeliest	$230.00
Maximum	$253.00

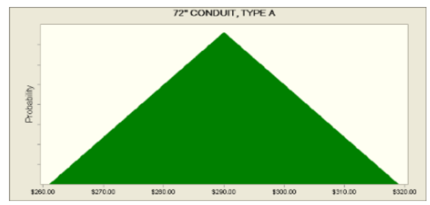


Correlated with:	Coefficient
24" Conduit, Phase 3 (M19)	1.00

Assumption: 72" CONDUIT, TYPE A **Cell: I28**

Triangular distribution with parameters:

Minimum	$261.00
Likeliest	$290.00
Maximum	$319.00

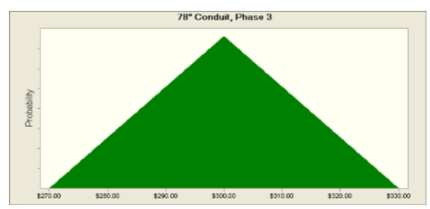


Correlated with:	Coefficient
36" CONDUIT, TYPE A (I22)	1.00

Assumption: 78" Conduit, Phase 3 **Cell: M29**

Triangular distribution with parameters:

Minimum	$270.00
Likeliest	$300.00
Maximum	$330.00

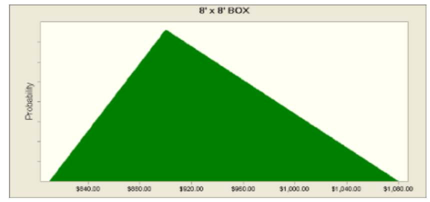


Correlated with:	Coefficient
24" Conduit, Phase 3 (M19)	1.00

Assumption: 8' x 8' BOX **Cell: M31**

Triangular distribution with parameters:

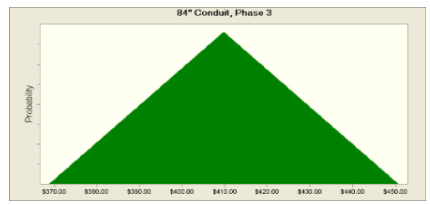
Minimum	$810.00
Likeliest	$900.00
Maximum	$1,080.00



Assumption: 84" Conduit, Phase 3 **Cell: M30**

Triangular distribution with parameters:

Minimum	$368.79
Likeliest	$409.77
Maximum	$450.75

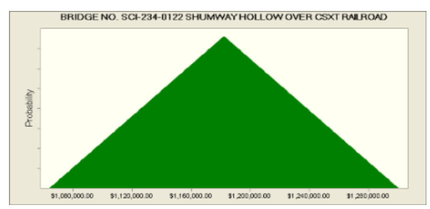


Correlated with:	Coefficient
24" Conduit, Phase 3 (M19)	1.00

Assumption: BRIDGE NO. SCI-234-0122 SHUMWAY HOLLOW OVER CSXT RAILROAD **Cell: E45**

Triangular distribution with parameters:

Minimum	$1,063,896.91
Likeliest	$1,182,107.68
Maximum	$1,300,318.45



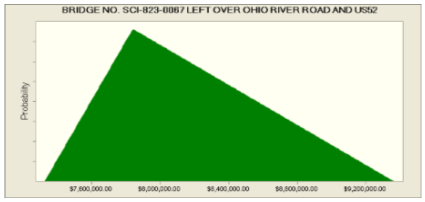
Correlated with:	Coefficient
BRIDGE NO. SCI-823-0074 RIGHT OVER OHIO RIVER ROAI	0.60

Assumption: BRIDGE NO. SCI-823-0067 LEFT OVER OHIO RIVER ROAD AND US52 **Cell: M64**

Triangular distribution with parameters:

Minimum	$7,326,180.00	(=M64*0.9)
Likeliest	$7,840,200.00	
Maximum	$9,361,230.00	(=M64*1.15)

Assumption: BRIDGE NO. SCI-823-0067 LEFT OVER OHIO RIVER ROAD AND US52 (cont'd) **Cell: M64**

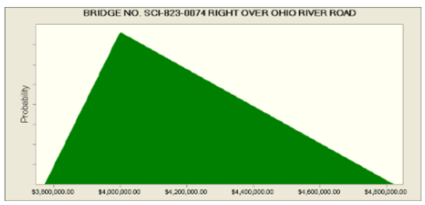


Correlated with:	Coefficient
BRIDGE NO. SCI-823-0074 RIGHT OVER OHIO RIVER ROAD	1.00

Assumption: BRIDGE NO. SCI-823-0074 RIGHT OVER OHIO RIVER ROAD **Cell: M63**

Triangular distribution with parameters:

Minimum	$3,773,340.00	(=M63*0.9)
Likeliest	$4,000,000.00	
Maximum	$4,821,490.00	(=M63*1.15)

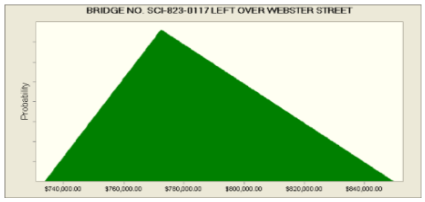


Correlated with:	Coefficient
BRIDGE NO. SCI-823-0214 RIGHT OVER CSX RAILROAD (M	0.60
BRIDGE NO. SCI-823-0229 LEFT OVER SLOCUM AVENUE (I	0.60
BRIDGE NO. SCI-823-0248 RIGHT OVER SR335 AND LITTLE	0.60
BRIDGE NO. SCI-823-0214 LEFT OVER CSX RAILROAD (M6	0.60
BRIDGE NO. SCI-823-0248 LEFT OVER SR335 AND LITTLE S	0.60
BRIDGE NO. SCI-823-0117 RIGHT OVER WEBSTER STREET	0.60
BRIDGE NO. SCI-8230722 LEFT OVER SHUMWAY HOLLOW	0.60
BRIDGE NO. SCI-823-0117 LEFT OVER WEBSTER STREET	0.60
BRIDGE NO. SCI-823-0229 RIGHT OVER SLOCUM AVENUE	0.60
BRIDGE NO. SCI-8230722 RIGHT OVER SHUMWAY HOLLOW	0.60
BRIDGE NO. SCI-234-0122 SHUMWAY HOLLOW OVER CSX	0.60
BRIDGE NO. SCI-823-0067 LEFT OVER OHIO RIVER ROAD	1.00

Assumption: BRIDGE NO. SCI-823-0117 LEFT OVER WEBSTER STREET **Cell: M65**

Triangular distribution with parameters:

Minimum	$733,780.00	(=M65*0.95)
Likeliest	$772,400.00	
Maximum	$849,640.00	(=M65*1.1)

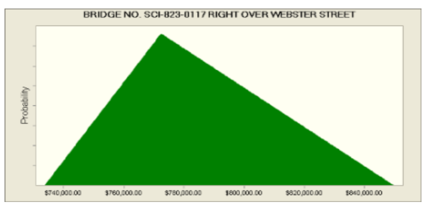


Correlated with:	Coefficient
BRIDGE NO. SCI-823-0117 RIGHT OVER WEBSTER STREE	1.00
BRIDGE NO. SCI-823-0074 RIGHT OVER OHIO RIVER ROAI	0.60

Assumption: BRIDGE NO. SCI-823-0117 RIGHT OVER WEBSTER STREET **Cell: M66**

Triangular distribution with parameters:

Minimum	$733,780.00	(=M66*0.95)
Likeliest	$772,400.00	
Maximum	$849,640.00	(=M66*1.1)



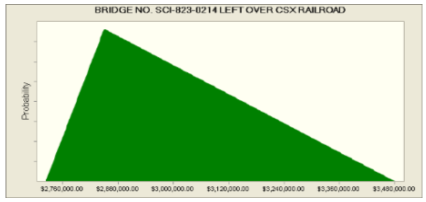
Correlated with:	Coefficient
BRIDGE NO. SCI-823-0117 LEFT OVER WEBSTER STREET	1.00
BRIDGE NO. SCI-823-0074 RIGHT OVER OHIO RIVER ROAI	0.60

Assumption: BRIDGE NO. SCI-823-0214 LEFT OVER CSX RAILROAD **Cell: M67**

Triangular distribution with parameters:

Minimum	$2,723,130.00	(=M67*0.9)
Likeliest	$2,850,000.00	
Maximum	$3,479,555.00	(=M67*1.15)

Assumption: BRIDGE NO. SCI-823-0214 LEFT OVER CSX RAILROAD (cont'd) **Cell: M67**

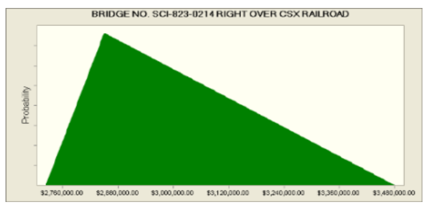


Correlated with:	Coefficient
BRIDGE NO. SCI-823-0214 RIGHT OVER CSX RAILROAD (M	1.00
BRIDGE NO. SCI-823-0074 RIGHT OVER OHIO RIVER ROAD	0.60

Assumption: BRIDGE NO. SCI-823-0214 RIGHT OVER CSX RAILROAD **Cell: M68**

Triangular distribution with parameters:

Minimum	$2,723,130.00	(=M68*0.9)
Likeliest	$2,850,000.00	
Maximum	$3,479,555.00	(=M68*1.15)

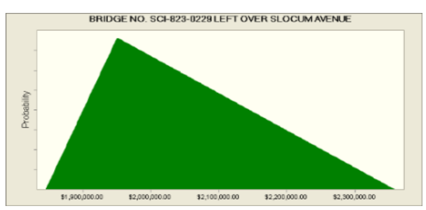


Correlated with:	Coefficient
BRIDGE NO. SCI-823-0074 RIGHT OVER OHIO RIVER ROAD	0.60
BRIDGE NO. SCI-823-0214 LEFT OVER CSX RAILROAD (M6	1.00

Assumption: BRIDGE NO. SCI-823-0229 LEFT OVER SLOCUM AVENUE **Cell: M69**

Triangular distribution with parameters:

Minimum	$1,845,630.00	(=M69*0.9)
Likeliest	$1,950,700.00	
Maximum	$2,358,305.00	(=M69*1.15)



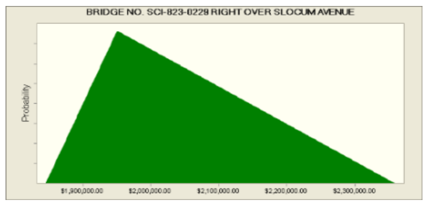
Assumption: BRIDGE NO. SCI-823-0229 LEFT OVER SLOCUM AVENUE (cont'd) **Cell: M69**

Correlated with:	Coefficient
BRIDGE NO. SCI-823-0229 RIGHT OVER SLOCUM AVENUE	1.00
BRIDGE NO. SCI-823-0074 RIGHT OVER OHIO RIVER ROAD	0.60

Assumption: BRIDGE NO. SCI-823-0229 RIGHT OVER SLOCUM AVENUE **Cell: M70**

Triangular distribution with parameters:

Minimum	$1,845,630.00	(=M70*0.9)
Likeliest	$1,950,700.00	
Maximum	$2,358,305.00	(=M70*1.15)

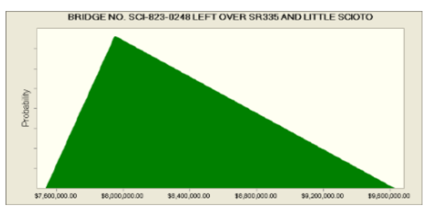


Correlated with:	Coefficient
BRIDGE NO. SCI-823-0229 LEFT OVER SLOCUM AVENUE (I	1.00
BRIDGE NO. SCI-823-0074 RIGHT OVER OHIO RIVER ROAD	0.60

Assumption: BRIDGE NO. SCI-823-0248 LEFT OVER SR335 AND LITTLE SCIOTO **Cell: M71**

Triangular distribution with parameters:

Minimum	$7,535,160.00	(=M71*0.9)
Likeliest	$7,950,000.00	
Maximum	$9,628,260.00	(=M71*1.15)

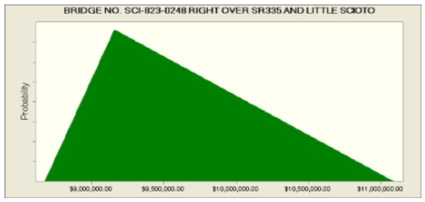


Correlated with:	Coefficient
BRIDGE NO. SCI-823-0074 RIGHT OVER OHIO RIVER ROAD	0.60
BRIDGE NO. SCI-823-0248 RIGHT OVER SR335 AND LITTLE	1.00

Assumption: BRIDGE NO. SCI-823-0248 RIGHT OVER SR335 AND LITTLE SCIOTO **Cell: M72**

Triangular distribution with parameters:

Minimum	$8,678,430.00	(=M72*0.9)
Likeliest	$9,160,000.00	
Maximum	$11,089,105.00	(=M72*1.15)

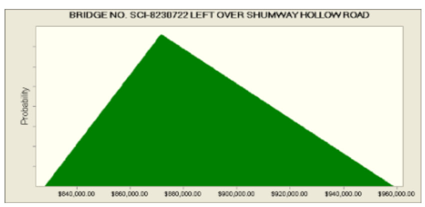


Correlated with:	Coefficient
BRIDGE NO. SCI-823-0074 RIGHT OVER OHIO RIVER ROAE	0.60
BRIDGE NO. SCI-823-0248 LEFT OVER SR335 AND LITTLE :	1.00

Assumption: BRIDGE NO. SCI-8230722 LEFT OVER SHUMWAY HOLLOW ROAD **Cell: M73**

Triangular distribution with parameters:

Minimum	$828,020.00	(=M73*0.95)
Likeliest	$871,600.00	
Maximum	$958,760.00	(=M73*1.1)



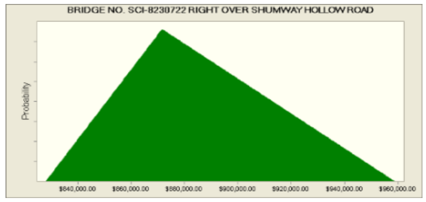
Correlated with:	Coefficient
BRIDGE NO. SCI-823-0074 RIGHT OVER OHIO RIVER ROAE	0.60
BRIDGE NO. SCI-8230722 RIGHT OVER SHUMWAY HOLLO'	1.00

Assumption: BRIDGE NO. SCI-8230722 RIGHT OVER SHUMWAY HOLLOW ROAD **Cell: M74**

Triangular distribution with parameters:

Minimum	$828,020.00	(=M74*0.95)
Likeliest	$871,600.00	
Maximum	$958,760.00	(=M74*1.1)

Assumption: BRIDGE NO. SCI-8230722 RIGHT OVER SHUMWAY HOLLOW ROAD (cont'd) **Cell: M74**

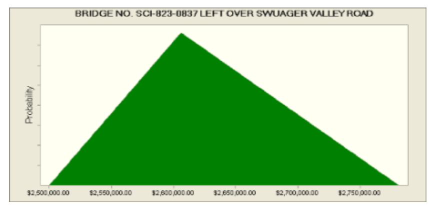


Correlated with:	Coefficient
BRIDGE NO. SCI-823-0074 RIGHT OVER OHIO RIVER ROAD	0.60
BRIDGE NO. SCI-8230722 LEFT OVER SHUMWAY HOLLOW	1.00

Assumption: BRIDGE NO. SCI-823-0837 LEFT OVER SWUAGER VALLEY ROAD **Cell: E46**

Triangular distribution with parameters:

Minimum	$2,500,000.00
Likeliest	$2,606,000.00
Maximum	$2,781,000.00

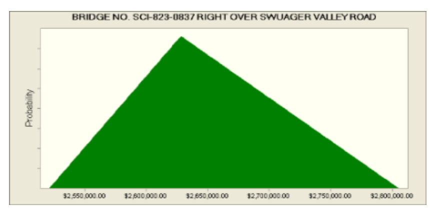


Correlated with:	Coefficient
BRIDGE NO. SCI-823-0917 RIGHT OVER PORTSMOUTH MI	1.00
BRIDGE NO. SCI-823-0917 LEFT OVER PORTSMOUTH MINI	1.00
BRIDGE NO. SCI-823-0837 RIGHT OVER SWUAGER VALLE	1.00

Assumption: BRIDGE NO. SCI-823-0837 RIGHT OVER SWUAGER VALLEY ROAD **Cell: E47**

Triangular distribution with parameters:

Minimum	$2,521,000.00
Likeliest	$2,628,000.00
Maximum	$2,805,000.00

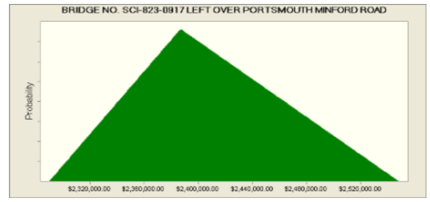


Correlated with:	Coefficient
BRIDGE NO. SCI-823-0837 LEFT OVER SWUAGER VALLEY	1.00

Assumption: BRIDGE NO. SCI-823-0917 LEFT OVER PORTSMOUTH MINFORD ROAD **Cell: E48**

Triangular distribution with parameters:

Minimum	$2,290,000.00
Likeliest	$2,387,000.00
Maximum	$2,548,000.00

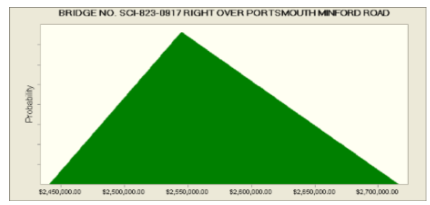


Correlated with:	Coefficient
BRIDGE NO. SCI-823-0837 LEFT OVER SWUAGER VALLEY	1.00

Assumption: BRIDGE NO. SCI-823-0917 RIGHT OVER PORTSMOUTH MINFORD ROAD **Cell: E49**

Triangular distribution with parameters:

Minimum	$2,441,000.00
Likeliest	$2,545,000.00
Maximum	$2,716,000.00

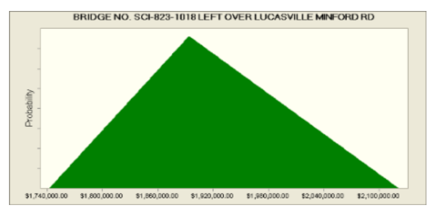


Correlated with:	Coefficient
BRIDGE NO. SCI-823-0837 LEFT OVER SWUAGER VALLEY	1.00

Assumption: BRIDGE NO. SCI-823-1018 LEFT OVER LUCASVILLE MINFORD RD **Cell: I50**

Triangular distribution with parameters:

Minimum	$1,742,480.00
Likeliest	$1,894,000.00
Maximum	$2,121,280.00



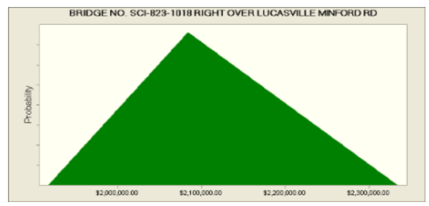
Assumption: BRIDGE NO. SCI-823-1018 LEFT OVER LUCASVILLE MINFORD RD (cont'd) **Cell: I50**

Correlated with:	Coefficient
BRIDGE NO. SCI-823-1595 RAMP C OVER FAIRGROUNDS F	0.60
BRIDGE NO. SCI-823-1603 RAMP C OVER NORFOLK SOUT	0.60
BRIDGE NO. SCI-823-1096 RIGHT OVER BLUE RUN ROAD (	0.60
BRIDGE NO. SCI-823-1357 LEFT OVER MORRIS LANE BLUE	0.60
BRIDGE NO. SCI-823-1096 LEFT OVER BLUE RUN ROAD (I5	0.60
BRIDGE NO. SCI-823-1431 FLATWOOD FALLEN TIMBER OV	0.60
BRIDGE NO. SCI-823-1018 RIGHT OVER LUCASVILLE MINF	1.00
BRIDGE NO. SCI-823-1593 RAMP B OVER FAIRGROUNDS F	0.60
BRIDGE NO. SCI-823-1357 RIGHT OVER MORRIS LANE BLU	0.60
BRIDGE NO. SCI-823-1594 S.R. 823 OVER FAIRGROUNDS F	0.60
BRIDGE NO. SCI-823-1601 S.R. 823 OVER NORFOLK SOUT	0.60
BRIDGE NO. SCI-823-1598 RAMP B OVER NORFOLK SOUTI	0.60

Assumption: BRIDGE NO. SCI-823-1018 RIGHT OVER LUCASVILLE MINFORD RD **Cell: I51**

Triangular distribution with parameters:

Minimum	$1,917,280.00
Likeliest	$2,084,000.00
Maximum	$2,334,080.00

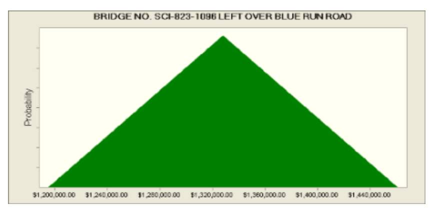


Correlated with:	Coefficient
BRIDGE NO. SCI-823-1018 LEFT OVER LUCASVILLE MINFC	1.00

Assumption: BRIDGE NO. SCI-823-1096 LEFT OVER BLUE RUN ROAD **Cell: I52**

Triangular distribution with parameters:

Minimum	$1,195,200.00
Likeliest	$1,328,000.00
Maximum	$1,460,800.00

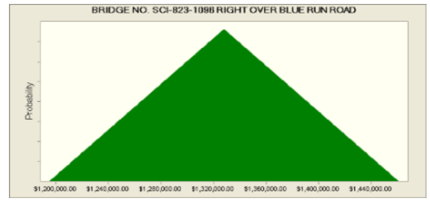


Correlated with:	Coefficient
BRIDGE NO. SCI-823-1018 LEFT OVER LUCASVILLE MINFC	0.60
BRIDGE NO. SCI-823-1096 RIGHT OVER BLUE RUN ROAD (	1.00

Assumption: BRIDGE NO. SCI-823-1096 RIGHT OVER BLUE RUN ROAD **Cell: I53**

Triangular distribution with parameters:

Minimum	$1,195,200.00
Likeliest	$1,328,000.00
Maximum	$1,460,800.00

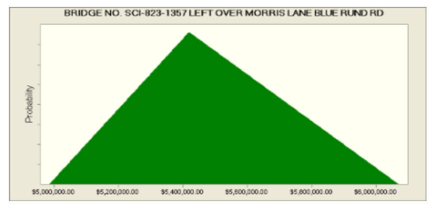


Correlated with:	Coefficient
BRIDGE NO. SCI-823-1018 LEFT OVER LUCASVILLE MINFC	0.60
BRIDGE NO. SCI-823-1096 LEFT OVER BLUE RUN ROAD (I5	1.00

Assumption: BRIDGE NO. SCI-823-1357 LEFT OVER MORRIS LANE BLUE RUND RD **Cell: I54**

Triangular distribution with parameters:

Minimum	$4,985,480.00
Likeliest	$5,419,000.00
Maximum	$6,069,280.00

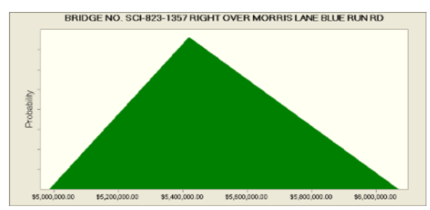


Correlated with:	Coefficient
BRIDGE NO. SCI-823-1357 RIGHT OVER MORRIS LANE BLU	1.00
BRIDGE NO. SCI-823-1018 LEFT OVER LUCASVILLE MINFC	0.60

Assumption: BRIDGE NO. SCI-823-1357 RIGHT OVER MORRIS LANE BLUE RUN RD **Cell: I55**

Triangular distribution with parameters:

Minimum	$4,985,480.00
Likeliest	$5,419,000.00
Maximum	$6,069,280.00

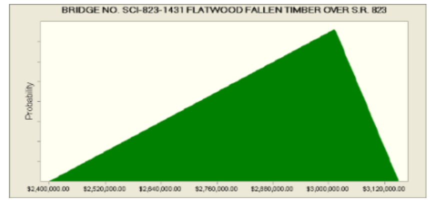


Correlated with:	Coefficient
BRIDGE NO. SCI-823-1357 LEFT OVER MORRIS LANE BLUE	1.00
BRIDGE NO. SCI-823-1018 LEFT OVER LUCASVILLE MINFC	0.60

Assumption: BRIDGE NO. SCI-823-1431 FLATWOOD FALLEN TIMBER OVER S.R. 823 **Cell: I56**

Triangular distribution with parameters:

Minimum	$2,400,000.00
Likeliest	$3,012,800.00
Maximum	$3,150,000.00

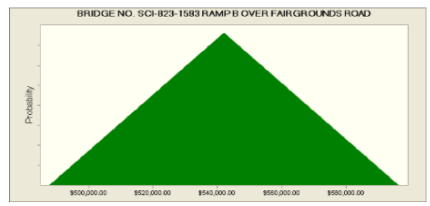


Correlated with:	Coefficient
BRIDGE NO. SCI-823-1018 LEFT OVER LUCASVILLE MINFC	0.60

Assumption: BRIDGE NO. SCI-823-1593 RAMP B OVER FAIRGROUNDS ROAD **Cell: I57**

Triangular distribution with parameters:

Minimum	$487,800.00
Likeliest	$542,000.00
Maximum	$596,200.00

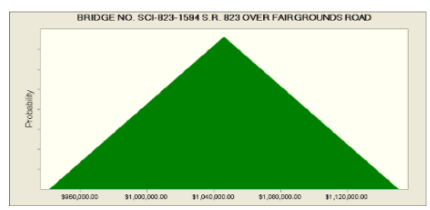


Correlated with:	Coefficient
BRIDGE NO. SCI-823-1595 RAMP C OVER FAIRGROUNDS F	1.00
BRIDGE NO. SCI-823-1018 LEFT OVER LUCASVILLE MINFC	0.60
BRIDGE NO. SCI-823-1594 S.R. 823 OVER FAIRGROUNDS F	1.00

Assumption: BRIDGE NO. SCI-823-1594 S.R. 823 OVER FAIRGROUNDS ROAD **Cell: I58**

Triangular distribution with parameters:

Minimum	$941,400.00
Likeliest	$1,046,000.00
Maximum	$1,150,600.00

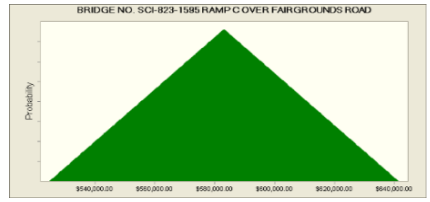


Correlated with:	Coefficient
BRIDGE NO. SCI-823-1593 RAMP B OVER FAIRGROUNDS F	1.00
BRIDGE NO. SCI-823-1018 LEFT OVER LUCASVILLE MINFC	0.60

Assumption: BRIDGE NO. SCI-823-1595 RAMP C OVER FAIRGROUNDS ROAD **Cell: I59**

Triangular distribution with parameters:

Minimum	$524,700.00
Likeliest	$583,000.00
Maximum	$641,300.00

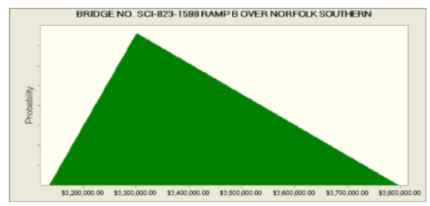


Correlated with:	Coefficient
BRIDGE NO. SCI-823-1018 LEFT OVER LUCASVILLE MINFC	0.60
BRIDGE NO. SCI-823-1593 RAMP B OVER FAIRGROUNDS F	1.00

Assumption: BRIDGE NO. SCI-823-1598 RAMP B OVER NORFOLK SOUTHERN **Cell: I60**

Triangular distribution with parameters:

Minimum	$3,136,000.00
Likeliest	$3,301,000.00
Maximum	$3,796,000.00

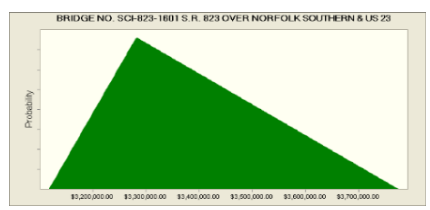


Correlated with:	Coefficient
BRIDGE NO. SCI-823-1603 RAMP C OVER NORFOLK SOUT	1.00
BRIDGE NO. SCI-823-1018 LEFT OVER LUCASVILLE MINFC	0.60
BRIDGE NO. SCI-823-1601 S.R. 823 OVER NORFOLK SOUT	0.80

Assumption: BRIDGE NO. SCI-823-1601 S.R. 823 OVER NORFOLK SOUTHERN & US 23 **Cell: I61**

Triangular distribution with parameters:

Minimum	$3,118,000.00
Likeliest	$3,282,000.00
Maximum	$3,774,000.00

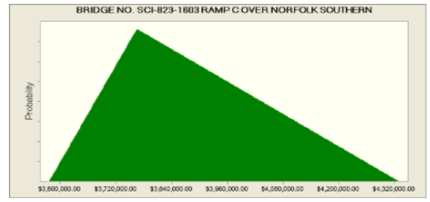


Correlated with:	Coefficient
BRIDGE NO. SCI-823-1018 LEFT OVER LUCASVILLE MINFC	0.60
BRIDGE NO. SCI-823-1598 RAMP B OVER NORFOLK SOUTI	0.80

Assumption: BRIDGE NO. SCI-823-1603 RAMP C OVER NORFOLK SOUTHERN **Cell: I62**

Triangular distribution with parameters:

Minimum	$3,576,000.00
Likeliest	$3,765,000.00
Maximum	$4,329,000.00

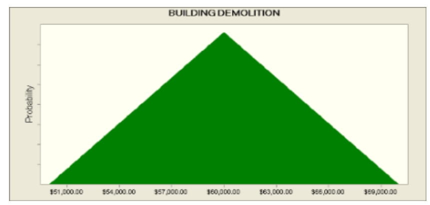


Correlated with:	Coefficient
BRIDGE NO. SCI-823-1018 LEFT OVER LUCASVILLE MINFC	0.60
BRIDGE NO. SCI-823-1598 RAMP B OVER NORFOLK SOUTI	1.00

Assumption: BUILDING DEMOLITION **Cell: E42**

Triangular distribution with parameters:

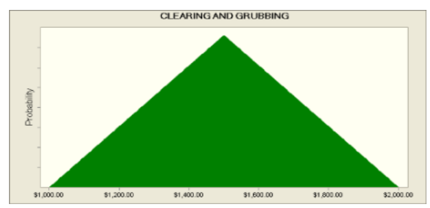
Minimum	$50,000.00
Likeliest	$60,000.00
Maximum	$70,000.00



Assumption: CLEARING AND GRUBBING **Cell: I8**

Triangular distribution with parameters:

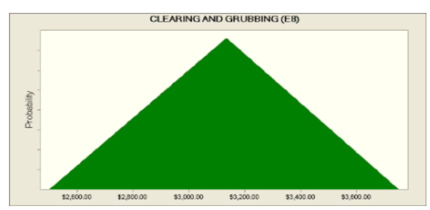
Minimum	$1,000.00
Likeliest	$1,500.00
Maximum	$2,000.00



Assumption: CLEARING AND GRUBBING (E8) **Cell: E8**

Triangular distribution with parameters:

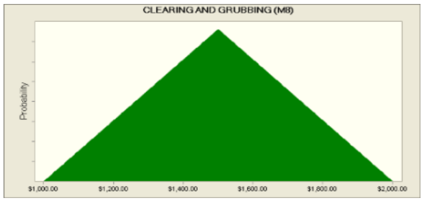
Minimum	$2,500.00
Likeliest	$3,134.00
Maximum	$3,750.00



Assumption: CLEARING AND GRUBBING (M8) **Cell: M8**

Triangular distribution with parameters:

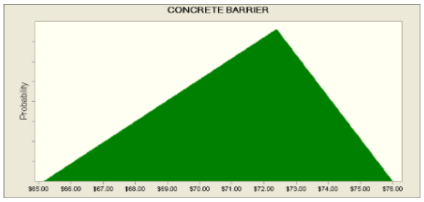
Minimum	$1,000.00
Likeliest	$1,500.00
Maximum	$2,000.00



Assumption: CONCRETE BARRIER **Cell: E7**

Triangular distribution with parameters:

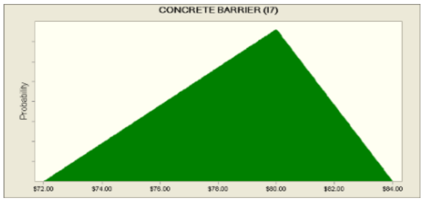
Minimum	$65.15
Likeliest	$72.39
Maximum	$76.00



Assumption: CONCRETE BARRIER (I7) **Cell: I7**

Triangular distribution with parameters:

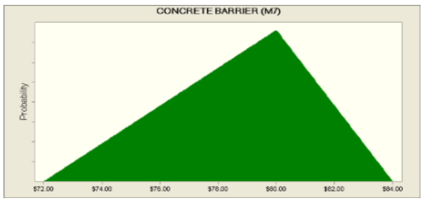
Minimum	$72.00
Likeliest	$80.00
Maximum	$84.00



Assumption: CONCRETE BARRIER (M7) **Cell: M7**

Triangular distribution with parameters:

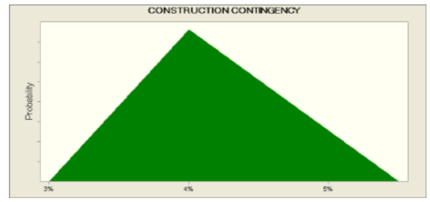
Minimum	$72.00
Likeliest	$80.00
Maximum	$84.00



Assumption: CONSTRUCTION CONTINGENCY **Cell: E89**

Triangular distribution with parameters:

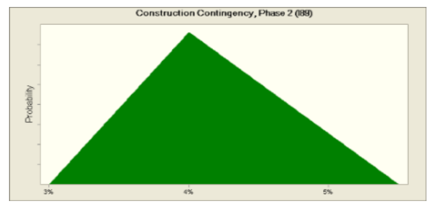
Minimum	3%
Likeliest	4%
Maximum	6%



Assumption: Construction Contingency, Phase 2 (I89) **Cell: I89**

Triangular distribution with parameters:

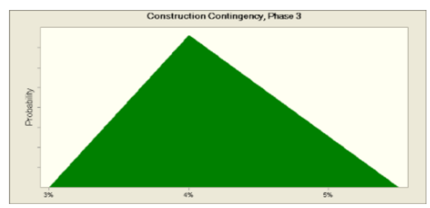
Minimum	3%
Likeliest	4%
Maximum	6%



Assumption: Construction Contingency, Phase 3 **Cell: M89**

Triangular distribution with parameters:

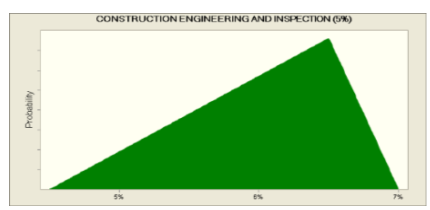
Minimum	3%
Likeliest	4%
Maximum	6%



Assumption: CONSTRUCTION ENGINEERING AND INSPECTION (5%) **Cell: E91**

Triangular distribution with parameters:

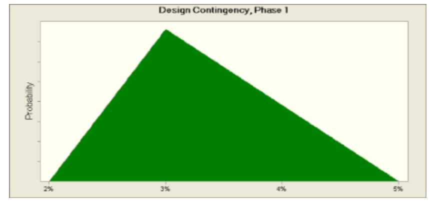
Minimum	5%
Likeliest	7%
Maximum	7%



Assumption: Design Contingency, Phase 1 **Cell: E90**

Triangular distribution with parameters:

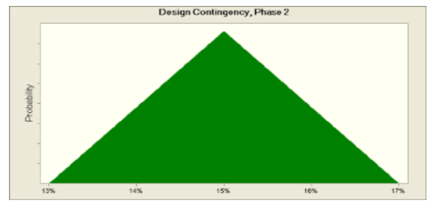
Minimum	2%
Likeliest	3%
Maximum	5%



Assumption: Design Contingency, Phase 2 **Cell: I90**

Triangular distribution with parameters:

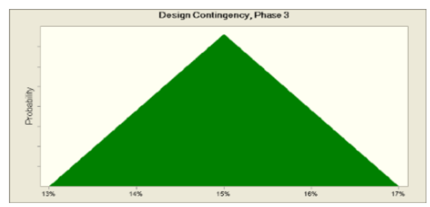
Minimum	13%
Likeliest	15%
Maximum	17%



Assumption: Design Contingency, Phase 3 **Cell: M90**

Triangular distribution with parameters:

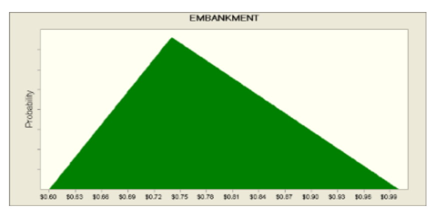
Minimum	13%
Likeliest	15%
Maximum	17%



Assumption: EMBANKMENT **Cell: E5**

Triangular distribution with parameters:

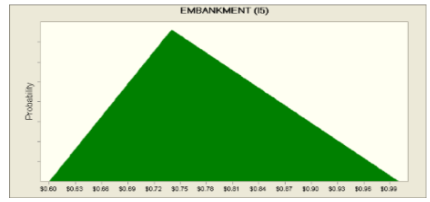
Minimum	$0.60
Likeliest	$0.74
Maximum	$1.00



Assumption: EMBANKMENT (I5) **Cell: I5**

Triangular distribution with parameters:

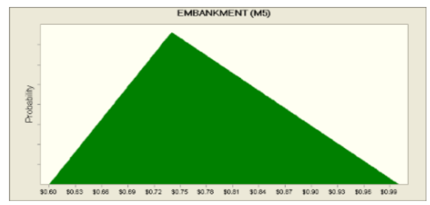
Minimum	$0.60
Likeliest	$0.74
Maximum	$1.00



Assumption: EMBANKMENT (M5) **Cell: M5**

Triangular distribution with parameters:

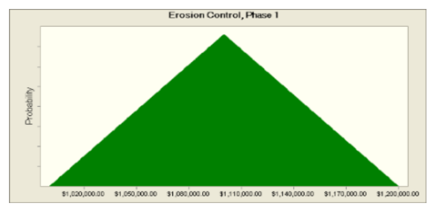
Minimum	$0.60
Likeliest	$0.74
Maximum	$1.00



Assumption: Erosion Control, Phase 1 **Cell: E14**

Triangular distribution with parameters:

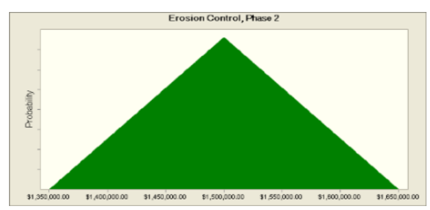
Minimum	$1,000,000.00
Likeliest	$1,100,000.00
Maximum	$1,200,000.00



Assumption: Erosion Control, Phase 2 **Cell: I14**

Triangular distribution with parameters:

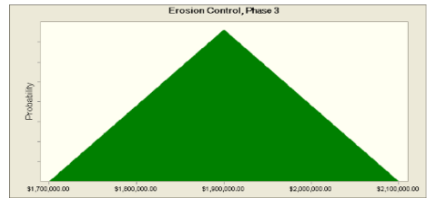
Minimum	$1,350,000.00
Likeliest	$1,500,000.00
Maximum	$1,650,000.00



Assumption: Erosion Control, Phase 3 **Cell: M14**

Triangular distribution with parameters:

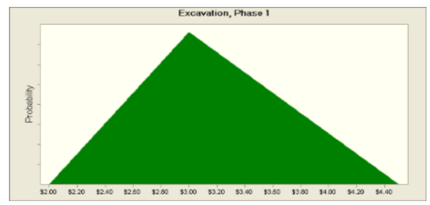
Minimum	$1,700,000.00
Likeliest	$1,900,000.00
Maximum	$2,100,000.00



Assumption: Excavation, Phase 1 **Cell: E4**

Triangular distribution with parameters:

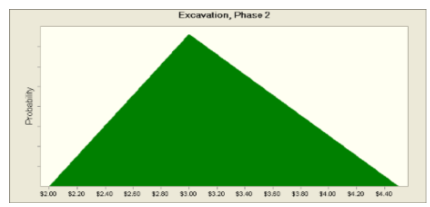
Minimum	$2.00
Likeliest	$3.00
Maximum	$4.50



Assumption: Excavation, Phase 2 **Cell: I4**

Triangular distribution with parameters:

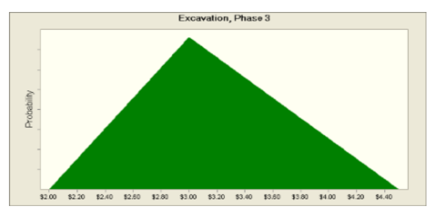
Minimum	$2.00
Likeliest	$3.00
Maximum	$4.50



Assumption: Excavation, Phase 3 **Cell: M4**

Triangular distribution with parameters:

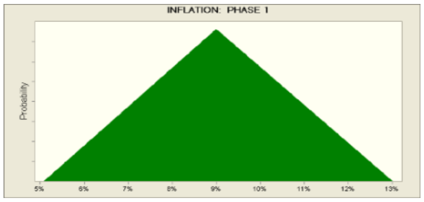
Minimum	$2.00
Likeliest	$3.00
Maximum	$4.50



Assumption: INFLATION: PHASE 1 **Cell: E99**

Triangular distribution with parameters:

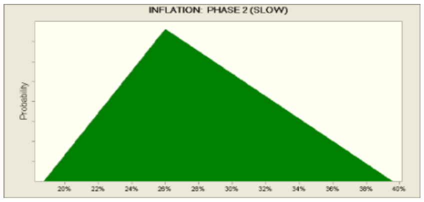
Minimum	5%	(='Inflation Factors'!D45-1)
Likeliest	9%	(='Inflation Factors'!D44-1)
Maximum	13%	(='Inflation Factors'!D43-1)



Assumption: INFLATION: PHASE 2 (SLOW) **Cell: I99**

Triangular distribution with parameters:

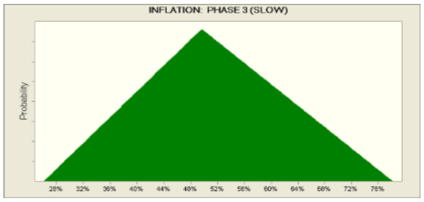
Minimum	19%	(='Inflation Factors'!H31-1)
Likeliest	26%	(='Inflation Factors'!H48-1)
Maximum	40%	(='Inflation Factors'!H47-1)



Assumption: INFLATION: PHASE 3 (SLOW) **Cell: M99**

Triangular distribution with parameters:

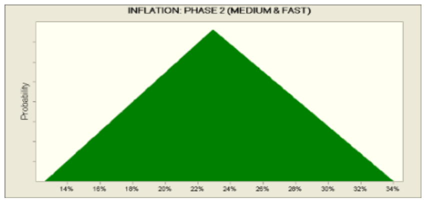
Minimum	26%	(='Inflation Factors'!M53-1)
Likeliest	50%	(='Inflation Factors'!M52-1)
Maximum	78%	(='Inflation Factors'!M51-1)



Assumption: INFLATION: PHASE 2 (MEDIUM & FAST) | **Cell: I102**

Triangular distribution with parameters:

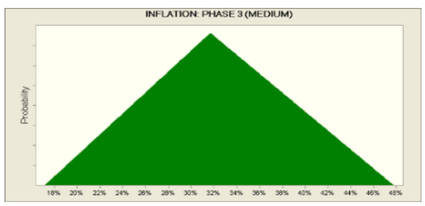
Minimum	13%	(='Inflation Factors'!G143-1)
Likeliest	23%	(='Inflation Factors'!G142-1)
Maximum	34%	(='Inflation Factors'!G141-1)



Assumption: INFLATION: PHASE 3 (MEDIUM) | **Cell: M105**

Triangular distribution with parameters:

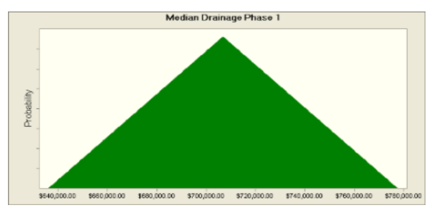
Minimum	17%	(='Inflation Factors'!I147-1)
Likeliest	32%	(='Inflation Factors'!I146-1)
Maximum	48%	(='Inflation Factors'!I145-1)



Assumption: Median Drainage Phase 1 | **Cell: E17**

Triangular distribution with parameters:

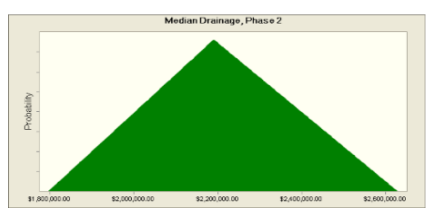
Minimum	$636,105.89
Likeliest	$706,784.32
Maximum	$777,462.75



Assumption: Median Drainage, Phase 2 | **Cell: I17**

Triangular distribution with parameters:

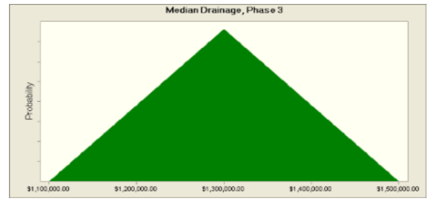
Minimum	$1,795,800.00
Likeliest	$2,190,000.00
Maximum	$2,628,000.00



Assumption: Median Drainage, Phase 3 **Cell: M17**

Triangular distribution with parameters:

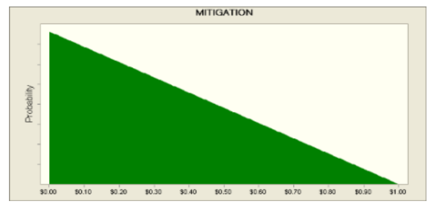
Minimum	$1,100,000.00
Likeliest	$1,300,000.00
Maximum	$1,500,000.00



Assumption: MITIGATION **Cell: M10**

Triangular distribution with parameters:

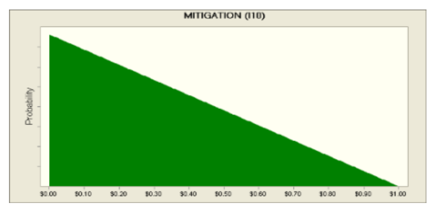
Minimum	$0.00
Likeliest	$0.00
Maximum	$1.00



Assumption: MITIGATION (I10) **Cell: I10**

Triangular distribution with parameters:

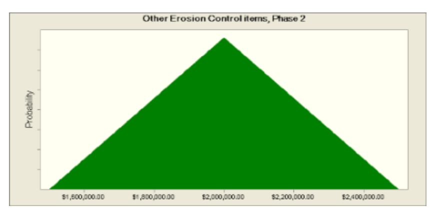
Minimum	$0.00
Likeliest	$0.00
Maximum	$1.00



Assumption: Other Erosion Control items, Phase 2 **Cell: I15**

Triangular distribution with parameters:

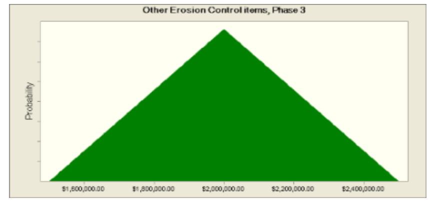
Minimum	$1,500,000.00
Likeliest	$2,000,000.00
Maximum	$2,500,000.00



Assumption: Other Erosion Control items, Phase 3 **Cell: M15**

Triangular distribution with parameters:

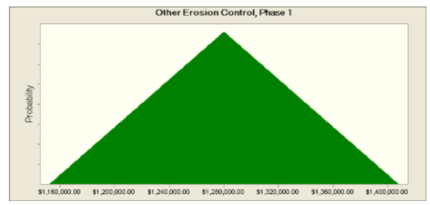
Minimum	$1,500,000.00
Likeliest	$2,000,000.00
Maximum	$2,500,000.00



Assumption: Other Erosion Control, Phase 1 **Cell: E15**

Triangular distribution with parameters:

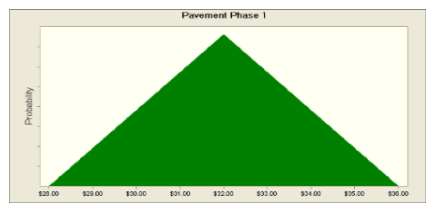
Minimum	$1,152,007.29
Likeliest	$1,280,008.10
Maximum	$1,408,008.91



Assumption: Pavement Phase 1 **Cell: E33**

Triangular distribution with parameters:

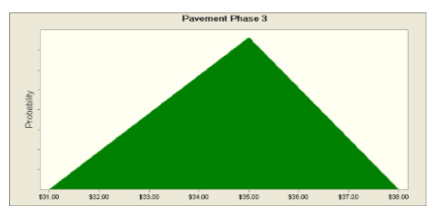
Minimum	$28.00
Likeliest	$32.00
Maximum	$36.00



Assumption: Pavement Phase 3 **Cell: M33**

Triangular distribution with parameters:

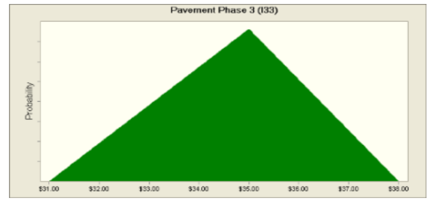
Minimum	$31.00
Likeliest	$35.00
Maximum	$38.00



Assumption: Pavement Phase 3 (I33) **Cell: I33**

Triangular distribution with parameters:

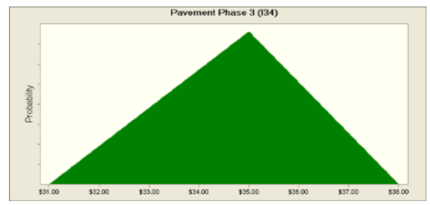
Minimum	$31.00
Likeliest	$35.00
Maximum	$38.00



Assumption: Pavement Phase 3 (I34) **Cell: I34**

Triangular distribution with parameters:

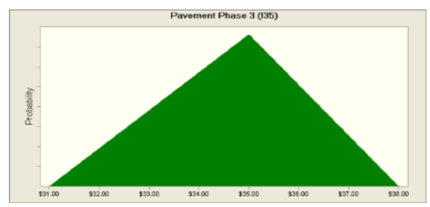
Minimum	$31.00
Likeliest	$35.00
Maximum	$38.00



Assumption: Pavement Phase 3 (I35) **Cell: I35**

Triangular distribution with parameters:

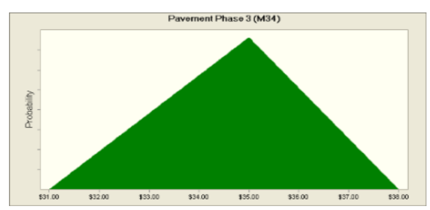
Minimum	$31.00
Likeliest	$35.00
Maximum	$38.00



Assumption: Pavement Phase 3 (M34) **Cell: M34**

Triangular distribution with parameters:

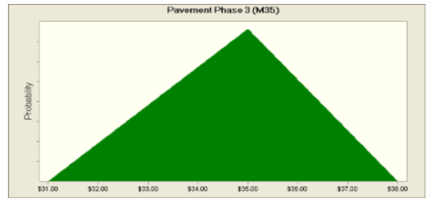
Minimum	$31.00
Likeliest	$35.00
Maximum	$38.00



Assumption: Pavement Phase 3 (M35) **Cell: M35**

Triangular distribution with parameters:

Minimum	$31.00
Likeliest	$35.00
Maximum	$38.00

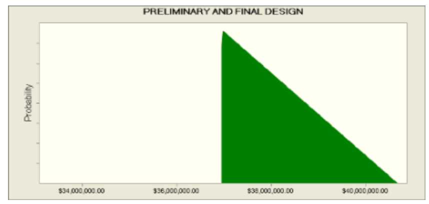


Assumption: PRELIMINARY AND FINAL DESIGN **Cell: F94**

Triangular distribution with parameters:

Minimum	$33,278,479.20
Likeliest	$36,976,088.00
Maximum	$40,673,696.80

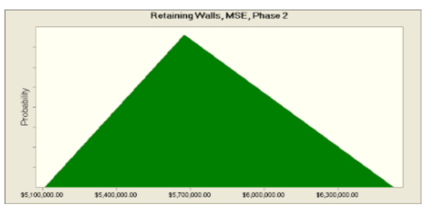
Selected range is from $36,941,576.98 to Infinity



Assumption: Retaining Walls, MSE, Phase 2 **Cell: I41**

Triangular distribution with parameters:

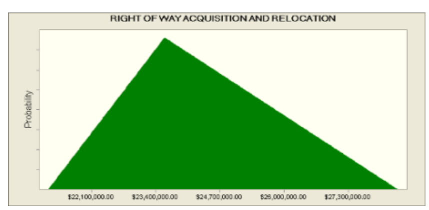
Minimum	$5,106,960.00	
Likeliest	$5,674,400.00	
Maximum	$6,525,560.00	(=I41*1.15)



Assumption: RIGHT OF WAY ACQUISITION AND RELOCATION **Cell: F95**

Triangular distribution with parameters:

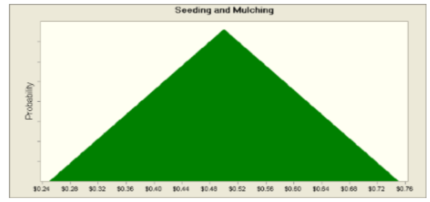
Minimum	$21,218,364.00
Likeliest	$23,575,960.00
Maximum	$28,300,000.00



Assumption: Seeding and Mulching **Cell: E12**

Triangular distribution with parameters:

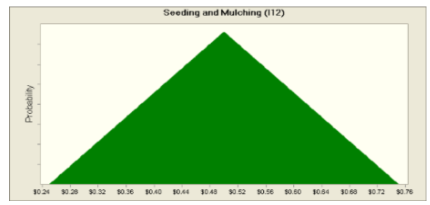
Minimum	$0.25
Likeliest	$0.50
Maximum	$0.75



Assumption: Seeding and Mulching (I12) **Cell: I12**

Triangular distribution with parameters:

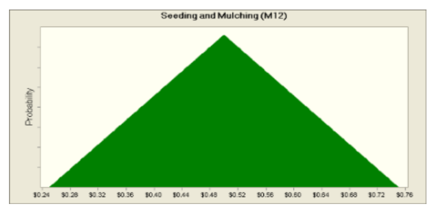
Minimum	$0.25
Likeliest	$0.50
Maximum	$0.75



Assumption: Seeding and Mulching (M12) **Cell: M12**

Triangular distribution with parameters:

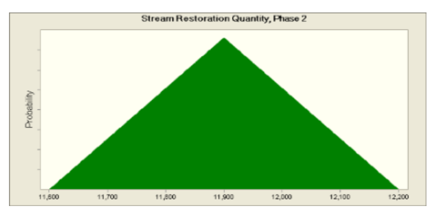
Minimum	$0.25
Likeliest	$0.50
Maximum	$0.75



Assumption: Stream Restoration Quantity, Phase 2 **Cell: H76**

Triangular distribution with parameters:

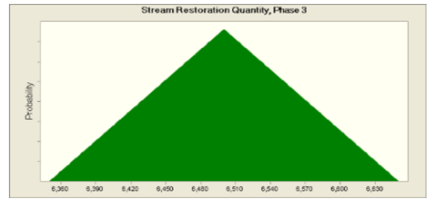
Minimum	11,600
Likeliest	11,900
Maximum	12,200



Assumption: Stream Restoration Quantity, Phase 3 **Cell: L76**

Triangular distribution with parameters:

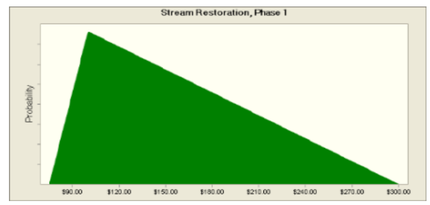
Minimum	6,350
Likeliest	6,500
Maximum	6,650



Assumption: Stream Restoration, Phase 1 **Cell: E76**

Triangular distribution with parameters:

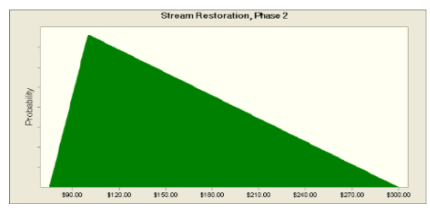
Minimum	$75.00
Likeliest	$100.00
Maximum	$300.00



Assumption: Stream Restoration, Phase 2 **Cell: I76**

Triangular distribution with parameters:

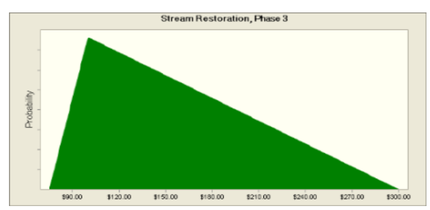
Minimum	$75.00
Likeliest	$100.00
Maximum	$300.00



Assumption: Stream Restoration, Phase 3 **Cell: M76**

Triangular distribution with parameters:

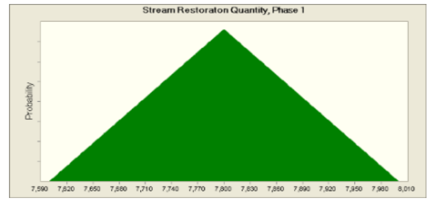
Minimum	$75.00
Likeliest	$100.00
Maximum	$300.00



Assumption: Stream Restoraton Quantity, Phase 1 **Cell: D76**

Triangular distribution with parameters:

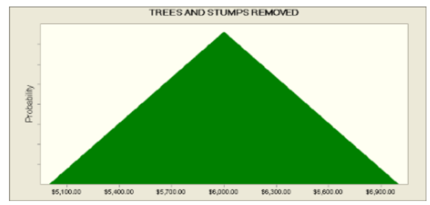
Minimum	7,600
Likeliest	7,800
Maximum	8,000



Assumption: TREES AND STUMPS REMOVED **Cell: I9**

Triangular distribution with parameters:

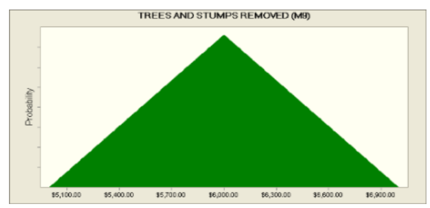
Minimum	$5,000.00
Likeliest	$6,000.00
Maximum	$7,000.00



Assumption: TREES AND STUMPS REMOVED (M9) **Cell: M9**

Triangular distribution with parameters:

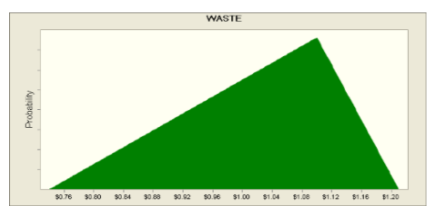
Minimum	$5,000.00
Likeliest	$6,000.00
Maximum	$7,000.00



Assumption: WASTE **Cell: E6**

Triangular distribution with parameters:

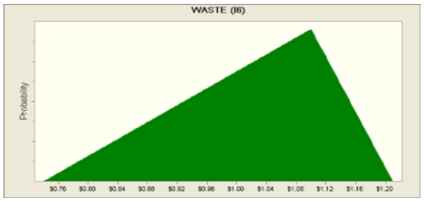
Minimum	$0.74
Likeliest	$1.10
Maximum	$1.21



Assumption: WASTE (I6) **Cell: I6**

Triangular distribution with parameters:

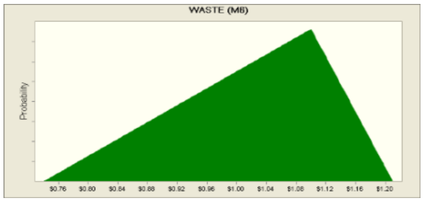
Minimum	$0.74
Likeliest	$1.10
Maximum	$1.21



Assumption: WASTE (M6) **Cell: M6**

Triangular distribution with parameters:

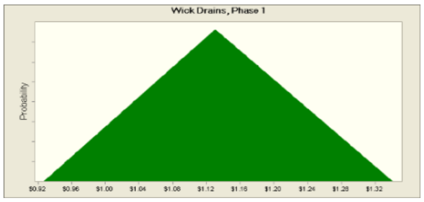
Minimum	$0.74
Likeliest	$1.10
Maximum	$1.21



Assumption: Wick Drains, Phase 1 **Cell: E18**

Triangular distribution with parameters:

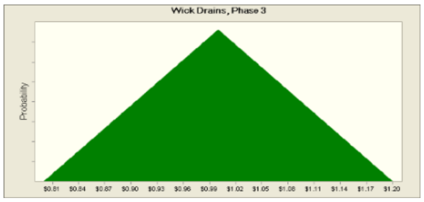
Minimum	$0.93
Likeliest	$1.13
Maximum	$1.34



Assumption: Wick Drains, Phase 3 **Cell: M18**

Triangular distribution with parameters:

Minimum	$0.80
Likeliest	$1.00
Maximum	$1.20

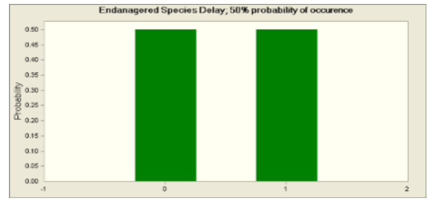


Worksheet: [GroupingSCI-823-Portsmouth Bypass Cost Estimate FINAL.xlsx]Cost & Schedule Risk

Assumption: Endanagered Species Delay; 50% probability of occurence **Cell: S42**

Yes-No distribution with parameters:

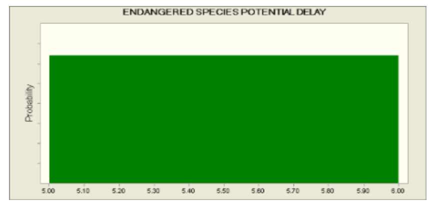
Probability of Yes(1)	0.5



Assumption: ENDANGERED SPECIES POTENTIAL DELAY **Cell: Z42**

Uniform distribution with parameters:

Minimum	5.00
Maximum	6.00

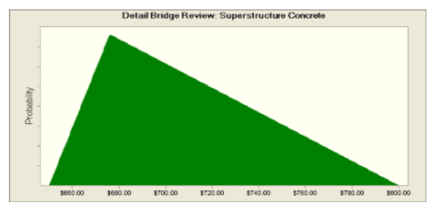


Worksheet: [GroupingSCI-823-Portsmouth Bypass Cost Estimate FINAL.xlsx]Detail Bridge

Assumption: Detail Bridge Review: Superstructure Concrete **Cell: F25**

Triangular distribution with parameters:

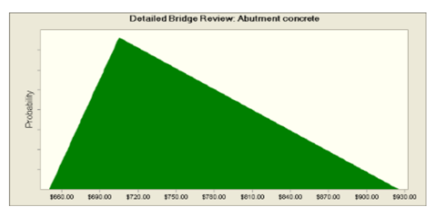
Minimum	$650.00
Likeliest	$676.00
Maximum	$800.00



Assumption: Detailed Bridge Review: Abutment concrete **Cell: F30**

Triangular distribution with parameters:

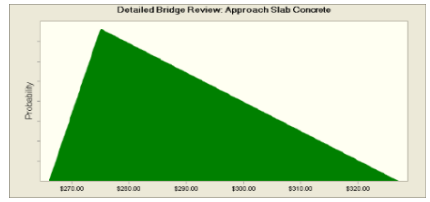
Minimum	$650.00
Likeliest	$705.00
Maximum	$925.00



Assumption: Detailed Bridge Review: Approach Slab Concrete **Cell: F26**

Triangular distribution with parameters:

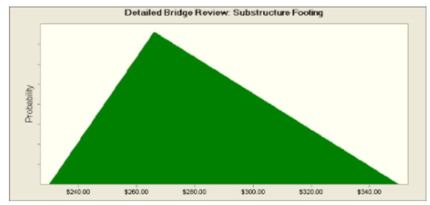
Minimum	$266.00
Likeliest	$275.00
Maximum	$327.00



Assumption: Detailed Bridge Review: Substructure Footing **Cell: F31**

Triangular distribution with parameters:

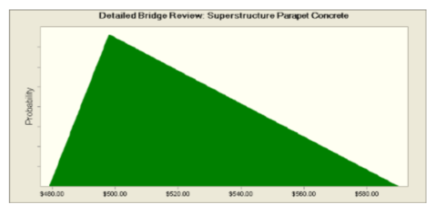
Minimum	$230.00
Likeliest	$266.00
Maximum	$350.00



Assumption: Detailed Bridge Review: Superstructure Parapet Concrete **Cell: F27**

Triangular distribution with parameters:

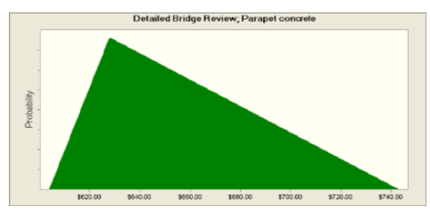
Minimum	$479.00
Likeliest	$498.00
Maximum	$590.00



Assumption: Detailed Bridge Review; Parapet concrete **Cell: F28**

Triangular distribution with parameters:

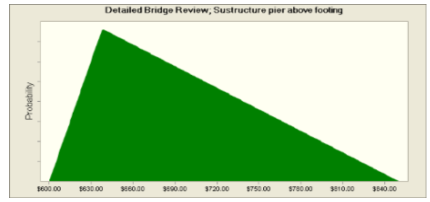
Minimum	$604.00
Likeliest	$628.00
Maximum	$743.00



Assumption: Detailed Bridge Review; Sustructure pier above footing **Cell: F29**

Triangular distribution with parameters:

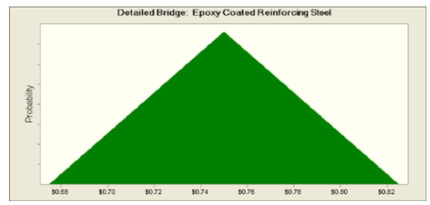
Minimum	$600.00
Likeliest	$638.00
Maximum	$850.00



Assumption: Detailed Bridge: Epoxy Coated Reinforcing Steel **Cell: F10**

Triangular distribution with parameters:

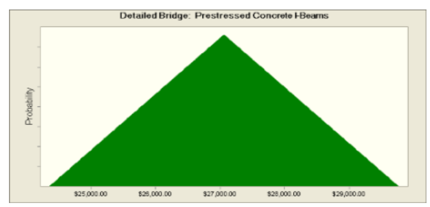
Minimum	$0.68
Likeliest	$0.75
Maximum	$0.83



Assumption: Detailed Bridge: Prestressed Concrete I-Beams **Cell: F12**

Triangular distribution with parameters:

Minimum	$24,351.99
Likeliest	$27,057.76
Maximum	$29,763.54

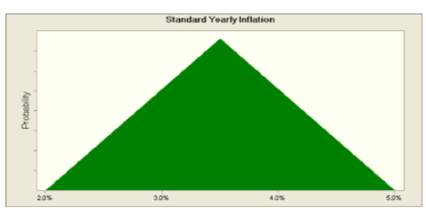


Worksheet: [GroupingSCI-823-Portsmouth Bypass Cost Estimate FINAL.xlsx]Inflation Factors

Assumption: Standard Yearly Inflation **Cell: S89**

Triangular distribution with parameters:

Minimum	2.0%	(=S90)
Likeliest	3.5%	
Maximum	5.0%	(=S88)



End of Assumptions

APPENDIX D – PRE-CER COST ESTIMATE SUMMARY

		PHASE 1 T.R. 234 to C.R. 28			PHASE 2 C.R. 28 to U.S. 23			PHASE 3 U.S. 52 to T.R. 234			PROJECT TOTALS			
DESCRIPTION	UNITS	QUANTITY	UNIT COST	TOTAL	QUANTITY	UNIT COST	TOTAL	QUANTITY	UNIT COST	TOTAL	QUANTITY	UNIT COST	TOTAL	% OF TOTAL
EXCAVATION	CY	4,477,400	$3.35	$14,999,290.00	10,258,038	$3.35	$34,364,427.30	10,293,100	$2.40	$24,703,440.00	25,028,538	$2.96	$74,067,157.30	24.62%
EMBANKMENT	CY	3,435,500	$0.74	$2,542,270.00	10,226,193	$0.74	$7,567,382.82	9,426,700	$0.75	$7,070,025.00	23,088,393	$0.74	$17,179,677.82	5.71%
WASTE	CY	935,410	$1.10	$1,028,951.00	3,109,256	$1.10	$3,420,181.60	2,410,300	$1.10	$2,651,330.00	6,454,966	$1.10	$7,100,462.60	2.36%
CONCRETE BARRIER	FT	15,162	$72.39	$1,097,565.72	36,380	$80.00	$2,910,400.00	29,100	$80.00	$2,328,000.00	80,642	$78.57	$6,335,965.72	2.11%
CLEARING AND GRUBBING	ACRE	268	$2,500.00	$670,000.00	275	$1,500.00	$412,500.00	430	$1,500.00	$645,000.00	973	$1,775.44	$1,727,500.00	0.57%
TREES AND STUMPS REMOVED	ACRE				210	$6,000.00	$1,260,000.00	250	$6,000.00	$1,500,000.00	460	$6,000.00	$2,760,000.00	0.92%
MITIGATION	LS				1	$1,599,600.00	$1,599,600.00	1	$1,387,560.00	$1,387,560.00	2	$1,493,580.00	$2,987,160.00	0.99%
GUARDRAIL	FT	28,063	$11.67	$327,435.59	69,600	$10.00	$696,000.00	63,022	$10.00	$630,220.00	160,685	$10.29	$1,653,655.59	0.55%
SEEDING AND MULCHING/SODDING	SY	1,003,746	$0.23	$234,184.61	1,282,600	$1.00	$1,282,600.00	2,100,736	$1.00	$2,100,736.00	4,387,082	$0.82	$3,617,520.61	1.20%
ROCK CHANNEL PROTECTION	CY	841	$60.69	$51,037.47	3,440	$50.00	$172,000.00	2,984	$50.00	$149,200.00	7,265	$51.24	$372,237.47	0.12%
EROSION CONTROL ITEM 832	LS	1	$2,454,000.00	$2,454,000.00	1	$1,290,000.00	$1,290,000.00	1	$1,119,000.00	$1,119,000.00	3	$1,621,000.00	$4,863,000.00	1.62%
OTHER EROSION CONTROL COSTS	LS	1	$1,280,008.10	$1,280,008.10	1	$50,000.00	$50,000.00	1	$18,650.00	$18,650.00	3	$449,552.70	$1,348,658.10	0.45%
UNDERDRAINS	MILE	4.83	$135,165.16	$652,847.71	6.97	$150,000.00	$1,045,500.00	6.04	$100,000.00	$604,300.00	17.84	$129,050.48	$2,302,647.71	0.77%
MEDIAN DRAINAGE	LS	1	$706,784.32	$706,784.32	1	$2,190,000.00	$2,190,000.00	1	$910,000.00	$910,000.00	3	$1,268,928.11	$3,806,784.32	1.27%
WICK DRAINS	LF	4,581,674	$1.13	$5,178,746.00				3,266,275	$1.00	$3,266,275.00	7,847,949	$1.08	$8,445,021.00	2.81%
24" CONDUIT, TYPE A	LF							195	$63.78	$12,437.10	195	$63.78	$12,437.10	0.00%
27" CONDUIT, TYPE A	LF	213	$67.09	$14,289.22							213	$67.09	$14,289.22	0.00%
30" CONDUIT, TYPE A	LF	120	$80.73	$9,687.55				235	$74.78	$17,573.30	355	$76.79	$27,260.85	0.01%
36" CONDUIT, TYPE A	LF	375	$97.83	$36,687.61	253	$138.00	$34,914.00	500	$87.40	$43,700.00	1,128	$102.22	$115,301.61	0.04%
42" CONDUIT, TYPE A	LF							145	$129.15	$18,726.75	145	$129.15	$18,726.75	0.01%
48" CONDUIT, TYPE A	LF	1,361	$113.36	$154,284.98	1,553	$186.00	$288,858.00	30	$175.40	$5,262.00	2,944	$152.31	$448,404.98	0.15%
54" CONDUIT, TYPE A	LF	1,422	$135.00	$191,970.00	1,697	$216.00	$366,552.00				3,119	$179.07	$558,522.00	0.19%
60" CONDUIT, TYPE A	LF				6,108	$230.00	$1,404,840.00	2,008	$200.00	$401,600.00	8,116	$222.58	$1,806,440.00	0.60%
66" CONDUIT, TYPE A	LF				1,816	$275.00	$499,400.00				1,816	$275.00	$499,400.00	0.17%
72" CONDUIT, TYPE A	LF	1,722	$202.36	$348,459.08	1,938	$290.00	$562,020.00	1,371	$230.00	$315,330.00	5,031	$243.65	$1,225,809.08	0.41%
78" CONDUIT, TYPE A	LF	612	$601.80	$368,301.29				1,132	$300.00	$339,600.00	1,744	$405.91	$707,901.29	0.24%
84" CONDUIT, TYPE A	LF							52	$409.77	$21,308.04	52	$409.77	$21,308.04	0.01%
8' x 8' BOX	LF							2,479	$900.00	$2,231,100.00	2,479	$900.00	$2,231,100.00	0.74%
34" X 53" CONDUIT, TYPE A, 706.04	LF	43	$268.40	$11,540.99							43	$268.40	$11,540.99	0.00%
PAVEMENT, SR823	SY	191,530	$35.06	$6,714,366.34	354,960	$38.00	$13,488,480.00	311,050	$38.00	$11,819,900.00	857,540	$37.34	$32,022,746.34	10.65%
PAVEMENT, RAMPS	SY				29,083	$38.00	$1,105,154.00	40,680	$38.00	$1,545,840.00	69,763	$38.00	$2,650,994.00	0.88%
PAVEMENT, LOCAL ROADS	SY				5,307	$32.00	$169,824.00	9,250	$38.00	$351,500.00	14,557	$35.81	$521,324.00	0.17%
LIGHTING	LS				1	$300,000.00	$300,000.00	1	$300,000.00	$300,000.00	2	$300,000.00	$600,000.00	0.20%
SIGNS	MILE	4.76	$18,866.60	$89,805.02	7.70	$25,000.00	$192,500.00	6.80	$25,000.00	$170,000.00	19.26	$23,484.17	$452,305.02	0.15%
EDGE LINE	MILE	15.04	$1,820.61	$27,381.97	33.20	$2,500.00	$83,000.00	26.86	$2,500.00	$67,150.00	75.10	$2,363.94	$177,531.97	0.06%
LANE LINE	MILE	4.19	$1,045.84	$4,382.07	13.93	$1,500.00	$20,895.00	12.09	$1,500.00	$18,135.00	30.21	$1,437.01	$43,412.07	0.01%
SIGNALS	LS							1	$80,000.00	$80,000.00	1	$80,000.00	$80,000.00	0.03%
RETAINING WALLS, MSE	LS				1	$5,674,400.00	$5,674,400.00				1	$5,674,400.00	$5,674,400.00	1.89%
BUILDING DEMOLITION	LS	1	$345,000.00	$345,000.00	1	$132,000.00	$132,000.00	1	$360,000.00	$360,000.00	3	$279,000.00	$837,000.00	0.28%
NOISE BARRIER	LS	1	$207,903.00	$207,903.00				1	$580,000.00	$580,000.00	2	$393,951.50	$787,903.00	0.26%
CATTLE CROSSING\8' x 8' BOX CULVERT	LS	1	$245,471.10	$245,471.10							1	$245,471.10	$245,471.10	0.08%

BRIDGE NO. SCI-234-0122 SHUMWAY HOLLOW OVER CSXT RAILROAD	LS	1	$1,182,107.68	$1,182,107.68							1	$1,182,107.68	$1,182,107.68	0.39%
BRIDGE NO. SCI-823-0837 LEFT OVER SWUAGER VALLEY ROAD	LS	1	$2,279,252.59	$2,279,252.59							1	$2,279,252.59	$2,279,252.59	0.76%
BRIDGE NO. SCI-823-0837 RIGHT OVER SWUAGER VALLEY ROAD	LS	1	$2,298,504.30	$2,298,504.30							1	$2,298,504.30	$2,298,504.30	0.76%
BRIDGE NO. SCI-823-0917 LEFT OVER PORTSMOUTH MINFORD ROAD	LS	1	$2,088,318.39	$2,088,318.39							1	$2,088,318.39	$2,088,318.39	0.69%
BRIDGE NO. SCI-823-0917 RIGHT OVER PORTSMOUTH MINFORD ROAD	LS	1	$2,225,951.07	$2,225,951.07							1	$2,225,951.07	$2,225,951.07	0.74%
BRIDGE NO. SCI-823-1018 LEFT OVER LUCASVILLE MINFORD RD	LS				1	$1,894,000.00	$1,894,000.00				1	$1,894,000.00	$1,894,000.00	0.63%
BRIDGE NO. SCI-823-1018 RIGHT OVER LUCASVILLE MINFORD RD	LS				1	$2,084,000.00	$2,084,000.00				1	$2,084,000.00	$2,084,000.00	0.69%
BRIDGE NO. SCI-823-1096 LEFT OVER BLUE RUN ROAD	LS				1	$1,328,000.00	$1,328,000.00				1	$1,328,000.00	$1,328,000.00	0.44%
BRIDGE NO. SCI-823-1096 RIGHT OVER BLUE RUN ROAD	LS				1	$1,328,000.00	$1,328,000.00				1	$1,328,000.00	$1,328,000.00	0.44%
BRIDGE NO. SCI-823-1357 LEFT OVER MORRIS LANE BLUE RUND RD	LS				1	$5,419,000.00	$5,419,000.00				1	$5,419,000.00	$5,419,000.00	1.80%
BRIDGE NO. SCI-823-1357 RIGHT OVER MORRIS LANE BLUE RUN RD	LS				1	$5,419,000.00	$5,419,000.00				1	$5,419,000.00	$5,419,000.00	1.80%
BRIDGE NO. SCI-823-1431 FLATWOOD FALLEN TIMBER OVER S.R. 823	LS				1	$3,012,800.00	$3,012,800.00				1	$3,012,800.00	$3,012,800.00	1.00%
BRIDGE NO. SCI-823-1593 RAMP B OVER FAIRGROUNDS ROAD	LS				1	$542,000.00	$542,000.00				1	$542,000.00	$542,000.00	0.18%
BRIDGE NO. SCI-823-1594 S.R. 823 OVER FAIRGROUNDS ROAD	LS				1	$1,046,000.00	$1,046,000.00				1	$1,046,000.00	$1,046,000.00	0.35%
BRIDGE NO. SCI-823-1595 RAMP C OVER FAIRGROUNDS ROAD	LS				1	$583,000.00	$583,000.00				1	$583,000.00	$583,000.00	0.19%
BRIDGE NO. SCI-823-1598 RAMP B OVER NORFOLK SOUTHERN	LS				1	$3,205,000.00	$3,205,000.00				1	$3,205,000.00	$3,205,000.00	1.07%
BRIDGE NO. SCI-823-1601 S.R. 823 OVER NORFOLK SOUTHERN & US 23	LS				1	$3,186,000.00	$3,186,000.00				1	$3,186,000.00	$3,186,000.00	1.06%
BRIDGE NO. SCI-823-1603 RAMP C OVER NORFOLK SOUTHERN	LS				1	$3,655,000.00	$3,655,000.00				1	$3,655,000.00	$3,655,000.00	1.22%
BRIDGE NO. SCI-823-0074 RIGHT OVER OHIO RIVER ROAD	LS							1	$4,192,600.00	$4,192,600.00	1	$4,192,600.00	$4,192,600.00	1.39%
BRIDGE NO. SCI-823-0067 LEFT OVER OHIO RIVER ROAD AND US52	LS							1	$8,140,200.00	$8,140,200.00	1	$8,140,200.00	$8,140,200.00	2.71%
BRIDGE NO. SCI-823-0117 LEFT OVER WEBSTER STREET	LS							1	$772,400.00	$772,400.00	1	$772,400.00	$772,400.00	0.26%
BRIDGE NO. SCI-823-0117 RIGHT OVER WEBSTER STREET	LS							1	$772,400.00	$772,400.00	1	$772,400.00	$772,400.00	0.26%
BRIDGE NO. SCI-823-0214 LEFT OVER CSX RAILROAD	LS							1	$3,025,700.00	$3,025,700.00	1	$3,025,700.00	$3,025,700.00	1.01%
BRIDGE NO. SCI-823-0214 RIGHT OVER CSX RAILROAD	LS							1	$3,025,700.00	$3,025,700.00	1	$3,025,700.00	$3,025,700.00	1.01%
BRIDGE NO. SCI-823-0229 LEFT OVER SLOCUM AVENUE	LS							1	$2,050,700.00	$2,050,700.00	1	$2,050,700.00	$2,050,700.00	0.68%
BRIDGE NO. SCI-823-0229 RIGHT OVER SLOCUM AVENUE	LS							1	$2,050,700.00	$2,050,700.00	1	$2,050,700.00	$2,050,700.00	0.68%
BRIDGE NO. SCI-823-0248 LEFT OVER SR335 AND LITTLE SCIOTO	LS							1	$8,372,400.00	$8,372,400.00	1	$8,372,400.00	$8,372,400.00	2.78%
BRIDGE NO. SCI-823-0248 RIGHT OVER SR335 AND LITTLE SCIOTO	LS							1	$9,642,700.00	$9,642,700.00	1	$9,642,700.00	$9,642,700.00	3.21%
BRIDGE NO. SCI-8230722 LEFT OVER SHUMWAY HOLLOW ROAD	LS							1	$871,600.00	$871,600.00	1	$871,600.00	$871,600.00	0.29%
BRIDGE NO. SCI-8230722 RIGHT OVER SHUMWAY HOLLOW ROAD	LS							1	$871,600.00	$871,600.00	1	$871,600.00	$871,600.00	0.29%
WETLAND CONSTRUCTION	ACRE	0.52	$50,000.00	$26,000.00	0.86	$16,000.00	$13,760.00	0.75	$16,000.00	$11,936.00	2.13	$24,316.09	$51,696.00	0.02%
STREAM RESTORATION	LF	6,000	$250.00	$1,500,000.00	9,200	$250.00	$2,300,000.00	4,965	$250.00	$1,241,250.00	20,165	$250.00	$5,041,250.00	1.68%
*OTHER COSTS	LS	1	$6,929,566.81	$6,929,566.81							1	$6,929,566.81	$6,929,566.81	2.30%
INCIDENTALS														
FIELD OFFICE	MNTH	42	$2,500.00	$105,000.00	41	$2,500.00	$102,500.00	36	$2,500.00	$90,000.00	119	$2,500.00	$297,500.00	0.10%
MAINTAINING TRAFFIC (1% OF COST)	LS	1	$585,223.52	$585,223.52	1	$1,175,989.89	$1,175,989.89	1	$1,128,247.84	$1,128,247.84	3	$963,153.75	$2,889,461.24	0.96%
MOBILIZATION	LS	1	$1,600,000.00	$1,600,000.00	1	$2,000,000.00	$2,000,000.00	1	$2,000,000.00	$2,000,000.00	3	$1,866,666.67	$5,600,000.00	1.86%
RAILROAD INSURANCE BOND	LS	1	$15,000.00	$15,000.00	1	$45,000.00	$45,000.00	1	$30,000.00	$30,000.00	3	$30,000.00	$90,000.00	0.03%
PERFORMANCE BOND (0.5% OF COST)	LS	1	$304,137.88	$304,137.88	1	$604,612.39	$604,612.39	1	$580,365.16	$580,365.16	3	$496,371.81	$1,489,115.43	0.50%
CONSTRUCTION LAYOUT STAKES (0.5% OF COST)	LS	1	$304,137.88	$304,137.88	1	$604,612.39	$604,612.39	1	$580,365.16	$580,365.16	3	$496,371.81	$1,489,115.43	0.50%
SUBTOTALS				**$61,435,850.85**			**$122,131,703.39**			**$117,233,762.35**			**$300,801,316.59**	**100%**
CONSTRUCTION CONTINGENCY (5% PH-1, 15% PH-2,3)				**$3,071,792.54**			**$18,319,755.51**			**$17,585,064.35**			**$38,976,612.40**	
CONSTRUCTION ENGINEERING AND INSPECTION (5%)				**$3,071,792.54**			**$6,106,585.17**			**$5,861,688.12**			**$15,040,065.83**	
ENVIRONMENTAL				**$0.00**			**$0.00**			**$0.00**			**$0.00**	
TOPOGRAPHIC SURVEY				**$0.00**			**$0.00**			**$0.00**			**$0.00**	
PRELIMINARY AND FINAL DESIGN				**$0.00**			**$0.00**			**$0.00**			**$0.00**	
RIGHT OF WAY ACQUISITION AND RELOCATION				**$0.00**			**$0.00**			**$0.00**			**$0.00**	
UTILITY RELOCATION				**$0.00**			**$0.00**			**$0.00**			**$0.00**	
TOTAL				**$67,579,435.93**			**$146,558,044.07**			**$140,680,514.82**			**$354,817,994.83**	

* Other costs include all items that could not be grouped into the categories on this spreadsheet. Some examples are removals, undercut and granular material, geotechnical quantities such as pre-splitting and hydrologist, aggregate drains, fence, rumble strips, other striping, and various others.

APPENDIX E – AGENDA AND SIGN IN SHEETS

AGENDA

TITLE: Cost Estimate Review Portsmouth Bypass SCI823 Major Project
Facilitators: Jason P. Spilak, PE, & David J. Carter, CCM
DATE: March 14, 15, 16 & 17, 2011
LOCATION: ODOT 1606 W. Broad St. (Columbus, Ohio) – Sign Shop Conference Rooms

Date and Topic	**Time	Activity	*Attendees
Monday, March 14			
Introduction & Process Overview	8:00-8:30	Introduction and process overview (Spilak)	Project Team and all SME's.
Team Defined Outline	8:30 – 9:00	Discuss Outline & Agenda to be followed for this CER (Spilak)	*Project Team and ODOT Personnel
Discuss Scope Status, Schedule and Overview	9:00-10:00	Project Team Presentation; Scope discussion Review Project Scope, Status, Schedule and Overview of Project Scope	Project Design Team
Review Project Costs Roadway Earthwork, Drainage, Pavements and Materials assumptions	10:00-11:30	Start Review of Projects Major Items. ODOT Team or Design Team needs to discuss how the present estimates were prepared. This discussion should cover methodology, type of estimate, quantities, unit prices, and any contingency included and reasons why. Start cost review: - Roadway - Drainage - Storm Water (including Ponds) - Geotech	Subject Matter Experts: Project Manager
	11:30–1:00	Lunch	
Review Costs	1:00-4:00	Continue costs review: - Bridges - Retaining Walls - Geotech	Subject matter experts:

AGENDA

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Tuesday, March 15			
Review Costs	9:00-9:30	Continue costs review: - Traffic Issues - Construction Issues - Access Issues	Subject matter experts:
Review Costs	9:30-10:30	Continue costs review: - Environmental Issues - Historic, Arch Issues	Subject matter experts:
Review Costs	10:00-10:30	Continue costs review: - Right-of-Way - Utilities - Hazardous Materials - Railroads - Other.	Subject matter experts:
Indirect Project Costs	10:30-11:00	Review costs related to project but not included in the construction cost of the project. - Utilities (non-project related) - R.O.W. (advanced)	Project Design Team & Project Manager
Catch-Up Time	11:00-12:00	Review costs related to other identified issues	Identified March 14
	11:30–1:00	Lunch	
Project Support Costs	1:00-2:30	Discuss Fixed Costs: - Delivery Costs - Non-traditional costs, - CSD, - Unbundling, - Project reporting admin - Design - CE&I - Right-Of-Way - Other?	Project Team
Risks and Opportunities	2:30- 4:00	The project team will review risks, opportunities, probabilities, and impacts with input from ODOT. Discuss Project's Possible Risks and Opportunities	Project Team

AGENDA

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Wednesday, March 16			
Date and Topic	****Time**	**Activity**	***Attendees**
Inflation & contingency review	9:00-11:30	Inflation & contingency review/determination	Project Team, - Jerry Workman
Thursday, March 17			
Finalize presentation	8:00-10:00	Finalize and prepare draft presentation	Spilak & Carter
Presentation (draft)	9:00-9:30	Draft Presentation of CER Results to Team	Project Team
Presentation	10:00-11:00	Presentation of CER Results with Q&A Period (Spilak & Carter)	General Attendance

NOTES

** Project Team: Project Managers,Project Development, Planning & Design leaders may need to attend all sessions.*

*** Times may adjust one half hour either way due to variability of topic sessions. Attendees should plan to arrive one half hour prior to technical topics*

823 Portsmouth Bypass

An Appalachian Development Highway

FHWA Cost Estimate Review Sign In Sheet

Monday March 14, 2011

Name	Organization	E-Mail Address	Telephone Number
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823 Portsmouth Bypass
An Appalachian Development Highway

FHWA Cost Estimate Review Sign In Sheet

Tuesday March 15, 2011

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823 Portsmouth Bypass

An Appalachian Development Highway

FHWA Cost Estimate Review Sign In Sheet

Wednesday March 16, 2011

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FHWA Cost Estimate Review Sign In Sheet

Thursday March 17, 2011

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APPENDIX F – ODOT INFORMATION

January 2011 Construction Cost Outlook and Forecast

OVERVIEW:

Construction cost inflation for CY2011 is expected to be at or above 5% throughout the year, as prices continue to recover from their late 2009 and early 2010 lows. During the second half of 2010, the Ohio DOT Construction Index move quickly upward, finishing the year 3.9% higher from a year ago.[1] Early in CY2011, BART expects inflation to peak at 5% - 10% between the 1st and 3rd quarters of 2011. After construction costs fully recover from their 2009/2010 lows, BART expects late CY2011 and CY2012 inflation to be approximately 5% with an upward bias. Inflation will result from continued Asian, US, and European construction growth. Beyond 2012, BART expects long-term construction cost inflation rates of 4% - 5% largely resulting from the influence of fuel, asphalt and steel prices. Expected inflation could easily exceed the provided forecast range if the value of the US dollar continues to slide against foreign currencies.

According to the National Bureau of Economic Research, the U.S. has been in an economic recovery since June of 2009. This recovery has been uneven at best, as of December 2010 nearly 17% of the US workforce either was unemployed or could only find part-time work for economic reasons.[2] Many economists predict that it will take several years for the country to create enough new jobs to reach pre-recession employment levels. Currently, the unemployment rate in the construction industry is double that of the national average.[3] As an example of how poorly the construction industry is performing, the number of new privately owned housing units started -which peaked at 2.3 million homes on an annualized basis in early 2005- crashed by 79% to a low of less than 500,000 in 2009[4]. During calendar year 2010, the Census Bureau estimates that only 321,000 new single-family homes were sold; the lowest number since records began in 1963.[5]

In contrast, there are strongly positive signs that the overall economy is recovering; total spending by U.S. consumers at the end of 2010 exceeded the peak level of spending reached in 2008.[6] Furthermore, in 2009 and 2010 businesses were able to reorganize their operations to become profitable again and build cash holdings. It is highly anticipated that in 2011 business will begin spending their accumulated cash on new equipment, technologies and other resources in preparation for an expanding US and global economy.[7]

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[1] The Ohio DOT Construction Cost Index value of 3.9% is based upon an annual average changes in price from 2009 to 2010.

[2] Bureau of Labor Statistics, Table A-15 Alternative measures of labor utilization; U-6 Total unemployed, plus all persons marginally attached to the labor force, plus total employed part time for economic reasons, as a percent of the civilian labor force plus all persons marginally attached to the labor force. http://www.bls.gov/news.release/empsit.t15.htm, 24 January 2011.

[3] The average annual unemployment rate for the construction industry was 20.6% in 2010 (BLS LNU04032231) versus the average annual unemployment rate for all industries in the US of 9.6% (BLS LNU04000000), http://www.bls.gov/cps/, 24 January 2011.

[4] U.S. Census, New Privately Owned Housing Units Started, http://www.census.gov/const/startssa.pdf.

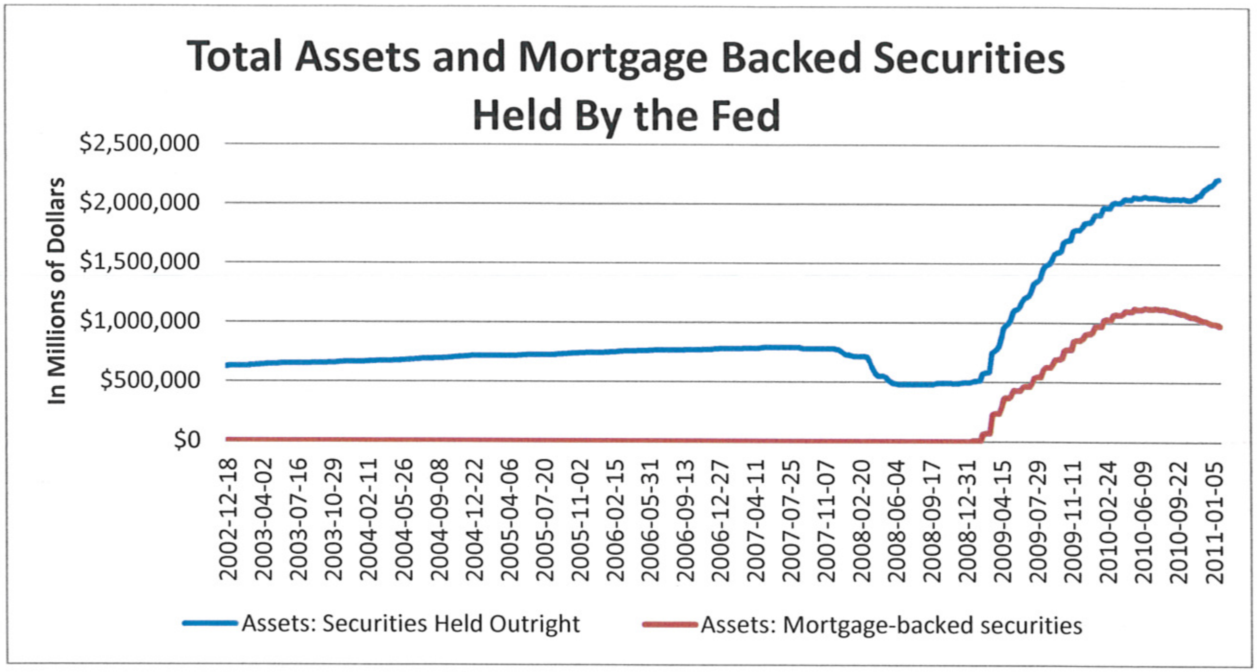
[5] U.S. Census, *New Residential Sales in December 2010, http://www.census.gov/const/newressales.pdf.*

[6] Bureau of Economic Analysis, *Real Personal Consumption Expenditures*, Series ID: PCEC96, http://www.bea.gov/national/pdf/nipaguid.pd

[7] Hagerty, James R. and Dana Mattioli, "Big Firms Poised to Spend Again", *Wall Street Journal*, page B1, 3 January 2011.

Between 2008 and 2010, the Federal Reserve pushed interest rates to historic lows. To protect the economy from further decline, the Federal Reserve purchased 1.25 trillion dollars of mortgages and added these debts to its total assets as shown in Figure 1. By buying nearly 10% of the country's total mortgage debt from private institutions, the Fed nearly doubled its total assets.[8] At the beginning of 2011, about half of all Federal Reserve held securities were mortgages.[9] Looking to the future, if the Fed unwinds its reserves too quickly it could trigger a second recession while if the Fed is too slow it could result in higher inflation rates during BART's forecasted period. Either scenario will have serious consequences for the value of the dollar and the U.S. economy in general, resulting in unexpected oil and steel price movements.

Figure 1



Source: U.S. Federal Reserve Bank[10]

KEY CONSTRUCTION INPUT TRENDS:

LABOR: The US employment picture continues to suffer disproportionately in the construction sector. The latest statewide data for Ohio indicates that the construction market further weakened in 2009. Between 2008 and 2009, the number of Ohio construction employees declined by 6%[11] while wages simultaneously declined by 12% as shown in Figure 2.

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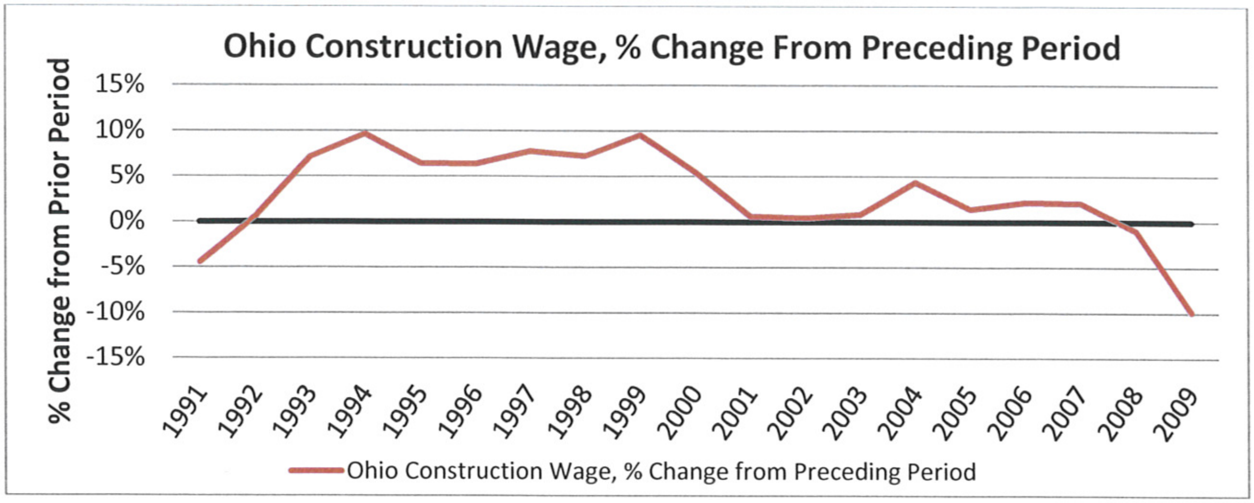
[8] How to Spend 1.25 Trillion Dollars, National Public Radio, http://www.npr.org/templates/transcript/transcript.php?storyId=129451895, August 26, 2010.
[9] Federal Reserve Balance Sheet as of 27Jan2011, http://www.federalreserve.gov/releases/h41/current/h41.htm
[10] http://www.federalreserve.gov/datadownload/Chart.aspx?rel=H3&series=fb574c0abd00d1541caa4104aa61650c&lastObs=&from=01/01/1959&to=01/31/2011&filetype=spreadsheetml&label=include&layout=seriescolumn&pp=
[11] Bureau of Labor Statistics, Labor Force Statistics from the Current Population Survey: Unadjusted unemployment rate for construction industry series ID LNU04032231. July 18, 2010.

Figure 2



Source: Bureau of Economic Analysis http://www.bea.gov/regional/remdchart/default.cfm#chart_top

COMPETITION: BART's vendor competition tracking indicated a greater level of competition among vendors during 2008 and 2009 as contractors had to compete in the face of limited demand. Vendor competition returned to long-term levels in 2010 for "asphalt" and "general" construction work types. BART expects competition levels for all work types to show heightened competition through 2011. After 2011, BART expects competition levels will return to their long-term trends.

OIL: The market for oil is incredibly volatile due to rapid and sizeable changes in expected future oil demand and supply. Oil prices have increased over 123% from their 2008 lows[12]. The current price of oil and diesel fuel -$89.42[13] per barrel and $3.40[14] per gallon respectively- appear to contradict US oil supply and demand influences. Since March of 2009, stockpiles of oil in the U.S. have sustained 30-year highs.[15] Simultaneously, U.S. oil consumption declined by 10% from its pre-recession levels in 2007 and 13% from its 2005 peak. The following international market factors are essential for explaining the rise in oil prices during this time of ample U.S. supply and depressed U.S. demand: currency exchange rates, oil consumption in developing countries, and oil price speculation.

- Currency Exchange: The dollar has depreciated against many major currencies. In the two years ending 30Dec2010, the U.S. dollar had lost over 18% of its value against the Canadian Dollar, 7.3% against the Euro, and finally 3.3% against the Chinese Yuan.[16] As a result of the dollar's declining value, international oil demand has driven the price upward in spite of lackluster U.S. demand.

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12 Based on spot market oil prices published by the Wall Street Journal, oil price of $41.02 on 1 December 2008 compared to$ 91.38 on 19 January 2011.

13 The January 2011 monthly average West Texas Intermediate spot oil price as reported on The St. Louis Federal Reserve Bank (FRED) Source: The Dow Jones Company, Wall Street Journal. Series ID: OILPRICE.

14 Weekly Retail On-Highway Diesel Prices (Dollars per gallon, including all taxes) U.S Energy Information Administration, 1-31-2011. http://www.eia.doe.gov/oog/info/wohdp/diesel.asp#graph_buttons

15 Monthly U.S. Crude Stocks at Tank Farms, U.S. Energy Information Administration, http://tonto.eia.doe.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=mcrsfus1&f=m

16 Spot Exchange Rate Values provided by the Federal Reserve, http://www.federalreserve.gov/releases/h10/Hist/dat00_ch.txt

- Oil Consumption in Developing Countries: China, Brazil, and India comprise only some of the countries who have increased their oil consumption by 10% to 33% since 2007. Between 2007 and 2009, the average country increased its oil consumption by 4% and the world overall consumed only 2% less oil than in 2007.[17] At the end or 2010, China consumed 2.5 million barrels more oil per day than it did at the end of 2007, more than offsetting the 1.8 million fewer barrels per day the U.S. now consumes.[18]
- Future oil prices are speculation based and therefore subject to volatility not based entirely upon fundamental supply and demand conditions. The expected timing and pace of a global economic recovery is a chief factor driving future oil prices. BART expects oil prices to hold between $90 and $110 a barrel over the next 12 months.

DIESEL FUEL: Diesel fuel prices typically follow oil price trends. We expect diesel prices to rise in the early portion of the forecasted period resulting from the nation's economic recovery and weak dollar value. According to the U.S. Energy Information Administration:

> *On-highway diesel fuel retail prices, which averaged $2.99 per gallon in 2010, average $3.40 per gallon and $3.52 per gallon in 2011 and 2012, respectively. Rising crude oil prices are the primary reason for higher retail prices, but higher gasoline and distillate refining margins are also expected to contribute to higher retail prices.*[19]

LIQUID ASPHALT: Beginning in 2008, oil and asphalt prices diverged as oil and fuel prices moved lower while asphalt binder prices remained high. This was in part a result of the greater profitability of producing "light" refined goods (gasoline, diesel, etc.) rather than producing "heavy" products such as asphalt. For the forecasted period, BART believes refiners will continue to favor the production of light oil products and therefore reduce the production of heavy-oil products.

- BART expects unchanging liquid asphalt prices for CY2011 as limited supply and demand offset one another. The supply-side fundamentals that drove prices up in recent years still exist and BART expects that as a result binder prices will increase throughout the remainder of the forecasted period. As demand for gasoline and diesel increases due to the U.S. economic recovery and the continued growth of the international economy, prices for liquid asphalt will face upward pressure from limited refinery supply. Further upside pricing pressure will result from delayed demand in the U.S. construction industry.

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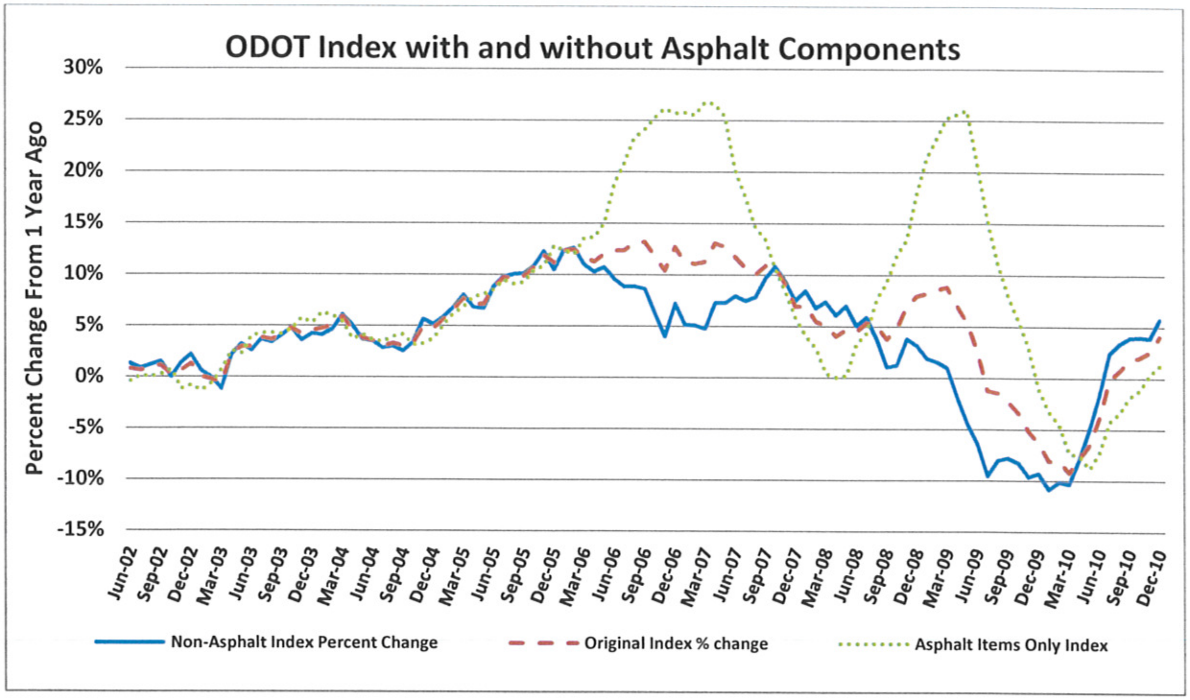
[17] U.S. Energy Information Administration, International Energy Statistics, *Total Consumption of Petroleum Products (Thousands of Barrels per Day)*, http://tonto.eia.doe.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=5&pid=54&aid=2, 19Jan2011

[18] Hall, Simon. *China's Thirst For Oil At All Time High*, The Wall Street Journal, http://online.wsj.com/article/SB10001424052748703954004576090250923792020.html?mod=WSJ_Commodities_LEFTTopNews, 19Jan2011.

[19] U.S. Energy Information Administration, Short Term Energy Outlook, January 11, 2011 Release http://www.eia.doe.gov/emeu/steo/pub/contents.html, 11Jan2011.

Figure 3



As shown in Figure 3, the price of asphalt significantly influences changes in the ODOT cost index. At the end of CY2010, non-asphalt items were 7% more expensive than a year ago, asphalt items were approximately unchanged and as a result, the overall index was 3.9% higher for the calendar year.

Steel: International and domestic steel prices rebounded at the end of 2010. "The world average carbon-steel price is forecast to exceed $1,000 by the second half of 2011, up from an average $733 last year".[20] BART expects that strong steel demand coupled with limited supplies of steel inputs will keep steel prices elevated well into 2011. The steel industry has recovered significantly from mid-2009 when production was less than half of the full capacity possible. The combination of strong international demand for steel and flooding in Australia's coal regions have pushed up prices not only for steel but also coal and iron ore. Beyond 2011, BART expects the steel market to see more modest pricing gains.

Ready Mix Concrete (RMC): Though cement -a component of RMC- is impacted by global construction demand, RMC prices are influenced more by regional demand factors. With both the housing and commercial construction markets stabilized at levels substantially lower than their market highs, RMC prices have also been steady. BART expects that RMC prices will continue to be stable until the residential and commercial building markets recover. Prices are expected to move upward slightly in the latter-half of the forecasted period.

Aggregate: Ohio has a limited number of aggregate suppliers whom meet Ohio DOT's quality standards. BART expects aggregate prices will trend upward throughout the forecasted period.

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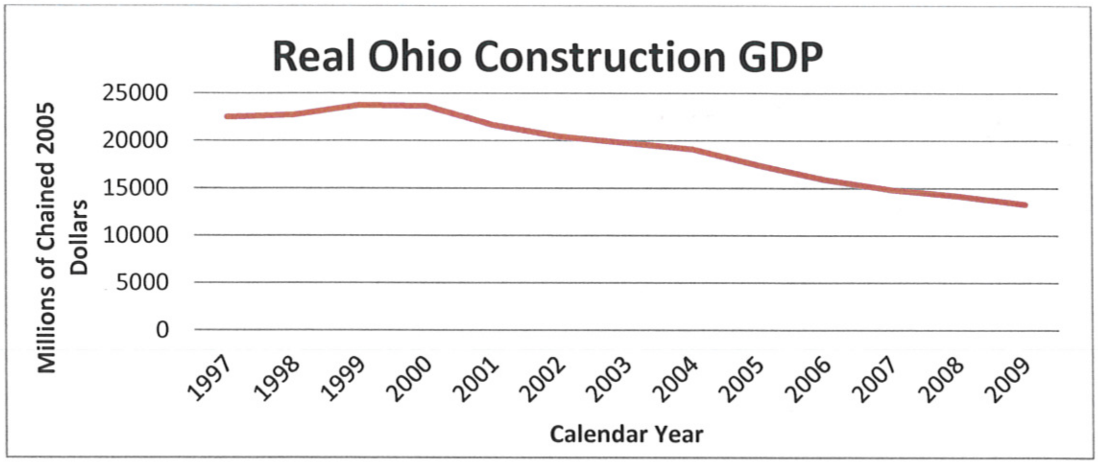
[20] Blackstone, Brian and Marcus Walker, "Global Price Fear Mount", Wall Street Journal, 24Jan2011, pg A1.

OTHER KEY ISSUES:

Other Construction Markets:

Demand for construction services results from the combined demand for construction of homes, and commercial and public infrastructure. In Ohio, private sector demand for construction services has faced a multi-year decline (see Figure 4). As Ohio's private sector demand rebounds during the latter half of the forecasted period, BART expects upward pressure on construction prices.

Figure 4



BART expects that fiscal restraint at both the state and federal levels will result in a smaller Ohio DOT construction and preservation program beginning in State Fiscal Year (SFY) 2012. Because ODOT's construction budget constitutes a significant portion of statewide demand for construction services, depressed ODOT spending levels will put downward pressure on prices.

The expectation of $3.00 - $4.00 fuel prices in 2011 and beyond will curb state gas tax revenues, affecting the revenue streams at the state and federal levels.[21] The expected net result of these influences is that ODOT's demand for highway construction work will be limited in the short-term and uncertain in the long-term.

JANUARY 2011 CONSTRUCTION COST INFLATION FORECAST

	CY 2011	CY 2012	CY 2013	CY 2014	CY 2015
High	**10%**	**9%**	**9%**	**9%**	**9%**
Most Likely	**5.7%**	**5%**	**4.5%**	**4.5%**	**4.5%**
Low	**3%**	**3%**	**3%**	**3%**	**3%**

Prepared by the Bid Analysis and Review Team, Office of Estimating, Ohio Department of Transportation, February 9th, 2011.

[21] The Ohio Department of Transportation 2010-2011 Business Plan, December 2009, page 30.

Page Updated: 2/1/2008

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ODOT Cost Categories

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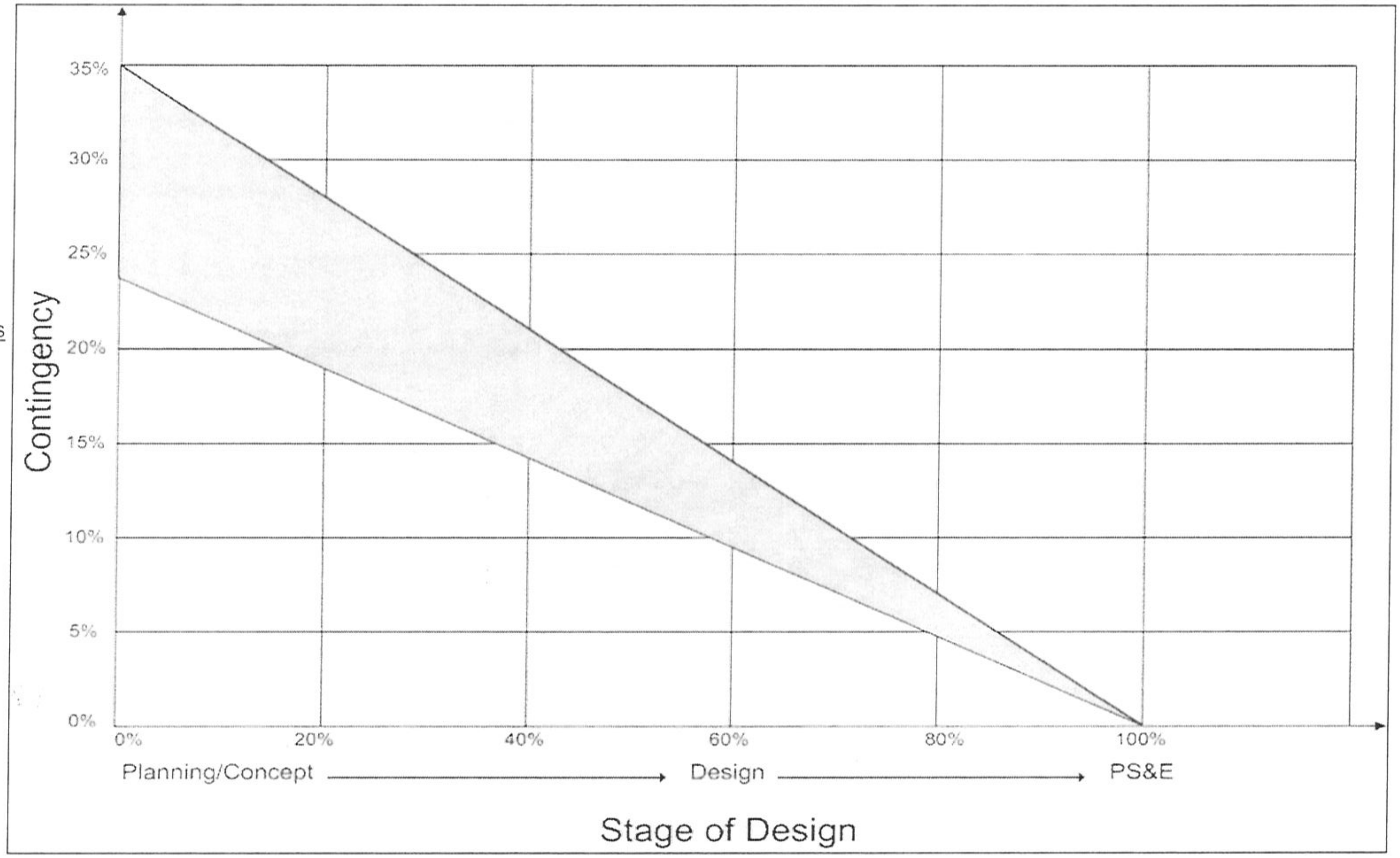
Design Completion Risk Guidelines for Cost Estimating of Major Projects



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PDP DESIGN RISK CONTINGENCY COSTS INFORMATION

Contact Us

Page Updated: 4/6/2009

	Major Cost Headings	Unit Cost Category	Sub-Unit Cost Category	UNIT	COSTS	NOTES
Major Cost Drivers	See Graph - next page			lump		See Graph - next page
	Conceptual Estimating Techniques					
	<u>PDP Design Risk</u> Note: This % add-on should be a single project add-on to the total cost. As Detail Design Quantities are developed in the PDP then the Design Risk Contingency % should be attached to each category or grouping as warranted. Please see Design Risk Contingency Graph for direction.					** <u>Design Risk Contingency</u> (items not accounted for in design) **PDP Design Risk Contingencies:** Reasonable risk contingencies should be built into the total project cost estimate. Although not included in the final C-2 estimate or the final engineer's estimate, a design contingency based on different levels of design completion should be included in the project's total cost estimate. This cost of risk has been developed based on previous historical data for similar type and size projects.
			PDP steps 1-3	lump	25-35%	<u>**% Add-on for PDP step 1-3**</u>
			PDP steps 4-7	lump	15-25%	<u>**% Add-on for PDP step 4-7**</u>
			PDP step 8	lump	10-15%	<u>**% Add-on for PDP step 8**</u>
			PDP step 9	lump	10%	<u>**% Add-on for PDP step 9**</u>
			PDP step 10	lump	5-10%	<u>**% Add-on for PDP step 10**</u>
			PDP step 11	lump	0%	<u>**% Add-on for PDP step 11**</u>
			PDP step 12	lump	0%	<u>**% Add-on for PDP step 12**</u>
			PDP step 13	lump	0%	<u>**% Add-on for PDP step 13**</u>

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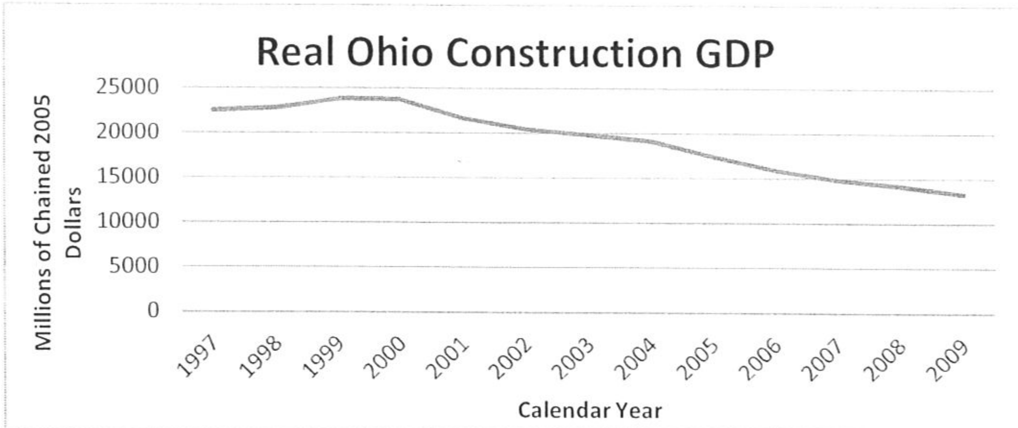

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JANUARY 2011 CONSTRUCTION COST INFLATION FORECAST

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High	10%	9%	9%	9%	9%
Most Likely	5.7%	5%	4.5%	4.5%	4.5%
Low	3%	3%	3%	3%	3%

Prepared by the Bid Analysis and Review Team, Office of Estimating, Ohio Department of Transportation, February 9th, 2011.

[21] The Ohio Department of Transportation 2010-2011 Business Plan, December 2009, page 30.

FY10-11 Business Plan Inflation Calculator:

Last Modified: February 18th, 2010

Today's Date: March 16, 2011

ENTER VALUES in the Yellow Areas Only:

Estimation Start Date:
Less than or Equal to Today's Date
(mm/dd/yyyy)

3/16/2011
Start Date:

Enter Construction Mid-Point Date:
(cannot exceed 06/01/2025)
(mm/dd/yyyy)

6/24/2013
Construction Mid-Point Date:

Present-Day Estimated Cost:

$ 100.00
Estimated Dollar Amount:

Estimate Start Date to Construction Mid-Point Date: 27 **Months**

Inflation - Start to Mid-Point of Construction:

(compounded growth rate)

Inflated Dollar Amount:

Business Plan	11.4%	$ 111.35

Estimator's Name:

County - Route - Section:

PID:

Estimator's Notes:

PHASE 1 Start 3/9/2012 31 MONTS
End. 10/3/14
MID 6/24/2013 15.5 MONTS

FY10-11 Business Plan Inflation Calculator:

Last Modified: February 18th, 2010

Today's Date:
March 16, 2011

ENTER VALUES in the Yellow Areas Only:

Estimation Start Date:
Less than or Equal to Today's Date
(mm/dd/yyyy)

3/16/2011
Start Date:

Enter Construction Mid-Point Date:
(cannot exceed 06/01/2025)
(mm/dd/yyyy)

6/15/2016
Construction Mid-Point Date:

Present-Day Estimated Cost:

$ 100.00
Estimated Dollar Amount:

Estimate Start Date to Construction Mid-Point Date: 63 Months

Inflation - Start to Mid-Point of Construction:

(compounded growth rate)

Business Plan 28.9%

Inflated Dollar Amount:

$ 128.90

Estimator's Name:

County - Route - Section:

PID: PHASE 2

Estimator's Notes:

Start 8/1/14 45 MONTHS
End 10/1/18
MID 6/15/2017 22.5 MONTHS.

FY10-11 Business Plan Inflation Calculator:

Last Modified: February 18th, 2010

Today's Date: March 16, 2011

ENTER VALUES in the Yellow Areas Only:

Estimation Start Date:
Less than or Equal to Today's Date
(mm/dd/yyyy)

3/16/2011
Start Date:

Enter Construction Mid-Point Date:
(cannot exceed 06/01/2025)
(mm/dd/yyyy)

2/1/2017
Construction Mid-Point Date:

Present-Day Estimated Cost:

$ 100.00
Estimated Dollar Amount:

Estimate Start Date to Construction Mid-Point Date: 70 **Months**

Inflation - Start to Mid-Point of Construction:

(compounded growth rate)

Business Plan 32.7%

Inflated Dollar Amount: $ 132.66

Estimator's Name:

County - Route - Section:

PID:

Estimator's Notes:

PHASE 2
Start 8/1/14 60 MONTHS
End. 8/1/19
MID 2/1/17 30 MONTHS.

FY10-11 Business Plan Inflation Calculator:

Last Modified: February 18th, 2010

Today's Date:
March 16, 2011

ENTER VALUES in the Yellow Areas Only:

Estimation Start Date:
Less than or Equal to Today's Date
(mm/dd/yyyy)

3/16/2011
Start Date:

Enter Construction Mid-Point Date:
(cannot exceed 06/01/2025)
(mm/dd/yyyy)

11/1/2019
Construction Mid-Point Date:

Present-Day Estimated Cost:

$ 100.00
Estimated Dollar Amount:

Estimate Start Date to Construction Mid-Point Date: 103 **Months**

Inflation - Start to Mid-Point of Construction:

(compounded growth rate)

Business Plan 51.7%

Inflated Dollar Amount:

$ 151.71

Estimator's Name:

County - Route - Section:

PHASE 3

PID:

Estimator's Notes:

Start 5/1/17
End 5/1/22 60 MONTHS
MID 11/1/19 30 MONTHS