Duffy, Daniel FOI #14554

From: edward.krudy@thomsonreuters.com
Sent: Monday, January 13, 2014 4:30 PM
To: Duffy, Daniel
Cc: Torres Rojas, Genara; Van Duyne, Sheree
Subject: Freedom of Information Online Request Form

Information:

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Required copies of the records: Yes

List of specific record(s):
1. The full project cost estimate review for the Goethals Bridge as conducted in accordance with FHWA and USDOT requirements and that led to the Port Authority's estimates for the design build cost of the Goethals Bridge. 2. The full report on maintenance costs of the Goethals Bridge conducted for the Port Authority by technical consultants and that led to the Port Authoritys estimate for the maintenance costs of the Goethals Bridge.

THE PORT AUTHORITY OF NY & NJ

FOI Administrator

August 8, 2014

Mr. Edward Krudy
Reuters
3 Times Square
New York, NY 10036

Re: Freedom of Information Reference No. 14554

Dear Mr. Krudy:

This is in response to your January 13, 2014 request, which has been processed under the Port Authority's Freedom of Information Code (the "Code") for a copy of the full project cost estimate review for the Goethals Bridge as conducted in accordance with FHWA and USDOT requirements and a copy of the full report on maintenance costs of the Goethals Bridge conducted for the Port Authority by technical consultants.

Material responsive to your request for a copy of the full project cost estimate review for the Goethals Bridge and available under the Code can be found on the Port Authority's website at http://www.panynj.gov/corporate-information/foi/14554-O.pdf. Paper copies of the available records are available upon request.

We have searched our files and found no records responsive to the remainder of your request.

Please refer to the above FOI reference number in any future correspondence relating to your request.

Sincerely,

Heavyn-Leigh American
FOI Officer

225 Park Avenue South, 17th Floor
New York, NY 10003
T: 212 435 3642
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GOETHALS BRIDGE MODERNIZATION PROGRAM – PROJECT AUTHORIZATION

It was recommended that the Board authorize: (1) a project (Project) for the Goethals Bridge Modernization Program (GBMP), to advance the implementation and delivery of the replacement of the Goethals Bridge as a public-private partnership project, at an estimated total project cost of $1.521 billion, which is comprised of $934 million for the design and replacement of the Project, $224 million for financing during construction and other construction-related costs and $363 million in Port Authority-funded Project costs (inclusive of $179 million previously authorized by the Board for Phase I project work); and (2) the Executive Director to: (a) enter into an agreement with NYNJ Link, a partnership of Macquarie Infrastructure and Real Assets, Inc. and Kiewit Development (the Developer), for the design, construction, financing and maintenance of the Project, with the total aggregate compensation to be provided to the Developer for its costs to implement and maintain the Project to be inclusive of: (i) post-construction interest expense on the amount of financing to be provided to the Port Authority by the Developer, with such interest rate to be established at financial close, and calculated off a base average interest rate of 5.18 percent per annum, to be adjusted based on certain factors, substantially in accordance with the terms outlined to the Board; and (ii) certain maintenance payments to be made over the term of the agreement which would be subject to annual escalation based on the Consumer Price Index (CPI) (total maintenance payments over the 40-year term are currently estimated at $458 million based on an assumed annual CPI of 2.0 percent); (b) make milestone-based payments to the Developer, in an amount of up to $150 million, during the latter stages of construction through completion of design and construction work and demolition of the existing bridge; (c) extend the existing agreement with HNTB Corporation (HNTB), for a term of up to six years, to provide continued professional and technical advisory services, on an as-needed basis, to support the Project, at an amount of up to $40 million; (d) extend the existing agreement with URS Corporation (URS), for a term of up to six years, to provide continued professional program management support services, on an as-needed basis, to support the Project, at an amount of up to $16 million; (e) enter into agreement(s), as necessary, to effectuate wetlands mitigation efforts in connection with the Project, including an agreement with Prologis Development Services Incorporated for the purchase of 1.017 wetlands mitigation credits in New Jersey, at an estimated amount of $705,000; (f) take action with regard to the award of such contracts for professional, technical, financial, construction-related, integrity monitoring, and advisory services as may be necessary to implement the Project; and (g) execute such documents, agreements and contracts with public and private entities as are necessary to effectuate the Project.

The Goethals Bridge is a crucial asset to the region's productivity. Its strategic location, in the heart of a complex surface transportation network, provides truck and auto connections between the New Jersey Turnpike, U.S. Routes 1&9 and other New Jersey highways, the Staten Island Expressway (I-278), and the Verrazano-Narrows Bridge. The Goethals Bridge sustains the robust commercial activity of the Howland Hook Marine Terminal, and its proximity to Newark Liberty International Airport positions it at the center of one of the largest air cargo gateways in the nation. Despite increasing reliance on freight rail operations to move goods to and from these gateway areas, the major portion of these goods are transported by truck, making the Goethals Bridge essential to moving cargo to and from airports and seaports to regional hinterland markets.

Constructed in 1928 to then-current criteria and standards, the Goethals Bridge is now approaching functional obsolescence, and there is a need to replace the bridge with a more modern structure.

Via prior actions from September 2003 through February 2009, the Board authorized planning work to support the GBMP. During this planning phase, the bridge deck was rehabilitated in 2006, with the intention of ensuring that the deck would function adequately for approximately 10 years, while planning work and subsequent replacement of the bridge occurred.

On March 29, 2011, the Board authorized Phase I work for the Project, at a total estimated amount of $126 million, inclusive of $59.1 million previously authorized for Project planning, which included: seeking options for the purchase of property, executing right-of-entry agreements, and commencing pre-vesting condemnation processes; continuation of existing contracts and/or award of new contracts for professional services, program management support, environmental, technical, financial support, a relocation specialist and other work, including preparation of applications for permits and other documents; and work associated with the preparation and application for a Transportation Infrastructure Finance and Innovation Act (TIFIA) loan, as well as an application to support the allocation of Private Activity Bonds (PABs) towards the Project.

At its meeting of November 15, 2011, the Board authorized an increase of $53 million in the amount of the authorization for Phase I work, to provide for the acquisition of real property in New York and New Jersey in connection with the Project, bringing the total Phase I project authorization to $179 million.

As part of its capital planning process, the Port Authority made a determination to pursue a public-private-partnership in connection with the replacement of the Goethals Bridge. On May 25, 2011, the Board authorized the solicitation of proposals for a contract to design, build, finance and maintain the Project. In June 2011, following a Request for Qualifications process, the Port Authority short-listed three teams deemed best qualified to participate in a Request for Proposals (RFP).

Concurrent with the RFP process, staff pursued federal financing options for use by the selected Developer as a source of funds to finance the Project, and on March 16, 2012 the Port Authority submitted its formal TIFIA loan application for the Project, in the amount of $432 million, with a maximum loan amount not to exceed $500 million. In addition, on June 27, 2012, the Port Authority submitted a PABs allocation request for the Project, in the amount of $1.2 billion. Each of these federal financing applications was submitted to the United States Department of Transportation (USDOT), with the condition that the Developer would be the borrower for each instrument. The Port Authority received an allocation letter from USDOT regarding the provisional $1.2 billion in PABs on January 2, 2013, based on an eligible conduit (not the Port Authority) issuing the PABs on behalf of the Developer. In addition, the TIFIA term sheet for the Project loan was endorsed by the USDOT's Credit Council on January 15, 2013, to include in the RFP for the Proposers if they elect to use TIFIA funds in their financing plan.

Three proposals were received and evaluated, in accordance with the evaluation criteria set forth in the RFP. Staff recommended NYNJ Link, a partnership of Macquarie Infrastructure and Real Assets, Inc. and Kiewit Development as the successful Proposer, based on having (1) passed all steps of the pass/fail evaluation process, and (2) achieving the lowest adjusted evaluation price.

In support of the planning effort, HNTB was retained in August 2004 to provide professional and technical advisory services, on an as-needed basis, at a total amount of $16.8 million. From November 2011 through January 2013, the Executive Director authorized increases to the agreement with HNTB, in the total estimated amount of $9.5 million, for HNTB to continue to provide necessary services to support the Phase I project through its completion, resulting in a revised total authorization amount of $26.3 million.

With the advancement of the proposed Project for the replacement of the Goethals Bridge, it was recommended that the professional and technical advisory services agreement with HNTB be extended for up to six years, on an as-needed basis, to support the design-build phase, to provide for services including technical reviews, compliance and quality auditing, construction oversight support, materials verification and testing support, third-party coordination with utilities, outside agencies and governmental entities, records and process management, change management, and Federal Highway Administration coordination, at an increase of up to $40 million, resulting in a total authorized amount of $66.3 million.

Additionally, in support of the planning effort, URS was retained in April 2004 to provide professional program management support services, on an as-needed basis, at a total amount of $5 million. The authorization included the option to extend the agreement to support the Phase I project through its completion. In January 2012, the Executive Director authorized an increase of $1 million to the agreement with URS, for continued program management support for the Phase I project, resulting in a revised total authorization amount of $6 million.

With the advancement of the Project, it was recommended that the professional program management support services agreement with URS be extended for up to six years, on an as-needed basis, to support the design-build phase, at an increase of up to $16 million, resulting in a total authorized amount of $22 million.

In addition, as part of the Project, construction wetland impacts must be mitigated in both New York and New Jersey. In New Jersey, the New Jersey Department of Environmental Protection Tidal Open Water Mitigation Permit conditions allow for the purchase of wetland mitigation credits from a Mitigation Bank, specifying that, should credits be the option selected, they be procured from the Port Reading Bank (operated by Prologis Development Services Incorporated). Based on the replacement bridge concept in the National Environmental Policy Act-Environmental Impact Statement document for the Project, 1.017 mitigation credits are needed in New Jersey, resulting in a purchase cost of $705,000 from Prologis Development Services Incorporated. The proposed authorization also would effectuate the acquisition of wetlands mitigation efforts on the New York side in connection with the Project.

Pursuant to the foregoing report, the Board adopted the following resolution, with Commissioners Bagger, Lynford, Moerdler, Rubin, Samson, Schuber and Steiner voting in favor; Commissioners Rechler and Sartor recused and did not participate in the consideration of, or vote on, this item. General Counsel confirmed that sufficient affirmative votes were cast for the action to be taken, a quorum of the Board being present.

RESOLVED, that a project (Project) for the Goethals Bridge Modernization Program, to advance the implementation and delivery of the replacement of the Goethals Bridge as a public-private partnership project, at an estimated total project cost of $1.521 billion, which is comprised of $934 million for the design and replacement of the Project, $224 million for financing during construction and other construction-related costs and $363 million in Project costs to be funded by the Port Authority (inclusive of $179 million previously authorized by the Board for Phase I project work); and it is further

RESOLVED, that the Executive Director be and he hereby is authorized, for and on behalf of the Port Authority, to: (1) enter into an agreement with NYNJ Link, a partnership of Macquarie Infrastructure and Real Assets, Inc. and Kiewit Development (the Developer) for the design, construction, financing and maintenance of the Project, with the total aggregate compensation to be provided to the Developer for its costs to implement and maintain the Project to be inclusive of: (i) post-construction interest expense on the amount of financing to be provided to the Port Authority by the Developer, with such interest rate to be established at financial close, to be calculated off a base average interest rate of 5.18 percent per annum, to be adjusted based on certain factors, substantially in accordance with the terms outlined to the Board; and (ii) certain maintenance payments to be made over the term of the agreement which would be subject to annual escalation based on the Consumer Price Index; (2) make milestone-based payments to the Developer, in an amount of up to $150 million, during the latter stages of construction through completion of design and construction of the replacement bridge and demolition of the existing bridge; (3) extend the existing agreement with HNTB Corporation, for a term of up to six years, to provide continued professional and technical advisory services, on an as-needed basis, to support the Project, at an amount of up to $40 million; (4) extend the existing agreement with URS Corporation, for a term of up to six years, to provide continued professional program management support services, on an as-needed basis, to support the Project, at an amount of up to $16 million; (5) enter into agreement(s), as necessary, to effectuate wetlands mitigation efforts in connection with the Project, including an agreement with Prologis Development Services Incorporated for the purchase of 1.017 wetlands mitigation credits in New Jersey, at an estimated amount of $705,000; (6) take action with regard to the award of such contracts for construction, and professional, technical, financial, construction-related, integrity monitoring, and advisory services as may be necessary to implement the Project; and (g) execute such documents, agreements and contracts with public and private entities as are necessary to effectuate the Project; and it is further

RESOLVED, that the form of all contracts, agreements and documents in connection with the foregoing Project shall be subject to the approval of General Counsel or his authorized representative.

GOETHALS BRIDGE REPLACEMENT PROJECT

STATEN ISLAND, NEW YORK, AND ELIZABETH, NEW JERSEY

FHWA Cost Estimate Review
November 2012
FINAL Report

THE PORT AUTHORITY OF NY & NJ

DEPARTMENT OF TRANSPORTATION UNITED STATES OF AMERICA

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EXECUTIVE SUMMARY

A review team consisting of the Federal Highway Administration (FHWA), the Port Authority of New York and New Jersey (PANYNJ), and their consultants conducted a Cost Estimate Review (CER) workshop to review the cost and schedule estimates for the Goethals Bridge Replacement Project. The workshop was held at the PANYNJ Office in Manhattan, NY from November 27-29, 2012.

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

The Project constructs a new six-lane cable stay bridge over the Arthur Kill Channel between the Borough of Staten Island, New York and the City of Elizabeth, New Jersey. The Project will eliminate the functional and physical obsolescence of the existing bridge, address the aging structure's escalating maintenance, repair and structural retro-fit needs, provide system redundancy, improve traffic service, provide for safe and reliable truck access for regional goods movement, and provide for potential future transit in the corridor.

The project team submitted a project estimate of $1.14 billion in Year of Expenditure (YOE) dollars prior to the start of the review. This cost included environmental, engineering, right-of-way (ROW), utilities, and construction costs. It should be noted that financing and operation and maintenance costs are not included in this estimate. The anticipated completion date is September 2018.

During the week of the review, cost and schedule risks were identified and quantified. Based on this risk assessment, the range of total project costs varies between $0.787 and $1.332 billion (YOE). The estimate at the 70% confidence level is $1.115 billion (YOE). This baseline is typically identified in the project's initial financial plan to show that adequate funding is available to construct the project. However, this estimate is a snapshot in time and is expected that through further project development, such as the on-going procurement activities, the estimate will change. The initial financial plan should detail any changes in the project estimate.

Significant review findings are as follows:

- Appropriate estimate for 30% illustrative design
- Use of unit prices from NYSDOT and NJDOT

- Use of historical information from other bridge projects
- Application of robust risk-based approach
- Iterative estimation process (May 2008, October 2010, & July 2011)
- Proactive permit, third-party, and utility coordination
- Use of P3 procurement strategy to maximize efficiency of design, i.e. interim proposals
- Project has many constraints
    - Project limits – Toll Plaza and New Jersey Turnpike interchange
    - Bridge height restrictions
    - Cross road clearances (16’ or 16’-6”)
    - Wetlands

The following recommendations are provided based on this review:

- Update estimate to reflect estimate adjustments discussed during review
    - Final comprehensive review of estimate
    - Refine lump sum item
- Continue ROW acquisition to ensure timely schedule
    - Determine appropriate approach for acquiring critical parcels
- Continue coordination and finalize criteria with Conrail regarding Travis Bridge Overpass
- Continue proactive utility and permit coordination
- Continue implementing risk management procedures
    - Continue documenting and managing risks in the risk register
    - Continue updating estimate based on risk management, i.e. reevaluation of project contingencies

CHAPTER 1 – REVIEW PROCESS

A review team consisting of the Federal Highway Administration (FHWA), the Port Authority of New York and New Jersey (PANYNJ), and its consultants, conducted a Cost Estimate Review (CER) workshop to review the cost and schedule estimates for the Goethals Bridge Replacement Project. The workshop was held at the PANYNJ Office in Manhattan, NY from November 27-29, 2012. The closeout presentation was conducted on November 29, 2012.

The purpose of this chapter is to provide a general overview of the cost estimate review process. This chapter includes a discussion of the review objective, team, documentation provided and methodology.

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 review team also reviewed the proposed Project schedule to determine potential schedule impact on the Project cost.

BASIS OF REVIEW

The Moving Ahead for Progress in the 21st Century Act (MAP-21) requires the financial plan for all Federal-aid projects with an estimated total cost of $500 million or more to be approved by the U.S. Department of Transportation Secretary (i.e. FHWA) based on reasonable assumptions. The $500 million threshold includes all project costs, such as engineering, construction, ROW, utilities, construction engineering, and inflation. The FHWA has interpreted 'reasonable assumptions' to be a risk based analysis. The cost estimate review provides this risk based assessment and is used in the approval of the financial plan. This is an independent review, but does not use an independent FHWA estimate. The review team used an estimate provided by the PANYNJ project team.

REVIEW TEAM

The 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 team participated together throughout the workshop, and individuals with specific Project expertise briefed the review team on portions of the Project or estimate development process.

The review team also discussed the development of the Project cost estimate quantities, unit prices, assumptions, opportunities and threats. A sign-in sheet is provided in the Appendices.

The review team was comprised of members of the following organizations:

- FHWA
  - New York Division Office
  - Headquarters – Office of Innovative Program Delivery
- PANYNJ
- Consultants
  - HNTB
  - URS
  - Allen & Overy

DOCUMENTS REVIEWED

Documents reviewed prior to and during the workshop included:

- Project Cost Estimate
- Project Schedule
- Project Risks
  - Risk Register
  - July 2011 Risk Report
- Project Website
  - August 2010 Final Environmental Impact Statement
  - January 2011 Record of Decision
- Request for Proposals
- Draft Project Management Plan

METHODOLOGY

The methodology for this cost estimate review is outlined as follows:

- Verify accuracy of cost estimate
  - Understand project scope and cost estimate development process
  - Discuss assumptions for contingencies and projected inflation rates
  - Review major cost elements
  - Identify threats and opportunities (Risks)
- Model uncertainties
  - Establish base estimate variability

    - Model variation of inflation
    - Determine probability of occurrence and schedule and cost impacts for significant project threats and opportunities
    - Model anticipated market conditions at the time of letting
- Perform Monte Carlo simulation to model variability and risks and generate likely range of project cost and schedule
- Communicate results
    - Report methodology and results in a close-out presentation
    - Document review in a final report that will be used to inform the public and develop the financial plan

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

Verify Accuracy of Cost Estimate

The review team was provided an overview of the estimation process used to develop the project's estimate. This overview included understanding the scope of the project, stage of design, and assumptions used to develop the estimate. The review team interviewed the project team and discussed the accuracy of the each major cost element. Where changes were needed these changes were recorded and the estimate updated. Additions or deletions were also recorded and the PANYNJ's estimate updated to reflect the change.

Model Uncertainties

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

Base variability is a measure of uncertainty applied to the base estimate that represents the inherent randomness associated with the estimating process. Base variability is a function of the project's current level of design and the process used to develop the estimate. This may be demonstrated by the fact that two estimators using the same data source and following the same general estimate development guidance will generate different estimates. Additionally, the lack of details about the project and assumptions that should be used to develop the estimate would cause more uncertainty and variability in the estimate. This base variation is a function of the system (i.e. assumptions and data sources used to define the estimate). Base variability is applied to the base estimate exclusive of risks. Contingencies that include risks are removed from the base estimate to avoid double counting risks identified in the risk register. Allowances and expected construction change order costs typically remain in the base estimate.

Market conditions at the time of advertisement, bid, and award are modeled to reflect the future competitive bidding environment. Three scenarios are evaluated including worse than planned, as-planned, and better than planned. Each scenario is assigned a likelihood of occurrence and range of associated costs. In addition to market conditions, inflationary risk is also modeled and used to project current year dollars to year of expenditure.

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

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

Communicate Results

The last part of the review is to communicate the review results by providing a closeout presentation and final report. At the end of the review the review team provides a closeout presentation that summarizes the review findings. The presentation identifies the review objectives and agenda, discusses the methodology, and highlights the results of the review including the pre/post workshop estimate results and any estimate adjustments made during the review. The closeout presentation also identifies any significant cost and schedule risks, and provides a brief overview of recommendations by the review team. The close-out presentation for this review was held on November 29, 2012 and is included in Appendix B.

The estimate review is a snapshot in time and as additional information becomes available it is expected that the estimate will change and be updated. Following the review if errors or omissions are identified and confirmed with the project sponsor these modifications will be incorporated into the final report. The final report communicates all findings of the review to the project sponsor and Division and serves as the official document for the cost estimate review. As noted earlier, the review results are used in the approval of the financial plan. Cost estimate review reports are maintained by the FHWA Office of Innovative Program Delivery's Project Delivery Team in Washington DC.

CHAPTER 2 – REVIEW SUMMARY

PROJECT BACKGROUND & SCOPE

The Goethals Bridge Replacement Project will replace the existing facility with a new six-lane cable stay bridge over the Arthur Kill Channel between the Borough of Staten Island, New York and City of Elizabeth, New Jersey. The facility is maintained and operated by the PANYNJ and serves has a vital link in the New York/New Jersey metropolitan area's regional highway network. The Goethals Bridge is a primary link along Interstate I-278, which begins at U.S. Route 1/9 in Linden, New Jersey and continues across northern Staten Island as the Staten Island Expressway, and then continues into Brooklyn and Queens, before it terminates at I-95 in the Bronx. Interstate 278 also provides a direct connection to the New Jersey Turnpike (Interstate 95) at Interchange 13 in New Jersey and the West Shore Expressway, the major north-south highway on Staten Island.

Opened in 1928, the Goethals Bridge was designed to accommodate bi-state automobile and truck traffic for that era. The importance of the Goethals Bridge within the regional roadway network grew substantially with the opening of the Verrazano-Narrows Bridge in 1964 and the resultant rapid population growth on Staten Island. The Goethals Bridge has become functionally and physically obsolete as its design features, based on codes and standards of the 1920s, no longer meet current design standards. Deteriorating traffic conditions and relatively higher accident levels on the Goethals Bridge, in comparison to other Staten Island Bridges, were attributed to ever increasing traffic volumes. Such conditions were projected to continue to worsen in future years with expected increases in traffic volume. A Project Location Map for the proposed improvements is shown in Figure 1.

The purpose of the project as outlined by the Final Environmental Impact Statement (EIS) is listed below.

- Address design deficiencies and functional obsolescence of the existing bridge and provide safer operating conditions.
- Enhance structural integrity and reduce life-cycle costs.
- Provide transportation system redundancy.
- Improve traffic service.
- Provide for safe reliable truck access for regional goods movement.
- Provide for potential future transit in the corridor.

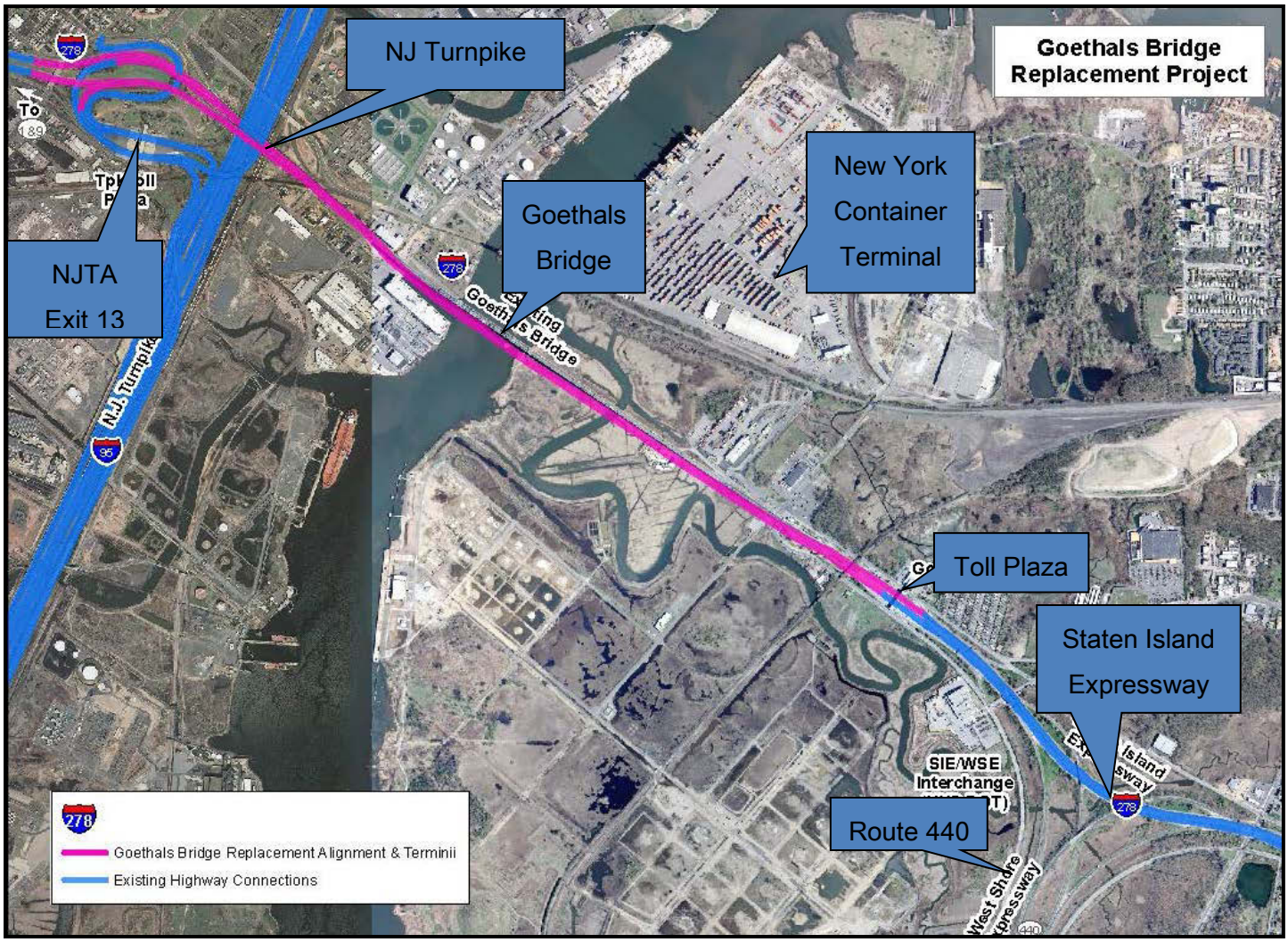


Figure 1. Project Location Map

The scope of work for the project includes the following components.

- A new six-lane cable stay bridge over the Arthur Kill Channel (the Main Bridge) including the design and construction of standoff fendering along the New Jersey bulkhead line as well as the design and construction of fendering for the New York main tower if the Developer's Final Design warrants it necessary;
- New approach structures in New Jersey and New York (the Approach Spans) to link the main cable stay bridge with the existing road network;
- Work to tie in the New Jersey and New York approach roads to the geometry of the Approach Spans;
- Installation of all roadway, structures, electrical, mechanical, drainage, ITS, lighting, pavement markings, signage, utility adjustments or relocations and inspection/maintenance facilities required according to these Requirements and Provisions for Work;

- Permanent fencing generally following the Project Right of Way at ground level along both sides of the Replacement Bridge, except through open waters and public roads;
- A permanent access road, including a trestle bridge over Old Place Creek located generally below the New York portion of the Replacement Bridge for purposes of construction, maintenance and security;
- Re-alignment and construction of Gulf Avenue in Staten Island;
- Removal of the existing Goethals Bridge, appurtenances, Existing Bridge pier protection system (dolphins), approach structures and associated infrastructure; including the removal and or relocation of attached facilities or utilities;
- Removal of the existing ramp structure in New Jersey; and
- Replacement of the Travis Branch railroad bridge over I-278.

ENVIRONMENTAL PROCESS

The United States Coast Guard, as the Federal Sponsor, determined that an EIS should be prepared to assess the impacts of the proposed project. The Final EIS was approved on August 2010 and the Record of Decision was issued in January 2011. FHWA plans to adopt the EIS approved by the USCG once all necessary additional assessments are completed to meet FHWA requirements.

PROJECT PROCUREMENT

Currently, the PANYNJ is pursuing a public-private partnership (P3) to deliver the project. It is anticipated that the P3 developer will design, build, finance, and maintain the project as part of a 35-year concession agreement. Three teams were shortlisted in 2011 and the contract is scheduled for award in spring of 2013. A Transportation Infrastructure and Finance Innovation Act (TIFIA) Loan is also being pursued as part of the financial plan for the project by the P3 proposers.

During discussions with the project team, PANYNJ explained that it had been determined that this project was appropriate to be delivered via a P3 due to the opportunity to leverage anticipated revenue streams and industry interests in the project. Also, project characteristics such as an accelerated schedule seemed well suited for the P3 delivery method. A feasibility study for the use of a P3 delivery for the project has been completed for the project.

PROJECT SCHEDULE

Table 1 outlines some of the key schedule dates. The overall project completion is estimated in September 2018.

Table 1 Project Milestones

Milestone	Date
ROD Issued	January 2011
Three P3 Proposer Teams Shortlisted	May 2011
Conformed RFP Issued	December 2012
PANYNJ Board Approval of Successful Proposer and Project Authorization	Spring of 2013
Commercial Close Deadline	June 2013
Financial Close Deadline	September 2013
Design & Construction Activities	September 2013 – September 2018
Overall Project Completion	September 2018

COST ESTIMATE

Prior to the CER, the project team submitted a total project estimate of $1.02 billion (2011) and $1.14 billion (YOE) dollars. This estimate is based on the 30% illustrative design for the project.

The following estimate adjustments were made to the estimate by the project team during the review.

- Added $15 million for mitigation of hazardous materials
- Added $2.5 million for the traveler inspection system
- Added $8.4 million for stainless steel rebar in main span
- Added $13 million for maintenance & operation during construction
- Added $27.4 (4% of construction costs) million for construction engineering and inspection
- Added $7.8 million for Surety costs
- Added $14.5 million (2.5% of construction costs) for insurance
- Decreased from $9.9 million to $6.9 million to reflect Galvanized Mounting Rail instead of Stainless Steel
- Decreased from $43.2 million to $35.7 million to reflect updated estimate for bridge demolition
- Added $6 million for environmental/wetland mitigation costs

Table 2 shows a cost breakdown for both the original and adjusted estimate. This estimate includes cost associated with construction, environmental studies, utilities, construction

support, construction inspection, and contingency. It should be noted that financing and operation and maintenance costs are not included in this estimate.

Table 2 Cost Estimate Breakdown in 2011 dollars

	2011 Estimate	**CER Adjusted**
Prior Costs: NEPA, Preliminary Engineering, Procurement Activities	$82,768,300	$82,768,300
PANYNJ Agency Costs: Development & Oversight Costs, Right-of-Way Costs	$222,984,000	$228,984,000
Developer Contract: Design & Construction Costs	$709,616,662	$787,777,069
Total (2011 Dollars)	**$1,015,368,962**	**$1,099,529,369**

REVIEW FINDINGS

Several findings were noted during the CER, including the following:

- Appropriate estimate for 30% illustrative design
- Use of unit prices from NYSDOT and NJDOT
- Use of historical information from other bridge projects
- Application of robust risk-based approach
- Iterative estimation process (May 2008, October 2010, & July 2011)
- Proactive permit, third-party, and utility coordination
- Use of P3 procurement strategy to maximize efficiency of design, i.e. interim proposals
- Project has many constraints
    - Project limits – Toll Plaza and New Jersey Turnpike interchange
    - Bridge height restrictions
    - Cross road clearances (16’ or 16’-6”)
    - Wetlands

REVIEW RECOMMENDATIONS

During the workshop the review team developed the following recommendations for implementation:

- Update estimate to reflect estimate adjustments discussed during review
    - Final comprehensive review of estimate
    - Refine lump sum item
- Continue ROW acquisition to ensure timely schedule

    - Determine appropriate approach for acquiring critical parcels (Baker)
- Continue coordination and finalize criteria with Conrail regarding Travis Bridge Overpass
- Continue proactive utility and permit coordination
- Continue implementing risk management procedures
    - Continue documenting and managing risks in the risk register
    - Continue updating estimate based on risk management, i.e. reevaluation of project contingencies

CHAPTER 3 – RISK ANALYSIS

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

FORECAST RESULTS FOR TOTAL PROJECT COSTS

Figures 2 and 3 show the results of the simulation for the project. Figure 2 shows the results in 2011 dollars. This forecast includes costs construction, environmental studies, utilities, construction support, construction inspection, ROW, and project uncertainty. Figure 3 depicts the forecast curve for the Total Project Cost in YOE dollars. In additional to the cost included in the current year forecast (Figure 2), Figure 3 accounts for inflation. The 70th percentile level of confidence that the estimate will not exceed $1.115 billion (YOE) in total project cost is shown by the blue shaded area. Alternatively, these results predict a 30% probability that total project costs will exceed this value based on the underlying variation within the estimate. It should be noted that $82.7 million in prior costs that have been expended for costs such as environmental studies and procurement activities are included in the analysis. Financing and operation and maintenance costs are not included in this analysis.

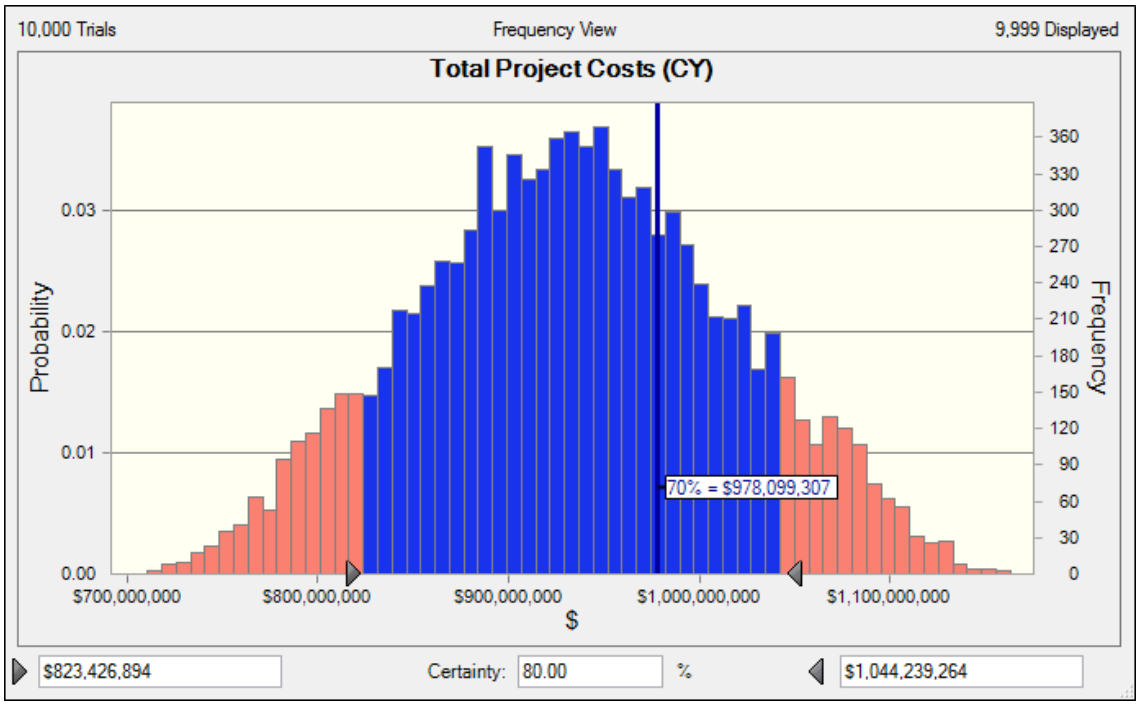


Figure 2 Probable Range of Total Project Costs (2011 dollars)

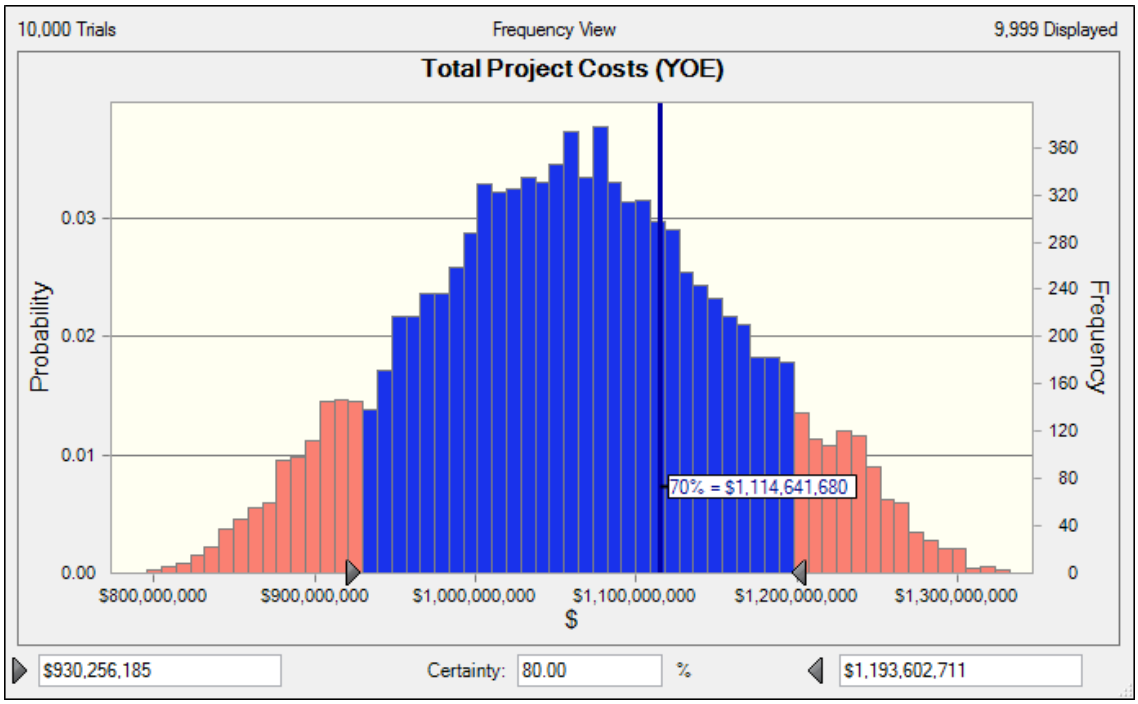


Figure 3 Probable Range of Total Project Costs (YOE dollars)

Table 3 demonstrates that the project cost ranges from $787 million to $1.332 billion. The lower and higher ends of the variance are unlikely. The higher end at the 100% percentile reflects an occurrence where all significant risks identified during the review will be realized, including those with a relatively low likelihood. The estimate at the 70% percentile of $1.114 billion should be used as the baseline cost in the initial financial plan.

Table 3 Percentile Rankings of Total Project Costs in YOE Dollars

Percentile	Forecast values
0%	$786,720,181
10%	$930,256,185
20%	$975,728,011
30%	$1,008,124,740
40%	$1,035,433,925
50%	$1,061,162,774
60%	$1,086,200,019
70%	$1,114,641,680
80%	$1,148,951,028
90%	$1,193,602,711
100%	$1,331,755,891

OTHER FORECAST RESULTS

As discussed previously, the project is being delivered using a P3. To assist the project team in analyzing direct agency cost versus developer cost, forecasts were developed for each category of cost. Those results are provided below. Please note that the total project cost will not be the sum of the following individual probability distributions as distributions estimated separately with Monte Carlo Simulations are not additive.

Developer Cost

Figure 4 below provides the forecast results for all work items included in the Developer cost. Based on the analysis, contract cost is estimated at $846 million at a 70% confidence level. This analysis includes all design, utility relocation, construction, and construction support costs for the Developer contract and risk events only applicable to the project's design and construction phases that would be accounted for in the Developer cost.

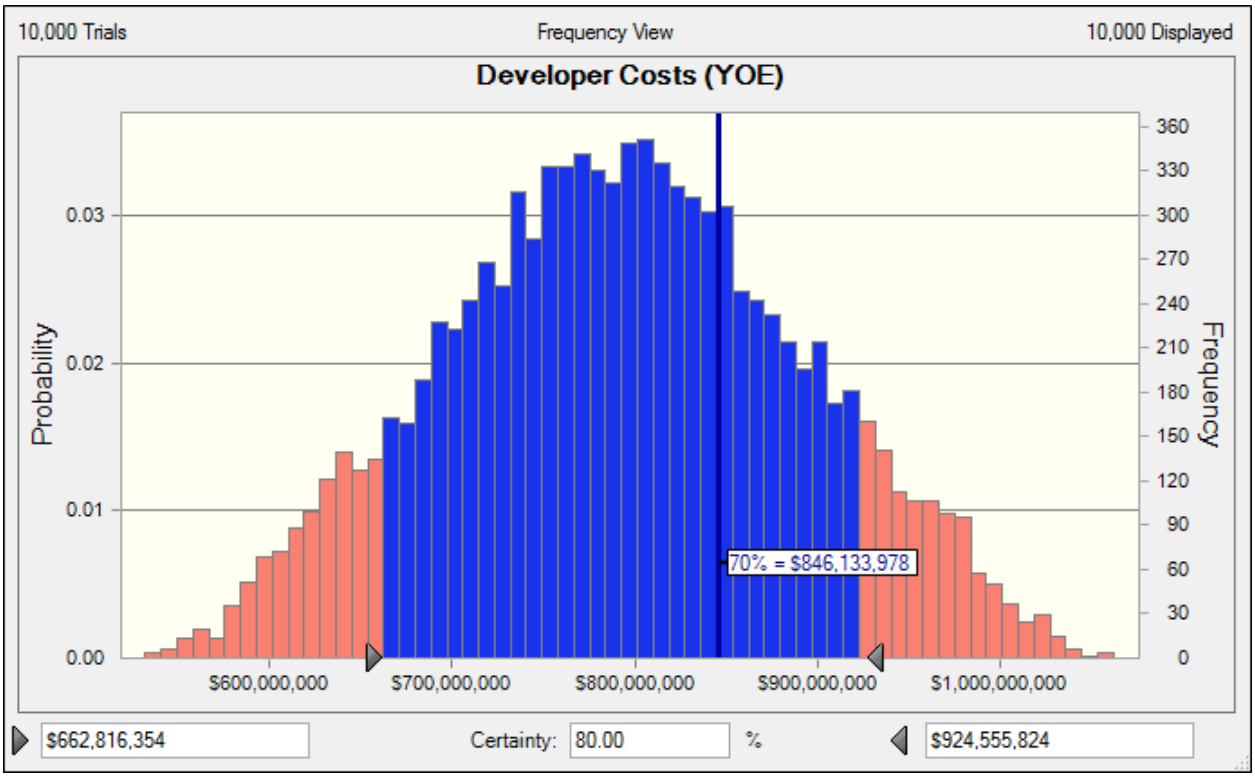


Figure 4 Probable Range of Developer Costs (YOE)

Table 4 below provides a summary of forecasted cost estimates for various confidence levels.

Table 4 Percentile Rankings of Developer Costs in YOE Dollars

Percentiles	Developer (YOE) Forecast values
0%	$532,516,582
10%	$662,816,354
20%	$707,566,654
30%	$739,571,933
40%	$767,359,575
50%	$793,065,838
60%	$818,408,368
70%	$846,133,978
80%	$880,242,251
90%	$924,555,824
100%	$1,061,332,978

PANYNJ Agency Cost

Figure 5 below provides the forecast results for all direct cost to the PANYNJ. Based on the analysis, this cost is estimated at $272 million at a 70% confidence level. This analysis includes

all development, oversight, and ROW costs and risk events applicable to those items. It should be noted that $82.7 million in prior costs are included in the PANYNJ agency cost.

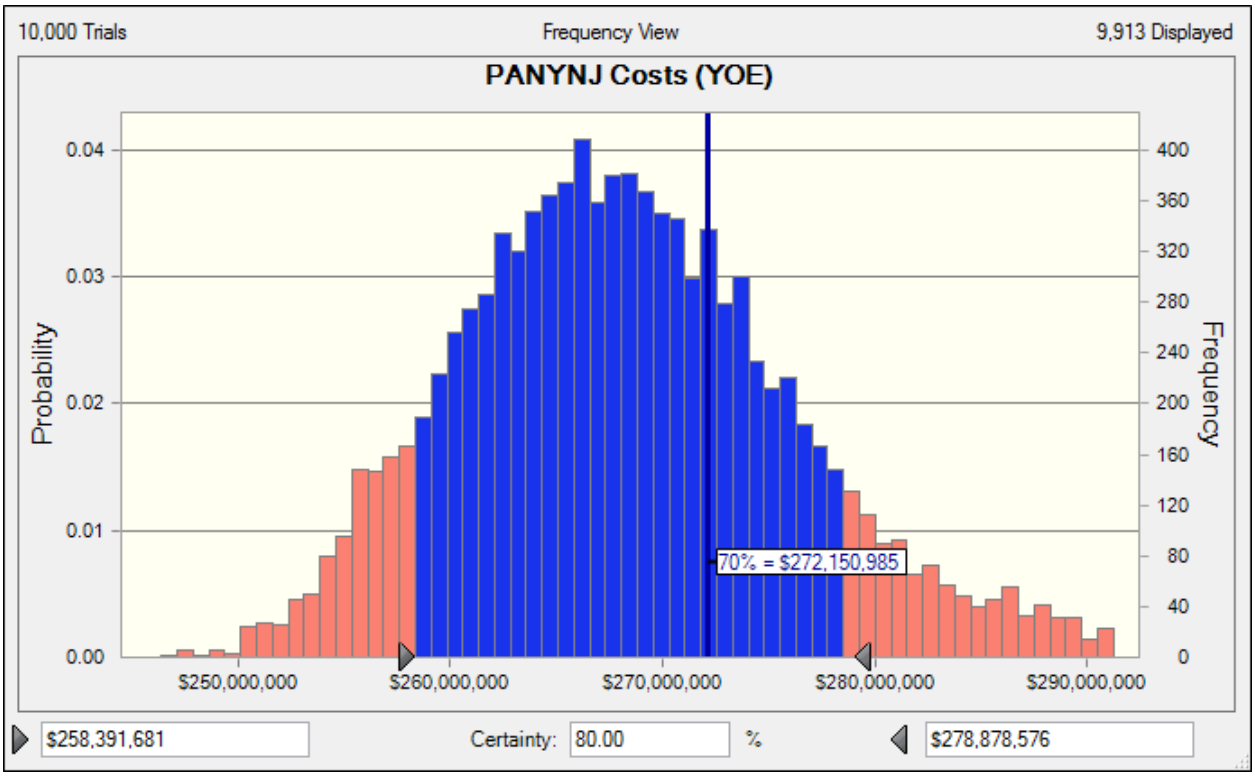


Figure 5 Probable Range of PANYNJ Agency Costs (YOE)

Table 5 below provides a summary of forecasted cost estimates for various confidence levels.

Table 5 Percentile Rankings of PANYNJ Agency Costs in YOE Dollars

Percentiles	PANYNJ Agency (YOE) Forecast values
0%	$245,613,437
10%	$258,391,681
20%	$261,528,456
30%	$263,857,370
40%	$265,895,072
50%	$267,878,755
60%	$269,857,643
70%	$272,150,985
80%	$274,781,971
90%	$278,878,576
100%	$300,159,536

PROBABILITY ASSUMPTIONS

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

Risk - Threats and Opportunities

In a traditional cost estimate, risks are often accounted for using estimates of contingency. The review team identified that $143.1 million had been designated as contingency in the estimate. This contingency is intended to cover cost associated with risks events (known-unknowns) that may be realized during the project. Approximately $68 million was designated as contingency to be utilized by PANYNJ for risk events related to items such as ROW and environmental mitigation and $75.1 million was allotted as part of developer cost for potential risk that may be realized during design and construction activities by the developer. This contingency was removed to determine the base estimate that was used for the risk analysis. All constituent components of contingency were separated into explicit risk events and documented in the risk register developed during the review.

During the review, a risk register was created and risk events were identified for the project. The purpose of the risk register is to identify significant cost and schedule risks in the estimate. The review team identified and discussed risks to the project in terms of threats and opportunities. For purposes of this review, a threat is a risk event that can add to the cost and/or schedule of the project and an opportunity is an event that can reduce the cost and/or shorten the schedule.

Risk events are quantified by likelihood of the occurrence and impact if it occurs. For example, the review team identified that there is potential for additional project cost related to design development and coordination with Conrail for the Travis Bridge Overpass. The review team identified a 90% likelihood that additional cost would be realized to address issues related to this risk. Additionally, if the risk event occurred there would be a most likely additional cost to the project of $6.5 million and a minimum and maximum cost of $5 million and $8 million, respectively. Figure 7 shows the binomial distribution used to model the likelihood of occurrence and Figure 8 shows the triangular distribution used to define how the cost impact was modeled in the simulation.

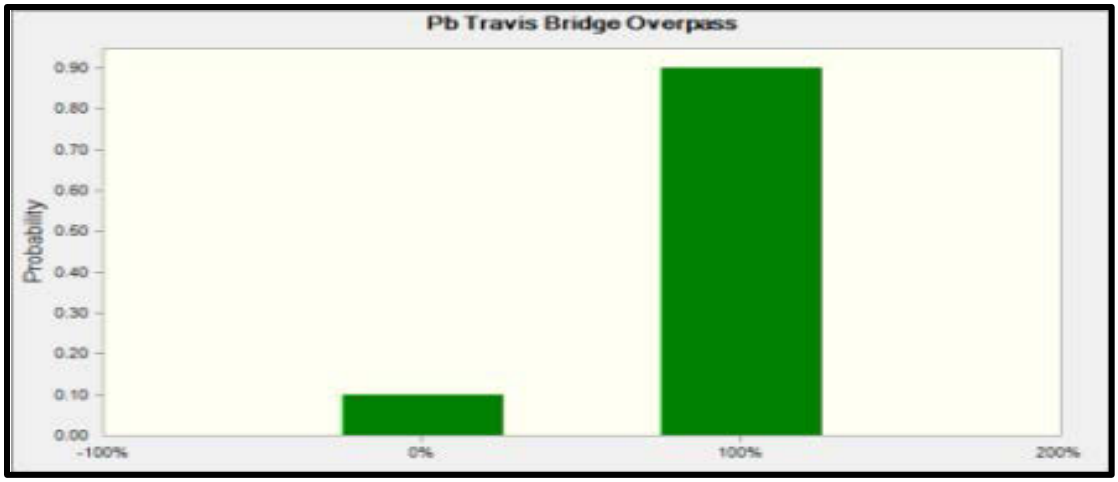


Figure 7 Example of Binomial Distribution for a Project Risk's Likelihood of Occurrence

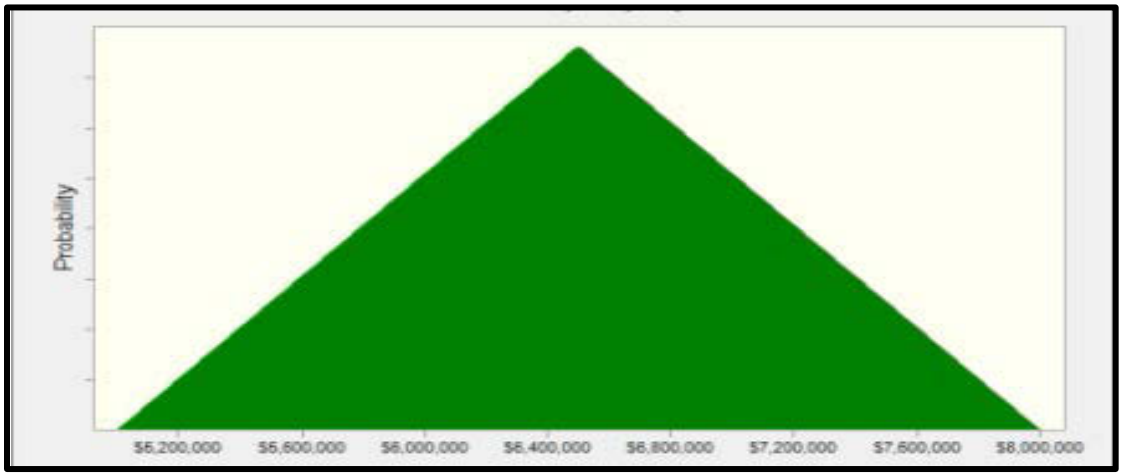


Figure 8 Example of Triangular Distribution for a Project Risk's Cost Impact

All risk events identified during the review are reported in Tables 8, 9, 10 and 11.

Table 8 Cost Threats

Phase	Event Risk Name	Description of Risk Event	Probability	Minimum Cost	Most Likely Cost	Maximum Cost
Developer	Design Growth	Accounts for additional scope due to further developed design. Ranges from 1% to 3% with most likely of 2% of construction costs.	50%	$5.8M	$11.6M	$17.5M
Developer	Project Contingency	Accounts for cost of less significant risk identified during the review. These costs may be related to bulkhead rehabilitation, flagging cost, separation of sidewalk and roadway drainage, additional hazardous material investigation, and owner changes.	75%	$2M	$5M	$8M
Developer	Protective Fencing	Accounts for recently implemented policy that requires incorporation of fencing with higher height. Recent estimates are $7 million for galvanize or $28 million for stainless steel for four runs of fencing. Unit prices for fencing on George Washington Bridge were referenced. Additional cost related to bridge design to accommodate fencing is negligible.	95%	$5M	$7M	$10M
Developer	Travis Bridge Overpass	Additional cost related to design development and coordination with Conrail. Cost of heavy steel may be the largest driver of uncertainty.	90%	$5M	$6.5M	$8M
Developer	Utility Contingency	Accounts for relocation of residential utilities, discovery of unknown utilities, and issues with TRANSCO	50%	$0.25M	$0.5M	$1M
PANYNJ	ROW Compensation Events	Accounts for delay caused to Developer for required parcels not being available related to negotiations and relocations issues. Cost impacts include construction disruption such as multiple mobilizations and out of sequence construction.	15%	$1M	$3M	$5M
PANYNJ	ROW Contingency	Additional costs associated with delays, contractual, and condemnation issues related to ROW.	100%	$15M	$25M	$25M
PANYNJ	Utility Compensation Events	Accounts for PANYNJ contingency for compensation events related to utilities, i.e. breach of master utility agreement by utility.	25%	0	$5M	$25M

Table 9 Cost Opportunities

Phase	Event Risk Name	Description of Risk Event	Probability	Minimum Cost	Most Likely Cost	Maximum Cost
Developer	P3 Procurement Developer Innovation/ Refinement	Potential savings due to innovation and refined design from developer proposals. For example, design loads may be reduced with additional investigations to provide better understanding of geotechnical issues and required methods (drill shafts versus piles). Illustrative estimate assumes more robust design due to wetland mitigation and lateral spread so savings may be realized in foundations, i.e. number of shafts, pile caps. These savings may range from 25-50% of foundation cost for approach spans.	100%	$25M	$50M	$70M

Schedule Analysis

The project is currently anticipated to be complete in September 2018. The review identified risk that would impact the project's critical path schedule. Tables 10 and 11 highlight the schedule risks that were identified during the review. Figure 5 shows the results of the probabilistic results of the schedule analysis. A completion date of February 2019 was forecasted at the 70th percentile confidence level.

Table 10 Schedule Threats

Phase	Event Risk Name	Detailed Description of Risk Event	Probability	Minimum Duration (mo.)	Most Likely Duration (mo.)	Maximum Duration (mo.)
Developer	ROW Compensation Events	Accounts for delay caused to Developer for required parcels not being available related to negotiations and relocations issues.	15%	12	24	36
Developer	Schedule Delay	Accounts for cumulative delay associated with coordination for railroads, TIFIA Loan, FHWA requirements, and third-party review/approval, permitting.	60%	1	2	6

Table 11 Schedule Opportunities

Phase	Event Risk Name	Detailed Description of Risk Event	Probability	Minimum Duration (mo.)	Most Likely Duration (mo.)	Maximum Duration (mo.)
Developer	P3 Procurement Early Completion	Accounts for potential of earlier completion of work due to construction sequencing selected by developer.	50%	1	3	3

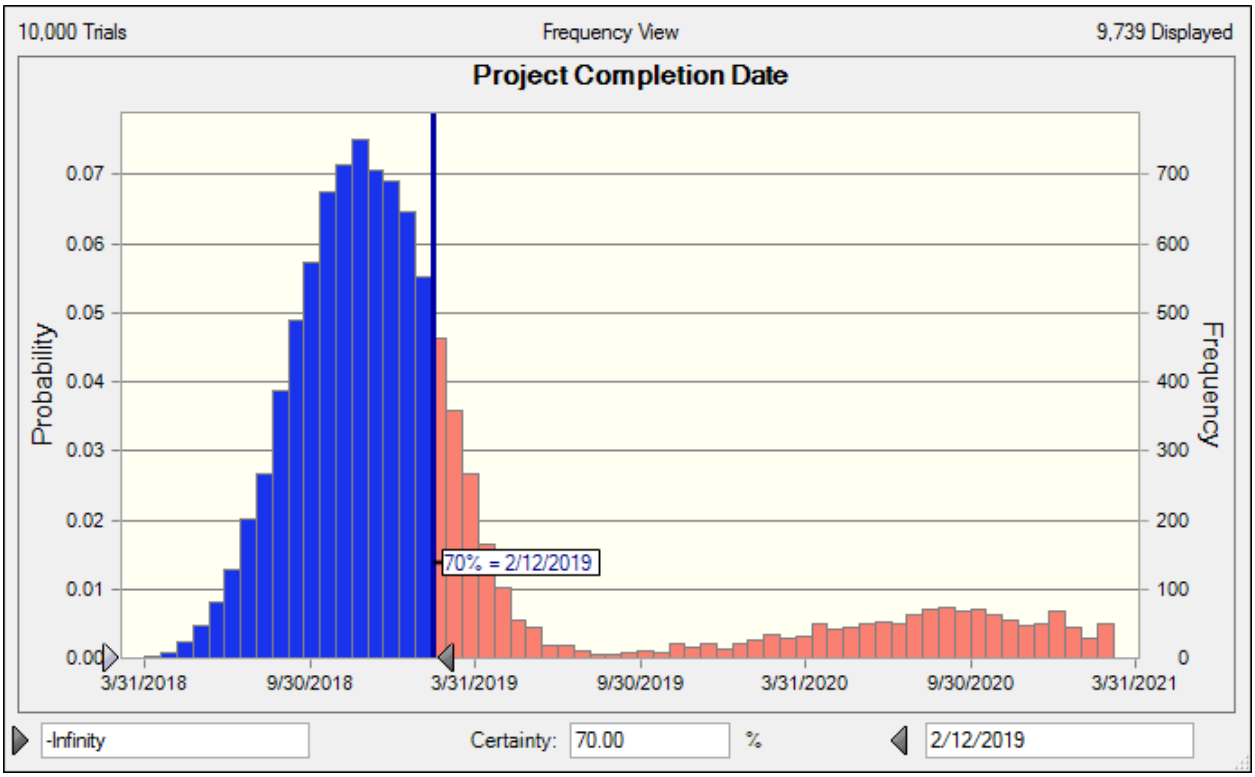


Figure 9 Probable Range of Project Completion Date

Base Variability

Base variability captures the variability and uncertainty inherently associated with the cost estimating process. Based on feedback from the project team and subject matter experts about the level of design for the illustrative design used to develop the estimate, estimating trends for PANYNJ, and experiences estimating similar projects, the base variability for the estimate was determined to be +/-15% for the Developer costs. Additionally, it should be noted that the feedback from the project team utilized information from previous risk assessments. The base variability for PANYNJ agency costs was modeled at +/-5% based on its history of agency administrative and overhead costs associated with delivering capital projects as well as oversight costs based on the anticipated management program for the project during the design and construction activities.

Market Conditions

The primary reason for modeling market conditions are to reflect the uncertainty associated with the bidding environment. These discussions consider the potential number of bidders on project contracts and the large amount of resources that will be required to deliver the project.

Other factors considered were labor and material availability and the influence of other large projects scheduled to be advertised in the same timeframe. A major factor in this discussion for the Goethals Bridge Replacement project is the P3 procurement being utilized and that currently there are three teams shortlisted and submitting interim proposals.

Based on recent interactions with the shortlisted proposer teams, the project team determined that it was appropriate to model market conditions as having a 50% likelihood of cost being up to 5% better than planned. This accounted for the apparent good competition reflected by the number of proposers, the use of low cost selection for the P3 contract, and the project's status as first P3 in region. The model also reflected that there is no possibility of worse than planned cost due to the seemingly adequate availability of materials and labor in the region. Also, because of the characteristics and schedule of the project, the project team did not foresee major conflicts with other projects in the region. From these assumptions, it follows that the model assumes that there is a 50% likelihood that cost will be as estimated by the project team.

Inflation

Table 8 shows the inflation rates used in the model. These rates are from an August 2011 policy memo issued by the PANYNJ Planning and Regional Development Department. The rates are based on the New York City Construction Cost Index Inflation Forecast. Additionally, due to the uncertainty of inflation, the review team modeled the annual inflation factor as having a variability of +/-1% each year. No inflation was applied to the PANYNJ agency cost because the build-up of staff costs used YOE dollars. Based on these assumptions for inflation, approximately $137 million of the total project cost in YOE can be attributed to inflation.

Table 8 Assumptions for Inflation Rates

Analysis Year	2012	2013	2014	2015	2016	2017
Inflation %	3.9%	2.8%	5.4%	3.5%	2.7%	2.6%

CONCLUSION

Based on the assumptions and risks discussed during this review, the cost estimate at the 70% confidence level was $1.115 billion (YOE). This baseline is typically identified in the project's initial financial plan to show that adequate funding is available to construct the project. However, this estimate is a snapshot in time and is expected that through further project development, such as the on-going procurement activities, the estimate will change. The initial financial plan should detail any changes in the project estimate. It is highly recommended that

these costs be used in any project information conveyed to the public. Appendix C includes the entire report of inputs and results of this probability analysis.

Goethals Bridge Replacement

Staten Island, New York, and

Elizabeth, New Jersey

FHWA Cost Estimate Review

Opening Presentation

November 27, 2012

THE PORT AUTHORITY OF NY & NJ

DEPARTMENT OF TRANSPORTATION UNITED STATES OF AMERICA

Cost Estimate Review
Objective

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

Goethals Bridge Replacement

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

Policy Directives

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

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

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

THE PORT AUTHORITY OF NY & NJ

CERs & Financial Plans

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

CERs & MAP-21

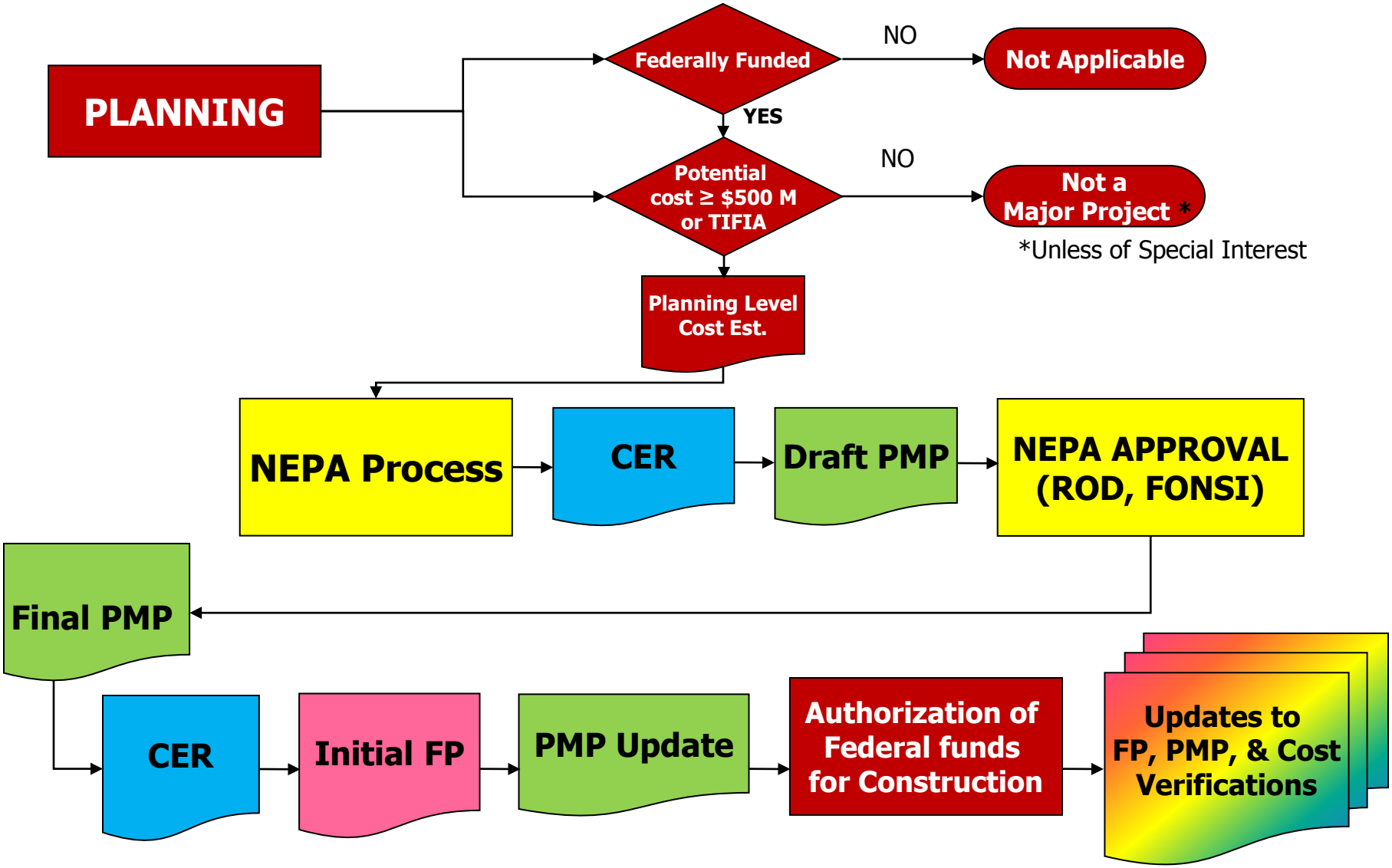
- Phasing Plans
  - Is funding available to construct the entire project as defined in the NEPA document?
  - MAP-21 allows project sponsors to show full funding in the financial plan for portions of the project that can be opened to public and effectively operate without having full funding for the entire project, i.e. fundable incremental improvements
  - CERs should evaluate the cost estimate and schedule for each phase to be identified in the financial plan

CERs & MAP-21 (cont.)

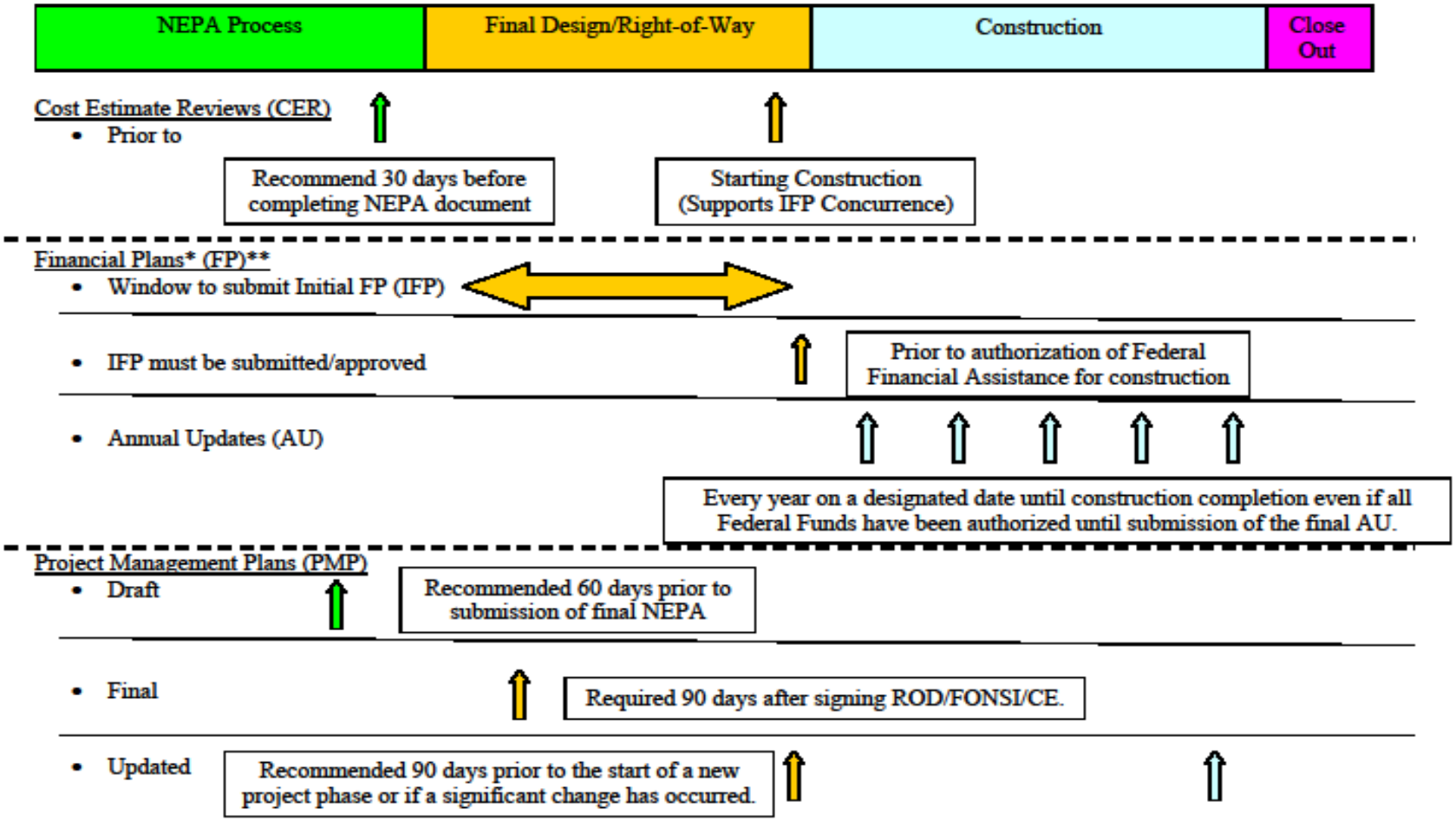
- P3 Assessment
  - All financial plans must assess the appropriateness of a P3 to deliver the project
  - All CERs should include discussions as to whether:
    1. P3 or traditional procurement could more effectively leverage the revenue stream
    2. Current state-level legislative authority for P3s
  - For projects being procured as P3s, CERs must include an analysis of the allocation of risks with respect to delivering the project through a P3
  - For projects with phasing plans, an assessment must be included for each funded phase

THE PORT AUTHORITY OF NY & NJ

Basic Major Project Process



Major Project Deliverable Timeline



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

FHWA Major Project Resources

FHWA Innovative Program Delivery Office

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

- *FHWA MAP-21 Interim Guidance,* September 2012
- *FHWA Final Major Project Guidance*, January 2007
- *Major Project Program Cost Estimating Guidance*, January 2007
- *Financial Plan Guidance*, January 2007
- *Project Management Plan Guidance*, January 2009
- *Operational Independence and Non-Concurrent Construction Guidance*, December 2009
- Active Major Project Monthly Status (FOIS Output)

Review Agenda

Goethals Bridge Replacement
November 27-29, 2012
8:00 am – 4:30 pm
225 Park Avenue South New York, NY

Tuesday, November 27th

- Site Visit
- CER Introduction by FHWA
- Project Overview and Scope of Work
- Overview of Estimate and Assumptions
- Project Relief and Compensation Events Discussion
- Discussion of Market Conditions

Review Agenda (cont.)

Wednesday, November 28th

- Review of Previously Identified Risks
- Identification of Items Not Included in Previous Risk Assessment
- Technical Focus – Substructure & Main Span
- Technical Focus – Approaches & Miscellaneous
- Technical Focus – Existing Bridge Demolition
- Review of Soft Costs
- Review and Finalize Risk Register Details

Thursday, November 29th

- Reassessment of Primary Risks
- Review and Finalize Risk Register
- CER Team Working Session
- CER Closeout Presentation

Basis of Review

- Review based on estimates provided by the Team in advance with revisions made during the review
- Review to determine the reasonableness of assumptions used in the estimate
- Not an independent FHWA estimate
  - Did not verify quantities and unit prices
  - Goal is to verify accuracy and reasonableness of estimate

Risk-based Probabilistic Approach

Review Participants

- FHWA
  - Division Office
  - Headquarters Project Delivery Team
- Port Authority of NY & NJ
- Consultants

Pre-Review Webinar

Wednesday, November 14, 2012

- Introduction to FHWA CER process
- Project background
- Overview of Project Estimate
- Risk analysis
- CER Logistics

Documentation Provided

- Project Cost Estimate
- Project Schedule
- Project Risks
  - Risk Register
  - July 2011 Risk Report
- Project Website
  - August 2010 Final Environmental Impact Statement
  - January 2011 Record of Decision
- Request for Proposals
- Draft Project Management Plan

Review Baseline

Total Cost (2011)*: $1,012 million

Total Cost (YOE)*: $1,144 million**

*Includes $48.2 million in prior costs

**Assumes annual inflation rate between 2.0% and 5.4%

Project Completion Date: September 2018

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Review Methodology

Verify

- Major cost elements
- Allowances/contingencies
- Adjust estimate as necessary

Model

- Base variability
- Market conditions and inflation
- Risk events (cost, schedule, probability, impact, relationships)
- Monte Carlo simulation

Communicate

- Closeout Presentation
- Final report
- Issuance of NEPA Decision Document
- Approval of finance plan

CER Concepts – Uncertainty

"We know it is going to happen"

Known Knowns

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

Known Unknowns

(ALLOWANCES)

Unknown Knowns

(RISK REGISTER/CONTINGENCY)

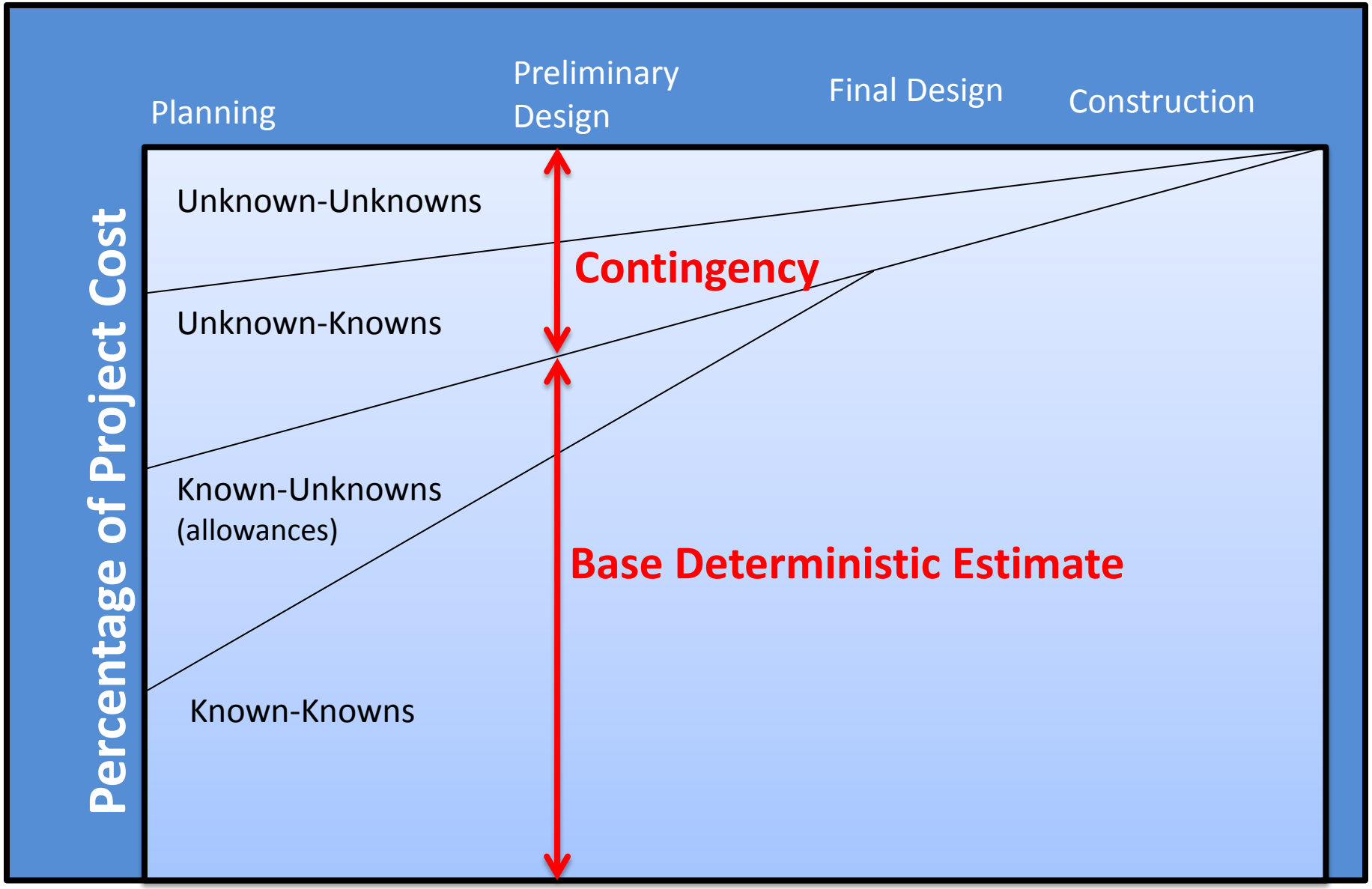
"It might happen, but at least we know about it"

Unknown Unknowns

"We didn't see that coming!"

CER Concepts – Uncertainty (cont.)

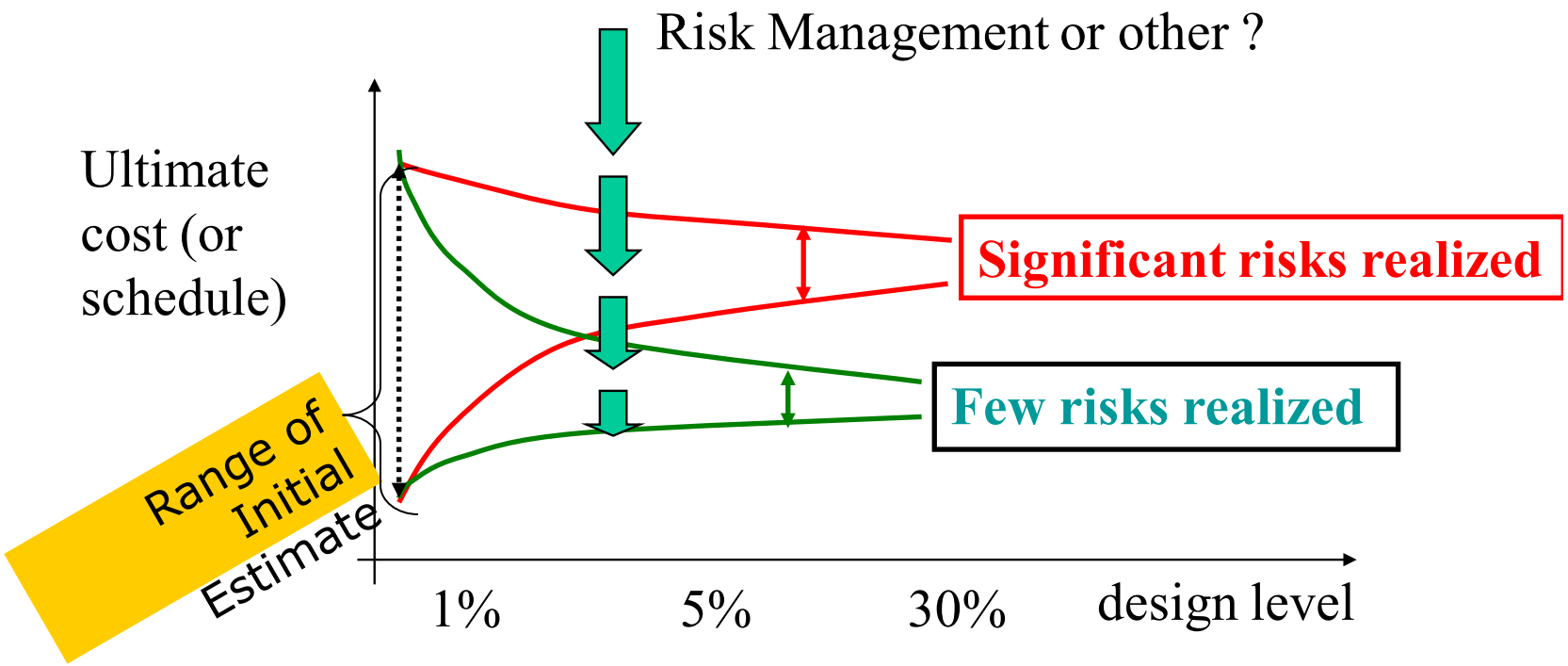
Principle 1 - Components of Cost Uncertainty



CER Concepts – Uncertainty (cont.)

Principle 2 – The Evolution of Uncertainty

Uncertainty Decreases with Design Development



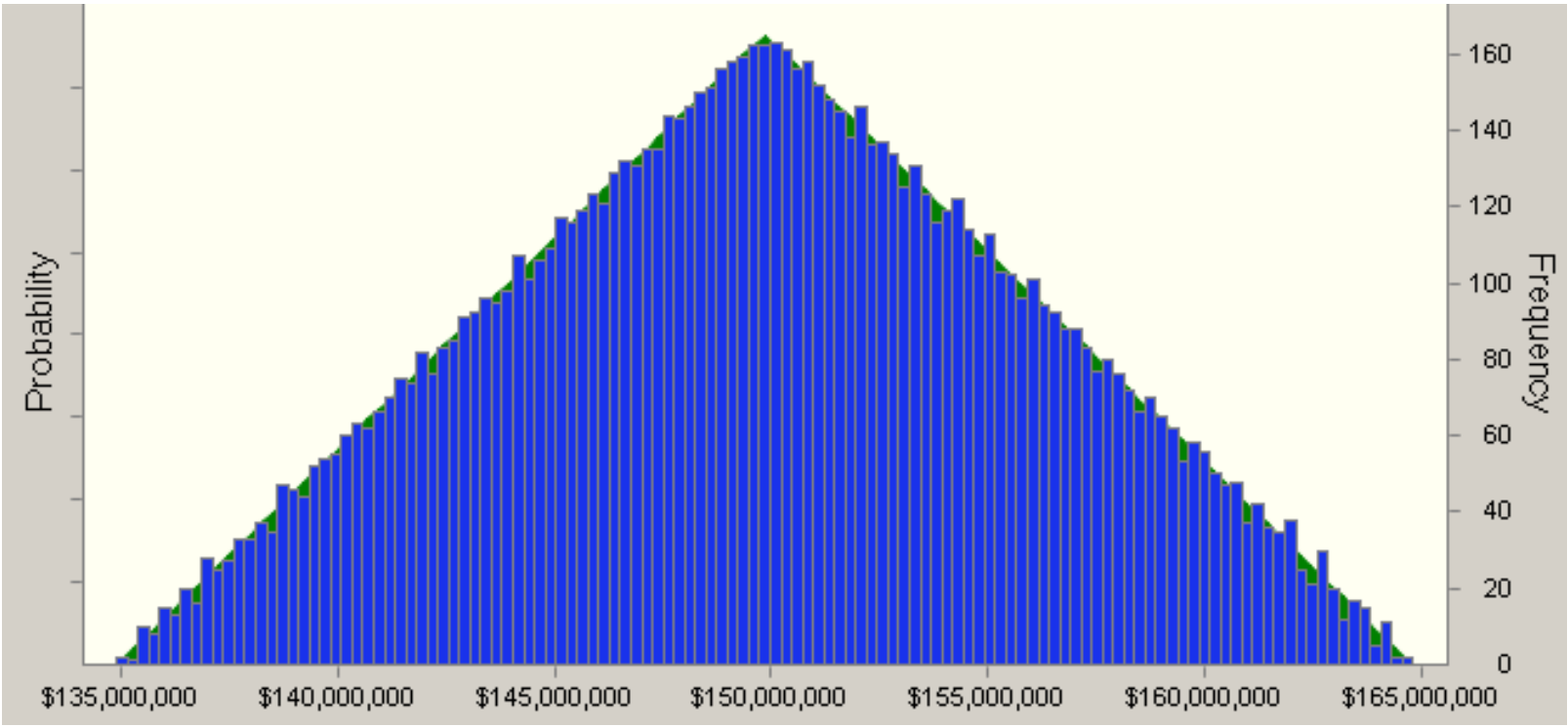
CER Concepts

Uncertainty = Base Variability + Risks

- Base Variability – inherent uncertainty not caused by risk events
  - Function of level of design & estimation process
- Risks – an uncertain event or condition that if it occurs has a negative or positive effect on project's objectives
  - Threats – negative impacts
  - Opportunities – positive impacts
  - Impacts project cost and/or schedule

CER Inputs – Base Variability Example

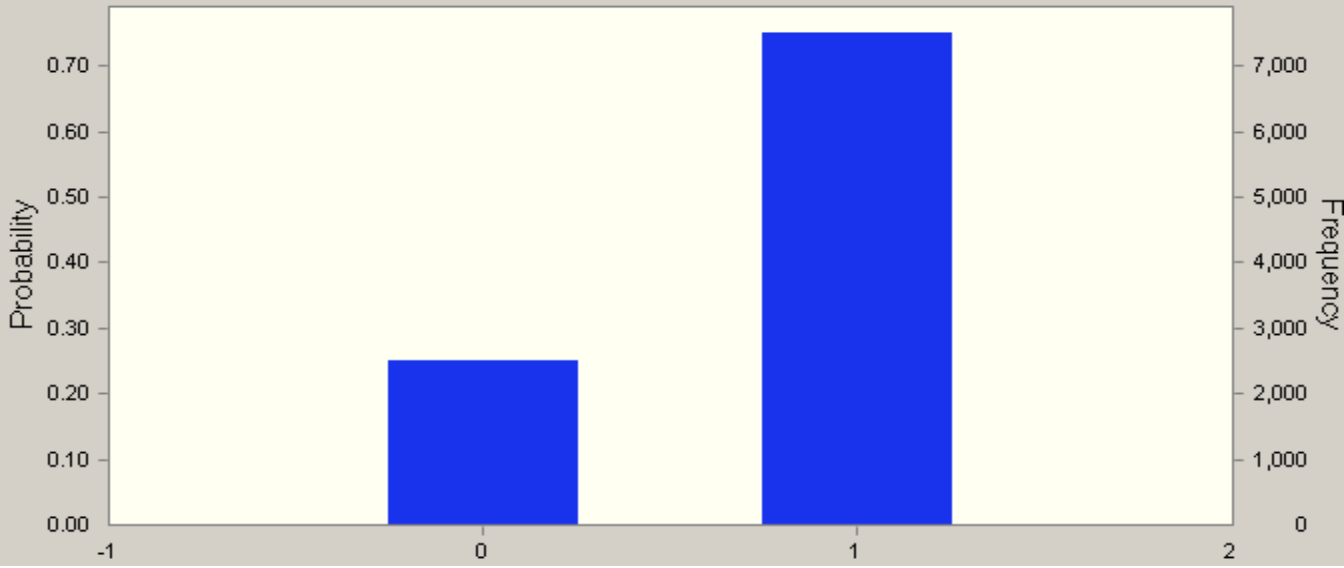
STRUCTURES



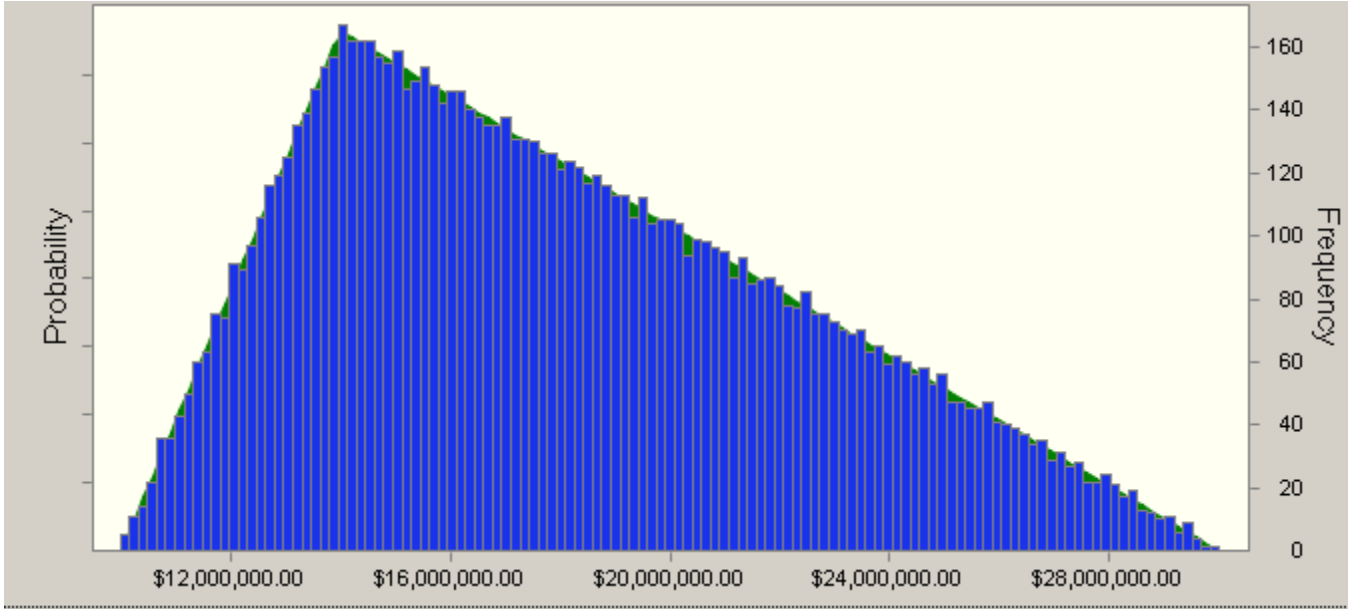
Triangular Distribution
Most Likely - $150 M
Minimum – $135 M
Maximum - $165 M

CER Inputs – Risk Example

Likelihood of Occurrence
75%



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



How do we Model Uncertainty in a Risk-Based Estimate?

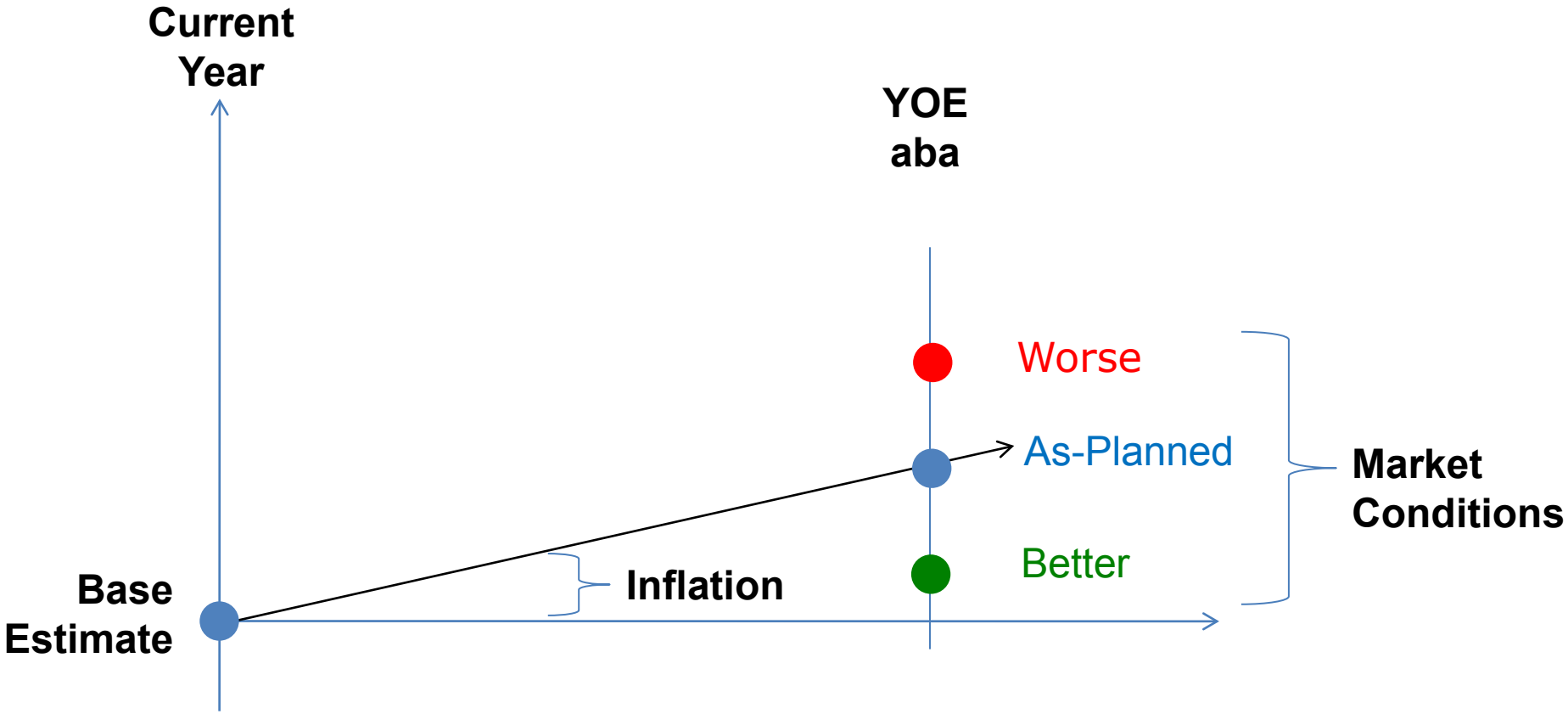
- Base Estimate
  - Base variability
  - Construction Contingency
  - Allowances
- Risk Register
  - Risk Events (Threats and Opportunities)
  - Aggregate Minor Risks
  - Aggregate Unidentified Risks
  - Global (Projectwide) Project risks

CER Concepts

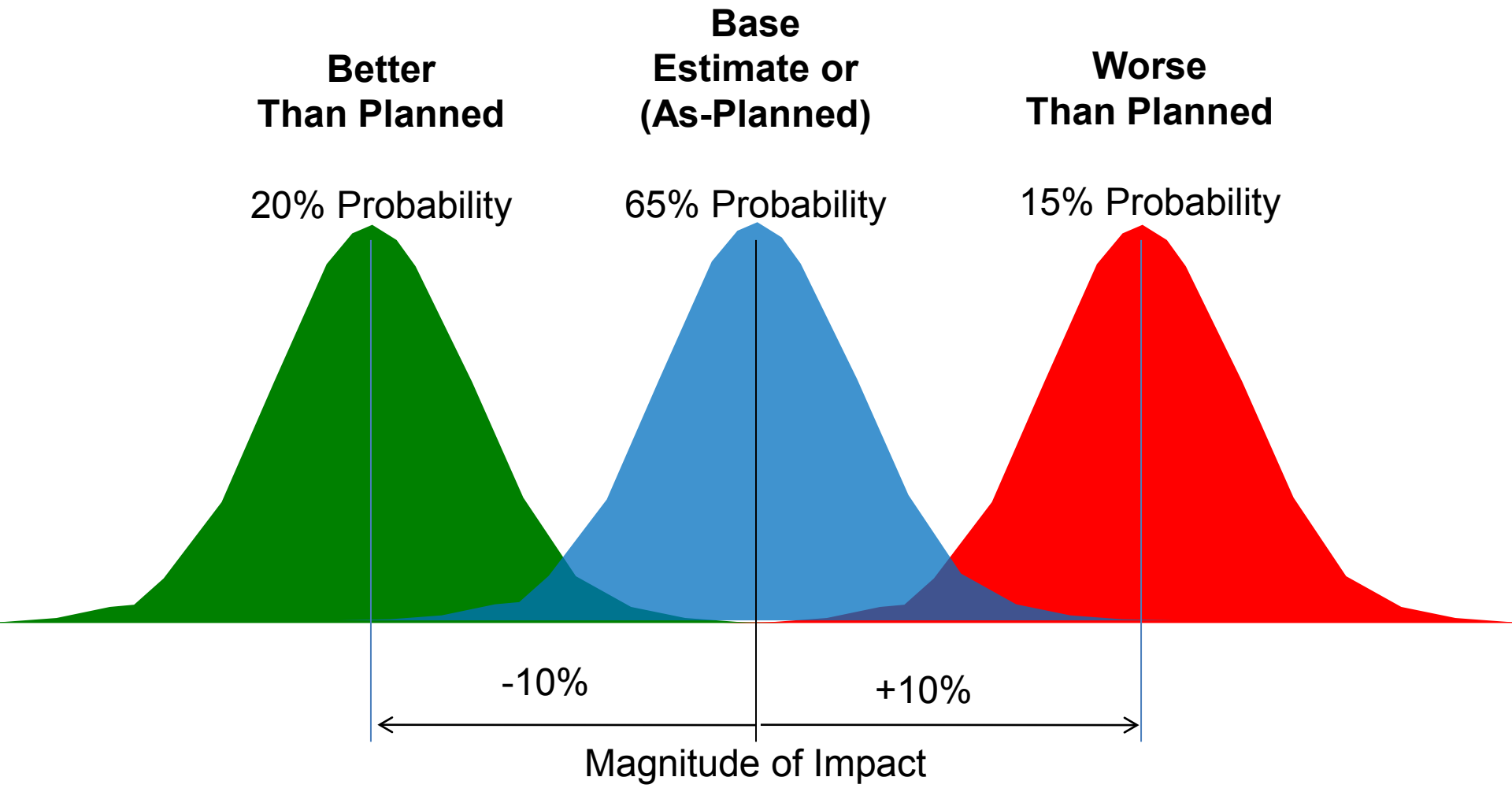
- Inflation – increase in price over time
- Market Conditions – consequence of supply and demand factors which determine prices in a market economy
  - bidding environment at time of letting, i.e. number of bidders, available labor

The base estimate is adjusted to account for inflation and market conditions at the time of letting

Conceptual Overview of Inflation & Market Conditions



Market Conditions



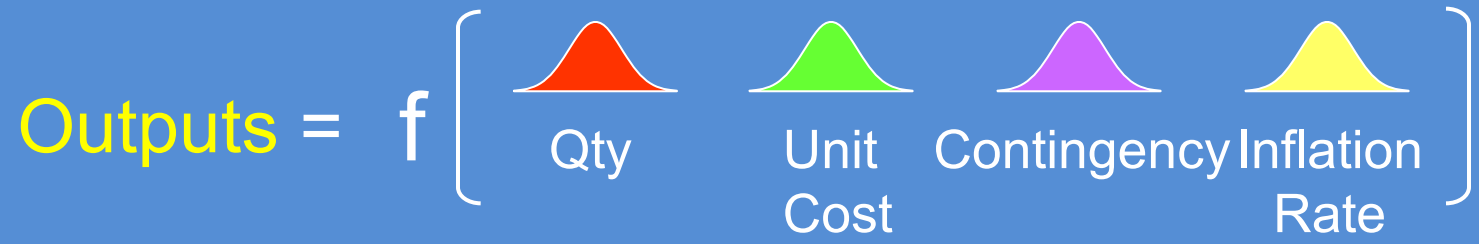
CER Concepts

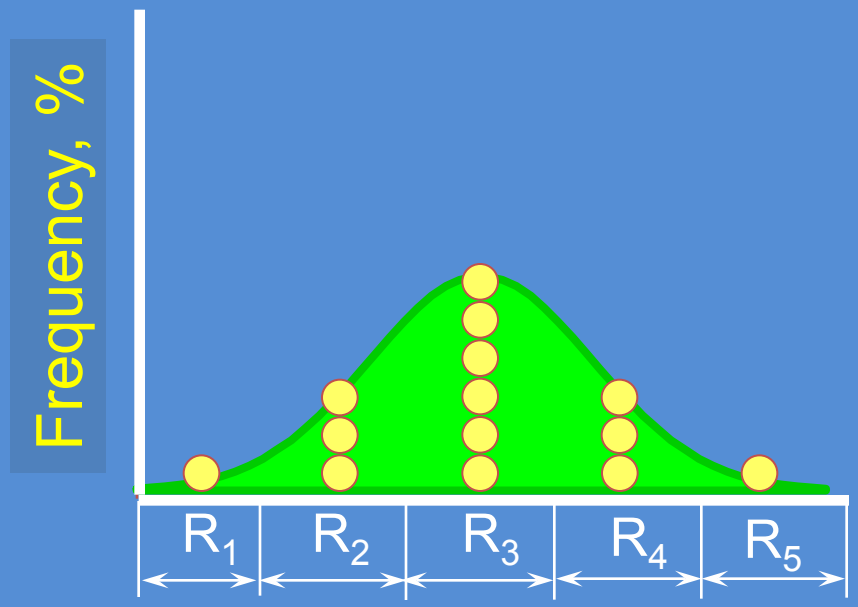
- Escalation – changes in price levels driven by project characteristics and underlying economic conditions
  - Includes the effects of, but differs from, inflation
  - Causes
    - Scope changes
    - Delivery/Procurement Approach
    - Engineering/Construction Complexities
    - Poor Estimating
  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

Monte-Carlo Simulation

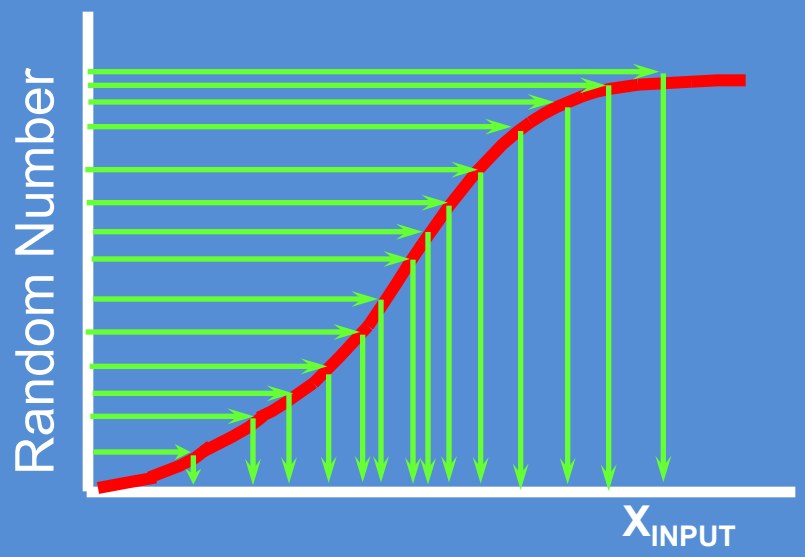
Random Numbers and Outputs

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





Outputs: Binned Results

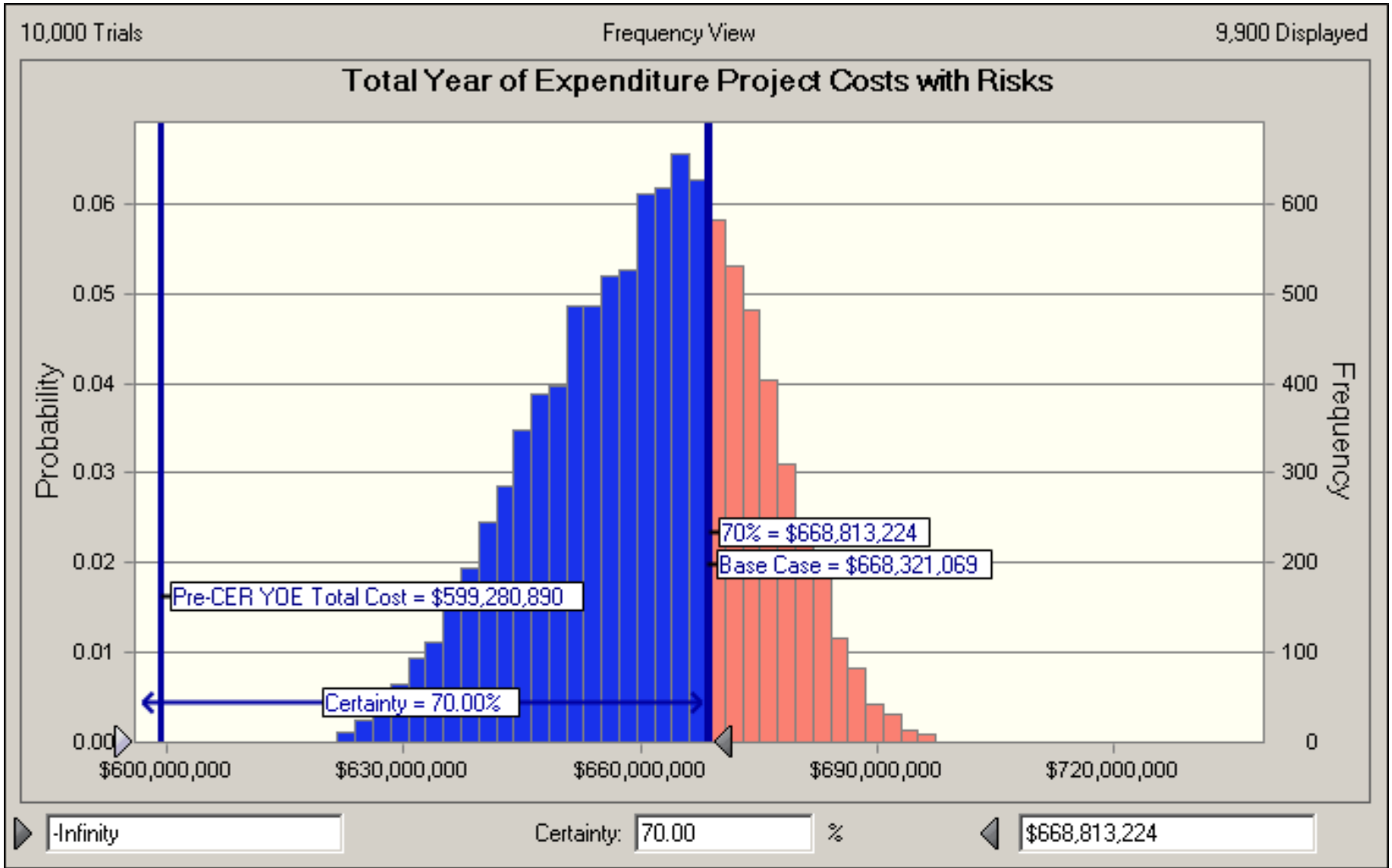


Inputs: Sampled Values

CER Outputs

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

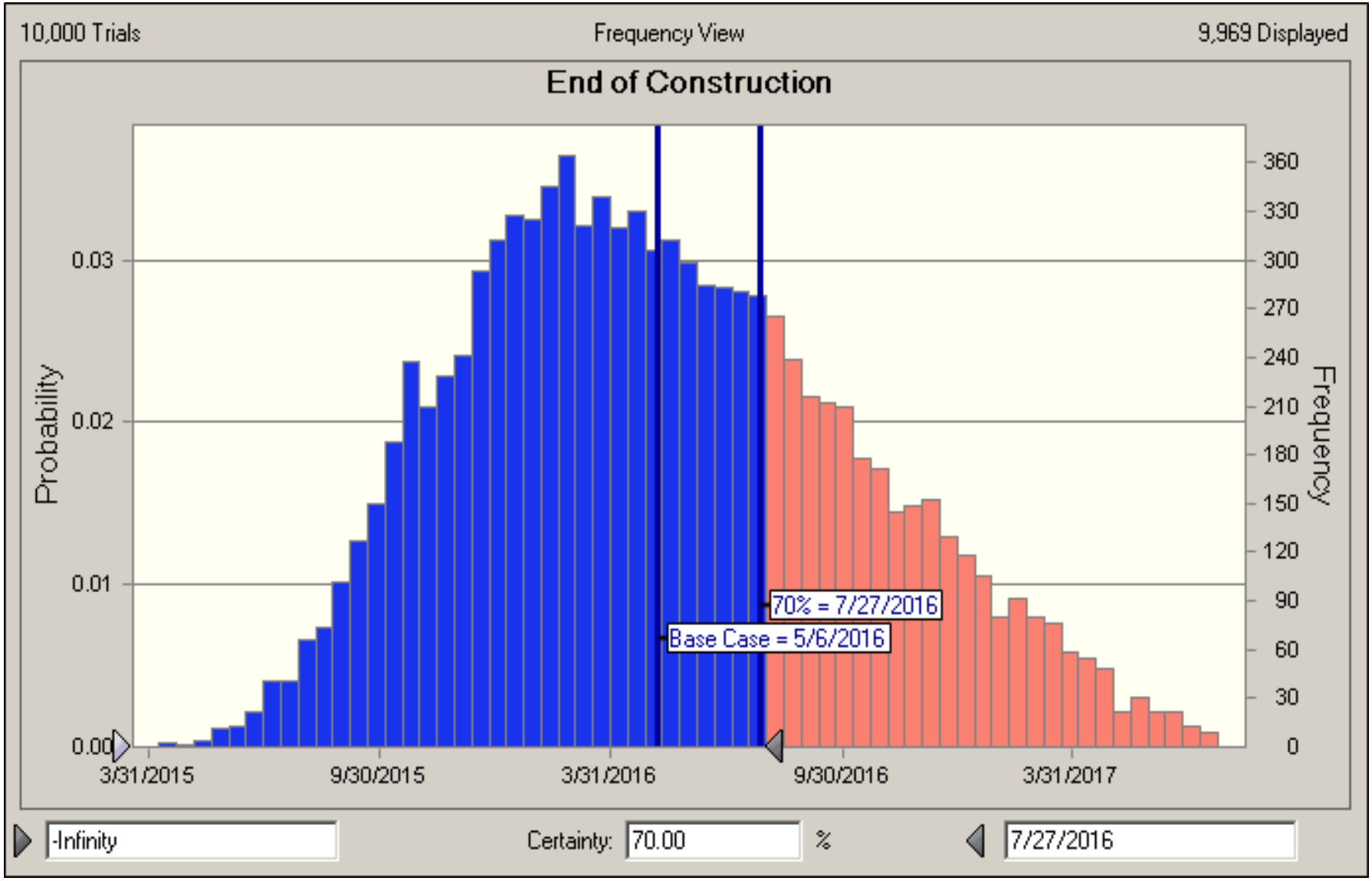
CER Outputs - Cost Forecast Example



CER Outputs - Cost Forecast Example

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

CER Outputs - Schedule Forecast Example

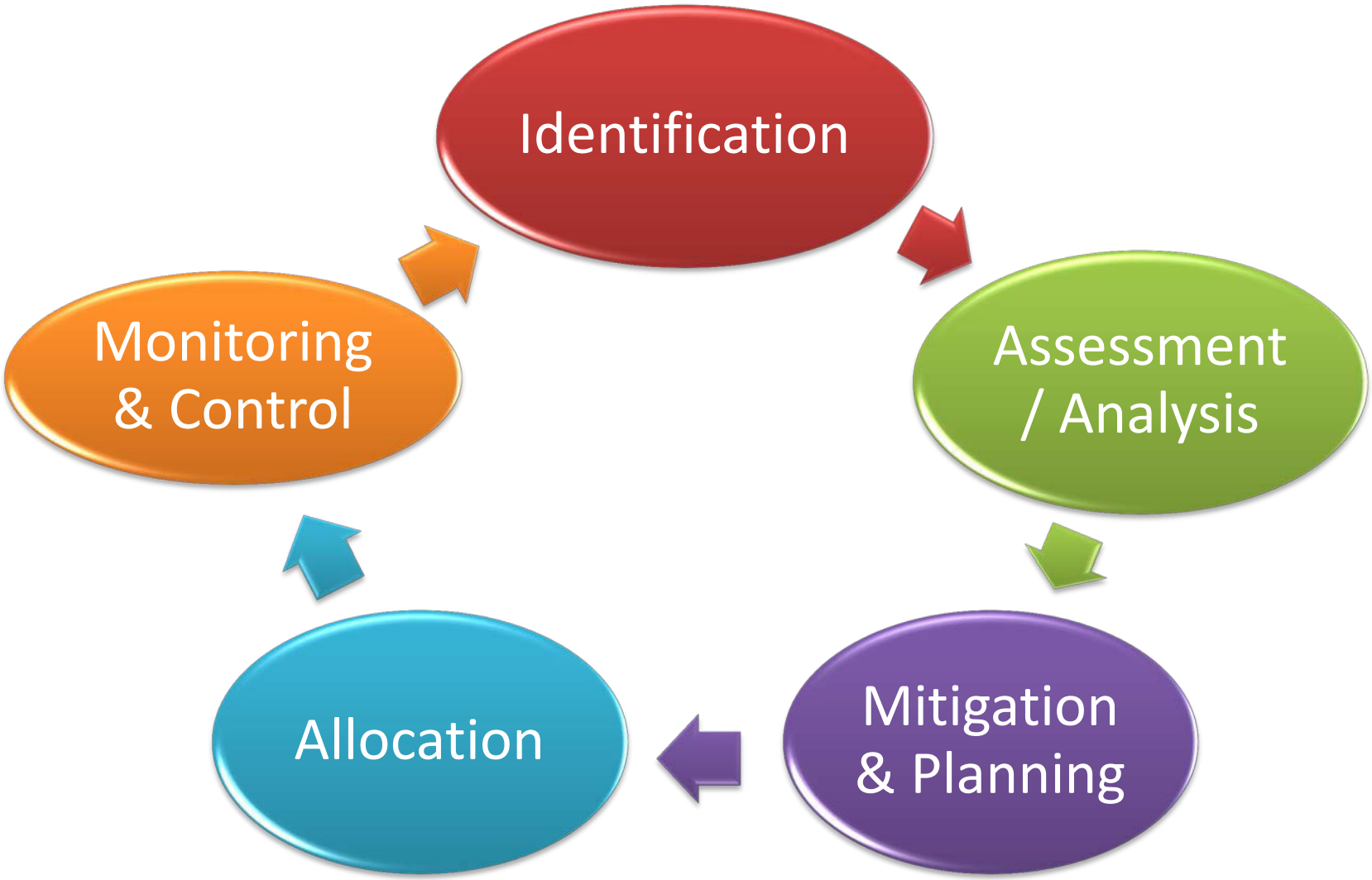


CER Outputs - Risk Register

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

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

Risk Management Process



CER Next Steps

- FHWA will prepare a final report documenting review findings.
  - Draft report for review within 30 days
  - Draft report will be e-mailed to Division Office
  - Division Office will review the draft and forward it to the Project Team
  - Final report issued within 30 days after receipt of comments
  - Final report forwarded to the Division Office for distribution to the Project Team
- FHWA uses the results as the official cost estimate for the project (NEPA, IFP, reporting)
- Estimate review is a snapshot of the current estimate

Goethals Bridge Replacement

Questions?

THE PORT AUTHORITY OF NY & NJ

DEPARTMENT OF TRANSPORTATION
UNITED STATES OF AMERICA

Crystal Ball Report - Full

Simulation started on 1/11/2013 at 2:36 PM
Simulation stopped on 1/11/2013 at 2:37 PM

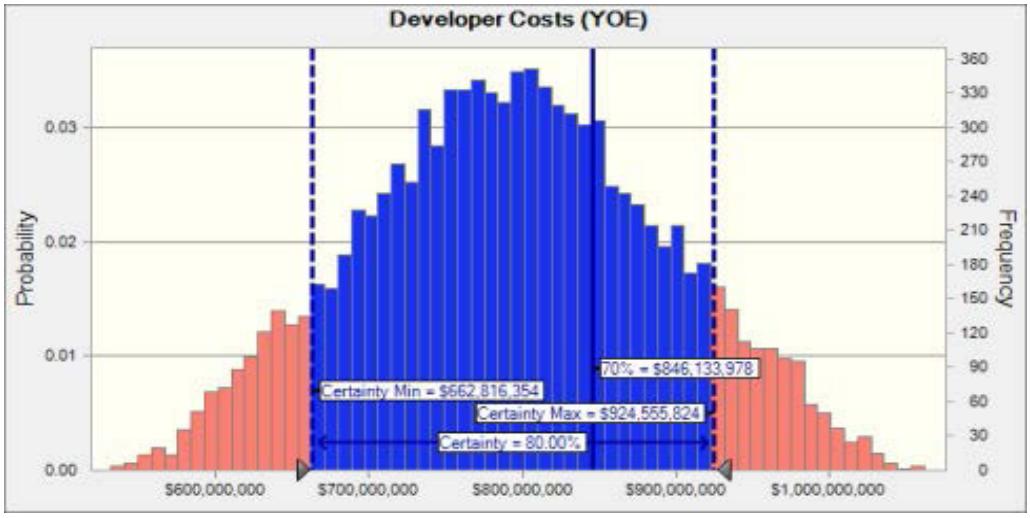
Run preferences:	
Number of trials run	10,000
Monte Carlo	
Random seed	
Precision control on	
Confidence level	95.00%
Run statistics:	
Total running time (sec)	56.94
Trials/second (average)	176
Random numbers per sec	7,376
Crystal Ball data:	
Assumptions	42
Correlations	0
Correlated groups	0
Decision variables	0
Forecasts	7

Forecasts

Worksheet: [NY Goethals Bridge CER Template FINAL.xlsm]YOE

Forecast: Developer Costs (YOE) **Cell: C17**

Summary:
Certainty level is 80.00%
Certainty range is from $662,816,354 to $924,555,824
Entire range is from $532,516,582 to $1,061,332,978
Base case is $811,023,287
After 10,000 trials, the std. error of the mean is $978,265



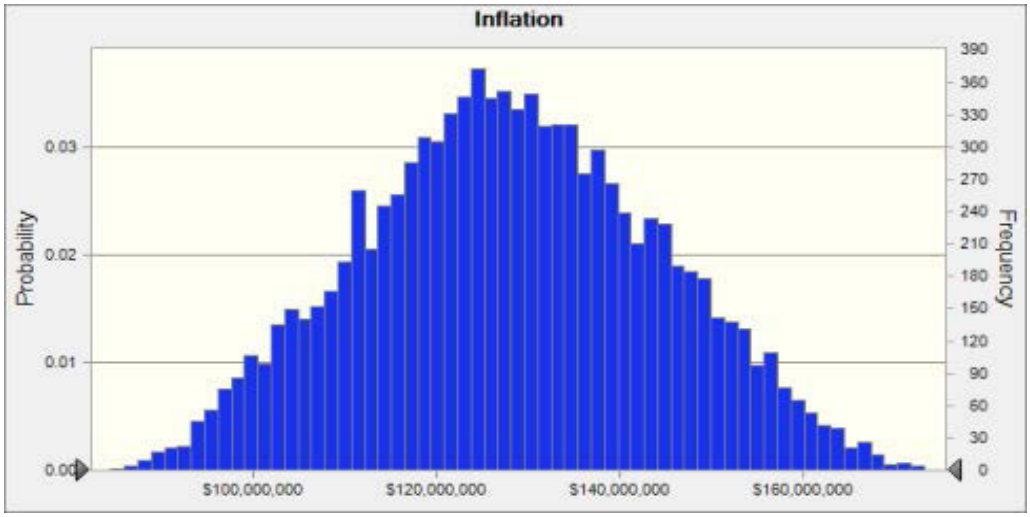
Statistics:	Forecast values
Trials	10,000
Base Case	$811,023,287
Mean	$793,486,251
Median	$793,067,219
Mode	---
Standard Deviation	$97,826,538
Variance	$9,570,031,593,047,340
Skewness	0.0206
Kurtosis	2.50
Coeff. of Variability	0.1233
Minimum	$532,516,582
Maximum	$1,061,332,978
Range Width	$528,816,396
Mean Std. Error	$978,265

Forecast: Developer Costs (YOE) (cont'd) **Cell: C17**

Percentiles:	Forecast values
0%	$532,516,582
10%	$662,816,354
20%	$707,566,654
30%	$739,571,933
40%	$767,359,575
50%	$793,065,838
60%	$818,408,368
70%	$846,133,978
80%	$880,242,251
90%	$924,555,824
100%	$1,061,332,978

Forecast: Inflation **Cell: C13**

Summary:
Entire range is from $84,482,330 to $176,275,033
Base case is $129,813,217
After 10,000 trials, the std. error of the mean is $161,188



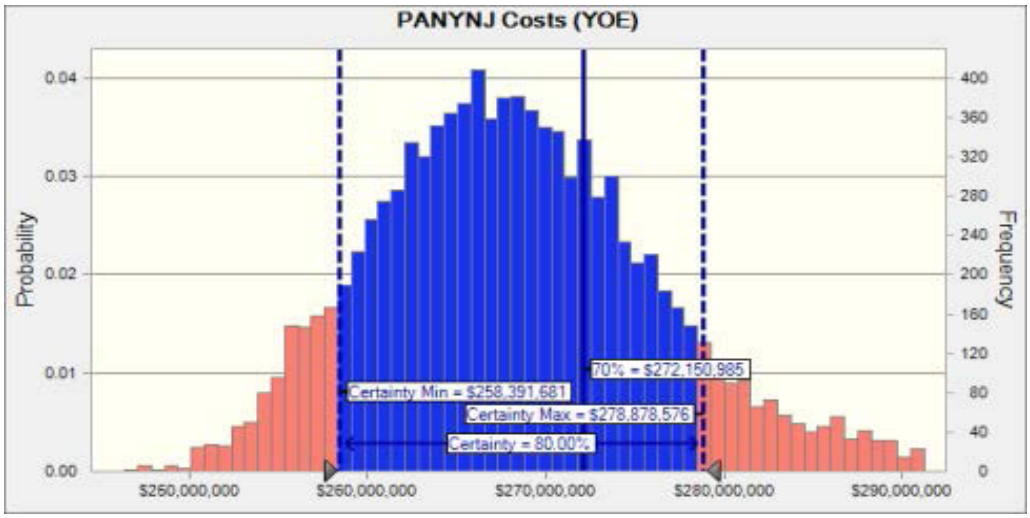
Statistics:	Forecast values
Trials	10,000
Base Case	$129,813,217
Mean	$128,102,957
Median	$127,785,406
Mode	---
Standard Deviation	$16,118,753
Variance	$259,814,203,034,535
Skewness	0.0510
Kurtosis	2.53
Coeff. of Variability	0.1258
Minimum	$84,482,330
Maximum	$176,275,033
Range Width	$91,792,704
Mean Std. Error	$161,188

Forecast: Inflation (cont'd) **Cell: C13**

Percentiles:	Forecast values
0%	$84,482,330
10%	$106,652,764
20%	$113,937,313
30%	$119,205,787
40%	$123,702,267
50%	$127,783,720
60%	$132,046,231
70%	$136,825,629
80%	$142,571,964
90%	$149,662,187
100%	$176,275,033

Forecast: PANYNJ Costs (YOE) **Cell: C16**

Summary:
Certainty level is 80.00%
Certainty range is from $258,391,681 to $278,878,576
Entire range is from $245,613,437 to $300,159,536
Base case is $270,452,300
After 10,000 trials, the std. error of the mean is $81,438



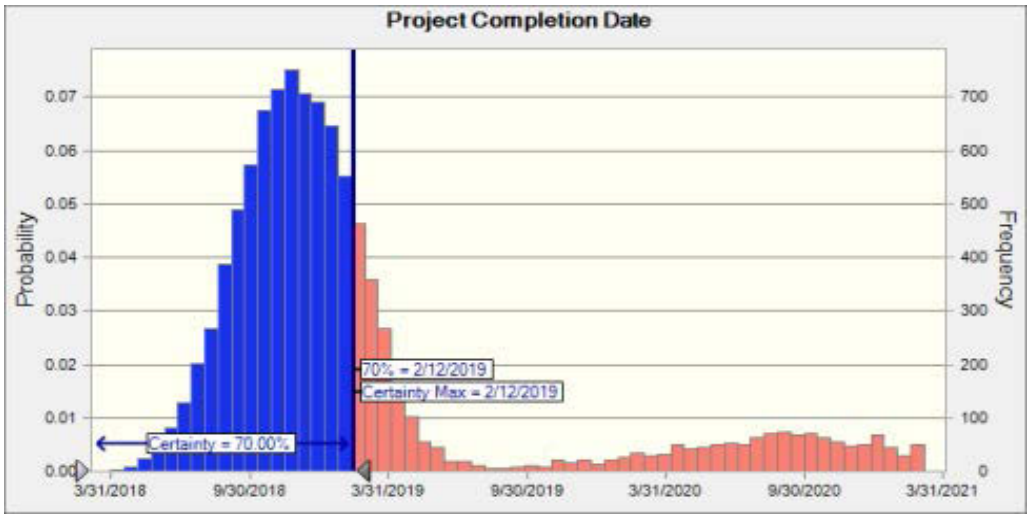
Statistics:	Forecast values
Trials	10,000
Base Case	$270,452,300
Mean	$268,427,804
Median	$267,879,416
Mode	---
Standard Deviation	$8,143,825
Variance	$66,321,887,402,157
Skewness	0.4887
Kurtosis	3.34
Coeff. of Variability	0.0303
Minimum	$245,613,437
Maximum	$300,159,536
Range Width	$54,546,099
Mean Std. Error	$81,438

Forecast: PANYNJ Costs (YOE) (cont'd) **Cell: C16**

Percentiles:	Forecast values
0%	$245,613,437
10%	$258,391,681
20%	$261,528,456
30%	$263,857,370
40%	$265,895,072
50%	$267,878,755
60%	$269,857,643
70%	$272,150,985
80%	$274,781,971
90%	$278,878,576
100%	$300,159,536

Forecast: Project Completion Date **Cell: C14**

Summary:
Certainty level is 70.00%
Certainty range is from -Infinity to 2/12/2019
Entire range is from 4/1/2018 to 1/14/2022
Base case is 1/16/2019
After 10,000 trials, the std. error of the mean is 2.58



Statistics:	Forecast values
Trials	10,000
Base Case	1/16/2019
Mean	3/13/2019
Median	12/18/2018
Mode	---
Standard Deviation	258.27
Variance	66,704.59
Skewness	1.86
Kurtosis	5.45
Coeff. of Variability	0.0059
Minimum	4/1/2018
Maximum	1/14/2022
Range Width	1,383.98
Mean Std. Error	2.58

Forecast: Project Completion Date (cont'd) **Cell: C14**

Percentiles:	Forecast values
0%	4/1/2018
10%	8/30/2018
20%	10/4/2018
30%	10/31/2018
40%	11/24/2018
50%	12/18/2018
60%	1/13/2019
70%	2/12/2019
80%	4/1/2019
90%	7/24/2020
100%	1/14/2022

Forecast: Risks (Threats/Opps) **Cell: C10**

Summary:
Certainty level is 85.00%
Certainty range is from -Infinity to $8,512,712
Entire range is from $(45,241,984) to $42,967,747
Base case is $(4,730,000)
After 10,000 trials, the std. error of the mean is $127,529

Statistics:	Forecast values
Trials	10,000
Base Case	$(4,730,000)
Mean	$(4,859,472)
Median	$(5,097,102)
Mode	---
Standard Deviation	$12,752,855
Variance	$162,635,306,768,049
Skewness	0.1899
Kurtosis	2.86
Coeff. of Variability	-2.62
Minimum	$(45,241,984)
Maximum	$42,967,747
Range Width	$88,209,732
Mean Std. Error	$127,529

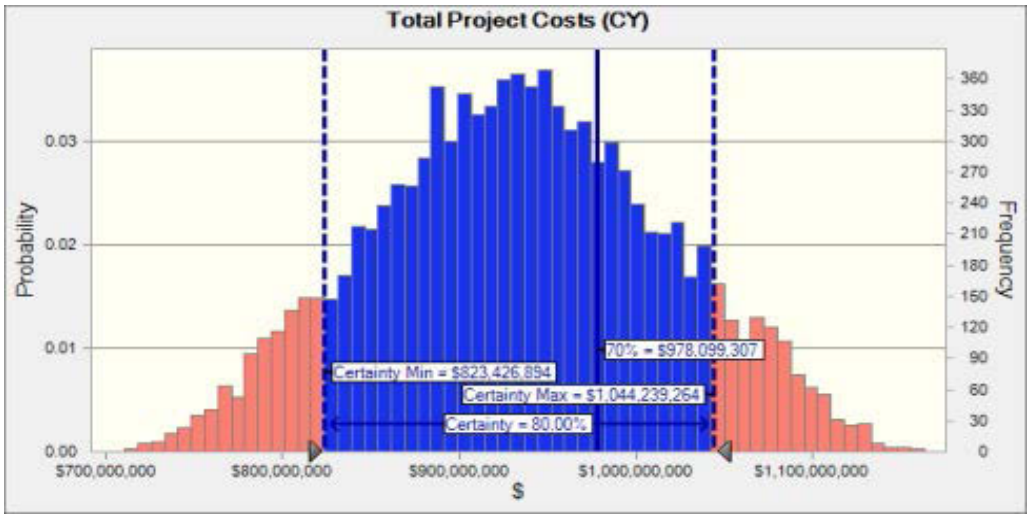
Forecast: Risks (Threats/Opps) (cont'd) **Cell: C10**

Percentiles:	Forecast values
0%	$(45,241,984)
10%	$(21,110,968)
20%	$(15,923,091)
30%	$(12,166,707)
40%	$(8,644,062)
50%	$(5,098,765)
60%	$(1,890,466)
70%	$1,800,963
80%	$6,005,112
90%	$11,812,606
100%	$42,967,747

Forecast: Total Project Costs (CY) **Cell: C11**

Includes base costs, prior costs, fixed costs, and risks

Summary:
Certainty level is 80.00%
Certainty range is from $823,426,894 to $1,044,239,264
Entire range is from $699,236,740 to $1,162,983,101
Base case is $951,662,369
After 10,000 trials, the std. error of the mean is $823,971



Statistics:	Forecast values
Trials	10,000
Base Case	$951,662,369
Mean	$933,811,097
Median	$933,251,912
Mode	---
Standard Deviation	$82,397,089
Variance	$6,789,280,344,141,910
Skewness	0.0210
Kurtosis	2.51
Coeff. of Variability	0.0882
Minimum	$699,236,740
Maximum	$1,162,983,101
Range Width	$463,746,362
Mean Std. Error	$823,971

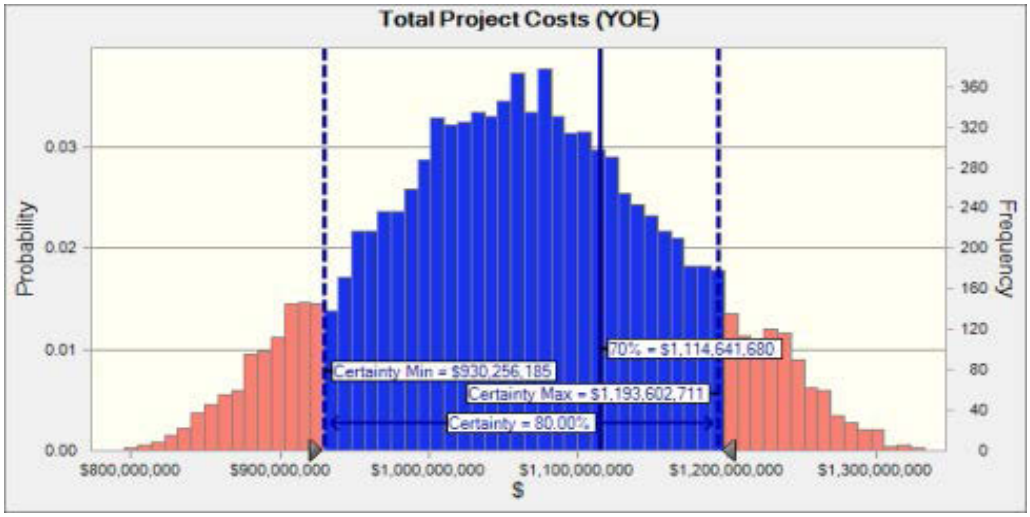
Forecast: Total Project Costs (CY) (cont'd) **Cell: C11**

Percentiles:	Forecast values
0%	$699,236,740
10%	$823,426,894
20%	$861,628,492
30%	$888,672,621
40%	$911,249,195
50%	$933,247,381
60%	$954,336,887
70%	$978,099,307
80%	$1,006,330,709
90%	$1,044,239,264
100%	$1,162,983,101

Forecast: Total Project Costs (YOE) **Cell: C12**

Includes base costs, prior costs, fixed costs, risks, and inflation

Summary:
Certainty level is 80.00%
Certainty range is from $930,256,185 to $1,193,602,711
Entire range is from $786,720,181 to $1,331,755,891
Base case is $1,081,475,587
After 10,000 trials, the std. error of the mean is $981,928



Statistics:	Forecast values
Trials	10,000
Base Case	$1,081,475,587
Mean	$1,061,914,054
Median	$1,061,172,018
Mode	---
Standard Deviation	$98,192,763
Variance	$9,641,818,634,821,760
Skewness	0.0221
Kurtosis	2.51
Coeff. of Variability	0.0925
Minimum	$786,720,181
Maximum	$1,331,755,891
Range Width	$545,035,710
Mean Std. Error	$981,928

Forecast: Total Project Costs (YOE) (cont'd) **Cell: C12**

Percentiles:	Forecast values
0%	$786,720,181
10%	$930,256,185
20%	$975,728,011
30%	$1,008,124,740
40%	$1,035,433,925
50%	$1,061,162,774
60%	$1,086,200,019
70%	$1,114,641,680
80%	$1,148,951,028
90%	$1,193,602,711
100%	$1,331,755,891

End of Forecasts

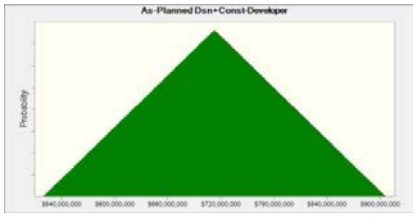
Assumptions

Worksheet: [NY Goethals Bridge CER Template FINAL.xlsm]BaseCost

Assumption: As-Planned Dsn+Const-Developer **Cell: L40**

Triangular distribution with parameters:

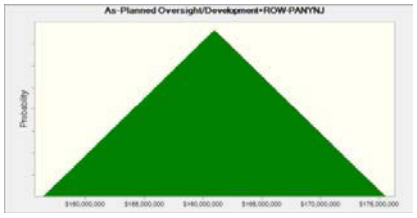
10%	$605,744,059	(=I33)
Likeliest	$712,640,069	(=J33)
90%	$819,536,080	(=K33)



Assumption: As-Planned Oversight/Development+ROW-PANYNJ **Cell: L39**

Triangular distribution with parameters:

10%	$152,934,800	(=I32)
Likeliest	$160,984,000	(=J32)
90%	$169,033,200	(=K32)

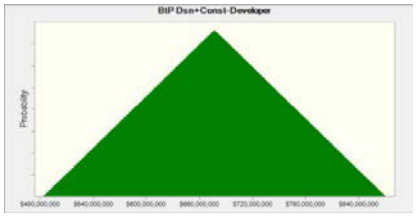


Assumption: BtP Dsn+Const-Developer **Cell: K40**

Triangular distribution with parameters:

10%	$570,112,056	(=F33)
Likeliest	$677,008,066	(=G33)
90%	$783,904,076	(=H33)

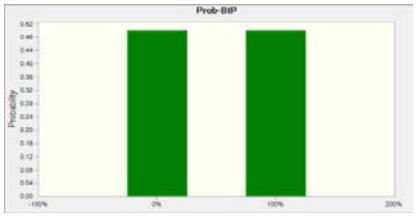
Assumption: BtP Dsn+Const-Developer (cont'd) **Cell: K40**



Assumption: Prob-BtP **Cell: I40**

Yes-No distribution with parameters:

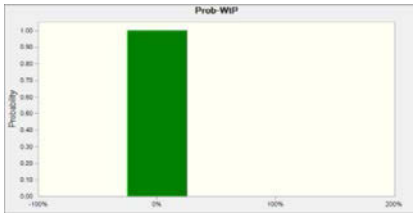
Probability of Yes(1)	0.5	(=D40)



Assumption: Prob-WtP **Cell: J40**

Yes-No distribution with parameters:

Probability of Yes(1)	0.0	(=E40)

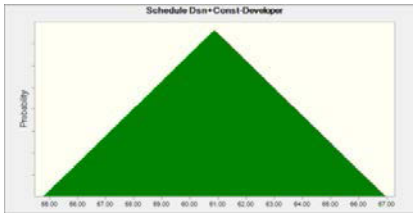


Assumption: Schedule Dsn+Const-Developer **Cell: L16**

Triangular distribution with parameters:

Minimum	54.78	(=J16*(1-K16))
Likeliest	60.87	(=J16)
Maximum	66.95	(=J16*(1+K16))

Assumption: Schedule Dsn+Const-Developer (cont'd) **Cell: L16**



Assumption: Schedule Oversight/Development+ROW-PANYNJ **Cell: L15**

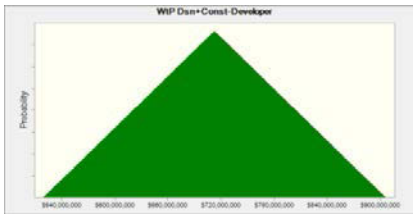
Triangular distribution with parameters:

Minimum	62.94	(=J15*(1-K15))
Likeliest	69.93	(=J15)
Maximum	76.93	(=J15*(1+K15))

Assumption: WtP Dsn+Const-Developer **Cell: M40**

Triangular distribution with parameters:

10%	$605,744,059	(=L33)
Likeliest	$712,640,069	(=M33)
90%	$819,536,080	(=N33)

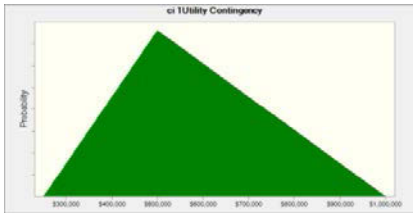


Worksheet: [NY Goethals Bridge CER Template FINAL.xlsm]Risk Register

Assumption: ci 1Utility Contingency **Cell: S10**

Triangular distribution with parameters:

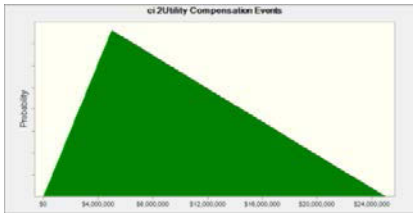
Minimum	$250,000	(=P10)
Likeliest	$500,000	(=Q10)
Maximum	$1,000,000	(=R10)



Assumption: ci 2Utility Compensation Events **Cell: S11**

Triangular distribution with parameters:

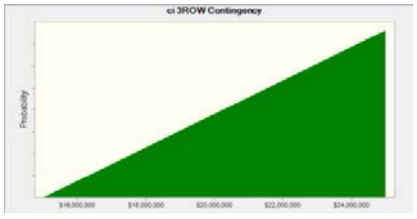
Minimum	$0	(=P11)
Likeliest	$5,000,000	(=Q11)
Maximum	$25,000,000	(=R11)



Assumption: ci 3ROW Contingency **Cell: S12**

Triangular distribution with parameters:

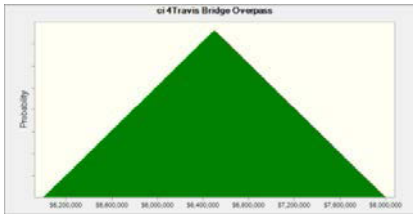
Minimum	$15,000,000	(=P12)
Likeliest	$25,000,000	(=Q12)
Maximum	$25,000,000	(=R12)



Assumption: ci 4Travis Bridge Overpass **Cell: S13**

Triangular distribution with parameters:

Minimum	$5,000,000	(=P13)
Likeliest	$6,500,000	(=Q13)
Maximum	$8,000,000	(=R13)



Assumption: ci 5ROW Compensation Events **Cell: S14**

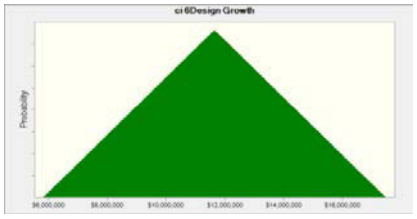
Triangular distribution with parameters:

Minimum	$1,000,000	(=P14)
Likeliest	$3,000,000	(=Q14)
Maximum	$5,000,000	(=R14)

Assumption: ci 6Design Growth **Cell: S15**

Triangular distribution with parameters:

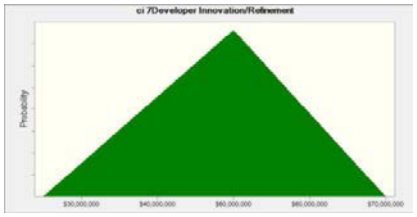
Minimum	$5,820,000	(=P15)
Likeliest	$11,640,000	(=Q15)
Maximum	$17,460,000	(=R15)



Assumption: ci 7Developer Innovation/Refinement **Cell: S16**

Triangular distribution with parameters:

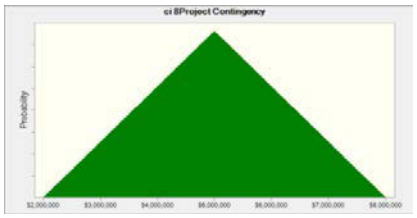
Minimum	$25,000,000	(=P16)
Likeliest	$50,000,000	(=Q16)
Maximum	$70,000,000	(=R16)



Assumption: ci 8Project Contingency **Cell: S17**

Triangular distribution with parameters:

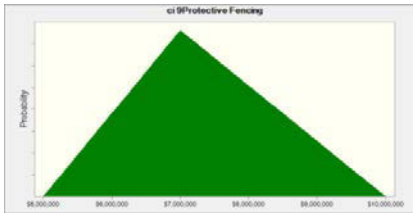
Minimum	$2,000,000	(=P17)
Likeliest	$5,000,000	(=Q17)
Maximum	$8,000,000	(=R17)



Assumption: ci 9Protective Fencing **Cell: S18**

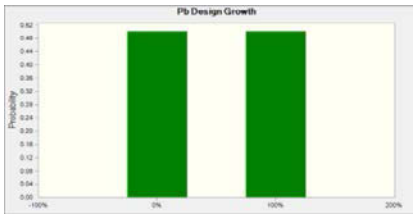
Triangular distribution with parameters:

Minimum	$5,000,000	(=P18)
Likeliest	$7,000,000	(=Q18)
Maximum	$10,000,000	(=R18)



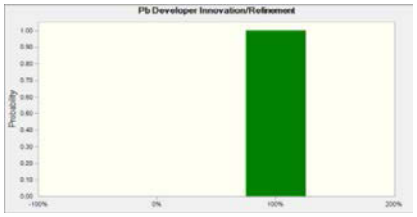
Assumption: Pb Design Growth **Cell: N15**

Yes-No distribution with parameters:
Probability of Yes(1) 0.5 (=N15)



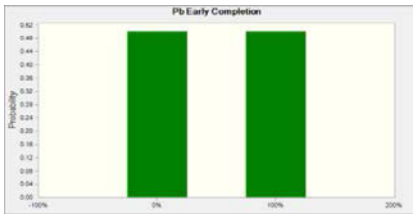
Assumption: Pb Developer Innovation/Refinement **Cell: N16**

Yes-No distribution with parameters:
Probability of Yes(1) 1.0 (=N16)



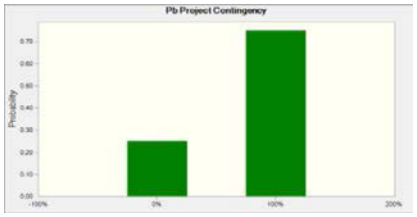
Assumption: Pb Early Completion **Cell: N20**

Yes-No distribution with parameters:
Probability of Yes(1) 0.5 (=N20)



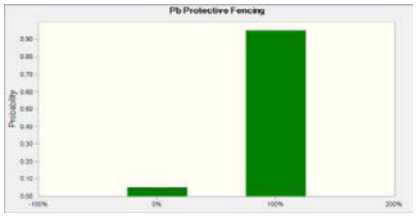
Assumption: Pb Project Contingency **Cell: N17**

Yes-No distribution with parameters:
Probability of Yes(1) 0.75 (=N17)



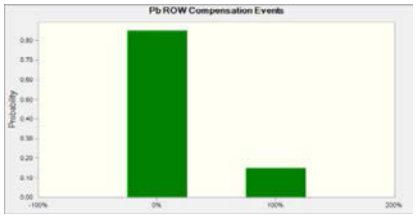
Assumption: Pb Protective Fencing **Cell: N18**

Yes-No distribution with parameters:
Probability of Yes(1) 0.95 (=N18)



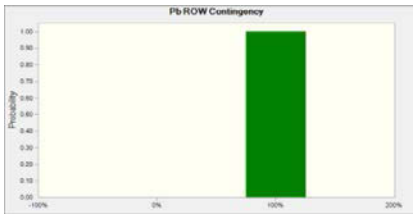
Assumption: Pb ROW Compensation Events **Cell: N14**

Yes-No distribution with parameters:
Probability of Yes(1) 0.15 (=N14)



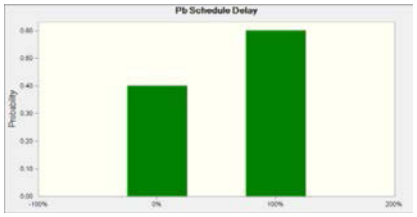
Assumption: Pb ROW Contingency **Cell: N12**

Yes-No distribution with parameters:
Probability of Yes(1) 1.0 (=N12)



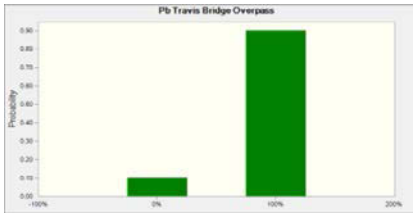
Assumption: Pb Schedule Delay **Cell: N19**

Yes-No distribution with parameters:
Probability of Yes(1) 0.6 (=N19)



Assumption: Pb Travis Bridge Overpass **Cell: N13**

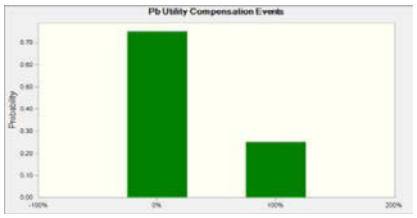
Yes-No distribution with parameters:
Probability of Yes(1) 0.9 (=N13)



Assumption: Pb Utility Compensation Events **Cell: N11**

Yes-No distribution with parameters:

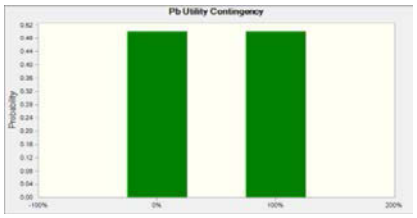
Probability of Yes(1)	0.25	(=N11)



Assumption: Pb Utility Contingency **Cell: N10**

Yes-No distribution with parameters:

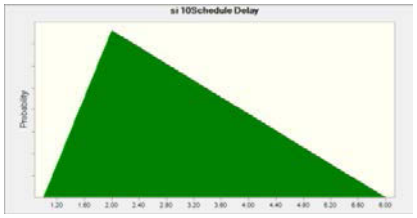
Probability of Yes(1)	0.5	(=N10)



Assumption: si 10Schedule Delay **Cell: AA19**

Triangular distribution with parameters:

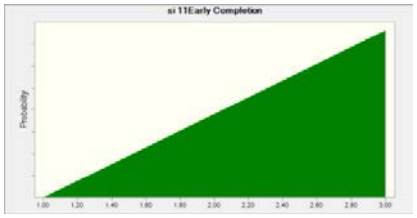
Minimum	1.00	(=X19)
Likeliest	2.00	(=Y19)
Maximum	6.00	(=Z19)



Assumption: si 11Early Completion **Cell: AA20**

Triangular distribution with parameters:

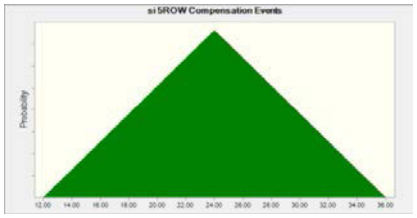
Minimum	1.00	(=X20)
Likeliest	3.00	(=Y20)
Maximum	3.00	(=Z20)



Assumption: si 5ROW Compensation Events **Cell: AA14**

Triangular distribution with parameters:

Minimum	12.00	(=X14)
Likeliest	24.00	(=Y14)
Maximum	36.00	(=Z14)

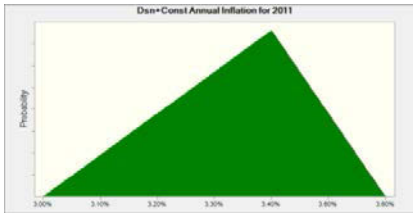


Worksheet: [NY Goethals Bridge CER Template FINAL.xlsm]YOE

Assumption: Dsn+Const Annual Inflation for 2011 **Cell: X4**

Triangular distribution with parameters:

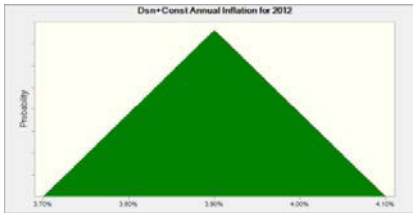
Minimum	3.00%
Likeliest	3.40%
Maximum	3.60%



Assumption: Dsn+Const Annual Inflation for 2012 **Cell: X5**

Triangular distribution with parameters:

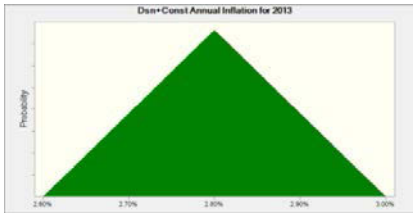
Minimum	3.70%
Likeliest	3.90%
Maximum	4.10%



Assumption: Dsn+Const Annual Inflation for 2013 **Cell: X6**

Triangular distribution with parameters:

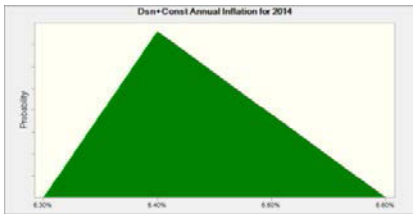
Minimum	2.60%
Likeliest	2.80%
Maximum	3.00%



Assumption: Dsn+Const Annual Inflation for 2014 **Cell: X7**

Triangular distribution with parameters:

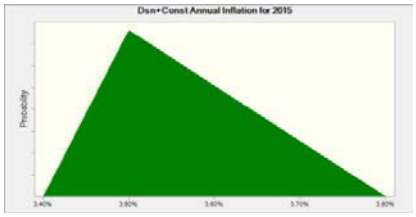
Minimum	5.30%
Likeliest	5.40%
Maximum	5.60%



Assumption: Dsn+Const Annual Inflation for 2015 **Cell: X8**

Triangular distribution with parameters:

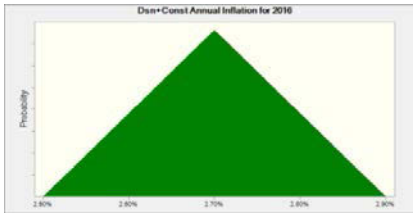
Minimum	3.40%
Likeliest	3.50%
Maximum	3.80%



Assumption: Dsn+Const Annual Inflation for 2016 **Cell: X9**

Triangular distribution with parameters:

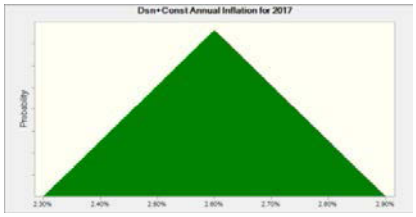
Minimum	2.50%
Likeliest	2.70%
Maximum	2.90%



Assumption: Dsn+Const Annual Inflation for 2017 **Cell: X10**

Triangular distribution with parameters:

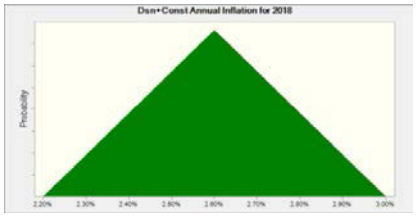
Minimum	2.30%
Likeliest	2.60%
Maximum	2.90%



Assumption: Dsn+Const Annual Inflation for 2018 **Cell: X11**

Triangular distribution with parameters:

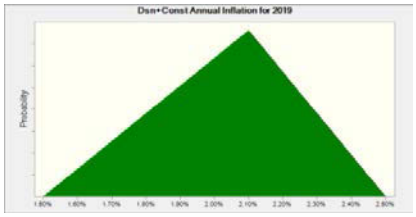
Minimum	2.20%
Likeliest	2.60%
Maximum	3.00%



Assumption: Dsn+Const Annual Inflation for 2019 **Cell: X12**

Triangular distribution with parameters:

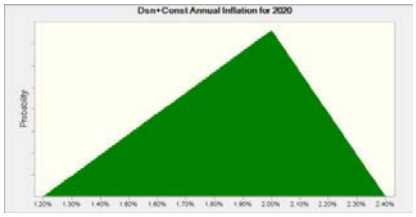
Minimum	1.50%
Likeliest	2.10%
Maximum	2.50%



Assumption: Dsn+Const Annual Inflation for 2020 **Cell: X13**

Triangular distribution with parameters:

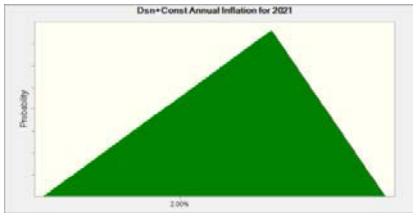
Minimum	1.20%
Likeliest	2.00%
Maximum	2.40%



Assumption: Dsn+Const Annual Inflation for 2021 **Cell: X14**

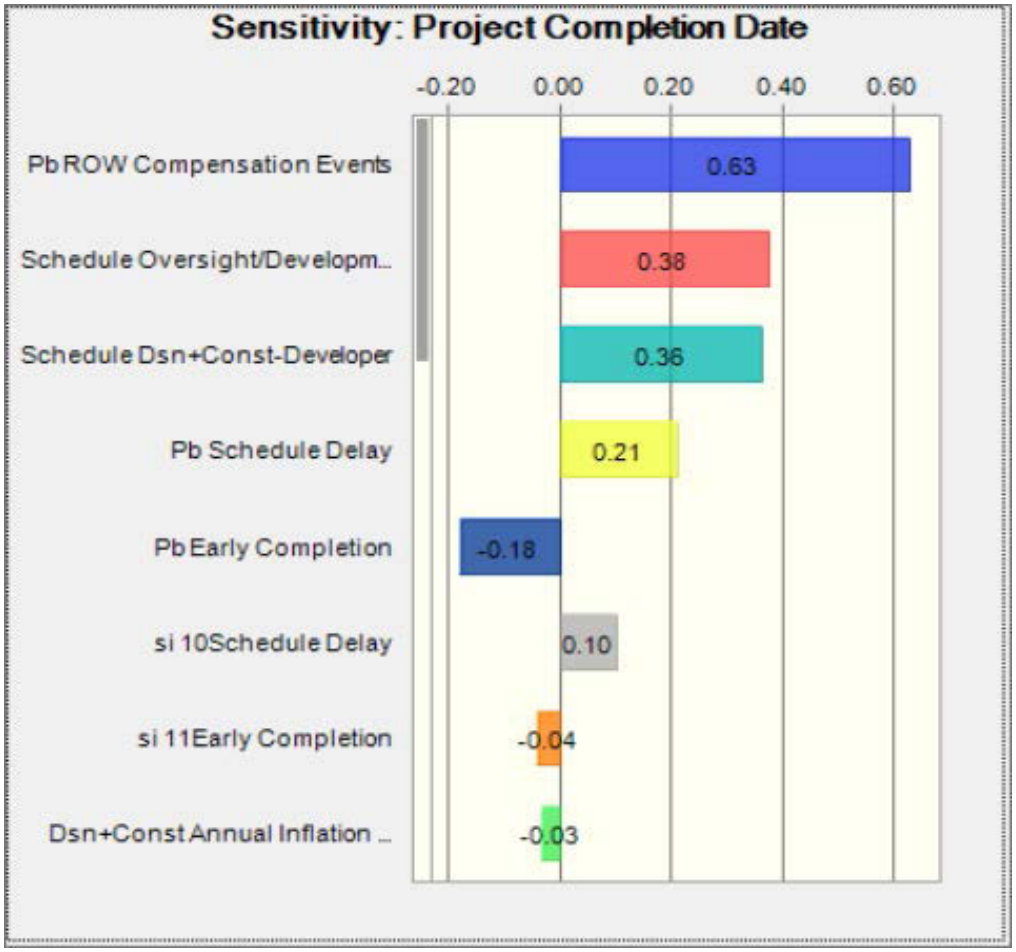
Triangular distribution with parameters:

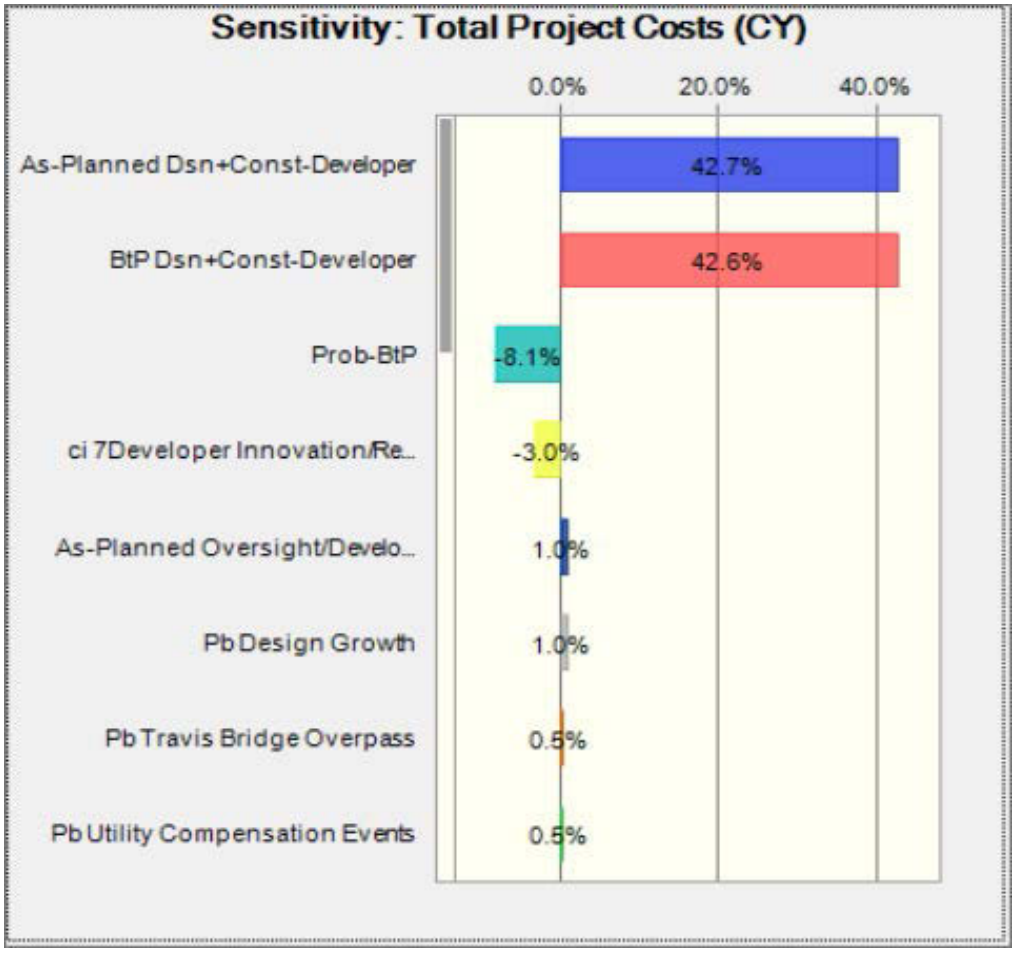
Minimum	1.40%
Likeliest	2.40%
Maximum	2.90%

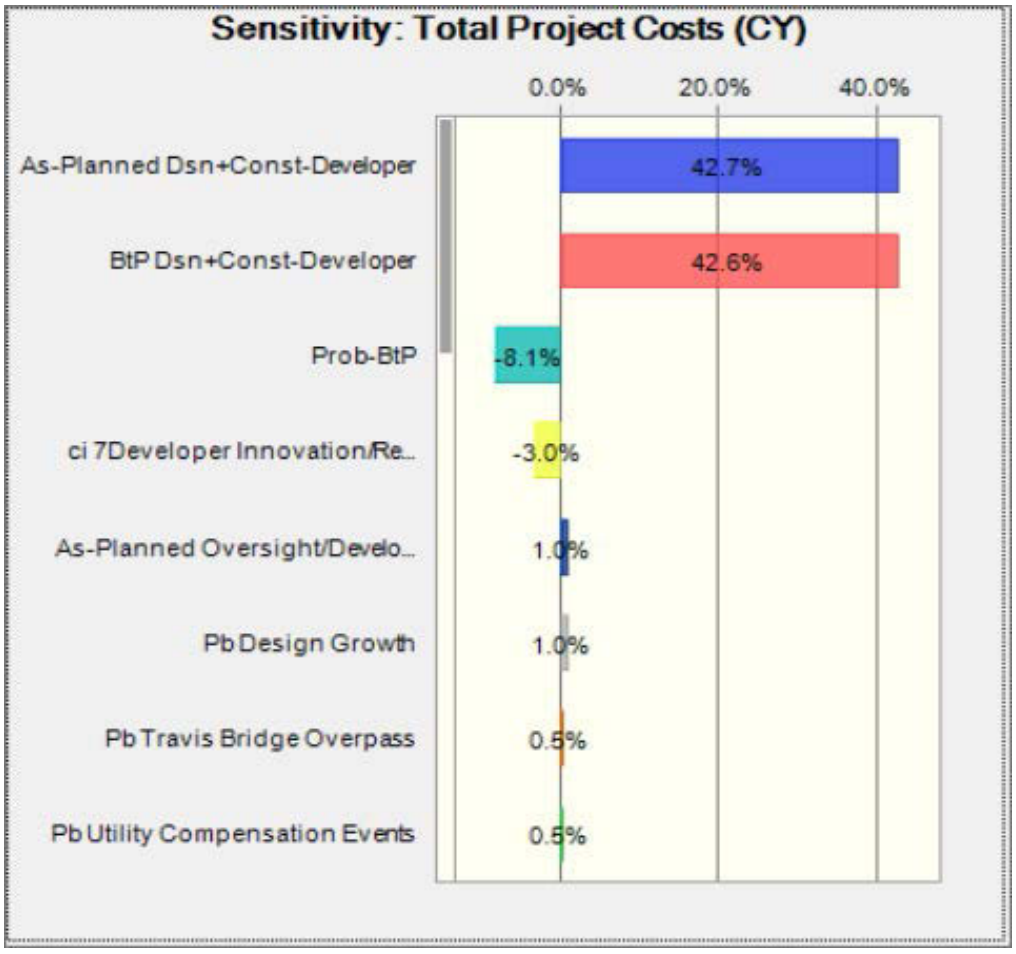


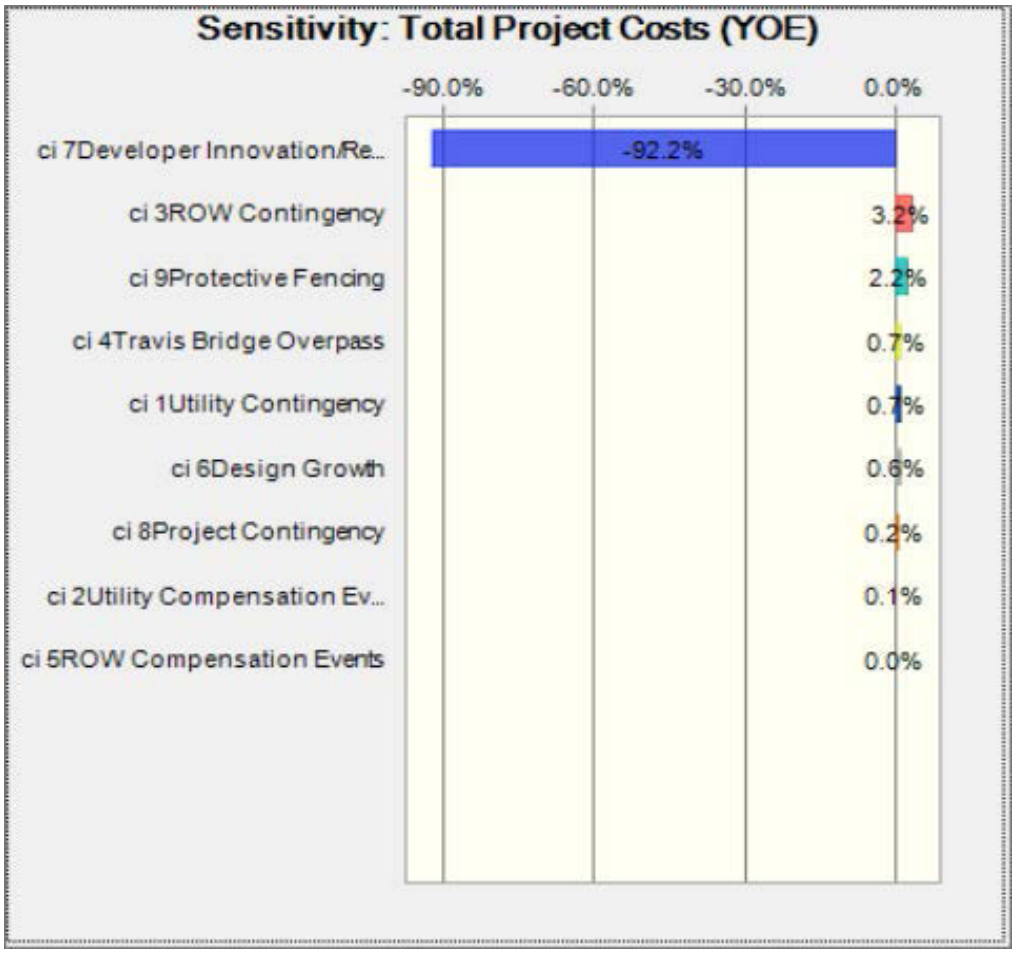
End of Assumptions

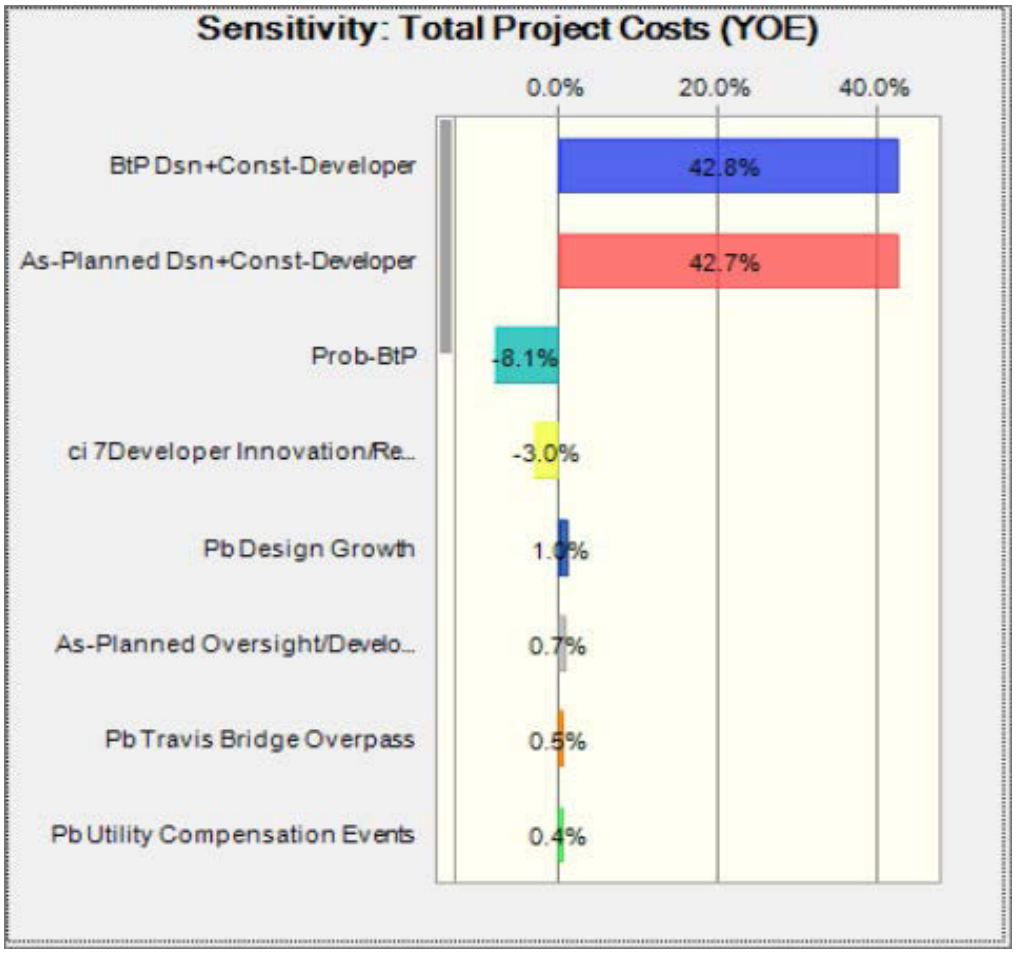
Sensitivity Charts




Sensitivity: Total Project Costs (CY)
0.0%
20.0%
40.0%
As-Planned Dsn+Const-Developer
42.7%
BtP Dsn+Const-Developer
42.6%
Prob-BtP
-8.1%
ci 7Developer Innovation/Re...
-3.0%
As-Planned Oversight/Develo...
1.0%
Pb Design Growth
1.0%
Pb Travis Bridge Overpass
0.5%
Pb Utility Compensation Events
0.5%


Sensitivity: Total Project Costs (CY)
0.0%
20.0%
40.0%
As-Planned Dsn+Const-Developer
42.7%
BtP Dsn+Const-Developer
42.6%
Prob-BtP
-8.1%
ci 7Developer Innovation/Re...
-3.0%
As-Planned Oversight/Develo...
1.0%
Pb Design Growth
1.0%
Pb Travis Bridge Overpass
0.5%
Pb Utility Compensation Events
0.5%


Sensitivity: Total Project Costs (YOE)
-90.0%
-60.0%
-30.0%
0.0%
ci 7Developer Innovation/Re...
-92.2%
ci 3ROW Contingency
3.2%
ci 9Protective Fencing
2.2%
ci 4Travis Bridge Overpass
0.7%
ci 1Utility Contingency
0.7%
ci 6Design Growth
0.6%
ci 8Project Contingency
0.2%
ci 2Utility Compensation Ev...
0.1%
ci 5ROW Compensation Events
0.0%



End of Sensitivity Charts

AGENDA

Meeting Title: Cost Estimate Review (CER)

Meeting No.:

Date/Location: November 27-29, 2012

Objective: To conduct an un-biased review of the GBRP Project risk-based cost estimate and develop a total project cost assessment jointly between the Port Authority and FHWA.

DAY 1

1:00 – 2:00 PM	Introduction to CER Process by FHWA
2:00 – 3:00 PM	Project Overview and Scope of Work
3:15 – 4:00 PM	Overview of Estimate and Assumptions
4:00 – 4:30 PM	Project Relief and Compensation Events Discussion
4:30 – 5:00 PM	Discussion of Market Conditions
5:15 PM	Adjourn

DAY 2

8:30 – 8:45 AM	Day 2 Goals & Objectives
9:00 – 10:00 AM	Review of Previously Identified Risks
10:15 – 11:00 AM	Identification of Items Not Included in Previous Risk Assessment
11:00 – 12:00 PM	Technical Focus – Substructure & Main Span
12:00 – 12:45 PM	Lunch
1:00 – 2:15 PM	Technical Focus – Approaches and Miscellaneous
2:30 – 3:00 PM	Technical Focus – Existing Bridge Demolition
3:15 – 4:00 PM	Review of Soft Costs
4:15 – 5:00 PM	Review and Finalize Risk Register Details
5:15 PM	Adjourn

DAY 3

8:30 – 8:45 AM	Day 3 Goals & Objectives
9:00 – 10:00 AM	Reassessment of Primary Risks
10:15 – 11:00 AM	Review and Finalize Risk Register
11:15 – 11:45 AM	Finalize Findings and Report Preparation
12:00 – 12:45 PM	Lunch
1:00 – 2:45 PM	Presentation Preparation and Dry Run
3:00 – 4:00 PM	Closeout Presentation
4:15 PM	Adjourn