

P3-Value: Financial Assessment Tool User Manual

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1 Overview

The Federal Highway Administration’s (FHWA) Office of Innovative Program Delivery (OIPD) is producing a P3 Toolkit comprising tools and guidance documents to assist in educating public sector policymakers, legislative and executive staff and transportation professionals. The P3 Toolkit forms the base of a broader P3 capacity-building program which includes a curriculum of P3 courses and webinars. The P3 Toolkit will address Federal requirements related to P3s and four key phases in P3 implementation: (1) Legislation and Policy; (2) Planning and Evaluation; (3) Procurement; and (4) Monitoring and Oversight.

The target audiences for the P3 Toolkit resources are decisionmakers and technical staff in public sector agencies such as:

- ▶ State Executive and Legislative Offices;
- ▶ State Departments of Transportation (DOT);
- ▶ Metropolitan Planning Organizations (MPOs);
- ▶ Regional Planning Agencies;
- ▶ Tolling Authorities;
- ▶ Local jurisdictions; and
- ▶ FHWA Division Offices.

Purpose of P3-VALUE

P3-VALUE (Public-Private Partnership Value-for-Money Analysis for Learning and Understanding Evaluation) is a key component of FHWA’s P3 Toolkit. It is a suite of educational tools that introduces users to public-private partnerships (P3s) and the methods used in P3 evaluation, discusses limitations, and explains how public agencies may evaluate different procurement options for a particular project. P3-VALUE can help users understand the processes and considerations that go into a rigorous quantitative analysis of P3 procurement options for transportation projects. P3-VALUE is based on the experience of the U.S. P3 market and therefore reflects the terminology and methodology practiced in the United States. The focus of FHWA’s Office of Innovative Program Delivery and its P3-VALUE tools is on long-term P3 contracts that involve designing, operating, constructing, operating and maintaining new highway facilities, also known as greenfield projects.

P3-VALUE is based in Microsoft Excel, and is supported by primers, user guides and other guidebooks, some of which are under development. Practitioners can use P3-VALUE to better understand the concepts, inputs, assumptions and outputs from evaluations of risk, financial feasibility and “value for money” analyses, which are used to evaluate the potential of P3s to



generate value in comparison with conventional methods of project delivery. Users are cautioned that P3-VALUE has been designed for educational purposes only and is not intended to guide decisions on actual projects. The complexity of the analyses for specific projects requires that they be performed by experts using more detailed modeling; however, P3-VALUE provides hands-on instruction in how such detailed modeling analyses are conducted, and can help government officials understand the importance of the inputs and assumptions used by modeling experts, and the extent to which key assumptions can affect the analysis results.

Structure of P3-VALUE

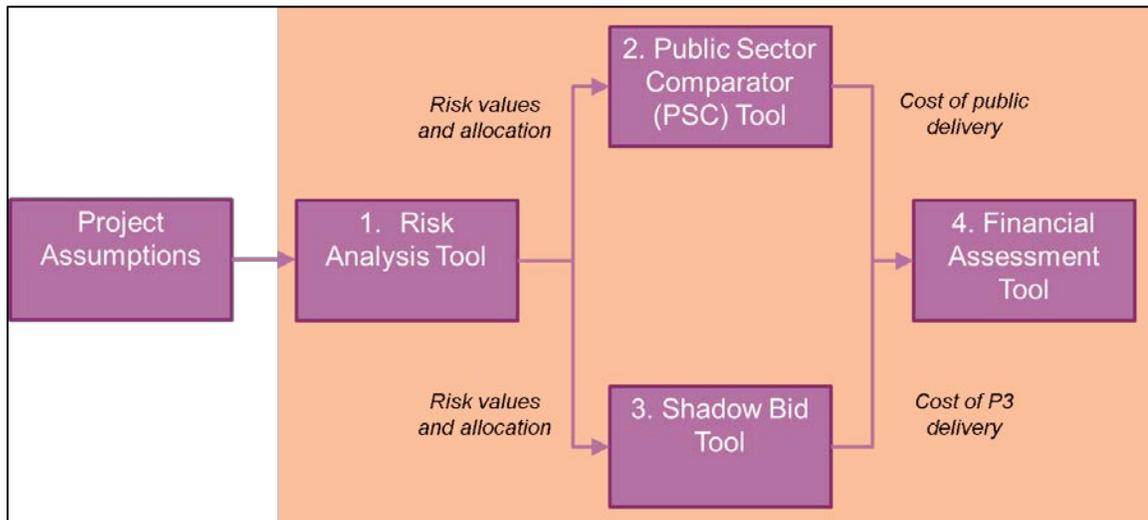
Under a public-private partnership (P3) for a highway project, a private partner may participate in some combination of design, construction, financing, operations and maintenance, including collection of toll revenues. Value for Money (VfM) analysis is a process used to compare the financial impacts of a P3 project against those for the traditional public delivery alternative. The methodology for carrying out a VfM analysis that is incorporated in P3-VALUE involves:

- ▶ Creating a Public Sector Comparator which estimates the risk-adjusted whole-life cost of carrying out the project through a traditional approach;
- ▶ Estimating the risk-adjusted whole-life cost of the P3 alternative (either as proposed by a private bidder, or a hypothetical “shadow bid” at the pre-procurement stage); and
- ▶ Completing an “apples-to-apples” comparison of the present values of costs under the two approaches.

As depicted in Figure 1-1, P3-VALUE is comprised of four interactive, integrated spreadsheet-based analytical tools that allow users to explore different components of Value for Money Analysis (VfM) including:

- ▶ **Risk Assessment Tool** – This tool allows users to document project risks and risk management strategies and to estimate the costs of risks under different procurement structures.
- ▶ **Public Sector Comparator (PSC) Tool** – This tool allows users to calculate the risk-adjusted costs for a project that is designed, financed, constructed, maintained and operated under a traditional public sector delivery model.
- ▶ **Shadow Bid Tool** – This tool allows users to calculate the costs of payments to a private partner for delivering a project as a P3 concession.
- ▶ **Financial Assessment Tool** – This tool allows users to compare the PSC and Shadow Bid costs for procuring a project and to assess the financial subsidies required using different procurement methods.

Figure 1-1: P3-VALUE Overview



Accompanying Evaluation Resources

P3-VALUE is supported by several other tools and guides, including:

- ▶ An *Orientation Guide* that summarizes the issues and factors that are evaluated when considering a P3 as a financing and procurement mechanism;
- ▶ Three Primers, one each on *Risk Assessment* (reference for Risk Assessment Tool), *Value for Money Analysis* (reference for Public Sector Comparator and Shadow Bid tools) and *Financial Structuring and Assessment* (reference for Financial Assessment Tool);
- ▶ *User guides* for each analytical tool in the P3-VALUE suite that explain how to use the tools;
- ▶ *Frequently Asked Questions* and a *Troubleshooting Guide* that provide technical advice in support of the P3-VALUE tools;
- ▶ *Evaluation Guidebooks* (under development) for practitioners seeking a deeper understanding of evaluation processes and data sources as well as the concepts, assumptions, inputs and outputs involved in the above analyses; and
- ▶ *P3-SCREEN*, an Excel-based project screening tool along with a supporting user guide to assist practitioners seeking to perform a preliminary screening evaluation of the suitability of a P3 for high-cost highway projects.

P3-VALUE and its accompanying evaluation resources serve as a reference for decision-makers and practitioners seeking to understand P3s as a financing alternative for major capital projects. Practitioners can use P3-VALUE and its accompanying resources to familiarize themselves with the process of evaluating procurement decisions, the data required to conduct quantitative assessments of procurement options and the impact that various assumptions can have on the desirability and feasibility of different procurement structures.



Financial Assessment Tool

This User Manual, the *Financial Assessment Tool User Manual* (User Manual) dated April 19, 2013, corresponds to version 1.0 of the *Financial Assessment Tool* and both are part of FHWA's P3-VALUE tool suite. FHWA designed the Financial Assessment Tool and User Manual as educational materials to demonstrate how a public agency might complete a Value for Money (VfM) Analysis. Specifically, the following components of the Financial Assessment Tool demonstrate the relationship between key project assumptions and analysis results:

- ▶ In the “VfM Analysis” section, the Financial Assessment Tool demonstrates how the outputs generated by two other P3-VALUE tools, the PSC Tool and the Shadow Bid Tool, are compared to complete the VfM analysis process; and
- ▶ In the “Viability Assessment” section, the Financial Assessment Tool demonstrates an assessment of a notional project's cash flows to understand the funding amount needed to deliver the project.

Although the Financial Assessment Tool is interactive, FHWA does *not* intend for users to conduct a VfM analysis for a “real-world” project using the tool. FHWA expects appropriate experts will perform such an analysis for a project sponsor. Project data assumptions and requirements vary by project, thereby necessitating project-specific VfM evaluation procedures.

In using the “VfM Analysis” section of the tool, users are encouraged to reference FHWA's *Primer on Value for Money Assessment for Public-Private Partnerships*, which provides an overview of basic PSC and VfM concepts and is accessible at www.fhwa.dot.gov/ipd/p3/toolkit/guidance_documents/vfm_for_ppps/toc.htm.

In using the “Viability Assessment” section of the tool, users are encouraged to reference FHWA's *Financial Structuring and Assessment for Public-Private Partnerships: A Primer* (Primer), which provides an overview of basic financial assessment concepts and is accessible at www.fhwa.dot.gov/ipd/p3/toolkit/guidance_documents/financial_structuring_and_assessment/toc.htm.

System Requirements

The tools provided in the P3 Evaluation Toolkit are Microsoft Excel spreadsheets and are best viewed in Microsoft Excel 2007 or later editions. Users may not be able to access the tools when using an earlier version of Excel or when using a different operating system, such as Macintosh.

2 Quick-Start Guide

While the User Manual provides detailed guidance on the Financial Assessment Tool, users may also refer to the “Quick-Start” version below for step-by-step instructions.

ACCESSING THE FINANCIAL ASSESSMENT TOOL

1. OPEN THE TOOL.
2. CLICK “ENABLE EDITING” AND/OR “ENABLE CONTENT” ON YELLOW BAR ACROSS TOP OF SCREEN.
3. READ THE DISCLAIMER AND CLICK “I ACCEPT.”

CONDUCTING A VfM ANALYSIS

1. CLICK THE “VfM ANALYSIS” BUTTON ON THE TOOL INDEX TO NAVIGATE TO THE “VFM ANALYSIS” SECTION OF THE TOOL.

This section allows users to make a comparison between the PSC and Shadow Bid to assess value for money.

IMPORT NPC AND CASH FLOWS.

- a. Navigate to the “Source Data” tab.
- b. Click “Browse for PSC Tool.”
 - i. In the dialog box, navigate to the directory where the PSC tool is saved.
 - ii. Select the file name. The file’s path should populate in the ‘PSC’ row.
 - iii. Click “Import NPC Results.”

Note: This may take a few minutes. Once the import is complete, you will see a dialog box that says, “Results have been loaded.” Click ‘OK.’
- c. Click “Browse for Shadow Bid Tool.”
 - i. In the dialog box, navigate to the directory where the Shadow Bid Tool is saved.
 - ii. Select the file name. The file’s path should populate in the ‘Shadow Bid’ row.
 - iii. Click “Import Cash Flows.”

Note: This may take a few minutes. Once the import is complete, you will see a dialog box that says, “Results have been loaded.” Click ‘OK.’

REVIEW COMPARISON.

Note: It may be useful to refer to the *Financial Assessment Tool User Manual* in understanding the results.

- a. Navigate to the “Model VfM_PSC Outputs” sheet to review the side-by-side comparison of the PSC and Shadow Bid costs.
- b. Navigate to the “NPC Results” tab to review another side-by-side comparison of the PSC and Shadow Bid costs with different levels of risk.
- c. Navigate to the successive results charts to review graphical representations of this comparison and of the cash flows.



CONDUCTING A VIABILITY ANALYSIS

1. CLICK THE “VIABILITY ASSESSMENT” BUTTON ON THE TOOL INDEX TO NAVIGATE TO THE “VIABILITY ASSESSMENT” SECTION OF THE TOOL.

This section allows users to assess a project’s cash flows to determine the amount of additional funding needed to deliver the project.

INPUT ASSUMPTIONS.

- a. Navigate to the “Assumption” tab.
- b. In light-blue cells, input assumptions regarding project delivery structure, timing, design and construction costs, operation and maintenance costs, toll and other revenue, funding, inflation, risk costs, and discount rate.

Note: This data is used to construct a project’s cash flow, which estimates the net project cost before considering the project delivery method.

REVIEW RESULTS.

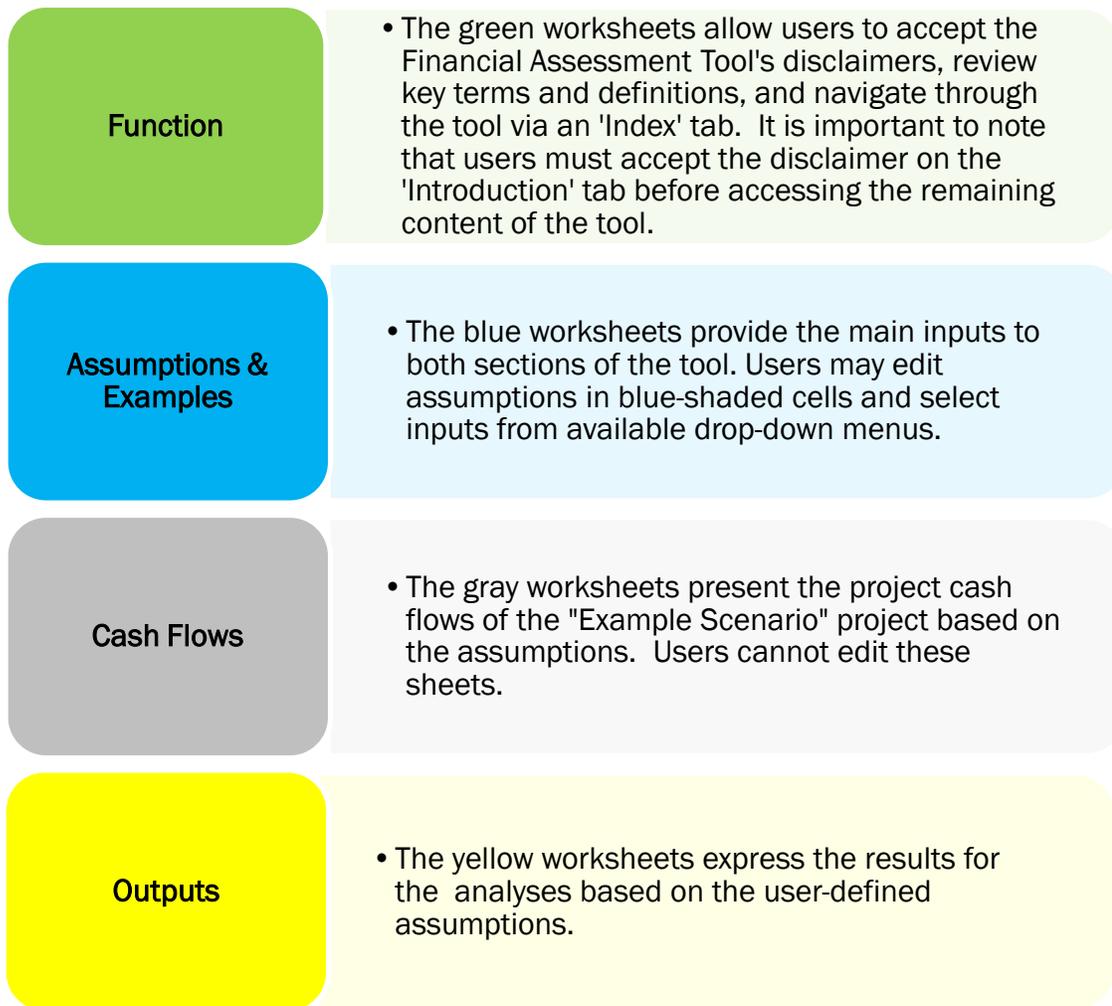
- a. Navigate to the “Viability Disclaimer” sheet and click “I Accept.”
- b. Navigate to the “Viability Output” sheet.
- c. Review the “Cash Flow Viability – NPC Summary” table for the calculation of the initial project estimate and risk-adjusted net project costs.
- d. Review the “NPC Results” graph for another representation of the net project costs.
- e. Run the Sensitivity Analysis.
 - i. Select the risk percentile in the light-blue shaded drop-down menu in the “Sensitivity Analysis” Table.
 - ii. Select the result type (\$ or %) in the light-blue shaded drop-down menu in the “Sensitivity Analysis” Table.
 - iii. Click “Run Sensitivity.”
 - iv. Review the results to understand the sensitivity of the NPC results to changes in assumptions.
- f. Run the Scenario Analysis.
 - i. Select “Cash Flow Viability” in the “Scenario Type” drop-down menu adjacent to the “Load Scenario Button.”
 - ii. Select “On” in the “Financing Assumptions” row.
 - iii. Select “bond” (to provide financing at the start of the project) or “draw” (to draw down financing as needed throughout the project) in the “Facility Type” row.
 - iv. Input the length of the maturity period (in months).
 - v. Input the interest rate (as an annual percentage).
 - vi. Input the cost of facility fees (as a percentage).
 - vii. Insert the length of the grace period (in months).
 - viii. Click “Run Financing” and recalculate the Sensitivity analysis to reflect the net project cost including financing. View changes to results in the Cash Flow Viability – NPC Summary table.

Note: You may run the scenario analysis to assess the costs of delivering the project as a P3 by selecting “VfM Viability” from the “Scenario Type” drop-down menu, inputting the financing assumptions, and clicking “Run Financing” once more.

3 Using the Tool

The Financial Assessment Tool contains two separate sections, one for completing a Value for Money Analysis and the other for conducting a Viability Assessment (also known as “Financial Feasibility Assessment” or “Affordability Assessment”). As outlined in Figure 3-1, both of those sections contain four major classes of worksheets that are color-coded by purpose:

Figure 3-1. Key Components of the Financial Assessment Tool



The Financial Assessment Tool and User Manual provide information on a pre-populated “Example Scenario” to demonstrate the types of assumptions and analysis that may be needed to conduct a quantitative VfM analysis. It is important to note that the “Example Scenario” assumptions provided in the Financial Assessment Tool do not reflect any specific project and are not recommended



values. Users should refer to the example assumptions and outputs only in developing their understanding of the VfM analysis process and not as a basis for evaluating a “real-world” project. Furthermore, users should refer to the Public Sector Comparator Tool User Manual and Shadow Bid Tool User Manual for information on the components of those tools and for a discussion of the key considerations when completing VfM steps in the financial assessment process.

A public agency that is considering delivering a project as a P3 may choose to conduct a VfM analysis to assess the comparative value that different delivery structures may provide. The key stages of a VfM analysis are listed below:

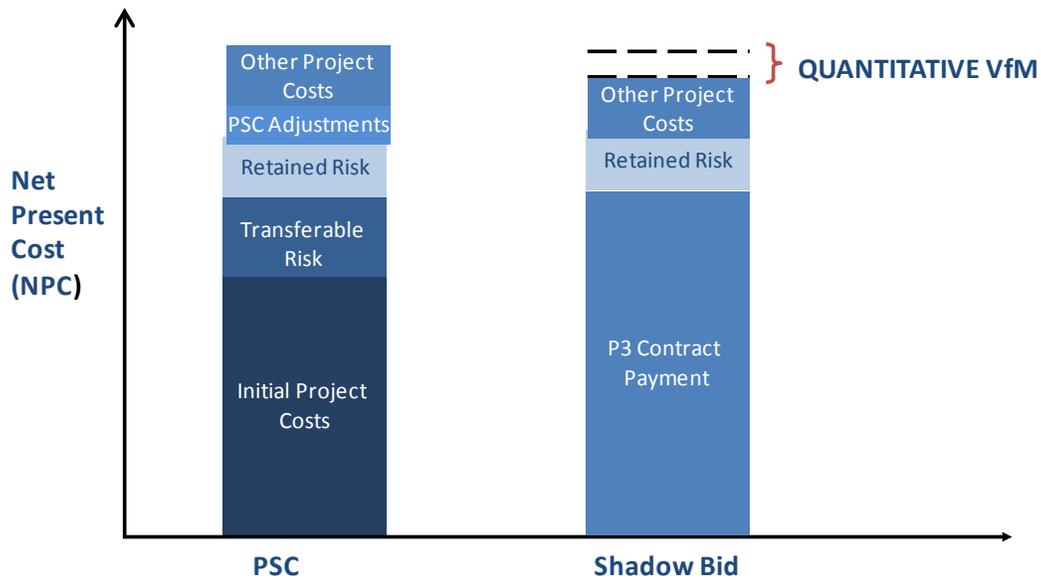
1. **Conduct a risk assessment** to identify, quantify, and allocate risks between the public and private partners.
2. **Develop a PSC estimate** that indicates the potential cost of public delivery.
3. **Develop a P3 Estimate** (or “shadow bid”) that indicates the potential cost of private delivery.
4. **Conduct a VfM analysis** that compares the PSC and VfM outcomes to assess whether the public or private delivery option provides greater VfM for the public agency. The Financial Assessment Tool represents this fourth and final step of the VfM analysis.



Conducting a VfM Analysis

This User Manual demonstrates the comparison between a notional PSC and P3 Estimate, (or “shadow bid”) that completes the quantitative VfM process. To determine which procurement structure provides better VfM to the public sponsor, the Financial Assessment Tool compares the Net Present Cost (NPC) of the P3 Estimate (from the Shadow Bid Tool) with the NPC of the PSC (from the PSC Tool). If the P3 Estimate is lower than the PSC’s NPC when costs are compared on a like-for-like basis, the P3 delivery option may allow the public sector to realize value through more efficient management of risks and costs. Figure 3-2 demonstrates how a comparison of discounted, risk-adjusted project costs in the PSC and P3 estimate can be used to quantify value for money in the Financial Assessment Tool.

Figure 3-2. Quantitative VfM Analysis



Using the Financial Assessment Tool

Users can navigate to the “VfM Analysis” section of the Financial Assessment Tool through the “Tool Index” tab. The purpose of the VfM Analysis section is to allow users to complete the quantitative VfM analysis by comparing the outputs from the PSC Tool and the Shadow Bid Tool to assess which option may provide greater value for money to the public agency. The text below details what steps users may take in each worksheet of the “VfM Analysis” section to complete the quantitative VfM analysis.

Importing Source Data

The VfM Analysis section compares the outputs from the PSC Tool and the Shadow Bid Tool. These data need to be imported into the Financial Assessment Tool to complete the VfM analysis. The Source Data Sheet enables the user to import data from the PSC and Shadow Bid Tools. Both sets of data are required to populate the remaining sheets in the VfM Analysis section.

1. To import data from the PSC Tool press ‘Browse for PSC Model’ and select the PSC Tool file; and
2. To import data from the Shadow Bid Tool press ‘Browse for Shadow Bid Model’ and select the Shadow Bid Tool file.
3. Once each file is selected, the file path populates in the table and users can then click the ‘Import NPC Results’ and the ‘Import Cash Flows’ buttons to import the data from the files.



Tips for Importing Shadow Bid Cash Flows

The Shadow Bid Tool allows users to calculate Availability Payment, Real Toll and Shadow Toll estimates for P3 project delivery. Each estimate generates unique cash flows in the Shadow Bid Tool. To ensure that the proper cash flow is imported into the VfM Analysis, the user should take the following steps in the Shadow Bid Tool:

- In the Assumptions tab, select the desired delivery method.
- In the VfM Output tab and within the Payment Calculation Analysis, select desired payment analysis output from the drop-down menu. Run the payment calculation.
- Within Table 12 “Toll and Other Revenue,” verify that the VfM Revenue payment cash flows are populated with the desired payment analysis.
- After following instructions to import the Shadow Bid cash flows into the Financial Assessment Tool, a user can check that the appropriate cash flow has been imported to perform the VfM analysis.

PSC Cash Flow Summary

The “PSC Cash Flow” sheet contains a summary of the project nominal cash flows under the public delivery method. The sheet presents the project costs and then accounts for project revenues, funding and financing, and risks. All values are provided on a nominal basis for the “Example Scenario” and the sheet details the same cost and revenue categories as the “Cash Flow Summary” sheet in the PSC Tool. Together with the “Model VfM_PSC Outputs” table, this sheet is essential for generating several results charts in the Financial Assessment Tool. The project cash flows may also support users seeking further insight into the key cost components of the public delivery structure.

VfM Cash Flow Summary

Similar to the “PSC Cash Flow Summary” sheet, this sheet contains values imported from the Shadow Bid Tool (note that the sheet name is a misnomer that cannot be changed without affecting the tool’s functionality). Unlike the “PSC Cash Flow Summary,” the “VfM Cash Flow” sheet contains two sections:

- ▶ The Private Sector Cash Flows section, which indicates the nominal cash flows of the private sector concessionaire, including the value of the payment required for the P3 project to be delivered; and
- ▶ The Public Sector Cash Flows section, which indicate the costs incurred by the agency in delivering the project as a P3, in addition to the payment amount.

All values are provided on a nominal basis for the “Example Scenario” and the sheet details the same cost and revenue categories as provided in the Shadow Bid Tool for the public and private entities. Together with the “Model VfM_PSC Outputs” table, this sheet is essential for generating several results charts in the Financial Assessment Tool. The project cash flows may also support users seeking further insight into the key cost components of the private delivery structure.

Model VfM_PSC Outputs

This table provides a breakdown of the costs and revenues associated with the PSC and the P3 Estimate for comparative purposes. The costs and revenues in the table reflect the P70 results for the PSC and the P3 Estimate in nominal dollars (i.e., total cash flows in current or year of expenditure dollars). Many of the items presented in this table for the P3 Estimate are costs incurred by the private entity in delivering the project. These costs are displayed in detail on the “VfM Cash Flow Summary” sheet. The table also includes the total nominal value of payments to the private partner to illustrate how the costs incurred by the private entity support the payment calculation. Results Chart 5 presents a summary graph of the comparison table (see Figure 3-9 at the end of this chapter). Each numbered line item of the table is discussed below and the table for the Example Scenario is provided in Figure 3-3.

Line 1: Baseline Lifecycle Costs

This line provides the nominal costs of designing, constructing, operating and maintaining the facility independent of risk. The PSC Costs column shows these costs for a conventional procurement. The Shadow Bid Costs column shows these costs for a P3 procurement. The Shadow Bid baseline costs may differ from the PSC costs if the user has entered different cost and timing assumptions in the Shadow Bid and PSC tools or if the user has entered cost efficiency assumptions in the Shadow Bid Tool.

Lines 2 and 3: Values of Retained Risks and Transferrable Risks

Lines 2 and 3 show the estimated impacts of risks on project costs under the P70 risk scenario for the PSC and the P3 Estimate. Risk assumptions for the PSC and P3 Estimate may be drawn from results of simulations conducted in the Risk Assessment Tool. Based on the results of the risk assessment the user may have entered different risk values in the PSC than in the Shadow Bid. For example, the user may have assumed that a private partner may be more capable of managing transferrable risks than a public agency and thus entered lower risk values in the Shadow Bid Tool than in the PSC Tool. In the PSC, the retained risk impacts and the transferrable risk impacts count as costs to the public partner. In the Shadow Bid, retained risk impacts count as public costs, but transferrable risks are counted as private partner costs.



Figure 3-3. Cost Breakdown Comparison

Components of the PSC and SB	PSC COSTS (Nominal \$)	SB COSTS (Nominal \$)
<i>Design/Construction</i>	\$ 500,000,000	\$ 450,000,000
<i>Operation</i>	\$ 58,287,937	\$ 57,713,658
<i>Routine Maintenance</i>	\$ 29,143,969	\$ 28,856,829
<i>Periodic Maintenance</i>	\$ 414,056,238	\$ 372,650,614
1. Baseline Lifecycle Costs	\$ 1,001,488,144	\$ 909,221,101
<i>Retained Construction Risk Impact on Project Costs (P70)</i>	\$ 90,274,491	\$ 54,164,694
<i>Retained O&M Risk Impact on Project Costs (P70)</i>	\$ 5,934,996	\$ 1,004,938
2. Total Retained Risk Impacts	\$ 96,209,488	\$ 55,169,633
<i>Transferrable Construction Risk Impact (P70)</i>	\$ 75,387,376	\$ 45,232,426
<i>Transferrable O&M Risk Impact (P70)</i>	\$ 43,103,963	\$ 5,181,533
3. Total Transferrable Risk Impacts	\$ 118,491,339	\$ 50,413,959
<i>Federal Tax</i>		\$ -
<i>State Tax</i>		\$ -
4. Tax Costs	\$ -	\$ -
<i>Amount Borrowed for Construction and Interest Reserve (Base)</i>	\$ (473,836,583)	\$ (297,500,000)
<i>Total Debt Payments for Construction and Interest Reserve (Base)</i>	\$ 931,298,911	\$ 689,898,664
5. Total Debt Costs (Base)	\$ 457,462,329	\$ 392,398,664
<i>Risk Impact on Total Borrowing (P70)</i>	\$ (196,516,524)	\$ (45,748,352)
<i>Risk Impact on Total Debt Payments (P70)</i>	\$ 387,824,198	\$ 107,134,856
6. Risk Impacts on Total Debt Costs (P70)	\$ 191,307,674	\$ 61,386,504
<i>Equity Investment</i>		\$ (71,664,294)
<i>Equity Returns</i>		\$ 901,805,057
7. Total Costs of Equity	\$ -	\$ 830,140,763
8. Total P70 Finance Costs (including equity returns)	\$ 648,770,002	\$ 1,355,590,226
9. Sub-total (Total P70 project costs w/o adjustments or subsidies)	\$ 1,864,958,972	\$ 2,243,560,991
10. Revenues	\$ -	\$ -
11. Competitive Neutrality	\$ -	
12. Other Project Costs	\$ 40,000,000	\$ 40,000,000
13. External Subsidies	\$ (100,000,000)	\$ (100,000,000)
<i>14. Total Costs to Private Partner (including equity returns)</i>	\$ -	\$ 2,143,560,991
<i>15. Total Payments to Private Partner (P70)</i>	\$ -	\$ (2,106,902,790)
16. Total Adjusted Cost to Public Agency	\$ 1,804,958,972	\$ 2,202,072,423

Accounting for Toll Revenues and Toll Revenue Risk

In the prepopulated Example Scenario, toll revenue risk is not accounted for in line items 2 and 3. While a toll concession would bear the costs of revenue risk (which are retained by the procuring agency in the PSC and in the availability payment concession model), this risk is not included in the value of transferred risks, because its effect is incorporated in the higher costs for financing for a toll concession in line 8.

For the toll concession model, higher revenue risk will result in lenders and equity investors requiring a risk premium (i.e., a higher rate of return than for the availability payment model). This risk premium further increases finance costs and would be accounted for in lines 5, 6 and 7 in the toll concession option. This increase includes the value of revenue risk taken on by the concessionaire. The toll revenue risk is retained by the public agency in the PSC and availability payment models and should be accounted for under competitive neutrality in line 11.

When modeling an availability payment shadow bid, toll revenue will typically be assumed to be equivalent in the PSC and the Shadow Bid since the public agency would be entirely in control of setting toll rates in both cases. Higher toll revenue may be estimated for a toll concession Shadow Bid, since the private sector may be more aggressive in setting toll rates (within the limits imposed by the P3 agreement) and may seek revenue in innovative ways.

Line 4: Tax Costs

Tax costs calculated for the Shadow Bid reflect assumptions concerning the costs associated with Federal and State corporate income taxes paid by the private partner under a P3 arrangement. While a contractor responsible for delivering a project in a PSC and subcontractors of a concessionaire will also incur taxes it is assumed those costs are incorporated into the baseline costs.

Line 5: Total Debt Costs (Base)

Total debt costs represent the costs of borrowing to finance the design, construction, operation and maintenance of the project independent of risks. They include the costs of borrowing to fund both the construction costs and the interest reserve needed to meet the required debt service coverage ratio associated with the project financing. The total debt costs are equal to the total debt payments minus the total amount borrowed.

Line 6: Risk Impacts on Total Debt Costs

Additional borrowing is required to finance the impacts of risks on project costs. The Risk Impacts on Total Debt Costs represent the additional borrowing costs incurred under a P70 risk scenario. For the PSC, the totals reflect additional borrowing necessary to meet the costs associated with both retained and transferrable construction risks. For the Shadow Bid, the additional borrowing accounts for the impacts of transferrable risks alone.



Line 7: Total Costs of Equity

This line represents the costs of equity as the total amount of cash returned to equity investors in a P3 minus the total equity invested (i.e., cash in-flow from equity investors). Equity returns are calculated based on assumptions in the Shadow Bid Tool related to the portion of the project financed through equity investment and the expected rate of return tied to the equity invested. While technically not a cost to the private partner, they are factored into the calculation of the total payment to the private partner in the Shadow Bid.

Line 8: Total P70 Finance Costs (including equity returns)

This represents the sum of finance and equity costs as calculated in lines 5, 6 and 7.

Line 9: Sub-Total (Total P70 project costs w/o adjustments or subsidies)

This represents the total risk-adjusted, nominal costs associated with the project. For both the PSC and the Shadow Bid it includes the baseline life cycle costs, the retained and transferrable risk impacts, and the total financing costs. The Shadow Bid subtotal also includes any tax costs.

Line 10: Revenues

This line includes any project revenues from either tolls or other sources. In the PSC model, the revenues are retained by the public sector and are subtracted from project costs to calculate the total costs of the project to the public agency. For the Shadow Bid the treatment of revenue depends on the payment model assumed in the Shadow Bid Tool. In an availability payment or shadow toll model, the revenues are subtracted from the total payments to the private partner to calculate the total nominal costs of the project. In a real toll model, the revenues are retained by the private partner and are factored into the calculation of payments to the private partner. To ensure that revenues are treated appropriately in the calculation of private partner payments the user should select the appropriate payment model in the dropdown menu to the right of Line 15.

Line 11: Competitive Neutrality

This line includes adjustments to the PSC costs to account for differences in the way the public sector and the private sector treat certain costs and revenues. The adjustments for competitive neutrality are typically positive and are generally added to the PSC costs to account for: (1) the opportunity costs of real estate, sales and corporate taxes that would be paid by the concessionaire to the State or local government under a P3; and (2) toll revenue risk. Since the perspective taken in the VfM analysis is that of a State government sponsor, Federal taxes paid by the concessionaire may be ignored, as well as any Federal tax benefits to the concessionaire from depreciation allowances. An alternative way to represent the tax adjustments would be to subtract the concessionaire's tax payments in the Shadow Bid under the competitive neutrality line item.

Line 12: Other Projects Costs

Other project costs include costs to the public sector associated with project development, procurement and oversight that are otherwise not accounted for in the project's design, construction, operations, maintenance and finance costs. Generally, these costs would be similar for both the PSC and the Shadow Bid. Procurement costs may be included in the baseline PSC life cycle cost estimates and care should be taken to avoid double-counting these costs. These costs are added to the Shadow Bid estimates to account for public agency costs for procurement and oversight under the P3 options.

Line 13: External Subsidies

This line accounts for funding provided to the project from sources outside the public agency sponsoring the project (e.g., Federal funding). This funding is subtracted from the costs to the public agency in both the PSC and the Shadow Bid.

Line 14: Total Pre-Payment Net Costs to Private Partner

This line represents the total nominal costs incurred by the private partner in the Shadow Bid model. It includes total risk-adjusted, nominal costs associated with the project including financing costs and equity returns, minus any subsidies or revenues received by the private partner. To ensure that revenues are treated appropriately in calculating the pre-payment net costs to the private partner the user should select the payment model used to calculate results in the Shadow Bid Tool using the drop-down menu to the right of line 15.

Line 15: Total Payments to Private Partner

This line represents the sum of any payments made by the public sponsor agency to the private partner in the Shadow Bid. The Shadow Bid Tool treats payments to the private partner differently depending on the payment model selected. For an availability payment model, payments are made on an annual basis beginning at the end of construction and continuing through the concession term. In a real toll model the payment is made as a lump sum payment upon construction completion. In a shadow toll model, the public agency pays the private partner based on annual facility traffic and established shadow toll rates. The total payments to the private partner should be roughly equal to the total costs to the private partner. They may differ slightly due to the two percent tolerance level set in the Shadow Bid Tool for calculating these payments.

Line 16: Total Adjusted Cost to Public Agency

The total adjusted costs to the public agency include the total payments to the private partner and the cost impacts of retained risks as well as any competitive neutrality adjustments. These costs are offset by any revenues or external subsidies the public agency may receive.



NPC Results

This sheet displays the “NPC Results” data imported from the PSC Tool and Shadow Bid Tool to illustrate a comparison of the PSC and P3 Estimate in NPC terms to identify which delivery method may provide greater value to the public agency. If the user would like to update the scenario, such as changing the discount rate, then it is necessary to first update the underlying PSC Tool or Shadow Bid Tool, save the changes, and re-import the file in the “Source Data” sheet in the Financial Assessment Tool. The tool is not capable of applying different discount rates to cash flows depending on the risk level (i.e., P10, P70 or P90). Users would need to run the tools three times (once for each of three different discount rates) and would need to select results for the discount rate/risk level combination that is appropriate.

The “NPC Results” calculated in the PSC Tool and the Shadow Bid Tool are based on a DCF analysis of the net costs of delivering the project under each delivery method. A DCF involves forecasting all revenues and costs for a project into the future. The streams of cash flows to and from the public agency are discounted to estimate the value of the project in today’s dollars. The discount rate is applied to the project cash flows in each period. The Financial Assessment Tool imports the results of the DCF analysis completed in the PSC Tool and the Shadow Bid Tool and presents the results on the “NPC Results” sheet as a side-by-side comparison.

Discounted Cash Flow Analysis and Financing Costs

Depending on the level of interest rates and the term of the borrowing, the debt cost shown in lines 5 and 6 (i.e., annual interest payments) can significantly increase a project’s overall costs in nominal terms. Since the rates of return required for private debt and equity will generally exceed the public sector’s borrowing rate, differences in finance costs may result in large differences in the nominal costs between the PSC and the shadow bid.

In VfM Analysis the costs of financing, which are incurred in throughout the term of the debt, are discounted to calculate the net present costs of the PSC and Shadow Bid. Depending on the discount rate used and the borrowing rates assumed, those costs may even result in negative net present costs. For example, the present value of the debt service on a bond issue discounted at the effective borrowing rate by definition equals the par amount borrowed. Thus, for the PSC, the effective cost of debt financing in present value terms would be near zero and (except for bond issuance costs) is equivalent to paying for the project with cash on hand. If the selected discount rate exceeds the procuring agency’s borrowing rate, debt financing costs would have a negative value. For the Shadow Bid, which will typically rely on debt borrowed at higher rates, discounting future cash flows using the public agency’s borrowing rate will not negate the costs of financing the project.

The results are presented as a table as shown in Figure 3-4. Project costs are summarized in the first section of the table. Any revenues generated by the project, such as toll revenues that are passed to the agency, are reflected in the “Toll and Other Revenue” line and subtracted from the costs to

calculate the “Total Payments.” Revenues that are retained by the concessionaire would be subtracted from its negative cash flows (i.e., its expenditures) to calculate the payment required by the concessionaire (in addition to toll revenues) to deliver the project.

Figure 3-4. VFM Analysis – NPC Results

P3C Discount Rate: 5%	Nominal Payment Value		PV of Payment with P50 Risk Adjustment		PV of Payment with P70 Risk Adjustment		PV of Payment with P90 Risk Adjustment	
	P3C	SB	P3C	SB	P3C	SB	P3C	SB
VFM Discount Rate: 5%								
Project Payments								
Design Construction After Subsidy ⁽¹⁾	\$ -	(\$ -)	\$ -	(\$ -)	\$ -	(\$ -)	\$ -	(\$ -)
Operations	\$ 58,287,937	(\$ -)	\$ 17,821,845	(\$ -)	\$ 17,821,845	(\$ -)	\$ 17,821,845	(\$ -)
Resume Maintenance	\$ 29,143,969	(\$ -)	\$ 8,910,922	(\$ -)	\$ 8,910,922	(\$ -)	\$ 8,910,922	(\$ -)
Periodic Maintenance	\$ 418,056,238	(\$ -)	\$ 114,274,912	(\$ -)	\$ 114,274,912	(\$ -)	\$ 114,274,912	(\$ -)
Risk Adjustments								
Construction Transferable Risk ⁽²⁾	\$ -	(\$ -)	\$ -	(\$ -)	\$ -	(\$ -)	\$ -	(\$ -)
Construction Retained Risk ⁽²⁾	\$ -	(\$ -)	\$ -	(\$ -)	\$ 16,875,193	(\$ -)	\$ 42,016,309	(\$ -)
Operations & Maintenance Transferable Risk	\$ -	(\$ -)	\$ 5,261,424	(\$ -)	\$ 13,179,264	(\$ -)	\$ 36,106,717	(\$ -)
Operations & Maintenance Retained Risk	\$ -	(\$ -)	\$ 719,908	(\$ -)	\$ 437,845	(\$ -)	\$ 307,265	(\$ -)
Availability Payment	\$ -	\$ 1,894,776,060	\$ -	\$ 618,462,153	\$ -	\$ 660,105,124	\$ -	\$ 689,740,693
Payment Type								
Adjustments								
P3C Adjustments	\$ -	N/A	\$ -	N/A	\$ -	N/A	\$ -	N/A
Financing								
Principal Debt Payments	\$ 400,000,000	(\$ -)	\$ 149,074,792	(\$ -)	\$ 182,331,858	(\$ -)	\$ 197,677,645	(\$ -)
Interest & Fee Payments	\$ 457,462,328	(\$ -)	\$ 257,971,344	(\$ -)	\$ 315,795,453	(\$ -)	\$ 342,450,283	(\$ -)
Other Project Costs	\$ 40,000,000	\$ 40,000,000	\$ 35,770,085	\$ 35,770,085	\$ 35,770,085	\$ 35,770,085	\$ 35,770,085	\$ 35,770,085
Toll + Other Revenues	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Payments	\$ 1,398,850,473	\$ 1,924,776,060	\$ 689,889,097	\$ 671,565,377	\$ 739,199,793	\$ 737,426,632	\$ 780,502,784	
Notional Value For Money (\$)	(\$525,825,587)		(\$81,790,146)		(\$48,309,636)		(\$43,076,152)	
Notional Value For Money % of P3C	-38%		-14%		-7%		-6%	

⁽¹⁾Included in the Availability Payment
⁽²⁾The payment value shown for these items under the P3C represents any unfinanced payments for the agency. Repayment of the debt utilized for these items is reflected in Principal Debt Payments.

The NPC is provided for the P3C and P3 Estimate, indicating the cost to the agency of delivering the project under each delivery structure, including:

- ▶ The initial project estimate, which excludes the risk adjustments provided from the risk assessment process; and
- ▶ The risk-adjusted NPC at the 10th percentile, 70th percentile, and 90th percentile values.

Value for money is calculated by subtracting the NPC of the P3 Estimate from the NPC of the P3C. The result of this calculation is shown as a dollar value and also as a percentage of the P3C. If this value is positive, then the NPC of delivering the project as a P3 is lower than the NPC of delivering the project by public delivery, indicating that the P3 provides greater value to the public agency. In the prepopulated scenario, the “NPC Results” sheet in the Financial Assessment Tool indicates that the “Example Scenario” is less expensive under the public delivery structure, as the “Notional Value for Money” is negative under the initial project and risk adjusted cash flows.

Often, when the NPV of the P3C is compared with the NPC of the Shadow Bid, a saving may be estimated. The reduced value of risks and life cycle costs and higher toll revenue yield under a toll concession may more than make up for its higher financing and procurement costs, so the net financial savings for the public agency may be positive. In an availability payment model, life cycle cost efficiencies and reductions in risk costs may still exceed the higher financing costs, producing value for money.

The savings to the public agency estimated in a Shadow Bid may be relatively small compared to the total costs of the two procurement options. This is not unusual in quantitative VFM analyses.



Qualitative factors are often more important in making the final VfM determination. Together, the quantitative and qualitative assessments typically inform the overall VfM analysis and decisionmaking process. Qualitative factors that should be considered in a pre-procurement VfM assessment may include, for example, earlier project delivery.

Reviewing the Results

The Financial Assessment Tool includes five charts to assist the user in understanding and interpreting the results of the VfM analysis. The data provided on the “Model VfM_PSC Output Sheet,” “NPC Results,” the “PSC Cash Flow Summary,” and “VfM Cash flow Summary” sheets form the basis of the charts provided, which include:

- ▶ **Results Chart 1** provides a “VfM Quantitative Analysis” chart comparing the costs under PSC delivery and P3 delivery in net present terms (see Figure 3-5). This chart provides a snapshot of the “NPC Results” for the selected risk adjustment, with each component of the PSC and VfM delivery structures compared so the user can identify the components that have the greatest impact on the VfM analysis results. The data provided in this chart reflect the risk percentile indicated to the left of the chart. Users can change the risk percentile by making a selection from the drop-down menu.
- ▶ **Results Chart 2** provides a “PSC Cash Flow Summary” chart indicating the total costs and revenues of the public delivery over the life of the project (see Figure 3-6). This chart may be useful in understanding how the project’s cash flows under public sector delivery impact the agency’s budget. The data provided in this chart reflect the risk percentile indicated to the left of the chart. Users can change the risk percentile by making a selection from the drop-down menu.
- ▶ **Results Chart 3** provides a “P3 Cash Flow Summary” chart indicating the agency’s costs and revenues of P3 delivery over the life of the project (see Figure 3-7). Similar to Results Chart 2, this may be useful for the agency as it considers the budgetary impact of delivering the project as a P3. The data provided in this chart reflect the risk percentile indicated to the left of the chart. Users can change the risk percentile by making a selection from the drop-down menu.
- ▶ **Results Chart 4** provides a “Net Cash Flow Comparison” line graph comparing the net cost to the agency of each delivery structure over the life of the project (see Figure 3-8). When examining the VfM analysis results, this chart may be helpful in understanding the net budgetary impact of the delivery structures. For example, the “Net PSC Cost” for the prepopulated “Example Scenario” indicates that there is a sharp increase in costs for each periodic maintenance period. In contrast, the “Net VfM Cost” line is more stable throughout the concession period and these sharp increases are not reflected in the “Net VfM Cost” as they are contained in the payment amount. This difference partly explains the “Net VfM Cost” increasing steadily above the “Net PSC Cost” over the life of the concession. This type of information may be useful for an agency when considering the affordability of each delivery

structure, the predictability or certainty of the project costs over the life of the project, and in understanding the relative advantages and disadvantages of each delivery structure as part of the VfM analysis process. The data provided in this chart reflect the risk percentile indicated to the left of the chart. Users can change the risk percentile by making a selection from the drop-down menu.

- ▶ **Results Chart 5** provides a “SB PSC Cost Breakdown Comparison” chart comparing the costs of PSC and P3 delivery in nominal dollars (see Figure 3-9). The chart is based on the data presented in the cost breakdown comparison table in the “Model VfM_PSC Output Sheet.” Users may compare the total costs to determine value for money and may examine the individual components to identify which components have the greatest impact on the VfM analysis results.

Figure 3-5. Results Chart 1 – VfM Quantitative Analysis

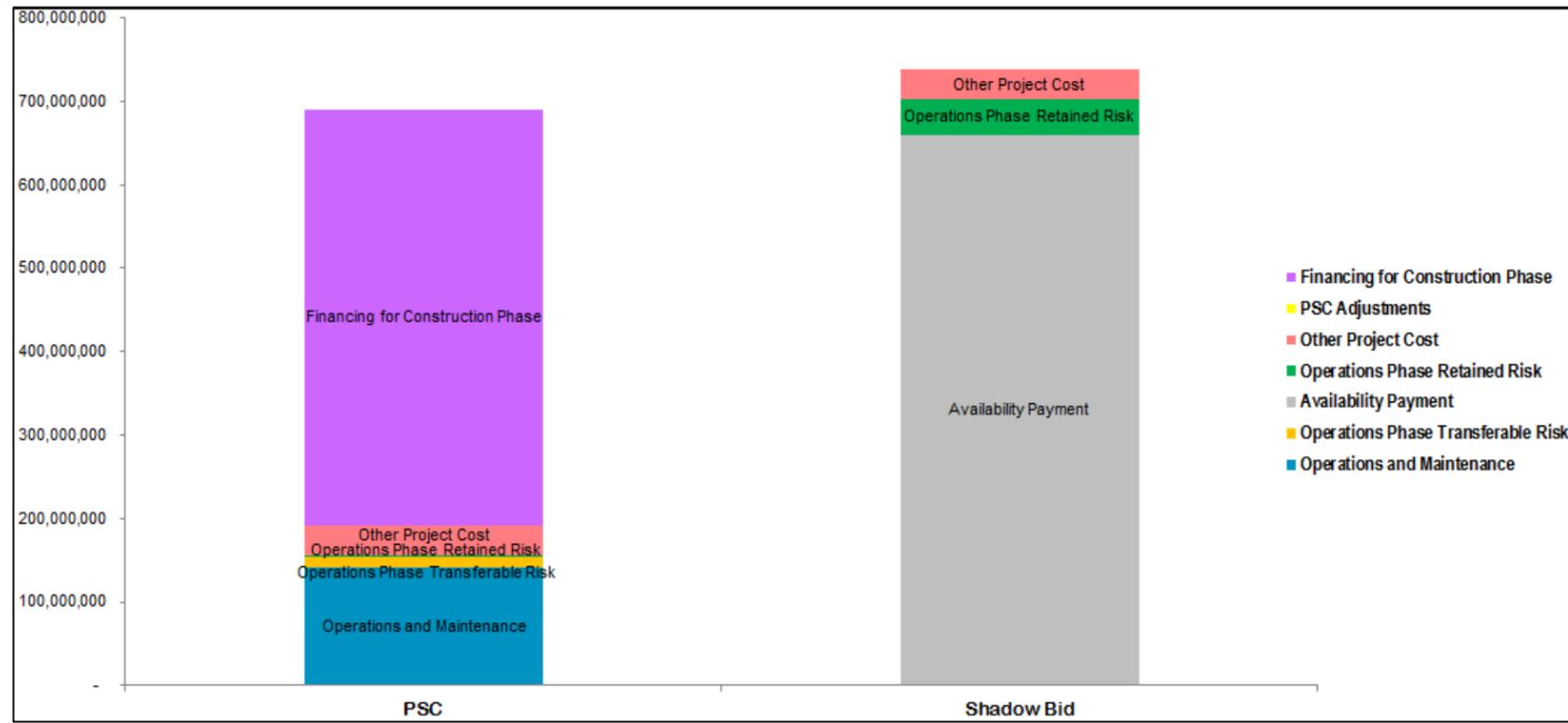


Figure 3-6. Results Chart 2 – PSC Cash Flow Summary

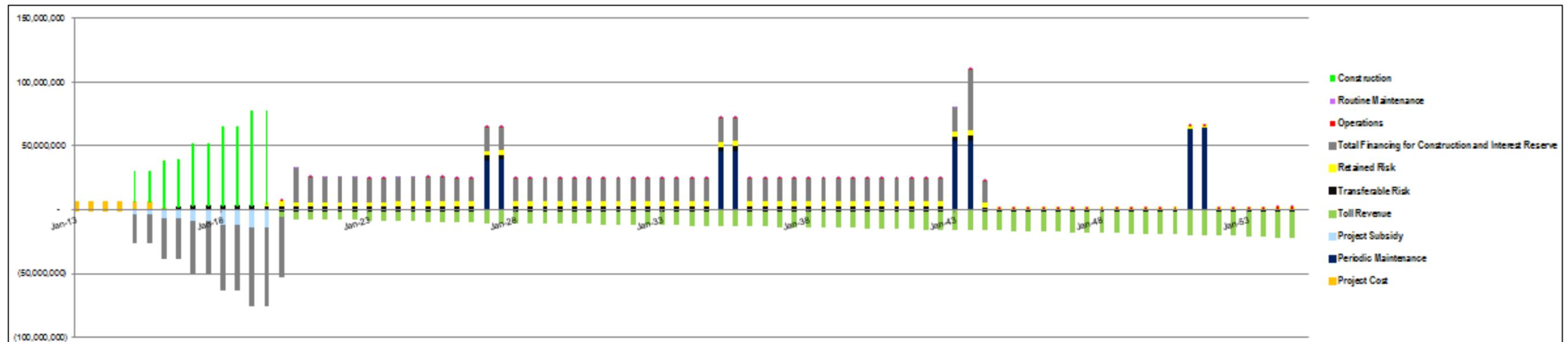


Figure 3-7. Results Chart 3 – P3 Cash Flow Summary

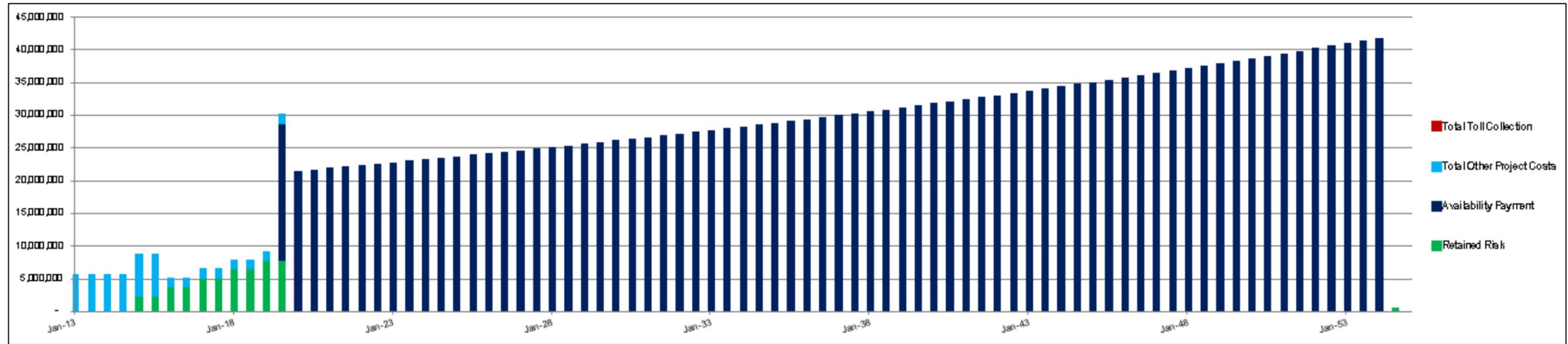


Figure 3-8. Results Chart 4 – Net Cash Flow Comparison

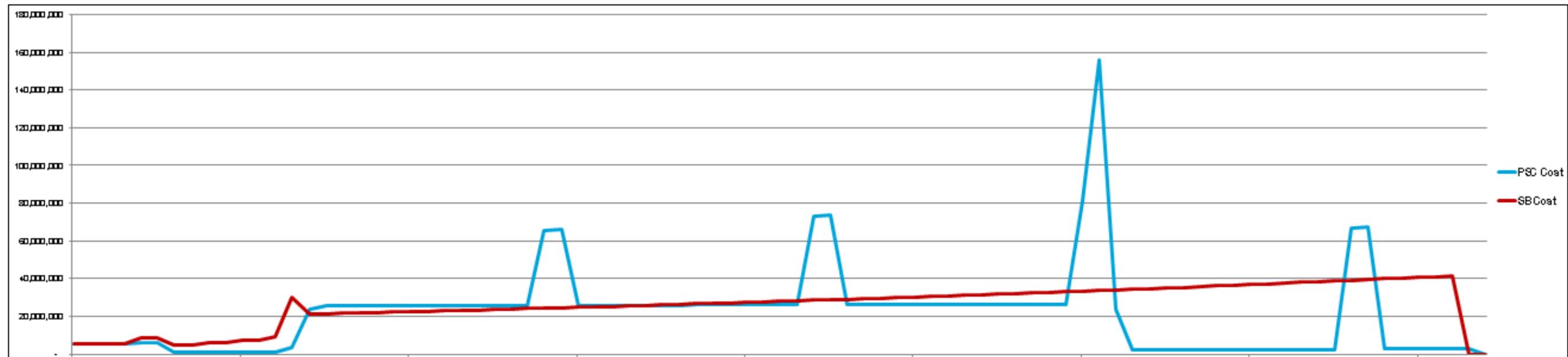
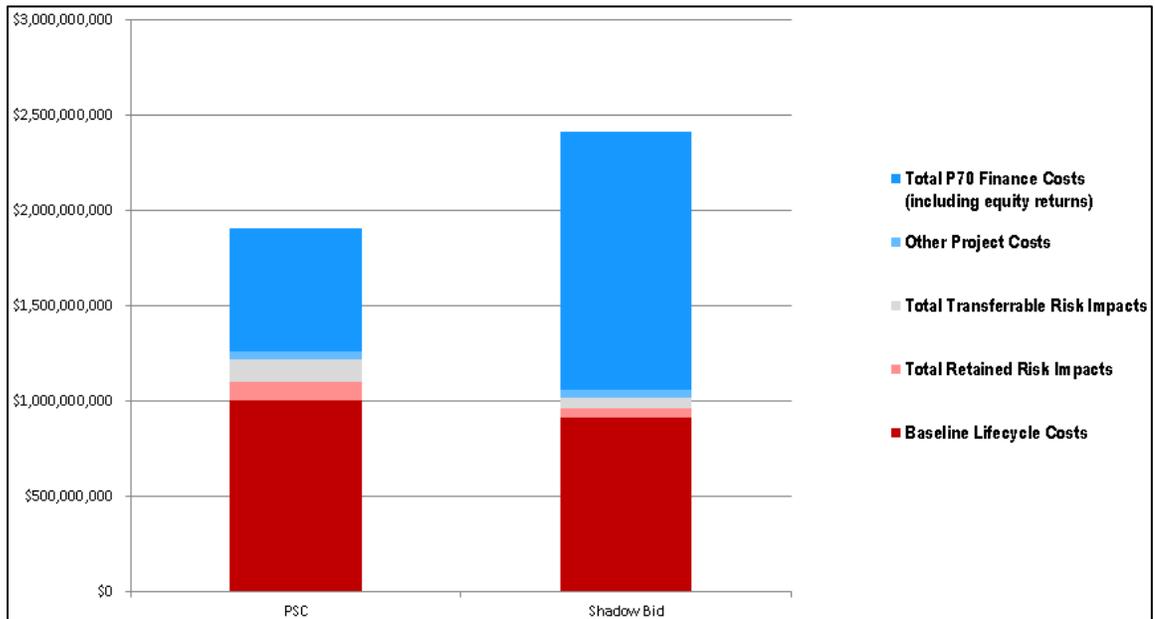


Figure 3-9. Results Chart 5 – SB PSC Cost Breakdown Comparison



4 Viability Assessment

Prior to conducting a value for money analysis to determine whether a public or private delivery structure would provide greater value, public agencies conduct a viability assessment (also known as “affordability assessment” or “financial feasibility assessment”) to analyze:

- ▶ The overall project viability;
- ▶ The level of funding that may be required to deliver the project if the project costs are greater than its revenues; and
- ▶ The associated financing costs of providing this level of funding.

Unlike a VfM analysis, a viability assessment does *not* consider the project procurement method (i.e. public or P3). Based on users’ assumptions, the “Viability Assessment” section of the Financial Assessment Tool calculates a project’s net costs. The “Viability Assessment” section also provides a scenario analysis function for the user to assess the cost to the agency if it utilizes financing in delivering the project as a P3. The sheets of the “Viability Assessment” are detailed below.

Assumptions

The “Assumptions” sheet provides the data inputs for constructing the project cash flows, which provide an estimate of the net cost of the project, before consideration of the project procurement method (the PSC Tool and Shadow Bid Tool reflect those assumptions specific to public or P3 project delivery methods, respectively).

Using the Financial Assessment Tool

The general categories of assumptions included in the Viability Assessment are:

- Project and Traffic Scenarios
- Project Delivery Structure (i.e., whether O & M and tolling are included)
- Timing
- Construction Costs
- Operating & Maintenance Costs
- Toll & Other Revenue
- Funding
- Inflation and Discount Rate
- Other Project Costs for the Agency

The assumptions are explained below and users may also refer to the PSC User Manual and Shadow Bid User Manual for a better understanding of the Viability Assessment inputs, though unlike the Shadow Bid and PSC Tools, the Viability Assessment reflects neither a private nor a public delivery.

Project and Traffic Scenarios

The “Example Scenario” demonstrates the range of assumptions that underpin a Viability Assessment. Users can select the “Example Scenario” from the “Project” drop-down menu at the top of the “Assumptions” sheet and click “Load Project” to view the assumptions. Upon loading the scenario, users can save edits made to the assumptions by pressing the “Save Project” button. Pressing the “Refresh Project List” button will refresh the assumptions back to the initial scenario. A new scenario can be included by clicking the “Create Project” button, inserting the scenario name and pressing the “Load Project” button.

The Viability Assessment also includes tolling examples that can be included in the scenario. Users can select the “Variable Tolling Example,” “Simple Tolling Example,” or “Toll Scenario Template” from the “Traffic Scenarios” drop-down menu. Upon selecting a traffic scenario, users can click on the “Load Scenario” button to load the scenario. They may then navigate to the corresponding sheet and modify the pre-populated toll rate and traffic volume assumptions (though if the “Toll Scenario Template” is selected, users must populate the entire sheet).

Project Delivery Structure

The example project stored in the Financial Assessment Tool demonstrates the viability analysis for different Project Delivery Structures (e.g., whether tolling and O & M are included). Users can alter the delivery structure of an example project through selecting or de-selecting the ‘Project Delivery Structure’ check boxes. The Financial Assessment Tool allows users to enter assumptions relevant to the Project Delivery Structure selected. The components of the Project Delivery Structure provided in the Financial Assessment Tool are:

- ▶ **Design Build:** The ‘design’ aspect refers to completing plans for the project, which includes producing engineering drawings and selecting construction materials and the construction site. ‘Build’ refers to constructing the road, which includes reviewing conditions at the building site, providing construction staff and materials, selecting equipment, and, when necessary, amending the design to address problems discovered during the construction phase.
- ▶ **Finance:** Financing includes providing capital for the project, which may include issuing debt such as project revenue bonds.
- ▶ **Operations:** Operations facilitates the performance and availability of the highway, which includes removing debris and snow. It may also include the cost of collecting traffic data.
- ▶ **Maintenance:** Maintenance keeps the project in a state of good repair, which includes filling potholes, repaving or rebuilding roadways, and ensuring the integrity of bridges and highways.
- ▶ **Toll Collection:** Toll collection includes the installation and operation of toll booths.

Timing

The “Timing” assumptions develop the project cash flows and define when specific costs and inflation factors apply to the project. The project delivery structure determines which “Timing”



assumptions are applicable for the example project. For example, if toll collection is not included in the project delivery structure, then the tolling-related timing assumptions are not visible.

Users can manually input data for the following “Timing” assumptions:

- ▶ Base Date (date – format YYYY)
- ▶ Construction Period (no. years from 1 to 10)
- ▶ Construction Start (date – format YYYY)
- ▶ Operations Period (no. years from 1 to 75)
- ▶ Operations Start (date – format YYYY)

Based on the inputs to these “Timing” assumptions, the following fields will be calculated:

- ▶ Concession Period (no. years) – Sum of the construction period and the operations period
- ▶ Construction End (date) – Adds the construction period to the construction start
- ▶ Operations End (date) – Adds the operations period to the operations start
- ▶ Tolling Period (no. years) – Equals the operations period
- ▶ Tolling Start (date) – Equals the operations start
- ▶ Tolling End (date) – Adds the tolling period to the tolling start

The “Timing” assumptions are used to support the project delivery structure selected in the Financial Assessment Tool. For example, a design-build-finance delivery structure can be shown by checking the Design Build and Finance check boxes. The “Timing” assumptions and other assumptions fields that relate to this structure, such as “Construction Start” and “Financing”, are then visible and can be completed.

Entering Cost Assumptions

Users should estimate their cost assumptions in base year dollars (*not* current or year of expenditure dollars) consistent with the base date defined in the “Timing” assumptions table. All costs are inflated based on the user’s assumptions entered in the “Inflation” table.

Other Project Costs

These assumptions reflect the project costs incurred by the agency as the project owner. The types of costs incurred by the agency can vary and may include costs associated with the acquisition of any right-of-way (ROW), preliminary design costs, procurement or transaction costs, quality assurance, related works, owner costs / construction engineering costs (which include the allowable costs for environmental evaluation and documentation, permits, or approvals), or other miscellaneous project costs.

Construction Costs

The “Construction Costs” reflect the costs associated with the project’s design and construction phases. Specific costs may include the cost of the design-build contract or the total of the separate costs of the design contract and construction contract (under a design-bid-build structure, the bid costs are reflected under “Project Costs”). These costs are provided in the “Asset Type” column. Based on estimated costs, users may input the total dollar value of each cost in the “Cost (\$)” field and then determine the allocation of each cost across the design and construction phase as percentages of the total cost.

Operating and Maintenance (O&M) Costs

In the Financial Assessment Tool, the operations and routine maintenance costs are provided as annual values, and can be entered as either a percentage of construction (Column E) or as a dollar value (Column F). Users may enter operation and maintenance cost assumptions in the “Assumptions” sheet. Typical maintenance costs include:

- ▶ **Routine maintenance** that is planned and performed on a routine basis to maintain and preserve the condition of the highway system; and
- ▶ **Periodic or preventive maintenance** that includes resealing, re-gravelling, or new line markings at regular intervals during operations.

The assumptions required for “Periodic Maintenance Costs” are the same as for routine maintenance; however, users can enter a number in the “Years Per Period” field to indicate how often the periodic maintenance is completed. For example, if the “Years Per Period” field indicates “8”, then the “Periodic Maintenance Costs” will occur every eight years during the operations phase. Note that if users choose to input O&M costs as dollar values, the adjacent cells in column E black out to ensure that the inputs are only either dollar values or percentages

Toll & Other Revenue

Public agencies typically conduct traffic and revenue (T&R) studies to evaluate the feasibility of tolling a project based on specific policy objectives. The policy objectives usually include one of two criteria: revenue generation or traffic demand management. The outcomes from the T&R studies provide the basis for the tolling and revenue assumptions in a Viability Assessment:

- ▶ The “Toll Revenue Leakage” assumption reflects a set percentage of revenue that is not collected each year (i.e., due to unpaid toll violations). “Toll Revenue Leakage” is expressed as a percentage deducted from annual gross revenues and is entered as a negative value.
- ▶ The “Toll Revenue Ramp-Up” period reflects the period after the road opens where initial traffic volumes increase to a steady state. The ramp-up period may be up to six years long. Users can enter a negative percentage value per year. It is important to review the traffic assumptions to assess if the ramp-up period has already been factored into the traffic volumes.



If so, leaving the ramp-up period assumptions out will avoid double counting the impact of the ramp-up period. Similarly, if toll revenue values are inputs to the Financial Assessment Tool, it is important to consider whether toll leakage has already been accounted for in these values prior to including this assumption.

- ▶ “Annual Non-Road Pricing Revenue” covers a wide landscape of strategies that may be employed to generate value from the project. Depending on the project, non-road pricing strategies may involve the sharing of costs, revenues or financial risk between public and private partners, or may impose fees or taxes on defined groups expected to benefit from the project. For example, value capture strategies can be applied to roads to take advantage of the increased property values and other economic benefits produced by such improvements as in the case of the San Joaquin Toll Road in California and E-470 in Colorado. Non-road pricing strategies can be accounted for as project revenues.

Funding

The “Funding” assumptions reflect the amount of any grant or subsidy that the agency may receive during the construction phase of a project. The assumption can be provided as an amount of total funding or it can be set as a percent of the construction costs.

Inflation

There are four inflation factors provided as assumptions in the Viability Assessment. Users may input those assumptions as percentages for the following indices:

- ▶ Consumer Price Index (CPI) – Applies to all costs during the operations period as well as any non-road pricing revenue.
- ▶ An index for construction phase costs – Applies to construction costs if the field has a value greater than zero.
- ▶ An index for operations phase costs – Applies to operations period costs if the field is greater than zero (if zero, the CPI will be used).
- ▶ An index for toll rates (if the project delivery structure includes toll collection) – Applies to Toll Revenue.

Risk Values

The risk value assumptions are calculated in the Risk Assessment Tool. The Risk Assessment Tool also calculates risk allocations to the public and private partners as percentages, but those outputs do not become inputs to the Viability Assessment because only the total risk value is relevant for viability assessment. For the Viability Assessment, the key inputs from the Risk Assessment Tool are the 10th percentile, 70th percentile, and 90th percentile values for cost and schedule delays for the project’s construction and operations phases in real dollars.

Table 4-1 below specifies where users may locate the applicable risk outputs and where they should enter those values into the Viability Assessment section of the Financial Assessment Tool. It is important to note that users should use the risk values that result from completing the Risk Assessment Tool from the public perspective.

Table 4-1. Integrating Risk Assessment Outputs in the Financial Assessment Tool

OUTPUTS			INPUTS		
Risk Assessment Tool			Financial Assessment Tool		
<i>Worksheet</i>	<i>Field</i>	<i>Cell</i>	<i>Worksheet</i>		<i>Cell</i>
Table 5 – Cost Impact Outputs	P10 DB Subtotal	F26	Viability Assessment – Assumption	P10 Design Build Cost Impact	E78
Table 5 – Cost Impact Outputs	P70 DB Subtotal	G26	Viability Assessment – Assumption	P70 Design Build Cost Impact	F78
Table 5 – Cost Impact Outputs	P90 DB Subtotal	H26	Viability Assessment – Assumption	P90 Design Build Cost Impact	G78
Table 5 – Cost Impact Outputs	P10 Oper. Subtotal	F27	Viability Assessment – Assumption	P10 Operations Cost Impact	E79
Table 5 – Cost Impact Outputs	P70 Oper. Subtotal	G27	Viability Assessment – Assumption	P70 Operations Cost Impact	F79
Table 5 – Cost Impact Outputs	P90 Oper. Subtotal	H27	Viability Assessment – Assumption	P90 Operations Cost Impact	G79
Table 7 –Schedule Impact Output	P10 DB Subtotal	F38	Viability Assessment – Assumption	P10 Design Build Schedule Impact	E80
Table 7 –Schedule Impact Output	P70 DB Subtotal	G38	Viability Assessment – Assumption	P70 Design Build Schedule Impact	F80
Table 7 –Schedule Impact Output	P90 DB Subtotal	H38	Viability Assessment – Assumption	P90 Design Build Schedule Impact	G80
Table 7 –Schedule Impact Output	P10 Oper. Subtotal	F39	Viability Assessment – Assumption	P10 Operations Schedule Impact	E81
Table 7 –Schedule Impact Output	P70 Oper. Subtotal	G39	Viability Assessment – Assumption	P70 Operations Schedule Impact	F81
Table 7 –Schedule Impact Output	P90 Oper. Subtotal	H39	Viability Assessment – Assumption	P90 Operations Schedule Impact	G81



Discount Rate

Users may manually enter the discount rate as a percentage value in the “Rate” field. The discount rate is the factor applied to the cash flows to generate the project’s NPV or NPC. With a discounted cash flow analysis, all cash flows are discounted to their present value using the discount rate established by the public agency. The discount rate is the rate at which the cash flows occurring at different times in the future are brought to a base period.

A discounted cash flow analysis may utilize either a real or a nominal discount rate. The selection of a nominal or real discount rate should be consistent with the use of nominal or real project cash flows. The pre-populated “Example Scenario” includes inflation assumptions that are applied to the project cash flows. The Example Scenario’s nominal discount rate accounts for the effect of inflation and is therefore consistent with the cash flows being discounted. If users wish to apply a real discount rate, they should input inflation assumptions. Users should refer to the Shadow Bid Tool User Manual for additional information about discount rates.

Reviewing the Cash Flow Sheets

The project’s nominal cash flows are based on the assumptions entered in the “Assumptions” sheet. The cash flow sheets display the cash flows for the project assumptions, which are brought together in the Cash Flow Summary Sheet. The notional example provided in the “Viability Assessment” section generates the following cash flow sheets:

- ▶ **Project Cash Flow** – Includes flags and factors based on the timing and inflation assumptions that are needed to generate the project cash flows.
- ▶ **Construction** – Construction phase cash flows.
- ▶ **Operations and Maintenance** – Operations and maintenance cash flows.
- ▶ **Other Project Costs** – Nominal cash flows for other project costs.
- ▶ **Traffic Scenario** – If tolling is included, this sheet reflects the raw traffic and toll rates based on the Traffic Scenario selected on the “Assumptions” sheet.
- ▶ **Revenue CF** – Provides the gross annual revenues per vehicle classification.
- ▶ **Toll and Other Revenue** – Applies any revenue leakage and ramp-up assumptions to the gross toll revenues and calculates any non-road revenues.
- ▶ **Project Subsidy** – Cash flow for any funding provided to the project.
- ▶ **Risk** – Calculates the total risk values for cost and schedule delays.
- ▶ **Cash Flow Summary** – Summarizes the project’s cash flows.

Viability Outputs

The “Viability Disclaimer” must be accepted for the “Viability Output” sheet to be displayed. This sheet provides the net cost of the project cash flows in NPC terms. The “NPC Results” displayed on

the “Viability Output” sheet are based on DCF analysis. This type of analysis involves forecasting all revenue and cost cash streams (including capital expenditure) for a project into the future. The streams of cash flows to and from the public agency are discounted to estimate the value of the project in today’s dollars. The user’s discount rate assumption is converted into a discount factor for each cash flow period and is applied to the following cash flows throughout the concession period:

- ▶ **Costs** – Construction, operation, routine maintenance, periodic maintenance and other project costs;
- ▶ **Revenues** – Toll and other revenue, as well as project subsidy; and
- ▶ **Risks** – Transferrable and retained

The present values of these cash flows are contained in the “Cash Flow Viability – NPC Summary” table, which provides the total NPC to the agency of delivering the project. The results are provided for:

- ▶ The initial project estimate, which excludes the risk adjustments provided from the risk assessment process; and
- ▶ The risk-adjusted project cash flows at the 10th percentile, 70th percentile, and 90th percentile values.

Figure 4-1. Viability – NPC Summary Output Table

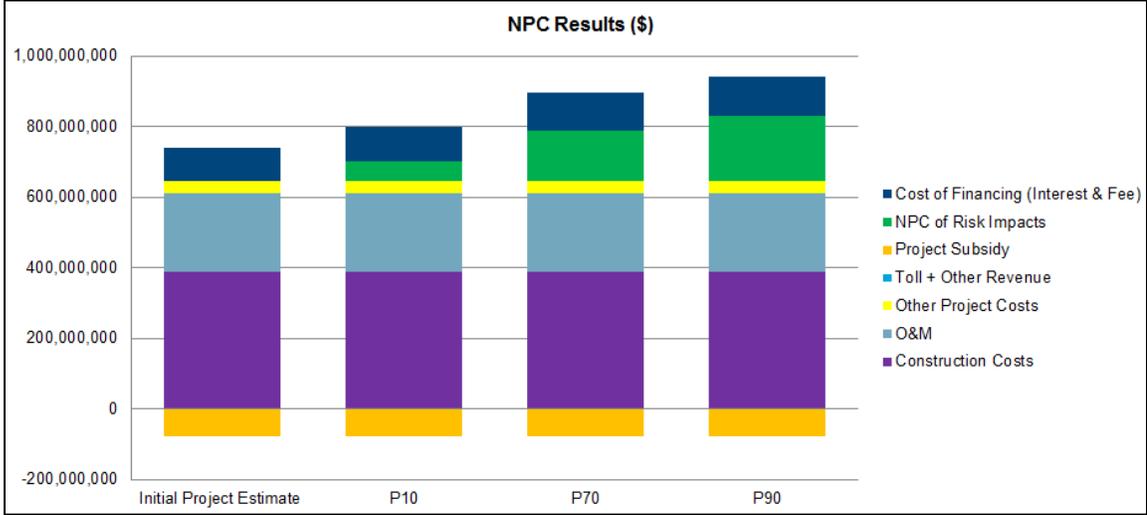
Cash Flow Viability - NPC Summary (\$)				
Nominal Discount Rate	Initial Project Estimate	P10	P70	P90
5.00%	NPC	NPC	NPC	NPC
<i>Costs</i>				
Construction Costs	387,856,973	387,856,973	387,856,973	387,856,973
O&M	221,205,979	221,205,979	221,205,979	221,205,979
Other Project Costs	35,770,085	35,770,085	35,770,085	35,770,085
NPC of Life Cycle Costs	644,833,037	644,833,037	644,833,037	644,833,037
<i>Revenues and Funding</i>				
Toll + Other Revenue	-	-	-	-
Project Subsidy	(77,571,395)	(77,571,395)	(77,571,395)	(77,571,395)
NPC of Revenues and Funding	(77,571,395)	(77,571,395)	(77,571,395)	(77,571,395)
NPC of Risk Impacts	N/A	54,927,134	143,500,141	185,718,834
Net Project Cost (excluding financing)	567,261,642	622,188,776	710,761,783	752,980,476
Cost of Financing (Interest & Fee)	94,098,664	99,553,428	106,458,159	109,879,825
Net Project Cost (including financing)	661,360,305	721,742,203	817,219,942	862,860,301

The value of each cost or revenue as shown in the “NPC Results” table is also depicted in a bar graph, as shown in Figure 4-2. Note that the second line from the bottom, “Cost of Financing” only



populates with data if the user turns the financing assumptions “on” in the Scenario Analysis (see Figure 4-4).

Figure 4-2. NPC Results Bar Graph



Sensitivity Analysis

A sensitivity analysis is provided on the “Viability Output” sheet to illustrate the sensitivity of the NPC results to changes in assumptions. To run the sensitivity analysis, the risk percentile can be selected from the drop-down menu in the top left hand corner. Users can choose whether to view the sensitivity analysis results as percentage changes or as dollar values by making the appropriate selection in the top left-hand corner via a drop-down menu, as shown in Figure 4-3. Once users make their selections, they may click the “Run Sensitivity” button to the right.

Figure 4-3. Sensitivity Analysis

Sensitivity Analysis of Cash Flow Viability NPC Results				
Select the Risk Percentile and the Result Type from the Drop Down Menus	P70	\$		
Multiplier	Construction Costs	Operating Costs	Routine & Periodic Maintenance Costs	Toll Revenue
-30%	\$ 479,923,917	\$ 625,216,929	\$ 593,607,732	\$ 630,563,483
-20%	\$ 530,137,106	\$ 626,999,114	\$ 605,926,316	\$ 630,563,483
-10%	\$ 580,350,294	\$ 628,781,298	\$ 618,244,899	\$ 630,563,483
0%	\$ 630,563,483	\$ 630,563,483	\$ 630,563,483	\$ 630,563,483
10%	\$ 680,776,671	\$ 632,345,667	\$ 642,882,066	\$ 630,563,483
20%	\$ 730,989,860	\$ 634,127,852	\$ 655,200,649	\$ 630,563,483
30%	\$ 781,203,048	\$ 635,910,036	\$ 667,519,233	\$ 630,563,483

Scenario Analysis

The scenario analysis displays the key project assumptions, their current values based on inputs provided on the ‘Assumptions’ sheet, and arrows to adjust the assumption values. After making changes to any of the assumptions, pressing F9 will update the “NPC Results” table, and pressing the “Reset” button will revert to the “Example Scenario” project assumptions.

As shown in Figure 4-4, the scenario analysis also provides the user with the option to assess the financing costs associated with financing the net project costs. To complete this scenario analysis, the user can select the following assumptions from the drop-down menus and arrows provided:

- ▶ **Scenario Type:** Select ‘Cash Flow Viability’ from the drop-down menu.
- ▶ **Financing Assumptions:** Select ‘On’ from the drop-down menu to view the additional assumptions required to complete the scenario analysis (this action will populate the “Cost of Financing” row of the NPC Summary Output Table).
 - **Facility Type:** Select ‘bond’ (financing is provided at the start of the project) or ‘draw’ (financing is drawn down as needed throughout the project).
 - **Maturity Period:** Insert the length of the maturity period in months.
 - **Interest Rate:** Insert the interest rate as an annual percentage.
 - **Facility Fees:** Insert the cost of facility fees as a percentage.
 - **Grace Period:** Insert the length of the grace period in months.

The NPC Results table can be updated by pressing the “Run Financing” button to include the cost of finance in the Results table.



Figure 4-4. Scenario Analysis

Scenario Analysis of Cash Flow Viability NPC Results			
Factor	Current Value	Units	
Concession Length	40	Years	Reset
Construction Length	5	Years	
Construction Cost	500,000,000	\$m	
Base Annual Operating Cost	1,000,000	\$m	
Base Periodic Maintenance Cost	60,000,000	\$m	Load Scenario
Periodic Maintenance Period	8	Years	
Base Routine Maintenance Cost	500,000	\$m	
CPI	2.00%	%	
Discount Rate	5.00%	%	Run Financing
Scenario Type <i>(Select From the Drop Down Menu)</i>	Cash Flow Viability		
Financing Assumptions <i>(Select From the Drop Down Menu)</i>	On		
Facility Type <i>(Select From the Drop Down Menu)</i>	Draw		
Maturity Period	360	Months	Run Financing
Interest Rate	2.00%	%	
Issuance Fee	1.00%	%	
Grace Period	0	Months	

In addition to providing a scenario analysis on the project cash flow viability as a conventional procurement, users can also conduct a separate scenario analysis to assess the costs of delivering the project as a P3. To conduct this scenario analysis, users can:

1. Select “VfM Viability” from the “Scenario Type” drop-down menu and press “Load Scenario” to update the “NPC Results” table with the net cost of delivering the project as a P3. These values are drawn from the “VfM Cash Flow Summary” sheet in the “VfM Analysis” section of the Financial Assessment Tool (which in reality provides Shadow Bid cash flows). The values displayed in the “NPC Results” table include the payment, other project costs, and retained risks.
2. Complete the financing assumptions as described for the cash flow viability scenario analysis and press the “Run Financing” button to include financing in the costs shown in the “NPC Results” table.

The sensitivity analysis chart will be shaded when the “NPC Results” table is displaying the “VfM Viability” scenario, as the assumptions listed in the sensitivity analysis table (such as construction costs and operation costs) are not costs that are incurred by the agency when delivering the project as P3.

5 Summary

The Financial Assessment Tool User Manual is an educational resource part of FHWA's P3-VALUE suite of tools. This User Manual corresponds to the FHWA Financial Assessment Tool and is intended to guide users in understanding how to conduct a value for money analysis and a financial viability assessment. Together, the Financial Assessment Tool and this User Manual provide:

- ▶ A side-by-side comparison of a notional PSC and P3 Estimate to complete a hypothetical quantitative VfM analysis process; and
- ▶ Information on the project cash flows and funding requirements.

The Financial Assessment Tool has been designed for use in FHWA-sponsored training. FHWA anticipates that at the conclusion of the training, users will have a greater understanding and appreciation of the VfM analysis process and several of the important considerations in conducting this type of analysis. FHWA encourages users to seek further guidance from appropriate experts (either in-house or external) to conduct a VfM analysis for real-world projects or to develop their own tools and processes for evaluating potential projects. The level of knowledge gained from the FHWA training should help in such an effort.

Financial Assessment Tool Limitations

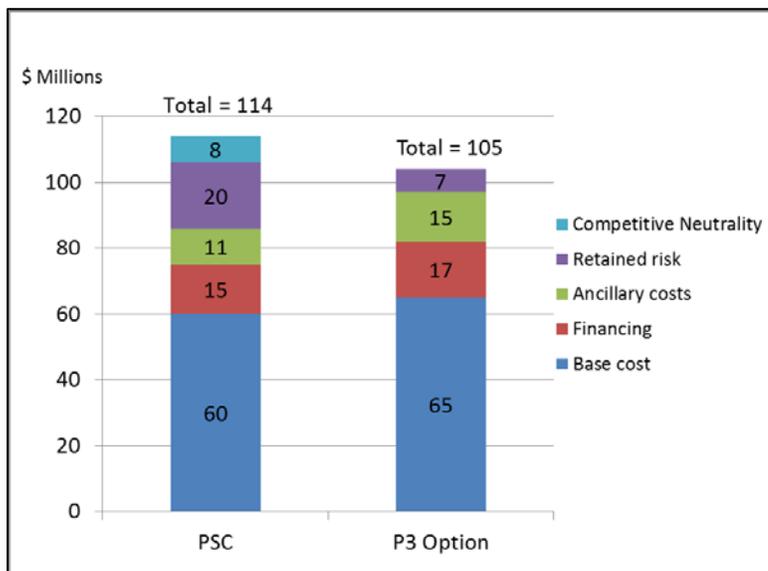
To provide a notional example of a functioning and interactive Financial Assessment Tool, a number of assumptions and formulas relate to the pre-populated "Example Scenario" and may not be suitable for all potential scenarios. Additionally, a financial analysis model for a "real-world" project would be highly customized to reflect the unique project structure and the entities involved in delivering the project and to optimize the financing required to deliver the project for the lowest cost.

Because the "VfM Analysis" section does not contain NPC calculations, users must import the NPC results and cash flows from the PSC Tool and Shadow Bid Tool, respectively, into the Financial Assessment Tool to complete the analysis. Thus, if a user is interested in updating the project scenario to make another comparison, the user must first change the assumptions in the underlying PSC and Shadow Bid Tools, save new versions of those files, and re-import the files in the "Source Data" sheet. This process is designed to accommodate diverse operating systems and keep calculation times to a reasonable duration.

6 Comparing Costs of the Shadow Bid and the Public Sector Comparator

VfM is expressed as the percentage difference between the costs of delivering the project through the PSC and the costs of the Shadow Bid. To determine VfM, the costs of financing and delivering the PSC, including adjustments for risks and competitive neutrality, are compared to the net present costs of payments to the private sector and adjustments for retained risks and any additional procurement and oversight costs (see Figure 6-1). A P3 offers better VfM if the total costs calculated by the Shadow Bid or preferred actual bid are less than the costs calculated by the PSC.

Figure 6-1. Example Value for Money Comparison



An agency may use the results of the VfM analysis in different ways. An agency can develop and compare a PSC and Shadow Bid during the initial project financial assessment and feasibility study, prior to determining the procurement method and issuing the solicitation. After agencies receive bids in response to a Request for Proposals (RFP), they may compare the PSC to the actual bids received to assess if VfM is still achieved prior to awarding the contract as a P3. In negotiating with the bidders, agencies may use the models to calculate the costs of transferring different risks to the private sector, sharing them, or retaining them, to understand tradeoffs. Finally, once an agency reaches its decision, it may use the results of the VfM analysis to demonstrate its rationale for choosing a particular procurement method. For more information on VfM analysis, refer to FHWA’s primer on the subject (see Appendix A).

The example depicted in Figure 4 portrays a comparison between a public procurement with a baseline present cost of \$60 million and a P3 Shadow Bid for which the baseline present cost (net of financing costs) is \$65 million. While the baseline P3 cost is \$5 million more and imposes an additional \$6 million in ancillary and financing costs, the \$13 million reduction in the costs of risk due to transfer of some risks to the private sector and \$8 million in competitive neutrality adjustments overcome these cost differences and result in a net savings to the government of \$9 million overall, offering 7 percent in VfM. This example illustrates the central trade-offs that often characterize P3 procurement: the government trades away significant risks in exchange for higher baseline costs and financing costs in the P3 scenario.

Appendix A: Glossary

Term	Description
AC Heavy Maintenance Post	Periodic Maintenance costs post construction completion
AC Heavy Maintenance Pre	Periodic Maintenance costs before construction completion
AC Light Maintenance Post	Routine Maintenance costs post construction completion
AC Light Maintenance Pre	Routine Maintenance costs before construction completion
AC Operations Post	Operation Costs post construction completion
AC Operations Pre	Operation Costs before construction completion
Base Date	The Base Date is commonly referred to as the estimated date of financial/contract close for a project.
Concession Period	Concession Period (Total construction and operation periods).
Construction Delay Day Cost	Construction delay per day.
Construction End	End date of construction period.
Construction Period	Number of years in construction period.
Construction Phase	The Construction phase involves the actual construction of the physical asset. This phase is often the most sensitive to risks which could result in change orders, schedule delays, and contract disputes. By identifying potential risks before the start of construction phase, it may be possible for the project team to better anticipate and manage construction risks before they occur.
Construction Start	Start date of construction period.
Construction Year Index	Count for construction periods
DSCR	Debt Service Cover Ratio.
Design Cost Total	Total cost associated with the design and construction of the project
Design Cost	Design and construction cost associated with a design element
Design Cost Calculation	Option to include design build cost assumptions
Design Cost Profile	Percentage of an element's cost that is recognized per year
Design Type	Asset Type in reference to the 'Assumptions' sheet of the Shadow Bid Tool.
DCF	Discounted Cash Flow.
Discount Rate Nominal	Discount rate factoring in the inflation rate.
Discount Rate Nominal, Choice	Option to manually input specific nominal interest rate or a specified project IRR
Discount Rate Nominal, Manual	Input of a discrete nominal interest rate
Discount Rate Real	Discount rate that does not account for inflation.
Discount Rate Real, Choice	Option to manually input specific real interest rate or specified project IRR
Discount Rate Real, Manual	Input a discrete real interest rate
Non Agency Subsidy	Percentage of construction costs provided by non-agency government subsidy
Non Agency Subsidy, Dollars	Dollar amount of non-agency government subsidy
Heavy Maintenance Cost	Cost of Periodic Maintenance as a percentage of total construction costs
Heavy Maintenance Cost, Dollar	Dollar cost of Periodic Maintenance
Heavy Maintenance Cost, Period	Period between Periodic Maintenance works
Heavy Maintenance Cost Index	Flag indicating the cash flow periods where Periodic Maintenance occurs
Inflation Consumer Price Index	Inflation Consumer Price Index used as a base rate for inflation assumptions.



Term	Description
Inflation CPI Index	An index of CPI factors
Light Maintenance Cost	Cost of Routine Maintenance as a percentage of construction cost
Light Maintenance Cost, Dollar	Dollar cost of Routine Maintenance
Light Maintenance Cost, Period	Period that Routine Maintenance occurs
Light Maintenance Cost Index	Flag indicating the cash flow periods where Routine Maintenance occurs
Maintenance Calculation	Option to include maintenance assumptions
NPC	Net Present Cost.
NPC Base	Net Present Cost of the base project (excluding risk).
NPC P10	Net Present Cost of the project at the 10th risk percentile.
NPC P70	Net Present Cost of the project at the 70th risk percentile.
NPC P90	Net Present Cost of the project at the 90th risk percentile.
Operations Year	Year of operations
Operations Calculation	Option to include operations assumptions
Operations Cost Index	Flag indicating the period of cash flow periods where operations occur
Operations Cost of Delay	Cost per day of risks associated with delaying operations
Operations End	End of the operation period
Operations Cost	Cost of operations as a percent of total construction cost
Operations Dollar	Dollar costs of operations
Operations Cost Period	Period where operation costs are incurred
Operations Period	Project operations period
Operations Start	Start date of operations
PC Land/ROW	Project costs associated with Land/ROW
PC Land/ROW End	End of period where Land/ROW costs occur
PC Land/ROW Index	Flag indicating the periods where Land/Row costs are incurred
PC Land/ROW Start	Start of period for Land/ROW costs
PC Other	Other project Costs
PC Other End	End of period where PC other costs occur
PC Other Index	Flag indicating the periods where PC Other Costs are incurred
PC Other Start	Start of period for which other costs are incurred
PC Other Miscellaneous	Misc. Project Costs
PC Other Miscellaneous End	End of period where other miscellaneous costs occur
PC Other Miscellaneous Start	Start of period for which other miscellaneous costs are incurred
PC Owner	Owner Costs
PC Procurement	Procurement Costs
PC Procurement End	End of period where Procurement costs occur
PC Procurement Index	Flag indicating the periods where Procurement costs are incurred
PC Procurement Start	Start of period for Procurement costs
PC QA	Quality Assurance Costs
PC QA End	End of period where QA costs occur
PC QA Index	Flag indicating the periods where QA costs are incurred
PC QA Start	Start of period for QA costs
PC Related Works	Project Related Works Costs



Term	Description
PC Related Works End	End of period where related works costs occur
PC Related Works Index	Flag indicating the periods where related works costs are incurred
PC Related Works Start	Start of period for related works costs
Period per CF	Number of months in each cash flow period
Project IRR P70	Internal Rate of Return of the project at the 50th risk percentile
Revenue Leakage	Assumed annual revenue losses for a tolling facility.
Revenue 2/3/4 Axle or Motorcycle	Toll revenue collected from 2 axle vehicles, 3 axle vehicles, 4 axles vehicles, or motorcycles
Revenue Non Road	Non-road pricing revenues
Revenue Ramp-up Period	Months in each revenue ramp-up period
Revenue Ramp-up	Tolling periods in which revenues are reduced while demand grows
Revenue Yearly	Calculated total yearly revenue from all vehicle tolls
Risk Design Cost Impact P10	Costs associated with construction phase risks at the 10th risk percentile
Risk Design Cost Impact P70	Costs associated with construction phase risks at the 70th risk percentile
Risk Design Cost Impact P90	Costs associated with construction phase risks at the 90th risk percentile
Risk Design Day Cost Percentage	Percentage of daily construction costs incurred during a construction delay (indirect costs)
Risk Design Day Finance Percentage	Percentage of daily financing costs incurred during a construction delay
Risk Design Day Impact P10	Schedule delay at the 10th risk percentile
Risk Design Day Impact P70	Schedule delay at the 70th risk percentile
Risk Design Day Impact P90	Schedule delay at the 90th risk percentile
Risk Design Day Operation Cost Percentage	Percentage of daily operation costs incurred as a result of a construction delay
Risk Design Day Revenue Percentage	Percentage of daily revenue loss as a result of a construction delay
Risk Operation Cost Impact P10	Costs associated with operations phase risks at the 10th risk percentile
Risk Operation Cost Impact P70	Costs associated with operations phase risks at the 70th risk percentile
Risk Operation Cost P90	Costs associated with operations phase risks at the 90th risk percentile
Risk Operation Day, Construction Percentage	Percentage of daily construction costs incurred as a result of an operations delay
Risk Operation Day, Finance Percentage	Percentage of daily financing costs incurred during an operations delay
Risk Operation Day, Impact P10	Number of days associated with operations phase risks at the 10th risk percentile
Risk Operation Day, Impact P70	Number of days associated with operations phase risks at the 50th risk percentile
Risk Operation Day, Impact P90	Number of days associated with operations phase risks at the 90th risk percentile
Risk Operation Day, OM Percentage	Percentage of daily operation costs incurred as a result of an operations delay (indirect costs)
Risk Operation Day, Revenue Percentage	Percentage of daily revenue loss as a result of an operations delay
Subsidy Profile	Disbursement schedule of non-agency funding as a percentage of total funding
Toll Year	Flag for toll collection period
Toll Collection Cal	Option to include toll revenues



Term	Description
Tolling End	End of tolling period
Tolling Period	Total time (years) that toll revenues are generated
Tolling Start	Tolling start date
Total Cost	Total Construction Cost
Total Cost Profile	The total allocation of costs over the construction period for an asset type
T&R	Traffic and revenue
Traffic Scenario	Option to select the traffic scenario
Traffic Scenario 1	Simple Toll Example Scenario
Traffic Scenario 2	Toll Scenario Template
Traffic Scenario 3	Variable Toll Example Scenario
Valid Construction Period	A flag that indicates whether the period is a valid construction period
Valid Finance Period	A flag that indicates whether the period is a valid finance period
Valid Maintenance Period	A flag that indicates whether the period is a valid maintenance period
Valid Operation Period	A flag that indicates whether the period is a valid operation period
Valid Period	A flag that indicates whether the period is a valid project period
Valid Toll Period	A flag that indicates whether the period is a valid tolling period
Volume 2/3/4 Axle or Motorcycle	Total yearly volume of 2 axle vehicle, 3 axle vehicle, 4 axle vehicle, or motorcycle traffic
Volume Yearly	Total yearly volume of all vehicles
Revenue Other	Other revenue source
Find Project IRR	A macro that will find the IRR that makes the project cash flows at the 50th risk percentile equal to 0.
Run Sensitivity	A macro that illustrates the sensitivity of the project NPV at the selected risk percentile to changes in key assumptions
Non Agency Subsidy	Other Government Funding provided as a percentage of project cost
Non Agency Subsidy, Dollar	Dollar amount of funding provided by Other Government Funding
Subsidy Profile	Disbursement schedule as a percentage of Total Other Government Funding

Appendix B: References

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