



Oversight Procedure 40c – Risk and Contingency Review - Full

1.0 PURPOSE

The purpose of this Oversight Procedure (OP) is to describe the review procedures and reporting requirements that the Federal Transit Administration (FTA) expects from the Project Management Oversight Contractor (PMOC) during the review of a Sponsor’s plan for mitigating and managing project risks.

This OP also describes the procedure for full PMOC risk assessment, using the Beta Range Factor Analysis, see Appendix D.

2.0 BACKGROUND

The reliability of the Sponsor’s project scope, cost estimate, and schedule over the course of the project life is extremely important, not only for the success of the individual project, but also for the professional credibility of the transit industry including FTA. Professional risk management provides the basis for improving the reliability of project delivery.

3.0 OBJECTIVES

The PMOC’s review of project risk and risk mitigation requires evaluation of the Sponsor’s project scope, cost estimate, and schedule. The PMOC should place special focus on elements of uncertainty associated with the Sponsor’s project implementation and project conditions.

During a Risk and Contingency Review, the PMOC must review the Sponsor’s Risk and Contingency Management Plans so that the PMOC can:

- 1) Evaluate, explore, and analyze uncertainties and risks
- 2) Establish an appropriate qualitative and quantitative assessment of ranges of forecasted cost and schedules
- 3) Describe and evaluate the analytical methods used
- 4) Consider risk mitigation options and alternatives including use of cost and schedule contingencies; and
- 5) Provide recommendations for adjustment to scope, cost, schedule, project delivery method, construction methodology, and project management and risk planning in order to respond to project risk.

FTA may request the PMOC complete a Risk and Contingency Review at various points in a project’s life. This review is applicable to projects using any project delivery method: Design-Build-Build (DBB), Design-Build (DB), Construction Manager/General Contractor (CM/GC) or other alternate delivery methods.

The PMOC’s review under this OP is a critical input to FTA’s decision regarding project advancement and funding.

4.0 REFERENCES

The statutes, regulations, policies, guidance documents and circulars in OP 01 Administrative Conditions and Requirements apply.

5.0 REVIEW OF SPONSOR'S SUBMITTALS

The Risk and Contingency review requires the PMOC to obtain and study project documents similar to those listed in Appendix B. These documents at a minimum include the Sponsor's Project Management Plan (including the Risk and Contingency Management Plan) and supporting documents. Supporting documents shall include appropriate design, cost, and schedule information. Many of these documents will already be available because of previous scope, schedule, cost, and Sponsor management capacity and capability reviews. The PMOC should perform an initial review and notify the FTA of important discrepancies in the project information that would hinder the Risk and Contingency Review. An example of an important discrepancy would be insufficient detail or a mismatch between drawings and the cost estimate because the drawings are current and the cost estimate is not.

6.0 SCOPE OF WORK

6.1 Overview

The goal of the Risk and Contingency Review is to evaluate a Sponsor's risk identification and assessment process and to evaluate the Sponsor's Contingency Management Plan. After evaluation, the PMOC should recommend changes to the Sponsor for risk identification, assessment, and mitigation. The PMOC should also recommend changes to the Sponsor's Risk and Contingency Management Plan. The PMOC shall independently develop a risk analysis to provide a thorough analysis of the Sponsor's project.

This risk management review builds upon any review of scope, schedule, cost, and Sponsor management capacity and capability in other OPs that may have been previously performed.

6.1.1 Sponsor interface

PMOC interface with the Sponsor during its risk review facilitates and expedites the process and provides the PMOC with the background necessary to efficiently evaluate risk and provide recommendations for revisions, if any, to the Sponsor's Project Management Plan. A typical structure for Sponsor interface meetings is presented in Appendix C.

6.1.2 Organizing the Risk Assessments by Milestones

Depending on the project conditions, detailed forecasted levels of project risk should be developed around points in time when level of project development typically indicates changes in project risk. The following reflect common and important FTA and other milestones for such detailed reviews:

- Readiness to Enter into Engineering;
- Readiness for FFGA/SSGA award;
- Ready to Bid Construction;
- Start of Construction;
- 20% construction;
- 50% construction;
- 75% construction; and

- 90% construction.

The FTA Milestones may be modified to reflect important milestones in the Sponsor's schedule, especially those points where significant changes in risk occur. If milestones are more than one year apart, the PMOC should consider developing supplemental milestones.

6.2 Project Status Evaluation: PMOC's Efforts

The PMOC project status evaluation is a precursor to the detailed risk review. The completeness and accuracy of the risk review is highly dependent on the completeness and accuracy of the project status evaluation. The project status evaluation typically includes evaluation of:

- 1) The Sponsor's management capacity and capability
- 2) The Sponsor's contract packaging strategies
- 3) The project's scope, cost and schedule. Other review elements may be included at the discretion of the FTA.

6.3 Identification and Categorization of Risks: Sponsor's Efforts

Risk identification plays a significant role in the risk management process. Efforts should be made by the Sponsor to ensure that there is a thorough listing of risks. This "Risk Register" shall include a description of the potential risks, their qualitatively-evaluated potential consequences, and the likelihood of each risk's occurrence. The "Risk Register" shall also list each risk's SCC category and risk category, its contract package, a method for prioritizing risks, and potential actions to mitigate the risk.

6.3.1 Example of risk register

A simplified example of a partial risk register is included in Appendix E.

6.4 Identification and Categorization of Risks: PMOC's Efforts

The PMOC shall obtain current project documents, reports, and observations developed through prior analysis of the Sponsor's organization, the project's scope, cost estimate, schedule, and contract packaging to develop a list of PMOC-identified risk events. This list shall be compared with the "Risk Register" independently developed by the Sponsor.

6.4.1 Risk Events

Risk Events are individually identified events that may occur and can cause changes to the project significant enough to incite management scrutiny or action. Such events do not represent all risk on a project. Additionally, new risks develop as a project progresses. Therefore, risk identification will require frequent updates as a project progresses.

6.4.2 Risk Categories

Risk shall be characterized into categories: Requirements Risk, Design Risk, Market Risk, and Construction Risk. See Appendix F for application of the risk category to risk assessment principles for capital and non-capital construction project elements.

Requirements Risk relates to the difficulty of succinctly and fully developing project requirements. Generally, requirements risk is associated with project development activities from earliest concept through Alternatives Analysis. A significant portion of Requirements Risk can be attributed to differences in project stakeholder goals, third parties (such as regulatory agencies), and undefined

requirements.

Design Risk is associated with the performance and variability of design activities occurring after Alternatives Analysis. Design risk occurs when design-related assumptions are incorrect or in situations where unknown factors cause designs to change.

Market Risk refers to the risk of procuring project management, administrative, right-of-way, design, or construction services, materials, and equipment. This risk refers to both the effects of the open-market pricing of goods and services, as well as the effects of the Sponsor's contract packaging strategies.

Construction Risk includes both risks that are due to variability of the project's environment—including unusual weather, unexpected subsurface conditions, and unexpected construction contractor failure. Construction risk also includes performance risk of consultants and contractors. Capital construction risk may be subdivided into: Early-Range Construction Risk (composed generally of site activities such as Geotechnical or Utility activities, usually associated with up to 20% complete), Mid-Range Construction Risk (associated with coordination of contractors, etc., from 20% to 50%), and Late-Range Construction Risk (associated with 50% to substantial completion).

6.5 Not used

6.6 Risk Assessment: PMOC's Efforts

6.6.1 Project Cost Risk Overview

The PMOC shall use its professional judgment and cost data to evaluate the cost risk. The PMOC will also assess the magnitude of project risk and guide potential responses to manage the risk.

Top-down Cost Risk Assessment - The FTA has developed methodologies for evaluating cost risk using cost data derived from historic project information. These parameters are applied as risk-based ranges of potential cost at a summarized category level, and this process is referred to as a top-down cost risk assessment model. The FTA top-down cost risk assessment methods are project-level risk assessment tools that have been developed through implementation on many FTA transit projects. The features have become accepted as common starting points for the creation of a project-specific cost risk assessments.

6.6.2 Pre-assessment Adjustments of the Sponsor Estimate

Stripped Cost Estimate - Based on review of the cost estimate, the PMOC shall ensure that the Sponsor has identified all contingency funds embedded within its cost estimate. Contingency funds may include both unallocated funds (usually applied as a percentage of summary costs) and allocated funds (usually applied as increases to individual estimate line items). Both patent (exposed) contingency funds and latent (hidden) contingency funds shall be identified. The identification of latent contingency funds will likely involve interviews with the Sponsor. Further, PMOCs should look for contingent funds embedded within estimates for inflation or escalation risk.

Once these contingency funds have been quantified, they shall be removed from the estimate to form a Stripped Cost Estimate.

Adjusted Cost Estimate – The Adjusted Cost Estimate is created by the PMOC and is the term used to describe the Stripped Cost Estimate amended to include the PMOC's line item revisions. Information to create the Adjusted Cost Estimate can be found from scope, cost, schedule, and contract packaging documents and from Operational Procedures and workshops with the Sponsor. The amount

of analysis shall be appropriate with the level of project development.

The PMOC should determine if line item revisions should become elements of the Risk Register. The adjusted estimate, at a minimum, shall include one level of breakdown below the standard SCC Cost Elements [e.g.10.01, 10.02, etc.]. The estimate shall be inflated to the year of expenditure (YOE). The inflation rate used for developing the Adjusted Cost Estimate should be a reasonably-expected value without hidden contingency

Subsequent analyses of risk depend on accurate estimate adjustments. The PMOC should obtain consensus from the FTA, PMOC, and Sponsor in adjustments before moving forward with the risk assessment.

This Adjusted Cost Estimate, appropriately stripped of contingencies, establishes an accurate level of cost forecast. The adjusted cost estimate line items will be used later for assessing the range of risk.

6.6.3 Risk Profiles

Many large transit projects, especially those in latter stages of development, are planned, built and funded in multiple phases and phases frequently overlap. Additionally, each phase can be delivered with various contracting methods. The overlap of phases and the different contracting methods create situations where project risks are difficult to quantify.

Where practical for accurate assessment of project risk or contingencies, the project's risks may be apportioned based on different risk profiles: risk and mitigations, including contingencies assessed independently by project portion; and the portions subsequently combined using appropriate techniques into an overall project risk recommendation.

6.6.4 Cost Risk Assessment – Beta Range Model

The PMOC shall develop an independent top-down project cost risk assessment using the Beta Range Model method. The following describes its procedures. Actual implementation of the Beta Range Model method should be undertaken by those thoroughly familiar with the process and able to use engineering judgment to fine-tune the process for specific project conditions.

6.6.4.1 Standard Cost Category (SCC) Risk Assessment

SCC Cost Element Ranges - Utilizing the procedures outlined below, the PMOC shall establish a range for each estimated line items, or elements, at the minor SCC level, to which a Beta probability distribution function will be applied. This will allow the application of risk across the entire project. The Beta probability distribution function has been derived from historical FTA transit project outcomes, and may be adjusted from time-to-time. These ranges shall be established as follows:

- **Lower Bound SCC Cost Element Range Establishment** - The Adjusted Cost Estimate for each minor SCC is established as the lower bound value of the SCC element.
- **Upper SCC Cost Element Range Establishment** - The PMOC shall establish the upper bound minor SCC value through multiplying the Lower Bound value by a range factor (hereinafter referred to as the Beta Range Factor or BRF); i.e., Upper Bound = BRF*Lower Bound.

Beta Range Factor Establishment - The PMOC shall establish the Beta Range Factor (BRF) values by using the guidelines indicated below and in Appendix F. The PMOC should use project specific Beta Factors based upon previously developed generic Beta factors.

Beta Range Factors are sums of Risk Category factors; i.e., total risk for an SCC element is the sum of

the individual Risk Category Factors for Requirements Risk, Design Risk, Market Risk, and Construction Risk, added to a base factor of 1.05. The base factor of 1.05 provides for a 5% end-of-project risk range allowance, which recognizes that risk generally remains, even at the end of construction.

Methods for establishing the BRFs are presented in Appendix F.

SCC Cost Item Risk Curve Establishment - The median, mean, and variance of the suggested range of distribution for the SCC cost item are fully determined using the Lower Bound, the BRF, and the historically-derived Beta distribution. These calculations are modeled in the Beta Range Model Workbook.

Project Delivery Method Influence - Differing project delivery methods may impact the timing and scope of Sponsor risk, but not necessarily the magnitude of risk nor the sequence of risk mitigation. Traditional project delivery methods (Design-Bid-Build) transfer risk to the contractor at the completion of design. Alternative project delivery methods such as Design-Build may transfer or share some requirements, design, market, or construction risk between the Sponsor and contractor. The effectiveness of risk transfers and risk retention methods should be considered when developing recommendations for BRF assignment.

6.6.4.2 Project Level Cost Risk Assessment

Project-level risk is the sum of all risks associated with all of the SCC Cost Ranges. The Beta Range Model Workbook develops these calculations.

The Beta Range Model Workbook has been developed to illustrate the method's common features and to serve as a starting point for a particular project. This workbook is based on the organizational structure of the FTA Standard Cost Categories (SCC):

- 1) SCC Category 10 through 80: Capital cost elements of a project
- 2) SCC Category 90: Contingency, specifically excluded as a duplicate measure of risk
- 3) SCC Category 100: Finance charges not covered in the standard BRFs for categories 10 through 80. The finance cost risk is provided separately through other FTA reviews.

The Beta Range Model Workbook illustrates the formats and bases of calculations to execute the cost risk assessment described. The PMOC shall become familiar with the Beta Range Model Workbook prior to developing its model and shall adjust the FTA Beta Range Model Workbook to meet specific project conditions.

The PMOC shall use the Beta Range Model Workbook to create a summary table that lists the Sponsor's estimated values, and the PMOC's recommended project cost elements with its assessment data. The summary table will include the reportable range of variability determined in the risk assessment and its effect on the overall budget. The PMOC will then identify the key risk drivers through an analysis of those project elements with large cost risk impact.

The FTA may direct the PMOC to perform additional analyses to provide further insight into the project-level risk assessment.

Conditioned Estimate - The PMOC shall evaluate the project's contingency amounts and then shall comment on the sufficiency of the contingency. The PMOC will also recommend a contingency amount for the project in accordance with this OP. A Conditioned Estimate will be developed by adding the recommended contingency to the Adjusted Estimate, which forms the PMOC's

recommendation for the project budget. Contingency recommendations, regardless of method of analysis, are applied at the project level only.

6.6.5 Project Schedule Risk Overview

The PMOC shall use its professional judgment and schedule data to evaluate the Sponsor's assessment of its project's schedule risk, and the PMOC will provide an independent assessment of the schedule risk.

Schedule Risk is any risk that can cause delay on the project's critical path. Note that schedule risk may also indicate cost risk.

6.6.5.1 Pre-assessment Adjustments of the Sponsor Schedule

Stripped Schedule - Based upon analyses of the schedule, the PMOC shall advise FTA on the Sponsor's identification of contingency durations and if the Sponsor's level of analysis conforms to the level required by the FTA. Contingency durations the PMOC should assess may include unallocated (dummy activity at the end of the project or sub-network) and allocated (increases to individual activity durations) schedule contingency. The PMOC will identify both patent (exposed) contingency durations and latent (hidden) contingency durations. Latent contingency is usually discovered during interviews with Sponsors. The PMOC should carefully review contingent durations that may be embedded as lag time hidden within the activity logic ties or artificially applied constraints.

Once identified, these contingency durations shall be quantified and removed from the schedule to form a Stripped Schedule.

Adjusted Schedule - Utilizing scope, cost, schedule, and other information developed in prior-performed Operational Procedures or joint PMOC and Sponsor workshops, the PMOC shall provide suggested revisions to the Stripped Schedule, increasing or decreasing the various activity durations. When applied to the Stripped Schedule, the suggested changes will develop an Adjusted Schedule. Any such adjustments and their rationale shall be fully documented.

The Adjusted Schedule forms a highly optimistic schedule for the project.

Subsequent analyses of risk depend on accurate schedule adjustments. The PMOC should get consensus of the FTA, PMOC, and Sponsor schedule adjustments before moving forward with the schedule risk evaluation.

6.6.6 Schedule Risk Assessment

6.6.6.1 Summary Schedule Development

The PMOC shall review a summary schedule based upon the Adjusted Schedule. The summary schedule shall be a mechanically-correct critical-path method schedule that reflects the relationships between activities so that it models the impacts of schedule changes on other activities. The number of activities modeled should be commensurate with the Adjusted Schedule and level of detail available at the time of analysis. However, large models that are difficult to understand shall be avoided. The PMOC will use a summary schedule for risk assessment that creates balance between transparency and the detail required for sufficient risk assessment.

6.6.6.2 Schedule Activity Risk Assessment

The length of each activity on the Summary Schedule shall be determined by evaluating the specific project attributes (especially those on the Risk Register). Each activity's duration will be analyzed by both the Sponsor and the FTA to verify its reasonability. The Adjusted Schedule activity lengths shall

be used to establish the optimistic estimate for the summarized activity durations. The PMOC shall determine that appropriate technical experts have been consulted to establish the most likely and the most pessimistic estimates for each activity duration. The choice of probability functions or other technical parameters used in the analysis should be clearly documented. Methods used in the analysis should be presented clearly so that all parties can understand the analysis of the schedule risk assessment.

The schedule activity risk assessment shall utilize a commercially-available project scheduling system that is capable of critical path scheduling and stochastic modeling for probabilistically-described activity durations. This system will be used for capturing and reporting activity risk duration ranges, as well as reporting the resulting project-level schedule risk assessment.

6.6.6.3 Project Level Schedule Risk Assessment

The likelihood of project completion within the timeframes estimated on Sponsor's master schedule shall be assessed using a commercially available scheduling software program capable of stochastic schedule risk modeling ("Monte Carlo" modeling). The schedule modeling software shall develop alternate forecasted project completion dates, based upon the activity range input described above. This PMOC's modeling shall be completed by an expert versed in "Monte Carlo" modeling and transit project risk. This assessment shall include an evaluation of the predicted range of completion dates compared to the Sponsor's scheduled milestones. The assessment will also evaluate assigned activity duration ranges, including statistical information such as range, median, mean, minimum and maximums. The assessment will also identify critical and near-critical paths and the relationship between those paths and identified risk events. The FTA may direct other analyses.

The Project Schedule Risk Assessment shall consider whether non-construction activities, such as vehicle procurement, may introduce a relationship that creates a critical path that in turn masks critical paths for construction activities. In this case, it may be prudent to temporarily remove the non-construction activities and perform a separate analysis on the altered schedule.

Based upon its findings, the PMOC shall assess the sufficiency of the Sponsor's base sequencing and schedule to adequately reflect the modeled interim and final milestone completion dates. The PMOC shall provide recommendations for adjustment to the Sponsor's schedule and Project Management Plan to reduce the risk of not meeting the project's schedule goals.

Conditioned Schedule - The PMOC shall evaluate the contingency amounts identified for the project and shall comment on the sufficiency of the contingency. The PMOC shall also establish and recommend a schedule contingency amount for the project in accordance with this OP. A Conditioned Schedule is developed when the recommended contingency is integrated with the Adjusted Schedule.

6.7 Risk Mitigation: Sponsor's Efforts

The PMOC shall review and recommend changes to the Sponsor risk mitigation plans. Areas of review and comment shall include the development and management of:

- Primary mitigation
- Secondary mitigation
- Contingencies and
- Contingency draw-down curves.

6.7.1 Risk Mitigation Recommendations

Each of the PMOC's recommendations to the Sponsor's Risk Mitigation Plans should be organized by the Mitigation Structure defined below, its SCC, and Risk Type. Each mitigation recommendation shall be denoted by the Mitigation Type that best describes the mitigation recommendation.

6.7.1.1 Mitigation Structure

Mitigation structure refers to defined roles of whom and how the Sponsor and its consultants and contractors respond to risks identified in the review process. This structure consists of three parts: Primary Mitigation, Secondary Mitigation, and Contingencies.

Primary Mitigation occurs during all project phases and is the result of the planned actions of the Risk Management Plan and recommendations of the PMOC. Mitigation activities should be scheduled at the earliest phase during which the mitigation activity may occur, and should be completed quickly so that cost and schedule risks can be reduced early. Examples of mitigation might be completing design or performing a geotechnical survey.

Secondary Mitigation consists of pre-planned, potential scope or process changes that do not change the basic requirements and functionalities of the project. Secondary Mitigation may be triggered when risk events cause overuse of project contingencies; where such potential changes are unavailable on a project, additional contingency allowances may be required to protect the project. Example events that may trigger secondary mitigation include construction bids that are significantly over the estimate, or unexpected geotechnical hazards that are encountered and cause the project to be significantly over budget. Such "triggered" mitigation enables the Sponsor to make cost reductions in a planned and orderly process and preserves contingencies for use later in the project. Secondary Mitigation is fundamentally different than value engineering, which is a formal, systematic, multi-disciplined process designed to optimize the value of each dollar spent.

Contingencies are set-aside estimated amounts (monetary set-asides for cost and time set-asides for schedule) that are included within the overall cost or schedule targets for the project. The amounts are to be used to overcome increases in cost or schedule that are caused by potential risks. Contingency amounts may be associated with a particular activity or category of cost, or may be set aside in a general fund. In most cases, the project's risk decreases as the project progresses toward completion. As a result of risk decreasing over a project's life, the amount of required contingency also decreases. However, some contingency should always be available even beyond project completion.

6.7.1.2 Mitigation Types

The PMOC shall indicate whether the four Mitigation Types— Risk Avoidance, Risk Transfer, Risk Reduction, or Risk Acceptance—have been sufficiently considered in the Sponsor's list of proposed mitigation measures.

Risk Avoidance is available when project elements may be alternatively delivered through a less-risky process or design, or may be eliminated altogether.

Risk Transfer occurs when responsibility and consequences for risk are transferred to a party other than the Sponsor. Risk transfers may be partial or complete. Risk is transferred to a third party through contract requirements, warranties, or insurance policies. The PMOC may recommend risk transfers or may recommend scope changes to transfer risk to parties better suited to mitigate risk.

Risk Reduction is a planned action that will either reduce the consequence or the likelihood of a risk event. When listing risk reduction, the PMOC should annotate: 1) The cause of the risk, 2) the

possible outcomes of the risk, 3) how the mitigation measures will be reduce the risk, and 4) whom within the Sponsor organization or project team will carry out the mitigation.

Risk Acceptance results from the recognition that further reduction of a particular risk would only come at the expense of the project's fundamental goals, such as unacceptable service loss or cost increase, etc. Risk acceptance may also be a preferred method to deal with those risks that are of a high level of impact yet low level of probability and that mitigating them would put undue financial burden on the project. Risk Acceptance often involves the potential consumption of project cost or schedule contingencies, project schedule float, or an increase in either project estimate or schedule.

In its review, the PMOC shall recognize the tipping point where non-contingency mitigation becomes so difficult to implement that risk acceptance is more beneficial to the overall project. This "break point" between risk reduction and risk acceptance typically occurs at the point where significant contingency funds are the only effective means to treat this project risk.

6.7.2 Primary Risk Mitigation Recommendations

The PMOC shall review the Sponsor's Risk Mitigation process and its mitigation activities. After review, the PMOC will comment on the sufficiency of the project's cost risk and the project's schedule risk mitigation measures.

The PMOC's comments will include proposed management activities for the Sponsor and its consultants that will reduce risk. This list will serve to provide recommendations and to monitor the reduction of project cost risk. The RCMP should include progress-reporting timeframes for tracking the performance of mitigation actions. All assumptions should be identified with their rationales. The mitigation plans should develop priorities so that mitigation activities of high-risk project elements are executed as early as possible.

Mitigation measures should include actions that transfer risk. PMOCs should focus on recommending risk transfers through construction contracting. The PMOC should also ensure the Sponsor understands the risk it still has and that the Sponsor has an effective risk response plan. The Sponsor's project delivery methods and contracting methods should ensure that all costs due to risk transference are reflected in the project estimate.

Schedule risk mitigation recommendations should specifically address both critical path and non-critical path activities. Schedule risk mitigation aims to protect non-critical path activities from becoming critical path activities. This is done by: 1) Keeping a necessary amount of path float between the project critical paths and all of the intersecting (or potentially intersecting) paths and 2) keep significant risk off of the project critical path, or minimize their schedule variance if critical path activities are involved. The general principle is that activities with high schedule risk should start and complete as soon as feasible.

6.7.3 Project Cost Contingency

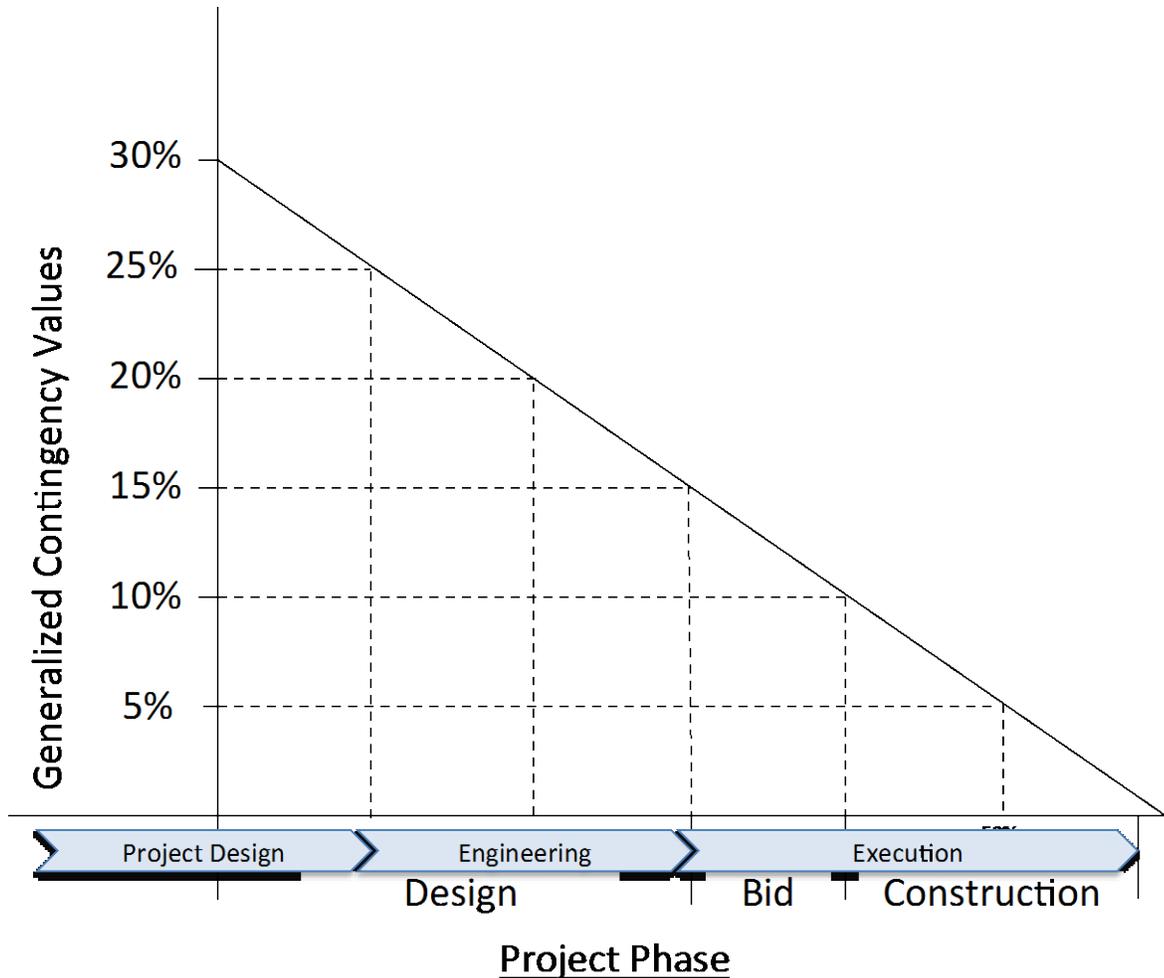
The PMOC shall identify, describe, and analyze the adequacy of the Sponsor's cost contingencies. This analysis shall be developed in consideration of four models: 1) the generalized contingency level recommendations (described below); 2) a Cost Contingency Draw-down curve (described below); 3) a Sponsor-provided risk assessment model (if undertaken); and 4) a PMOC-developed risk assessment model. The PMOC shall use its professional judgment to evaluate the contingency requirements estimated by these four approaches, and shall establish an overall recommended minimum contingency level, as described below.

6.7.3.1 Generalized Contingency Levels

The FTA has determined, from historic project information, that the following minimum levels of contingency (the aggregate of allocated and unallocated cost contingency) are prudent:

- At Entry into Engineering, 25%
- At Readiness to Bid Construction, 15%.
- At Start of Construction, 10%.
- At 50% physically complete for construction, 5%.

The above contingency estimates may be interpolated at points of completion between the above milestones (see figure below).



The generalized contingency levels reflect historic risk undertaken through a design-bid-build delivery method. When alternate delivery methods are used, some portion of Sponsor risk associated with design and procurement (Design and Market Risk Categories) will be transferred to the design-builder. An analysis of the actual contracting documents is necessary to determine how much risk is transferred and the resulting contingency requirements.

6.7.4 Cost Contingency Draw-down Curve

The PMOC shall review the Sponsor's Cost Contingency Draw-down Curve and then make recommendations to improve it. The PMOC will also evaluate the Sponsor's current contingency and Forward Pass analysis (and Backward Pass analysis as appropriate) in development of its recommendations. The PMOC shall recommend minimum contingency amounts for the Cost Contingency Draw-down Curve by phase that reflects the specific project conditions. These minimum levels should be noted for each of the FTA milestones, including additional milestones identified by the Sponsor and PMOC. These milestones and minimum contingency amounts define a cost contingency drawdown curve, indicating a minimum level of contingency that must remain in the project budget at any given point in time. This draw-down curve is used to protect from inappropriately early draw down of contingency funds.

6.7.4.1 Forward Pass Cost Contingency Analysis

The Cost Contingency Draw-down Curve is evaluated as a "forward pass" set of minimum recommended cost contingency values for each of the Project Milestones beyond the current review and for points of significant changes of project risk.

Where the Sponsor or PMOC have identified additional milestone points, the PMOC shall use its judgment to establish forward-pass contingency recommendations based on interpolated Generalized Contingency recommendations discussed above.

In the case of multiple project phases that in different levels of development, or significant portions that exhibit differing risk profiles, a project contingency curve may be constructed as the addition of several contingency curves reflecting each significant project portion.

6.7.4.2 Backward Pass Cost Contingency Analysis

Projects, or portions of projects, may face extraordinary levels of risk during specific project points in time. In such case, the PMOC may establish a Cost Contingency Draw-down Curve using a "backward pass" set of recommended cost contingency values. These values would represent the minimum amount of total cost contingency expected to be necessary at Project Milestones and may be used to adjust forward pass contingency/milestone recommendations. The Backward Pass method considers estimates of minimum total cost contingencies based on an assessment of the project status and project risk at the milestone under consideration. Items of high risk, especially those identified with the Mitigation Type of "Risk Acceptance", shall be specifically reviewed when performing the backward pass analysis.

This process begins by considering the final stages of the project (say 95% complete) and determining how large of a contingency fund should remain in the project budget to solve potential risk-laden events. This amount becomes the minimum amount of contingency that should be maintained at that final stage. The next step is to consider another point in time when the project is less complete (say at 75% completion) and to similarly determine the size of contingency fund that should remain available at the 75% completion time. This process is completed—moving stage by stage toward the beginning of the project—until the current phase is reached.

The following considerations shall be made in development of the backward pass contingency values:

- At the Revenue Service Date (RSD), the demand for total cost contingency has been reduced to a minimum requirement for scope changes or clarifications and schedule delays or changes. The establishment of required contingency at this point should carefully consider conditions such as the

Sponsor's experience and experience on other similar transit projects to identify an amount sufficient to close out punch list work, additional work orders, etc. The working target for this point is generally 1-3% total contingency, including 0-1% for schedule delay costs and the remainder for other costs;

- At the point that the project construction procurement is “substantially complete” (90-100% bid for either Design-Bid-Build or 90-100% subcontracted for alternative project delivery methods), the project is exposed to cost changes in the range of 10% of project costs, which includes 4-6% to reflect schedule delays that at this point can average 20% of the construction phase duration; and
- For any potential delay duration greater than 9 months, the contingency amounts shall assume 3 months each of demobilization and remobilization with a variable standby period in between.
- Consideration should be made to appropriately reflect contingency needs under design-build contracts, where the cost of the contracted design-build portion is accurately reflected in the Adjusted Estimate. In this circumstance, Sponsor contingency needs for Design and Market risks may be significantly reduced, and Sponsor contingency needs for Construction risks may also be significantly reduced, though to a lesser extent. A thorough analysis of the design-build contract is necessary to establish these amounts.

6.7.5 Secondary Cost Risk Mitigation Recommendations

The PMOC shall review the credibility and applicability of the Sponsor's schedule of Secondary Risk Mitigation items, and comment on whether such Secondary Mitigation results in sufficient protection for the project. Such evaluation shall consider levels of risk reflected within the risk register, as well as any risk analyses available for the project. The schedule of Secondary Mitigation shall include the targeted magnitude of the cost and/or time savings expected and the latest time at which a Secondary Mitigation item may be triggered effectively, as well as a description of the scope, deliverables, and outcomes of the item. The PMOC will also review and comment on scheduled progress-reporting intervals for Sponsor's tracking of the utilization and management of such mitigation capacities, as well as any integration with the Sponsor's overall program schedule. All important assumptions shall be identified along with their rationales.

Estimation of all Secondary Mitigation items shall be at a level commensurate with the current level of estimating used for the project as a whole. Further, the cost and/or schedule adjustments proposed shall include an analysis of the adjustment for any scope reductions as well as any adjustment for redesign of the project area affected due to such scope reduction, with any associated soft costs.

The Secondary Mitigation Recommended Amount in the Beta Range Model is calculated as the Secondary Mitigation Target minus the Conditioned Estimate. This target is developed using the Beta Range Model Workbook; if the project budget includes contingency above the modeled Conditioned Estimate, such contingency amount above the Conditioned Estimate may be considered as fulfilling a portion of the Secondary Mitigation recommended amount. With approval from the FTA, the PMOC may modify this amount based upon overlapping Sponsor milestones, actual progress beyond a given phase, or other project-specific factors.

Where Secondary Mitigation is insufficient to protect the project at the level prescribed in the Beta Range Model Workbook, or as otherwise adjusted by the FTA, the PMOC shall recommend sufficient additional contingency to reach the level of protection that would otherwise be available through Secondary Mitigation. In general, Secondary Mitigation should be sufficient to bring the project to the 65% confidence level as indicated in the Beta Range Model Workbook, or such other level as may be directed by the FTA.

As a project progresses toward completion, it may be increasingly difficult to develop Secondary Mitigation measures, especially if project construction is already contracted. Early identification of Secondary Mitigation measures helps to preserve its availability in later stages of the project. The PMOC shall consider the current design efficiency, the stage of the project, and the impact that developing Secondary Mitigation measures will have on the FFGA/SSGA's scope, transit capacity, or level of service.

In the case of design-build contracting, Secondary Mitigation elements may be preserved by contractually causing the design-builder to provide Secondary Mitigation design options in its work, subject to Sponsor's option.

6.7.6 Project Schedule Contingency Review

The PMOC shall fully identify, describe, and analyze the adequacy of the Sponsor's schedule contingencies. The PMOC shall make recommendations as to what minimum amounts of schedule contingency are recommended for inclusion in the Sponsor's Project Management Plan and supporting schedules.

6.7.6.1 Schedule Contingency Analysis and Recommendation

The PMOC shall evaluate the schedule contingency available within the Sponsor's schedule, and provide recommendations as appropriate. Such recommendation shall be made in consideration of the following:

- The project shall follow the general guideline that sufficient schedule contingency is available at any major review milestone to absorb a project schedule delay equivalent to 25% of the remaining duration through the Revenue Service Date proposed for the project, calculated by adding the schedule contingency to the Adjusted Schedule;
- Any available schedule risk assessment histogram indicates a confidence level of at least 65% of reaching the proposed Revenue Service Date (RSD); and
- The general assessment of risk is not in conflict with the risk contingency requirements established in development of the Schedule Contingency Draw-down Curve, below.
- Based on inflation factors, professional opinion and other factors, the PMOC should ensure that the cost estimate is appropriately increased to account for any additional schedule contingencies.

6.7.6.2 Schedule Contingency Draw-down Curve

The Sponsor shall develop a plan that forecasts the minimum amount of schedule contingency required for the project at the current, and all future major milestones. The PMOC shall review the Sponsor's analysis and make recommendations about its sufficiency. Premature use of schedule contingency reduces the ability of a project to withstand schedule change. Minimum levels of schedule contingency should be noted by the PMOC for each of the FTA milestones, including additional milestones identified by the Sponsor and the PMOC designated as points in the project when significant changes in risk may occur. These milestones and minimum schedule contingency amounts define a schedule contingency drawdown curve. The schedule contingency drawdown curve defines

minimum levels of contingency that must remain in the project schedule at any given time. The draw-down curve is used to protect from inappropriately early draw down of schedule contingency durations.

The Schedule Contingency Draw-down curve shall be evaluated by sequentially “stepping back” through various completion milestones for the project. The Schedule Contingency Draw-down curve will also be evaluated by estimating the minimum amount of schedule contingency required to complete the project on schedule from that point forward. The PMOC shall evaluate this draw-down curve and comment on the appropriate allocation of risk over time.

6.8 Sponsor’s Risk and Contingency Management Plan (RCMP)

The PMOC shall ensure that the Sponsor’s RCMP identifies all aspects of potential risk, including management capacity and capability, project performance, cost and schedule risk. A recommended structure for the Risk and Contingency Management Plan is included in Appendix G.

Upon FTA approval, the PMOC shall give the Sponsor the assessment and recommendations developed in this OP for inclusion in the Sponsor’s RCMP. The PMOC shall work collaboratively with the Sponsor as the Sponsor prepares and/or revises the RCMP section of its Project Management Plan to reflect the recommendations provided by the PMOC.

6.9 PMOC’s Monitoring of Sponsor’s Risk and Contingency Management Plan

Post-assessment monitoring by the PMOC is intended to assess the Sponsor’s performance in risk management and ensure that the Sponsor’s project implementation achieves its risk management objectives and targets. The PMOC shall use the Sponsor’s RCMP, which has been collaboratively amended with the PMOC’s recommendations, as its guide for post-risk review monitoring.

The PMOC shall report on the following items:

- The effectiveness of the Sponsor’s implementation of the Primary Mitigation measures and the effectiveness and timeliness of the mitigation action on the potential risk.
- The occurrence of risk events on the project, and whether or not the risk was previously identified. The PMOC will also comment on the estimated effect of the risk on the project’s cost and schedule goals;
- The use of cost and/or schedule contingencies and whether such use threatened **minimum levels of contingency required for future phases;**
- Successful implementation of other major initiatives noted in the RCMP; and
- The effectiveness of the Sponsor’s organization to fully manage its Risk and Contingency Management Plan.

7.0 REPORT, PRESENTATION, RECONCILIATION

The PMOC shall provide the FTA with a written report of its findings, analysis, recommendations, professional opinions, and a description of the PMOC’s review activities. After FTA approval, the PMOC will share the report with the Sponsor. If the PMOC and the Sponsor have different opinions of the PMOC’s findings, the FTA may direct the PMOC to reconcile with the Sponsor and provide FTA with a report addendum covering the modifications agreed upon by the Sponsor and PMOC.

The report formatting requirements of OP-1 apply. The PMOC shall perform data analysis and develop data models that meet FTA requirements using Microsoft Office products such as Excel and Word and use of FTA-templates when provided. The PMOC may add other software as required, but documentation and report data shall be available to FTA.

The PMOC shall prepare a written report in the format discussed in Appendix H and attach the sponsor's most current SCC estimate, schedule, and other related documents. The PMOC may also include embedded references to, or exhibits from, the Sponsor's estimate and schedule, or other documents that clarify the analysis, findings, and recommendations.

The PMOC's report will integrate and summarize available information and data for the project, providing professional opinion, analysis, information, data and descriptive text in an accessible and understandable format. Opinions shall be supported by data tables.

APPENDIX A

Acceptable Quality Level

	DESIRED OUTCOME	PERFORMANCE REQUIREMENT	CHECK LIST	PERFORMANCE MEASURE	ACCEPTABLE QUALITY LEVEL	MONITORING METHOD
1	PMOC shall support FTA's programmatic decisions through review and analysis of Sponsor's risk management process PMOC shall review, analyze and recommend to FTA regarding Project Contingency and Contract Packaging.	R1a. The PMOC shall develop and document a process for review, analysis and reporting to FTA of Sponsor's risk assessment and risk management practices.		M1a. Evidence of a documented process.	Q1a. Process exists and has been followed.	MM1a. Periodic review by FTA or its agent.
		R1b. The PMOC shall use its process to analyze and advise FTA on Cost, Schedule and Contract Packaging and other project risk issues.		M1b. Documented assessment of overall Project Contingencies and Contractual Risk Allocations.	Q1b. Review must be made and the PMOC provides internal verification that the process as documented was followed.	MM1b. Periodic review by FTA or its agent.
		R1c. The PMOC shall develop and document a process for review and analysis of Sponsor's Project Contingencies, Contractual Risk Allocations and Contract Packaging.		M1c. Evidence of a documented process.	Q1c. Process exists and has been followed.	MM1c. Periodic review by FTA or its agent.
		R1d. The PMOC shall use its process to analyze the adequacy, effectiveness and efficiency of Sponsor's Project Contingencies and Sponsor's management and risk management practices prior to each milestone, as directed by FTA.		M1d. Documented assessment of overall Project Contingencies, Contractual Risk Allocations and management practices.	Q1d. Review must be made and the PMOC provides internal verification that the process as documented was followed.	MM1d. Periodic review by FTA or its agent.
2	The PMOC shall utilize its experience and professionalism in monitoring Sponsor risk management systems to produce required deliverables based on comprehensive systems analysis strategically repeated as the project advances. The PMOC shall review, identify, characterize and analyze project contingency	R2a. PMOC Oversight Plan. The PMOC shall develop and submit a plan for providing surveillance of the Sponsor's performance in risk management defining how services and products will be accomplished in a manner meeting FTA requirements.		M2a. Documented evidence of a risk management surveillance plan, supported by professional opinion.	Q2a. Professional opinion of risk management objectives and targets, other supporting documentation or submittals and recommendations for course of action.	MM2a. Periodic review by FTA or its agent.
		R2b. Cost Risk. The PMOC shall identify, assess and evaluate the uncertainties in Sponsor's cost estimates in terms of project's social, political, legal, financial and physical environment and make recommendations regarding identified risks.		M2b. Documented evidence of review of Sponsor's cost estimates, supported by professional opinion.	Q2b. Professional opinion and recommendations regarding identified items of likely risk.	MM2b. Periodic review by FTA or its agent.

	DESIRED OUTCOME	PERFORMANCE REQUIREMENT	CHECK LIST	PERFORMANCE MEASURE	ACCEPTABLE QUALITY LEVEL	MONITORING METHOD
	availability, status and forecasts for critical project milestones and assure Sponsor's use of sound project management strategies.	R2c. Schedule Risk. The PMOC shall identify, assess and evaluate Sponsor's project schedule uncertainties in terms of social, political, legal, financial and physical environment and make recommendations regarding identified risks.		M2c. Documented evidence of review of Sponsor's project schedule, supported by professional opinion.	Q2c. Professional opinion and recommendations regarding identified items of likely risk.	MM2c. Periodic review by FTA or its agent.
		R2d. Non-Cost and Non-Schedule Risk. The PMOC shall, as directed by FTA, identify, assess and evaluate all non-cost and non-schedule related uncertainties and risks found in Sponsor's project, including risks associated with Sponsor's project delivery methods and strategies for packaging the contracts for construction, and make appropriate recommendations.		M2d. Documented evidence of review and evaluation of Sponsor's non-cost and non-schedule related uncertainties, supported by professional opinion.	Q2d. Professional opinion and recommendations regarding identified items of likely risk.	MM2d. Periodic review by FTA or its agent.
		R2e. Risk Mitigation. The PMOC shall review Sponsor's risk register and risk mitigation plan. If required by the FTA, the PMOC shall independently identify and characterize project risks, develop a and prepare a report showing it's recommendations, including those for needed changes to Sponsor's PMP.		M2e. Documented evidence of review and assessment of risk together with recommend changes to PMP and preparation of risk mitigation plan, supported by professional opinion.	Q2e. Professional opinion and recommended changes to PMP together with risk mitigation plan.	MM2e. Periodic review by FTA or its agent.
		R2f. The PMOC shall identify, describe and analyze the adequacy of Sponsor's cost contingencies, make necessary recommendations and, through parameters developed using the "forward pass" and "backward pass" approaches, create the overall minimum contingency curve.		M2f. Documented evidence of a thorough review, analysis and description of Sponsor's Cost Contingencies, supported by professional opinion.	Q2f. Professional opinion of Cost Contingencies.	MM2f. Periodic review by FTA or its agent.
		R2g. The PMOC shall develop a "Forward Pass" cost contingency analysis using historically-developed parameters and a "Backward Pass" cost contingency analysis using project specific data. This data shall be reconciled and a Cost Contingency Curve and graphics developed.		M2g. Documented evidence of forward and backward pass cost contingency analysis, and creation of cost contingency curve, supported by professional opinion.	Q2g. Professional opinion and review of all cost contingency analyses and creation of Cost Contingency Curve with graphics.	MM2g. Periodic review by FTA or its agent.
		R2h. The PMOC shall identify, describe and analyze the adequacy of Sponsor's schedule contingencies making recommendations for minimum amounts of schedule contingency and supporting schedules.		M2h. Documented evidence and review of Sponsor's Project Schedule Contingencies, supported by a professional opinion.	Q2h. Professional opinion and evaluation of Sponsor's Schedule Contingencies.	MM2h. Periodic review by FTA or its agent.

	DESIRED OUTCOME	PERFORMANCE REQUIREMENT	CHECK LIST	PERFORMANCE MEASURE	ACCEPTABLE QUALITY LEVEL	MONITORING METHOD
		R2i. The PMOC shall "step back" at various milestones and estimate the minimum amount of schedule contingency required to complete the project on schedule. This data shall be used to develop a Schedule Contingency Curve.		M2i. Documented evidence of schedule contingency analysis and creation of schedule contingency curve, supported by a professional opinion.	Q2i. Professional opinion and review of all schedule contingency analyses and creation of Schedule Contingency Curve with graphics.	MM2i. Periodic review by FTA or its agent.
		R2j. The PMOC shall identify, describe and analyze Sponsor's individual contract packages and a) Contract Packaging Strategy: characterize and report on the sufficiency of design and construction contract packaging strategies; b) Contractual risk Allocation: discover and report proposed or actual allocation of risk between Sponsor and third parties; and c) Contractual Risk Allocation Assessment: evaluate proposed contractual allocations of risk and comment on potential cost-to-benefit balance and effectiveness of assignments.		M2j. Documented evidence, review and assessment of Sponsor's Contract Packaging Strategy and Contractual Risk Allocations and supporting documents, supported by professional opinion.	Q2j. Professional opinion and Contract Packaging Review.	MM2j. Periodic review by FTA or its agent.
3	The PMOC shall document its findings, professional opinions, and recommendations in a report to the FTA for its Risk, Cost and Schedule Contingency, and Contractual Risk Allocation Reviews to the FTA. PMOC shall further attach SCC estimate, schedule and other related documents with Primary Deliverables and Subdeliverables.	R3. The PMOC shall present its findings, conclusions, analysis and recommendations to FTA and reconcile those recommendations with the Sponsor to the extent possible when so directed by FTA.		M3. PMOC's findings conclusions, recommendations, and presentation.	Q3. Reports and presentations are professional, clear, concise, and well written. The findings and conclusions have been reconciled with other PMOC reports and have been reconciled with Sponsor to the extent possible.	MM3. Periodic review by FTA or its agent.

APPENDIX B

Sponsor's Submittals

In advance of performing the review, the PMOC should obtain and study the following, as appropriate for the particular project phase and level of review required. Many of these documents will have been obtained through the review of scope, schedule, cost, and Sponsor management capacity and capability in other OPs. The PMOC should perform an initial review and notify the FTA of important discrepancies in the project information that would hinder the review; an example would be insufficient detail or a mismatch between drawings and cost estimate in which the drawings are current and the cost estimate is significantly older.

Coordinate these submittals with those required for the OPs related to *Readiness to Enter Engineering* and *Readiness for FFGA/SSGA*.

Programmatic

Alternatives Analysis Final Report
MPO adoption of the LPA into Fiscally Constrained Long Range Plan
TIP and STIP include the project for PE, Final Design, and Construction phases
Final environmental documents and NEPA determination

Scope / Project Definition

Basis of Design Reports, Design Criteria Reports
Project Plans, Drawings, and Specifications
Master Permitting Plan and Schedule
Geotechnical Baseline Report
Passenger Level Boarding Design documents
Vehicle design documentation
Transit Capacity and Operating Plan
Documentation of changes to scope that have occurred since last FTA review

Project Management Plan and sub-plans

Program Management Plan (if applicable)
Basis for the Project
Environmental Assessment/Mitigation Plan
Design Control including but not limited to Value Engineering, Agreements with Railroads, Utilities, other Third Parties
Project Controls (Document, Scope, Cost, Schedule, Dispute)
Risk Assessment, Risk and Contingency Management Plan
Project Delivery and Procurement
Sponsor Technical Capacity and Capability
Quality Assurance / Quality Control Plan
Safety and Security Management Plan
Real Estate Management Plan
Fleet Management Plan

Schedule

Project schedule in original and SCC format; schedule narrative describing critical path, expected durations, and logic

Cost Estimate

Summary of O&M Cost Assumptions/Productivities
Capital cost estimate in original and SCC format

Capital cost estimate backup documentation
Capital cost estimating methodology memo
Before and After Study Documentation

FTA Agreements

Entry to Engineering Checklist (if applicable)
FFGA/SSGA Checklist (if applicable)
Record of Decision
Full Funding Grant Agreement/Small Starts Grant Agreement and Attachments if available

APPENDIX C

Sponsor Risk Interface

Interface with the Sponsor during the risk review facilitates the process and provides the Sponsor with the background necessary to incorporate the risk review recommendations into its Project Management Plan. A typical structure for Sponsor interface meetings is as follows; the PMOC shall assess the level of project completion and familiarity of the Sponsor with the risk review process to determine whether adjustment to the following structure is appropriate:

Kickoff meeting:

- Introduce PMOC team and Sponsor team;
- Sponsor presents the project to PMOC team:
 - Agency organization, including project team and plan for staffing;
 - Description of work and reviews over the previous year;
 - Review of the project by discipline;
 - Review of schedule, cost estimate, Sponsor's RCMP and risk register;
- PMOC presents the risk review process to Sponsor; and
- Tour of alignment, station and support facility locations.

Workshop 1 (may be broken into two sessions): This workshop should occur after PMOC team has reviewed Sponsor's documents, written and exchanged issue papers for each discipline, and has developed its RCMP, including its cost and schedule risk assessment products.

- Introduce PMOC team and Sponsor team;
- Characterize PMOC's understanding of Sponsor Technical Capacity and Capability, Scope, Cost and Schedule (all reviewed under separate Ops);
- Discuss summary schedule (if schedule risk assessment is undertaken);
- Discuss risks, categorized by SCC structure and/or summary schedule activity, identified by the PMOC, review the status of Sponsor's risks listed on its Risk Register, and discuss and record any additional risks discovered during the workshop, including qualitative characterization of likelihood and magnitude of cost and/or schedule impact for the identified risks;
- Where possible, confirm or establish draft mitigation actions for the identified risk events;
- Summarize findings, conclusions, recommendations, questions, and enter into joint discussions to resolve open questions;
- Discuss actions required to facilitate the next stage of risk review; and
- Inform the Sponsor of next steps in the risk review process.

Workshop 2 (may be combined with Workshop 1 in the case of a risk refresh): This workshop should occur after PMOC team has reviewed the risk listing, has developed its cost and schedule risk assessments (as appropriate), and has developed recommendations regarding Sponsor's target budget, contingency and risk mitigation.

- Introduce PMOC team and Sponsor team;
- Describe the process used to review and establish quantitative risk recommendations;
- Summarize the key findings of the review and recommendations;

- Provide recommendations regarding risk mitigation options and alternatives including possible changes to scope, budget, schedule, project delivery method, construction methodology, and/or use of cost and schedule contingencies;
- Review detail of individual risks, as appropriate, regarding the method of quantification of risk and which risks strongly influence overall project risk;
- Review specific recommended mitigation measures and solicit completion dates; and
- Discuss action items and next steps in the risk management and FTA review process.

APPENDIX D

Risk and Contingency Review Levels

The following generally depicts large differences among the three OP40 products (OP40 a, b, or c). Refer to details within each OP40 product to establish technical requirements for each element to be performed. The FTA will initially determine the level of risk and contingency review to apply to any project, and the FTA may change the level of review at any time during a project as project conditions warrant.

Activity		FTA will determine initial level of review required based on assumed project conditions; level of review may be changed should actual project conditions warrant, at FTA discretion.		
		OP40a Sponsor-led	OP40b Abbreviated	OP40c Full
A	Review of management capacity & capability, scope, cost, schedule (and others as directed)	Sponsor presents organization, scope, schedule and estimate; PMOC reviews and comments	Perform 1-2 month abbreviated TCC, scope, cost, schedule review, etc. Includes 2-3 day workshop	Perform full TCC, scope, cost, schedule review, etc. Generally 2-3 month process.
B	Review sponsor risk identification	PMOC participates with Sponsor Risk Register Workshop and comments	Review, comment on, and provide amendments to sponsor's risk register	
C	Review sponsor assessment (if required or provided)	Participate and comment on Sponsor's assessment	Review and comment on sponsor's assessment process; contrast against PMOC risk assessment	
D	Develop or refresh PMOC Beta range assessment and develop or refresh schedule risk model	PMOC participates in Sponsor's assessment process. No PMOC risk modeling required	Provide concurrently with TCC, scope, cost, schedule workshop where possible	Usually requires a separately scheduled risk workshop
E	Review sponsor risk response plans (primary and secondary mitigation)	Sponsor presents mitigation management; PMOC reviews and provides comment	Review, comment on, and provide amendments to Sponsor's primary and secondary mitigation plans	
F	Review sponsor contingency and contingency management	Sponsor presents contingency planning; PMOC reviews and provides comment	Provide modeled contingency recommendations; compare to sponsor's contingency. Review and comment on Sponsor's contingency management planning	
G	Review sponsor RCMP	Sponsor presents its RCMP; PMOC reviews and provides comment	Review and comment on sponsor's PMP; focus on risk organization and levels of contingency authority	

APPENDIX E

Example Risk Register

The following is provided as an example only of a risk register used for risk identification; the intention is to convey the basic content for a robust risk register. Other more detailed formats have been found useful in practice, depending on professional experience and project-specific requirements.

The Risk Register developer is encouraged to obtain the most recent examples before determining Risk Register format.

RISK REGISTER										
Grantee:					Rating	Low (1)	Med (2)	High (3)	Very High (4)	Significant (5)
Project:					Probability	<10%	10><50%	>50%	75%><90%	>90%
Date:					Cost	<\$250K	\$250K><\$1M	\$1M><\$3M	\$3M><\$10M	>\$10M
					Schedule	<1 Mths	1><3 Mths	3><6 Mths	6><12 Mths	>12 Mths
					Ranking	<=3	3.1-9.49		>=9.5	
					Risk Ranking					
					Probability	Cost	Schedule	Risk Rating		
SCC	ID	Risk Cat.	Risk Description	Outcome	[P]	[C]	[S]	(P) X (C+S)/2		Mitigation Action
10.01	3	1-Requirements	Third parties may influence the alignment in an untimely manner.	Delay and cost.	2	1	0	1		Obtain municipal consent buy-in at 30% design.
10.01	5	1-Requirements	Delays may occur in reconfiguring Railroad connection project.	If Railroad connection is not completed in time, entire Agency project could be subject to indefinite delay.	3	2	5	10.5		Agency undertake design
10.01	6	1-Requirements	The drawings indicate that there are freight tracks close to the LRT guideway. Is clearance an issue at any of these locations? Is there the possibility of crash walls or something similar required?	Could cause additional costs and studies involved with providing greater physical separation between light rail and freight rail lines.	3	4	0	6		Evaluate whether the current estimate reflects this scope for crash walls. May be an estimate reduction
20.01	43	1-Requirements	As all stations have center island platforms at grade, if a decision, for safety or operations reasons, is made to avoid pedestrian grade crossings, all stations will need tunnels or bridges along with multiple vertical circulation elements to replace them.	Much greater cost per station.	1	5	0	2.5		History indicates a very low probability
20.01	153	2-Design	Potential elevated pedestrian connection between park-and-ride and LRT station (814)		3	3	0	4.5		
30.02	55	1-Requirements	Failure to identify economical, environmental-suitable, and practical location for maintenance facility could cause excessive project costs.	Much higher costs, both for real estate acquisition and construction cost and for O&M costs when the project goes into operation.	1	3	0	1.5		Is currently under choice selection, among final 4 sites. Re-evaluate costs when a site is chosen.
40.01	61	1-Requirements	Balance of earthwork is unknown at this time, although it would appear that there may be more fill than cut. Lack of economical embankment material could be a problem.	Higher cost if material is hard to find.	4	4	3	14		Evaluate as an estimate adjustment. Figure out more during design.
40.02	62	1-Requirements	Since a number of the "tunnels" are only shallow cut & cover grade separations under existing streets (where the utilities are usually buried), there are likely to be utility issues to be dealt with.	Costly relocations of utilities. Short construction season may require expedited advance utility relocation packages to avoid delaying project.	2	3	0	3		Perform utility location studies during early PE
60.01	139	1-Requirements	Potential impact to loading dock access of existing commercial building (124)		5	4	0	10		Evaluate for estimate adjustment

APPENDIX F

Beta Range Factor Guidelines

The following guidelines apply for cumulative Beta Range Factors (BRFs). Note that 1) the following BRF amounts are the sum of the individual risk category factors; 2) failure to remove a category of risk at a given phase indicates that some amount of that risk survives to the next phase—for example, Design Risk may exist during the construction phase if a design decision has been delayed; and 3) the cumulative factors here represent a range of observed risk across many transit projects and therefore increases to the suggested BRFs should only occur where exceptional risks are involved, beyond what would be expected by a “normal” project. The PMOC shall appropriately suggest BRFs, depending upon the complexity of and risk inherent in the element under analysis.

SCC10 through 50:

- A BRF above 2.50 implies uncertainty associated with the completion of the alternatives analysis process; after completion of alternatives analysis, some level of Requirements Risk remains;
- A BRF between 2.50 and 2.25 implies reduction of remaining Requirements Risk, and increasing mitigation of Design Risk as design proceeds to Entry to Engineering. During Engineering, remaining design risk is virtually removed, yielding a BRF at completion of Engineering of 1.75;
- A BRF between 1.75 and 1.50 recognizes the existence and reduction of Market Risk (bid risks; uncertainties associated with reliable information on market conditions, short of a project specific firm price, etc.);
- A BRF between 1.50 and 1.35 generally recognizes uncertainties related to construction associated with geotechnical/utility, other underground/construction activities occurring during the first 20% of construction “Early Construction”).
- A BRF of 1.25 indicates reduction of risk to the level of 50% of construction;
- A BRF between 1.25 and 1.05 indicates uncertainty associated with late construction activities, including activities through start-up and substantial completion.
- A BRF of 1.05 implies that no unresolved risk events are identified for this item and only unknown risk events remains.

SCC10 through 40:

- Where exceptional geotechnical conditions exist, especially deep excavations and/or tunneling, the PMOC shall provide a separate analysis and explanation of the BRFs that apply to the corresponding estimate elements. Such BRFs may significantly exceed standard BRFs.

The standard BRFs are presented in Table 1 and Figure 1 in this appendix. Note that at any given point in a project, BRFs for the SCC elements may be comprised of cumulative factors of risk from any or all of the categories shown.

Table 1 – SCC 10-50 Beta Range Factors by Risk Category

<u>Risk Category</u>	<u>Risk Category</u> <u>Factor</u>		
Requirements Risk	Min. 0.15		
Design Risk in Project Development	0.10		
Design Risk in Engineering	0.50		
Market Risk	0.25	<u>Construction Risk</u> <u>Sub-Factor</u>	
Construction Risk	0.45		
Early Construction			0.25
Mid Construction			0.15
Late Construction			0.05
Post Construction	0.05		

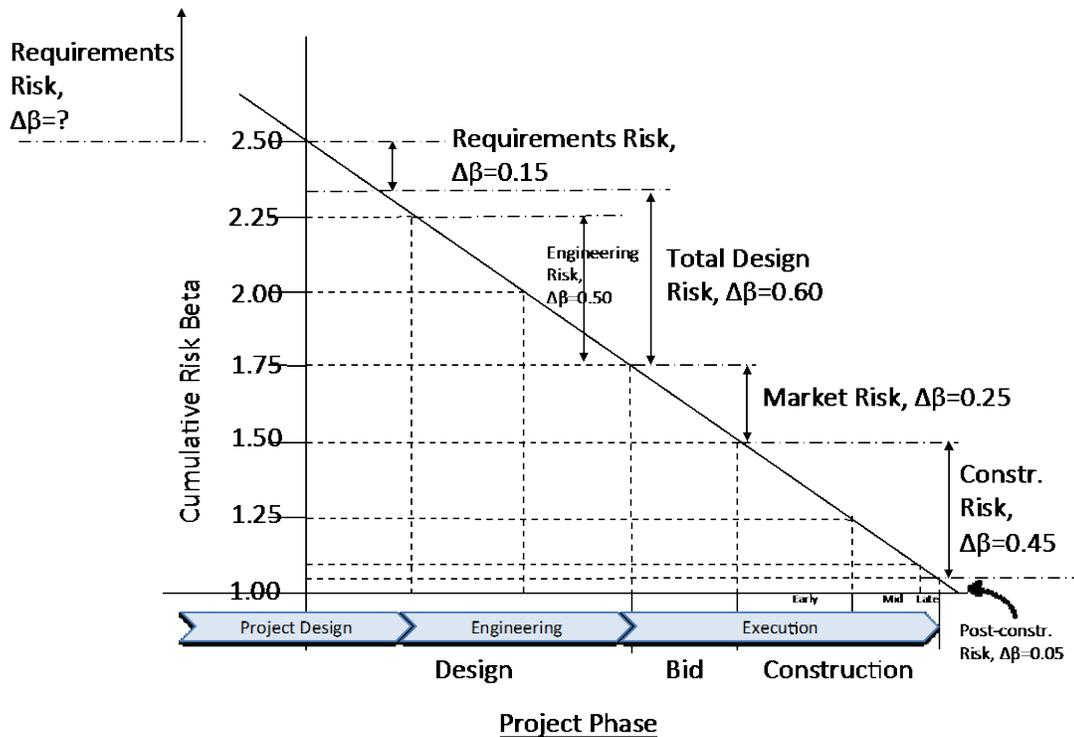


Figure 1 – SCC 10-50 Beta Risk Factors by Level of Development

SCC60 through 80:

SCCs 60 through 80 represent project elements that are not traditional construction elements. As such, the risk categories shall be interpreted as follows:

- Requirements risk is similar to that defined above, wherein it is related to uncertainty of environmental conditions, uncertainty of third party requirements or regulations, or uncertainty of project goals;
- Design risk is related to the sufficiency and potential error of development of plans for execution of the element. For example, for SCC80, this may relate to the development of staffing plans for project management staffing;
- Market risk is similar to that defined above. It is related to the potential variance in price for acquisition of the property, equipment, or staffing necessary to complete the element; and
- Construction risk relates to the actual act of completing the element itself, including any variances that result from conditions only evident at the time of acquisition of property or equipment, or at the time of execution of management or technical activities, such as design or construction management.

SCC60:

- Risk for Right-of-Way tends to survive later in time and suffer higher risk than for those items in SCC 10 through 50 due to large uncertainties and delayed resolution of ROW acquisition; therefore cumulative BRFs are generally estimated larger than that of SCCs 10 through 50 until ROW acquisition is substantially complete. See Figure 2.

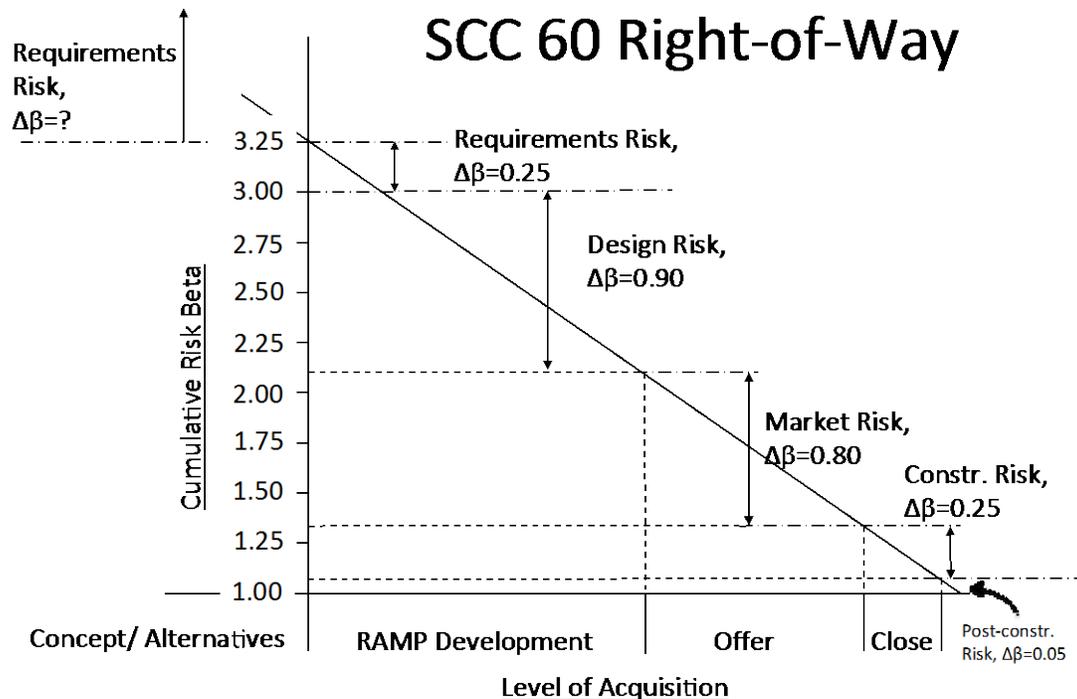


Figure 2 - SCC 60 Beta Range Factors by Level of Development

SCC70:

- Risk for vehicles tends to be removed more quickly in time than for those items in SCC 10 through 50 due to reduced design uncertainties and early vehicle purchasing; therefore cumulative BRFs are generally less than that of SCCs 10 through 50 during early phases of the project. See Figure 3.

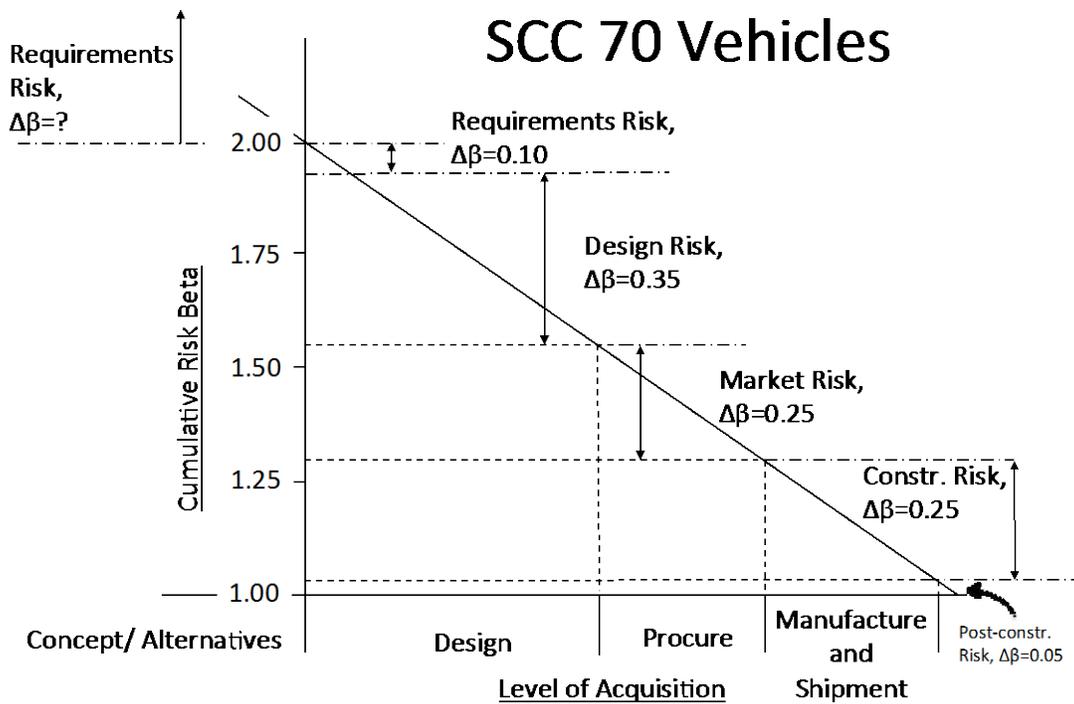


Figure 3 - SCC 70 Beta Range Factors by Level of Development

SCC80:

- Risk for each minor SCC for professional services is highly dependent upon the phase in which it is performed. For professional services, the cumulative BRFs should be mostly drawn down at the point at which the category of services has been largely completed. BRFs for other services (i.e., insurance, etc.) in this category shall be estimated in consideration of the commensurate risk factors. See Figure 4 for standard BRF values for professional services.

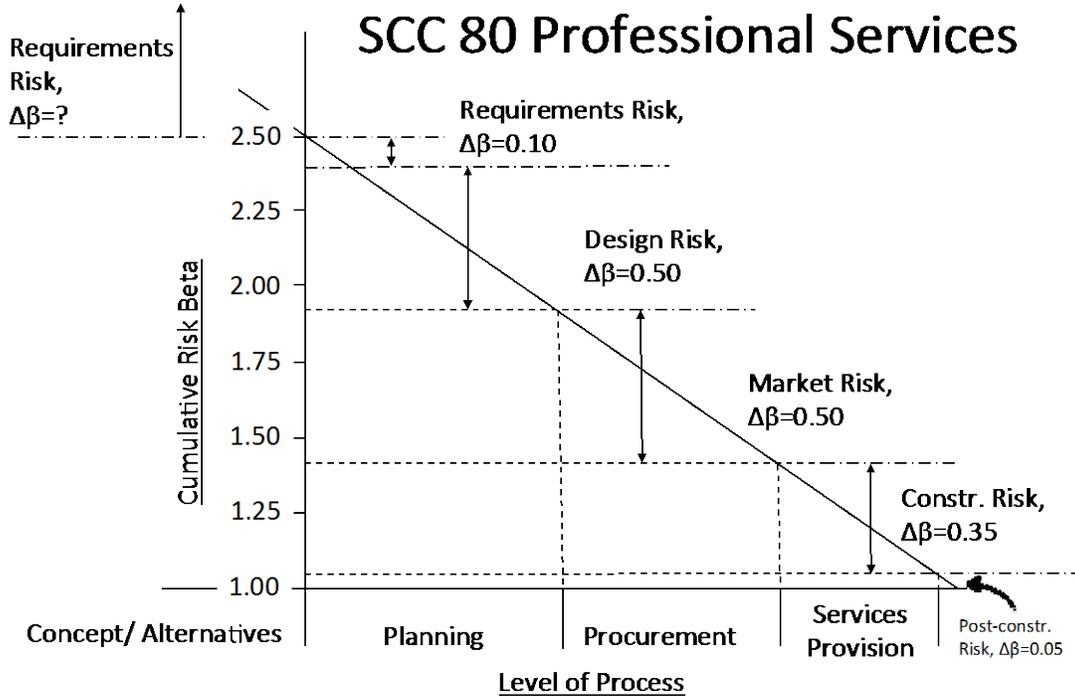


Figure 4 - SCC 80 Beta Range Factors by Level of Development

APPENDIX G

Risk and Contingency Management Plan (RCMP) Structure

Note: the following narrative for potential structure of the RCMP contains elements or details that may not be appropriate for all phases of the project. For example, early in the design phase, some details may be undeveloped and only broad characterization of project elements or risk management plans may be available. The PMOC's review of the Sponsor's RCMP should appropriately consider the phase of the project development, and the PMOC should adjust its review accordingly.

The Risk and Contingency Management Plan (RCMP) is a subplan of the Sponsor's Project Management Plan (PMP); its successful implementation depends upon a fully updated and active PMP. It is the purpose of the RCMP to highlight specific areas of management focus as identified through the risk evaluation process, which should be implemented along with Sponsor's normal project operations as described elsewhere within the PMP. Further, the RCMP provides a means for monitoring Sponsor's progress as it moves the project forward to its next phase. These areas of management focus may include actions to strengthen management capacity and capability, project performance, cost and schedule analyses, mitigations of identified project risks, and others.

Information contained within the RCMP should complement and not be in conflict with information contained elsewhere within the PMP or in other FTA guidance documents. Such areas of concordance should include, for example, the project estimate and schedule, FTA's completion criteria for the various phases such as Entry to Engineering and FFGA/SSGA, master checklists for being considered ready to proceed into the next phase, as well as associated FTA PMOC work products used to review the various technical elements of the project, etc.

Successful implementation of the RCMP is important to the goals of both the Sponsor and the FTA, and monitoring of the RCMP implementation will be undertaken by both the Sponsor and the FTA (through the PMOC). It is important, therefore, that the FTA, PMOC, and Sponsor work collaboratively and develop agreement on the substance of the RCMP.

A potential structure for the RCMP follows:

Overview

This section should indicate that the RCMP is a subplan of the over-arching PMP, including an indication of the latest version of the PMP upon which the RCMP is based. If the RCMP depends specifically on other sections of the PMP, those sections should be noted, including an indication of their latest versions.

A brief description of the important, actionable findings of the RCMP should be included in the overview. If further actions are required to finalize the current draft of the RCMP, those should also be indicated along with expected completion dates.

A brief summarization of topics covered within the RCMP should be included, including such topics as:

Primary Mitigation, organized by significant project activities, such as:

- Management Capacity and Capability
- Project Scoping and Design;
- Delivery Methods and Contracting;
- Construction Process;

- Project Tracking, including:
 - Cost Estimating, Financing and Financial Management; and
 - Project Schedule Management.

Insurance:

- Professional services, construction phase, wrap-up, or other specialized insurances purchased for reduction of risk exposure.

Contingency Management:

- Cost Contingency Management Plan; and
- Schedule Contingency Management Plan.

Secondary Mitigation:

- Establishment of Secondary Mitigation actions and cost targets which may trigger the implementation of Secondary Mitigation.

Risk Management:

- Risk management and mitigation monitoring, change identification, and management controls.

Goals and Objectives

The major goals of the RCMP should be stated, including establishment of measures to complete the project within budget and on schedule, implementation of project cost and time contingency procedures, risk mitigation, and development of available risk mitigation capacity. The role that the RCMP plays in advancing the Sponsor into the next stage of FTA approval should be noted.

Broad goals expected to be accomplished prior to the next stage of RCMP revision (including revisions required at FTA milestones) should be noted. For example, for a project in the Engineering (ENG) phase, such goals may include (similar, phase-appropriate goals would apply to other project phases):

- Adherence to environmental requirements, such as the National Environmental Policy Act (“NEPA”) requirements;
- Mitigation of design risks where possible during the ENG phase, or appropriate transfer of such risks to a design-build entity if applicable;
- Mitigation of other identified risk events;
- Reasoned analysis and assessment of likely market risks to be encountered;
- Cost and schedule risk mitigation capacity developed and implemented as needed, including targets to be achieved during the ENG Phase and forecasted cost and schedule risk management mitigation capacity for subsequent phases;
- Uncertainty in cost estimates and forecasts and project schedules, including tracking mechanisms to identify trends in known costs and risk reduction; and
- Maintenance of minimum cost contingency and schedule contingency targets.

Generally, detailed description of these or other broad goals is required to achieve measurable project evaluations; those descriptions and their metrics should be outlined in separate plans or in an appendix to the RCMP.

The RCMP should note that the Sponsor and its local and state partners understand that the plan was

developed in concurrence with the FTA, that implementation of the RCMP is an important consideration in further FTA approvals, and that the RCMP describes processes and requirements that must be adhered to, in addition to current FTA grant contracts and related FTA Circulars, regulations and guidance.

Risk Review Process:

The section should include a description of procedures used for development of the Risk and Contingency Management Plan, including procedures for development of risk identification, risk assessment, risk response recommendations, risk protection measures (including Secondary Mitigation and minimum contingencies) and risk management and control.

[Note: In the following sections, the Sponsor should provide an outline of its strategic, performance-based project management activities to identify, assess and respond to the project risks. It is the intent of the following to view risk management as a process of continual risk reduction; i.e., while the mitigation of any specific identified risk is an important activity, the identification, addition and mitigation of newly-discovered risks forms a process that provides both the Sponsor and the FTA (through its PMOC) with the means and methods to best ensure satisfactory outcomes for the project. The goal of the RCMP is to provide a plan to take the Sponsor through the upcoming phase, and prepare it for possible entry into the next phase, with:

- Cost estimates and forecasts and project schedules continuing to be developed as planned;
- Reasoned analysis and assessment of likely upcoming risks, including risks associated with Sponsor's management capacity;
- Mitigation of risks at the earliest possible time;
- Completion of all mitigation actions scheduled for the upcoming phase;
- Cost and schedule risk mitigation capacity developed, implemented as needed, and targets achieved; and
- Minimum cost and schedule contingency targets continuing to be achieved.]

Insurance

This section should include a summarized discussion of current or future major insurances provided to the project to respond to identified risk, including especially unusual, highly likely, or high exposure risk identified through the risk review process. Such insurances may include professional services, builder's risk, wrap-up, or other specialized insurances purchased for reduction of risk exposure. Detailed insurance information should be included as an appendix to the RCMP or reflected elsewhere in the PMP.

Primary Mitigation

The primary mitigation section should include the process used to develop the Risk Register, which outlines risks and mitigations that require Sponsor managerial, administrative, and technical action. The section should be organized as follows; each area below should include a brief summary of key risks and action items as of the date of the latest RCMP update.

A detailed listing of all identified risks and proposed mitigations should be included as a separate report, or attached as an appendix, as further indicated below; this separate report should be updated at the frequency noted in the RCMP.

Management Capacity:

The RCMP should summarize key management capacity risks identified in the Risk register. A plan should be indicated for additional resource commitments, additional requirements for methods and resources, and improved management strategies to address the findings of risk. Management strategies should include specific plans or products, project control, responsibilities, authorities, and measures of performance.

Detailed risk issues related to Management Capacity should be specifically cited in an appendix, and should be noted as *Management Capacity Risks and Mitigations*. This list should include proposed mitigation activities, responsibility for action and targeted date for completion.

Project Scoping and Design:

Requirements: A summary of key requirements risks and proposed mitigations should be discussed in the body of the report to provide a succinct overview of the outstanding risk mitigation work to be accomplished. In addition, all outstanding project requirements risks, including undefined project goals, third party requirements, and environmental considerations should be listed in an appendix, indicated as *Requirements Risks and Mitigations*. Such activities should also include risk associated with all compliance of NEPA activities consistent with the NEPA Final Determination; and public and governmental reviews and critiques;.

Design: A summary of important design risks and proposed mitigations should be discussed in the body of the report to provide a succinct overview of the outstanding design risk mitigation work to be accomplished. In addition, all design activities indicated in the risk review as potential risk events, including activities associated with unproven project technologies, unresolved alternate design approaches, late design, and others should be listed in an appendix, indicated as *Design Risks and Mitigations*. As appropriate, statements of subconsultant responsibilities for risk mitigation should be included.

Where value engineering efforts have been or will be undertaken, a summarized discussion of the effect on project risk should be discussed, including plans for closure of the value engineering process. Detailed value engineering items should be referenced elsewhere in the PMP, or included in an appendix if otherwise unavailable.

Delivery Methods and Contracting:

The purpose of this section is to illustrate the Sponsor's plans for efficient risk allocation through choice of delivery method and through contractual risk allocation; such risks so considered should include common design, market, and construction risks as well as those risks identified in the risk review. All contracts should be considered, including design, vendor, and construction contracts. The Sponsor should discuss the following:

- Strategies for contractual risk allocation or risk sharing through explicit contract language, ordinary custom/commercial/trade practices, or statutory authority such as the Uniform Commercial Code. The risk allocation plan should include allocations of future and prior contracted work, should complement other PMP sub-plans, such as the Contract Package Plan and future individual contracts, the Real Estate Acquisition Management Plan ("RAM"), and all NEPA-related documentation;
- The effect of the chosen strategy on market pricing for the various contracts;
- Assessment of the contracted party's capacity to efficiently mitigate its allocated project risk exposure, including market risk, such that the risk allocation represents the best value for the project; and

- Actions to implement the strategy.

Detail for the proposed allocation strategy should be referenced elsewhere in the PMP or should be included in an appendix. Individual risks identified in the risk review should be indicated as *Delivery Methods and Contracting Risks and Mitigations*.

Construction Process:

The purpose of this section is to demonstrate the Sponsor's plans for effective management of risk during the construction process. This section should include a summarized discussion of the key construction phase risks identified in the risk review and plans to mitigate and respond to those risks. Especial attention should be placed on those risks that have not been wholly transferred to a contracted party. In addition, all outstanding project construction risks identified in the risk review should be listed in an appendix, indicated as *Construction Risks and Mitigations*.

Project Tracking:

The purpose of this section is to discuss those activities that will be put in place to ensure that adequate tracking and forecasting of cost and schedule outcomes are available to measure potential increased cost or time due to project risk. Such increases may require actions, such as use of contingencies or may trigger the implementation of Secondary Mitigation. This section should complement and may reference other related sections of the PMP. Where the risk review has identified risks associated with project cost and time tracking, a detailed listing of all identified risks and proposed mitigations should be included in an appendix, indicated as *Project Tracking Risks and Mitigations*. The section should be organized as follows; each area below should include a brief summary of key risks and action items:

Cost Estimating and Forecasting: discussion should include the process used for development and management of project cost and project cost uncertainty, including the effect of schedule risk uncertainty on the cost risk results. Included within the discussion should be establishment of reliable estimates for the maximum dollar amount of the FTA financial contribution needed to implement or complete the project.

The following efforts for reduction of cost uncertainty should be indicated or referenced elsewhere in the PMP:

- Continuous administrative and management efforts for increased detailed development of the cost estimate;
- Internal quality control to ensure adequate technical provision of all estimating and forecasting work;
- Methods for adjustment of cost schedules in reaction to realized schedule risks.

Detailed cost and cost risk information should be referenced as available elsewhere in the PMP or made available in an appendix to the RCMP.

Project Schedule Management: discussion should include the process used for development and management of project schedule forecasts and project schedule uncertainty, including any effect of cost risk uncertainty on the schedule risk results. Such external requirements as NEPA compliant related work and community involvement should be considered in the discussion of risk-related schedule management.

Plans to maintain schedule tracking should be discussed, including both design and construction schedules, to detect schedule deviation through techniques such as earned value. Such plans should indicate responsibility and frequency of reporting (usually monthly). Where appropriate, the RCMP should indicate efforts made to ensure that consultants and contractors comply with similar measures.

Such tracking is important for the establishment of risk response actions, such as potential use of schedule contingency; this discussion shall rely upon and complement schedule control discussions contained within the scheduling section of the PMP.

Contingency Management

The purpose of this section is to discuss the Sponsor's plans for establishment and management of cost and schedule contingency protections. The section should be organized as follows:

Cost Contingency Management Plan:

- Results of cost contingency recommendations developed, including minimum contingency hold points by milestone and reflected in a minimum cost contingency draw-down curve;
- Sponsor plans to reach substantial conformance with the contingency recommendations on a timely basis;
- Procedures in place to implement and maintain throughout the project, a Cost Contingency Management Plan as an identifiable element in the RCMP, including authorities and procedures for distribution, transfer and use of all cost contingency in conformance with the requirements of this plan and sufficient documentation as each transfer occurs. This Cost Contingency Management Plan should also describe the manner in which the Sponsor will forecast and trend the project contingency; and
- Sponsor plans to recover in those cases where cost estimate forecasts indicate contingency levels have fallen below the minimum planned contingency hold points, including as necessary implementation of a formal Recovery Plan or adjustment of the expected project final cost with FTA approval.

Schedule Contingency Management Plan:

- Results of schedule contingency recommendations developed, including minimum contingency hold points by milestone and reflected in a minimum schedule contingency draw-down curve;
- Sponsor plans to reach substantial conformance with the contingency recommendations on a timely basis;
- Procedures in place to implement and maintain a Schedule Contingency Management Plan as an identifiable element in the RCMP, including authorities and procedures for distribution, transfer and use of all schedule contingency in conformance with the requirements of this plan and sufficient documentation as each transfer occurs. This Schedule Contingency Management Plan should also describe the manner in which the Sponsor will forecast and trend the project contingency; and
- Sponsor plans to recover in those cases where schedule estimate forecasts indicate contingency levels below the minimum planned contingency hold points, including as necessary a formal Recovery Plan or adjustment of the expected completion date for the project or appropriate milestones.

Secondary Mitigation

The purpose of this section is to discuss the Sponsor's plans for establishment and management of Secondary Mitigation protections. The section should discuss the following:

- Results of Secondary Mitigation recommendations developed and the process for reviewing and developing future items;

- A summary discussion of such Secondary Mitigation, including a brief description of a prioritized list of identified Secondary Mitigation items and the timing necessary for their implementation, especially including dates beyond which the items may no longer be effective;
- A discussion of those points of project completion at which Secondary Mitigation at which the items are no longer available to be triggered for implementation; and
- Procedures in place to track such trigger points and to implement available Secondary Mitigation, including authority responsibility for such actions.

If the project has progressed to a stage at which no available Secondary Mitigation has been identified, this condition should be discussed in the report.

Risk Management and Risk Mitigation

The Sponsor should describe its plans to implement, administer and maintain throughout the project, a Risk and Contingency Management plan for:

- Assessing (identifying and analyzing) project cost and schedule risk;
- Developing risk-handling options inclusive of primary risk mitigation;
- Developing a secondary mitigation plan to handle risk events or “triggered” mitigation activities;
- Monitoring risks to determine how risks have been handled or changed; and
- Documenting and reporting to the FTA the risk management program.

The risk management description should include such considerations as:

- Design control processes to detect potential consultant failure, such as scope, schedule, and budget “earned value” metrics;
- Clearly established Sponsor, consultant, and contractor responsibilities for risk management;
- Plans for amendment of the risk register during the course of the work, to both succinctly catalogue additional significant issues that arise, as well as to identify closure of issues as they become resolved to the satisfaction of the Sponsor and the FTA; and
- Plans and timing for systematically updating the RCMP.

APPENDIX H

Risk Report Format

Reporting should occur soon after conclusion of the risk workshops; timely reporting will facilitate Sponsor's early adoption of the recommended risk mitigation measures into its Project Management Plan.

In the conduct of this report, the PMOC shall use its professional judgment to identify and categorize, assess and evaluate the uncertainties in the Sponsor's project information, considering the project's administrative, management, political, legal, financial and physical conditions. The PMOC will document and report its professional opinions and its recommendations for responding to identified risk, including recommendations for mitigations including contingencies. Unless otherwise directed, the report will be sectioned as follows:

Title Page

Include disclaimer, below.

Disclaimer Insert: This Project Management Oversight Contractor (PMOC) report and all supporting reports and back up materials contain the findings, conclusions, professional opinions and recommendations stemming from a risk-informed evaluation and assessment, prepared solely for the Federal Transit Administration (FTA). This report should not be relied upon by any party, except FTA or the project Sponsor, in accordance with the purposes of the evaluation and assessment as described below. For projects funded through FTA's Major Capital Investment (New Starts) program, FTA and its PMOCs use a risk-informed process to review and reflect upon a Sponsor's scope, schedule, and cost, and to analyze the Sponsor's project development and management. This process is iterative in nature. The results represent a "snapshot in time" for a particular project under the conditions known at that point. The evaluation or assessment and related results may subsequently change due to new information, changes in circumstances, additional project development; specific measures a Sponsor may take to mitigate risks, Sponsor's selection of strategies for project execution, etc.

Table of Contents

List of Figures and Tables

Executive Summary

The PMOC should provide an executive summary in three pages or less that includes the following:

- 1) Purpose
- 2) Project Description
- 3) Results and Recommendations - PMOC's professional opinion regarding:
 - a) Contract packaging review and assessment
 - b) Total project cost, including statement of potential range of cost (lower reporting range, conditioned estimate and upper reporting range) and recommended cost contingency where a separate PMOC risk assessment has been performed;
 - c) Project schedule and schedule contingency, including statement of separate PMOC findings where a PMOC assessment has been performed; and
 - d) Top Risks, mitigations, and recommended actions.

Project Background

Project descriptions and data shall be consistent with the Monitoring report guidance, current monitoring report and the most recent FTA New Start profile. Notwithstanding the foregoing, FTA may direct the contractor to use an identifiable draft version of these materials. Ridership shall include peak hour ridership data. Sub-sectioning shall also include Guideway Components, Project Delivery Method, proposed Contract Packaging Strategy and, as applicable, Master Planning for the Corridor.

Summary of Project Status from other OPs

Summary-level information from: Sponsor Management Capacity and Capability, Project Scope, Project Estimate, and Project Schedule reviews if performed. Include specifically elements from prior reviews that are particularly important to developing understanding of the issues presented later in this report.

Risk Identification

Provide a summary of the process used for identification of risks, and provide a narrative discussion of key risk events (categorized by SCC), including their potential impact on the project. Characterize the remaining elements of the Risk Register, which is to be attached as an appendix.

Risk Assessment

For projects with prior risk reviews, include comparisons of the currently-assessed project risk to the prior-assessed project risks and comment on the changes indicated.

PMOC Cost Risk Assessment

Where the cost risk review is based on an independent PMOC risk assessment, describe the methodology used to deliver the risk assessment products. Further, present any cost estimate adjustments and selection of cost range factors; especially discuss any factors that vary from standard recommendations. Provide a summary of key risks that influence PMOC's characterization of level of project risk by SCC. The PMOC shall present detailed data and analysis in a separate appendix as necessary in order to maintain readability of the report.

PMOC Schedule Risk Modeling

Where the schedule risk review is based on an independent PMOC risk assessment, describe the methodology used to deliver the risk assessment products. This section shall present the findings resulting from the schedule risk modeling, including development of the summary schedule activities, ranges for activity durations in the summary schedule, and characterization of specific risks that influence important schedule activities; characterization of the results of the schedule risk modeling, including confidence levels for achieving the Sponsor's Revenue Service Date target; the PMOC's professional opinion regarding the most likely schedule for Revenue Service Date; and PMOC's recommended actions.

Risk Mitigation

The purpose of this section is to present the PMOC's review and recommendation for any adjustment of risk mitigation efforts by the Sponsor. The PMOC's narrative should allow FTA management and the Sponsor to maintain focus upon these risk mitigation efforts as the means to maintain the baseline cost estimate and avoid potential cost escalation from these potential project risks.

The report should include separate subsections for Primary Mitigation, Secondary Mitigation and Contingency Recommendations.

Primary Mitigation - Specific mitigation recommendations shall be presented, including appropriate timeframes for completion of the mitigation activity, especially focused on those mitigations considered necessary for successful approval at the next FTA milestone. Where a PMOC assessment has been performed, link the mitigation activity to the risk register and/or the assignment of exceptional risk factors. Such mitigation recommendations shall be segregated by SCC and Risk Category.

For projects with prior risk reviews, include discussions (as appropriate for project phase) of Sponsor's historic mitigation efforts by Risk Category.

Secondary Mitigation - Provide recommendations for adjustments to amounts of Secondary Mitigation capacity developed by the Sponsor. Where the risk review has provided such, include suggested additional areas for potential Secondary Mitigation.

Contingency - Provide a narrative indicating minimum recommended levels of both cost and schedule contingency, including a summary of the basis for development of the recommended minimums. Further, provide graphical or tabular representations of the Sponsor's contingency draw-down curves, including review comments and PMOC's recommendations for adjustment, if any.

Monitoring Plan Basis

Indicate a plan for testing the implementation and effectiveness of Sponsor mitigation measures on the project.

Conclusion

Appendices

As required, include the following or other additional information:

Risk Register

Sponsor Data Characterization

Provide a descriptive listing of documents used in this analysis, including a narrative characterization of their completeness and sufficiency as appropriate for the project phase during which this review was conducted.