



*Signature on file*

**Roger Millar, PE, FASCE, FAICP**  
Secretary of Transportation

*April 6, 2022*

Date

## **Project Risk Management and Risk-Based Estimating**

### **I. Introduction**

#### **A. Purpose**

The Washington State Department of Transportation (WSDOT) is committed to comprehensive project risk management as an integral part of project management. This Secretary's Executive Order formalizes WSDOT's continuing commitment to identify, share, and manage risks across organizations and functions. This commitment to project risk management also supports WSDOT's efforts and directions provided in Secretary's Executive Order [E 1038](#) *Enterprise Risk Management* and Secretary's Executive Order [E 1032](#) *Project Management*.

This Secretary's Executive Order directs employees to apply the use of project risk management and risk-based estimating for all phases of all WSDOT Improvement and Preservation capital construction projects. The project estimate and project risk management plan are part of the project management plan. This material is developed during the project definition phase and is updated and actively managed through the design and construction phases.

WSDOT has developed tools and methods to identify risks and uncertainties associated with projects and to express cost and schedule estimates as a range, rather than a single estimate.

The department's ability to realistically determine a range for both project cost and schedule estimates is directly related to the public's confidence in WSDOT's ability to estimate and manage costs for large public projects.

#### **B. Supersession**

This Secretary's Executive Order supersedes and replaces the prior version with the same title, dated May 11, 2011. It also supersedes and replaces Policy Statement P 2047, titled *Estimating Project Budget and Uncertainty*, dated March 20, 2017. All references to the superseded E 1053.01 and P 2047.00 now reference E 1053.02.

#### **C. What Has Changed**

- This revision replaces references to the Strategic Analysis and Estimating Office and the Cost Risk Estimating Management Office with references to the Engineering Analysis Office.
- In Section I, this revision modifies the language about applying the use of project risk management and risk-based estimating and about the project estimate and project risk management plan. It also updates and clarifies the language.

- In Section II, this revision modifies the language about required processes and modifies the language in the table. It clarifies that a risk management process is required for all Improvement and Preservation capital construction projects.
- In Section III, this revision updates and adds required responsibilities throughout the section. It adds Subsection III.F, Capital Program Development and Management Division. It also makes minor edits to clarify the existing language.
- This revision adds a new Section IV, which adapts and updates the rules and procedures previously shown in Policy Statement P 2047.
- In Section VI, this revision updates the references to provide current information.
- In Section VII, this revision adds language about leadership review and replaces references to the Assistant Secretary of Engineering and Regional Operations with references to the Director of the Development Division.

## II. Secretary’s Executive Order

Employees that manage construction projects are directed to actively manage project risks. A risk management process is required for all Improvement and Preservation capital construction projects. These processes are a part of project risk management and aid in more informed decision making to help project managers control scope, cost, and schedule and manage risks.

The following table provides the minimum risk management process required based on project size. Project managers may choose to use a higher-level process than required.

<b>Project Size</b> (M = million)	<b>Minimum Risk Management Process Required</b>
<b>\$10 M or less</b>	<p>Project managers can use a higher-level process if desired.</p> <p><i>In some cases, it is acceptable to combine a value engineering study with a risk-based estimating workshop; discuss with the Engineering Analysis Office.</i></p>
<b>\$10 M to \$25 M</b>	<p><b>Qualitative Risk Assessment</b></p> <p>Project teams may use the <a href="#">Qualitative Spreadsheet</a> or their own format as preferred.</p>
<b>\$10 M to \$25 M</b>	<p><b>Informal Risk-Based Estimating Workshop</b></p> <p>Use the Project Risk Analysis Model (PRAM); have results reviewed by HQ Design Office.</p> <p>An informal risk workshop is composed of the project team (or key project team members); the project manager/project team may include other participants as deemed necessary.</p>
<b>\$25 M to \$100 M</b>	<p><b>Cost Risk Assessment (CRA) Workshop</b></p> <p>Projects \$25 million to \$100 million should use the informal risk-based estimating workshop in the scoping phase, followed up by the more formal CRA or CEVP® process during the design phase.</p>
<b>\$100 M or more</b>	<p><b>Cost Estimate Validation Process (CEVP®) Workshop</b></p> <p>Projects \$100 million and over should use the informal risk-based estimating workshop in the scoping phase, followed up by the more formal CEVP® process during the design phase.</p>

### III. Information to Carry Out This Secretary's Executive Order

The following required responsibilities are established.

#### A. Executives and Managers

Executives and managers are required to:

1. Promote and express support for active project risk management.
2. Direct and support project managers to develop project risk management knowledge, skills, and abilities required to deliver capital transportation projects.
3. Require project managers to keep project management plans, including the project risk management process and risk-based estimates, current and consistent with this Executive Order.
4. Require project managers to be prepared to discuss and/or present the project risk management plan and estimate at meetings and/or on request.

#### B. Project Managers

Project managers are required to:

1. Proactively manage projects to reduce threats, maximize opportunities, and control project costs and schedules. This includes:
  - a. Allocating appropriate resources to perform project risk-based activities in support of project risk management.
  - b. Using project management best practices as identified in the [Project Management Guide](#).
  - c. Incorporating quality assurance and quality control (QA/QC) for project development activities including project cost and schedule estimating and risk management.
  - d. Following requirements provided in the [Plans Preparation Manual](#) M 22-31 and other related manuals, guidance, and directional documents.
  - e. Reviewing and updating the project management plan, project schedule, basis of estimate, and project estimate annually, unless significant changes occur that require an update at that time.
  - f. Documenting significant new risks or changes in likelihood and/or severity of identified risks and changes in scope, schedule, and cost as they are identified, and communicating them to senior management and executives.
  - g. Following up on the effectiveness of risk response actions.
2. Keep projects within the intended scope to address the identified project need or deficiency.
3. Use the appropriate level of risk analysis for projects based on the table provided in this document.
4. Incorporate project risk management activities into the project schedule.

5. Present results of risk management process workshops to executives and managers as requested.

### **C. Specialty Groups**

Specialty group members are required to:

1. Participate in risk identification and provide the project manager with a schedule and estimate for the planned actions in response to identified risks for assigned projects.
2. Document and communicate new risks and changes in the scope, schedule, and cost as they are identified to the project manager and project team.

### **D. Headquarters Design Office and Construction Office Staff**

The Headquarters Design Office and Construction Office staff members are required to:

1. Review the project risk management plan in accordance with this policy and the requirements in Secretary's Executive Order [E 1038](#) *Enterprise Risk Management*.
2. Identify prominent risks and recurrent risks seen across projects. Evaluate potential changes in policy or procedures to address these risks.

### **E. Engineering Analysis Office**

Engineering Analysis Office (EAO) staff members are required to:

1. Provide support and training on developing and maintaining risk-based estimates and project risk management plans.
2. Assist with questions on how to implement this Executive Order.
3. Assist when the Project Risk Analysis Model (PRAM) tool is used. Risk analyses conducted using the PRAM are reviewed and validated by EAO if requested by the region.
4. Review results of formal workshops.

### **F. Capital Program Development and Management Division**

Capital Program Development and Management (CPDM) staff members are required to:

1. Review the results of risk analysis reports and review project uncertainty risks at least once a year prior to May 1st and coordinate with region program managers and budget program managers as needed.
2. Monitor and report on each current programmed project's identified risks and risk reserves for known risks that may occur over the life of the project.
3. Report on retired risks and unused contingency funding at each project's completion.
4. Monitor risk reserves and trends of excesses or shortfalls of reserves and work with the Development Division to continuously improve methods for determining project risk reserves.

## IV. Rules and Procedures

### A. Establishing the Project Budget

1. For WSDOT projects (as identified by their Project Identification Number [PIN]) with a total estimated cost less than or equal to \$10 million, a formal risk report is not required. The project manager and region program manager determine whether project cost or schedule uncertainty warrants the use of the Project Risk Analysis Model (PRAM) tool instead of the Qualitative Risk Assessment to update the project budget.
2. Each WSDOT project with a total estimated cost greater than \$10 million shall go through a quantitative cost and schedule risk assessment. Project teams may perform their own quantitative project risk assessment for projects between \$10 million and \$25 million using the PRAM. For projects from \$25 million to \$100 million, project cost risk workshops may take the form of a Cost Estimate Validation Process (CEVP®) or Cost Risk Assessment (CRA). Lastly, for projects over \$100 million, project risk workshops must take the form of a CEVP®. Occasionally, if deemed appropriate by EAO in collaboration with the project manager, a risk assessment may be combined with Value Engineering (also known as VERA). Each of these workshop formats provides a Cost Risk Analysis report that summarizes the results necessary for setting the schedule, budget, and risk reserve. An exemption from the requirement to convene a workshop may be granted by the Assistant State Design Engineer, upon request of the project manager.
3. The first risk workshop normally occurs early in the design process soon after opening the preliminary engineering work order. For large and/or complicated projects, formal risk assessment shall be performed during the scoping phase. Updates to the project risk assessment are initiated when the project engineer determines that significant changes have occurred in project scope, cost, or schedule that affect project risk.
4. The Engineer's Estimate (EE) shall be periodically reviewed and validated. This revised EE serves as the base cost estimate in the process of cost and schedule risk analysis. Over time, the design will be refined and the EE will change. The project manager closely monitors changes to the project EE between workshops to determine whether significant changes in project scope, cost, or schedule affecting project risk have occurred. If so, it is expected that the project manager will contact EAO for guidance on the appropriate action to take with respect to a cost risk update, including the need for a new workshop.
5. The project manager establishes the project budget using two different percentiles from the project's quantitative estimated cost risk profile:
  - The budgeted "legislative" value is given by the 60th percentile of the project's total cost.
  - The operational budget value is given by the 40th percentile of the total project's cost.
  - To address schedule uncertainties, the advertisement date and end of construction date are given by the 60th percentile of their distribution as shown in the Cost Risk Analysis report.

6. Risk response is a scalable element of risk management. Risk response involves reviewing and developing response actions designed to optimize achieving project objectives (cost and schedule) within the scope. The results of this work are threat response actions that may include avoidance, acceptance, mitigation (a change in a risk's probability of occurrence or impact to reduce or minimize the threat), and transferring risk to other entities. For opportunity risks, response actions include exploiting, sharing, enhancing, or accepting the opportunity. These recommendations may change the project base cost, duration, and risk register. The project manager is responsible for documenting whether each response action will be implemented as provided, implemented with revisions, or rejected.
7. Notes:
  - a. There may be situations when the percentiles representing the legislative or operational budgets are in a volatile zone of the project's risk profile. A volatile zone is defined as a section of the curve where there is a sudden jump in percentile values. The volatile zone is represented on the cumulative distribution diagram by a horizontal line. When this occurs, the project manager shall contact CPDM and EAO for assistance in choosing an appropriate cost value for use in the legislative budget and/or operational budget.
  - b. The project manager is responsible for preparing and submitting to CPDM an updated project budget and variance explanation when an update to the project's scope, cost, and schedule risk analysis significantly differs from the previous analysis. A new budget request can be processed only after CPDM has approved this updated budget.
  - c. Risk response actions evaluate all significant risks that may affect the project in order to optimize the project's cost and schedule. In conducting risk response, the project team pays particular attention to: (1) high-impact threats regardless of probability, because if these risks occur, the project cannot absorb them by using its own risk reserve, and (2) opportunities with very high impact and very high or high probability of occurrence, because if these opportunities do not occur, the project may need additional funds that cannot be provided by its own risk reserve.
  - d. Risk response is accomplished within the normal project resources allocated for risk assessment.
  - e. A copy of the updated and completed Cost Risk Analysis report is to be submitted to CPDM. The Cost Risk Analysis report is to provide a summary table to include (at a minimum):
    - The recommended operational budget in current year dollars.
    - The legislative budget percentile of the advertisement date and end of construction date.
    - The project risk reserve in year of expenditure dollars. (See the [Program Management Manual M 3005](#) for direction on entering results into the Capital Program Management System [CPMS].)
    - Documentation of project assumptions and reasons for major scope, cost, or schedule changes, if any, from the last Cost Risk Analysis report assumptions.

## **B. Risk Reserve**

1. The difference between the legislative and operational budgets in the year of expenditure is called the project risk reserve. The project manager prioritizes protection of the risk reserve in all relevant project decision making, while CPDM manages all risk reserves statewide in order to optimize programming needs.
2. The risk reserve is created to address project uncertainties. Periodic evaluations by CPDM of individual projects, and the overall program, contribute valuable information about whether an increase or decrease to the risk reserve is needed to optimize delivery of the entire transportation program. As a result, project managers are provided access to the risk reserve only when it is justified, and upon approval of CPDM.
3. Use of federal funds for the risk reserve is not allowed except by approval of CPDM.
4. The dollar value of the project's risk reserve is included in the legislative budget figure, using a project Work Item Number (WIN) specifically assigned to risk reserve. During pre-construction, the risk reserve may be accessed to cover unplanned expenditures for preliminary engineering and right of way activities. At contract award, all pre-construction risks are retired, as are any construction risks that were resolved during the design phase.

## **C. Managing to the Operational Budget**

1. Project managers are responsible for managing their projects within the established operational budget. The risk reserve is to be used when risk mitigation efforts taken by the project manager are insufficient to retire the risks that have been documented in the risk register.
2. A project cost risk workshop is recommended every two years following the initial workshop. Consistent with Subsections III.B.1.e and III.B.1.f above, the project manager determines if updates are needed more or less frequently in consultation with region Program Management. As a rule of thumb, this Executive Order defines significant change in the EE as any decrease or increase in the EE by an amount comparable to the value of the risk reserve.
3. A significant change to the EE requires reconsideration of the risk reserve. Estimators shall clearly document what has changed in their estimate and why, with significant changes to be recorded and described by the project manager in the Transportation Executive Information System (TEIS). A significant change to the EE requires one of the following actions:
  - If the significant change can be addressed through the existing risk reserve, then the project manager submits a request to the region program manager. This request is forwarded to CPDM to transfer funds from the risk reserve to the operational budget. Contact CPDM for details.
  - If the significant change cannot be addressed through the existing risk reserve—in other words, the increase or decrease in the EE is in excess of the risk reserve—then an updated quantitative cost and schedule risk assessment needs to be performed to update the cost risk profile.

4. In addition to cost risk workshops, the project's uncertainty and risks are reviewed periodically (at least once a year prior to May 1st) by the project manager and region program manager; a quarterly review is recommended but not required. The review is used to determine whether risks on the register need to be adjusted or new risks need to be added. A project risk is considered for removal from the register when it is determined that the conditions associated with the occurrence of that risk have been mitigated or resolved, or when the impact of the risk is determined to be insignificant. This review is also an opportunity to document whether a risk workshop will be needed to update the risk register and risk profile.

#### **D. Inflation**

Inflation tables for construction, right of way, and preliminary engineering are made available to project managers by CPDM. These rates are to be used for projects during the quantitative cost and schedule risk assessment. CPDM owns and maintains these tables and they are used by CPMS to inflate project costs from current year dollars to year of expenditure dollars.

#### **E. Market Conditions**

1. Market conditions represent the influences of supply and demand, which exacerbate uncertainty in unit prices and contractor bids and are separate from inflation. They are powerful drivers of the construction costs and the cost of land (right of way) and include the bidding environment, the labor market, resource availability, and other factors. Data about market conditions may be entered into the risk model to help capture the influence of price volatility on project estimates, and these data contribute to the risk reserve calculation.
2. The project manager monitors market conditions and may consider adjusting the project advertisement date to take advantage of favorable conditions. Any change in project advertisement date must be approved by CPDM. The region program manager uses this information to consider how packaging or timing multiple project contracts can address market conditions.
3. The project manager should consult with local and objective subject matter experts when estimating the possible impacts of the market on the project cost. Contact EAO for more information about market conditions and their impact on risks associated with a project estimate.
4. The impact of market conditions on project cost *typically* decreases as the project nears the advertisement date. It is recommended that estimates done within one year of the advertisement date be examined with respect to the potential number of bidders for the project and the impact of the bid environment on bid values.

#### **F. Exceptions**

In order to replace the default legislative budget percentile for a project with a different percentile, the requester shall use one of the following approval processes.

1. Projects with an executive oversight committee (EOC):
  - a. The project manager presents the results of the risk assessment to the EOC, along with a recommendation and information supporting the percentile request.



- b. If the EOC approves, region executive management provides a request in writing and obtains written approval from the Assistant Secretary, Regions.
  - c. The project manager provides a copy of the written approval to the region program manager and CPDM.
2. Projects without an EOC:
  - a. The project manager presents the results of the risk assessment to region executive management, along with a recommendation and information supporting the percentile request.
  - b. Region executive management provides a request in writing and obtains written approval from the Assistant Secretary, Regions.
  - c. The project manager provides a copy of the written approval to the region program manager and CPDM.
3. Projects that completed a risk assessment under guidance from a previous directional document must use the percentiles previously used. Exceptions can be granted subject to the provisions in Subsections IV.F.1 and IV.F.2, shown above.

## **G. Required Documentation**

Documentation needed to support the budgets or a change in the budgets (operational and legislative) shall include:

1. Latest risk report.
2. Updated basis of estimate.
3. Updated base cost estimate for the project, using the [estimating template](#) on the [Cost risk assessment](#) webpage.
4. Documentation of new risks identified and quantified.

## **V. Contact for More Information**

For more information about this Secretary's Executive Order, please contact the Engineering Analysis Office at 360-705-7457.

## **VI. References**

- Secretary's Executive Order [E 1032](#) *Project Management*
- Secretary's Executive Order [E 1038](#) *Enterprise Risk Management*
- [Plans Preparation Manual](#) M 22-31
- [Program Management Manual](#) M 3005
- [Cost risk assessment](#) webpage
- [Project Management Guide](#) webpage

## **VII. Review and Update Requirements**

When changes are necessary to update this document, please inform the Director of the Development Division.

The Director of the Development Division reviews this document periodically and proposes updates for leadership review and approval by the Secretary of Transportation.

### **Americans with Disabilities Act (ADA) Information**

This material can be made available in an alternate format by emailing the Office of Equal Opportunity at [wsdotada@wsdot.wa.gov](mailto:wsdotada@wsdot.wa.gov) or by calling toll free, 855-362-4ADA(4232). Persons who are deaf or hard of hearing may make a request by calling the Washington State Relay at 711.