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Date

Estimating Project Budget and Uncertainty

I. Introduction

The Washington State Department of Transportation (WSDOT) provides and supports safe, reliable, and cost-effective transportation options to improve livable communities and economic vitality for people and businesses. This mission is fulfilled by successfully delivering projects and services. Project risk management is a tool that provides a better estimate of project cost and schedule, and identifies measures that can be taken to optimize project objectives. These measures are going to be used for establishing and adjusting project budgets, and in the monitoring and control of project delivery.

The Secretary of Transportation directs project management requirements in the following Executive Orders:

- [E 1032](#) *Project Management*
- [E 1038](#) *Enterprise Risk Management*
- [E 1053](#) *Project Risk Management and Risk-Based Estimating*

A. Purpose

This Policy Statement provides project management staff with instructions and information necessary for establishing and adjusting project budgets that incorporate project uncertainty and risk treatment planning, based on information provided in project cost and risk assessment efforts. It directs project management staff to consistently employ the department's project management policies, procedures, and tools with the aim of optimizing project delivery within the scope.

B. Supersession

This Policy Statement supersedes and replaces Instructional Letter IL 4071.02 *Use of Risk-Based Project Estimates for Budgeting and Project Management*, dated February 23, 2012. All references to the superseded IL 4071.02 now reference P 2047.00.

C. What Has Changed

The following table indicates the major changes from Instructional Letter IL 4071.02:

Description	IL 4071.02 Dated February 23, 2012	P 2047.00
Title	Use of Risk-Based Project Estimates for Budgeting and Project Management	Estimating Project Budget and Uncertainty
Enhanced Risk Based Estimate	Silent	Requires inclusion of Risk Treatment Planning into the Risk Based Estimate
Legislative Budget	Defined as the 60 percentile on the project risk profile	Unchanged for projects under \$100M; changed to the 50th percentile on the project risk profile for projects over \$100M
Operational Budget	Defined as the Base Estimate established during the workshop	Defined as the 40 th percentile on the project risk profile for projects under \$100M and the 30 th percentile for projects over \$100M
Ad Date and End of Construction Date	Silent	Defined by the 60 th percentile on the project risk profile
Risk Reserve	Risk Reserve = 60% - Base Cost	Project risk reserve < \$100M = 60 th %ile - 40 th %ile > \$100M = 50 th %ile - 30 th %ile
Minimum Data Summary Table	Silent	Required to be included on each cost risk assessment report
Results to Be Entered Into CPMS	Last diagram	Attachment A
Project Risk Management Cycle	Silent	Attachment B
Approval Process for Using a Different Percentile	Attachment A	Attachment C
Statement of Inflation Rate	Attachment B	Incorporated in the body of the document
How to Implement This Instructional Letter	Attachment C	Incorporated in the body of the document

II. Rules and Procedures

This Policy Statement establishes the following rules and procedures:

A. Establishing the Project Budget

1. Projects with a total estimated cost (for Preliminary Engineering [PE], Right of Way [ROW], and Construction [CN]) greater than \$10 million shall go through a cost and schedule risk assessment. Projects whose risks are low and well understood may be exempted from this requirement. Executive Order [E 1053](#) provides direction on the level of cost and schedule risk assessment that a project requires. The Strategic Analysis and Estimating Office (SAEO) at the Headquarters (HQ) Development Division is the designated support office for this function, providing assistance at the request of the project manager in the preparation of project risk assessments.
2. Budgets for projects with a total estimated cost (PE, ROW, and CN) less than or equal to \$10 million are initially based on the Engineer's Estimate (EE). The project manager and region program manager jointly determine the need for a project cost risk assessment based on whether there is significant uncertainty with respect to the estimated project cost or schedule. If a cost risk assessment is deemed necessary, the Risk Based Estimate Self-modeling (RBES) tool is used to assess the risk and update the project budget. Risk analyses conducted using the RBES tool are reviewed and validated by SAEO staff, unless this expertise is specifically provided by the region. Once an RBES model is validated, the results of the model are used to update the project budget per this Policy Statement (see below). Contact SAEO for more information about and technical support in the use of the RBES tool.
3. Project cost risk workshops may take the form of a Cost Estimate Validation Process (CEVP) or Cost Risk Assessment (CRA). Occasionally, if deemed appropriate by SAEO 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 of the workshop with respect to the project risk metrics necessary for setting schedule, budget, and risk reserve. An exemption from the requirement to convene a workshop may be granted by SAEO, per item 1 above, upon request of the project manager.
4. 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.
5. The Engineer's Estimate (EE) shall be reviewed and validated during the cost risk assessment process. 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 SAEO for guidance on the appropriate action to take with respect to a cost risk update, including the need for a new workshop.

6. The project manager establishes the project budget using two different percentiles from the project's estimated cost risk profile:
 - a. For projects *under* \$100M:
 - 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.
 - b. For projects *over* \$100M:
 - The budgeted "legislative" value is given by the 50th percentile of the project's total cost.
 - The operational budget value is given by the 30th percentile of the total project's cost.

The figures are recorded in the Project Summary approved by the Capital Program Development and Management Office (CPDM). The standard WSDOT "4 percent contingency" is included in the base cost estimate, and hence is reflected in both budget numbers

7. The estimated project schedule is as important as the estimated cost of the project. To address schedule uncertainties, the Ad Date and End of Construction Date are given by the 60th percentile of their distribution as shown in the Cost Risk Analysis report following the most recent cost risk assessment workshop (as revised by risk treatment planning). These percentiles are also used as the Ad Date and the End of Construction Date when calculating the estimated year of expenditure (YOE) cost in the Capital Program Management System (CPMS).
8. Risk treatment planning is a scalable element of the risk management designed to allow project teams time to evaluate and make decisions regarding how to optimize the project objectives (cost and schedule) within the scope. A risk treatment planning step is included in every project cost risk assessment (see Attachment B, "Project Risk Management Cycle"). The results of this work are specific recommendations for risk avoidance, risk acceptance, a change in a risk's probability of occurrence, a change in the risk's impact, and sharing the risk with other entities. These recommendations may change the project base cost, duration, and risk register. The project manager is responsible for documenting whether each recommendation will be implemented as provided, implemented with revisions, or rejected.
9. Notes:
 - a. The 60th percentile of the total project cost is the default figure to use for the project budget for projects under \$100M and the 50th percentile for projects over \$100M. However, it is important to note that the sum of the 60th or 50th percentile figures of the individual project phases (PE, ROW, and CN) *does not necessarily equal* the 60th or 50th percentile of the total project cost. If you have questions, contact the SAEO for guidance.

- b. 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 HQ CPDM and SAE0 for assistance in choosing an appropriate cost value for use in the legislative budget and/or operational budget.
- c. The project manager is responsible for preparing and submitting to CPDM an updated project budget when an update to the project 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.
- d. Risk treatment planning evaluates all significant risks that may affect the project in order to optimize the project's cost and schedule. In conducting risk treatment planning, 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.
- e. Risk treatment planning is accomplished within the normal project resources allocated for risk assessment. In order that these limited project resources can be properly allocated during risk treatment planning, cost risk assessment workshops need to identify and focus only on those risks that are likely to present a significant impact to the project cost and/or schedule.
- f. All Cost Risk Analysis reports are to provide a summary table to include (at a minimum): (1) recommended PE, ROW, and CN operational budget in current year dollars, (2) the legislative budget percentile of the Ad Date and End of Construction Date, and (3) the project risk reserve in YOE dollars (see Attachment A, "Risk-Based Estimate Results to Be Entered Into CPMS").

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 HQ 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 HQ 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 both the region program manager and HQ CPDM.
3. Use of federal funds for the risk reserve is not allowed except by approval of HQ 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 phases (PE and ROW), the risk reserve may be accessed to cover unplanned expenditures for PE and ROW activities. At contract award, all pre-construction risks are retired, as are any construction risks that were resolved during the design phase. However, as significant uncertainty may remain through the construction phase, the need for adjustments to the risk reserve WIN following contract award, and during the construction phase in general, is determined jointly by the project manager and region program manager, in consultation with SAEO.

C. Managing to the Operational Budget

1. Project managers are responsible for managing their projects to 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 required every two years following the initial workshop to update the cost risk profile, unless more or less frequency is justified and documented using information determined through periodic reviews. As a rule of thumb: this Policy Statement defines significant change in 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 is 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 HQ CPDM to transfer funds from the risk reserve to the operational budget. Contact HQ 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 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 (risks) is 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 or not a risk workshop will be needed to update the risk register and risk profile.

D. Inflation and Market Conditions

1. Inflation tables for CN, ROW, and PE are made available to project managers by HQ CPDM. These rates need to be used during the cost and schedule risk assessment process, and by CPMS for all WSDOT projects. CPDM owns and maintains these tables.
2. Market conditions represent the influences of supply and demand which exacerbate uncertainty in unit prices and contractor bids. They are powerful drivers of the construction costs and the cost of land (ROW). 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.
3. The project manager monitors market conditions and may consider adjusting the project Ad Date to take advantage of favorable conditions. The region program manager uses this information to consider how packaging or timing multiple project contracts can address market conditions.
4. 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 SAEO for more information about market conditions and their impact on risks associated with a project estimate.
5. The impact of market conditions on project cost decreases as the project nears the advertisement date. It is recommended that estimates done within one year of the advertisement date are examined with respect to the potential number of bidders for the project and the impact of the bid environment on bid values.

E. 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. See also Attachment C, “Approval Process for Using a Different Percentile.”

1. Projects with an executive oversight committee (EOC):
 - a. The project manager presents the results of the CEVP 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, Engineering and Regional Operations.
 - c. The project manager provides a copy of the written approval to the region program manager and HQ CPDM.
2. Projects without an EOC:
 - a. The project manager presents the results of the CEVP 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, Engineering and Regional Operations.
 - c. The project manager provides a copy of the written approval to the region program manager and HQ CPDM.

F. Required Documentation

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

1. Cost risk assessment workshop (latest report).
2. Updated basis of estimate.
3. Updated base cost estimate for the project, using the estimating template at www.wsdot.wa.gov/projects/projectmgmt/riskassessment/information.htm.
4. Documentation of new risks identified and quantified.

III. Contact for More Information

For information regarding this Policy Statement, please contact the HQ Strategic Analysis and Estimating Office at 360-705-7457 or HQ CPDM Office at 360-705-7143, or visit us at the webpage: www.wsdot.wa.gov/projects/projectmgmt/riskassessment.

IV. References

- Secretary's Executive Order [E 1032](#) *Project Management*
- Secretary's Executive Order [E 1038](#) *Enterprise Risk Management*
- Secretary's Executive Order [E 1053](#) *Project Risk Management and Risk-Based Estimating*

V. Attachments

A. Risk-Based Estimate Results to Be Entered Into CPMS

B. Project Risk Management Cycle

C. Approval Process for Using a Different Percentile

VI. Review and Update Requirements

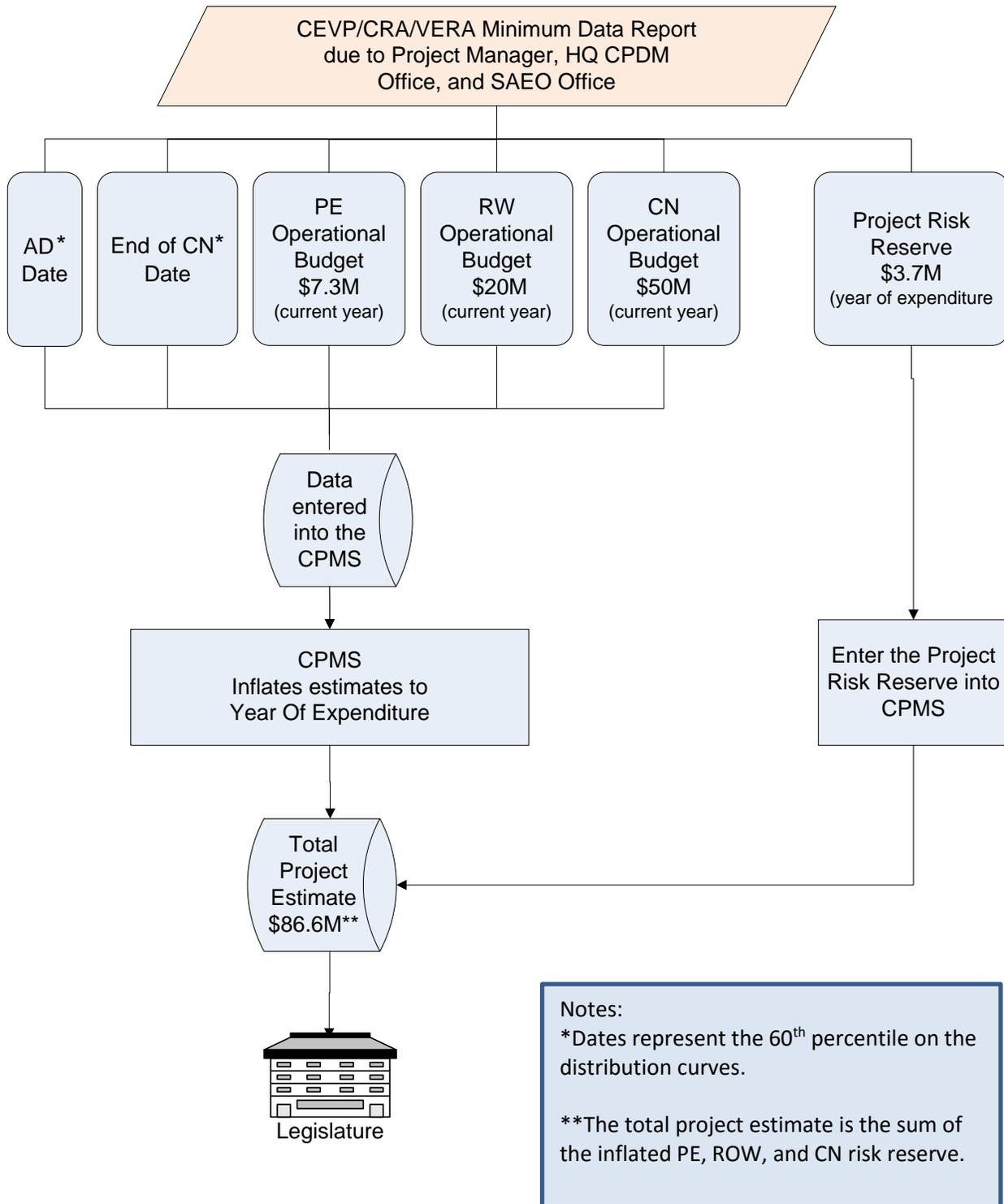
When changes are necessary to update this document, inform the Assistant Secretary, Engineering and Regional Operations.

The Assistant Secretary, Engineering and Regional Operations, reviews this document periodically and may approve updates or other changes.

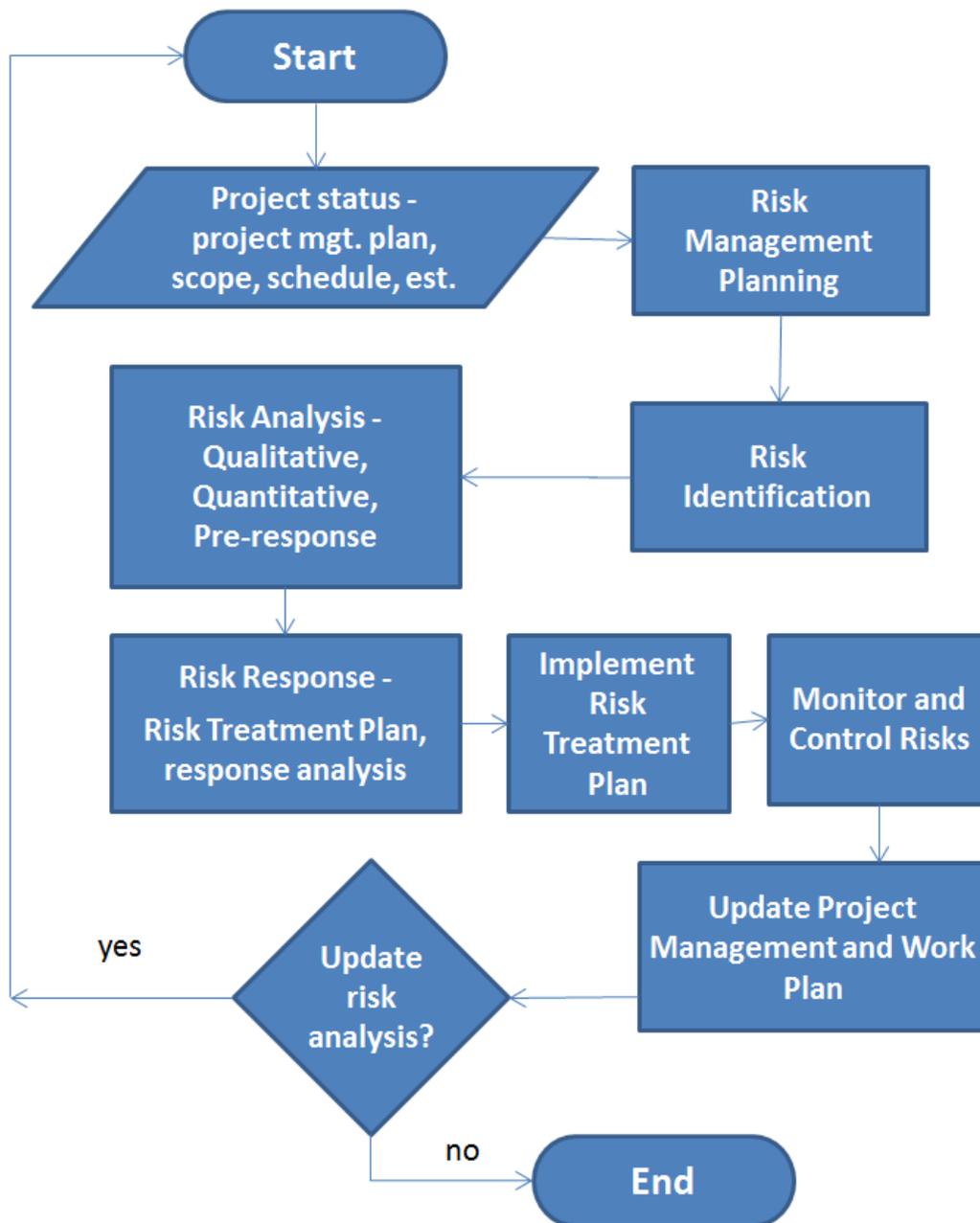
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Attachment A: Risk-Based Estimate Results to Be Entered Into CPMS



Attachment B: Project Risk Management Cycle



- Project Manager receives data within two weeks of the workshop conclusion, including: Base cost, Basis of Estimate, Complete Risk Register, and Ideas for Risk Treatment.
- Project Manager and team develop risk treatment plan defining risk treatment options within three months.
- A follow-up meeting with the risk analyst is convened to run a simulation model that incorporates the changes resulting from the risk treatment plan and the report is finalized.
- The report is distributed to the project manager, SAEO, and CPDM. Project estimates in the report constitute the basis for establishing the project budget and risk reserve.

Attachment C: Approval Process for Using a Different Percentile

