



Signature on file:

J.C. Lenzi, P.E., Chief Engineer
Assistant Secretary of Engineering and
Regional Operations

February 23, 2012

Date
Expires: February 24, 2013

Use of Risk-Based Project Estimates for Budgeting and Project Management

I. Introduction

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

- [E 1032.01 Project Management](#)
- [E 1042.00 Project Management and Reporting System \(PMRS\)](#)
- [E 1053.01 Project Risk Management and Risk Based Estimating](#)

A. Purpose

The purpose of this Instructional Letter is to provide Washington State Department of Transportation (WSDOT) project management staff with information necessary for the use of risk-based estimating on projects over \$10 million, and to require that all projects regardless of cost shall have a risk matrix to support any established risk reserves. This Instructional Letter covers inflation rates, market conditions, percentile selection, estimate updates, and establishment and use of risk reserves. It also identifies data requirements for documenting this information in the Capital Program Management System (CPMS).

For projects over \$10 million, this Instructional Letter directs project management staff to:

- Achieve project costs that are as close as possible to the base cost estimate.
- Manage to the base cost estimate.
- Establish a separate risk reserve to pay for risks realized during the course of project delivery.

For projects less than \$10 million, generally, separate risk reserves will not be established and will require approval by Headquarters (HQ) Capital Program Development and Management (CPDM) staff.

All projects, regardless of size, should have a published Risk Matrix regardless of project total cost and the Risk Matrix should support any established risk reserves.

B. Supersession

This Instructional Letter supersedes and replaces IL 4071.01 *Risk-Based Project Estimates for Inflation Rates, Market Conditions, and Percentile Selection* dated May 7, 2010. All references to the superseded IL 4071.01 now reference IL 4071.02 *Use of Risk-Based Project Estimates for Budgeting and Project Management*.

C. What Has Changed

Minor grammatical and definition changes have been made. The following table indicates major changes from the previous Instructional Letter:

Description	IL 4071.01 Version Dated May 7, 2010	IL 4071.02 This Version
Title	<i>Risk-Based Project Estimates for Inflation Rates, Market Conditions, and Percentile Selection</i>	<i>Use of Risk-Based Project Estimates for Budgeting and Project Management</i>
Funds for risk reserves	Silent	Requires CPDM approval for use of federal funds to establish risk reserves
Estimate format	Silent	Requires use of standard format for estimates

II. Rules and Procedures

This Instructional Letter establishes the following rules and procedures.

A. Use and Reporting of Risk-Based Estimating Results

1. Establish base cost estimate (cost to design and build today, if project development proceeds through preliminary engineering (PE), right-of-way (RW), and construction (CN) phases as planned and no significant risks materialize).

Early in the project development process for projects estimated to cost \$10 million or more, a Cost Estimate Validation Process (CEVP), Cost Risk Assessment (CRA) workshop, or a self-modeling process (depending on project size), is planned and conducted to provide the project manager with a validated base cost estimate that will be used as a baseline to measure delivery performance.

The cost lead, risk lead, subject matter experts, and project team review the estimate. Based on experience, bid tab data, and recent projects in the area, unit costs and quantities may be revised. This reviewed and validated estimate becomes the base cost estimate for the risk-based estimating process and for the project.

2. Establish the 60th percentile cost estimate.

For WSDOT projects over \$10 million, the estimate should always be expressed as a range determined through risk-based estimating. The low end of the range is the base cost estimate; the high end of the range is the 60th percentile cost from the risk based estimate.

3. Establish a risk reserve, which is the difference between the base cost estimate and the 60th percentile estimate. Use of federal funds for risk reserves is discouraged and will require HQ CPDM approval.

4. Evaluate the estimate every six months or sooner if any of the following occur:
 - New information is gathered or processed (quantity change or new items).
 - Major design levels are completed (for example at 30 percent, 60 percent, 90 percent design).
 - Volatile price fluctuations occur.
 - Highest cost items change.
 - To comply with updated versions of the *Cost Estimating Manual for WSDOT Projects M 3034*.
5. If warranted, update the estimate. The level of effort for estimate updates is scalable and should be appropriate for the amount of change.
6. Assess possibilities for mitigation of risk, and develop an estimate for the project that reflects the mitigated results and include it with the project mitigation plan.
7. Enter uninflated base cost estimates (initial and updated estimates) and the uninflated risk reserve estimate in CPMS. CPMS will inflate as appropriate, using currently authorized rates. (If you wish to calculate a year of expenditure estimate in your estimating process, use the CPMS authorized rates, but enter only your uninflated estimate in CPMS.).

The risk reserve may be entered either by project phase or as a single number in the construction phase, either aged across the phase(s) or aged in the 25th month for later re-aging. Project reports and agency budget requests will use the 60th percentile estimate, inflated by CPMS to year of construction.

If at any time during the life of the project the 60th percentile represents a change from the previously approved budget or the last estimate approved by the department, the new estimate will be subject to the normal change management process through Regional and HQ Program Management. If the change is approved, it will then be sent to the legislature as a budget request by HQ. Any changes to the base cost estimate or the risk reserve will be documented in CPMS.

8. Manage to the base cost estimate.

Project managers are responsible for managing their projects to the base cost estimate, inflated by CPMS. The risk reserve will be held in reserve for use if risks materialize. All changes in the base cost estimate assumptions shall be documented in the Basis of Estimate.

9. Use and adjust the risk reserve, if needed. Established risk reserves and associated Risk Matrices should be reviewed at least quarterly by the project manager and region program manager and adjusted as risks are realized or mitigated.

If risks materialize, the project manager submits a request to Region Program Management for funds to be transferred from the risk reserve to the authorized project funding. If the risk reserve nears depletion or is depleted, despite active risk management on the part of the project team, the 60th percentile estimate should be reviewed and, if necessary, the risk reserve and estimate should be updated.

If identified risks do not materialize, the region program manager should release associated risk reserves for use on other projects within the state. A thorough review of risks still outstanding should be conducted at the time of contract award, so that any available funds can be released.

B. Project File Documentation

Documentation needed to support the estimate shall include:

1. Basis of estimate (assumptions):
www.wsdot.wa.gov/projects/projectmgmt/riskassessment/information.htm
2. Current base cost estimate for the project, using the estimating template at
www.wsdot.wa.gov/projects/projectmgmt/riskassessment/information.htm.
3. A description of each significant risk, including threats and opportunities, which have been identified. Include the potential impacts to the project cost and schedule.
4. A plan for managing and/or mitigating each of the significant risks that have been identified, as determined through an updated risk-based estimate model output.

C. Inflation and Market Conditions

1. Inflation rates.

The inflation rates for CN, RW, and PE used in risk-based estimating to inflate current year dollars (CY\$) to the year of expenditure dollars (YOES) must be the current (at time of the risk-based estimating) CPMS inflation rate tables for RW or PE, and the Construction Cost Index (CCI) table at:

wwwi.wsdot.wa.gov/ppsc/pgmmgt/cpms/tables.asp

2. Market conditions.

Market conditions are the consequence of supply and demand factors which determine prices and quantities in a market economy and which are separate from inflation. Market conditions include things like: competitive environment during bidding and contracting; the labor market; resource availability; etc.

Market conditions for a project may be influenced by several factors. The following factors must be documented and mitigation strategies proposed when preparing cost estimates if the project team determines that special market conditions are applicable to their project.

- a. Bidding environment and other construction market conditions.
 - (1) Bidding environment refers to how the number of potential bidders for a project might impact the estimate for construction. The project team must document whether the project might be subject to a “non-competitive” bidding environment and develop mitigation strategies for this risk. Conversely, any potential of a favorable (highly competitive) bidding environment must also be captured.
 - (2) Other market condition risks for construction are to be captured through the risk elicitation process. A well-documented explanation must be provided that describes why the project is subject to additional market condition risks. Potential response strategies to these risks must be provided.

b. Right-of-way market condition risks.

Right-of-way market condition risks must be obtained from subject matter experts. The project team must document information that affects the project including right of way, zoning, speculation, and other market condition risks that may be obtained from a variety of sources such as real estate services or planning. Comparable recent real estate transactions must be a primary source of RW cost data.

c. Preliminary engineering market condition risks.

Preliminary engineering market condition risks must be identified and documented. Sources for characterization of the risk must be clearly stated in the documentation describing why this project is at risk (e.g., availability of skilled labor or specialty professional services).

D. CPMS Data Requirements

Project teams must provide specific data to the Region Program Management Office for inclusion into CPMS, both at the time of original budget request and at the time that estimates are changed. The required data includes:

1. Project schedule that is current, has been regularly reviewed, and includes the following milestone dates:
 - Project summary completion.
 - Begin preliminary engineering.
 - Environmental document complete.
 - Right-of-way certification.
 - Project advertisement.
 - Operationally complete.

Schedule risk activity (similar to a buffer in critical chain), if appropriate and if significant schedule risk is identified (i.e. time critical work that is subject to limited work windows, such as weather or fish windows a schedule risk activity can be included in the scheduled so that it can be tracked and managed).

2. Estimated cost in CY\$ for each Project Item Number (PIN) and for each funding source (state, local, private). CPMS will inflate.
 - Project base estimates for:
 - Design cost.
 - Right-of-way cost.
 - Construction cost.
 - Project risk reserve.
3. Current estimate and Basis of Estimate form. See Attachment D, and the template at: www.wsdot.wa.gov/projects/projectmgmt/riskassessment/information.htm

E. Exceptions

Exceptions to the use of the 60th percentile requirement in this Instructional Letter must use one of the following approval processes. See also Attachment A.

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, including supporting information on the percentile level requested to be included in management plans and budget.
 - b. If the EOC approves, regional executive management will request in writing and obtain written approval from the Assistant Secretary of Engineering and Regional Operations.
 - c. Project manager provides a copy of the written approval to Region Program Management and HQ CPDM.
2. Projects without an EOC:
 - a. The project manager presents the results of the CEVP or CRA to regional executive management and provides supporting information on the percentile level requested to be included in management plans and budgets.
 - b. Regional executive management will request in writing and obtain written approval from the Assistant Secretary, Engineering and Regional Operations.
 - c. Project manager provides a copy of the written approval to Region Program Management and HQ CPDM.

III. Contact Information

For information regarding this IL, please contact the HQ CPDM Office at 360-705-7130 or the Strategic Analysis and Estimating Office at 360-705-7452 or visit the Web page:

www.wsdot.wa.gov/projects/projectmgmt/riskassessment

IV. References and Resources

- Secretary's Executive Order E 1032 *Project Management*
wwwi.wsdot.wa.gov/publications/policies/fulltext/1032.pdf
- Secretary's Executive Order E 1042 *Project Management and Reporting System (PMRS)*
wwwi.wsdot.wa.gov/publications/policies/fulltext/1042.pdf
- Secretary's Executive Order E 1053 *Project Risk Management and Risk Based Estimating*
wwwi.wsdot.wa.gov/publications/policies/fulltext/1053.pdf
- *Cost Estimating Manual for WSDOT Projects M 3034*
www.wsdot.wa.gov/publications/manuals/m3034.htm
- *Plans Preparation Manual M 22-31*
www.wsdot.wa.gov/publications/manuals/m22-31.htm
- Basis of Estimate
www.wsdot.wa.gov/projects/projectmgmt/riskassessment/information.htm
- CPMS Inflation Rate Tables
wwwi.wsdot.wa.gov/ppsc/pgmmgt/cpms/tables.asp

- Glossary of Cost Risk Estimating
www.wsdot.wa.gov/publications/fulltext/cevp/glossary.pdf
- Guidelines for CRA CEVP Workshops
www.wsdot.wa.gov/projects/projectmgmt/riskassessment/
- Project Management Online Guide
www.wsdot.wa.gov/projects/projectmgmt/pmog.htm
- Project Risk Management Guidance for WSDOT Projects
<http://www.wsdot.wa.gov/publications/fulltext/cevp/projectriskmanagement.pdf>
- Training: Introduction to Cost Estimating Course Code CZV
- Training: Risk-Based Transportation Cost and Schedule Estimate Evaluations Course Code CZ2

V. Attachments

A. Approval Process for Using a Different Percentile

B. Statement on Inflation Rates

C. How to Implement This Instructional Letter

D. Basis of Estimate

VI. Executive Review and Update Requirements

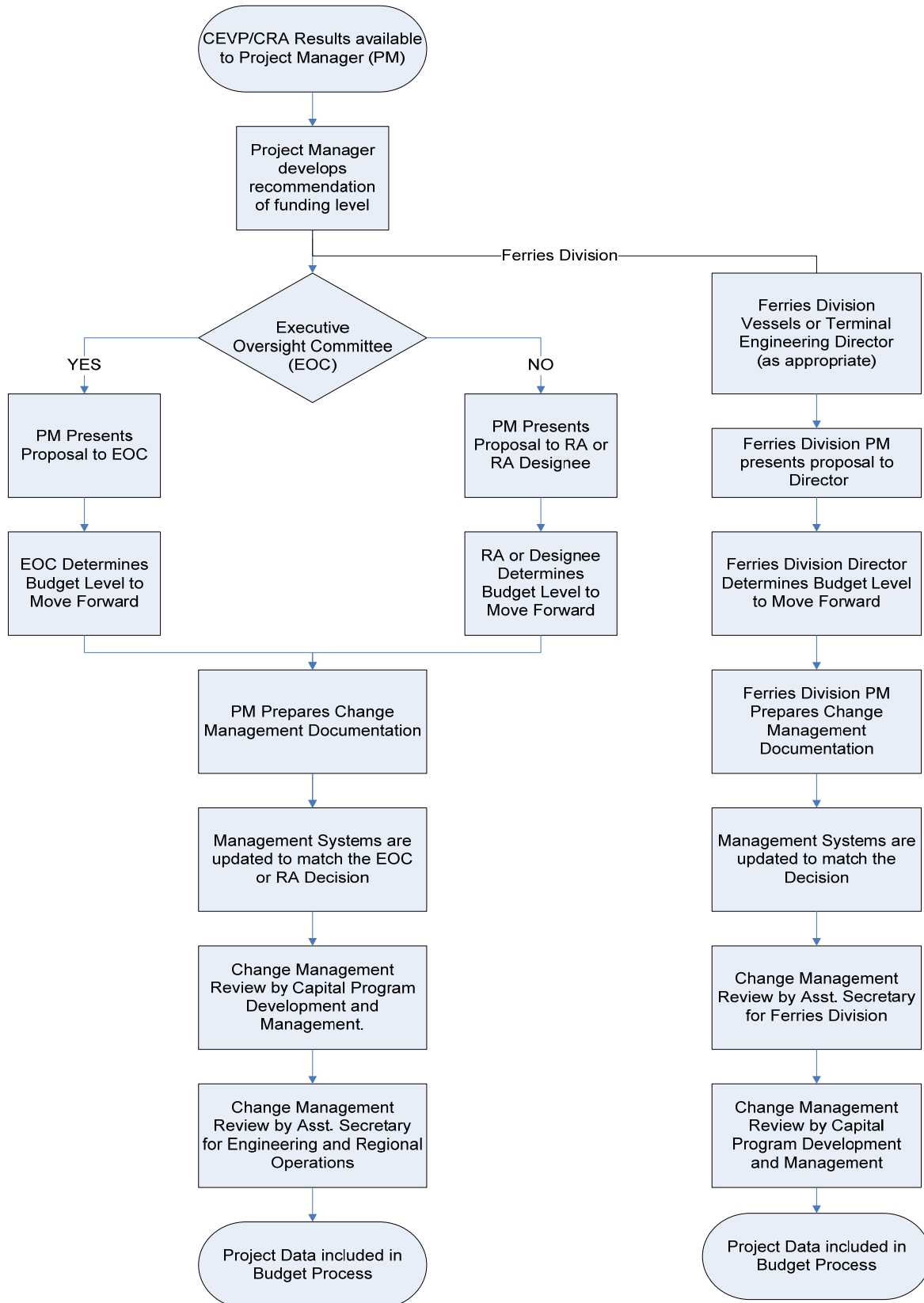
All executives are responsible for informing the Assistant Secretary, Engineering and Regional Operations, of changes needed for the maintenance of this document.

The Assistant Secretary, Engineering and Regional Operations, is responsible for periodic review and updates to this document.

Americans with Disabilities Act (ADA) Information

Materials can be provided in alternative formats: large print, Braille, cassette tape, or on computer disk for people with disabilities by calling the Office of Equal Opportunity (OEO) at 360-705-7097. Persons who are deaf or hard of hearing may contact OEO through the Washington Relay Service at 7-1-1.

Attachment A: Approval Process for Using a Different Percentile



Attachment B: Statement on Inflation Rates¹

WSDOT requires the use of CPMS inflation tables posted at the time of the estimating process, for any calculations of YOES\$. The projections in the inflation tables are provided by experts in PE, RW, and construction. When the recommendations of these experts change, their recommendations are reviewed by WSDOT management, and if appropriate, the tables in CPMS are changed.

The Region Program Management Office enters project estimates in CY\$ into CPMS, which then inflates project estimates to YOES\$. Model forecasts prepared following CRA and CEVP workshops will also use the CPMS inflation tables. It is important that the most current CPMS tables are used and the date of these tables well documented in the CRA or CEVP report.

It is not allowed for project estimators or the participants at CRA and CEVP workshops to unilaterally establish inflation forecasts. Therefore, the discussion of inflation and uncertainty is not an effective use of time at CRA and CEVP workshops. The responsibility for inflation rates rests with the HQ CPDM. The rates to be used are those posted in CPMS at the time of the estimate:

- WSDOT CPMS Inflation Rate Tables
wwwi.wsdot.wa.gov/ppsc/pgmmgt/cpms/tables.asp

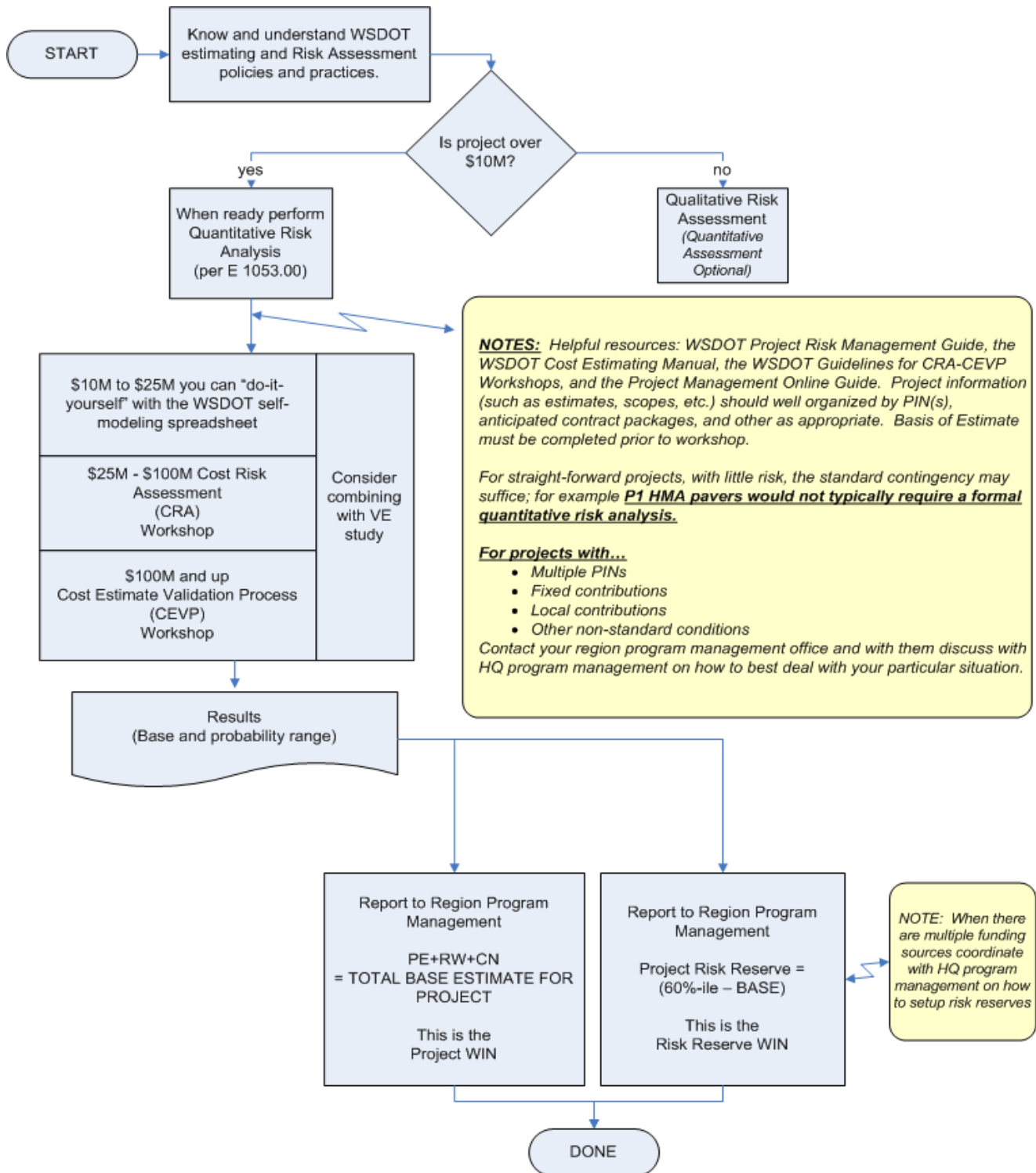
To use the CPMS inflation rate tables to convert the CY\$ estimate to YOES\$ estimate:

1. Find the CCI factor for the month and year of the CY\$.
2. For PE and RW phases, find the appropriate index factor for the month and year that is the mid-point between the WIN phase start date and the WIN phase end date. For the CN phase, find the mid-point between the award date and the operationally complete date.
3. Divide the factor for the mid-point by the CY\$ factor.
4. Multiply the result by the CY\$ estimate. The result is the inflated YOES\$ estimate.

Liberal use of market condition risks creating a “range” of inflation rates is not allowed. Workshops need not discuss inflation rates and should focus on areas of respective expertise for the project.

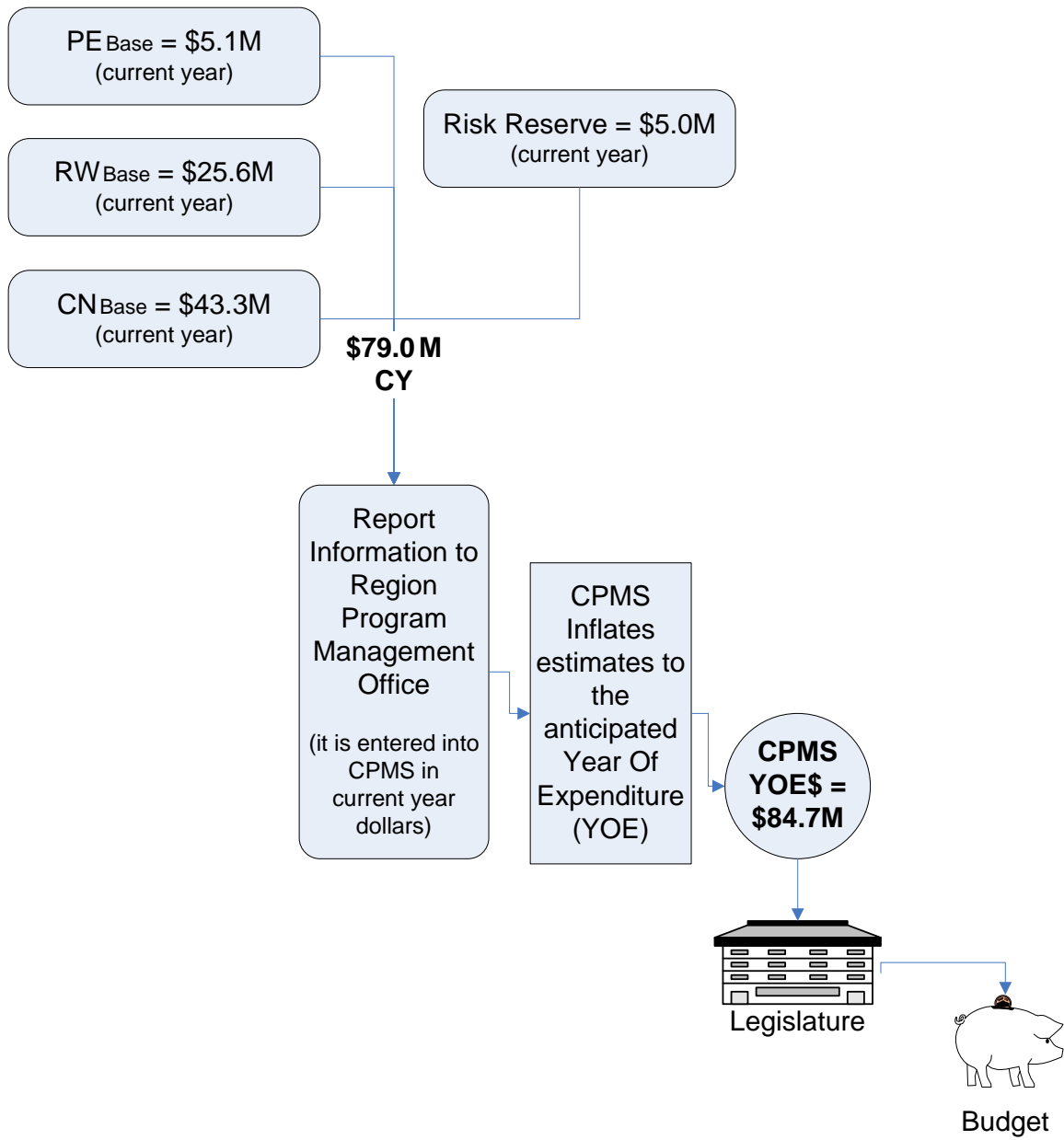
¹CPMS inflation tables do not currently apply to Ferries Division vessel engineering projects.

Attachment C: How to Implement This Instructional Letter



The table below illustrates typical output from a risk-based estimate model and how to use the results.

Example of typical output for risk-based estimate.			Notes:	
Project Estimate (opinion of cost at this time)	Estimated Project Cost (Current Year/CY) YYYY \$M	Total Project Cost Year-Of- Expenditure \$M	Use of risk based estimating results.	
Base Cost Est.	74.0	80.0	Reviewed/validated base estimate Base = 'if project goes as planned'	
Mean	77.4	83.0	Risk reserve = 60%-ile – Base = \$79.0 M – \$74.0 M = \$5.0 M Report estimates as follows: PEBASE = \$5.1 M RWBASE = \$25.6 M CNBASE = \$43.3 M ===== Estimate Project BASE = \$74.0 M Risk Reserve WIN = \$ 5.0 M ===== Total available for project = \$79.0 M	
Std Dev	6.5	7.2		
Percentiles				
1%	62.3	66.2		
5%	67.3	71.7		
10%	69.2	73.8		
20%	72.0	76.9		
25%	73.1	78.2		
30%	74.0	79.2		
40%	75.7	81.1		
50%	77.3	82.9		
60%	79.0	84.7		Figure submitted for budgeting
70%	80.6	86.6		
75%	81.7	87.8		



Setting Up Risk Reserves in CPMS

- Overview: The objective of identifying a risk reserve in CPMS is to more fully integrate risk-based estimating with normal business practices at WSDOT. CPMS is the official repository for project cost estimates. It is used for expenditure planning, bond sale sizing, and budget and program building. It is important for the department to understand how much project risk is addressed in our program estimates. This can be done by differentiating between the base estimate and risk reserve in CPMS, for those projects with risk reserves. This is particularly important for high visibility projects with line-item appropriations in the legislatively approved transportation budget. These projects need to be “self-insured” against risk from a budget standpoint. However, it should be noted that estimate details (base estimate dollars and risk estimate dollars) are not reported externally in the Gray Notebook or in budgetary documents.
- Base and risk estimates are first established by use of a risk-based estimating process. The results of a CRA or CEVP workshop or of a self-modeling process need to be sufficiently detailed to feed CPMS requirements. The results must provide the base cost estimates by phase, by PIN, and by WSDOT/Local Agency contribution. The total percentile estimates also need to be broken down by PIN and funding agency when more than one exists.
- For line-item projects, reserves are set up on a Work Item Number (WIN) in CPMS under the budgeted PINs. A project which employs risk-based estimating will now have a minimum of two WINs associated with it: One WIN containing the project’s base cost estimate, (the cost that can reasonably be expected if no significant risks materialize), and the other WIN containing the risk reserve estimate.
- A “project” as assigned to a project manager may occasionally have more than one PIN associated with it. The Regional Program Manager will establish one risk reserve WIN for each PIN needing a reserve. The project manager will be responsible for managing the risk register for his project and for providing the Regional Program Manager with guidance for proper sizing and maintenance of each risk reserve for each PIN.
- Each risk reserve WIN may be subdivided into three phases: PE, RW, and CN. At least one phase must be designated. The simplified default phase for a risk reserve is CN. The project manager and Regional Program Manager will decide if it is desirable to establish more than one phase in a risk WIN (e.g., if a relatively large RW risk exists, it may not be appropriate to put all the risk in the CN phase especially if RW and CN phases occur in different biennia).
- Typically, the fund types budgeted for the project or authorized for the current phase will be the same as those used in the risk reserve. These may include “local” funds if a local agency is participating in the project. However, the use of pre-existing funds (PEF) or federal funds for risk reserves is discouraged and requires HQ CPDM approval. Please contact Funds Management in HQ CPDM when in doubt.

Aging a Risk Reserve in CPMS

- For simplicity and ease of data maintenance in CPMS, most risk reserves may be aged in the 25th month of the biennium in which they will most likely be spent. This aging approach is very appropriate when the project manager believes that active risk management may preclude the need to expend risk funds.

- CPMS has the flexibility to age risk reserves in the months in which they are most likely to be spent. For any individual risk, if the project manager believes it will most likely materialize in a specific month(s), risk funds should be aged accordingly. The balance of the risk reserve may be left in the appropriate 25th month.
- At least six months before the end of the biennium, the reserve balance in the 25th month should be evaluated by the project manager and reduced or re-aged as appropriate into the next biennium by the Regional Program Manager.

Managing the Base Cost and Risk Reserve Estimates

- After a risk-based estimate is created, the base cost estimate will be reviewed (and updated if necessary) by the project manager at least every six months. Insignificant changes to the base cost estimate WIN can be implemented without regard to the risk reserve WIN.
- Significant changes to the base cost estimate WIN may require adjustment of the risk reserve WIN. A significant increase to the base may be accommodated by a corresponding decrease to the risk reserve WIN.
- When transferring funds from the risk reserve to the base WIN, consideration should be given to the reason the base is increasing. If the increase is due to an identified risk, the transfer of funds is appropriate and the total project cost (60th percentile) is unchanged.
- If a significant increase in the base estimate was caused by an unanticipated occurrence not identified in the risk reserve, consider seeking a budget increase. This might be the decision if the magnitude of the unanticipated increase is large in comparison to the size of the risk reserve.
- The cumulative effect of numerous small increases (or decreases) to the base cost estimate may require adjustment of the risk reserve. It may be appropriate to reevaluate the size of the risk reserve if the reserve is being depleted but significant time and risk issues remain on the project. Consider updating the risk-based estimate model.

Accessing Risk Reserve Funds

- The base cost estimate and the risk reserve estimate may be updated by the project manager at any time. The region program manager will reflect those changes in CPMS in a timely manner. Most changes will likely involve the transfer of estimated dollars from the reserve WIN to the base estimate WIN. HQ CPDM should be notified of significant changes by the region program manager. HQ CPDM will perform a quarterly review of risk reserves with the region program manager.
- Transfers from the reserve WIN will require authorization to spend the transferred dollars. Additional PE funds may be needed to complete PS&E, additional RW funds may be needed for a pending real estate purchase, or additional CN funds may be needed due to executed change orders. In these cases, a Work Order must be processed to authorize the funds for expenditure. The Work Order justification should mention the reason for the increase and the amount that is being transferred from the risk reserve.

Attachment D: Basis of Estimate (Assumptions)

The Basis of Estimate is required documentation for all project cost estimates from planning through PS&E. The Basis of Estimate provides a clear history of project assumptions as the project passes from one group to another, or as team members change. The project estimate file including the Basis of Estimate should follow the project through the various stages so that each new estimate can be easily tied to the previous one.

A well-documented Basis of Estimate used in the development of a project estimate can eliminate overlap of future estimate assumptions and provide a document trail regarding what is known about the project. This allows project “knowns” and “unknowns” to be clearly identified. This document enables the agency to easily track changes to project scope, cost, and schedule.

The Basis of Estimate form is available at:

www.wsdot.wa.gov/projects/projectmgmt/riskassessment/information.htm