

# **WSDOT**

# **Glossary for**

# **Cost**

# **Risk**

# **Estimating**

# **Management**



**Washington State**  
**Department of Transportation**

## **Glossary**

*The beginning of wisdom is the definition of terms -Socrates (470-399 BC)*

*NOTE: Sources are cited, if there is no independent source cited the definition was developed by WSDOT.*

<b>A</b>	
<b>AACEI</b>	Association for the Advancement of Cost Engineering International
<b>Accountability</b>	The quality or state of being <u>accountable</u> ; <i>especially</i> : an obligation or willingness to accept responsibility or to <u>account</u> for one's actions. <i>SOURCE: Merriam-Webster Online Dictionary</i>
<b>Accuracy</b> Forecast Accuracy	The difference between the forecasted value and the actual value (forecast accuracy). <i>SOURCE: Principles of Forecasting by J. Scott Armstrong</i>
<b>Activity</b>	A component of work performed during the course of a project. <i>SOURCE: PMBOK Third Edition</i>
<b>Activity Duration</b>	The time in calendar units between the start and finish of a schedule activity. <i>SOURCE: PMBOK Third Edition</i>
<b>Actual Cost</b>	Total <i>costs</i> actually incurred and recorded in accomplishing <i>work</i> performed during a given time period for a <i>schedule activity</i> or <i>work breakdown structure component</i> . Actual cost can sometimes be direct labor hours alone, direct costs alone, or all costs including indirect costs. Also referred to as the actual cost of work performed (ACWP). <i>SOURCE: PMI Combined Standards Glossary</i>
<b>“acts of God”</b> See also “Force majeure”	Inevitable, unpredictable, and unreasonably severe event caused by natural forces without any human interference, and over which an insured party has no control, such as an earthquake, flood, hurricane, lightning, snowstorm. Acts of God are insurable accidents and valid excuses for non-performance of a contract. Also called act of nature. See also force majeure. Businessdictionary.com
<b>Advance Elicitation Interviews, AEI</b>	Advanced Elicitation Interviews – Risk Elicitation interviews that are held in advance of an upcoming risk assessment workshop (CRA/CEVP). <i>SOURCE: WSDOT Definition</i>
<b>Allowance</b>	Additional resources included in an estimate to cover the cost of known but undefined requirements for an activity or work item. Allowance is a Base Cost item.
<b>Alternatives and Options</b>	<ul style="list-style-type: none"> <li>• When making a selection, you decide between <b>alternatives</b>.</li> <li>• When holding an option, you defer the selection between <b>alternatives</b> to a later date.</li> </ul> <p style="text-align: right;"><i>SOURCE: New Generation Whole-Life Costing</i> <i>Note: Options have value.</i></p>
<b>Analogy</b>	A resemblance of situations... A forecaster can think of how similar situations turned out when making a forecast for a given situation. <i>SOURCE: Principles of Forecasting by J. Scott Armstrong</i>
<b>Anchoring</b> Forecast Accuracy	The tendency of judges’ estimates (or forecasts) to be influenced when they start with a “convenient” estimate in making their forecasts. This initial estimate (or anchor) can be based on tradition, previous history, or available data. <i>SOURCE: Principles of Forecasting by J. Scott Armstrong</i>
<b>Assess</b>	...implies a critical appraisal for the purpose of understanding or interpreting, or as a guide in taking action.
<b>Assumptions</b> [Output/Input]	<p>1) Assumptions are factors that, for planning purposes, are considered to be true, real, or certain without proof or demonstration. <i>SOURCE: PMI Combined Standards Glossary</i></p> <p><b>NOTE: be careful not to “assume away” risk.</b></p>
<b>ATC</b>	Alternative Technical Concept The ATC process (in Design Build contracts) allows innovation, flexibility, and construction time and cost savings into the design and construction of the project and ultimately to obtain the best value for the public.

**B**

<b>Base Cost Estimate</b>	<p><b>Base Cost Estimate</b> - The term “base cost estimate” is a term developed by WSDOT for cost risk analysis and represents the reviewed and/or validated project cost estimate to be used in the quantitative risk analysis for the project. The base cost represents the cost which can reasonably be expected if the project materializes as planned, including PE, RW, and CN costs. The base cost estimate is unbiased and neutral- it is not optimistic and it is not conservative. The base cost estimate does not include any risks, but does include the WSDOT standard construction contingency, since that amount is based upon historical usage. Base costs reported to program management shall be in current-year dollars (the un-inflated estimate).  <i>Note: See WSDOT Plans Prep Manual 800.03 (2).</i></p>
<b>Base Cost Estimate Validation</b>	<p>A detailed examination of the estimated costs for a particular project under consideration to assess validity, reasonableness, consistency and accuracy of these costs.  <i>Note:</i></p> <ol style="list-style-type: none"> <li>1. <i>Estimates can be reviewed and validated several times throughout project development.</i></li> <li>2. <i>For projects using quantitative analysis project costs are initially estimated by the Project Team and then reviewed and validated prior to and/or during the workshop, this reviewed and validated estimate becomes the base cost estimate for quantitative analysis.</i></li> </ol>
<b>Base Uncertainty</b>	See base variability.
<b>Base Variability</b>	<p>Inherent in the base estimate. Base variability is always present and is not caused by risk events. Variability exists even if no risk events are present. Base variability is captured as a modest symmetric range about the estimated value; that is of the form: base value <math>\pm x\%</math>. (typically from <math>\pm 5\%</math> to <math>\pm 15\%</math> depending on level of project development and complexity of the project). The variability represents quantity and price variations about the estimated base).</p>
<p><i>EXAMPLE of base variability: When we decide to fill the gas tank in our car we have a general idea of what we will pay per gallon -but do not know for sure - until we actually get to the gas station and make the purchase - there is some uncertainty about the cost per gallon. Similarly if the gas tank is rated at 20 gallons and the gas gauge indicates half a tank -that informs us the approximate amount of gas <u>needed</u> - half a tank indicates about 10 gallons; when we fill it up the actual amount will likely fall somewhere between 9 and 11 gallons, not precisely 10.0 gallons.</i></p>	
<b>Baseline</b>	<p>The approved time phased plan (for a project, a work breakdown structure component, a work package, or a schedule activity), plus or minus approved project scope, cost, schedule, and technical changes. Generally refers to the current baseline, but may refer to the original or some other baseline. Usually used with a modifier (e.g., cost baseline, schedule baseline, performance measurement baseline, technical baseline).</p>
<b>Performance Measurement Baseline</b>	<p>An approved integrated scope-schedule-cost plan for the project work against which project execution is compared to measure and manage performance. Technical and quality parameters may also be included.</p> <p style="text-align: right;"><i>SOURCE: PMBOK Third Edition</i></p>

<b>Basis Of Estimate</b> <i>(estimate basis and assumptions)</i>	Documentation to enable the agency to easily track changes to project scope, cost, and schedule. A well-documented estimate basis and documentation of assumptions used can eliminate overlap of future estimate assumptions. This document provides a trail about what is known about the project. This allows project “knowns” as well as “unknowns” to be clearly identified. This documentation is important because multiple estimators may be involved on the project; complex projects particularly take years to develop and estimates must be completed multiple times.  <p style="text-align: right;"><i>NCHRP Report Number 574</i></p>
<b>Batch (or Lot)</b>	Material made with the same process at the same time having identical characteristics throughout.  <p style="text-align: right;"><i>SOURCE: Composites Technology 1997</i></p>
<b>Benefit-cost ratio (projects)</b>	The ratio of the present worth of estimated project benefits to present worth of estimated project costs. If the ratio is 1.0 or higher (benefits > costs) the project is considered worthwhile; it does not mean that the project should be built, there are many projects and limited resources.
<b>Best Practices</b>  <b>Bias</b>  <b>Bidding Environment</b> <b>Bond</b>	In general, best practices refers to the optimal methods, currently recognized within a given industry or discipline, to achieve a stated goal or objective. In OPM3 context, best practices are achieved when an organization demonstrates consistent organizational project management processes <b>3 a: BENT, TENDENCY b:</b> an inclination of temperament or outlook; <i>especially:</i> a personal and sometimes unreasoned judgment. <i>SOURCE: Merriam-Webster Online Dictionary</i>  See market conditions.  An obligation made binding by a money forfeit; <i>also</i> : the amount of the money guarantee: an insurance agreement pledging surety for financial loss caused to another by the act or default of a third person or by some contingency over which the third person may have no control.  <p style="text-align: right;"><i>SOURCE: Merriam-Webster Online Dictionary</i></p>
<b>C</b>	
<b>CEVP</b> (see CRA)	Cost Estimate Validation Process CEVP® is an intense workshop where transportation projects are examined by a team of top engineers and risk managers from local and national private firms and public agencies reviewing project details with WSDOT engineers. Many of the participants have had extensive first-hand experience with large project programming and delivery.  The CEVP® workshop team uses systematic project review and risk assessment methods to evaluate the quality of the information at hand and to identify and describe cost and schedule risks. Importantly, the process examines how risks can be lowered and cost vulnerabilities managed or reduced. A dividend of CEVP® is to promote the activities that will improve cost and schedule forecasting. CEVP is typically used for projects over \$100M.
<b>CEVP Team</b>	The CEVP Core Team plus the Project Team, working together as an integrated unit during the CEVP workshop
<b>Confidence Interval</b>	An expression of uncertainty. The likelihood that the true value will be contained within a given interval. In forecasting the confidence level refers to the uncertainty associated with the estimate of the parameter of a model while the prediction interval refers to the uncertainty of a forecast. See also Prediction Interval.  <p style="text-align: right;"><i>SOURCE: Principles of Forecasting by J. Scott Armstrong</i></p>
<b>Confidence Range</b>	The difference between upper and lower values of a set of numbers or results within specific Confidence Levels. For example: “...the range of cost between the 10% and 90% Confidence Levels is \$###XXX.”

<b>Configuration Management</b>	Configuration management provides management, oversight and control of design information, safety information, and records of modifications (both temporary and permanent) that might impact the ability of items relied upon. <i>SOURCE: Wikipedia</i>
<b>Consequence</b>	Outcome of an event affecting objectives. <i>SOURCE: ISO 31000, Risk management – Principles and guidelines</i>
<b>Conservatism</b>	The assumption that things will proceed much as they have in the past. <i>SOURCE: Principles of Forecasting by J. Scott Armstrong</i>
<b>Construction Administration Costs</b>	The Base Costs of administration, management, reporting, design services in construction and community outreach etc. which are required in the Construction Phase
<b>Construction Phase</b>	That part of a project life cycle during which the construction work is carried out, aka implementation phase. <i>Source: <a href="http://www.maxwideman.com/pmglossary/PMG_C06.htm#Construction">http://www.maxwideman.com/pmglossary/PMG_C06.htm#Construction</a></i>
<b>Construction Contingency</b>	<b>Construction Contingency</b> – funds authorized at the time of contract award to be expended on unexpected, urgent, minor needs due to uncertainties in quantities, unit costs, and minor risk events that occur during construction.
<b>Contingency</b>	The Association for the Advancement of Cost Engineering International (AACEI) defines contingency as "An amount added to an estimate to allow for items, conditions, or events for which the state, occurrence, or effect is uncertain and that experience shows will likely result, in aggregate, in additional costs. Typically estimated using statistical analysis or judgment based on past asset or project experience.
<b>Control</b>	Measure that is modifying risk. <i>SOURCE: ISO 31000, Risk management – Principles and guidelines</i>  synonyms: direct, guide, steer, care-for
<b>Correlation</b>	Correlation is a statistical measure of the association between two uncertain variables. Values of the correlation coefficient range from -1 to +1. “...measure of the strength of the relationship or association between variables” <i>(After George W. Summers, William S. Peters, &amp; Charles P. Armstrong. Basic Statistics in Business and Economics, 3rd edition. Belmont, CA: Wadsworth Publishing Company).</i>  Note: Some mistakenly assume that correlation infers a degree of causation – correlation is <b>not</b> causation.
<b>Cost</b>	The expenses a contractor will incur in performing contract work. Cost + Profit = Price <i>SOURCE: Guide to Contract Pricing 5<sup>th</sup> Edition, 2009</i>
<b>Cost Engineering</b>	An area of engineering principles where engineering judgment and experience are used in the application of scientific principles and techniques to problems of cost estimation; cost control, business planning and management science. (those who practice cost engineering are <b>cost engineers</b> ) <i>SOURCE: <a href="http://www.maxwideman.com/pmglossary/PMG_C11.htm">http://www.maxwideman.com/pmglossary/PMG_C11.htm</a></i>
<b>Cost Lead</b>	The cost lead will participate and lead portions of a Cost Estimate Validation Process (CEVP) or Cost Risk Assessment (CRA) workshop for the project. Work includes workshop participation, leadership and facilitation, preparation, pre-workshop meetings, documentation, follow up, reconciliation of workshop results, management consulting, technical report writing, process evaluation and communication, and meeting requests to rerun models or assess new scenarios for the project. Travel to and from workshop and/or project locations.

<b>Cost of Quality</b>	[Technique]. Determining the costs incurred to ensure quality. Prevention and appraisal costs (cost of conformance) include costs for quality planning, quality control (QC), and quality assurance to ensure compliance to requirements (i.e., training, QC systems, etc.). Failure costs (cost of non-conformance) include costs to rework products, components, or processes that are non-compliant, costs of warranty work and waste, and loss of reputation. <i>SOURCE: PMBOK Third Edition</i>
<b>Cost Team</b>	Those CEVP Team members plus Project Team members who focus on Cost for the particular project under consideration.
<b>CPM</b>	Critical Path Method - a scheduling technique for projects with multiple stages and/or activities
<b>CRA</b> (see CEVP)	Cost Risk Assessment – workshop typically used for projects between \$25M and \$100M. CRA workshops follow the same methodology as CEVP® workshops where transportation projects are examined by a team of top engineers and risk managers. The use of extensive external subject matter expertise is somewhat relaxed for CRA workshops as compared to CEVP®.
<b>CRIP</b>	Cost Reduction Incentive Proposal Cost Reduction Incentive Proposals (CRIP): intended to promote innovative, ideas involving improved work methods, new products, and improved equipment. The CRIP can include more efficient techniques, substitution of contract items, or elimination of contract items. The intended result is cost savings for the department; secondary results may include decreased shutdown time for the motoring public, less material use, and savings for the contractor. The department equally shares the net cost savings with the contractor. This is a win-win situation for both the department and the contractor, the use of cost reduction incentives are encouraged.
<b>Critical Path</b>	A path connecting all activities which have minimum or zero slack times. The critical path is the longest path through the network.
<b>CY</b>	Current Year
<b>Current Year Dollars</b>	Today's price; the estimated cost of the project if the project were built and completed in the analysis year, in present-day dollars.
<b>D</b>	
<b>Damage Tolerance</b>	A measure of the ability of structures to retain load-carrying capability after exposure to sudden loads. <i>SOURCE: Composites Technology 1997</i>
<b>Damping</b>	Reduce the intensity of vibrations; diminish the amplitude of oscillations by dissipating energy.
<b>Deliverable</b>	[Output/Input]. Any unique and verifiable product, result or capability to perform a service that must be produced to complete a process, phase, or project. Often used more narrowly in reference to an external deliverable, which is a deliverable that is subject to approval by the project sponsor or customer? See also product, result, and service. <i>SOURCE: PMBOK Third Edition</i>
<b>Design Phase</b>	The effort (budget/cost) of taking a project through the planning, scoping, and design phases. Planning and scoping typically have separate budgets but are encompassed under Design or Preliminary Engineering (PE). The terms "Design" or "Design Phase" are sometimes used interchangeably with PE.

<b>Distributions</b>	<p>A characteristic statistical pattern of occurrences of values for a particular outcome when repeated many times. In statistical modeling, values are generated within a defined range according to a particular distribution, thought to be representative of the value being modeled. Normal, uniform, beta, and negative exponential are examples of distributions. Each of these distributions has characteristic shapes when values are plotted against frequency of occurrence. For example, a normal distribution has a bell shape, exponential curves from horizontal to vertical and uniform has a straight horizontal line.</p> <p style="text-align: right;"><i>SOURCE: PRAM Guide, 2004 APM Publishing</i></p>
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<b>E</b>	
<b>Earned Value Analysis</b>	<p>“Earned Value” is a project management technique. It measures what you got, for what you actually spent; the value of the work accomplished; the measured performance; the Budgeted Cost of Work Performed (BCWP).</p>
<b>Elicit</b>	<p>To draw forth...; To bring out... <i>from</i> the data in which they are implied. To extract, draw out (information) <i>from</i> a person...</p> <p>To draw forth, evoke (a response, manifestation, etc.) <i>from</i> a person.</p> <p style="text-align: right;"><i>Oxford English Dictionary</i></p>
<b>Elicitation</b>	<p>The action of eliciting or drawing forth.</p> <p>By elicitation, he understands....</p> <p style="text-align: right;"><i>Oxford English Dictionary</i></p>
<b>Engineer’s Estimate</b>	<p><b>Engineer’s Estimate</b> – not defined. The term is frequently used to mean the estimate at time of bid (called the Contract Estimate in the Plans Preparation manual), but also used by some to mean any estimate done during the PE phase.</p> <p><i>Note: See WSDOT Plans Prep Manual Division 8 Contract Estimate, 800.01.</i></p>
<b>Escalation</b>	<p>The total annual rate of increase in cost of the work or its sub-elements. The escalation rate includes the effects of inflation plus market conditions and other similar factors. See also inflation.</p> <p style="text-align: right;"><i>John K. Hollmann &amp; Larry R. Dysert. Escalation Estimation: Working With Economics Consultants. 2007 AACE International Transactions. Morgantown, WV: AACE International, p. EST.01.01. Accessed: <a href="http://www.c4ce.com/AACE_Escalation_Hollmann_Paper.pdf">http://www.c4ce.com/AACE_Escalation_Hollmann_Paper.pdf</a></i></p>
<b>Estimate</b>	<p>An estimate is comprised of two components: the base cost estimate component and the risk/uncertainty component. An estimate is more appropriately expressed not as a single number but as a range.</p> <p>A quantitative assessment of the likely amount or outcome. Usually applied to project costs, resources, effort, and durations and is usually preceded by a modifier (i.e. preliminary, conceptual, order-of-magnitude, etc.). It should always include some indication of accuracy (e.g. <math>\pm</math> x percent).</p> <p style="text-align: right;"><i>SOURCE: PMBOK Third Edition</i></p>
<b>Estimate at Completion (EAC)</b>	<p>The expected total cost of a project when the defined scope of work will be completed.</p> <p style="text-align: right;"><i>SOURCE: PMBOK Third Edition</i></p>
<b>Estimate to Complete (ETC)</b>	<p>The expected cost needed to complete all the remaining work for a... project.</p> <p style="text-align: right;"><i>SOURCE: PMBOK Third Edition</i></p>
<b>Event</b>	<p>Occurrence or change of a particular set of circumstances.</p> <p style="text-align: right;"><i>SOURCE: ISO 31000, Risk management – Principles and guidelines</i></p>

<b>Expected Value</b>	<p>Probability X Impact</p> <p>An expected value is the best estimate of what should happen on average (that is, the mean outcome for cost, activity duration and so on). The expected value for a probability distribution function is calculated by multiplying all possible values by their probabilities. Expected values may be cumulative, particularly in the case of costs, but there may be factors involved that prevent this from being the case. For example, there may be overlaps or omissions inherent to the probability distributions being summed.</p> <p style="text-align: right;"><i>Source: Project Risk Analysis and Management Guide</i></p>
<b>Expert Judgment</b>	<p>Judgment provided based upon expertise in an application area, knowledge area, discipline, industry, etc. as appropriate for the activity being performed. Such expertise may be provided by any group or person with specialized education, knowledge, skill experience, or training, and is available from many sources include: other units within the performing organization; consultants; stakeholders; including customers; professional and technical associations; and industry groups.</p> <p style="text-align: right;"><i>SOURCE: PMBOK Third Edition</i></p>
<b>F</b>	
<b>Fad</b>	A temporary fashion, notion, manner of conduct, etc. Especially followed enthusiastically by a group.
<b>FOB</b>	<p>F.O.B. = "Freight On Board". FOB indicates where the seller's responsibility ends and the buyer's begins regarding shipment of the materials. For example, if the terms are FOB Origin, then as soon as the item is loaded on the truck the freight costs, and risks, become the responsibility of the purchaser.</p> <p>For this reason buyers prefer "FOB Destination" terms for shipments. That places all the responsibility on the shipper until materials are delivered and the delivery receipt is signed.</p>
<b>FHWA</b>	Federal Highway Administration - division of USDOT that funds highway planning & programs.
<b>Flowcharting</b>	<p>The depiction in a diagram format of the inputs, process actions, and outputs of one or more processes within a system.</p> <p style="text-align: right;"><i>SOURCE: PMBOK Third Edition</i></p>
<b>Force majeure risks</b> See also "acts of God"	<p>Low-probability risks with a high impact on the project, usually arising from causes outside the project's sphere of influence – for example catastrophic environmental conditions, disturbance of normal working conditions or prevention or suspension of operations. Force majeure risks are difficult to manage within a project and are often escalated to a higher level.</p> <p style="text-align: right;"><i>SOURCE: PRAM Guide, 2004 APM Publishing</i></p>
<b>Forecasts</b>	<p>Estimates or predictions of conditions and events in the project's future based on information and knowledge available at the time of the forecast. Forecasts are updated and reissued based on work performance information provided as the project is executed. The information is based on the projects past performance and expected future performance and includes information that could impact the project the future, such as estimate at completion and estimate to complete.</p> <p style="text-align: right;"><i>SOURCE: PMBOK Third Edition</i></p>
<b>Future Costs</b>	Costs that are escalated by projected inflation rates to specific points in time, consistent with a particular project schedule.
<b>FY</b>	Fiscal Year
<b>G</b>	
<b>Goal</b>	the end toward which effort is directed: <b><u>AIM</u></b>
<b>GSP</b>	General Special Provisions,
<b>H</b>	

<b>Historical Information</b>	Documents and data on prior projects including project files, records, correspondence, closed contracts, and closed projects. <i>SOURCE: PMBOK Third Edition</i>
<b>Human Resource Planning</b>	The process of identifying and documenting project roles, responsibilities and reporting relationships, as well as creating the staffing management plan. <i>SOURCE: PMBOK Third Edition</i>

<b>I</b>	
<b>ICE</b>	Interstate Cost Estimate
<b>Impact</b>	The effect on the project objectives if a risk event should occur. <i>SOURCE: PRAM Guide, 2004 APM Publishing</i>
<b>Inflation</b>	<sup>1</sup> A persistent tendency for prices and money wages to increase. Inflation is measured by the proportional changes over time in some appropriate price index...; <sup>2</sup> an increase in the volume of money and credit relative to available goods and services resulting in a continuing rise in the general price level. <i>1A Dictionary of Economics. John Black. Oxford University Press, 2002. Oxford University Press. St. Martin's Univ. 2Merriam-Webster/online</i>

<b>J</b>	
<b>Job</b>	<b>1 a:</b> a piece of work; <i>especially:</i> a small miscellaneous piece of work undertaken on order at a stated rate <i>SOURCE: Merriam-Webster Online Dictionary</i>

<b>K</b>	
<b>Knowledge</b>	An understanding of something or a process with the familiarity gained through experience, education, observation or investigation, it is understanding a process, practice or technique, or how to use a tool. <i>SOURCE: PMBOK Third Edition</i>

<b>L</b>	
<b>Lessons Learned</b>	The learning gained from the process of performing the project. Lessons learned may be identified at any point. Also considered a project record to be included in the lessons learned knowledge base. <i>SOURCE: PMBOK Third Edition</i>
<b>Likelihood</b>	Chance of something happening. SOURCE: ISO 31000, Risk management – Principles and guidelines

<b>M</b>	
<b>Magnitude</b>	The expected value of consequence associated with an event.

<p><b>Market Conditions</b></p>	<p>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.</p> <p>MARKET CONDITION influences include:: "availability of skilled labor is tight due to high demand for their skills"; "supply of steel is low because of high demand in multiple markets therefore causing a temporary upswing in steel prices"; "the number of bidders is expected to be low therefore the competition for the work is reduced"; "the type, size, and/or 'packaging' of the work is anticipated to influence bids and/or the number of bidders"; "influences of timing of advertisement on bidders and their responses".</p> <p><i>EXAMPLE OF HOW TO CAPTURE MARKET CONDITIONS:</i></p> <table border="1" data-bbox="651 695 1318 894"> <thead> <tr> <th colspan="3">Market Conditions applied to Base</th> </tr> </thead> <tbody> <tr> <td><b>Better than planned</b> (more competition, lower costs)</td> <td>25%</td> <td>20%</td> </tr> <tr> <td><b>Worse than planned</b> (less competition, higher costs)</td> <td>20%</td> <td>10%</td> </tr> <tr> <td></td> <td>probability</td> <td>impact</td> </tr> </tbody> </table>	Market Conditions applied to Base			<b>Better than planned</b> (more competition, lower costs)	25%	20%	<b>Worse than planned</b> (less competition, higher costs)	20%	10%		probability	impact
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<p><b>MDL</b> Master Deliverables List</p>	<p>a standardized Work Breakdown Structure; a comprehensive listing of project elements that is agreed to by all regions –This list is intended as a starting point for the creation of work breakdown structures (WBS) for projects. The Master Deliverables List is organized in project phases and listed down to the deliverables level. <a href="http://wwwi.wsdot.wa.gov/projects/PDIS/MDL.htm">http://wwwi.wsdot.wa.gov/projects/PDIS/MDL.htm</a></p>												
<p><b>Measures of Effectiveness (MOE)</b></p>	<p>Measures or tests, which reflect the degree of attainment of particular objectives. Measures of Effectiveness (MOEs) are used to compare competing alternatives. MOEs are sometimes called performance measures.</p>												
<p><b>Mitigation</b></p>	<p>Any action taken to reduce the impact of an undesirable risk event. The term 'mitigation' is often used to refer to all responses to threats but some practitioners use the term to refer specifically to proactive risk responses and others specifically to reactive risk responses.</p> <p>SOURCE: PRAM Guide, 2004 APM Publishing</p>												
<p><b>Monitoring</b></p>	<p>Continual checking, supervising, critically observing or determining the status in order to identify change from the performance level required or expected.</p> <p>SOURCE: ISO 31000, Risk management – Principles and guidelines</p>												
<p><b>Monte Carlo Analysis</b></p>	<p>A technique that computes or iterates the project cost or schedule many times using input values selected at random from the probability distributions of possible costs or durations, to calculate a distribution of possible total project cost or completion dates.</p> <p>SOURCE: PMBOK Third Edition</p>												
<p><b>Monte Carlo Sampling</b></p>	<p>A method of simulation modeling using a large number of random trials across the range of the distribution. Latin Hypercube is an alternative sampling method using stratified sampling. Latin Hypercube tends to result in convergence of the model using fewer trials.</p> <p>SOURCE: PRAM Guide, 2004 APM Publishing</p>												

<b>Monte Carlo Simulation</b>	A technique of multiple simulations of outcomes incorporating the variability of individual elements to produce a range of potential results
<b>MPD</b>	Managing Project Delivery. MPD is a WSDOT management process for project delivery from team initiation through project closing. Training in MPD is provided and the ATMS course code is B71. Now referred to as “PMP” Project Management Process at WSDOT.
<b>N</b>	
<b>Noise</b>	The random, irregular, or unexplained component in a measurement process. Noise can be found in cross-sectional data as well as time series data. <i>SOURCE: Principles of Forecasting by J. Scott Armstrong</i>
<b>O</b>	
<b>Occam’s Rule</b>	The rule that one should not introduce complexities unless absolutely necessary. “It is vain to do more what can be done with less.” <i>SOURCE: Principles of Forecasting by J. Scott Armstrong</i>
<b>Opportunity</b>	An event risk that has the potential to positively impact project objectives. Examples include strategies to reduce cost or accelerate schedule, beneficial funding decisions, improved revenue projections etc.
<b>Optimism</b>	A state of mind that causes the respondent to forecast that favorable events are more likely to occur than is justified by the facts. Many of us are susceptible to this bias. We think we are more likely to experience positive than negative events. Warnings about optimism bias help only to a minor extent. Analogies may help to avoid optimism. <i>SOURCE: Principles of Forecasting by J. Scott Armstrong</i>
<b>P</b>	
<b>PMBOK</b>	An acronym meaning Project Management Body of Knowledge. The term PMBOK(TM) is used by the Project Management Institute to refer to their Guide to the Project Management Body of Knowledge publication.
<b>PMI</b>	Project Management Institute, Inc.
<b>Parametric Estimating</b>	An estimating technique that uses a statistical relationship between historical data and other variables (e.g. lane miles, square footage, etc.) to calculate an estimate for activity parameters such as scope, cost, budget, and duration. Accuracy is dependent on the sophistication and the underlying data built into the model. An example for the cost parameter is multiplying the planned quantity of work to be performed by the historical cost per unit to obtain the estimated cost. <i>SOURCE: PMBOK Third Edition</i>
<b>Participation Matrix</b>	A spreadsheet to plan the attendance and timing of workshop participants.
<b>Percentiles from Monte Carlo Simulation Results Range</b>	Percentiles of Year Of Expenditure (YOE) Cost from a Monte Carlo simulation are interpreted as follows: Assuming the characterization of YOE cost uncertainty is correctly capture, the X-percentile, indicates the probability that the YOE cost will not exceed X-percent.
<b>Performance Measurement Baseline</b>	An approved integrated scope-schedule-cost plan for the project work against which project execution is compared to measure and manage performance. Technical and quality parameters may also be included. See also configuration management. <i>SOURCE: PMBOK 2003</i>
<b>Post-response risk</b>	The risk <i>after</i> a response is determined and actions are taken to enhance opportunities and reduce threats to the project’s objectives. The response action identifies and assigns parties to take responsibility for each risk response. Risks are known as “pre-response” if no response action has yet been determined (see below).

<b>Prediction Interval</b>	The bounds within which future observed values are expected to fall, given a specified level of confidence. For example, a 90% prediction interval is expected to contain the actual forecast 90% of the time. However, estimated prediction intervals are typically too narrow for quantitative and judgmental forecasting methods. <i>SOURCE: Principles of Forecasting by J. Scott Armstrong</i>
<b>Pre-response risk</b>	An identified risk for which no response action has yet been identified and implemented; after a response action is determined and implemented the risk is re-quantified with the new characteristics produced by the response (this becomes the “post-response” risk – see above).
<b>Price</b>	The financial outlay made to pay for a product or service. Price = Cost + Profit <i>SOURCE: Guide to Contract Pricing 5<sup>th</sup> Edition, 2009</i>
<b>Proactive Risk Response</b>	An action or set of actions to reduce the probability or impact of a threat (or delay its occurrence), or increase the probability or impact of an opportunity (or bring forward its occurrence). Proactive risk responses, if approved, are carried out in advance of the occurrence of the risk. They are funded from the project budget. <i>SOURCE: PRAM Guide, 2004 APM Publishing</i>
<b>Profit</b>	In a broad sense business profit is whatever monies are left after all costs have been paid. When talking about a particular contract, profit is the additional amount a contractor receives above out-of-pocket costs; profit makes it worthwhile to do the particular contract work. It is the reward for undertaking the contract task in the first place. Price = Cost + <b>Profit</b> <i>SOURCE: Guide to Contract Pricing 5<sup>th</sup> Edition, 2009</i>
<b>Program</b>	A group of projects having specified schedules and costs.
<b>Programming</b>	The process of developing a list of prioritized projects, with accurate cost estimates and spending plans, to put forward for the legislature to approve for funding. The heart of this effort is prioritizing projects within their various program and sub-program categories (preservation and improvement) safety, mobility, etc.
<b>Probability</b>	An estimate of the likelihood that a particular risk event will occur, usually expressed on a scale of 0 to 1 or 0 to 100 percent. In a project context, estimates of probability are often subjective, as the combination of tasks, people and other circumstances is usually unique. <i>SOURCE: PRAM Guide, 2004 APM Publishing</i>  “Probability –is degree of certainty and differs from absolute certainty as the part differs from the whole.” <i>Jacob Bernoulli drawing from the work of Leibniz, p. 123 “Against the gods –the remarkable story of risk” by Peter L. Bernstein</i>
<b>Probable Cost of Risk Events</b>	Costs associated with risk events, typically with substantial variability.
<b>Product</b>	An artifact that is produced, is quantifiable, and can be either an end item in itself or a component item. <i>SOURCE: PMBOK Third Edition</i>
<b>Project Schedule</b>	The Schedule as presented by the Project Team, corresponding to the Project Team Estimate.
<b>Project Team</b>	The Team representing the particular project under consideration.
<b>Program Development</b>	Specific work site events designed to educate and inform employees of their commute options and available incentives. The promotion may be an on-site event two to four hours long or a distribution of materials to all employees.
<b>Program</b>	Program—a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually. (PMBOK)

<b>Programming</b>	To obtain approval to complete a project as part of the highway construction program (a plan for completing a group of projects having specified schedules and specific costs.) (WSDOT P&O Manual) <i>http://www.wsdot.wa.gov/publications/manuals/fulltext/M12-51/AB.pdf</i>
<b>Project</b>	The <b>Project Management Institute</b> defines a <b>project</b> to be "a <u>temporary</u> endeavor undertaken to create a <u>unique</u> product or service." <b>Projects</b> are distinct from "operations," which are usually <u>ongoing</u> and <u>repetitive</u> activities.
<b>Project Objectives</b>	A statement of specific and measurable aims by which the degree of success of the project will be assessed. <i>SOURCE: PRAM Guide, 2004 APM Publishing</i>
<b>Project Manager</b>	A <b>project manager</b> then is any person assigned to lead a team toward completion of a <b>project</b> . A <b>project manager</b> applies specialized knowledge, skills, tools, and techniques in order to meet defined goals and customer expectations for a <b>project</b> .
<b>Prospectus</b>	Description of a project.
<b>PSE / PS&amp;E</b>	Plans Specifications and Estimate. This is the set of contract plans with specifications and the design engineer's estimate for a project.
<b>Q</b>	
<b>Quality</b>	The degree to which a set of inherent characteristics fulfills requirements. <i>SOURCE: PMBOK Third Edition</i>
<b>Quality Assurance ("QA")</b>	All those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality. <i>SOURCE: ISO &amp; Quality Management for Projects &amp; Programs, Lew Ireland 1991</i>
<b>Quality Control ("QC")</b>	The process of monitoring specific project results to determine if they comply with relevant standards and identifying ways to eliminate causes of unsatisfactory performance. <i>SOURCE: ISO &amp; Quality Management for Projects &amp; Programs, Lew Ireland 1991</i>
<b>Qualitative assessment</b>	An assessment of risk relating to the qualities and subjective elements of the risk –those that cannot be quantified accurately. Qualitative techniques include the definition of risk, the recording of risk details and relationships, and the categorization and prioritization of risk relative to each other. <i>SOURCE: PRAM Guide, 2004 APM Publishing</i>
<b>Quantitative Analysis</b>	Modeling of numerical outcomes by combining actual or estimated values with an assumed or known relationship between values, using arithmetic or statistical techniques, to determine a range of likely outcomes of a variable or to understand how variance in one or more values is likely to affect others. <i>SOURCE: PRAM Guide, 2004 APM Publishing</i>
<b>R</b>	
<b>Range</b>	The difference between the upper and lower values of a set of numbers or results either measured absolutely or related to Confidence Levels.
<b>Range Cost Estimate</b>	A Cost Estimate that gives a range of costs, related to specific confidence levels.
<b>Residual Risk</b>	Remaining risk after risk response actions has been implemented.
<b>Result</b>	An output from performing project management processes and activities. Results include outcomes (e.g. integrated systems, revised processes, training personnel, etc.) and documents (reports, policies, plans, studies, etc.). <i>SOURCE: PMBOK Third Edition</i>

<b>Right-Of-Way (R/W) Phase</b>	This effort includes the revision of existing plans or the preparation of new plans detailing the need for new Right of Way defined during the design phase. It also includes the appraisal, negotiation, and purchase of new Right of Way by the Real Estate Services office. The right-of-way phase can begin during scoping, after design completion, or anytime in between. The phase end is when the RW is certified, but this may not have a direct relationship to the construction phase, except that CN cannot begin unless the RW is certified. Except under rare circumstances, all new Right-of-Way must be acquired before the project can go to Ad. NOTE: Preparation of R/W Plans is paid for with PE dollars and is part of the design effort; Negotiation, Purchase and Acquisition of R/W are performed by the Real Estate Services office and comprise the cost of R/W.
<b>Risk</b>	The effect of uncertainty on objectives. <i>SOURCE: ISO 31000, Risk management – Principles and guidelines</i>
<b>Risk Lead</b>	The risk lead(s) participate in a peer-level review or due diligence analysis on the scope, schedule and cost estimate for various projects to evaluate quality and completeness, including anticipated risk and uncertainty in the projected cost and schedule. The risk lead: <ul style="list-style-type: none"> <li>✓ Leads the risk portion of the process including risk elicitation and project flowchart development for modeling.</li> <li>✓ Participates in cost validation or review and risk uncertainty workshops for selected projects.</li> <li>✓ Conducts prep sessions, follow-up meetings, and/or rerun sessions as necessary.</li> <li>✓ Provides reports and presentations documenting workshops.</li> <li>✓ Provides reports using report guide/table of contents.</li> <li>✓ Develops or implements workshops on topics such as project definition, and risk identification and management.</li> </ul>
<b>Risk Analysis</b>	Use of available information to determine how often events may occur and the magnitude of their consequences. It may use a wide variety of mathematical and other models and techniques. <i>SOURCE: Project Risk Management Guidelines Cooper, Grey, Raymond, Walker</i>
<b>Risk Assessment</b>	The overall agreed process of risk analysis and risk evaluation. Its purpose is to develop agreed priorities for identified risks.
<b>Risk Evaluation</b>	Determines whether a risk is tolerable or not and identifies the risks that should be accorded the highest priority in developing responses. <i>SOURCE: Project Risk Management Guidelines Cooper, Grey, Raymond, Walker</i>
<b>Risk Events</b>	Uncertain events that affect the defined project resulting in impacts to cost, schedule, safety, performance or other characteristic but do not include the minor variance inherent in Base Costs. Examples include political, policy and/or management changes, changes in regulations and laws, earthquakes, fires, floods, unknown archeological sites, et al. (NOTE: Some may use the term “risk” to connote a negative event consequence and opportunity a positive event consequence.)
<b>Risk Identification</b>	Process of identifying, characterizing and quantifying potential risk events.
<b>Risk Management</b>	Refers to the culture, processes, and structures that are directed toward effective management of risks –including potential opportunities and adverse effects. Risk Management Process – systematic application of management policies, processes, and procedures to the tasks of establish the context, identifying, analyzing, assessing, treating, monitoring, and communicating risk. <i>SOURCE: Project Risk Management Guidelines Cooper, Grey, Raymond, Walker</i>

<b>Risk Miles</b>	Those sections of highway that have a higher probability of accidents over a continuous period of time.
<b>Risk Mitigation</b>	Establishes and implements management responses for dealing with risks in ways appropriate to the significance of the risk, benefit-cost of the responses and importance of the project. <i>SOURCE: Project Risk Management Guidelines Cooper, Grey, Raymond, Walker</i>
<b>Risk owner</b>	Person or entity with the accountability and authority to manage a risk. <i>SOURCE: ISO 31000, Risk management – Principles and guidelines</i>
<b>Risk profile</b>	Description of any set of risks. <i>SOURCE: ISO 31000, Risk management – Principles and guidelines</i>
<b>Risk Register</b>	The risk register serves as a repository for identified project risks. The risk register includes detailed information about the risk and is a “living” document that evolves as the project evolves. The risk register typically records information such as: risk ID #, status of risk, risk categories, risk Name, cause of the risk, effect of the risk, risk trigger, likelihood of risk occurrence, impact if risk does occur, response actions, and notes.  The risk register serves a project management and communication tool to aide decision-makers and facilitates risk analysis.
<b>Risk Reserve</b>	A provision in the project management plan to mitigate cost and/or schedule risk. (see IL 4071.01)
<b>Risk Response</b> (the ways we can respond to risk)	Risk response strategy is the process of developing options and determining actions to enhance opportunities and reduce threats to the project’s objectives. It identifies and assigns parties to take responsibility for each risk response. This process ensures that each risk requiring a response has an “owner”. The Project Manager and the project team identify which strategy is best for each risk, and then selects specific actions to implement that strategy.  Responses to threats: Avoid, Mitigate (reduce), Transfer, Accept (retain) Responses to opportunities: Exploit, Enhance (increase), Share, Accept (retain)
<b>Risk Team</b>	Those CEVP Team members plus Project Team members who focus on Risk for the particular project under consideration.
<b>Robust Design</b>	Robust Design methodology means systematic efforts to achieve insensitivity to noise factors. These efforts are founded on an awareness of variation and can be applied in all stages of product design. <i>2007 John Wiley &amp; Sons, Ltd.</i>
<b>ROD</b>	Record of Decision
<b>S</b>	
<b>Scenario</b>	a sequence of events especially when imagined; <i>especially</i> : an account or synopsis of a possible course of action or events <i>SOURCE: Merriam-Webster Online Dictionary</i>
<b>SCoRE</b>	Scope, Cost, and Risk Evaluation (a previous CRA type process)
<b>Scope of work</b>	Defines the work and activities to be performed to deliver a project including limits of the project. Establishes context and boundaries for the work to be performed.
<b>Sensitivity Analysis</b>	A technique that seeks to examine the sensitivity of model results to parameter estimates. Simple forms include varying parameters one at a time and observing the effect. <i>SOURCE: PRAM Guide, 2004 APM Publishing</i>
<b>Service</b>	Useful work performed that does not produce a tangible product or result, such as the performing of business functions supporting production or distribution. <i>SOURCE: PMBOK Third Edition</i>
<b>T</b>	

<b>TAG</b>	Transportation Analysis Group
<b>TDM ordinances</b>	See trip reduction ordinances
<b>Team</b>	Two or more people working interdependently toward a common goal and a shared reward. <i>SOURCE: PM Glossary, Welcome, Project Management Solutions <a href="http://maxwideman.com/pmglossary/PMG_T00.htm">http://maxwideman.com/pmglossary/PMG_T00.htm</a></i>
<b>Team Building</b>	The process of influencing a group of diverse individuals, each with their own goals, needs, and perspectives, to work together effectively for the good of the project such that their team will accomplish more than the sum of their individual efforts could otherwise achieve. <i>SOURCE: PM Glossary, Welcome, Project Management Solutions <a href="http://maxwideman.com/pmglossary/PMG_T00.htm">http://maxwideman.com/pmglossary/PMG_T00.htm</a></i>
<b>Team Management</b>	The direction of a group of individuals that work as a unit. Effective teams are results-oriented and are committed to project objectives, goals and strategies. <i>SOURCE: PM Glossary, Welcome, Project Management Solutions <a href="http://maxwideman.com/pmglossary/PMG_T00.htm">http://maxwideman.com/pmglossary/PMG_T00.htm</a></i>
<b>Threat</b>	An event risk that has the potential to negatively impact project objectives.
<b>TPA</b>	Transportation Partnership Act (Washington State Program of Projects)
<b>TRAC</b>	Transportation Center (WSDOT research center)
<b>Transportation</b>	Moving people and /or goods from one place to another.
<b>Transportation management</b>	A concept that includes the use of TDM and TSM techniques in order to lessen traffic impacts of development and encourage private sector improvement to accommodate traffic growth. Sometimes referred to as traffic mitigation.
<b>Transportation planning</b>	A process to determine which transportation projects should be funded and delivered. It involves: Understanding types of decisions to be made; Assessing opportunities/limitations of the future; Identify consequences of alternatives; Relate alternatives to goals and objectives; Present information to decision-makers.
<b>U</b>	
<b>Ultimate Cost</b>	Actual cost at completion of all work elements, including all outside costs, changes and resolution of risk and opportunity events.
<b>Ultimate Schedule</b>	Actual schedule at completion of all work elements, including all outside costs, changes and resolution of risk and opportunity events.
<b>Uncertain</b>	1: <b>INDEFINITE, INDETERMINATE</b> <the time of departure is <i>uncertain</i> > 5: not constant : <b>VARIABLE</b> , <i>SOURCE: Merriam-Webster Online Dictionary</i>
<b>Uncertainty</b>	The lack of knowledge of the outcome for a particular element or value. 1 : the quality or state of being <b>uncertain</b> : <b>DOUBT</b> <i>SOURCE: Merriam-Webster Online Dictionary</i>
<b>Uplift</b>	Information that leads to a rise in price(s). See <b>economic indicators</b> . <i>SOURCE: The Handbook of International Financial Terms. Peter Moles and Nicholas Terry. Oxford University Press 1997. Oxford Reference Online</i>
<b>USDOT</b>	United States Department of Transportation - principal direct federal funding and regulating agency for transportation facilities and programs. Contains FHWA and FTA, FRA and other agencies.

<b>V</b>	
<b>Validation</b>	A process to confirm the reasonableness, accuracy and completeness of estimated costs and quantities.
<b>Value Engineering</b>	A systematic approach to identifying and removing unnecessary costs which do not contribute to a desired result by analyzing cost vs. function.

<b>Variability, Variance</b>	The fact of, or capacity for, varying in amount, magnitude or value. <i>SOURCE: Oxford English Dictionary Online, 2010</i>  Inherent fluctuations due to random events that result in a range of potential values for a quantity.
<b>VE-CRA</b>	Value Engineering – Cost Risk Assessment (this is a workshop where both the cost risk assessment and value engineering workshops are combined).
<b>W</b>	
<b>Watch List</b>	A list of major risks examined at each monthly project review meeting. <i>SOURCE: Project Risk Management Guidelines Cooper, Grey, Raymond, Walker</i>
<b>Workshop</b>	a usually brief intensive educational program for a relatively small group of people that focuses especially on techniques and skills in a particular field <i>Merriam-Webster Online (m-w.com)</i>
<b>CRA/CEVP workshop</b>	CRA/CEVP workshops are a collaborative effort between the project team and subject matter experts to give a close and rigorous review of the estimated base cost and to identify and characterize the uncertainty and risk associated with the project.
<b>Informal workshop</b>	An informal workshop is comprised of the project team (or key project team members), other participants may be included as the project manager/project team deem necessary. <i>(WSDOT E 1053.00 December 10, 2008)</i>
<b>Y</b>	
<b>YOE</b>	Year Of Expenditure. The estimated year that money will be spent to complete project work elements.
<b>Year Of Expenditure Dollars</b>	The estimated cost of the project when it is anticipated to be built. WSDOT forecasts the estimated YOE cost by taking the estimate in current year dollars and inflating it to the anticipated midpoint of construction or activity.