1.0 purpose

 This document describes the methodology for establishing cost estimates for projects at PPPL in a manner that is compliant with the standards for implementation of appropriate Project Management controls and Earned Value Management.

2.0 SCOPE

Cost estimates, including the Estimate at Completion (EAC) and Estimates to Complete (ETC), are prepared in a clear, consistent, comprehensive format that facilitates review of details and assumptions throughout the cost estimation process. Activities to be estimated are identified in sufficient detail to support the cost estimate methodology used.

 The objectives of the cost estimating process are to: (1) support the establishment of the Performance Measurement Baseline (PMB); (2) serve as a basis for change control; and (3) support the establishment of the EAC and ETC. Project cost estimates shall be traceable to documented sources and based on accepted methodologies.

3.0 REFERENCES

**3.1** DOE Order 413.3B, “Program and Project Management for the Acquisition of Capital Assets”

 **3.2** PPPL Project Management System Description (PMSD)

 **3.3** PPPL Budget Office

 **3.4** PM Procedure 1.2, Project Work Breakdown Structure (WBS)

 **3.5** PM Procedure 1.5, Control Account Plan/Work Authorization

 **3.6** PM Procedure 1.6, Project Schedule

 **3.7** ENG-053 Job Cost Estimate Development & Review Procedure

4.0 PROCEDURE

 **4.1 Estimate Preparation and Review**

 The estimate preparation phase begins with the issuance of guidance and instructions from the Project Manager and encompasses those activities that translate technical design and fabrication into detailed labor and procurement elements of cost. The estimate shall be organized by Work Breakdown Structure (WBS).

The level of detail and accuracy of the budget becomes more mature as the project’s scope becomes better defined. The three general levels of budget estimates are Order of Magnitude Estimates, Preliminary Budget Ranges, and Definitive Estimate.

In a project’s earliest phases, the Initiation, or Pre-Conceptual Phase (before Critical Decision [CD] -0, an Order-of-Magnitude (or Parametric) Estimate is required. When a capital asset acquisition project has completed the Conceptual Design Phase, a Preliminary Budget Range is required to establish the Budget Baseline at CD-1.

Budget refinements shall be based on a Definitive Estimate for every element in the WBS and is required for CD-2.

The cost estimate should be analyzed for appropriate time-phasing with budget authority and budget outlay, consistent with the project appropriation profile, as directed by the Funding Agency.

 **4.1.1 Preparation of Detailed Estimate**

The Cognizant Individual (COG) sometimes referred to as the CAM shall be responsible for preparing or obtaining cost estimates for Work Packages and Planning Packages within the individual Control Accounts. The development of the cost estimate follows the definition of the Work Package/Planning Package scope, and the development of the initial schedule. The determination of the resources required to accomplish the defined scope, in the timeframes scheduled, is an iterative process that culminates in a preliminary, and then final, performance measurement baseline.

Activity based costing refers to the process of determining the resources required for each activity in the schedule within the Work Package level. The level of resource/cost estimate development will be determined by the project manager and may be at the schedule activity or work package levels in either case, a “resource loaded schedule” results.

Labor rate tables, indirect costs, and escalation rates will be provided by Project Control to assist the COG in estimating/budget development. The Project Manager will review this information and approve all cost estimates/budget plans prior to implementation.

 **4.1.2 Cost Estimate Methodology**

The result of the project cost estimate process shall be the COGs most current, detailed cost estimate, commensurate with design maturity. The COG will use one of the approved methodologies described in Appendix B.

COGs should use Categories 1, 2, 3, and 7 when possible, especially for high-cost items, as this will provide maximum estimate support. The COGs’ basis for all estimates will be documented for each project and retained by the Project Manager, with a copy provided to Project Controls. The documentation includes files to support project cost estimates (such as books, vendor quotes, engineering notes, memos, records of conversations with vendors, drawings, code output) with appropriate safeguards for proprietary information provided.

Cost estimates are developed for each WBS element at the Work Package level or lower as deemed necessary by the COGs. They shall be broken down by project phase, institution, labor discipline and element of cost, as appropriate. Items and activities in the estimate shall be of sufficient detail to support interpretation by independent reviewers.

 **4.2 Documentation**

The Project Manager shall control supporting documentation and ensure that it is retained by WBS element. The Project Manager shall forward copies of the documentation to Project Controls. Proper care shall be given to protect business-confidential and proprietary information from unauthorized disclosure.

Documents and records generated as a result of implementing this procedure shall be generated in a manner suitable for reproduction and dated at the time of completion or approval. Official documents shall be retained by the Project Manager, with copies to Project Controls. Documents, records, and work papers shall include but not be limited to the following:

* Estimate spreadsheet.
* Work papers, including vendor quotes, telephone records, material takeoffs, basis notes, calculations, etc.
* Analysis, such as contingencies, escalation application, and quantity discounts.
* Estimating codes, such as labor disciplines and phase codes.
* Application rates and associated application methodology.

**4.3 Contingency and Management Reserve**

The Project Cost Estimate (budget) shows the amount of funds set aside for in-scope, unbudgeted work, known as contingency. Contingency funds allocated by the Federal Project Director to the PPPL Project Manager are called “management reserve”. Because contingency/management reserve cover potential events only, it cannot be time-phased and cannot become part of the Performance Measurement Baseline. A contingency/management reserve budget is required and should be established as the result of a risk analysis. The Project Manager, COGs, and other Stakeholders shall work together to determine a risk-based level of contingency/management reserve.

5.0 APPENDIX

 5.1 Appendix A: Cost Estimating Process

 5.2 APPENDIX B: Estimate Methodologies

APPENDIX B

ESTIMATE METHODOLOGIES

|  |  |  |
| --- | --- | --- |
| *Code* | *Type of Estimate* | *Description* |
| 1 | Catalog Listing Or Industrial/ Construction Databases | This category will be used when most of the costs in an estimate can be documented from current vendor catalogs or from published or proprietary industrial or construction databases. |
| 2 | Documented Vendor Estimate Based On Drawings/ Sketches & Specifications | The estimate is primarily based on vendor estimates obtained for the specific item or activity. To the extent possible, these estimates will be written rather than oral. If the latter, they will be documented. Such quotes by a vendor indicate that a design is sufficiently mature that its cost can be independently estimated (i.e., significant detail in drawings and specifications have been prepared), although the quotes will not be taken as an offer to sell at that price. |
| 3 | Engineering Estimate Based On Drawings/Sketches & Specifications | Estimates in this category have the same level of detail available as in (2) above, but the estimates are done by an expert estimator at PPPL, or a subcontractor who is not likely to be a vendor. |
| 4 | Engineering Estimated Based On Similar Items Or Procedures | Estimates are chiefly based on items or activities that have previously been procured or undertaken. The basis for scaling up of down, or “factoring” (e.g., known cost sensitivities) should be documented in the estimate files. Given the variable degree of similarity between components of various PPPL projects, judgment must be used in selecting between (4) and (5). |
| 5 | Engineering Estimate Based On Analysis | Estimates of items or procedures that are different from previous experience, and while sketches and specifications may exist, the level of detail is not sufficient to quality for (3) above. Some labor costs, such as assembly of an item not previously built, may fall into this category. Supporting background for procured items would include, for example, standard costs for fabricating a given material and the mass of material needed. |
| 6 | Expert Opinion (Engineering Allowance) | This category should be used for items or procedures having little documented basis for the estimate. It indicates little confidence in the estimate. Its use should obviously be minimized in the final estimate. It will be used as the estimate preparation develops, however, to measure the maturity of the estimate at any given point. |
| 7 | Existing Lien | A contract has already been awarded. |