

# Engineering and Construction Project Cost Estimating

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*Approved By* [REDACTED]

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*Active Divisions/Departments*  
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## Purpose

To define the Denver headquarters and McMurdo, Palmer, and South Pole Stations processes for cost estimating of engineering and construction projects. The process will utilize the *Engineering Project Definitions (EPD)*(EN-D-200), design specifications, and other sources of information as the basis for the cost estimate. These estimates will be utilized for budgeting and planning purposes only and will not be utilized for the purposes of bidding projects as "fixed price" type work.

## Scope/Applicability

This procedure applies to all cost estimates for engineering and construction projects for maintenance and construction conducted by Raytheon Polar Services Company (RPSC). It includes the South Pole Station Modernization (SPSM) project. This procedure applies regardless of the organization that produces the design.

## Responsibilities

### Director, FEMC

- Assures that this procedure is followed for all engineering and construction projects.
- Approves the project cost estimates prior to release.
- Interfaces with the National Science Foundation (NSF) on engineering and construction project cost estimates.

## **Manager, Planning and Controls**

- Supervises the establishment of standard databases for estimates to ensure uniform project estimating.
- Selects the type of estimate to be produced based on the level of information defined in the project scope. The estimate types are preliminary (rough order of magnitude), final (detailed), or fast track.
- Supervises the accomplishment of the cost estimate.
- Supervises the establishment of actual cost feedback systems to provide accurate cost data to the estimating databases.
- Monitors the cost feedback system to ensure data accuracy and system integrity.

## **Manager, Engineering**

- Supervises the collection of project information prior to the cost estimate preparation, including the preparation of the Engineering Project Definition, design drawings, and specifications.
- Reviews the cost estimate for accuracy and reasonableness.

## **Manager, FEMC**

- Reviews standard and project specific work packages for utility and accuracy.
- Reviews the cost estimate for accuracy and reasonableness.

## **Project Engineer**

- Provides engineering requirements to the Estimator.
- Assists the Construction Coordinator and the Estimator with the identification and creation of project specific work packages.
- Assists the Estimator with the interpretation of the plans and specifications.
- Reviews the estimate to ensure completeness and conformity with the drawings and specifications.

## **Estimator**

- Establishes preliminary (order of magnitude) and final (detailed) databases.
- Produces the type of estimate selected by the Manager, Planning and Controls.
- Performs material takeoffs.
- Establishes standard and project specific work packages.
- Accomplishes the cost estimate using the inputs of the Construction Coordinator and the Project Engineer.
- Updates the databases and work packages using actual cost and performance data.
- Performs statistical risk analyses on projects as directed by the Director, FEMC.

## **Scheduler**

- Monitors the construction project and records the actual resources utilized for each work package installed.
- Records the conditions under which the work is performed as well as all circumstances impacting the performance of the work.
- Transmits approved work package corrections to the estimator.

## **Construction Coordinator**

- Assists the estimator with the creation of project specific work packages.
- Provides the Scheduler and Estimator with an accurate record of labor and equipment actually used.

## **General**

This procedure will be used to produce three types of cost estimates: preliminary; or rough order of magnitude, final, or detailed, and fast track estimates.

## Procedures

### **Preliminary Estimates:**

The preliminary cost estimate will be conducted upon request from the NSF. This estimate will be based on the scope of the approved Engineering Project Definitions (EPD), or list of requirements supplied by the NSF if no EPD exists, or a “What If” scenario is requested. This estimate will contain summary, rather than detailed, work packages and it will calculate the work packages under the scenario; best guess with the assumptions concerning conditions and costs clearly defined for each work package. Preliminary estimates will be presented with a +/-% based upon the definition of scope and historical information on similar work. Classification and % will be based on the AACE (Association for the Advancement of Cost Engineering) International Recommended Practice No. 17R-97, *Cost Estimate Classification System*, ©2003 (See EN-DMPS-208a).

### **Final Estimates:**

Final estimates will be accomplished after design and specifications have received final approval and after all work requiring shop drawings or subcontracts has been bid and accepted. This estimate will contain detailed, rather than summary, work packages and will be used as a target for monitoring and training. This estimate will be based on the approved drawing and submittal package. The format of the final estimate will be an overall project cost broken between fiscal years with an associated Scope of Work (SOW). The Director, FEMC, may require that the estimate be subjected to a statistical risk analysis to establish best and worst case cost parameters.

### **Fast Track Estimates:**

Fast Track estimates will be accomplished when procurement or construction must begin prior to final approval of design and specifications or prior to accepted bids for subcontracts or work requiring shop drawings. This estimate will contain detailed work packages. The format will be a single value. Fast Track projects in excess of \$500,000 may be subjected to a statistical risk analysis review and approved by NSF prior to any expenditure of construction funding. Fast Track estimates will be revised and recalculated

with updated design and cost data on a schedule determined by the Director, FEMC.

### **Review/Approval:**

All cost estimates shall be reviewed by the Project Engineer; Construction Coordinator; Manager, Planning and Controls; and Director, FEMC. The Director, FEMC, must approve all estimates requiring submission to the NSF. FEMC personnel will not submit cost estimates directly to the NSF. Estimates that have been approved at the FEMC level will be submitted to the RPSC Financial group for review, standardized formatting and the addition of approved contract markups. The Director of Finance or delegated authority will submit all cost estimates to the NSF representative.

### **Distribution/Use:**

Preliminary cost data will be listed in the Estimate Cost Data section of the EPD. These cost estimates are intended as internal planning estimates for the preparation of budgets and other planning documents. The estimates will not normally be distributed outside of RPSC. The RPSC Program Manager, or Director, FEMC, may provide copies of the estimate to the NSF.

## **References**

*Cost Estimate Classification System*, AACE International Recommended Practice No. 17R-97 (EN-DMPS-208a)(PDF Format)

*Engineering Project Definitions (EPD)* (EN-D-200)

## **Records**

See “Engineering Project Definitions” under the FEMC-DHQ & STATIONS tab of the *FEMC Records Management Table* (EN-D-226a).