

CHAPTER X

COST ENGINEERING GUIDE FOR MILITARY CONSTRUCTION

Table of Contents

1. REFERENCES:
 - 1.1 EI 01D010
 - 1.2 EP 1110-1-8
 - 1.3 ER 1110-1-1300
 - 1.4 ER 1110-3-1300
 - 1.5 ER 1110-2-1302
 - 1.6 ER 1110-3-1301
 - 1.7 TI 802-01
 - 1.8 Memorandum, Cost Control During Design.
 - 1.9 Memorandum, Military Design and Cost Engineering
2. COST ESTIMATES
3. COST GROWTH
4. AF FORM 1178 AND ARMY ENG FORM 3086
5. BASELINE COST ESTIMATES
6. SUBMITTALS
 - 6.1 Requirements and Management Plan (RAMP - Air Force)
 - 6.2 Schematic Design Submittal (Army)
 - 6.3 Project Engineering Phase, Code 3 (Army)/Project Definition (Air Force)
 - 6.4 Concept Design (Army)/Preliminary Design (Air Force) and Design-Build
 - 6.5 Preliminary Design (Army)/Interim Design (Air Force)
 - 6.6 Final Design
 - 6.7 Corrected Final Design with Bid Opening Estimate

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1. REFERENCES:

1.1 **EI 01D010**: Construction Cost Estimates, 1 September 1997. Available from HQUSACE Cost Estimate & Economic Team Home Page under Engineering Instructions at web address http://www.hq.usace.army.mil/cemp/e/ec/ec_new.htm

1.2 **EP 1110-1-8**: Construction Equipment Ownership and Operating Experience Schedule, latest edition.

1.3 **ER 1110-1-1300**: Engineering and Design COST ENGINEERING POLICY AND GENERAL REQUIREMENTS, 26 March 1993.

1.4 **ER 1110-3-1300**: Engineering and Design MILITARY PROGRAMS COST ENGINEERING, 30 July 1993.

1.5 **ER 1110-2-1302**: Engineering and Design CIVIL WORKS COST ENGINEERING, 31 March 1994.

1.6 **ER 1110-3-1301**: Engineering and Design COST ENGINEERING POLICY AND GENERAL REQUIREMENTS FOR HAZARDOUS, TOXIC AND RADIOACTIVE WASTE (HTRW) COST ESTIMATES, 10 March 1999.

1.7 **TI 802-01**: Technical Instructions for Code 3 Design With Parametric Estimating, 15 April 1998.

1.8 **Memorandum** from CESWD-ETE-T dated 16 June 1999, subject: Cost Control During Design.

1.9 **Memorandum** from CESWD-ET/CESWD-PM dated 7 September 1995, subject: Military Design and Cost Engineering.

2. **COST ESTIMATES**. All military cost estimates shall be prepared in accordance with EI 01D010 or the District Cost Estimating Guide and will be bound (or stapled) separately from other submittal data. If the District prepares a cost-estimating guide to supplement EI 01D010, the Cost Engineering Branch will be responsible for its preparation

within the EI guidelines. The Estimating Guide of each District (if prepared) will supplement Chapter X of the Architectural and Engineering Instruction Manual and will apply to the preparation of cost estimates, either in-house or A-E, for all military construction. All cost estimates shall be prepared and organized according to the applicable work breakdown structure. (Each district will furnish to CESWD Cost Engineering a copy of the Estimating Guide and all updates thereto.) The A-E shall be aware of and take such precautionary measures as necessary to maintain the confidential nature of all cost estimates. In general, cost estimates, at the earliest practical stage of project development, are to be prepared using the latest version of MCACES (Micro Computer Aided Cost Estimating System). When MCACES is waived on a given project by formal memorandum issued by the District Cost Engineering Branch, the cost estimate shall be prepared in accordance with EI 01D010 or the District Cost Estimating Guide.

3. **COST GROWTH**. The unit costs of all construction cost estimates submitted shall reflect the current pricing at the time of submittal. For all estimates prior to the Advanced Final Design, cost growth (escalation) - using the Tri-Services Index - is to be added to the total project cost, projecting costs to the assumed midpoint of construction. For Final Design and later cost estimates, cost growth may or may not be added as directed by the District Chief, Cost Engineering Branch.

4. **AF FORM 1178 AND ARMY ENG FORM 3086**. For all Air Force submittals except bid opening, an AF Form 1178 cost estimate shall be prepared and submitted with the detail cost estimate. For Army projects, an ENG Form 3086 cost estimate shall be prepared and submitted with the detail cost estimate for all submittals through 35% design (Concept). Guidance for preparing the 1178 or 3086 cost estimates will be provided by the District Chief, Cost Engineering Branch.

5. **BASELINE COST ESTIMATES**. A baseline cost estimate is required early in the design process, usually at the Project Engineering Phase, Code 3 (Army) or Project Definition (Air Force) level of design. This parametric cost estimate is to be a detail parametric, budgetary-type cost estimate using MCACES version 5.3 (or later), TRACES PBMW version 3.0 (or later) or PACES (latest version). All parametric cost

estimates prepared using either TRACES PBMW or PACES must be exported to MCACES and printed from MCACES. The estimate must be itemized according to the approved Tri-Services work breakdown structure to at least the sub-system level and edited to represent project specific items as defined by the designers. This cost estimate must be structured to allow comparison of costs to the primary line items as shown in the DD 1391. The cost estimate is to be used by the designers as a design guide throughout the design phase. If changes to the design are required, the cost engineer must update the baseline estimate immediately. The construction cost estimate is to be a "live" estimate that keeps the user informed of the anticipated project costs. Anticipated costs above the construction cost limitation (CCL) must be resolved between the user, the designer and the cost engineer. Separable elements (potential additives/options) may have to be identified early on in order to keep the project within the funds available.

6. **SUBMITTALS**. For IFB projects, the required level of design completion for each submittal may vary depending upon the project. The District Project Manager will provide the level of design required for each submittal. Some projects may require different or additional submittals and will require separate guidance on a case-by-case basis. In general, the following types of detail estimates are required:

6.1 **Requirements and Management Plan (RAMP) (3%) (Air Force)**. When this submittal is required, a detail parametric, budgetary-type cost estimate is required. The estimate must be itemized according to the approved Tri-Services work breakdown structure to at least the sub-system level and edited to represent project specific items as defined by the designers. This cost estimate must be structured to allow comparison of costs to the primary line items as shown in the DD 1391.

6.2 **Schematic Design Submittal (5%) (Army)**. Unless directed otherwise, no cost estimate is required with this submittal.

6.3 **Project Engineering Phase, Code 3 (Army)/Project Definition (Air Force)(10%-15%)**. When this submittal is required, a detail parametric, budgetary-type cost estimate

using MCACES version 5.3 (or later), TRACES PBMW version 3.0 (or later) or PACES (latest version) is required. All parametric cost estimates prepared using either TRACES PBMW or PACES must be exported to MCACES and printed from MCACES.

If a detailed parametric cost estimate was previously prepared at an earlier stage of design, it may be used and updated based on current information. The estimate must be itemized according to the approved Tri-Services work breakdown structure to at least the assembly category level and edited to represent project specific items as defined by the designers. The designers must identify their intended design in sufficient detail that the cost engineer can prepare the cost estimate outline with related costs. This cost estimate must be structured to allow comparison of costs to the primary line items as shown in the DD 1391. This submittal shall also include a completed AF Form 1178 or, for the Army, an ENG Form 3086, cost estimate that is based upon the parametric budgetary-type estimate. Submittal of the ENG Form 3086 electronically by the district cost engineer will usually be required. As a part of this submittal, an electronic copy of the MCACES project file (with related databases) on a 3.5" diskette is to be furnished to the district cost engineer.

6.4 Concept (Army)/Preliminary (Air Force)(30%-35%) and Design-Build. When this submittal is required, a detail parametric, budgetary-type cost estimate using MCACES version 5.3 (or later), TRACES PBMW version 3.0 (or later) or PACES (latest version) is required. All parametric cost estimates prepared using either TRACES PBMW or PACES must be exported to MCACES and printed from MCACES. If a detailed parametric cost estimate was previously prepared at an earlier stage of design, it may be used and updated based on current information. The estimate must be itemized according to the approved Tri-Services work breakdown structure to at least the assembly category level and edited to represent project specific items as defined by the designers. The designers must identify their intended design in sufficient detail that the cost engineer can prepare the cost estimate outline with related costs. This cost estimate must be structured to allow comparison to the primary line items as shown in the DD 1391. If the estimate exceeds the construction funds programmed, a meeting of the design team is required to recommend ways to reduce cost (Design to Cost). If the cost cannot be reduced to less than the programmed construction funds, the project design may

have to stop and the project may have to be reprogrammed. This submittal shall also include an ENG Form 3086 cost estimate that is based upon the parametric budgetary-type estimate. Electronic submittal of the ENG Form 3086 by the district cost engineer will usually be required. As a part of this submittal, an electronic copy of the MCACES project file (with related databases) on a 3.5" diskette is to be furnished to the district cost engineer.

6.5 Preliminary (Army)/Interim (Air Force) Design (60%-65%). When this submittal is required, a detail parametric, budgetary-type cost estimate is required. The detailed parametric cost estimate previously prepared at an earlier stage of design and exported into MCACES may be used and updated based on current information or a new cost estimate may be developed using MCACES. The estimate must be itemized according to the approved Tri-Services work breakdown structure to at least the assembly category level and edited to represent project specific items as defined by the designers. The designers must identify their intended design in sufficient detail that the cost engineer can prepare the cost estimate outline with related costs. This cost estimate must be structured to allow comparison of costs to the primary line items identified in the DD 1391. If the estimate exceeds the construction funds programmed, a meeting of the design team is required to recommend ways to reduce cost (Design to Cost). If the cost cannot be reduced to less than the programmed construction funds, the project design may have to stop and the project may have to be reprogrammed. As a part of this submittal, an electronic copy of the MCACES project file (with related databases) on a 3.5" diskette is to be furnished to the district cost engineer.

6.6 Final Design (90%-95%). This submittal is essentially a complete design except for resolution of final design comments and amendments issued after advertisement before bid opening. A completed bid schedule is required with this cost estimate. The proposed bid schedule will be coordinated with the District Cost Engineering Branch prior to preparation of the cost estimate. The bid schedule must identify each primary line item (primarily buildings) in the 1391 as a separate bid item. A detailed cost estimate must be prepared using MCACES or the detailed parametric cost estimate previously prepared at an earlier stage of design

and exported into MCACES may be used, and updated based on current information. The estimate must show detail cost entries with quantities, related crews, equipment and material costs. This cost estimate must be structured to allow comparison of costs to the primary line items identified in the DD 1391. If the estimate exceeds the construction funds programmed, a meeting of the design team is required to recommend ways to reduce cost (Design to Cost). If the cost cannot be reduced to less than the programmed construction funds, the project design may have to stop and the project may have to be reprogrammed. With the cost estimate provide calculation establishing the amount of the liquidated damages and establishing the construction duration. As a part of this submittal, an electronic copy of the MCACES project file (with related databases) on a 3.5" diskette is to be furnished to the district cost engineer.

6.7 Corrected Final Design (100%) with Bid Opening

Estimate. This estimate shall be a revision of the Final cost estimate prepared in accordance with 6.6 above. The revised cost estimate - to include a completed bid schedule shall include appropriate costs as required by the final review comments. The original and four copies shall be submitted with the transmittal letter not later than five working days prior to bid opening or as directed by the district-contracting officer. A copy of the bid schedule published in the specifications shall be completed and furnished with the cost estimate. As a part of this submittal, an electronic copy of the MCACES project file (with related databases) on a 3.5" diskette is to be furnished to the district cost engineer along with the liquidated damages calculations and the construction duration calculations.