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DEPARTMENT OF ARMY
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Regulation
No. 1110-1-1300

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Engineering and Design
COST ENGINEERING POLICY AND GENERAL REQUIREMENTS

1. Purpose. This regulation provides cost engineering policy, guidance, and procedures for all projects assigned to the U.S. Army Corps of Engineers (USACE) for Civil Works, Military, and Environmental Restoration Programs. Additional guidance is provided in specific cost engineering regulations for civil works, military, and environmental restoration programs.
2. Applicability. This regulation applies to all HQUSACE, major subordinate commands (MSC), districts, laboratories, and all field operating activities (FOA).
3. References. See Appendix A.
4. Cost Engineering Terminology. See Appendix B.
5. Objective. The objective of cost engineering is to focus USACE leadership on the effective development, management, and control of cost estimates to ensure funds are adequately programmed, authorized, and appropriated in all phases of the project. The USACE ability to provide quality project estimates is an essential element of our support to our customers and partners for the successful accomplishment of the project.
6. Policy.
 - a. The expertise, cost data bases, estimating programs, responsibility, and accountability will be centralized in the cost engineering branch.
 - b. Development of cost estimates which reflect total project costs, including life cycle cost analysis, is an absolute requirement, since it has a direct impact on the financial resources of local sponsors/partners or customers.
 - c. Planning and/or budget estimates should be carefully documented with contingencies, and thoroughly analyzed and or evaluated to explain the associated risks.
 - d. The estimates should include design assumptions and the proposed construction processes so that future design changes or construction modifications can be analyzed for cost impacts.

e. The basis for cost estimates must be thoroughly explained and address specific issues such as design assumptions and site conditions.

f. Cost estimates will be prepared in a professional manner in accordance with the above references and work breakdown structure as described in specific cost engineering regulations for civil works, military, and environmental restoration programs.

7. Cost Engineering Personnel Requirements and Training.

Commanders at each organizational level will assure that the cost engineering element is staffed with trained personnel and has sufficient manpower and computing tools and software programs to accomplish cost engineering functions. Supervisors should ensure that cost engineering personnel are afforded adequate training in cost estimating systems, life cycle costs analysis, cost analysis, cost risk analysis, and parametric techniques. Special emphasis should be placed on developmental assignments in construction, operations, design, and the project management fields, with the goal of becoming more familiar with all construction issues, field conditions, and construction and design processes and technologies.

8. Management Control.

a. Authority and Directives. The Commander, USACE, delegates responsibilities for the development, preparation, review, and approval of all cost estimates for projects assigned to USACE.

(1) Estimates for construction award and modification. The directives for preparing Government estimates are contained in the Federal Acquisition Regulation (FAR) part 36, subpart 36.203. Additional guidance for preparing estimates for the different types of projects are provided in specific cost engineering regulations for civil works, military, and environmental restoration programs.

(2) Planning and design estimates. The authority, directives, and procedures for preparing cost estimates throughout all phases of project development including planning, programming, and design are provided in specific cost engineering regulations for civil works, military, and environmental restoration programs.

(3) Other estimates. Cost estimates that support other procurement actions such as supplies or services, and emergency

management operations or to support special requirements such as decision making, budget forecasting, and alternative comparison will be prepared as required in accordance with the specific cost engineering regulations for civil works, military, and environmental restoration programs.

b. Estimating Philosophy and Methodology. FAR 36.203 requires that every Government estimate be prepared as though the Government were competing for the award. Therefore, all costs, which a prudent contractor would be expected to incur, should be included in each cost estimate. All construction cost estimates should be developed as accurately as possible and be based upon the latest available information. It shall be prepared on the basis of calculated quantities and unit prices commensurate with the degree of detail in design. The construction cost estimate will, in all aspects, represent the "fair and reasonable" cost to the Government.

c. Cost Control.

(1) Project cost estimate. A complete current working estimate that includes all costs associated with the construction of the project. All project cost estimates shall be developed using the latest required and approved work breakdown structure (WBS) as described in specific cost engineering regulations for civil works, military, and environmental programs. The project cost estimate shall be composed of all costs to complete the project regardless of funding source or funds type.

(2) Life cycle cost analysis. Life cycle cost analysis (LCCA) should be conducted on selected features of projects requiring periodic maintenance to assure that design selection or rejection decisions give consideration to total life cycle economy (i.e., to total cost of ownership), in accordance with established policy. The features should be selected in accordance with economic good sense, such that LCCA are conducted primarily where it is cost effective to do so. It would be inappropriate, for example, to conduct an LCCA among alternatives in a case where the cost of the analysis is likely to exceed any potential long-term savings which may be found. All LCCAs shall be conducted with the latest criteria and standards established for that purpose.

(3) Cost risk analysis. Project cost estimates shall include cost risk analysis to cover unknown conditions or uncertainties on work elements that will impact cost of construction in accordance with specific cost engineering

regulations for civil works, military, and environmental restoration programs. A cost risk analysis shall be prepared for cost plus contracts and for contracts where quantities and/or scope is not well defined.

(4) Contingencies. All project cost estimates in planning and design stages will be developed with appropriate contingencies based on cost, level of detail, cost risk analysis, and schedule analysis. These contingencies are allowances to cover unknowns, uncertainties, and/or unanticipated conditions that are not possible to adequately evaluate from the data on hand at the time the cost estimate is prepared. Assignment of construction contingencies may be subject to regulatory limits and must be adhered to as described in specific cost engineering regulations for civil works, military, and environmental restoration programs.

(5) Cost growth. Each program is subject to specific regulatory and statutory limits on cost growth which must be adhered to as described in specific cost engineering regulations for civil works, military, and environmental restoration programs.

(6) Changes to current working estimate. All cost changes to the estimate must be explained and properly documented in the estimate. The prompt reporting of cost changes is imperative, as this will have a direct impact on the successful accomplishment of the project. Reporting of cost changes shall be in accordance with ER 5-7-1(FR) and established procedures of each district or operating major subordinate command.

(7) Project schedule. Development of project schedule requires active participation of the cost engineer to ensure that the schedule reflects compatibility with the cost estimate in the application of manpower, equipment, material resources, and the project work breakdown structure.

(8) Construction contract modifications. Development of cost estimates for contract modifications shall be in accordance with the established procedures described in specific cost engineering regulations for civil works, military, and environmental restoration programs and cost estimating technical manual. The estimate should be based on the scope and requirements of the changed work current field conditions and impacts on the project schedule. The current working estimate shall be revised to reflect any contract modifications that affect the overall project costs.

d. Computer Software for Cost Estimates. The approved software for cost estimating is the Micro Computer Aided Cost Engineering System (MCACES). Exceptions to the use of the MCACES are listed in specific cost engineering regulations for civil works, military, and environmental restoration programs.

e. Cost Quality Management. The USACE is committed to providing quality and timely estimates. The level of confidence in the estimate is commensurate with the effort and time put into the estimate. The quality or integrity of cost estimates will not be compromised in order to meet completion deadlines or local sponsor/partner or customer imposed budget requirements.

(1) Cost engineering responsibility and accountability. The cost engineer is responsible and accountable for all project cost estimates as described in specific cost engineering regulations for civil works, military, and environmental restoration programs.

(2) Preparation of estimates. Project cost estimates including quantities are the responsibility of cost engineering in the districts or operating major subordinate commands. Quantity take-off shall be prepared by qualified personnel. When it is necessary to contract out the preparation of quantity take-offs/estimates, such services shall be provided by firms competent in cost estimating. Firms shall be capable of providing cost estimates according to all applicable procedures set forth in specific regulations for civil works, military, and environmental restoration programs.

(3) Review of estimates. All cost estimates shall be reviewed internally, approved, and signed by the chief of the cost engineering element before release or submission to higher authority. Cost estimates prepared by Architect-Engineer (A-E) firms or other Government agencies shall be carefully and thoroughly reviewed, validated, and signed by the chief of the cost engineering element before release or submission.

(4) Approval of estimates. All estimates will be approved, dated and signed by the district/operating major subordinate command (OMSC) commander or approved designee. Administrative contracting officers (ACO) may approve and sign estimates within their monetary authority.

(5) Safeguarding the security of estimates. The Government estimate shall be designated "For Official Use Only" unless a higher security classification is warranted. The "For Official Use Only" designation will not be removed until bids are opened

or until conclusion of negotiations. Access to the estimate and its contents should be limited to those persons whose duties require knowledge of the estimate. Although not required by regulations, partially completed design and related cost estimates should be handled in a discretionary manner and as described in specific cost engineering regulations for civil works, military, and environmental programs.

9. Roles and Responsibilities.

a. HQUSACE. The Directors of Civil Works and Military Programs, through their cost engineering elements, have primary responsibility and accountability for all project cost estimates and for life cycle cost estimates in support of design trade-off analyses. Responsibilities of the headquarters cost engineering elements include:

(1) Serve as principal staff liaison with the appropriate Office of the Assistant Secretary of Defense (Production and Logistics) OASD(P&L), Office of the Assistant Secretary of the Army (Civil Works) ASA(CW), Assistant Secretary of the Army (Installations, Logistics, and Environment) ASA(IL&E), Government agencies, and partners on cost engineering issues.

(2) Work with HQUSACE element chiefs to develop and implement cost engineering policies, procedures, guidance, and training for cost engineering.

(3) Provide project estimate analysis to ASA(CW), ASA(IL&E), DOD agencies, and other Government agencies. Provide defense of budget estimates to Congressional inquiries..

(4) Provide support to OASD(P&L) in the preparation and development of DOD cost guidance. Serves as member of Tri-Service Cost Engineering Committee.

(5) Provide technical support to the Office of the Chief Counsel in reviewing Government estimates when reasonableness has been protested by low bidder or mistake-in-bid allegations made by bidders.

(6) Provide consulting and technical support services to other Federal agencies, using services, and the private sector concerning cost engineering. Serves on Federal Construction Council and Inter-Agency standing committees concerning cost engineering.

(7) Conduct field reviews of MSC, OMSC, and district command's execution of cost quality management and recommend necessary corrective actions if warranted.

(8) Manage development, upgrade, and maintenance of MCACES. Provide cost estimating guidance and support for maintenance of Unit Price Books (UPB) and EP 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule.

(9) Serve as proponent for all PROSPECT cost engineering and estimating courses. Manage Cost Engineering Steering Committee in accordance with ER-15-1-36.

b. Major Subordinate Command. The commander of the MSC, through the cost engineering element, has primary responsibility for assuring the successful accomplishment of cost engineering objectives within the MSC and for each district. Responsibilities of the cost engineering element include:

(1) Act as MSC point of contact in communicating with HQUSACE cost engineering elements.

(2) Receive, interpret, disseminate, and implement cost engineering guidance, direction, and correspondence from higher authority in a-timely manner.

(3) Conduct field reviews of district commands execution of cost quality management and recommends necessary corrective actions when warranted.

(4) Support Project Manager in the-certification for project cost estimates and cost changes and provide PRB technical support on project costs as required.

(5) Review proposed awards of negotiated contracts and modifications requiring award approval above the authority delegated to district commanders.

(6) Review bid results, protests, and mistakes in bids. Evaluate and make recommendations on district actions for bid protests and mistakes in bid. Provide analysis and recommendations and take necessary actions as required.

(7) Participate in HQUSACE Cost Engineering Steering Committee and lead in subcommittee efforts.

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(8) Provide technical assistance to districts and MSC elements on cost engineering issues. Consolidate and disseminate MSC-wide historical cost data.

(9) Provide technical support to HQUSACE on development, upgrade, maintenance, and implementation of MCACES.

C. District Command or OMSC. The district commander or OMSC commander, through the cost engineering element, has primary responsibility for assuring the successful accomplishment of cost engineering objectives in the district or OMSC. Responsibilities of the cost engineering element include:-

(1) Responsible for all aspects of cost engineering functions in district or OMSC.

(2) Responsible for cost quality program to ensure the accuracy and completeness of project cost estimates and budgetary estimates prepared either in-house or by A-E firms.

(3) Responsible for preparation of cost estimates for all phases of the project, including planning, programming, design, construction, and operations and maintenance.

(4) Prepare all Government estimates for contract award.

(5) Responsible for quantity take-off and accuracy of quantity take-offs when prepared by qualified Government personnel or qualified A-E firms.

(6) Perform biddability, constructability, and operability reviews. Responsible for proper application of contingencies on construction features.

(7) Participate in project development to ensure that all aspects of the project are considered in developing the project estimate.

(8) Review bid results, protests, and mistakes in bids. Prepare technical evaluation of costs and recommend necessary actions to be taken.

(9) Prepare construction modification estimates and participate in negotiations as required. Prepare cost estimates for construction modification for operation and maintenance projects as required.

(10) Provide technical support in the evaluation of A-E's competency on cost engineering requirements. Participate as required in A-E selections and negotiations.

(11) Prepare construction schedule during design and participate in the development of bid schedule. Ensure cost estimate is in accordance with construction schedule.

(12) Responsible for maintaining the accuracy and completeness of the project estimate. Maintain complete documentation of project cost changes.

(13) Responsible for preparation of all life cycle costs. Ensure that life cycle costs are considered in the development of construction estimates.

(14) Responsible for preparation and submission of awarded cost information to higher headquarters. Responsible for updating and maintaining local cost data bases.

(15) Participate in value engineering studies. Provide technical support on cost engineering matters and prepare or validate estimates.

d. Cost Engineer Roles and Responsibilities. The duties of the cost engineer will be fully defined by the cost engineering element of each district or operating major subordinate command. The roles and responsibilities of the cost engineer will include the following:

(1) The cost engineer shall be a member of the project team and be involved in all major technical discussions regarding costs concerning value engineering studies or changes, A-E negotiations, supply and service type contracts, and negotiated contracts such as RFP, 8A procurement, and as requested by ACO on contract cost changes or claims.

(2) The cost engineer shall participate in negotiations for all cost changes exceeding \$100,000 during construction and other negotiations as requested by ACO.

(3) The cost engineer shall be a member of the project team and be responsible for accuracy and completeness of cost estimates for all stages of the project including planning, programming, design, and construction. The cost engineer has

responsibility for application of contingencies to properly weigh the uncertainties associated with each major construction cost item or feature in coordination with input with other members of the project development team.

(4) The cost engineer shall be a member of the project team and attend appropriate project review meetings in support of project cost estimates.

e. Relationship of Cost Engineer and Project Manager. The cost engineer is an important member of the project management team upon whom the project manager depends for a complete, accurate, and well documented construction cost estimate, as well as input to the construction schedule. The project manager has responsibility to ensure that the cost engineer is provided with the most current design information for preparing and updating cost estimates.

10. Report of Costs and Analysis.

a. Reporting of cost data based on contract awards is essential for fulfilling Commander, USACE responsibilities for the development, review, and control of construction budget cost estimates.

b. The district or operating major subordinate command which acts as construction agent is responsible for the preparation and submission of award cost information.

c. The cost engineering element at the district or operating major subordinate command shall prepare and submit the award cost information in accordance with the procedures contained in specific cost engineering regulations for civil works, military, and environmental programs.

11. Historical Cost Data Base.

a. The development and maintenance of historical cost data base are essential to ensure accuracy and reliability of cost estimates. The collection or assembly of historical cost data should be based upon the latest approved work breakdown structure specific to each program to ensure uniformity and consistency of cost data with other districts or OMSCs.

b. The cost engineering element at the district or OMSC shall be responsible for development, collection, and maintenance of local or regional cost data base.

FOR THE COMMANDER:



2 Appendices
APP A - References
APP B - Cost Engineering
Terminology

WILLIAM D. BROWN
Colonel, Corps of Engineers
Chief of Staff

APPENDIX A

References

1. All Programs.
 - a. FAR 36.203, 36.205, 31.105
 - b. EFARS 36.203
 - c. AR **340-17**, Release of Information and Records from Army Files
 - d. TM 5-800-2, Cost Estimates, Military Construction
 - e. ER **5-7-1(FR)**, Project Management
 - f. ER 15-1-36, Cost Engineering Subcommittee
 - g. ER 415-345-230, Negotiation Regulation Cost-Plus-A-Fixed Fee Construction Contract
 - h. EP 415-1-2, Modification and Claims Guide
 - i. EP 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule
2. Civil Works.
 - a. 33 USC 624
 - b. Public Law 99-646, The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended by Public Law 100-17
 - c. Public Law 99-662, Water Resources Development Act of 1986
 - d. ER **11-2-220**, Civil Works Activities - General Investigations
 - e. ER 11-2-240, Civil Works Activities - Construction and General Design
 - f. ER 1105-2-100, Guidance for Conducting Civil Works Planning Studies, Planning Guidance Notebook

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g. ER 1110-2-1300, Government Estimates and Hired Labor Estimates for Dredging

h. **EM** 1110-2-1304, Civil Works Construction Cost Index System (CWCCIS)

i. EP 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule

3. Military.

a. AR 415-15, Military Construction Program Development and Execution

b. AR 415-17, Construction Estimating For Military Programming

c. AR 340-17, Release of Information and Records from Army Files

d. TM 5-800-2, Cost Estimating for Military Construction

e. TM 5-802-1, Economic Studies for Military Construction Design

f. ER 335-345-1, Report of Costs and Analysis for Military Construction

g. ER 415-3-7, Execution, Control and Funding for Design and Construction of Industrial Facilities

h. ER 415-35-1, Construction Control of DA Execution Programs Through Authorization and Funding Action

i. ER 415-345-10, Congressional Limitation and Reporting Requirements

j. **ER** 415-345-42, Costs, Cost Estimating, and Reserves for Contingencies

k. Architectural and Engineering Instructions (AEI), Design Criteria

l. Architectural and Engineering Instructions (AEI), Medical Design Standards

4. Environmental Restoration.

a. RCRA of 1976, PL 94-580, as amended by the 1984 Hazardous and Solid Waste Amendments, PL 98-616

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b. Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), PL 96-510, as amended by SARA of 1986, PL 99-499, 42 U.S.C. 9601-9675

c. ER 385-1-92, Safety and Occupational Health Document Requirements for Hazardous, Toxic, and Radiological Waste (HTRW) Activities

APPENDIX B

Cost Engineering Terminology

Contingencies - Allowances to cover unknowns that are not possible to adequately evaluate from available data at-hand during engineering and design but must be represented in the project estimate.

Cost Risk Analysis - The process of identifying and measuring the cost impact of project uncertainties on the estimated total project cost.

Government Estimate - A formal, approved construction cost estimate prepared for contract purposes. This estimate is required for all contracts or contract modifications of \$25,000 or more (FAR 36.203). It is used to determine the reasonableness of competitive bids received in connection with formally advertised construction contracts, and serves as a control in evaluating costs and pricing data in negotiated contracts.

Life Cycle Cost - The sum total of the indirect, recurring, nonrecurring, and other related costs incurred or estimated to be incurred in the design, development, production, operation, maintenance, support, and final disposition of a major system over its anticipated useful life span. Where system or project planning anticipates use of existing sites or facilities, restoration, and refurbishment costs are included.

Work Breakdown Structure (WBS) - A product-oriented hierarchy of the project scope of work that provides a system for organizing the estimate in a logical manner.

Current Working Estimate (CWE) - The current total project cost to provide a complete and usable facility. (See specific cost engineering regulations for civil works, military, and environmental restoration programs for specific definition.)