

## APPENDIX D QUALITY DESIGN TOOLS

1. Design Criteria Information System (DCIS). The DCIS is a computer program in the Programming, Administration, and Execution (PAX) system available to all Army elements worldwide. The Architectural and Engineering Instructions (AEI) developed by HQUSACE (which include medical design standards), selected technical manuals and other design criteria documents are available electronically from the DCIS. Newsletter Number 38 in the PAX system provides information on DCIS and instructions on obtaining access. The proponent office in HQUSACE for DCIS is CEMP-EA.
2. Commuter-Aided Design and Drafting (CADD) Systems. The application of CADD and related technology can affect every phase of the design process positively. This technology offers the potential of cost reductions and shorter design schedules by increasing the productivity and capability of the design agency, while maintaining or enhancing the quality of projects. Maximum implementation and integration of this technology is encouraged. The proponent for CADD in HQUSACE is CEMP-ES.
3. Corps of Engineers Guide Specifications (CEGS). The Government can derive the benefits of maximum competition if specifications used throughout the Corps of Engineers are uniform. Use of the CEGS and other industry recognized standard specifications for preparing project specifications is mandatory to the maximum extent practicable. Requirements in connection with using guide specifications for the preparation of military project specifications are contained in ER 1110-345-720. Requirements for Civil Works are in ER 1110-2-1200. The HQUSACE proponents are CEMP-E and CECW-E, respectively.
4. Corps of Engineers Abridged Guide Specifications (CEAGS). These short form guide specifications have been developed from CEGS. CEAGS replace DoD Family Housing Guide Specifications and Army Reserve Guide Specifications. Their use is optional for small projects, small portions of large projects, or maintenance and repair work. These simple, direct-language specifications follow the Construction Specification Institute (CSI) format, as do the CEGS. Minimum shop drawing submittal requirements are a feature of the CEAGS, and heavy reliance is placed on manufacturers' installation requirements. In addition, most references to standards are deleted. The proponent office in HQUSACE for CEAGS is CEMP-EA.
5. Construction Criteria Base (CCB)/Compact disc - Read Only Memory (CD-ROM). In cooperation with the Department of Defense (Naval Facilities Engineering Command and the Corps of Engineers), the National Institute of Building Sciences (NIBS) developed an electronic database (CCB) of military and other federal construction agencies' guide specifications, technical manuals, standards, cost estimating system, and other information. Optical disc (CD-ROM) technology has been utilized as the transmission media. The CCB/CD-ROM is available on an annual subscription basis; updates are issued quarterly. Updates from DoD and other federal agencies such as the Veteran Administration and the National Air and Space Administration are also included. The proponent office in HQUSACE is CEMP-EA.

6. Microcomputer-Aided Cost Engineering System (MCACES). MCACES is an automated cost estimating tool which can be used in the programming, planning, design and construction process (i.e., throughout the project delivery process). MCACES had its beginning with the initial development of the Cost Estimating System (CES) in 1978 by the Middle East Division (now the Transatlantic Division). Huntsville Division expanded the system into CACES in 1982 and promoted its use in CONUS. MICRO-CACES was developed by CESAS and fielded to USACE Commands in 1989. A CACES (and MCACES) System Steering Committee, (MSC and HQUSACE members) now directs future development. The proponent in HQUSACE for CACES and MCACES is CEMP-EC, the Civil Works point of contact is CECW-EC.

7. Automated Review Management System (ARMS). ARMS is a minicomputer resident system developed by CECER to provide an effective mechanism for management of design review comments. It provides support at four primary user levels: (1) technical manager, (2) review manager, (3) reviewer, and (4) project designer. ARMS capitalizes on the computer's ability to organize and track multiple aspects of an information database. This relieves reviewers and designers of many of the laborious aspects of generating and responding to design review comments. The proponent office in HQUSACE is CEMP-ES. The TCX is CESP-ED-T, 916/557-7999.

8. Lessons-learned System: Hazardous, Toxic and Radioactive Waste Program (HTRW). This system has been developed to provide a means to identify real or potential problem areas in the HTRW program, collect ideas on solutions to these problems and to make the information available to all USACE Commands engaged in this work. Ideas are loaded to the central electronic file through district and MSC channels. Design and construction personnel use personal computers to access the central file.

9. Engineering Improvement Recommendation System (EIRS) Bulletins. EIRS Bulletins are part of a system for implementation of recommendations from various feedback sources (designers, area/resident engineers, DEH/BCE personnel, etc.) and are used in Military Programs to expedite dissemination of information regarding problems. The probable solutions included in EIRS Bulletins have not been thoroughly explored or staffed. As such, these probable solutions may not represent a final HQUSACE position and their use will not be mandatory. Probable solutions are considered as informational in nature and for the purpose of permitting prompt consideration by the field. EIRS Bulletin recipients are encouraged to comment on the probable solutions presented so that other viewpoints can be considered in the development of the final HQUSACE position. Since changes to guide specifications issued in EIRS Bulletins are expected to remain firm; they are identified as solutions, rather than as probable solutions, and should be used in current design. The proponent office in HQUSACE is CEMP-EA.

10. Technical Centers of Expertise. Successful execution of the Civil Works and military construction programs require a thorough working knowledge of a wide variety of highly specialized engineering, design, and operational activities. Centers of expertise were established in the Corps to provide specialized engineering services, and support USACE commands for purposes of economy and efficiency. The five types of centers currently established in the Corps are:

- Technical Centers of Expertise (TCX)
- Mandatory Centers of Expertise (MCX)

- Design Centers
- Technical Management Centers
- Centers of Standardization

The missions and their respective responsibilities assigned to the centers of expertise are defined in ER 1110-3-109 (for military). ER 1110-2-109 covers hydroelectric design centers for Civil Works programs. U.S. Army Engineer Division, Missouri River, has been designated the MCX for the hazardous, toxic and radioactive waste (HTRW) program. The USACE HTRW Management Plan describes the responsibilities of the MCX in this program. The services to be rendered by each of the technical centers to a USACE Command are generally advisory in nature, unless the use of these services has been made mandatory by HQUSACE in regulations or directives. HQUSACE proponent offices are CEMP-ET, CECW-EE and CEMP-R (for HTRW).

11. HOUSACE Consultants Services. When major or unusual design (or construction) problems are encountered, USACE command personnel may wish to seek the consulting services of technical specialists at HQUSACE. This service is available on a reimbursable basis. Generally, at least two weeks advance notice should be given. HQUSACE proponents for these services are the technical branches in CEMP-E and CECW-E.

12. Department of the Army Facilities Standardization Program. This program consists of applying a formal process for selecting types of facilities for standardization; defining requirements; developing, coordinating, approving, and implementing Army standard designs; and reviewing and updating approved Army standard designs. To provide flexibility to meet the varying needs of the Army, the thrust of the program is to develop standard designs in the form of definitive design drawings. This allows each Army standard design package to be adapted to the installation's architectural theme. This approach to standardization ensures facility users and installations that their facilities will be "Facilities of Excellence" and supports such new concepts as the Army Chief of Staffs "Communities of Excellence". Approval and implementation of standard designs are based on the recommendations of the Department of Army Committee, USACE Facilities Standardization Committee, and facility type subcommittees. These designs are mandatory for use in the Army for the planning, programming, design, and construction of the facility types for which they were intended. Standard designs are listed in Engineer Pamphlet 1110-345-2. Copies of approved Army standard design packages are available from the U.S. Army Engineer Division, Huntsville. The proponent office for this program is CEMP-EA.

13. Simplified Design Method (SDM). The SDM is intended for small, non-complex maintenance projects for installations. The basic idea is to use unique and innovative design methods and present these on plans, specifications and design analyses that are printable on a standard copier. The proponent office in HQUSACE for SDM is CEMP-EA.

14. Value Engineering (VE). VE is an effective tool to reduce the construction costs of a project. VE should be implemented early in the design process to minimize impact on the design schedule and lost design effort. Approved VE changes will result in a more life cycle cost-effective design, and will not reduce quality or adversely affect the function of the project. The availability of the VE tool, however, does not relieve the designer of his responsibilities to investigate and analyze alternate

systems/approaches during the initial design phases. The proponent office in HQUSACE for VE is CEMP-EV.

15. Peer Review. Two general types of peer review can be utilized to improve the delivery of quality services and products in a timely and cost-effective manner. The first is a management review which seeks to identify systemic weaknesses in the structural makeup or processes (procedures and practices) of the organization. These reviews will be initiated by MSC or HQUSACE and based on the methods developed by the American Society of Civil Engineers, the American Consulting Engineers Council, or others. The results are usually confidential with the information retained by the organization. A second type of review is the individual project review. This type of review shall be used for large or complex (state-of-the-art) projects. This is a thorough review of a project design by an independent individual or group which results in a report. The conclusions and recommendations are considered advisory in nature, and are not generally released outside the office being reviewed.

16. Special Design Instructions. USACE has recently initiated a system to advise design agencies of special design features for specific projects. A standard form will accompany all DD Form 1391's highlighting the following information: the Center of Standardization (COS) for the facility type, site adaptation drawings that are available from the (COS), any special expertise required to design the project, and any other unique or mandatory features of the project, such as use of MCXs, and TCXs. HQUSACE will include any special design instructions in authorizing design directives to USACE Programs and Project Management Organizations.

17. Design Element Menus. These "menus" are lists of technical and administrative services and products required for execution of a project, showing in some manner the anticipated costs for each item. These lists have proven to be very effective in establishing the expectations of customers prior to design. They are also used as a "design contract" between the Corps and customers to delineate the estimated cost of each element of design and later the actual cost of each element. Districts should develop a menu of design services for each project that will be compatible with the work breakdown structure that will be used, to ensure that the actual costs can be tracked in the Corps of Engineers Financial Management System. A sample is enclosed (excerpt from Logistics Management Report No. CEOOR1, Oct 91).

18. Standard Contract Formats. Standard contract formats for A-E, (including surveying and mapping), and construction services have been developed for use throughout the Command. Instructional Letter 92-4, issued 18 Dec 92 by the Principal Assistant Responsible for Contracting (PARC), provides the latest implementation guidance. Use of these standard contract formats - in a automation mode - will provide field offices with a new and important quality management tool. USACE, and the A-E and construction industries, will benefit from contract uniformity and completeness throughout the Corps. For more information on these formats, contact CEMP-ES.

SAMPLE DESIGN ELEMENT MENU

Engineering and design services	Typical cost	Proj. spec. cost	Budget est.
1.0 Concept design			
1.1 Design analysis			
1.2 Plans			
1.3 Specifications			
1.4 Cost engineering			
1.5 Life-cycle cost analysis			
1.6 Review			
1.7 Value engineering			
2.0 Final design			
2.1 Design analysis			
2.2 Plans			
2.3 Specifications			
2.4 Cost engineering			
2.5 Life-cycle cost analysis			
2.6 Review			
2.7 Value engineering			
3.0 Additional services			
3.1 Comprehensive interior design			
3.2 Existing condition survey			
3.3 Operating and maintenance support			
3.3.1 Customer training			
3.3.2 Documentation			
3.4 Preconcept design			
3.4.1 Surveys			
3.4.2 GEOTECH investigations			
3.4.3 Single line drawings			
3.5 Project definition			
3.5.1 scope			
3.5.2 Criteria			
3.5.3 Cost engineering			
3.5.4 Life-cycle cost analysis			
3.6 Promotional material			
3.6.1 Renderings			
3.6.2 Models			
3.7 Other			
3.8 Other			
3.9 Other			
4.0 A-E Contract			
4.1 Solicitation			
4.2 Selection			
4.3 Proposal			
4.4 Negotiation			
4.5 Award			
5.0 Construction contract			
5.1 Selection criteria (RFP)			
5.2 Bid Evaluation			
5.3 Other technical support			
6.0 Project management			
Total			