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	Engineering and Design UNITED STATES ARMY CORPS OF ENGINEERS (USACE) TECHNOLOGY TRANSFER SYSTEMS	
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Engineering and Design
UNITED STATES ARMY CORPS OF ENGINEERS
(USACE) TECHNOLOGY TRANSFER SYSTEMS

1. Purpose. This pamphlet identifies various methods for design and construction technology transfer available to USACE and other Army agencies. Technology transfer within USACE is defined as a system of processes, both formal and informal, that provides a structured approach for developing, submitting, and achieving modifications and additions to technical criteria, standards, and policy. Further, this pamphlet provides references and rationale for both formal and informal modes of technology transfer. Policy and procedures for the formal modes of technology transfer are governed by the documents referenced below.

2. Applicability. This pamphlet is applicable to HQUSACE/OCE elements, major subordinate commands, districts, laboratories and field operating activities (FOA) having responsibility for the design and construction of military facilities. This pamphlet neither establishes nor modifies existing policy related to technology transfer within USACE or other Army agencies.

3. References.

- a. 15 USC 3710a et seq..
- b. 33 USC 2313.
- c. AR 5-17.
- d. ER 37-345-10.
- e. ER 70-3-9.
- f. ER 415-1-13.
- g. ER 415-3-11
- h. ER 1110-3-109.
- i. ER 1110-345-100.
- j. ER 1110-345-720.

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- k. EP 11-1-3.
- l. EP 11-1-4.
- m. EP 70-1-3.

4. General. Authority to establish and modify technical USACE and Army design and construction criteria, standards, policy, and associated documents promulgated by Headquarters USACE (HQUSACE) is coordinated through the HQUSACE technical proponent. As with all other activities, funding for various aspects of technology transfer is addressed through the general accounting principles and policies established in ER 37-345-10, Accounting and Reporting, Military Activities.

a. Primarily, HQUSACE technical documents are developed and implemented to indicate policy, criteria, standards, and guidance for design and construction of facilities. These technical documents are in the form of Department of the Army (DA) Technical Manuals (TMs), Corps of Engineers Guide Specifications (CEGS), Architectural and Engineering Instructions (AEI) issued by HQUSACE, DA Standard Facility Designs, and Engineering Technical Letters (ETLs). These documents are generally developed in coordination with USACE MSCs, District Commands, Centers of Expertise, and the private sector.

b. Except when otherwise directed, the use of such technical documents is mandatory for design and construction of Army projects, but is applicable to Air Force, Navy, "HTRW" and "work for others" projects when so indicated. However, for some types of projects, such as commercially financed facilities (CFF), individual project planning, justification, and approval documentation may specifically exempt a given project from the mandatory use of some or all USACE technical documents.

5. Methods of Technology Transfer. There are a number of methods by which technology can be formally or informally transferred within the Army and USACE. Formal methods established by DA or HQUSACE to encourage participation in those processes by HQUSACE, MSC, district commands, and others are summarized below:

a. ENG FORM 3078. Recommended Change to Engineering Documents. ENG FORM 3078 is a major engineering feedback program vehicle. It is used to recommend changes to documents promulgated by HQUSACE, such as TMs, guide specifications, standard and definitive drawings, design guides, and other

criteria documents for military construction (see ER 37-345-10, Design Policy for Military Construction, and ER 1110-345-100, Specifications). It identifies the document recommended for change, showing the chain of command for submission; and it provides problem and recommended solution statements, and various comments and recommendations of USACE elements in the approval process. Form may be submitted by any USACE element through their chain of command to HQUSACE (CEMP-EA). The submitter should send an advance copy of the completed ENG FORM to HQUSACE (CEMP-EA) concurrent with submission to the Major Subordinate Command (division office). In the evaluation process, each intermediate reviewing echelon is required to provide an independent evaluation and recommendation on ENG FORM 3078A to the next higher echelon within USACE.

b. The Army Suggestion Program. This program is sponsored by DA under the auspices of AR 5-17, The Army Ideas of Excellence Program. The intent of this program is to encourage DA employees to recommend improvements in the manner by which the Army does business. Incentives provided by DA for employees to make recommendations for improvements suitable for implementation through this program are listed in AR 5-17. The program permits DA employees to address technical as well as procedural areas of Army operations. Where the use of the suggestion program is considered suitable for the area of concern, the use of DA FORM 1045 (for submitting a suggestion) and DA FORM 2440 (for evaluating a suggestion) are prescribed by that AR. Note that there may be an economic incentive for both the suggestor and the Government to achieve such savings, depending upon the criteria established for such a determination in AR 5-17. As with ENG FORM 3078, intermediate reviewing echelons must provide independent evaluations and recommendations to the next higher echelon on DA FORM 2440.

c. Research and Development (R&D). Improvements are often made to USACE technical policy, standards, criteria, and guidance through the R&D process. ER 70-3-9, Management and Execution of the U.S. Army Corps of Engineers Military Research, Development, Test, and Evaluation (RDTE) Program, provides details on the responsibilities of all USACE elements in the research and development arena. Efforts through this process can be initiated by individuals or user groups, either within or outside USACE, e.g., MACOM or installation personnel. The process begins with the determination of the need for an improvement that requires research and possibly development of a new method, material, or procedure related to design, construction, or operations and maintenance of Army facilities. An annual R&D programming process is sponsored by

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HQUSACE, involving HQUSACE technical proponents and Research and Development Directorate personnel, plus laboratory staff members, in conjunction with a combination of USACE MSC and District Command, Major Army Command (MACOM), and Army Installation personnel. This process provides a means for recommending and confirming the need for new research, and the establishment of a priority and funding level for each recommended project each fiscal year. A Mission Area Deficiency Statement (MADS) is developed to express the need for a research project. Once the need for a research project is confirmed by laboratory personnel, working in coordination with the HQUSACE technical proponent and research directorate personnel, project scope and funding levels by fiscal year are developed. A technology transfer plan is developed between the laboratory principal investigator and the HQUSACE technical proponent to insure that the research product can be readily absorbed into the USACE criteria and standards data base once the research is completed. Thus, R&D project initiators (whether individuals or user groups), technical proponents and research area personnel can participate in a cradle-to-grave initiation and development of each research project. This includes the modification or development of revised technical policy based upon the results of that research project. Within the general structure of the USACE R&D program are the Facilities Engineering Applications Program (FEAP) and the Construction Productivity Advancement Research (CPAR) Program. These are briefly described below:

(1) Facilities Engineering Application Program (FEAP): The purpose of FEAP is to transfer new and emerging technologies from the research environment directly to users at installations. FEAP provides for the demonstration of such technologies in the field to determine whether or not they will work as well in the operating environment as predicted by research results. Field results are used to determine potential savings in money or energy, or their effectiveness in attaining a greater efficiency of operation than technologies already in place. User guides are developed as a further result of the hands-on field experience obtained through FEAP, with the overall goal of permitting installation users to use the technologies being demonstrated. FEAP demonstrations are conducted in seven areas, i.e., buildings, corrosion, energy, environmental quality, management, natural resources, and pavements and railroads.

(2) Construction Productivity Advancement Research (CPAR) Program: The CPAR program resulted from the Water Resources Development Act of 1988, 33 USC 2313, Section 7; and the Stevenson-Wydler Technology Innovation Act of 1980, as amended by

15 USC 3710a wt seq. The CPAR program provides a joint-venture R&D arena, where USACE and the private sector combine resources to enter into a cost-shared R&D partnership. The private sector partners can be representatives of the construction industry, professional societies, state and local governments, academe, and any other organization interested in construction productivity and competitiveness. Projects proposed for the CPAR program must address issues that fall within USACE mission responsibilities, reflecting needs in four primary areas of USACE interest, i.e., planning and design improvement, improved construction site productivity, advanced materials, and methods of transferring new or emerging technology into construction industry operations for commercialization.

d. Installation Support One-Stop R&D Service. The total range of technology addressed by the USACE R&D community has been divided into selected research areas. Information concerning research either completed or being performed in each such area is available from a point of contact (POC) specifically designated for that purpose. EP 70-1-3, Installation Support One-Stop R&D Service, was developed to make that list of POCs available to those interested in one or more specific research areas. That EP provides the reader with listings of the research areas addressed and the name, telephone number, and organizational element of the POCs for those areas. Those interested in determining what has or is being addressed in each research area, needing assistance in applying research results to specific problem areas, or believing that there is a need for R&D in a specific area need only telephone the POC to obtain information on that subject. Note that such advice is free of charge, unless travel cost or assistance in excess of two work days of effort is required. In such cases, assistance will be provided on a reimbursable basis.

e. Value Engineering. In those instances where contracts include a Value Engineering clause, the project contractor is encouraged to submit proposals for alternative methods or materials used in construction that can result in decreased construction costs without compromising quality, safety, or other required performance features of the project.

(1) EP 11-1-3, Value Engineering Officer's Operational Guide, addresses the functions and responsibilities of USACE Value Engineering Officers. EP 11-1-4, Value Engineering Benefits and the Construction Contractor, addresses the value of the program to the construction industry in general and descriptive terms, and encourages contractors to assist USACE in obtaining shared benefits from construction cost savings resulting from Value Engineering proposals.

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(2) In essence, where the safety, quality of construction, or other required performance features of the project will not be compromised by the use of a construction material or method not reflected as being acceptable within the terms of a specific contract, the contractor has the opportunity to propose that a less costly, alternative material or method be substituted for that specified. Such proposals are evaluated by the appropriate USACE elements, and, where approved for use in a specific project, the cost savings resulting from the substitution, less the contractor's costs to implement the proposal, are divided equally between the Government and the contractor. As a result, there is an economic incentive for both the contractor and the Government to achieve such savings. Coincidentally, where the use of a less costly material or method can be applied to other projects on a broader geographic basis, the use of ENG FORM 3078, cited above, is an excellent vehicle for advising HQUSACE of the desirability to incorporate such a new or different material or method into the USACE criteria system, such as in guide specifications.

f. Design and Construction Evaluation Reporting. ER 415-1-13, Design and Construction Evaluation (DCE), describes the DCE management and reporting system in place within USACE.

(1) One basic purpose of the DCE management and reporting system is to acquire feedback from construction projects that can result in improvements to USACE technical guidance and construction management systems. This system uses the evaluation team approach, where team members normally consist of HQUSACE engineering and construction discipline staff members, often supplemented by MSC and DC staff members. The team evaluates the design, construction, and criteria associated with a number of ongoing construction projects at various sites within an MSC's geographic boundaries. The results of each DEC team efforts are reviewed by, among others, subject matter technical proponents at HQUSACE.

(2) In the case of the technology used in the design and construction processes for any given project, the team reports are analyzed to determine whether or not improvements to technical guidance documents, such as CEGS, are needed as a result of the data obtained from the team. Since the technical proponent has the team report at hand along with access to the reporting team member for additional details, it is possible to issue page changes to such documents without undue delay. As a result, the benefits from the DCE reporting system can be high, since the team visits are made periodically throughout each fiscal year, without relying on individual initiatives, as do

some other methods of obtaining data on improvements to standards and criteria.

g. Post Completion/Design Criteria Feedback Inspection. ER 415-3-11, Post Completion Inspection and Design Criteria Feedback Inspection, addresses another team approach used by USACE in evaluating the quality of design and construction achieved in the acquisition of facilities.

(1) Post completion inspections (PCI) are used to identify deficiencies or defects in the design, construction, materials, equipment, operability, maintainability, or functional adequacy of a completed facility that are not discernible until the projects have been subjected to usage. Such inspections normally occur approximately six months after occupancy of a facility.

(2) Design criteria feedback inspections (DCFI) are performed for much the same reasons as post completion inspections, but normally occur after a facility has been occupied for two or more years, but before original features have been obscured by alterations or repairs.

(3) Team constituency of PCI and DCFI includes appropriate HQUSACE, MSC and DC representatives, plus representatives of the local Director of Installation and Housing, the user, host and user Major Army Commands, the Engineering and Housing Support Center, and other concerned parties.

(4) PCI and DCFI reports are used by appropriate USACE subject matter proponents to improve design, construction, and operations and maintenance guidance promulgated by those proponents for dissemination throughout the Army.

h. Engineering Improvement Recommendation System (EIRS). The EIRS is an informal system used to disseminate new or modified design guidance USACE-wide pending incorporation of such new or revised guidance in permanent media, such as guide specifications and technical manuals. The document used in this dissemination process is the EIRS Bulletin. EIRS bulletins are developed by HQUSACE subject matter technical proponents, based upon descriptive reports and analyses received from other USACE and Army elements, that indicate a need for improvements in technical guidance on an expedited basis. EIRS bulletins are published periodically by HQUSACE, and their frequency of publication and wide dissemination make them an ideal vehicle for informing all USACE elements of new guidance in a very timely manner.

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i. Engineering Bulletins (EB). The Engineering Bulletin process initiated in July 1990 is an informal publication issued by HQUSACE (CEMP-E). The EB provides a means for sharing engineering-related information of general interest to the engineering community, especially USACE engineering personnel. Items of interest proposed for inclusion in an EB should be submitted to the HQUSACE technical proponent, or to HQUSACE (CEMP-EA), if the technical proponent is unknown.

6. Other Formal and Informal Methods of Technology Transfer. In addition to the formal methods of technology transfer mentioned above, which are governed by Department of the Army or HQUSACE guidance, there are a number of less formal and informal approaches to achieving technology transfer within USACE.

a. Centers of Expertise. The charter for most centers of expertise includes the function of acting as the executive agent for HQUSACE in the development of guidance documents such as those cited in paragraph 4a, above. In that role, those centers provide draft versions of TMs, CEGS, and similar documents to industry as well as various USACE MSCS, District Commands, and other USACE elements for review and comment during document development. Centers of expertise are listed in ER 1110-3-109, Corps-Wide Centers of Expertise Assigned to Divisions and Districts. Where appropriate, industry forums are held for the purpose of discussing comments on draft documents provided to industry. The feedback and comments from all these reviewing organizations make the transfer of proven new and emerging technologies a relatively easy process conducted during normal guidance document development or update activities.

b. Technical Workshops. Periodic technical workshops, such as those held at annual or biennial technical disciplinary conferences, provide a forum for USACE field office personnel to present new and emerging technologies being used or studied by their organizational element. These workshops also provide a venue for USACE field personnel to suggest that HQUSACE examine new technologies within the structure of more formal settings, such as by inclusion in the formal R&D program. Feedback and comments from workshop participants provide HQUSACE with additional information needed to determine technology transfer directions in future year programs.


c. Professional Society and Symposium Participation. As a result of attending professional society meetings and symposia, USACE personnel become familiar with new and emerging technologies being considered within the private sector. Efforts being expended within the private sector can be applied to USACE

mission and needs. Such participation can save scarce resources that might otherwise be expended on parallel efforts within USACE, and permit those resources to be used in other areas where needed.

7. Technology Transfer Continuity. Important to the success of all technology transfer systems is the continuity between those who use the systems and HQUSACE technical proponents. No matter which transfer mode is used, the proposer of the technology and the HQUSACE technical proponent are key players. When a new technology is proposed, the HQUSACE technical proponent applies expertise and technical judgment, and is involved in the decision on applicability and transfer method to be used. The technical proponent at HQUSACE is responsible for ensuring that the appropriate guidance documents are developed or modified to reflect new technology as it is approved for adoption. The processes outlined in this pamphlet and the involvement of the HQUSACE technical proponent are critical to ensure that USACE policy, standards, criteria, and guidance remain viable, yet flexible.

8. Distribution. In addition to the normal distribution afforded Engineering Pamphlets, this EP should be circulated to all MSC and District Command individuals involved technically with design and construction for the Army. This information should also be shared freely with architect-engineer firms and others who have dealings that involve design and construction with USACE elements.

FOR THE COMMANDER:


MILTON HUNTER
Colonel, Corps of Engineers
Chief of Staff