

CHAPTER 9

PRECONSTRUCTION ENGINEERING AND DESIGN
AND
ENGINEERING DURING CONSTRUCTION

9-1. Preconstruction Engineering and Design Studies (PED). This phase of project development encompasses all planning and engineering necessary for project construction, after release of the Division Engineer's Public Notice on a favorable preauthorization study. These studies are required to review the earlier study data, obtain current data, evaluate any changed conditions, establish the most suitable plan for accomplishment of the improvement and establish the basic design of the project features in final detail. Preconstruction planning and engineering studies for projects authorized for construction will be programmed as "continuing" activities. For projects authorized for planning, engineering and design only by the Water Resources Development Act (WRDA) of 1986, studies will be budgeted only after "new start" selection by the Assistant Secretary of the Army for Civil Works (ASA(CW)) and concurrence by the Office of Management and Budget (OMB). The results of preconstruction planning and engineering studies are presented in reports identified as "design memorandums." Preparation of design memorandums, and plans and specifications will be cost shared in accordance with the cost sharing required for project construction. The non-Federal share of costs for this work will ordinarily be recovered during the first year of construction. Current engineering guidance respecting document preparation and approvals should be consulted. (ER 1110-2-1150)

9-2. Preconstruction Engineering and Design (PED) Agreement. The model agreement for PED was approved by the ASA(CW) on 1 October 1996. Under this model PED agreement, no non-Federal credit will be given for non-Federal costs to negotiate the project cooperation agreement (PCA). However, non-Federal credit for PED Coordination Team costs incurred during the period of PED will be provided in accordance with the policy below.

a. Projects With PED Agreements. Credit for PED Coordination Team activities will be provided to non-Federal sponsors. Credit will be against the 25-percent cash payment for PED by non-Federal sponsors that have entered into a PED agreement.

b. Projects Without PED Agreements. Credit for PED Coordination Team activities will be provided under the following criteria:

(1) A PED Coordination Team has been established and non-Federal sponsor coordination activities to be credited occurred after the establishment of the PED Coordination Team.

(2) Only PED Coordination Team activities after 1 October 1996 are creditable.

(3) PED Coordination Team activities eligible for credit are activities involving the oversight of issues related to PED, including scheduling of report and work products; plans and specifications; anticipated real property and relocation requirements for construction or implementation of the project; contract awards and modifications; contract costs; the Government's cost projections; anticipated

requirements and needed capabilities for performance of OMRR&R of the project; and other related matters. Eligibility of expenses for credit will depend upon documentation that the expenses were incurred during the PED period in accordance with the audit and other financial standards established in model PCAs language.

9-3. Project Modifications. Congressional authorizations of Corps projects normally include a provision for implementation of the recommended plan with such modifications as the Chief of Engineers may deem advisable, in the interest of the purposes specified. However, for projects authorized or amended in WRDA 1986 (or in any law enacted after WRDA 1986 or amendment thereto) the total modified project cost, exclusive of price level changes, may not exceed 120 percent of the cost authorized in that Act without further congressional approval. Procedures for adoption of proposed project changes differ depending on whether they may be approved by the Chief of Engineers using such delegated discretionary authority or must be submitted to Congress for consideration and legislative modification of the existing authorization. To a limited extent, approval authority for some changes which are within the Chief's discretion has been redelegated to the division commanders. Where proposed changes are more significant, they are documented in a Post Authorization Change (PAC) Notification Report submitted to HQUSACE (unless timely coverage can be provided in a design memorandum or other routine preconstruction planning document submitted to HQUSACE). If it is determined, after review, that the proposed changes are not within delegated authority but are of sufficient importance to warrant a recommendation for modification of the project authorization, procedures and further reporting requirements for processing such a recommendation to the Congress will be selected as best suits that specific case. Occasionally, a project may warrant modification because its original development was inherently deficient. Given certain conditions, measures to correct such deficiencies may be undertaken (see paragraph 11-4). (ER 1165-2-119)

a. Modification Authority Delegated to the Chief of Engineers. Modifications and changes of a project necessary for engineering or construction reasons to produce the degree and extent of flood protection or the extent of navigation improvement or other purpose intended by the Congress are within the latitude delegated to the Chief of Engineers. Examples of such changes are shift of a dam to a nearby better foundation location; changes in channel alignment and dimensions indicated by more detailed studies; changes from a concrete to an earth structure because of lack of proper concrete aggregate; or moderate extensions of project scope, such as necessary to provide flood protection to adjacent urban areas developed since the project was authorized. The Chief of Engineers recognizes that this latitude for changes and modifications of authorized projects is an important delegation of authority which must be exercised carefully. Changes involving the addition of project purposes, significant changes in project cost, scale, features, benefit, location, and costs allocated to reimbursable project purposes require notification of OMB.

b. Modifications Beyond Delegated Authority. A proposed modification of an authorized project is brought to the attention of Congress if study after authorization shows that: the scope of functions of the project will be changed materially; the plan of improvement will be materially changed from that originally authorized by Congress; special circumstances exist which were not known to the

Corps or recognized by Congress when the project was authorized; or, for projects authorized or amended in WRDA 1986 (or in any law enacted after WRDA 1986 or amendment thereto), the updated estimate of total project costs exceeds the limitation on increases set in that Act. Decisions regarding project modifications are made on an individual case basis. Questionable cases are reported to HQUSACE in a PAC report (if not as one subject in a routine preconstruction planning document of broader project coverage) with the views and recommendations of the division and district commander. Recommendations for modifications beyond the authority delegated to the Chief of Engineers are submitted to the ASA(CW) with supporting documentation suitable to the case, for review and subsequent transmittal to Congress for authorization.

9-4. Design Sizing of Projects. The basic scope of projects is established in the project authorization and, if necessary, reaffirmed in a subsequent Design Memorandum or other post-authorization report. Modification of the project from authorized dimensions may require additional authorization in accordance with paragraph 9-3.

a. Flood Control. Flood damage reduction projects are authorized to provide a specific "degree of protection" with a given "degree of certainty". The "degree of protection" and the certainty with which it is provided for a particular project is the measure of flood severity and the certainty for its elimination of detrimental flood effects downstream from a reservoir or within the confines of a local flood protection project. This type of presentation gives the decision makers the opportunity to assess the degree of protection and the costs associated with increasing the certainty of obtaining the degree of protection desired. Risk based analysis is an approach to evaluation and decision making that explicitly, and to the extent practical, analytically, incorporates considerations of risk and uncertainty in the engineering and economic analysis of a project. Such analyses are particularly useful in evaluating levees and floodwalls, where the consequences of an overtopping may be severe and the benefits of increasing the certainty of protection may make such action desirable.

b. Navigation. Navigation projects are generally authorized to provide a channel of specific dimensions. In accordance with Section 5 of the River and Harbor Act of 1915 channel depths generally signify the depth at mean low water in tidal waters tributary to the Atlantic and Gulf coasts, at mean lower low water in tidal waters tributary to the Pacific coast, and the mean depth for a continuous period of 15 days of the lowest water in the navigation season of any year in rivers and non-tidal channels. Authorized channel dimensions are understood to permit increase at entrances, bends, sidings and turning places to allow free movement of vessels. Authorized channel depths include allowances for vessel draft, squat, roll, pitch, yaw and underkeel clearance. (EM 1110-2-1607, ER 1110-2-1403, 1457, 1458)

9-5. Aesthetic Treatment and Environmental Design. All project features are designed so that the visual and human-cultural values associated with the project will be protected, preserved, or maintained to the maximum extent practicable. Specific ecological considerations include actions to preserve critical habitats of fish and wildlife; accomplish sedimentation and erosion control; maintain water quality; regulate streamflow, runoff and groundwater supplies; and avoidance or mitigation of actions whose effect would be to reduce

scarce biota, ecosystems, or basic resources. In the development of individual project features, consideration is given to the needs for architectural design, land treatment or other resource conservation measures. Emphasis is given to developing measures for realizing the full scenic potential of the project feature as it affects the overall project. This is accomplished by providing for cover reforestation, erosion control, landscape planting, management of vegetation, healing of construction scars, prevention of despoilment, and other related activities for all project lands. (EM 1110-2-38)

9-6. Low Level Discharge Facilities. Generally, lakes impounded by Civil Works projects provide low level discharge facilities. Low level discharge facilities, capable of essentially emptying the lake, provide flexibility in future project operation for unanticipated needs such as major repair of the structure, environmental controls or changes in reservoir regulation. (ER 1110-2-50)

9-7. Engineering and Design Performance Analysis. The analysis, based on Command Management Review (CMR) data, includes performance in meeting scheduled physical milestones, performance in meeting scheduled funds expenditure, accurate cost estimating, and cost control. Quarterly reports are required from districts and divisions monitoring engineering and design performance.

9-8. Value Engineering (VE). VE is defined as the systematic application of recognized techniques which identify the function(s) of a product or service; establish a monetary value for that function; and provide the necessary function reliably at the lowest overall cost. VE is concerned with the elimination or modification of anything that contributes to the cost of an item or task but is not necessary for needed performance, quality, maintainability, reliability, aesthetic or interchangeability, or other intended function or objective of a product. VE is performed on the earliest document that satisfies the functional requirements of the project that includes a comprehensive micro-computer aided cost estimating system (M-CACES) cost estimate.

a. Use. VE is a permanent and integral part of Corps design and is applied actively to all Civil Works projects costing in excess of \$2,000,000. VE studies adhere to specifically prescribed methods of procedure and supplements the analysis of alternatives that is part of normal management or design procedures.

b. Non-Applicability. In Civil Works planning, VE is not substituted for economic value or feasibility studies. VE is not applied to aesthetic or environmental features of a project, except where it can be shown that the resulting design, after VE, is as pleasing from an environmental or aesthetic viewpoint as the original design. (OCE Supplement No. 1 to AR 5-4)

9-9. Use of Architect-Engineers (A-Es). Engineering for the civil works program usually requires: continuity of project investigations and planning over a period of several years; integration of project planning with related projects in basin-wide developments; engineering and design skills distinctive to the field of water resource development; and special coordination responsibilities with the public. Because of these requirements, the engineering required for survey investigations and basic design memoranda involving formulation of plans of improvements for civil works projects can be performed

by Corps staff or by supporting A-Es. When existing workload or resources (including manpower restraints or lack of specialized technical skills) in any district prevents accomplishment of these tasks in a timely and efficient manner, all or part of the investigations or design may be reassigned to another Corps office or to private A-E or consulting firms. Such reassignment is encouraged pursuant to effective utilization of funds, particularly for those field installations having difficulty in meeting scheduled obligation and expenditure of funds.

9-10. Use of Consultants. Services of individual experts and specialists outside the Corps of Engineers may be utilized for advice and consultation at appropriate stages of Civil Works project investigation, design, construction and operation activities. Consultants are often employed when problems are encountered that involve specialized fields in which Corps personnel are not regularly employed, or special problems of such magnitude or importance are encountered that it is advisable to obtain the views and advice of eminent experts to supplement conclusions of the Corps staff.

a. Other Federal Agencies. Services of other Federal agencies will be utilized as appropriate in their special fields to complement the investigations and planning of Civil Works by the Corps. Such agencies include the Environmental Protection Agency (EPA), National Park Service (NPS) and Fish and Wildlife Service (F&WS), among others.

b. Owners of Existing Facilities. Services of the owners of existing facilities to be relocated for Civil Works projects may be engaged for planning and design of relocations of their facilities. Procurement of such services from states, local governmental units, railroad companies, utility companies, etc., may be accomplished by use of a separate contract for engineering services. Alternately, these services may be made a part of the relocations contract.