Chapter 8
Hydrologic Engineering Studies

8-1. General

Hydrologic engineering studies are a key part of an overall Corps flood damage reduction analysis. These studies form the technical basis to define: existing, or base without-project conditions; future without- project conditions; and the same conditions with project. The best technical hydrologic engineering analysis cannot be done independent of input by others. Two-way communications with members of the study team and all other concerned individuals and groups are important. This chapter briefly describes some of the input of others necessary to perform hydrologic engineering studies.

8-2. Study Design and Management

The hydrologic engineering study must be planned and detailed to allow the effective and efficient management of the technical work. Before any hydrologic modeling or analytical calculations are undertaken, considerable planning efforts should be performed (ER 1110-2-1460).

a. Scope of study. The overall scope of the study should be resolved early, ideally while preparing the Initial Project Management Plan during the reconnaissance study, through meetings with the entire IPT and the local sponsor. The time and cost required are a direct function of the study scope and amount of detail necessary to fully evaluate the range of problems and potential solutions. The hydrologic engineer should formalize these scoping meetings and ideas on addressing the problems through preparation of a Hydrologic Engineering Management Plan (HEMP). This plan would be reviewed and approved by the technical supervisor and furnished to the study manager. Unusual problems or solutions would make it wise to receive division review also. The HEMP is especially important to develop immediately after the reconnaissance-phase report has identified the problems for further analysis in (and prior to initiating) the feasibility-phase study.

b. Study team coordination. Every cost-shared feasibility study has an IPT, headed by a study manager. The team consists of working-level members from the areas of economics, hydraulics, geotechnical, design, real estate, environmental, and cost estimating. The local sponsor is also a member, although the sponsor may not wish to attend all IPT meetings. Frequent meetings of the IPT should be held (once a week to once a month), depending on the level of study activity and complexity. The advantage of frequent meetings lies in communication and the exchange of ideas between team members. The most successful studies are those having free and easy communication among team members.

c. Technical procedures. General technical procedures have been addressed throughout this document. The hydrologic engineer should select those procedures which adequately address the problem(s) under study. Choose the simplest technical methods that will do this---usually hydrologic modeling. Where more difficult methods appear necessary; i.e., 2D unsteady flow analysis, etc., these methods should be presented in the reconnaissance-phase report for higher level technical review and concurrence.

d. Quality control and review. The assurance of quality work and an adequate review come from both the technical supervisor and the IPT. The development of the HEMP and the supervisor's concurrence in the methods and procedures for study analysis give the hydrologic engineer a road map for the entire study. Frequent updates and consultations between the engineer and technical supervisor are important. With these steps followed, technical quality should be acceptable for the final report. Similarly, scoping of the problems and necessary hydrologic information supplied to other IPT members will be accomplished through IPT meetings and discussions. Unusual technical problems or policy issues may require the review of higher level authority.

e. Relationship with cost-share partner. The cost-share partner is a full member of the IPT and often provides technical assistance in many areas of the study. The partner also has valuable insights on the study area and its problems that may not be apparent to the study team. The cost-share partner should have as much (or as little) input and access to the planning and technical analysis as desired. All hydrologic engineering negotiations with the cost-share partner must involve the hydrologic engineer.

8-3. Level of Detail/Completeness

This subject was more fully addressed in earlier chapters and is only summarized here. For feasibility reports, hydrologic engineering must fully address the hydrology of the study watershed and the level of flooding throughout. Feasible solutions are formulated and evaluated. These requirements necessitate that hydrologic engineering be complete and final upon completion of the feasibility report. Refined hydraulic design should be the

primary effort for the hydrologic engineer after the feasibility phase.

8-4. Documentation and Reporting

The technical analysis should be fully and completely presented in the portion of the feasibility report dealing with hydrologic engineering. A separate appendix for the hydrologic engineering effort is normally prepared. The appendix should present a complete and accurate description of the hydrologic engineering studies. A reviewer should be able to follow the logic and thought processes of the technical engineer and be able to reach the same conclusions concerning the make-up of the recommended plan. The appendix should describe the methods used, input parameters, calibration and verification processes, assumptions made, sensitivity tests performed, alternatives analyzed, plan selected, consequences of design exceedance of the recommended plan, and overall conclusions on project effectiveness. The complete, recommended project must be presented, including work required by other Federal and non-Federal agencies necessary to allow full functional operation of the recommended plan. The hydrologic engineer must also prepare the necessary technical studies outline and time and cost estimates for the Project Management Plan, which must also accompany the completed feasibility report.

8-5. Local Sponsor Coordination

Sponsor participation in the study process should be continuous. Study layout and scoping, IPT meetings and decisions, alternative evaluation and project selection, and report recommendations and review should all involve the local cost-share partner.

8-6. Summary

The Corps of Engineers has moved into a new era of feasibility planning, requiring a local partner to participate financially in the study process. These fiscal requirements by the Corps on the partner must also allow more participation of the partner in the study evaluation process. Further understanding of the hydrologic engineering analysis requirements during the feasibility phase by the local sponsor and others should allow for a better final product. This document is intended to provide an initial step in this direction.