

Chapter 2 Investigation Stages

2-1. Project Development Phases and Associated Geotechnical Investigations

Table 2-1 shows civil works project development phases and the geotechnical investigations performed during these phases.

ER 1110-2-1150 provides the requirements for each of the project development phases and EM 1110-1-1804 provides detailed discussions of the scope of geotechnical investigations for each phase.

2-2. Reconnaissance Study Phase

A reconnaissance study is fully Federally funded and is conducted to determine whether a problem has solutions acceptable to local interests which are in accordance with administration policy and if planning should proceed to the feasibility phase. The reconnaissance phase is general in scope and the engineering effort should be assessing potential alternatives, preparing and reviewing proposed project plans and developing preliminary cost estimates. Detailed engineering analyses are generally not required at this time. The level of engineering effort required for the following feasibility phase is identified and its associated costs estimated. Regional geologic and soils studies and field reconnaissances should be performed. In addition, an initial assessment of the hazardous and toxic waste (HTRW) potential of the study area shall be conducted during the reconnaissance phase as outlined in ER 1165-2-132. The reconnaissance is limited to 12 months.

2-3. Feasibility Study Phase

The feasibility study investigates and recommends solutions to water resource problems and, except for single-purpose inland navigation projects, are cost shared with a non-Federal sponsor. The feasibility study is the basis for Congressional authorization. Sufficient engineering and design should be performed to enable refinement of project features, prepare a baseline cost estimate, develop a design and construction schedule, and allow detailed design on the selected plan to begin immediately upon receipt of preconstruction engineering and design funds. Typical feasibility studies are completed in 3 to 4 years. General Design Memoranda (GDM) are not generally

scheduled or planned. The geotechnical investigation program should assure that sufficient geologic and soils information are acquired and analyzed to verify the project plan, support site selection, selection of structures, assessment of foundation conditions, foundation design and selection of types of foundation treatment. Explorations should be in sufficient detail to support project design and the baseline cost estimate. Potential sources of concrete aggregate, earth and rock borrow, and slope protection material should be located and the investigations necessary to prove-out and develop these sources identified. If needed, further HTRW assessments are conducted during the feasibility study phase as outlined in ER 1165-2-132.

2-4. Preconstruction Engineering and Design Phase

The preconstruction engineering and design phase (PED) is an intensive effort which ends with the preparation of the plans and specifications (P&S) and the award of the first construction contract. PED costs are shared in the same percentage as the purpose of the project. Necessary design memoranda (DM) are prepared and P&S are prepared for the first contract. Geotechnical investigations should be project feature specific and should validate and refine designs and costs developed during the feasibility study. Final investigations in support of development of the test quarry and conduct of the test fill should be completed. If the test quarry and test fill programs are to be accomplished by hired labor, or as contract explorations, they may be accomplished during the PED. If they are to be accomplished by construction contract, P&S should be prepared. The PED phase generally requires about 2 years. HTRW activities, if any, during the PED phase shall follow the procedures outlined in ER 1165-2-132.

2-5. Construction Phase

Engineering effort during the construction phase includes final design efforts, preparation of remaining DM's and preparation of P&S for subsequent construction contracts, site visits, initiation of any foundation report, development of Operation and Maintenance (O&M) manuals and emergency action plans and preparation of as-built drawings. In multi-contract projects, test quarry and test fill development may be accomplished at the beginning of the construction phase. HTRW activities, if any, during construction, shall follow the procedures outlined in ER 1165-2-132.

Table 2-1
Sequence of Geotechnical Investigations with Project Development Phases

Civil Works Project Development Phases	Geotechnical Investigations
Reconnaissance Phase	Development of Regional Geology and Field Reconnaissance
Feasibility Phase	Site Selection and Initial Field Investigations
Preconstruction, Engineering, and Design Phase	Foundation and Design Investigations and Constructibility Review
Construction Phase	Quality Assurance and Post-Construction Documentation Activities
Operation and Maintenance Phase	Special Investigations as required

(Adapted from ER 1110-2-1150 and EM 1110-1-1804)

2-6. Operations Phase

Engineering activities during the operations phase generally consist of the participation in periodic inspections and design and P&S preparation for major repair and rehabilitation projects.