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GUIDEBOOK FOR THE PREPARATION AND USE OF PROJECT STUDY PLANS

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GUIDEBOOK FOR THE PREPARATION AND USE OF PROJECT STUDY PLANS

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I. INTRODUCTION

BACKGROUND

A recent study, entitled *Assessment of Acceptability and Use of Project Study Plans* (Kiefer and Hauer, 1996), surveyed U.S. Army Corps of Engineers (Corps) district personnel as to how Project Study Plans (PSPs) are developed, and utilized. This study also obtained recommendations from the field on future PSP training and guidance. This study discovered that more than 40 percent of those surveyed felt more guidance is necessary to help develop PSPs. A need to supply (1) sample "excellent" PSPs, (2) a guidebook on how to comply with PSP guidelines, and (3) a PSP training course were the most frequently mentioned items that would provide additional assistance in formulating a PSP. Also, a majority of those surveyed indicated inconsistent guidance with regard to feedback from Headquarters review exists, implying that some districts have problems determining what is required of them in the PSP process.

The Institute for Water Resources (IWR) has retained Planning and Management Consultants, Ltd. (PMCL) to develop a guidebook on the preparation of PSPs. This report represents the guidebook, and relies on examples from PSPs that have been approved by Headquarters review. The guidebook provides a resource for complying with PSP requirements, and will be used as a basis for a forthcoming PSP training course.

OBJECTIVES

This guidebook seeks to use the recommendations from the preceding PSP survey to provide supplementary assistance for the development of PSPs. More specifically, the following objectives describe the purpose of this manual:

1. To provide how-to examples of meeting the requirements of the PSP that address reviewer expectations of PSPs

2. To identify an efficient process necessary to develop and submit PSPs

3. To review how PSPs should be used to plan for and guide feasibility studies

Thus, this guidebook is intended to assist in preparing, submitting, and using your PSP. This guidebook does not, however, establish or change official Corps policy for PSP preparation, submission, review, and use.

HOW TO USE THE GUIDEBOOK

This PSP guidebook should be used as a reference manual for preparing individual PSPs. Although the examples that will be shown may not pertain to one's past, current, or expected PSPs, these will at least demonstrate the necessary steps to develop PSPs properly. The reader will note that use of this guidebook is flexible, just as are the requirements of the PSPs themselves. The authors and sponsors of this guidebook understand that the complexity, size, and duration of any particular feasibility study will dictate the size and complexity of any particular PSP. Thus, the intent of this guidebook is to provide a foundation for PSP preparers to use creative planning techniques that work for them.[1]

ORGANIZATION OF GUIDEBOOK

The next chapter of this guidebook reviews the historical development of the PSP requirement and provides a working definition of the PSP process. The importance of planning is discussed, as well as how PSPs fit into the general Corps planning framework.

Chapter III provides descriptions and examples of how to fulfill each of the PSP requirements. This chapter offers guidance on the following PSP requirements:

- Task-Specific Scope of Studies (SOS): Included are narrative SOS examples of the PSP, which describes the process of enumerating work activities and subactivities required to determine feasibility of a project and/or project alternatives.

- Work Breakdown Structure (WBS): The Code of Accounts is introduced as a means to organize and summarize work activities.

- Organization Breakdown Structure (OBS): Examples of the Responsibility Assignment Matrix and descriptive narratives are used to illustrate techniques for portraying what functional organization(s) is responsible for what activity during the feasibility stage.

- Feasibility Study Schedule: Examples of tables, flow charts, and GANTT charts are provided to illustrate milestones for performing and completing feasibility study activities.

- Feasibility Study Cost Estimate: Examples are shown, which identify the allocation of costs to specific tasks and work elements. The examples also address the required delineation of costs to Federal and non-Federal sponsors.

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[1]As an additional aid in preparing your own PSP, an Internet world-wide web site provides a browseable version of this guidebook along with sample PSPs. This guidebook and sample PSPs may be found at the Institute for Water Resources homepage (http://www.wrc-ndc.usace.army.mil/iwr/psp/psp.htm) and/or at the Civil Works homepage (http://www.usace.army.mil/inet/functions/cw/index.htm).

Chapter III also provides objectives and pertinent examples of other components of the PSP requirement, such as the Reconnaissance Overview, the Quality Control Plan, identification of necessary procedures and criteria, and development of proper coordination mechanisms among involved parties. References to statutes, regulations, and other guidance associated with completed work are also addressed within this major chapter.

Chapter IV provides an outline to follow in combining the required PSP components into a coherent planning document. This chapter also includes a description of the protocol for submitting PSPs, and addresses ways to facilitate the PSP review process.

Chapter V demonstrates how the planning process identified in the PSP can guide the feasibility study. The concept of a PSP being a contract between the Corps and local sponsor is presented. Since the feasibility study is a discovery process, rules are presented for handling exceptions and deviations from the PSP when required. In addition, this chapter demonstrates how the PSP is to be used in feasibility study review.

Finally, Appendix A provides the official guidance on PSPs for easy reference as one uses the guidebook.

II. THE PROJECT STUDY PLAN

SOME HISTORY ON FEASIBILITY STUDY PLANNING[2]

During the 1980s, the U.S. Army Corps of Engineers (Corps) altered the way they managed and developed water resources projects. During this period the Corps transferred cost accountability of water resources projects to non-federal interests (Shabman, 1993). A formal framework for partnership between the Corps and non-Federal project sponsor(s) was established by the Water Resources Development Act of 1986.

The arrival of cost sharing brought about changes within the Corps planning process. Although funding by the Corps of the Reconnaissance Phase remained at 100 percent, the costs during the Feasibility Phase were shared equally between the Corps and project sponsor(s). Prior to entering the project Feasibility Phase, the Corps was first required to enter a Feasibility Cost Sharing Agreement (FCSA) with the project sponsor(s).

A more formal approach to project management was necessary once study cost sharing was introduced, and in 1986, EC 1105-2-162 offered guidance on the FCSA and its principal supplement, the Scope of Studies (SOS). The tasks, milestones, and costs that were associated with the Feasibility Phase were formalized in the SOS. The SOS differed from past similar Corps project management tools in that the SOS had to be mutually agreed upon by the Corps and the project sponsors(s) prior to entering the project Feasibility Phase. The initial guidance on the FCSA and SOS was refined and the *Planning Guidance* ER 1105-2-100 was released. The SOS was renamed as the Initial Project Management Plan (IPMP), and brought with it a renewed commitment to efficient project management by the Corps. In 1991, the *Project Management* regulation, ER 5-7-1 (FR), required Initial Project Management Plans (IPMPs) to be developed for each Civil Works feasibility study. At that time no specific model of the expected contents and use of IPMPs was available aside from what was contained in ER 5-7-1 (FR) and ER 1105-2-100 (Cone, 1992).

In December 1994, EC 1105-2-208 was released which offered guidance on the preparation and use of Project Study Plans (PSPs). The name changed from Initial Project Management Plan to Project Study Plan in order to distinguish the former from the Project Management Plan which was required under ER 5-7-1 (FR) to manage feasible civil works projects. According to EC 1105-2-208, a PSP is:

> *... a plan of study which is used to define and manage the development and conduct of a feasibility study. The PSP documents the assumptions, work tasks, products and the level of detail that will be necessary during the feasibility study to determine the existing and the future without project conditions; formulate a range of alternatives; assess their effects; and, present a clear rationale for the selection of water resource development plan(s).*

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[2] This section draws heavily from the 1996 report *Assessment of Acceptability and Use of Project Study Plans* (Kiefer and Hauer, 1996).

WHY PLAN?

One may question why there is a need to plan the activities of the feasibility study. Put simply, plans are developed to avoid potential or reoccurring problems which result in confusion, inefficiency, and losses to the taxpayer. Accordingly, the PSP forms the basis for agreement among district personnel, sponsor(s), and Headquarters on what work is required, how it will be done, by whom the work will be accomplished, and when the work will be completed. By elaborating on these items, it follows that the potential for such confusion and inefficiency is diminished. Furthermore, planning improves the odds of meeting commitments and fulfilling customer expectations, and makes it a lot easier to explain and defend what you are doing. This is not to say that things cannot go wrong with the plan. To the contrary, Murphy's Law is often binding. However, in the process of planning, one may detect what can go wrong, when and how it may occur, and how much it might cost. For this reason a concerted effort to assist district personnel in developing PSPs has been recognized.

HOW PSPS FIT INTO THE CORPS PLANNING PROCESS

The Principles and Guidelines (P&G) (Water Resources Council, 1983), the centerpiece of Corps planning guidance, enumerates a six-step planning process that provides a conceptual planning sequence for determining the feasibility of alternative project plans. The six steps follow a logical order, beginning with identifying problems and opportunities through formulation of alternative plans that may reduce problems or exploit opportunities, to comparison and eventual selection of recommended plan that is considered to be in the Federal interest.

As illustrated in Figure II-1, the PSP serves to outline the work activities that are necessary to perform these planning steps as well as to estimate the time and cost that will be required to move among the steps. Thus, as implied in earlier sections, the PSP is the "plan for the planning process".

From a temporal standpoint, the development of the PSP occurs at the end of the Reconnaissance Phase, the first phase of a five-phase process that ends with project operation and management. As shown in Figure II-2, the Reconnaissance Phase is expected to last from 12 to 18 months.

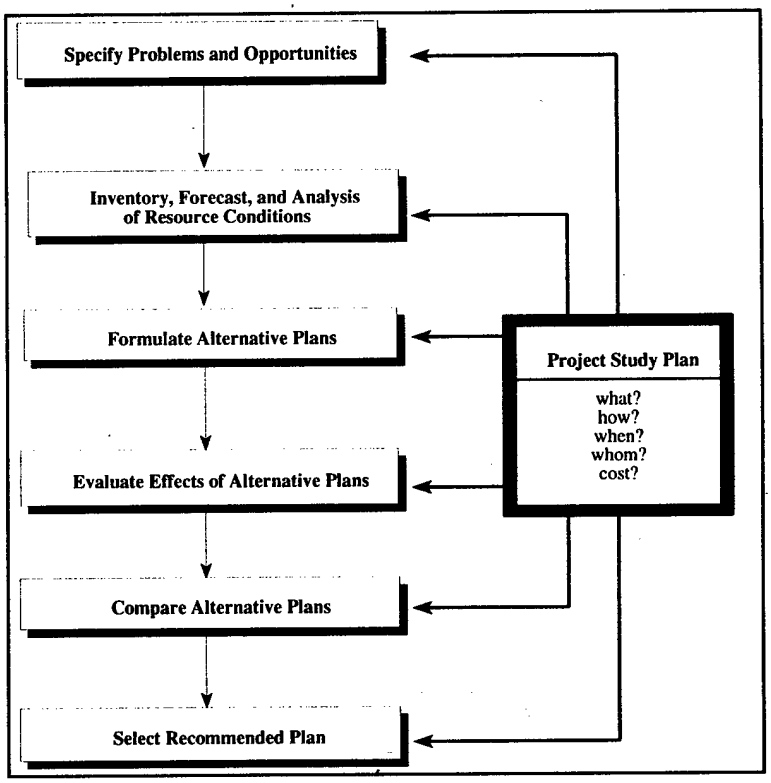

FIGURE II-1

THE SIX STEPS OF PLANNING AND THE PSP

The minimum requirements of the Reconnaissance Phase are [WRDA, 1986, section 905(b)]:

- to define problems, opportunities, and potential solutions
- to determine whether planning should proceed further; (i.e., is there a Federal interest)
- to assess the level of local interest and support for sharing the cost of the Feasibility Phase
- to estimate the necessary tasks and cost of the Feasibility Phase

The products of the Reconnaissance Phase include the Reconnaissance report itself and the Feasibility Cost Sharing Agreement (FCSA). The PSP is submitted as an attachment to the FCSA. Thus, if there is Federal interest and local financial support, the PSP defines the tasks and associated costs that the Federal government and local sponsors will be supporting financially. In this role, the PSP defines a contract between the Corps and local sponsors, and reflects "buy in" on the part of financial backers, as well as those who will be performing the activities involved in the feasibility study.

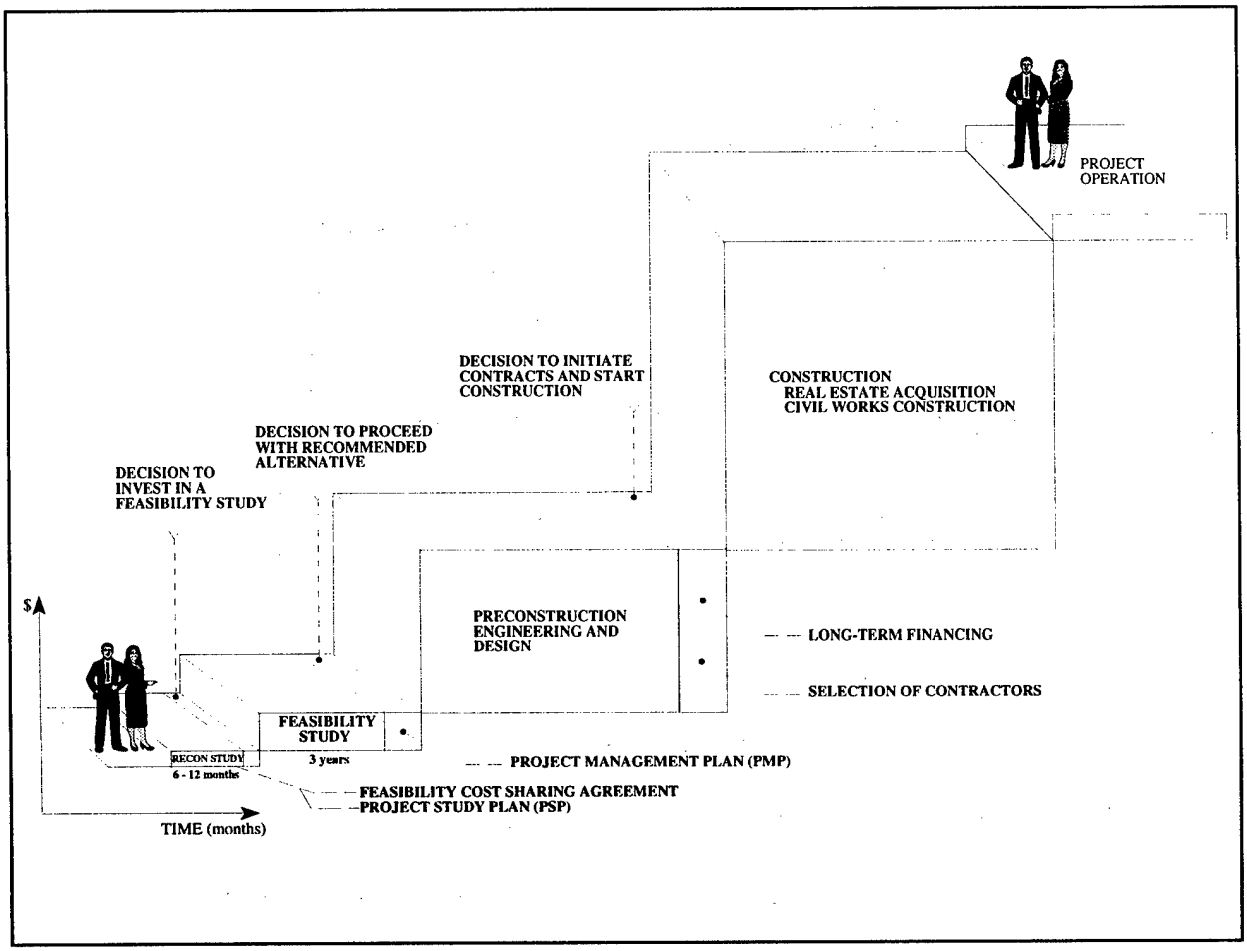

FIGURE II-2

THE FIVE PHASES OF PLANNING AND OPERATION[3]

Once the decision has been made to begin the feasibility study, one makes use of the knowledge gained during the Reconnaissance Phase to proceed with necessary analyses, formulation, and evaluation of economically feasible project plans. The PSP is the mechanism through which knowledge gained during the Reconnaissance Phase gets translated into the product of the Feasibility Phase, the Feasibility Study. Although the PSP is only a small component of the planning process, which is developed and activated early on in the planning process, it should be recognized that a good PSP can and usually does bring about an efficient and successful feasibility study, which then affects the later planning phases.

[3]This figure is adapted from Tudor Engineering Company (1984). The figure is for illustrative purposes only and is not drawn to scale.

THE PSP REQUIREMENTS

According to the official guidance (EC 1105-2-208), the following contents are required in the PSP:

1. Scope of Studies

Task specific, detailed scope of studies that describes the work to be accomplished, in narrative form, and answers the "what and how" questions, the "who", "when" and "how much" questions must also be included.

2. Responsibility

Product based Work Breakdown Structure (WBS) and Responsibility Assignment Matrix (RAM) that defines who will be performing what tasks to deliver which product.

3. Schedule

Performance and Milestones that define the anticipated timing of key decision points, delivery of products, completion of tasks, in-progress-reviews, and issue resolution meetings.

4. Measures for Progress and Quality

Mechanisms that will be implemented in order to measure progress and ensure the quality of all study efforts.

5. Baseline Feasibility Study Cost Estimate

Estimate of the cost of the anticipated feasibility study, including a break-down of costs by major task or product. The cost estimate should include the level of both financial and in-kind non-Federal sponsor(s) support.

6. Identification of Procedures and Criteria

Corps and other procedures and criteria required to assess the adequacy of the completed work effort and ensure study conformity to all existing Federal policies and procedures.

7. Coordination Mechanisms

Identification of how work assignments, completion, and review of feasibility study products will be coordinated among internal work elements and external parties.

8. References

A listing of statutes, regulations, and other guidance needed to conduct the work identified in the PSP.

The PSP is required to be comprehensive in scope, have sufficient information to define the products, describe study tasks necessary to produce the products, and define the level of detail necessary for accomplishing each task. The person responsible for preparing the PSP is the planning technical manager, in coordination with the other district technical managers and the project manager. The guidance also requires that the non-Federal sponsor be actively involved in the development of the PSP. The primary point of contact for the sponsor is the project manager.

The reader may refer to Appendix A of this guidebook for a copy of the official guidance on PSPs. The remainder of this guidebook will review the requirements of each of these components in detail, and will provide examples to follow in successfully meeting the PSP requirements.

III. PREPARING THE PROJECT STUDY PLAN

This chapter provides direction on preparing all of the components of a successful PSP. The chapter is arranged in a sequence that corresponds to separate sections or chapters of the PSP. Examples are provided to help you develop the following major PSP requirements:

- Reconnaissance Overview
- Task-Specific Scope of Studies
- Work Breakdown Structure
- Organizational Breakdown Structure
- Schedule of Performance
- Feasibility Study Cost Estimate

Furthermore, this chapter provides examples for developing other elements of the PSP, such as references, quality assurance, study coordination mechanisms, and others. As you read this chapter, it will be helpful to keep in mind that the primary objective in preparing your PSP is to describe the tasks to be accomplished during the feasibility study.

PREPARING THE RECONNAISSANCE OVERVIEW

The PSP should begin with introductory sections that summarize findings of the Reconnaissance study. This section must provide specific information on the alternatives that will be considered in the Feasibility Phase (Planning Guidance Letter 96-01). In addition this section should provide, at least at a conceptual level, the without-project condition (Planning Guidance Letter 96-01.

In summarizing the results of the Reconnaissance study, you should answer the following questions:

- Who authorized the Reconnaissance Phase?
- Where is the study area located and what are its characteristics?
- What is the problem and/or opportunity that is being studied?
- What is the general without-project conditions?
- What alternatives are to be considered and why?

The sections that follow present examples from previous Corps PSPs that do a good job of answering these important questions. Use these as a guide in preparing the Reconnaissance overview.

Project Authorization

The authorization under which the project is being conducted should be presented. An example of project authorization is this excerpt from the *Project Study Plan for Development of Computer Simulation Models of the Biscayne Bay Ecosystem.* The example cites the original sponsor and references the congressional resolution. The objective cited in this example is to create computer simulation models for resource managers to analyze and evaluate the hydrologic, water quality and biological impacts on Biscayne Bay.

United States Senate and House Resolutions adopted on December 5, 1980, and September 23, 1982, respectively, authorized the U.S. Army Corps of Engineers (Corps) to review existing Federal projects to determine if modifications are advisable to alleviate problems associated with water quality, biological productivity, and related factors in Biscayne Bay. The Corps completed a Reconnaissance Report in March 1984, which found that environmental assessments to determine the significance of these impacts and further review of selected works in the study area were warranted. The feasibility study phase was initiated in Fiscal Year (FY) 1984, but discontinued after FY 1985 when continued funding was not provided. Funding was provided again by Congress in FY 1994 to re-initiate the feasibility study. Metropolitan Dade County was contacted and agreed to act as a local sponsor, pending agreement on the Feasibility Cost Sharing Agreement (FCSA). Coordination was accomplished through Metro-Dade County's Department of Environmental Resources Management (DERM).

Location and Description (Study Area Characteristics)

A description of the study area characteristics is essential for understanding of the problem under investigation. Along with a narrative, a map is often the most valuable tool for characterizing the physical setting for the feasibility study. An example presentation of study area characteristics is this excerpt from the *Rio Salado, Salt River, Arizona Feasibility Study, Feasibility Cost Sharing Agreement and Project Study Plan.* Although a map is not included here, this example does identify the study area and relates some history about the evolution of the riparian habitat degradation that has occurred as a result of the construction of a dam.

The study area consists of approximately twenty-eight miles of the Salt River from the eastern boundary of Tempe, at McClintock Road, through the City of Phoenix, to the confluence of the Salt, Gila and Agua Fria Rivers in Maricopa County, Arizona. The Salt River is the largest tributary of the Gila River and drains an area of approximately 13,700 mi^2 within the northern and eastern portions of the State of Arizona. The Salt River's periphery of the fourteen mile reach from the Mesa/Tempe boundary to 40th Avenue in Phoenix is now highly urbanized. The next eight miles consist of agricultural and residential areas, interspersed with occasional industrial development. The remaining six miles is largely undeveloped. In presettlement times, prior to 1900, the river was one of the few perennially-watered riparian areas of the Sonoran desert, with highly-productive cottonwood, willow and mesquite habitats. These areas were rich in habitat diversity, supporting a wide variety of wildlife species. As the lower Salt River valley became developed, riparian habitat has degraded significantly. Degradation is largely attributable to the construction of upstream Federal dams which curtailed year-round water flows and converted the once perennial Salt River

into a dry river bed devoid of habitat. During the 1980's a Corps of Engineers flood control project at Indian Bend Wash displaced the last remnant of a mesquite bosque community that once occupied the region.

Problem and Opportunities

The problem and/or opportunity that was studied during the Reconnaissance Phase must be clearly defined. An example of problem definition is this excerpt from the *San Joaquin River Basin South Sacramento County Streams Investigation, California, Feasibility Phase Initial Project Management Plan.* This excerpt identifies the problem as flooding, states planning objectives, and addresses channel and levee improvements as potential alternatives that may address the problem.

The primary objectives of this study were to (1) identify flood and related water resource problems within the South Sacramento County Streams study area, (2) identify at least one feasible plan to solve these problems, (3) develop a management plan for feasibility-level studies, and (4) identify a potential non-Federal sponsor for the feasibility study.

The major findings in the reconnaissance study are:

- *Flooding is a serious and widespread problem on Morrison, Elder, Unionhouse, and Laguna Creeks. Flooding is especially severe in the populated, middle portion of the basin where backwater from Beach-Stone Lakes and flat gradients impede channel flow.*

- *There is a serious flood threat to the densely populated area north of Beach-Stone Lakes in the City of Sacramento due to failure of Sweeney Ranch, Beach Lake, or Morrison Creek levees from high water levels at Beach-Stone Lakes.*

- *Along Morrison and Unionhouse Creeks, 100-year level of protection can be economically achieved through either channel and levee improvements or a combination of channel and levee improvements and flood detention basins.*

- *It appears that the potential for developing an economically feasible flood control plan along Elder and Laguna Creeks is low. However, a flood control plan limited to certain reaches may be feasible.*

- *SAFCA, with the participation of the City and County of Sacramento, has stated its intent to act as the sponsor for feasibility studies of South Sacramento County Steams.*

The reconnaissance report recommended that the Federal Government proceed to the Feasibility Phase and initiate cost-shared feasibility studies.

Without-Project Conditions

The without-project conditions are those conditions that may occur if the project is not implemented. The without-project conditions must be stated in the PSP. However, one of the most common problems in PSPs is that the without-project conditions are often defined poorly.

An example of a description of without-project condition is this excerpt from the *San Joaquin River Basin South Sacramento County Streams Investigation, California, Feasibility Phase Initial Project Management Plan.* In this excerpt, the without-project assumptions are presented. The problem being studied in this example concentrates on floodings in an upper drainage basin.

Feasibility study without-project assumptions affect future condition hydrology and the risk of flooding. Without-project assumptions are as follows.

Land Use

The South Sacramento County Streams watershed within the City of Sacramento and the Sacramento County urban services area is projected to be fully urbanized within the life of any Federal project. The urban services boundary is delineated in the Sacramento County general plan. The boundary encompasses virtually all the drainage basin outside the Sacramento city limits except Beach-Stone Lakes, the aggregate mining area in the vicinity of Jackson Road and Morrison Creek, and the extreme northeast corner of the basin. Urbanization will consist of low to medium density residential development with supporting commercial, institutional, and industrial uses.

Future Water Resources Projects

For the purposes of this IPMP, the upper watershed is defined as areas of the basin above the reaches defined under study area. The feasibility study assumes that there will be no increased peak flows due to future urbanization in the upper watershed. Increased peak flows due to urbanization will be mitigated by the County. The method identified by the County to mitigate potential impacts of the flows is by local detention basins. The County is currently formulating local drainage master plans that include provisions for funding, dedicating land for, and constructing these detention basins. It is expected that some detention basins will be constructed and come on line within the next 3 years, others will be constructed as urbanization occurs. The basins will be considered part of the without-project condition. For detention not in place by the end of the feasibility study, the without-project condition will be dependent upon the County providing, before the end of the feasibility study, assurances of its intent to build all necessary detention facilities. The assurance must be approved drainage master plans, statutes, or other legally binding arrangement. The assurance must be acceptable to both the local sponsors and the Corps. As part of the feasibility study, the Corps will work with the County to revise the existing hydrologic model to reflect the County's detention plans. The feasibility study will confirm that the County's plans will work hydraulically and will develop future condition hydrology in accordance to Corps criteria. The study will also determine any increases in volume of runoff due to changes in land use. The detention basins together with the levee and channel improvements to be considered in the feasibility study are the major parts of the overall basin flood control plan. Channels and levees will be sized to work in concert with existing and future basins. The feasibility study will also assume that no project will be built that significantly affects water-surface elevations or hydrology of the Beach-

Stone Lakes area. It is also assumed for the study that there will be no changes to hydrology of the Mokelumne or Cosumnes Rivers.

The study will assume that the County will perform minimal channelization in the invert of the upper reaches of Florin, Elder, and Laguna Creeks, primarily to allow future storm drain outfalls from new urban development to drain by gravity. These limited channel improvements will increase 10-year peak flows, but should not increase design floodflows.

During the course of the feasibility study, without-project assumptions may be changed providing there is a consensus between the Corps, SAFCA, and the City.

Project Alternatives

Specific information on the range of alternatives that will be considered in the feasibility phase must be provided in the PSP (Planning Guidance Letter 96-01). The PSP should state which alternative will be fully developed and which alternatives are expected to be eliminated (for whatever reasons) and only discussed to explain why they were eliminated. These steps are required since the task specific scope of studies will in part be determined by the alternatives that will be considered (Planning Guidance Letter, 96-01). Furthermore, the PSP must define how the alternatives will be evaluated in determining and selecting the preferred alternative.

The example below states the alternatives and reviews the procedures that will be used to examine and select among the alternatives. This excerpt is from the *Jamaica Bay, New York, Ecosystem Restoration Project Study Plan*. The objective in this example is to investigate the feasibility and the extent of Federal interest in environmental restoration.

3. *Restoration Measures: Alternatives currently considered suitable for implementation at the site-specific restoration sites include regrading, ditching, vegetative plantings, culverting and full or partial removal of dike, bulkhead, rip rap, rubble, derelict vessels, or abandoned/deteriorated pilings and related shore facilities. In addition, most sites, especially those along the shore line, would require varying degrees of clean-up (removal of debris, rubble, and other garbage dumped or washed up on the degraded shorelines and adjacent upland) and protection (fencing, guard rails, upland buffers, etc) to maximize habitat value and minimize disturbances, especially during the early phases of each restoration project. These activities would not be the primary actions at any site, but would be necessary to ensure success of the selected alternative. Based on existing information, it is assumed that most sites will require some degree of regrading and planting to achieve desired inundation levels and species composition; clean up and protection would also be a part of many site plans. About half of the anticipated 20 site designs will also include structural alterations (mostly removal), or major excavations (ponds, interior waterways, culverts). The shoreline sites identified in the JBCWMP range in size from ½ to 5 acres, though they often include extensive stretches of shorelines, since many sites are relatively narrow. It is anticipated that sites identified in the central part of the bay, where there are less spatial restrictions, would average 10 - acres. Various size alternatives would be included in assessing each site, with the final decision being based on a combination of priority resource needs, minimal effective size, and incremental cost analysis. Table I lists initial ideas for restoration measures and habitats at the 1 8 JBCWMP sites, as well as the central bay sites and recontouring areas. The preliminary concepts include an*

assumption that excavated material will be suitable for use on or near the site, to enhance habitat values or site stability/protection; thereby avoiding costs for transport and disposal. The presence of material that is found to be unsuitable for beneficial reuse will likely result in site rejection.

Alternatives considered for recontouring the bay include filling in large pats in Grassy Bay, as well as removal of bars across tributary mouths and sediment that has accumulated within those waterbodies. To the extent possible, the two operations would be considered in conjunction with the other, with the excavated material used to fill pits and other artificial cuts in the bay bottom. Mater removed to regrade or excavate ponds/waterways at individual habitat restoration sites would also be considered for use in recontouring the bay, as would material removed from the Federal navigation channel.

For restoration projects it is particularly important that districts state how environmental significance of each alternative will be determined. This is done in the following excerpt that continues the example started immediately above.

4. <u>Selection and Evaluation of Restoration Alternatives:</u> Existing conditions at the habitat restoration sites would be determined by field investigations that would document vegetative cover, fish and waterfowl use, benthic communities, waterbird and song bird use and other resources on a seasonal basis. A habitat evaluation procedure (HEP) would then be applied to determine current value. Physical and chemical characteristics of each site would be determined by collection and analysis of surface sediments (grain size and bulk sediment analysis for commonly occurring contaminants), local water quality (dissolved oxygen, organics, chlorophyll) and site-specific physical conditions (salinity, temperature, water level, tide ranges, inundation periods, hydrology, depth, bathymetry). This data would be used to determine and prioritize the limiting factors responsible for degraded conditions of each site. A HEP analysis would be conducted on those alternatives that best address these limiting conditions, and selections made on the basis of which alternatives (methodology, size, location) produces the better overall increase in habitat value for the targeted species.

Potential Restoration Measures and Target Habitats

Site	RESTORATION MEASURES							HABITATS RESTORED				
	ReV	ReG	EXC	FIL	ALT	CLU	PRO	WET	SHL	DUN	BEA	UPL
JFK Shoreline	X	X						X				
Bergen Basin (Subway)	X	X				X		X				
Bergen Basin (West)	X	X			X	X		X	X			
Bergen Basin (Bulkhead)	X	X			X			X	X		X	
Hawtree Basin (Head)	X	X	X					X				
Hawtree Basin	X	X						X				
Canarsie Beach	X	X				X	X	X			X	X
Deadhorse Bay	X	X				X		X			X	X
Floyd Bennett Field	X	X			X			X	X			X
Bayswater Park					X			X				
Breezy Point	X							X		X		
Vernam Barbados	X					X	X	X			X	
Somerville Basin (West)	X	X				X		X	X			
Somerville Basin (East)	X	X				X					X	X
Conch Basin (Head)	X	X				X		X				
Conch Basin (SE shore)	X	X	X			X	X	X			X	
Healy Ave	X		X			X	X	X	X	X		
Mott Basin	X	X				X		X				X
Grassy Bay				X					X			
Mill Creek	X	X	X					X	X			
Fresh Creek	X	X	X					X	X			
Spring Creek	X	X	X					X	X			
Central Bay/Island	X	X	X					X	X			X

ReV = revegetation
Reg = regrading
EXC = excavate
FIL = Fill
ALT = Structural alteration
CLU = Debris clean up
PRO = Site protection

WET = wetland
SHL - Shallow water
DUN = Dune stabilization
BEA = Beach/shoreline
UPL = Upland buffer

Reconnaissance Overview Checklist

When preparing your own Reconnaissance overview, refer to the following questions. If you have answered theses questions in your narrative, you will have adequately summarized the Reconnaissance Phase.

1. Has the problem or opportunity that is being investigated been explained?
2. Has the study area been defined and characterized?
3. Have the alternatives been identified?

4. Have evaluation methods been discussed?

4. Have evaluation methods been discussed?
5. Has the without-project condition been characterized?
6. Has the authorization for the Reconnaissance Phase been referenced?

PREPARING THE SCOPE OF STUDIES

Following the Reconnaissance overview, the detailed task-specific Scope of Studies (SOS) is prepared. Included in the detailed SOS is a definition of the products and a description of the tasks to be accomplished so as to determine the feasibility of the project. The SOS must provide specific descriptions of the tasks to be accomplished (what), the reasons for the tasks (why), the techniques, models, and procedures to be used to accomplish the tasks (how), the organizational elements responsible for the tasks (who), the timing and schedule of the tasks (when), and the costs of the tasks (how much). Although the official guidance requires answers to all of these *interrogatives,* history has shown that review of this section of the PSP has focused primarily on the what and how questions.

The detailed SOS should not be developed in isolation. The planning technical manager should consult with the Corps personnel who will be responsible for conducting the tasks specified in the SOS to effectively determine what (when, how, and how much) is required to perform specific tasks. This collaboration promotes collective agreement on what is required and holds the team accountable for maintaining progress.

The non-Federal sponsor(s) should also be actively involved in the development of the SOS. The collaborative development of the PSP ensures that the work required for the feasibility phase has been carefully developed and considered, and reflects the requirements, desires, and interests of both parties. The SOS should identify the sponsor's share of the work effort.

The scope of studies needs to provide two types of detail to be complete. The first is a complete list of task which must be accomplished to do the feasibility study, consistent with current policy. The second type of detail answers; what, why, who, how, when and how much, for each task identified (the interrogatives).

Terms such as product, subproduct, major task, work element, activity, task and sub-task (and sub-sub-task etc.), are used to disaggregate the feasibility study into manageable elements. The distinction between these terms can be very arbitrary, and they are often used interchangeably. In order to clarify these terms, this guidebook offers the following definitions, which are consistent with the standard definitions provided in ER 5-7-1 (FR):

Product - The principal report, agreements, or documents that are required for each life cycle phase of a civil works project. A product represents the ultimate outcome or deliverable of a process (e.g., the feasibility report).

Subproduct - The reports, agreements, or documents that are required for the development of the products required for each life cycle phase of a civil works project. A subproduct represents a

significant component of a product that can be differentiated from the whole and still be considered a deliverable (e.g., engineering appendix of feasibility report).

Major Task/Work Element - The specific tasks which have a beginning and end date, which may be accomplished within one organizational element. A work element represents the broadly defined analyses or undertakings that are required to develop subproducts and products (e.g., economic analysis of the socioeconomic studies subproduct of the feasibility report product).

Task/Activity - The specific undertaking required to develop a work element, which can normally be characterized by man-hours. An activity is more specific than a work element and represents one of many analyses/undertakings that comprise a work element (e.g., estimate flood damages activity of the economic analysis work element of the socioeconomic studies subproduct of the feasibility report product).

One may even define sub-task/activities, sub-sub-task/activities, sub-sub-sub-task/activities, and so on, depending on how far one wants to or can differentiate more and more specific individual analyses/activities.[4]

The following sample breakdown of products, subproducts, major tasks, and tasks is presented in order to facilitate discussion of the desired level of detail:

Product - Feasibility Report - A feasibility report as per the guidance in ER 1105-2-100 presents recommendations for Federal action. These recommendations are passed to Congress to support a project authorization decision. All feasibility study schedule data is provided at the sub-activity level in section 5, Feasibility Study Schedule. Study costs are provided at the major task level in section 6, Feasibility Study Cost Estimate.

Subproduct - Socioeconomic Studies/Report - The socioeconomic studies are prepared in accordance with ER 1105-2-100 and contain analysis of the water resource problem, including the social and demographic characteristics of the local community, and the most effective solution to the problem.

Major Task - Economic Analysis - The economic analysis is required by EC 1105-2-100 and will be completed in its entirety by the Economic Section of the Best district, US Army Corps of Engineers.

Task- Estimate Existing Condition Average Annual Damages - This task is required to estimate average annual benefits of project alternatives.

Sub-task - Inventory the flood plain

Sub-sub-task - Using 1"=200 feet topo map (map to be based on recent aerial photography, show outlines of all structures and have spot elevations near each structure, also, cross-

[4] Note that in the development of your PSP, considerably less time should be spent deciding on and adopting a uniform set of definitions than on fully explaining what you intend to do. The fact that the official guidance refers to this section of the PSP as the "Task"- Specific Scope of Studies suggests that one use the Product, Subproduct, Major Task, Task, Subtask naming convention. However, it is acceptable to substitute the terms Work Element for Major Task, Activity for Task, Sub-activity for Sub-task, and so forth as long as you are consistent (e.g., if you specify an item as a Work Element then its components should be termed Activities and Sub-Activities, not Tasks and Sub-Tasks).

sections, flood plain delineations and flood water elevations) assign each structure an inventory code.

Sub-sub-task - Prepare data collection sheets. For each structure record structure inventory code and structure location by cross-section, most frequent exceedence frequency where structure is subject to flooding.

Sub-sub-task- Drive through flood plain and record for each structure; structure type, ground and first floor elevations, and structure condition.

Sub-sub-task - Photograph representative samples of each structure type and condition.

Sub-sub-sub-task - Get film from supply, check out camera from property desk, load film, pack camera in field bag, pick up bag and carry to car.

Sub-sub-sub-task - Take camera out of bag, remove lens cap, point camera at structure, depress button to take picture. Repeat for each structure type and condition.

Sub-sub-sub-task - Replace camera to field bag. Carry field bag back to office. Remove camera from field bag. Remove film from camera. Return camera to property desk. Have film developed. File photos in study file.

This example goes to the Sub-sub-sub-task level. Most would agree that this level of detail is not required. Some would like to stop at the Sub-task level (Inventory of the flood plain), which is acceptable, but only if the task is defined. What constitutes an inventory? Without stating what data is to be recorded, any set of data could be called an inventory of the flood plain. The list above describes that the inventory is of structures, defined by the location, type, condition, ground and first floor elevations and what frequency flood first inundates the structure. It also tells what it is not—it is not an inventory of linear feet of roads, sewers, electric and phone lines, number of cars and trucks. Without such description no one will know what "Inventory of the flood plain" means until after the feasibility study has been completed and forwarded for review. <u>This</u> is what Headquarters is trying to avoid with the PSP. So, while the Sub-sub-task level can seem minute, it provides the definition needed and helps to answer the interrogatives. This information is also useful to the study managers and section chiefs for assigning work and measuring earned value (progress). Of course the whole thing could have been written without specifying work efforts past the Sub-task level, simply by providing this same information in the description of "Inventory of the flood plain."

Obviously, some professional judgement must be used to decide the proper level of detail, and how to present the detail. For example, in the description provided above there is no "why" given for taking photographs—they are taken apparently just for the file. Some reviewers may consider this good documentation and not question it, others will wonder if it is really necessary and ask the "why" question.

Do you need to answer "how" the inventory will be accomplished? Probably. Do you need to answer "how" the person will drive through the flood plain? Probably not. How can you tell for sure? Unfortunately the only sure way is to submit your PSP for review. However, if there is a review concern, the reviewer should be able to tell you the SPECIFIC TASK you have missed OR the SPECIFIC INTERROGATIVE you have not answered and WHY it is important to the PSP to identify the task or answer the question.

Finally, the sample breakdown provided above implies the existence of a hierarchical *work breakdown structure,* where sub-tasks make up tasks, tasks make up major tasks, major tasks make up subproducts, and subproducts make up products. The Work Breakdown Structure (WBS) is a set of accounting codes that identify these tasks and products and is a required component of the PSP. When preparing your Scope of Studies you are encouraged to follow the accounting codes of the Work Breakdown Structure for Civil Works Projects (a.k.a. the Civil Works Breakdown Structure), which is designed to allow a specification of work efforts down to the sub-sub-task.[5] For example, a WBS for the work described above might be organized as follows:

J - Feasibility Report (Product)
- JB - Socioeconomic Studies/Report (Subproduct)
  - JBA - Economic Analysis (Major Task)
    - JBAA - Estimate Damages (Task)
      - JBAAA - Inventory Flood Plain (Sub-Task)
        - JBAAAA - Photograph Samples (Sub-sub-Task)

Other examples of the WBS requirement and a full description of the accounting codes of the Civil Works Breakdown Structure are provided later in this chapter.

The following sections offer narrative task-specific SOS examples that describe the enumeration of feasibility study products, work elements, and activities required to evaluate alternatives and determine feasibility.

Review of Feasibility Study Products

A feasibility study normally consists of a set of major products. These products should be determined and clearly stated in the SOS before the descriptions of the tasks that are required to produce these products. The following excerpt from *Baltimore Metropolitan Water Resources Project Study Plan (PSP) for the Deep Run and Tiber-Hudson Watersheds* identifies four major products of the feasibility study.

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[5] The Corps of Engineers Financial Management System (CEFMS) and the Project Management Information System (PROMIS) were designed to directly accept cost data for projects set-up using the Civil Works Breakdown Structure. Once the new financial management system goes on line, no funds can be spent without a study budget based on the Civil Works Breakdown Structure. Other new Corps applications are expected to require the use of this structure as well.

a. Feasibility Report

This product includes all activities leading to the approval of the final Feasibility Report/Environmental Impact Statement by the Office of the Chief of Engineers. It entails all problem identification and formulation activities required to identify and recommend plans of improvement. It also includes NEPA (NEPA compliance will include all activities leading to the assessment of environmental impacts related to the various projects being investigated. These activities include scoping and preparation of the environmental document, public coordination and review, and notification of findings), Section 106, and other environmental compliance documentation; coordination of the study and results with all interested parties; initial and final review by the North Atlantic Division, Office of the Chief of Engineers, and the Washington Level Review Center; and ultimately, transmittal to Congress. The feasibility study, culminating in the Notice of the Division Engineer, is scheduled for completion in August 1999.

b. Preliminary PCA and Financing Plan

As the details of the recommended plans are finalized, coordination will be undertaken with the local sponsor to review the model language for Project Cooperation Agreements (PCA's) for the various projects. Letters of intent that acknowledge the requirements of local cooperation and express good faith intent to provide those items for the recommended project will be developed. Additionally, preliminary financing plans will be developed by the sponsor(s) to detail plans for financing costs. Assessment of these plans will then be completed by the District. The coordination of the PCA model and the preliminary financing plans will be completed in conjunction with the draft report.

c. Draft Project Management Plan (PMP)

As part of the feasibility efforts, draft Project Management Plan(s) will be prepared based on the recommended projects and a baseline cost estimate will be developed. The draft PMP(s) will address the schedule of PED and construction activities. These activities include preparation of plans and specifications for the initial construction contracts. The draft PMP(s) will address the development of additional products and more detailed plans for successful management and completion of the projects. The draft PMP(s) will be completed in conjunction with the draft report.

d. Other Supporting Plans

Other supporting plans will be developed as needed as the study progresses to address specific items such as local cooperation, real estate acquisition, quality control, value engineering, environmental and cultural matters, safety and security, and operation and maintenance.

Description of Tasks Necessary to Produce Products, Analyze Alternatives, and Determine Feasibility

Provided below are 6 examples of SOS task descriptions from certified PSPs. As you will note, some are better than others in answering the necessary interrogatives and in describing what is to be done.

There really is no consensus "excellent" model for preparing task descriptions. Thus, the examples that follow generally have some good qualities, but lack some of the detail that is required by the PSP guidance. They are included to help you determine the best way to describe your tasks while you are answering your interrogatives.

Task Description Example 1

This example is a template that attempts to generate the requirements of the SOS through a series of questions and answers. The template has been partially applied to a specific task entitled Determine Commercial and Industrial Content Value. This example may be a helpful approach to follow when describing work tasks for your own PSP. This format is meant to force the authors of a PSP to fully formulate the what, why, who, when, and how much of each task.

TASK DESCRIPTION EXAMPLE 1: Excerpt from *Methodology Needed in the Development of an Economic Management Plan for an Urban Flood Control Feasibility Study* (derived from Wilbanks, 1992)

What task?	Determine commercial and industrial content value.
Why?	Commercial and industrial content value in conjunction with content depth percent damage relationships will be used to determine commercial and industrial content damage. These data are necessary for the development of a realistic economic damage model for the flood plain.
Who?	Corps Economic Analysis Branch, GS-xx Economist
When?	Data collected during the initial part of the study effort.
How?	A xx-percent survey will be conducted of approximately xxx commercial establishments. This survey percentage should yield a 90 percent confidence limit. Appropriate classes of industrial establishments will be surveyed. Fifteen trips will be required to conduct an estimated seven interviews per day. The questionnaire will include questions concerning not only content value but past flood damages. Content value data and depth-damage information will be compared to other studies for reasonableness.
How sensitive are data?	Reconnaissance studies indicated that the bulk of the damages occurred to residential development; therefore, commercial and industrial content value is not considered to be sensitive to project feasibility or selection.
How much data are available?	No area specific content value data are available? Data from other studies and secondary sources are available.
How much time and cost are required?	$0,000 xx days

Task Description Example 2

The PSP from which this example was taken developed separate tasking summaries for each organizational element involved in the feasibility study. This PSP also included detailed cost estimates for

each task and subtask for each particular organizational element. In order to distinguish the SOS from the baseline feasibility cost estimate, the cost breakdown is omitted from this example. The setting for this example involved determining the feasibility of improving the existing Federal navigation project for the Alafia River, Florida. The excerpt defines and describes the tasks assigned to the Coastal Engineering Branch. Although the task names are not well defined, the task narratives do a good job of describing what is to be done. However, the descriptions could do a better job of explaining how the tasks are to be accomplished. Also, the task descriptions do not mention schedule or cost.

TASK DESCRIPTION EXAMPLE 2: Excerpt from *Tampa Harbor-Alafia River, Florida, 10128, Appendix C, Project Study Plan and Initial Project Management Plan of the Feasibility Cost Sharing Agreement for Dare County Beaches, North Carolina*

Scope of Study for Coastal Engineering Branch

This scope of work includes all tasks to be performed by the Coastal Engineering Branch and, in addition, it includes work to be performed by the Cost Estimating Branch as a part of the tasks described here, in particular developing preliminary and final cost estimates to allow comparison of the alternatives and coordination work required to obtain mapping and survey services.

A. TASKS FOR OVERALL STUDY AREA. Certain tasks can be done initially which cover the entire study area and used later as the need arises for specific areas being investigated. All other tasks are specific to each problem area. The common tasks for the feasibility study are described below followed by detailed task descriptions for each specific study area.

1. Work plan meeting. A meeting of the study team to kickoff the study and finalize the study schedule.

2. Offshore borrow areas. Contract monitoring and data analysis of the seismic and vibracore data. Existing data are not sufficient to assess the extent of offshore borrow volumes of beach compatible sand. Continuation of the feasibility study is dependent on whether or not areas offshore exist that have potential sediment supplies near potential project areas.

3. Stage frequency. The stage frequency curves used in the reconnaissance study will be reevaluated and, if applicable, a new stage frequency developed. Risk and uncertainty will be incorporated in accordance with the most recent Corps of Engineers policy.

4. Wave height frequency. A wave height versus frequency curve will be developed based on recent CERC data collected at the field research facility in Duck, N.C. and on previous data containing wave heights for less frequent events. Risk and uncertainty will be incorporated in accordance with the most recent Corps of Engineers policy.

5. Beach profiles and survey baseline. A survey baseline will be established from northern Kitty Hawk town line to the southern end of South Nags Head, a distance of approximately 20 miles. Beach profiles will be obtained at 1,000 foot intervals along this baseline. The cross section of each profile will extend from landward of the existing dune to wading depth. Offshore surveys will also be obtained at the same station locations to approximately the 30-foot depth contour.

6. Photogrammetry. Contract work includes aerial photos, orthophotographs, and topography developed from aerial photography for the entire economic structure inventory, digitization for the COSTDAM model, reach identification, design line determination, and building relocation analyses. The orthophotographs will also be used to create detailed working maps of areas of interest. Topography will be needed to determine detailed wave inundation profiles for the area. These data must be current for the benefit cost analysis and are presently not available. Hired labor includes contract monitoring and preparation of the contract scope of work.

Task Description Example 3

This example describes a major task (Civil Design). In this example the requirements for general analysis are identified, as are the respective organizational elements that will be assigned to complete the major task. This example does not provide enough detail and the description is too brief. It also does not offer an explanation of why the tasks are necessary or when the tasks would be accomplished and how much they would cost. In fact, the description mentions many tasks and sub-tasks that could be defined and explained. Thus, only the what and who questions are answered, but they are answered inadequately. The problem being studied in this excerpt is to conduct and manage the Feasibility Phase for the Upper Penitencia Creek Flood Damage Reduction Study.

TASK DESCRIPTION EXAMPLE 3: Excerpt from *Upper Penitencia Creek, Draft Project Study Plan*

CIVIL DESIGN

Perform geometric design and layout, and coordinate surveys, mapping, and drafting requirements. Develop rudimentary working designs and quantities for preliminary plans. Develop detailed designs and quantity estimates for both the NED and LPP alternative plans (if the two plans are not the same), including basis for design and drafting. Compile written report and drawings for inclusion in the Feasibility Report and the Engineering Appendix.

Requirement to Complete Task: Digital topographic survey information, soil boring results, hydraulic design.
Work Elements: Hydraulics/Coastal section, Civil Design section, Geotechnical Section (soil boring contract).

Task Description Example 4

This narrative example describes one of many feasibility study subproducts defined in the Rio Salado, Salt River, Arizona, PSP. The example references schedule and estimated cost, as well as what and who will be involved in developing the subproduct Coordination and Public Involvement. It uses a WBS accounting system so that the schedule and cost of the subproduct and its related tasks may be tracked in relation to other efforts of the feasibility study. This example describes major tasks (i.e., 1.A, 1.B, etc.) that are trackable by account reference. Two project milestones are also defined within this particular tasking.

Task Description Example 5

This example describes the components of a feasibility study subproduct and its respective major tasks. The task names have been designated an alphabetic accounting code (i.e., JCA = Real Estate Supplement/Plan) that corresponds to the Civil Works Breakdown Structure, which is further utilized in preparing the feasibility study cost estimate and schedule of performance. Thus, the example adequately refers to what is to be done. However, this example does not incorporate many of the items needed to make it complete. The task description could be more specific with regard to whom is responsible for the work and the types of techniques that would be used, especially in real estate appraisal and physical takings analysis. There is no timeframe for the completion of tasks and no estimates of costs.

TASK DESCRIPTION EXAMPLE 4: Excerpt from *Rio Salado, Salt River, Arizona Feasibility Study, Feasibility Cost Sharing Agreement and Project Study Plan*

SUBACCOUNT 01 - Coordination and Public Involvement
SCHEDULE DURATION: 7/95 THRU 3/98
ESTIMATED TOTAL TASK COST: $50,000

The goals of this task are: 1) promote understanding of the planning, design, and construction processes; 2) obtain public input regarding problems, opportunities, constraints, alternatives, outputs, impacts and costs; and 3) coordinate Corps planning efforts with the efforts of other Federal, state, and local agencies.

This task will include public meetings, workshops, and briefings as well as the preparation and distribution of fact sheets and information papers to interested parties and local news agencies. A draft of all information to be provided to the public will be reviewed by the Study Manager.

The Coordination and Public Involvement Task will be a joint responsibility of several agencies. The work effort will be lead by the Corps of Engineers Study Manager with direct input and cooperation with interested agencies including but not necessarily limited to:

The City of Tempe, Arizona
The City of Phoenix, Arizona
The Flood Control District of Maricopa County
The Arizona Game and Fish Department
The Arizona Department of Water Resources
The Arizona Department of Environmental Quality
The United States Fish and Wildlife Service
The United States Environmental Protection Agency

The end product of the Coordination and Public Involvement Task will be to summarize the information obtained from the following subtasks into a Public Involvement section to the final feasibility report.

1.A Public Involvement Plan. The Corps Study Manager will provide participating sponsors with guidelines to define the objectives of the program. Public involvement techniques will be decided and a study schedule with specific milestones will be developed into a Public Involvement Plan. A mailing list will be prepared to include all potentially interested parties.

1.B Public Workshop (F2 Milestone). An initial public meeting will be held early in the feasibility schedule to serve to introduce the study to interested parties. Scoping issues, concerns, and opportunities will be discussed.

1.C Information Dissemination. All interested parties will continue to be informed of the progress of the study through news releases, newsletters, and telephone contacts. Prior to the Final Public Meeting, the Draft Feasibility Report will be released for review and comment by the public.

1.D Final Public Meeting (F7 Milestone). A Final Public Meeting will be held to present the findings of the Draft Feasibility Report. Direct input from the public will be obtained for incorporation into the Final Report.

TASK DESCRIPTION EXAMPLE 5: *San Joaquin River Basin, South Sacramento County Streams, Investigation, California, Feasibility Phase Initial Project Management Plan*

JC - REAL ESTATE ANALYSES/DOCUMENTS

JCA - Real Estate Supplement/Plan

Real estate studies will be conducted by the Corps to determine lands, easements, rights-of-way, relocations, and disposal areas (LERRDs) necessary for the project. The work includes completion of required investigations; preparation of documentation materials, including text and plates; coordination of real estate activities with the study manager; in-house reviews; response to comments; support to other technical elements during the study; and review of the financial plan. Costs, including acquisition and administrative, will be identified in the required format for the code of accounts. Study results will be documented in the real estate plan as an appendix to the feasibility report.

JCB - Gross Appraisal/Report

Investigative tasks will be conducted by the Corps and the non-Federal sponsor to include a gross appraisal of land costs, resale values, and damages required for economic evaluations of the alternative plans.

JCC - Preliminary Real Estate Acquisition Maps

Detailed identification of ownership and tentative real estate maps based on project design and mitigation requirements will be developed in accordance with ER 405-1-12 and ER 405-2-4.

JCD - Physical Takings Analysis

This is an analysis to evaluate if the project will hydraulically impact private property or rights for the public's use.

JCE - Preliminary Attorney's Opinion of Compensability

Investigation and attorney's determination, if owners of project affected facilities or utilities have a vested interest and compensable interest in the property.

JCF - Rights of Entry

Required rights-of-entry will be obtained by the Corps for cultural, environmental, HTRW, and engineering studies by the Corps.

JCG - All Other Real Estate Analyses/Documents

Real Estate input to the IPMP and an institutional real estate financial capability analysis are included under this subactivity.

Task Description Example 6

The following example from the Pillar Point Harbor PSP serves as example of what to avoid when writing your PSP. The Headquarters, Policy and Planning Division (CECW-P) provided comments after the first PSP revision. The following excerpt from the second PSP revision was still unacceptable due to a lack of detail. There is no mention of what data is being provided or how it will be used in the analysis by either the fishermen or the fisheries experts. Furthermore, two important and distinguishable tasks, the benefit analysis and the optimization, were not discussed individually. Moreover, there is no discussion as to what task or subtask the local sponsor is to perform.

TASK DESCRIPTION EXAMPLE 6: *Pillar Point Harbor Project Study Plan*

Benefit Analysis: The Corps will revise, as needed, the benefits analysis performed during the Reconnaissance. Data from local fisherman and fisheries experts will be obtained and utilized for this analysis. An incremental benefits analysis will be conducted to determine the optimum project depth. The period of analysis for the project will be limited to 50 years or the project life, whichever is less.
Requirements to Complete Task: Working costs estimates for proposed alternatives and working design from civil design and coastal hydraulics investigation must be completed.
Work Elements: Economics Branch, Cost Estimating Section, Civil Design Section, Hydraulics and Coastal Section, and SMCHD (the local sponsor).

Reference to Statutes, Regulations, and Guidance Needed to Perform the Work

A bibliography, or list of references, is a common part of almost any report. However, for the PSP, the references section does not list resources that were used to develop the PSP; but rather, statutes, regulations, Corps guidance, and other source materials that will be referred to during the feasibility study in the completion of feasibility study tasks. This requirement helps ensure that the study team has a firm understanding of technical and policy guidelines to follow during the conduct of the feasibility study. References that will be utilized during the completion of work tasks should be included at the end of the SOS section of the PSP.

Three examples of lists of references are provided below to illustrate this PSP requirement. The first two examples refer to quite different studies. The third example deals exclusively with references that are to be used to assess and control study quality.

References page from the *Navigation Feasibility Study, Cook Inlet, Alaska, Initial Project Management Plan*

The references cited below will provide technical guidance, in addition to that available in other texts, manuals, journals, and conference proceedings.

Pequegnat, W., Gallaway, B., and Wright, T. 1990. "Revised Procedural Guide for Designation Surveys of Ocean Dredged Material Disposal Sites," Technical Report D-90-8, U.S. Army Engineer Waterways Experiment Station, Vicksburg, 262 pp.

U.S. Army Corps of Engineers 1980. "Cost Estimates - Planning and Design Stages," EM 1110-2-1301, Washington D.C., 85 pp.

U.S. Army Corps of Engineers 1981. "Deep Draft Navigation Project Design." ER 1110-2-1404, Washington D.C., 10 pp.

U.S. Army Corps of Engineers 1983. "Hydraulic Design of Deep-Draft Navigation Projects," EM 1110-2-1613, Washington D.C., 74 pp.

U.S. Army Corps of Engineers 1989. "Water Levels and Water Heights for Coastal Engineering Design," Washington D.C., EM 1110-2-1414, 265 pp.

U.S. Army Corps of Engineers 1990. "Winter Navigation on Inland Waterways," EM 1110-8-1 (FR), Washington D.C., 265 pp.

U.S. Army Corps of Engineers 1991. "Tidal Hydraulics," EM 1110-2-1607, Washington D.C., 149 pp.

U.S. Army Corps of Engineers, Institute for Water Resources 1991. "National Economic Development Procedures Manual - Deep Draft Navigation," IWR Report 91- R-13, 256 pp.

Discussion of references from the *Metropolitan Region of Louisville, Kentucky Study, Initial Project Management Plan for Feasibility Study*

The work to be performed consists of a feasibility level effort per the attached schedules and budgets to determine the best solution to the flooding problems in the Morrison Creek/Laguna Creek basin. The National Economic Development (NED) plan will be identified, as well as any-plan preferred by the local sponsor, if different. This work includes preparation of an environmental impact statement/environmental impact report (EIS/EIR), cost/benefit evaluations, the necessary survey and geotechnical investigations, a hydraulic analysis, design calculations and drawings, preparation of an M-CACES cost estimate, real estate investigations, a recreational and wildlife enhancement analysis, study management, and coordination with local, State, and Federal agencies as well as environmental/other interest groups and the public. The scope of studies in terms of content and level of detail for the feasibility stage effort are as defined and required by the following documents:

ER 5-7-1 *dtd 1 March 1991*	*"Project Management"* *Department of the Army regulation for the overall management of civil works projects*
ER 220-2-2 *dtd 4 March 1988* *33 CFR 230*	*"Procedures for Implementing NEPA"* *Department of Army regulation on environmental quality*
ER 405-1-12 (Ch 12) *dtd 28 May 1991*	*"Real Estate Handbook - Local Cooperation"* *Department of the Army regulation establishing guidelines for real estate activities for local cooperation agreements.*
ER 1105-2-100 *dtd 28 December 1990*	*"Planning Guidance"* *Department of the Army regulation on policy and guidance for the conduct of civil works planning studies.*

ER 1110-2-1150	*"Engineering and Design for Civil Works Projects"*
ER 1165-2-131	*"Local Cooperation Agreement for New Starts" Department of the Army regulation for developing and processing local cooperation agreements.*
EC 1105-2-205	*"Risk Based Analysis for Evaluation of Hydrology/Hydraulics and Economics in Flood Damage Reduction Studies"*
EC 1110-2-263	*"Civil Works Construction Cost Engineering" Department of the Army circular establishing accounting standards for preparing cost estimates for civil project.*
EC 1110-2-538	*"Civil Works Project Cost Estimating - Code of Accounts" Department of the Army circular establishing accounting standards for preparing cost estimates for civil projects.*
EM 1110-2-1301	*"Cost Estimates - Planning and Design Stages"*
U.S. Water Resources Council Publication dtd 10 March 1983	*Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*

References to quality control guidance from the *Quality Control Plan, Central and Southern Florida Project Feasibility Studies*

CESAJ-PD-P Memorandum, dated 30 October 1995, subject: SAD Technical Quality Control and Review Guidelines.

CESAD-ET-E Memorandum, dated 13 October 1995, subject: SAD Quality Assurance Plan (Draft).

CESAD-ET-PL Memorandum, dated 22 September 1995, subject: SAD Technical Quality Control and Review Guidelines.

CESAJ-DP Memorandum, dated 7 August 1995, subject: Technical Review at District.

CECW-PW Memorandum dated 25 July 1995, subject: Planning Guidance Letter 95-02, Alternative Review Process.

CESAD-EP-PL Memorandum, dated 28 June 1995, subject: SAD Engineering and Planning Chiefs Meeting

CECW-A Memorandum, dated 25 April 95, subject: Implementation of New Technical and Policy Review Procedures.

CECW-A Memorandum, dated 14 April 95, subject: Implementation of New Technical and Policy Review Procedures.

CECW-A Policy Memorandum No. 2, dated 6 April 95, Subject: Civil Works Decision Document Review - Review Compliance.

ER 1110-1-12, dated 1 June 93, subject: E&D Quality Management.

CEAO-I Memorandum, dated 10 August 1988, subject: HQUSACE Internal Review Guides - Compliance with Feasibility Study Guidance.

SOS Checklist

This checklist serves as an aid to determine whether the Task-Specific Scope of Studies (Reconnaissance overview and detailed Scope of Studies) of your PSP meets the requirements presented in the official guidance. In developing your own SOS, use the examples given on the previous questions as a guide, but make sure you answer these questions. If you have answered these questions, your SOS will represent a fully formulated plan of study.

1. What are the major products and subproducts that will be produced during the Feasibility Phase?
2. What tasks and subtasks are required for the study in order to produce the products?
3. Why is each task necessary?
4. Who will accomplish each task?
5. When will the task be accomplished?
6. How critical is the task to the analysis?
7. How sensitive is the information needed for the task?
8. How will the task be accomplished?
9. What methods will be used to accomplish the task?
10. What information is required to accomplish each task?
11. What information is available?
12. What information will need to be collected or derived?
13. How much time and money should be devoted to each task?
14. What supporting documentation and guidance will be referred to during the fulfillment of the work effort?

PREPARING THE WORK BREAKDOWN STRUCTURE

The Work Breakdown Structure (WBS) is a product-oriented hierarchy of the scope of work, and is broken down into component products and sub-products. A well-developed WBS follows and relates the definition of major tasks, tasks, and subtasks defined in the SOS, and provides an accounting system for organizing the scope in a logical manner. The WBS is intended to summarize

the entire feasibility work effort and presents a simple derivation of what you plan to accomplish. In other words, the WBS identifies an outline of the specific tasks that are to be accomplished on the way to producing the feasibility study products. The WBS should follow a consistent set of accounting codes that can be used to cross-list the tasking described in the SOS with the costs summarized in the feasibility study cost estimate.

The following abbreviated example represents a simple Work Breakdown Structure of a certified PSP. This example identifies the study, the major products of the study, the subproducts, and the major tasks that will be undertaken to produce the products. The example shows that the Engineering Appendix (defined in the example as one of six products) consists of four major subproducts. Next, the example shows that the first subproduct of the Engineering Appendix product is Engineering Studies, Investigation and Design. In turn, Engineering Studies, Investigation and Design consists of five major tasks: (1) Hydraulic Design, (2) Civil Design, (3) Topographic Surveying, (4) Geotechnical Testing and Design, and (5) Cost Estimating. This WBS does not define any tasks subordinate to the major task level.

In addition to presenting the work which must be done to complete the feasibility phase, the WBS must establish a consistent set of accounting codes so that the tasks of the WBS can be linked to the SOS, the Responsibility Assignment Matrix (RAM), and the feasibility study cost estimate. The accounting codes of the WBS are intended to allow products, tasks, cost, and schedule to be tracked with easy reference throughout the feasibility phase. The Civil Works Breakdown Structure is an accounting system for Civil Works projects and can be used in the WBS of your PSP. As stated earlier in a footnote to this chapter, the Corps of Engineers Financial Management System (CEFMS) and the Project Management Information System (PROMIS) were designed to directly accept cost data for projects set-up using the Civil Works Breakdown Structure. Once these management systems go on line, no funds can be spent without a study budget based on the Civil Works Breakdown Structure. Other new Corps applications are expected to require the use of the Civil Works Breakdown structure as well. Therefore, in anticipation of the requirements of these systems, you are encouraged to adopt the accounting system of the Civil Works Breakdown Structure for your WBS. Table III-1 lists the accounting codes of the Civil Works Breakdown Structure for a feasibility report. The alphabetic code J corresponds to (and links) all work efforts related to preparing the feasibility report to the Feasibility Report product. The second level (e.g., JA = Engineering Appendix) corresponds to subproducts of the feasibility report. The third level (e.g., JCB = Gross Appraisal Report) corresponds to major tasks/work elements. The three dashes after the third level of the Civil Works Breakdown Structure indicates the flexibility to define tasks (4th level), sub-tasks (5th level), and sub-sub-tasks (6th level) in the WBS, if desired or necessary, using the alphabetic codes. To reiterate the example given earlier in this chapter, consider the following abbreviated WBS that concerns economic analysis and utilizes the accounting system of the Civil Works Breakdown Structure:

J - Feasibility Report (Product)
- JB - Socioeconomic Studies/Report (Subproduct)
  - JBA - Economic Analysis (Major Task)
    - JBAA - Estimate Damages (Task)
      - JBAAA - Inventory Flood Plain (Sub-Task)
        - JBAAAA - Photograph Samples (Sub-sub-Task)

WBS EXAMPLE: Derived from *Upper Penitencia Creek Draft Project Study Plan*

I. Level 1. The Study - Upper Penitencia Creek Flood Control Project Feasibility Study

II. Level 2. Major Products of the Study
1. Feasibility Report
2. Engineering Appendix
3. Real Estate Appendix
4. Environmental Impact Statement/Report (EIS/EIR)
5. Economics Appendix
6. Project Cooperation Agreement (PCA)

III. Level 3. Subproducts Subordinate to Level 2 Products
1. Feasibility Report
   a. Alternatives Analysis
   b. Recommendation
2. Engineering Appendix
   a. Engineering Studies, Investigation, and Design
   b. Plates. Design drawings, sketches, charts, diagrams, maps, profiles, or other graphic data necessary to clearly illustrate the design. The maps should clearly identify all place names mentioned in the test of the Engineering Appendix.
   c. Cost Estimate. Update baseline cost estimate with appropriate contingencies.
   d. Recommendations. Pertinent recommendations of the District Commander on the overall plan recommended in the Engineering Appendix. Recommendations regarding action on the Engineering Appendix should be contained in the letter of transmittal.
3. Real Estate Appendix
   a. Real Estate Evaluation
   b. Recommendations
4. Environmental Impact Statement/Report (EIS/EIR)
   a. Alternatives analysis
   b. Social studies
   c. Mitigation planning
   d. Cultural Resources
   e. Hazardous, Toxic, Radiological Waste study
   f. Fish & Wildlife study
   g. Permits
5. Economics Appendix
   a. Current economic analysis of the project, incl. Identification of the NED plan.
   b. Financial Analysis
6. Project Cooperation Agreement (PCA)
   a. Financial Plan
   b. Draft PCA
   c. Certificate of Legal Authority

IV. Level 4. Major Tasks Subordinate to Level 3 Subproducts
2. Engineering Appendix
   a. Engineering Studies, Investigation, and Design
      1) Hydraulic Design
      2) Civil Design
      3) Topographic Surveying
      4) Geotechnical Testing and Design
      5) Cost Estimating

TABLE III-1
CIVIL WORKS BREAKDOWN STRUCTURE
FOR FEASIBILITY REPORT PRODUCT

J-----Feasibility Report
- JA----Engineering Appendix
  - JAA---Surveys and Mapping, Except for Real Estate
  - JAB---Hydrology and Hydraulic Studies/Report
  - JAC---Geotechnical Studies/Report
  - JAE---Engineering and Design Analysis Report with Preliminary Drawings
- JB----Socioeconomic Studies/Report
  - JBA---Economic Analysis/Report
  - JBB---Social Studies/Report
  - JBC---Institutional Studies/Report
  - JBD---Ability to Pay Report
  - JBE---Financial Analysis Report
- JC----Real Estate Analyses/Documents
  - JCA---Real Estate Supplement/Plan
  - JCB---Gross Appraisal/Report
  - JCC---Preliminary Real Estate Acquisition Maps
  - JCD---Physical Takings Analysis
  - JCE---Preliminary Attorney's Opinion of Compensability
  - JCF---Rights of Entry
  - JCG---All Other Real Estate Analyses/Documents
- JD----Environmental Studies/Report
  - JDA---Environmental Studies/Report
  - JDB---Environmental Assessment or Finding of No Significant Impact
  - JDC---Environmental Impact Statement, or Supplemental Environmental Impact Statement
  - JDD---Coordination Documents with Other Agencies
  - JDE---Environmental Resource Inventory Report
  - JDF---Mitigation Analysis Report
  - JDG---Endangered Species Report
  - JDH---Section 404 Analysis Report
  - JDI---401 State Water Quality Certification
  - JDJ---Record of Decision
  - JDK---Section 103 Evaluation
  - JDL---Statement of Findings
  - JDM---Coastal Zone Management Consistency Determination
  - JDN---All Other Environmental Documents
- JE----Fish and Wildlife Coordination Act Report

TABLE III-1 (Continued)
CIVIL WORKS BREAKDOWN STRUCTURE
FOR FEASIBILITY REPORT PRODUCT

JF----HTRW Studies/Report
- JFA---HTRW Preliminary Assessment Report
- JFB---HTRW Site Inspection Report
- JFC---HTRW Remedial Investigation Study/Report
- JFD---All Other HTRW Documents

JG----Cultural Resources Report
- JGA---Site Survey Field Report
- JGB---Data Collection and Analysis Report
- JGC---Mitigation Plan Report
- JGD---Memorandum of Agreement
- JGE---One Percent Waiver
- JGF---All Other Cultural Resources Studies/Reports

JH----Cost Estimates
- JHA---Study Cost Estimate Updates
- JHB---PE&D Cost Estimate
- JHC---Project Cost Estimate
- JHD---OMRR&R Cost Estimate
- JHE---Baseline Fully Funded Cost Estimate
- JHF---All Other Cost Estimates

JI----Public Involvement Documents
- JIA---Notice of Public Meeting(s)
- JIB---Minutes of Public Meeting(s)
- JIC---Public Comments Report
- JID---Newsletters
- JIE---All Other Public Involvement Documents

JJ----Plan Formulation and Evaluation Report

JK----Draft Report Documentation
- JKA---Review Conference Documents
- JKB---Public Review Comments
- JKC---Project Guidance Memorandum
- JKE---All Other Draft Feasibility Report Documents

JL----Final Report Documentation
- JLA---Division Commanders Notice
- JLB---All Other Final Feasibility Report Documents

JM----Washington Level Report Approval
- JMA---Policy Review Approval
- JMB---Chief's Report
- JMC---OMB Report Approval
- JMD---ASA(CW) Report Approval

JN----All Other Feasibility Studies/Investigations

TABLE III-1 (Continued) CIVIL WORKS BREAKDOWN STRUCTURE FOR FEASIBILITY REPORT PRODUCT
JO----Damages Assessed AE Contractors JP----Management Documents JPA---AE Contract Documents JPB---Coordination Documents JPC---Study Funds Control Documents JPD---Trip Reports JPE---Minutes of Technical Review Conference JPF---All Other Management Documents

You will be expected to summarize the entire feasibility study in the WBS portion of your PSP using this type of hierarchical accounting system. The number of distinct levels in your WBS necessarily will depend on the number of subproducts you have defined and the level at which you plan to explain and track your work efforts for each subproduct.[1] For study management purposes, products and tasks should be broken down enough to answer the interrogatives of the SOS. For financial management purposes, the WBS must at least be grouped at the subproduct level and preferably at the major task level.

PREPARING THE ORGANIZATIONAL BREAKDOWN STRUCTURE

The Organizational Breakdown Structure (OBS) identifies which organization has responsibility or input for completing which tasks. Although the OBS is not explicitly required by the PSP guidance, it will help you formulate the Responsibility Assignment Matrix which is required. Besides identifying task responsibility, the OBS section should include mechanisms for assuring proper coordination among those involved in the feasibility study.

Organizational Work Responsibilities

The Organization Breakdown Structure (OBS) describes the responsibility of organization(s) in providing input to and/or completing tasks identified in the Scope of Studies and Work

[1] Note that the alphabetic code J relates only to the feasibility report product of the feasibility phase. Other products related to the feasibility phase (e.g., the Project Cooperation Agreement) and their related tasks will assume different alphabetic accounting codes within the Civil Works Breakdown Structure. For your convenience, the Civil Works Breakdown Structure is defined in it's entirety at the IWR homepage and/or Civil Works homepage, along with this guidebook.

OBS EXAMPLE: *Hudson River Habitat Restoration Reconnaissance Report, Revised Project Study Plan (PSP)*

EXECUTIVE COMMITTEE

As indicated in the Feasibility Cost-Sharing Agreement (FCSA), the overall study management is the responsibility of the Executive Committee, which is comprised of the New York District Engineer; Deputy District Engineer; the Chief of Programs and Project Management Division; the Chief of Planning Division; the Commissioner of the New York State Department of Environmental Resources and the New York State Secretary of State (or their representatives); The Executive Committee will meet throughout the study to review study progress, finances, and findings as developed and reported by the study team. The Chief of Environmental Analysis Branch, New York District, will act as alternate for the Chief of Planning Division while also serving as liaison to the study team.

As detailed in the FCSA for Interim #1, the Executive Committee must approve any significant amendments to the FCSA. Significant changes are defined as any modification to the FCSAs which increases the total study costs by more than 15 percent. For the first interim, this would be any cost exceeding $1,654,850.00. They must also approve any reassignment of work items between the sponsors/Federal government.

The Executive Committee is also responsible for decisions on whether to suspend or terminate studies under conditions of the FCSA. The committee will also resolve any disputes which are not resolved by the study team and will appoint appropriate representatives to serve on the study team.

PROGRAMS AND PROJECT MANAGEMENT DIVISION

The Project Manager (PM) is responsible for reporting to the District's Project Review Board and for preparation of required Life Cycle Project Management (LCPM) reports. In addition, PM responsibilities include the monitoring of project schedules and finances, processing schedule and cost change requests (SCCR), review of budget documents, coordination of Preliminary Cooperation Agreements (PCAs), and identifying problems and issues.

PLANNING DIVISION

Environmental Analysis Branch is the Planning Division Study Manager and is responsible for study management, including: developing environmental and cultural data, developing incremental analyses for justification of environmental projects, assessing environmental impacts, preparing mitigation plans, accomplishing environmental compliance, preparing study schedules, leading plan formulation, monitoring the progress of technical work, developing and preparing the feasibility report; developing economic data and demographic information, and evaluating economic impacts.

ENGINEERING DIVISION

The Engineering Division Technical Manager is responsible for managing the Engineering Division contribution to the feasibility study. This includes coordinating with the study manager regarding the status of efforts. The Geotechnical Branch is responsible for review and /or completion of design studies of foundations and other geotechnical matters (including subsurface exploration and sediment testing). Developing cost estimates for initial construction/maintenance of alternative plans, and the selected plan, is the responsibility of the Cost Engineering Branch. The Hydrology and Hydraulics Section is responsible for determining hydrology studies.

OPERATIONS DIVISION

The Operations Division will coordinate all necessary mapping, surveying and recording (including documentation related to past or ongoing federal projects in the study area), and formulate potential wetland restoration for those projects utilizing dredged material or those that potentially impact the existing navigation project.

OBS EXAMPLE (Continued): *Hudson River Habitat Restoration Reconnaissance Report, Revised Project Study Plan (PSP)*

REAL ESTATE DIVISION

The Real Estate Division is responsible for determining land ownership, and developing the real estate gross appraisal, and the real estate plan which will include a baseline cost estimate for real estate, development of a detailed schedule of acquisition milestones, and a general description of the area and total acreage to be acquired, with fee and easement breakdown. The Real Estate Division TM will be responsible for securing rights-of-entry for technical data collection.

SPONSORS

The sponsors will be involved in all aspects of the feasibility study to ensure that they agree with the findings of the study. The Corps will: fully coordinate with the sponsors for their experience/expertise concerning certain issues; attend progress meeting/public workshops; provide scientific/technical input to field studies; and participate in the plan formulation process, development of recommended plans, and review reports. The specific in-kind services that the sponsors are responsible for are described in section XI of this PSP. The study sponsors include the New York State Department of Environmental Conservation, and the New York State Department of State.

OTHER PARTICIPANTS

Numerous agencies/organizations will be consulted throughout the study for their input. Some agencies will participate in all projects and others will only participate in the plan formulation process for specific projects. Those organizations that control property, have shown a special interest in the study, or have a certain area of expertise required for the study include the following agencies which do not incorporate those organizations that were on the study mailing list. U.S. Fish and Wildlife Service, the National Estuarine Research Reserve - Hudson River Section, the National Oceanic and Atmosphere Administration-National Marine Fisheries Service, the National Oceanic and Atmosphere Administration-Sea Grant Program, the Department of Transportation-AMTRACK/CONRAIL, The Nature Conservancy, Ducks Unlimited, the Institute for Ecosystem Studies, Hudsonia, and the Museum of the Hudson Highlands.

Breakdown Structure. The following excerpt is an abbreviated OBS narrative from a certified PSP. The example identifies the major responsibilities of the primary work elements, the sponsor, and other external agencies.

Description of Coordination Mechanisms

Feasibility studies normally require input from many different work elements, the sponsor, and other external organizations, such as consultants, universities, and other government agencies. Proper coordination among these study participants is essential to stay on schedule, to avoid duplication of efforts, to detect problems in a timely manner, and generally to maintain agreement and cooperation—hence, the reason for identifying coordination mechanisms within the PSP.

The following excerpt from the *Upper Mississippi-Illinois Waterway System Navigation Study Baseline IPMP* defines both internal and external formal mechanisms for study coordination. This example represents a very well specified and ambitious plan for study coordination.

2.2.7 Formal Internal Measures

To ensure that effective internal command, control, and coordination is maintained during the feasibility study, the following special measures will be continued or implemented within the Corps of Engineers structure:

2.2.7.1 Quarterly District Commander IPR's. The Commanders from CENCS, CENCR, and CELMS will meet quarterly with the PM and TM's from each discipline. Division commanders will be informed of meeting dates and places and determine what form of participation is warranted. These meetings will include reporting on study progress, schedules, fiscal management, and issues that can be resolved at a district level.

2.2.7.2 Semi-Annual HQUSACE/Division IPR's. As recommended in HQUSACE memorandum of October 15, 1991, HQUSACE, CELMV, and CENCD representatives, the PM, FM's, TM's, district counterparts, and work group participants will meet semi-annually to report study progress, explore concerns, resolve critical issues, and receive guidance and direction. These IPR's will be held in conjunction with two quarterly IPR's for the three district commanders.

2.2.7.3 Earned Value Analysis. An earned value analysis will be accomplished on a monthly basis. The purpose of the analysis is to assess actual study progress against scheduled progress in regards to both cost and schedule. Performing this analysis also will indicate cost and schedule variances. A detailed description of this analysis is contained in Section 3.

2.2.7.4 Annual Work Plan. A work plan will be developed on an annual basis which reflects anticipated funding levels and work efforts. The plan will include reports on study progress to date, a schedule for the efforts planned for the coming year, specific work tasks required to complete investigations, estimates of costs from each work group by district, and other pertinent information. The plans will be approved by the Division Commanders of NCD and LMVD.

2.3 OTHER FEDERAL/STATE AGENCY OR INDIVIDUAL COORDINATION (EXTERNAL)

In several important areas of the feasibility phase investigation, coordination outside the Corps of Engineers will be necessary. External counterparts for the environmental work effort include U.S. Environmental Protection Agency (EPA), Advisory Council on Historic Preservation (ACHP), U.S. Fish and Wildlife Service (USFWS), Environmental Management Technical Center (EMTC), Waterways Experiment Station (WES), State Historic Preservation Officer (SHPO), the States of Iowa, Illinois, Wisconsin, Minnesota, and Missouri, and others.

2.3.1 Formal External Measures

The following measures will be implemented:

2.3.1.1 Coordination Committees

2.3.1.1.1 Governor's Liaison Committee. This committee consists of the Governor's designated representatives of the Sates of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, and the Commander of the North Central Division, U.S. Army Corps of Engineers. The purposes of the committee are:

(1) To provide the Corps of Engineers with the position of the Governor of each state on matters pertaining to the navigation study;

(2) To facilitate efforts by the Governor's representatives to arrive at a consensus among the five states; and

(3) To engender a shared set of goals and expectations for the navigation study among all committee members.

2.3.1.1.2 Work Group Coordination Committees. In addition to the external environmental coordination mentioned above, external coordination among the economics, engineering, and public involvement work groups also will be necessary. Committees will be established comprised of appropriate technical staff from the Corps of Engineers, other interested Federal agencies, and the states. Committee members also may include representatives from industry, academia, and other interests deemed appropriate. The general purpose of the work group coordination committees is to garner external input, support, and review of the technical aspects of the navigation study to help ensure development of a satisfactory product.

2.3.1.2 Public Meetings/Workshops. These gatherings will be scheduled throughout the study period to gather input, report on study progress, or to report study findings. The Public Involvement Work Group will arrange for and report on public meetings/workshops.

2.3.1.3 Study Updates. Study updates will be provided throughout the study period to the UMRBA, Illinois River Carriers, Inland Waterway Users Board, Upper Mississippi River Conservation Committee (UMRCC), MARC 2000, congressional and senatorial representatives, and others, as appropriate.

2.3.1.4 Newsletters. Newsletters will be developed by the Public Involvement Work Group with information provided by each TM. Newsletters will be distributed three times each year to a public mailing of approximately 1,500 agencies and interested individuals.

Development of Resource Codes

If there are multiple internal and external organizations involved in the development of the feasibility study, it may be necessary to develop a set of Resource Codes for accounting and administrative purposes. Typically resource codes abbreviate the names of important parties so that their respective responsibilities can be easily summarized in a Responsibility Assignment Matrix.

Table III-2 defines an example set of resource codes and their respective descriptions and are used in conjunction with the following Responsibility Assignment Matrix (Table III-3).

TABLE III-2
EXAMPLE RESOURCE CODES AND DESCRIPTIONS FOR RAM

Resource Code	Description
PM	Project Manager
PE-PF	Planning/Engineering Division - Plan Formulation Branch
PE-PE	Planning/Engineering Division - Plan Evaluation Branch
PA	Planning Associate
PE-C	Planning/Engineering Division - Cost Engineering Branch
PE-DC	Planning/Engineering Division - Design and Cost Estimates Branch
PE-HY	Planning/Engineering Division - Hydrology Branch
PE-HD	Planning/Engineering Division - Hydraulic Branch
PE-HR	Planning/Engineering Division - Economics Branch
PE-GG	Planning/Engineering Division - Geotechnical Branch
PE-GS	Planning/Engineering Division - Geology and Soils Branch
PE-GM	Planning/Engineering Division - Groundwater Management Branch
PE-RPE	Planning/Engineering Division - Report Preparation and Evaluation Branch
PE-RR	Planning/Engineering Division - Riparian Rights Branch
PE-RRF	Planning/Engineering Division - Riparian Rights and Forestry Branch
RE-A	Real Estate Division - Acquisition Branch
RE-AP	Real Estate Division - Appraisal Branch
OP-NW	Operations Division - Northwest
CO	Construction Division
PE-MS	Planning/Engineering Division - Mapping and Surveys Branch

TABLE III-3
EXAMPLE RESPONSIBILITY ASSIGNMENT MATRIX (RAM)

WBS	ACTIVITY	PM	PE-PF	PE-PE	PA	PE-C	PE-DC	PE-HY PE-HD	PE-HR	PE-GG PE-GS	PE-GM	PE-RPE	PE-RR PE-RRF	RE-A	RE-AP	OP-NW	CO	PE-MS	SPONSOR
CODE	FEASIBILITY RPT																		
J	MAIN REPORT	0	*		0						0								0
JA	ENGINEERING APP.																		
JAB	HYDRAULIC	0	0					*			0		0					0	0
JAC	GEOTECHNICAL	0	0							*									
JAG	DRE. & DIS. PL.	0	0				0	*		0	0					0	0		0
JB	ECONOMIC APP.	0	0	*				0								0		0	
JC	REAL ESTATE APP.	0													*				0
JD	ENVIRONMEN. APP.																		
JDC	ENVIR. IMP. STAT.	0	0	0				0	0			*	0						
JDH	SEC. 404 EVAL.	0	0									*							
JDI	SED. QUAL. EVAL.	0	0						0										*
JDK	SEC. 103 EVAL.	0	0					0	0	0	0	*	0			0			
JDM	CZM CONST. DEP.	0	0									*							
JE	FISH & WILDLIFE	0	0	0							0		*			0		0	0
JF	HTRW CONTAMIN.	0	0				*												
JG	CULTURAL REPORT	0	0										*						
JH	COST ESTIMATES	0	0			*									0				
JJ	PLAN FORMULATION	0	*	0		0		0								0	0		0
KA	PROJ. COOP. AGT.	0		0										*					0
LA	PROJECT MGT. PLAN	*	0	0			0	0	0	0		0	0	0	0	0	0		0
	REVIEW SUPPORT	0	*	0			0	0	0				0	0					0
	INFLATION FACTOR	*																	
	CONTINGENCY	*																	

LEGEND: * LEAD ORGANIZATION
0 CONTRIBUTING ORGANIZATION

The Responsibility Assignment Matrix

The Responsibility Assignment Matrix (RAM) is a tabular representation of the organizational responsibilities for the performance of the work efforts defined in the Work Breakdown Structure and is a required component of the PSP. It defines the intersection of the Organizational Breakdown Structure and the Work Breakdown Structure. Table III-3 presents an example of a thoroughly defined and well-structured RAM. Notice that WBS Codes are represented vertically in the first column of the matrix and adopt the accounting system of the Civil Works Breakdown Structure. Resource Accounts of the OBS are represented horizontally in the first row of the matrix. Thus, as required, the individual cells of the matrix identify the intersection of the WBS and OBS.

CHECKLIST FOR THE WBS, OBS, AND RAM

Before submitting your PSP for review, make sure that it contains a well defined Work Breakdown Structure, Organizational Breakdown Structure, and Responsibility Assignment Matrix. The following questions will help serve as a guide in preparing these components of the PSP.

A. Work Breakdown Structure

1. Does the WBS identify the major products of the study?
2. Does the WBS identify the tasks that will be undertaken to produce the products?
3. Do the products and tasks specified in the WBS correspond to those identified in the Scope of Study?
4. Has a WBS accounting system been established? Is the accounting system used consistently throughout the PSP? Does it correspond to accounting system of the Civil Works Breakdown Structure?

B. Organizational Breakdown Structure and Responsibility Assignment Matrix

1. Does the OBS identify and describe the functional organizations that are responsible for providing input to and/or completing each task identified in the Scope of Studies and Work Breakdown Structure?
2. Have you identified how the work activities of functional organizations and other involved parties will be coordinated?
3. Has the Responsibility Assignment Matrix (RAM) been completed? Does it conform to the intersection of the WBS and OBS?

PREPARING THE FEASIBILITY STUDY SCHEDULE

The PSP must define a schedule for the completion of major milestones and tasks so that it can be used for measuring the progress of the feasibility study. The Feasibility Study Schedule and designated milestones should include items such as key decision points, in-progress reviews, and issue resolution meetings. Development of the schedule should involve input from the personnel who will be expected to perform the work.

Major Milestones

To illustrate the schedule of major milestones, consider the following example below. The example lists (1) Milestone #, (2) Completion date, and (3) Milestone. The Milestone # code was designed to track a specific milestone throughout the entire Feasibility Phase in relation to other milestones and project tasks defined in the SOS and WBS.

LISTING OF MAJOR MILESTONES BY MILESTONE # : Derived from the *Metropolitan Region of Louisville Kentucky Study, Initial Project Management Plan for Feasibility Study.*

Milestone #	Completion	Milestone
MS100	March 1994	Initiation of Feasibility Study
MS120	May 1995	Technical Review Conference (TRC)
MS134	November 1995	Submit Preliminary Draft Report & M-CACES
MS140	December 1995	Feasibility Review Conference (FRC)
MS145	December 1995	HQUSACE submits PGM to CEORD
MS146	April 1996	Submit Draft Report & M-CACES
MS148	April 1996	CEORD approves Draft Report
MS152	May 1996	Public Review of Draft Feasibility Report
MS154	July 1996	Submit Final Feasibility Report & M-CACES
MS170	July 1996	Division's Commander Notice

Task Dependencies and Timeline for Work Activities

The GANTT chart is a useful approach for presenting the Feasibility Study Schedule in a way that illustrates task dependencies and provides a timeline for work activities. In the GANTT chart provided below, each task is listed, along with its start date, finish date, and duration in days. In addition, it provides a visual representation of when the tasks begin, what other tasks are being conducted simultaneously, and meeting dates (shown with a diamond). Even if you choose not to use a GANNT chart, you should at least define the anticipated duration of each task identified in the SOS and identify milestones in a tabular format.

The flowchart below provides another method of illustrating the plan formulation process. This type of figure is easy to read and understand by simply following the flow lines. The flowchart is designed to illustrate the sequence and interdependency of tasks and subtasks throughout the entire schedule of performance. Ideally, such a flowchart will supplement tabular and other visual representations of the project schedule.

Feasibility Study Schedule Checklist

This checklist will assist you in deciding whether the Feasibility Study Schedule in your PSP has met the requirements presented in the official guidance. Your Feasibility Study Schedule must estimate the time it will take to perform feasibility study tasks and should relate and portray milestones for completing major products, including items such as key decision points, in-progress reviews, and issue resolution meetings. If you are able to answer these questions affirmatively, your Feasibility Study Schedule is complete.

1. Have you identified the tentative dates for major milestones and delivery of products?

2. Have you estimated the duration of each work task?

3. Have you illustrated the entire study schedule through the use of tables and charts?

4. Have you characterized the sequence and coordination of tasks?

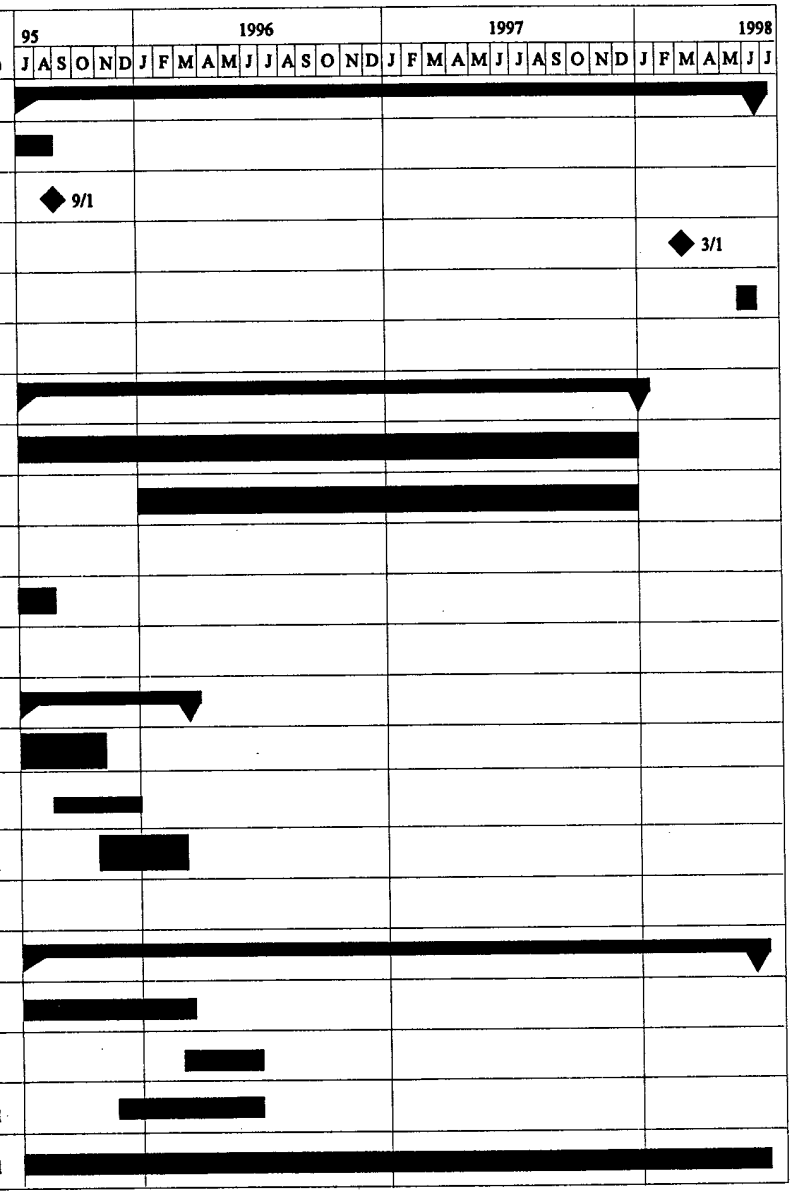
5. Have you linked the schedule to your RAM, that is, to both tasks and those who perform the work?

FEASIBILITY STUDY COST ESTIMATE

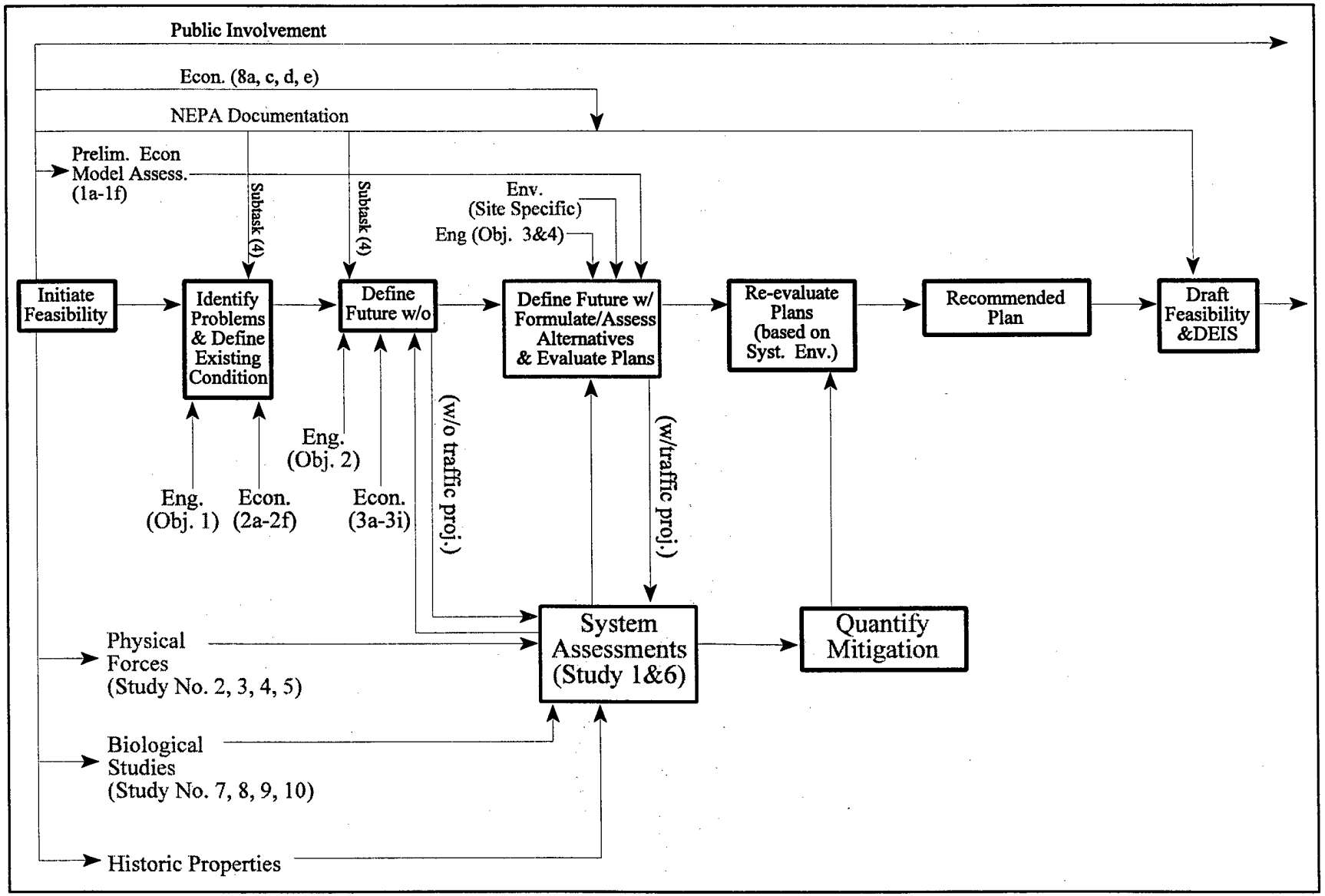
The Feasibility Study Cost Estimate in your PSP will assign costs to the work tasks of the feasibility study over the period of the investigation. Although costs are to be provided in the SOS, one must also have a distinct section in the PSP that deals with study costs. In most cases the

TASK SCHEDULE EXAMPLE: GANTT CHART FOR ILLUSTRATING PROJECT SCHEDULE: Reproduced from *Rio Salado, Salt River, Arizona Feasibility Study, Feasibility Cost Sharing Agreement and Project Study Plan*

ID	Task Name	Start	Finish	Duration
1	**01 - COORDINATION & PUBLIC INVOLVEMENT**	7/3/95	7/1/98	783d
2	Public Involvement Plan, Mailing List	7/3/95	8/31/95	44d
3	F2 - Public Workshop (Initial Pub Mtg)	9/1/95	9/1/95	0d
4	F7 - Final Public Meeting	3/1/98	3/1/98	0d
5	Distribute Final Report	6/1/98	7/1/98	23d
6				
7	**02 - IMPLEMENTATION STUDIES**	7/3/95	12/31/97	653d
8	Financial Analysis & Planning	7/3/95	12/31/97	653d
9	Documentation, Coordination	1/1/96	12/31/97	523d
10				
11	**03 - DEMOGRAPHIC STUDIES**	7/3/95	9/1/95	45d
12				
13	**04 - CULTURAL RESOURCES STUDIES**	7/3/95	2/29/96	174d
14	Archival and Field Surveys	7/3/95	10/31/95	87d
15	SHPO Coordination	9/1/95	12/31/95	86d
16	Report Writing	11/1/95	2/29/96	87d
17				
18	**05 - ENVIRONMENTAL STUDIES**	7/3/95	7/1/98	783d
19	Establish Without Project Conditions	7/3/95	2/29/96	174d
20	Habitat and Recreation Planning & Evaluation	3/1/96	6/30/96	86d
21	Documentation and Coordination	12/1/95	6/30/96	151d
22	NEPA - Public Involvement	7/3/95	7/1/98	783d



FEASIBILITY STUDY FLOWCHART EXAMPLE: Reproduced from *Upper Mississippi River - Illinois Waterway System Navigation Study*



Feasibility Study Cost Estimate does not need to have a substantial amount of narrative description. This section must, however, tabularize the cost of the work efforts of the feasibility study. The tabularization must identify costs to the government and financial and in-kind costs of the sponsor(s). If the cost estimates incorporate contingencies and/or cost escalation, then the assumptions must be defined explicitly. For consistency, the feasibility study cost estimate should follow the same accounting codes of the WBS that define producs and tasks. Again, you are encouraged to use the accounting codes of the Civil Works Breakdown Structure.

Costs of Work Tasks

Your cost estimate must reflect the anticipated cost of each task defined in the SOS, WBS, and RAM components of your PSP. For multiple year studies, costs by task must be defined each year of the investigation. Costs should be defined at least at the subproduct level of your WBS and preferably at the major task level.

Federal Contribution

The Federal Government provides 50 percent of the total funding of the feasibility study. The Federal cost contributions must be clearly indicated for each of the subproducts and major tasks defined in your cost estimate.

Sponsor Contribution

The local sponsor contributes 50 percent of all feasibility study costs. Up to one-half of this amount may be provided in the form of in-kind services. The FCSE must indicate separately the cash contributions of sponsors and the cash value of their in-kind services.

Cost Escalation

Allowances for inflation should be included in your study cost estimates, particularly if the feasibility study is expected to extend over more than one year. This allows the local sponsor(s) to be aware of the possibility of an increase in their total financial commitment and provides you with some flexibility with regard to uncertainty about study costs. If you escalate costs, you must explicitly state that you did, and provide the amount (or percentage) by which costs have been escalated.

Contingencies

Changes in the anticipated level of effort can and do occur. Thus, your cost estimate should reflect the degree of your uncertainty in being able to complete the work for the estimated cost. Contingency funds provide a means of insuring yourself against unforeseen changes in scope. If you feel that contingencies are warranted, then express them in your cost estimate. Provide the basis for your contingencies (e.g., uncertainty in required amount of public involvement) and explicitly define how the contingencies were calculated (e.g., 5 percent of baseline task cost estimate).

Feasibility Study Cost Estimate Examples

Four examples of Feasibility Study Cost Estimates (FSCEs) from previously certified PSPs are presented below. Example 1 is a good method to follow when preparing your own FSCE. This example summarizes costs at the subproduct level, and clearly shows Federal and non-Federal contributions broken down into cash and in-kind contributions by subproduct.[7] Your prepared cost estimate must show a cost breakdown as shown in Example 1, and preferably show costs at the major task level.

Example 2 provides a breakdown of costs for each year of the investigation. Although sponsor contributions are identified in Example 2, they are not identified by major task and/or subproduct as required.

Example 3 is a representation of only one part of an entire FSCE. This example does a good job of defining and costing the elements of the RAM. It identifies subproducts, their respective major tasks, who is responsible for completing them, and how much they will cost. Costs are provided at the major task level when possible where major tasks are defined. Although not included here, the cost estimate from this PSP clearly defined the required elements discussed above, including a delineation of Federal and sponsor costs.

Example 4 is from a PSP that had the overall goal of determining the feasibility of improving the existing Federal navigation project for the Alafia River, Florida. Costs are broken down into Federal and non-Federal support by subproduct (and by major tasks where defined), and the value of in-kind services are identified. Contingencies are included to cover uncertainties in the outcome of feasibility study review. Note, however, that the cost estimate does not contain any WBS accounting codes, which makes it difficult to link costs to the SOS and RAM.

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[7] The subproducts in the example are defined in the WBS by the accounting codes in the first column of the table. These accounting codes mimic the accounting codes of the Civil Works Breakdown Structure in that the numeric code 22 refers to the Feasibility Report product and the alphabetic codes refer to subproducts.

FEASIBILITY STUDY COST ESTIMATE EXAMPLE 1: Excerpt from *Schuylkill River Basin - Schuylkill Haven Area, Flood Control - Feasibility Study.*

SCHUYLKILL RIVER BASIN - SCHUYLKILL HAVEN AREA
FLOOD CONTROL - FEASIBILITY STUDY

CODE OF ACCOUNTS SUMMARY

CODE	FEATURE	FEDERAL CONTRIBUTION	SPONSOR CONTRIBUTION		TOTAL
			CASH	IN-KIND	
22A	Public Involvement	$12,500	$5,500	$7,000	$25,000
22B	Institutional Studies	$3,750	$1,750	$2,000	$7,500
22C	Social Studies	$3,500	$2,500	$1,000	$7,000
22D	Cultural Resource Studies	$16,750	$16,750	$0	$33,500
22E	Environmental Studies (Except for Fish & Wildlife)	$26,250	$26,250	$0	$52,500
22F	Fish & Wildlife Studies	$8,500	$8,500	$0	$17,000
22G	Economic Studies	$39,750	$39,750	$0	$79,500
22H	Real Estate Studies	$7,250	$5,750	$1,500	$14,500
22J	Hydrology and Hydraulic Studies	$56,500	$56,500	$0	$113,000
22K	Geotechnical Studies	$19,500	$19,500	$0	$39,000
22L	HTRW Investigations	$33,000	$33,000	$0	$66,000
22M	Other Studies/Investigations (Recreation)	$1,000	$500	$500	$2,000
22N	Surveying & Mapping (Except for Real Estate Purposes)	$31,000	$31,000	$0	$62,000
22P	Engineering Design and Cost Estimates	$33,250	$32,250	$1,000	$66,500
22Q	Study Management	$40,500	$35,500	$5,000	$81,000
22R	Plan Formulation and Evaluation	$18,250	$16,250	$2,000	$36,500
22S	Report Preparation	$32,250	$30,250	$2,000	$64,500
22T	Programs and Project Management	$20,750	$17,750	$3,000	$41,500
22V	Project Cooperation Agreement (PCA)	$4,250	$3,250	$1,000	$8,500
22Y	Washington Level Review	$21,500	$17,500	$4,000	$43,000
	TOTALS	$430,000	$400,000	$30,000	$860,000

FEASIBILITY STUDY COST ESTIMATE EXAMPLE 2: Excerpt from *South Sacramento County Streams, Feasibility Study Cost Estimate, Activities Summary*

Activity Code	Activity Name	Total FY95	Total FY96	Total FY97	Total FY98	Total All FY's
JA	Engineering Appendix	487,508	238,173	104,450	2,346	832,477
JB	Socioeconomic Studies/Report	32,962	82,823	101,052	0	216,837
JC	Real Estate Analyses/Documents	2,981	58,083	12,357	211	73,632
JD	Environmental Studies/Report	138,182	201,969	90,321	0	430,472
JE	Fish & Wildlife Coord Act Rpt	0	50,600	24,400	0	75,000
JF	HTRW Studies/Report	0	17,898	0	0	17,898
JG	Cultural Resource Report	13,488	13,488	0	0	26,976
JH	Cost Estimates	0	13,521	17,717	0	31,238
JI	Public Involvement Documents	26,476	6,869	14,738	0	48,083
JJ	Plan Formulation & Eval Report	0	33,251	43,631	0	76,882
JK	Draft Report Documentation	0	0	30,076	0	30,076
JL	Final Report Documentation	0	0	39,839	0	39,839
JN	All Other Feasibility Studies/Investigations	0	0	0	0	0
JP	Management Documents	279,073	191,338	375,037	55,815	901,263
	Total	980,670	908,011	853,617	58,372	2,800,670
	Labor	539,000	644,000	600,000	43,000	1,826,000
	Other Agency	27,000	50,600	24,400	0	102,000
	Miscellaneous Expense	1,800	0	8,000	0	9,800
	Contracts	237,000	57,500	0	0	294,500
	Federal	490,000	454,000	427,000	29,000	1,400,000
	Non-Federal	490,000	454,000	427,000	29,000	1,400,000
	In-Kind	175,000	156,000	221,000	15,000	567,000
	Cash	315,000	298,000	206,000	14,000	833,000

FEASIBILITY STUDY COST ESTIMATE EXAMPLE 3: Excerpt from the *Hudson River Habitat Restoration, Hudson River Basin, New York, Reconnaissance Report, Revised Project Study Plan.*

INTERIM #1 COMBINED SITES INTERIM
(SCHODACK/HOUTALING ISLAND, HUDSON BAY SOUTH,
MANITOU MARSH, MILL CREEK WETLANDS)
FY 96 - FY 98 (36 months)

Subaccount Number	Subaccount Name & Responsibility	Task Description	(Task Cost) Total Cost
22A	Coordination and Public Involvement (PL-ES, NYSDEC, HYSDOS)	- Initial Notification - Public Information Efforts - Public Meetings - Executive Committee Meetings	$21,600.00
22B	Institutional Studies (PL-ES)		$6,000.00
22C	Social Studies (PL-FF)	- Provide Demographic Data - Provide Employment Data - Determine Without Project Conditions - Provide Socio Economic Input To Feasibility Report	$6,000.00
22D	Cultural Resource Studies (PL-EA)	**Coordination/Research** - Coordinate with SHPO - Background Research on Site - ID potential Impacts/Data Gaps - SOW for Field Investigations	($14,600.00)
		Field Investigations - Contract Administration - Field Studies - Sub-Surface Testing - Prepare/Review Reports	($110,700.00)
		Analysis/Report Preparation - Interpret Research & Field Data - ID Further Study Needs - Prepare P&S Cost Estimates for mitigation - Input to Feasibility Report	($21,900.00)
		Management - Supervision and Administration - Internal Review	($22,100.00)
		22D Total Feasibility Study Cost	$169,700.00

FEASIBILITY STUDY COST ESTIMATE EXAMPLE 4: Excerpt from *Tampa Harbor-Alafia River, Florida, Appendix C, Project Study Plan*

MAJOR WORK ITEMS	PERFORMED BY FEDERAL
Public Involvement	$ 37,000
Environmental	
Cultural Studies	23,000
Aesthetics	3,500
FWLS Coordination	8,000
Environmental Studies	23,500
HTW Evaluation	6,000
Sub-Total	$ 64,000
Economic Studies	$ 70,000
Project Management	46,000
Engineering	
Surveying and Mapping	25,500
Hydrology and Hydraulics	9,000
Foundations and Materials	168,000
Designs and Cost Estimates	46,500
Sub-Total	$249,000
Real Estate Studies	$ 13,000
Study Management	$ 67,000
Plan Formulation and Evaluation	$ 24,000
Report Preparation and Reproduction	$ 44,000
Model Studies	$132,000
Technical Review	$ 35,000
Review Contingency	$ 29,000
Total	$810,000
TOTAL STUDY COST	$860,000

FEASIBILITY STUDY COST ESTIMATE EXAMPLE 4: Excerpt from *Tampa Harbor-Alafia River, Florida, Appendix C, Project Study Plan (Continued)*

MAJOR WORK ITEMS	STUDY COST
COST SHARING FOR FEASIBILITY STUDY	
TOTAL STUDY COSTS	$860,000
50% FEDERAL SHARE	$430,000
50% SPONSOR SHARE	
IN-KIND SERVICES	
Public Involvement	8,500
Environmental Studies	1,000
Economic Studies	14,000
Project Management	2,000
Engineering	13,000
Real Estate Studies	1,000
Model Studies	4,500
Review Contingency	6,000
Subtotal	$ 50,000
CASH FUNDS	$380,000
TOTAL SPONSOR SHARE	$430,000

Feasibility Study Cost Estimate Checklist

The baseline Feasibility Cost Estimate must tabularize the cost of the activities of the feasibility study. The tabularization must identify costs to the government and financial and in-kind costs to the sponsor(s) at least at the subproduct level and preferably at the major task level of the WBS. If the cost estimates incorporate contingencies and/or cost escalation, then the assumptions must be defined explicitly. If costs are incurred over time, then the FSCE should allocate the costs to each year of the investigation. For consistency, the feasibility study cost estimate should follow the accounting structure of the WBS. Answer the questions below to help you determine if your cost estimate has been prepared to a sufficient level of detail.

1. Have you estimated the cost of the feasibility study at the major task level?

2. Have the costs of each major task been broken down into Federal costs, sponsor costs, and sponsor in-kind services?

3. Have you incorporated anticipated cost inflation in your estimates?

4. Have you accounted for uncertainty in the level of effort through contingencies?

5. Have you provided a good basis for the costs of each task by properly answering the interrogatives (especially the why, what, and how questions) in your SOS? Have you defined the basis for escalation and contingency assumptions?

6. Have costs been tabularized and linked to the RAM using the accounting codes defined in your WBS?

QUALITY CONTROL PLAN

Prepare and include a Quality Control Plan (QCP) in your PSP. The quality control plan of your PSP should include the following required PSP components:

- Mechanism for measuring progress and study quality.
- USACE and other procedures to assess adequacy of the work effort and ensure study conformity to all existing Federal policies and procedures

As part of the QCP, these components are meant to supplement the scope of studies, organizational breakdown structure, and the cost estimate, and, as noted, focus on assurance of study quality and progress. Typically, these sections of the PSP follow standard narrative templates that are tailored to the specific requirements of any particular feasibility study.

Mechanism for Measuring Progress and Study Quality

A goal of any investigation should be to ensure that a quality product is delivered to the customer—one that satisfies stated agreements, is on schedule, and within budget. The following example from the *San Joaquin River Basin South Sacramento, California, Streams Investigation IPMP* provides an overview of the study management mechanisms that will be utilized to assure progress, quality, and timely recognition of potential problems. This excerpt explains the various management reports that will be prepared, when they will be prepared, and who will be responsible for preparing them.

Over the course of the feasibility study, the Corps will prepare a series of reports and other information documents useful in overall study management. They are available to the study sponsor and are as follows:

JUSTIFICATION SHEET

The budget analyst and the project manager prepare the justification sheet twice a year. It summarizes the study status, expenditures to date, and Federal budget requirements for the following year. This document is sent by the Corps to Congress to support the President's annual budget request. After the President's budget is released for the pertinent fiscal year, the justification sheet will be released to the sponsor. The series of justification sheets, along with other documents in this IPMP, will serve as the record of study progress.

PROJECT EXECUTIVE SUMMARY REPORT

The project manager prepares the Project Executive Summary (PES) report monthly with input from the study sponsors and the study manager, who prepares the status report, and the program analyst, who prepares the funds management report. This report will be sent to the Executive Committee, study team members, and the District and Division Project Review Boards (PRBs). Once the report is submitted to SPD, it may not be changed, but many be annotated. This report will be the principal document for reporting study status, milestone forecasts and approvals, and study cost change approvals, and forecasts at the executive level.

MONTHLY STATUS REPORT

The study manager will prepare the status report monthly with assistance from Study Management Team (SMT) members. In the status report, the study manager will report on each study task currently under way or about to be initiated. This report also will document all important dates and milestones, meetings, task completions, etc., and expenditures for Federal and non-Federal funds compared to budgets. The monthly status report will support the PES report. The series of status reports, along with other documents in this IPMP, will serve as the record of study progress.

FUNDS MANAGEMENT REPORT

The budget analyst will update the funds management report monthly and distribute copies to the study manager and the project manager. This report documents budgets and expenditures for each task, resource, and budget type (hired labor, contracts, miscellaneous expenses, etc.) For the current Federal fiscal year. This report will be made available to the study sponsors. At the end of each government fiscal year, a final funds management report is issued showing the total budgets, expenditures, and obligations for the fiscal year. The series of these end-of-the-year reports, along with other reports in this IPMP, will serve as documentation of the study progress. The year-end report will be sent to SAFCA, the City, and the County.

SCHEDULE AND COST CHANGE REQUEST

The Schedule and Cost Change Report (SACCR) is the principal form that will be used to change the IPMP. A SACCR usually is initiated by any person working on the study who first recognizes a need for a change. Requests can be made to change the study scope, cost, or milestones. Changes to work orders will be negotiated with the initiator of the work order. The initiator of the SACCR provides the request to the project manager for approval of impact assessment, evaluation of study impacts, and coordination with other SMT members. Local sponsor representatives on the SMT will review and agree to changes proposed by the SACCR before subsequent action by the appropriate level of approval in accordance with ER 5-7-1.

The Project Manager (PM) is authorized to revise project schedules that do not impact the major milestones. Changes which extend major milestones require approval of the SPD PRB.

USACE and Other Procedures to Assess Adequacy of Work and Conformity to Policy

Adequacy of work and conformity with existing policies is most often ensured through the development of a technical review plan. The example below is from the Quality Control Plan for the Central and Southern Florida Project Feasibility Studies and illustrates a technical review plan. The plan first designates the review team and management oversight, and then reviews the topics that will be addressed in assessing study adequacy and conformity with existing policies.

Independent Technical Review Team

The review team members will be senior professionals selected by their technical division chief based on the expertise needed for the study. They will not be affiliated with the development of the studies. Their assignment is to confirm the proper application of clearly established criteria, regulations, laws, codes, principles, and professional procedures.

Selected Technical Review Alternative

The selected alternative for accomplishing technical review for the Restudy feasibility studies is an in-house review by the District. This alternative is considered the most efficient and cost-effective means of ensuring a quality control process.

Management Oversight

Functional Division Chiefs are responsible for: (1) the quality of work done by their personnel, (2) establishment of review teams and team leaders, and (3) resolution of conflicts between study teams and review teams.

Study and Project Management Oversight

It is the responsibility of the Study and Project Managers for overall commitments and study progress. They will coordinate study issues and guide the feasibility studies process. The study manager will coordinate the review effort with the review team leader. Specific duties of the study manager with respect to the review process include the following: (1) scheduling timely and sufficient periods for review of the feasibility studies, (2) notifying the review team leader of review conferences, and (3) managing responses to review memorandums - including consulting with South Atlantic Division (SAD) on policy issues as necessary, and forwarding all unresolved technical issues to the appropriate functional chief for final determination.

Each review team member is responsible for performing an Independent Technical Review of the assigned technical component. Appropriate functional review team members should attend all In-Progress Reviews, such as the Feasibility Review Conference. The technical review should ensure:

a. Correct application of methods;
b. Adequacy of basic data and assumptions;
c. Accuracy of calculations;
d. Completeness of documentation;
e. Compliance with Guidance and Standards;
f. Adequately addresses Real Estate requirements;
g. The concepts, features, analyses, and details are appropriate, fully coordinated, and correct;
h. An appropriate range of feasible alternatives are evaluated;
i. The problems/opportunities/issues are properly defined and scoped;
j. The analytical methods used are appropriate and yield reliable results;
k. Technical adequacy;
l. Sponsors' needs/desires are considered;
m. Results supported by the presentation; and
n. Sponsors' capabilities (real estate acquisition and financial capacity).

It is the responsibility of the independent review team leader to: consult Division counterparts experienced in conducting reviews to obtain transfer of technical items of concern to look for during reviews; review design memoranda, design directives, and scopes of work; coordinate document review; consolidate comments for submission back to the responsible technical office; track comment responses; and refer disputes to the appropriate division chief for resolution.

The following excerpt from the *Project Study Plan for Schuylkill River Basin - Schuylkill Haven Area Flood Control Feasibility Study* represents a portion of a quality control plan that was included as part of the PSP. Note that an exhaustive list of internal review topics are specified in a question format. The questions shown below are just a few of the many questions posed in this part of this particular PSP.

The purpose of the Quality Control Plan is to delineate a process for technical review of the feasibility study report to ensure the completion of a quality product. Overall responsibility for Quality Control and technical review of the study report belongs to Philadelphia District. North

Atlantic Division has overall responsibility for Quality Assurance as well as providing senior technical leadership, coordination, and oversight, as needed.

Quality Control will be assured through an internal technical review. The feasibility study report and process will be examined by a team of reviewers that is independent and separate from the study team. In general, the review team will seek to verify that the following topics are adequately identified and addressed in the feasibility study:

- *Assumptions that were made for conduct of the study*
- *Methods, procedures, and materials used in the analysis based on the necessary level of detail*
- *Alternatives evaluated*
- *Appropriateness and scope of data used for the analysis*
- *Reasonableness of the results including whether the product meets the Sponsor's needs consistent with the law and Corps policy*
- *Assurance that functional, legal, safety, health, and environmental requirements are met*

During the review process, the review team will use checklists to address the above topics in greater detail. The review team will prepare a study review report which will document the entire review process and should include at minimum the review checklists, review comments and responses, and review certification. The review report will also list the members of the study team and independent review team by technical element.

Internal technical review topics are outlined in the following pages. These topics are meant to guide the review team through the technical review process. Upon completion of the internal technical review by the review team, a Branch Chiefs meeting will be convened to discuss the findings of the technical review. At this meeting, the technical review of the study and recommended project should be certified by the Branch and Division Chiefs.

PLANNING ACTIVITIES

A. *DEFINITION OF EXISTING AND WITHOUT PROJECT CONDITIONS*

1. *Were Federal/State/local agencies in the study area completely inventoried?*
2. *Was an inventory of previous studies pertinent to the study area completed?*
3. *Was existing/proposed water resources projects relevant to the study area inventoried?*
4. *Were existing conditions adequately defined to include the following?*
   - a. *Socio-economic Profiles*
   - b. *Land Use/Real Estate*
   - c. *Flood Plain Management & Mapping*
   - d. *Climate*
   - e. *Physiography*
   - f. *Geology and Soils*
   - g. *Utilities and Bridges*
   - h. *Terrestrial Resources*
   - I. *Aquatic Resources*
   - j. *Water Quality*
   - k. *Hazardous, Toxic, and Radioactive Wastes*
   - l. *Cultural and Historic Resources*
   - m. *Hydrology and Hydraulics*
5. *Did physical/economic/environmental data identify water resource problems?*
6. *Was the most probable future without project condition adequately defined?*
7. *Was the probable "No Action Taken" condition adequately defined?*

B. *FORMULATION OF ALTERNATIVES*

1. *Was a systematic approach to formulating alternatives followed?*
2. *Were plan formulation objectives, constraints, rationale, criteria, and screening measures adequately identified?*
3. *Was the plan formulation analysis accordance with accepted techniques and appropriate guidance regulations?*
4. *Were all applicable structural and non-structural measures addressed?*
5. *Were descriptions of rationale for eliminating measures provided?*
6. *Were all reasonable alternatives evaluated?*
   - a. *Did the alternatives identified address the full range of problems?*
   - b. *Were descriptions/maps/figures for the alternative plans considered?*
   - c. *Were real estate factors addressed for alternative plans?*
   - d. *Were the economic/environmental impacts of the alternatives defined?*
7. *Were summary tables of technical/environmental/institutional alternatives included?*
8. *Were tables included which detail the plan optimization and scaling process?*
9. *Were alternatives evaluated using risk-based analysis?*

C. *PLAN SELECTION*

1. *Was the rationale for choosing the recommended plan adequately defined?*
2. *Was the appropriate environmental documentation for the recommended plan prepared/coordinated in accordance with NEPA?*

3. *Were the economic/social impacts of the plan defined with appropriate techniques, guidance, and regulations?*
4. *Was the NED plan identified?*
5. *If applicable, was a "Locally Preferred Plan" defined?*
6. *If the NED plan was not advised, was there rationale for selecting another plan?*
7. *Was the plans cost estimate prepared with appropriate guidance/regulations?*
8. *Was the recommended plan reasonable, and did it meet the needs of the Sponsor?*

Quality Control Plan Checklist

Use these questions below to help you build your Quality Control Plan. If you have answered these questions affirmatively, then your QCP has sufficiently addressed the requirements of the PSP guidance.

1. Have you identified the parties that are responsible for management and conduct of the study and their respective roles?

2. Have you identified the parties that are responsible for review of the products and tasks of the feasibility study?

3. Have you developed a technical review plan that identifies review topics that will be addressed to judge study adequacy and conformity to existing policies?

LIST OF ACRONYMS

For the benefit of your sponsor and PSP reviewers, your PSP should include a list of all acronyms contained in your PSP. By simply turning to this list, the reader avoids having to search back through the document for the first time you defined an acronym in the PSP. The following example of a list of acronyms was taken from *Upper Mississippi River - Illinois Waterway System Navigation Study, Baseline Initial Project Management Plan.*

ACHP - Advisory Council on Historic Preservation
ADP - Automated Data Processing
A-E - Architect-Engineer
BERH - Board of Engineers for Rivers and Harbors
CEAP - Corps of Engineers Automation Plan
CELMS - St. Louis District, Corps of Engineers
CENCD - North Central Division, Corps of Engineers
CENCR - Rock Island District, Corps of Engineers
CEQ - Council on Environmental Quality
CIR - Color Infrared
CPN - Critical Path Network

EA - Environmental Assessment
EIS - Environmental Impact Statement
EMP - Environmental Management Program
EMTC - Environmental Management Technical Center
EQ - Environmental Quality
FEIS - Final Environmental Impact Statement
GEM - General Equilibrium Model
GIS - Geographic Information System
GREAT - Great River Environmental Action Team
HREP - Habitat Restoration and Enhancement Project
HQUSACE - Headquarters, U.S. Army Corps of Engineers
IPMP - Initial Project Management Plan
IPR - In-Progress Review
IWR - Institute for Water Resources
L/D - Lock and Dam
LTRMP - Long-Term Resource Monitoring Program
LUAP - Land Use Allocation Plan
MCACES - Micro-Computer Aided Cost Engineering System
MIPR - Military Interdepartmental Purchase Request
MSA - Metropolitan Statistical Area
NAWMP - North American Waterfowl Management Plan
NED - National Economic Development
NEPA - National Environmental Policy Act
NHPA - National Historic Preservation Act
NRHP - National Register of Historic Places
NRMS - Natural Resource Management System
O&M - Operation and Maintenance
OBS - Organizational Breakdown Structure
PED - Pre-Construction Engineering and Design
PA - Programmatic Agreement
PMP - Project Management Plan
PMS - Performance Monitoring System
POS - Plan of Study
PRB - Project Review Board
RAM - Responsibility Assignment Matrix
ROD - Record of Decision
SHPO - State Historic Preservation Officer
TCC - Technical Coordinating Committee
UMRCC - Upper Mississippi River Conservation Committee
UMR-IWW - Upper Mississippi River - Illinois Waterway
UMR-IWWSNS - Upper Mississippi River-Illinois Waterway System Navigation Study
UMRS - Upper Mississippi River System
WBS - Work Breakdown Structure
WCSC - Waterborne Commerce Statistics Center
WEEM - Waterway Efficiency Evaluation Model
WES - Waterways Experiment Station

IV. PROJECT STUDY PLAN SUBMISSION AND REVIEW

The previous chapter of this guidebook offered examples on how to prepare the required components of the PSP. This chapter provides assistance in joining these requirements together into a coherent planning document that can be used to guide the Feasibility Phase. In addition, this chapter outlines the process for submitting the PSP for review, and offers ways to facilitate the review process.

PUTTING THE REQUIREMENTS TOGETHER: THE DRAFT PSP

Although EC 1105-2-208 explains the required contents of the PSP, it generally does not provide guidance on how to arrange the required contents into a coherent planning document. Furthermore, a review of past PSPs indicates that there are a number of ways that can be devised to organize the PSP. Table IV-1 suggests an outline that may be followed to structure the formal draft PSP that will be submitted to Headquarters for review.

If you review the outline carefully you will note that it closely follows the structure of the previous chapter. Understand that there will be a lot of overlap among the sections of the PSP. For example, the Scope of Studies will reflect a Work Breakdown Structure and Organizational Breakdown Structure. There are two reasons for having specific sections that relate to specific requirements of the PSP. First, it ensures that these sections are included as dictated by the guidance. Secondly, it makes it easier for the reviewers to see that the required contents have been included so that they can assess particular sections for adequacy.

OVERVIEW OF THE REVIEW PROCESS

The PSP is submitted as the principal appendix to the Feasibility Cost Sharing Agreement (FCSA), which is a legally binding contract between the Corps and the non-federal sponsor which directs the course of the Feasibility Study. Since Headquarters is responsible for the policy review and program management of the Feasibility Phase, Headquarters reviews the PSP and must approve of it before the FCSA is signed. Unlike the Reconnaissance Report which culminates the Reconnaissance Phase, the FCSA and the PSP remain for the duration of the project development process (Cone, 1992).

Sequentially, the PSP review process consists of (1) submission of the PSP to Headquarters (along with the Reconnaissance Report and the draft FCSA), (2) scheduling of the Reconnaissance Review Conference (RRC), (3) review of the PSP by Headquarters, and (4) approval and certification of the draft PSP, FCSA, and Reconnaissance Report at the RRC. Issues that arise at the RRC may result in changes to the Reconnaissance Study, PSP, or both. In the case that policy questions or issues preclude the preparation of the draft PSP prior to the RRC, an Issue Resolution

TABLE IV-1
SAMPLE OUTLINE FOR THE PSP

I. Reconnaissance Overview
- A. Study Authorization
- B. Study Area Description
- C. Statement of Problems/Opportunity
- D. Without-Project Conditions
- E. Alternatives That Will be Considered

II. Scope of Studies (SOS)
- A. Review of feasibility study products
- B. Description of tasks necessary to produce products, analyze alternatives, and determine feasibility
- C. References to statute, regulations, and guidance needed to perform the work

III. Work Breakdown Structure (WBS)
- A. Development of Activity Accounts/Codes

IV. Organizational Breakdown Structure (OBS)
- A. Organizational Work Responsibilities
- B. Description of Coordination and Coordination Mechanisms
- C. Development of Resource Accounts/Codes
- D. Responsibility Assignment Matrix (RAM)

V. Feasibility Study Schedule
- A Major Milestones
- B. Task Dependencies and Timeline for Work Activities

VI. Baseline Feasibility Study Cost Estimate
- A. Costs of Work Tasks
  - 1. Federal Contribution
  - 2. Sponsor Contributions
    - a. Cash contribution
    - b. Value of in-task services
  - 3. Cost escalation procedure
  - 4. Contingencies procedure

VII. Quality Control Plan
- A. Mechanism for Measuring Progress and Study Quality
- B. USACE and Other Procedures to Assess Adequacy of Work and Conformity to Existing Policies

VIII. Table of Acronyms

Conference (IRC) should be requested. Finalization of the Reconnaissance Study allows the PSP to be completed. Once the PSP is completed, the FCSA can then be finalized and executed.

WAYS TO FACILITATE PSP REVIEW

According to the official guidance, the review by Headquarters focuses on the "What" and "How" component of the PSP to ensure that the products of the feasibility study and the methodologies that are used conform to current policies and procedures. There are a number of things that can be done to facilitate Headquarters review and limit major changes to the draft PSP. First, make sure that the PSP is comprised of all of the required components. Second, and more importantly, make sure that these sections relate your full understanding of what is required to produce the products of the feasibility stage. This will most often require an internal review of the draft PSP before it is submitted by those who will be expected to perform the work. Review of the scope of studies, schedule, and cost sections of the PSP by pertinent team members will simultaneously foster team-work and promote buy-in into the PSP contract. If you are proposing any activities that deviate from non-standard procedures, be sure to identify them specifically in the PSP, and, better yet, in your transmittal letter to Headquarters. Lastly, it is critical to involve the local sponsor in the development and review of the PSP. The draft PSP should not be submitted until the non-Federal sponsor understands and agrees to the scope of work, schedule, and cost needed to complete the feasibility study.

V. USING THE PSP DURING THE FEASIBILITY STUDY

THE PSP AS STUDY MANAGEMENT TOOL

The PSP should be used to guide all aspects of the feasibility study since it embodies a full formulation of what must be done—how, when, by whom, and at what cost. It should be used both to direct and track your progress and to determine where you could have planned better and when and where changes to the plan should be made. In this aspect, the PSP should be considered as a tool that will help you during the feasibility study and not simply as some new and added requirement. Refer to your PSP often during the course of the feasibility study and you will quickly realize its value in keeping you on the agreed-upon course and in helping you become a better planner.

THE PSP AS CONTRACT

It is worth noting that even without Federal cost sharing, planning the feasibility study would be necessary. Tasks would still need to be determined, schedules planned, and costs estimated. However, the advent of Federal cost-sharing, by construction, has led to increased accountability of the federal government and its expenditures. In this context, the PSP must be considered a necessary requirement. Accountability for cost and schedule has been formally imposed upon those who undertake the feasibility phase and is reflected in the signing of the FCSA.

Because the PSP is the primary appendix to the FCSA, it is in essence a contract. Stipulations of the PSP contract are agreed-upon by all involved before beginning the feasibility phase. Just as with any other contract, signatories should fully understand and make a conscious effort to abide by all of the elements of the agreement. In the PSP, these contractual elements are the scope of studies, the project schedule, and the baseline feasibility study cost estimate.

CHANGING THE CONTRACT

Even the best planner cannot anticipate the exact nature of future events. Changes in the level of effort for the feasibility study are bound to occur. Although the potential for these changes may be addressed in the PSP through the use of contingencies, some may be entirely unforeseen. Examples of such unforeseen circumstances may include changes in physical conditions, changes in technology, changes in team members, changes in the problem-solving strategies, changes in policy, changes due to new alternatives, changes due to review comments, and changes due simply to oversight (Cooper, 1992; Cone, 1992). It is important to note that the PSP is not a static plan, but rather a "living document" that can incorporate changes such as these over the course of the feasibility study. The PSP represents a negotiable and amendable contract.

There are some protocols that must be followed to make changes to the PSP. Changes to the PSP can be made by the local sponsor, the Planning Technical Manager, and the technical work elements. However, *all changes to the PSP must be approved by the Project Manager*, since he or she is responsible for the cost and schedule for the feasibility study. For relatively minor deviations in the plan of study that do not affect cost or schedule, approval can be obtained and changes made at the district level with limited documentation. To the extent possible, unanticipated changes in scope, schedule and/or cost should be accommodated without formal changes to the PSP and FCSA, as long as sufficient contingencies are appropriated at the onset of the feasibility phase.

A BASIS FOR CHANGE

Oftentimes, more costs are incurred and more time is required to accomplish additional work and evaluate new alternatives. If your PSP is well defined, it will outline the alternatives to be studied and specific tasks to be performed. This makes it easier to convince Sponsors and HQ to provide the additional funds and extend the schedule. Your well defined PSP can serve as the most valuable asset for providing justification for changes (Cone, 1992).

It is important to realize that a PSP can be the best and most dependable mechanism for providing justification for changes to study schedule and cost (Cone, 1992). Without a well-defined and mutually agreed upon plan, it becomes difficult to convince sponsors and Headquarters of the need to provide additional time and money to complete a feasibility assessment. In these days of tightening budgets and increased fiscal responsibility, one cannot simply ask for more time or money without referring to how one got into this position in the first place. Because the PSP identifies the plan to follow through the feasibility study, it can be used as the basis to define where the feasibility strayed off course and why. The PSP also provides the basis for the changes that invariably happen during the course of a study. The impact, in both time and funds, is easily assessed and decisions can be made on how to proceed. Here the trade offs between effort in the feasibility and effort in preconstruction engineering and design can be made in terms of more certain decisions, earlier in the development process (Kitch, 1992). To summarize, the PSP is changeable because it <u>is</u> the basis for change.

A BASIS FOR EVALUATION

Since the PSP represents a contract among study participants, it is reviewed as such at the end of the Feasibility phase to determine if all of the stipulations of the contract have been met. According to the official guidance, the PSP will "...serve as the basis for determining that the draft feasibility report has been developed in accordance with established procedures and previous agreements."

Because an approved PSP reflects mutual buy-in of district, division, sponsor, and Headquarters into the alternatives being analyzed and the methods, schedule, and costs of the

analysis, it should by design reduce the likelihood of a negative review at the Feasibility Review Conference. In other words, a reviewer is less likely to require work that is not included in an agreed upon PSP (Cone, 1992). On the other hand, a reviewer might demand additional work if this work was previously agreed upon in the PSP but not performed. Thus, once the PSP is developed and approved (i.e., once the contract is initiated), it must be followed closely for the benefit for all parties involved.

SUMMARY

The PSP is a means for the district, sponsor, division, and Headquarters to formally agree to the scope and conduct of the Feasibility study before it is initiated. Once the Feasibility phase commences, the PSP should be referred to on a frequent basis to assure that the Feasibility study is progressing according to the pre-defined scope of study, schedule, and cost. The PSP provides a means to identify and correct problems as the study process and to help prevent cumulative problems at the end of the study. Close adherence to the elements of the PSP ensures that the requirements specified and agreed upon by all parties involved have been fulfilled, which in turn reduces the likelihood of unanticipated review comments during the evaluation of the draft Feasibility study. The end result is a more efficient and effective path to determining the feasibility of the proposed project.

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Appendix A
EC 1105-2-208
Preparation and Use of Project Study Plans

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
Washington, D.C. 20314-1000

EC 1105-2-208

CECW-P

Circular
No. 1105-2-208

23 December 1994

EXPIRES 31 DECEMBER 1996
Planning
PREPARATION AND USE OF PROJECT STUDY PLANS

1. Purpose. This circular provides guidance on the development and use of Project Study Plans (PSP)(formerly Initial Project Management Plan) to guide the feasibility study process.

2. Applicability. This circular is applicable to all HQUSACE elements and all USACE Commands having Civil Works responsibilities. It applies to all General Investigation Feasibility Studies and General Reevaluation Studies. Applicability to the Continuing Authority Program (CAP) is governed by CAP guidance.

3 References.

a. ER 5-7-1 (FR) - project Management.
b. ER 405-1-12, Chapter 12 - Real Estate Handbook.
c. ER 1105-2-100 - Guidance for Conducting Civil Works Planning Studies.
d. ER 1110-2-1150 - Engineering and Design for Civil Works Projects.

4. Policy.

a. A Project Study Plan (ASP) is a plan of study which is used to define and manage the development and conduct of a feasibility study. The PSP documents the assumptions, work tasks, products and the level of detail that will be necessary during the feasibility study to determine the existing and the future without project Conditions; formulate a range of alternatives; assess their effects; and, present a clear rationale for the selection of water resource development plan(s). The PSP includes the baseline study cost, schedule and assignment of responsibilities. A PSP with clearly defined work tasks and products will provide district management a means for cost and schedule control, establish the basis for changes, help promote internal Communications, and preclude review problems for the feasibility study.

b. The project manager is the primary point of contact for the sponsor while the planning technical manager is responsible for the preparation of the PSP, in coordination with the other district technical managers and the project manager. The non-

Federal sponsor should be actively involved in the development of the PSP.

c. the PSP, to be developed in collaboration with the non-Federal sponsor, is to ensure that the work required for the feasibility phase has been carefully developed and considered and reflects the requirements, desires and interests of both parties. It is the basis for assigning tasks between the Corps and the sponsor and for establishing the sponsor's share and the value of any in-kind services. It documents the agreement that both parties understand their responsibilities and that they are able to perform them according to the cost and schedule presented in the PSP. The PSP is attached to the Feasibility Cost Sharing Agreement (FCSA). The project manager is responsible for FCSA negotiations.

d. Agreement, by all levels in the Corps, in the reconnaissance report and PSP will assure the non-Federal sponsor that the Corps will conduct the study appropriately and efficiently. This early involvement by all levels and agreement to the PSP will minimize conflicts and misunderstandings from developing during the study.

e. The PSP is a means for the district, sponsor, MSC and HQUSACE to formally agree to the scope and conduct of the study before it is initiated. The ASA(CW) will not participate in the review and approval of PSP's unless it is determined by HQ that unresolved policy issues warrant their involvement. Early agreement at all levels will help to insure appropriate levels of detail and minimize changes late in the study. The PSP provides a means to identify and correct problems as the study proceeds and to help prevent Cumulative problems at the end of the study. The PSP (with any agreed upon modifications) will be used in the review of the feasibility report within the Department of the Army for policy compliance and technical adequacy.

f. HQUSACE is responsible for the policy review and program management of feasibility studies and reports. In light of this responsibility, HQUSACE will review PSP's before the FCSA is signed. This review will focus on the "What" and "How" as discussed in paragraph 5b., below, to insure that the feasibility study products and methodologies employed conform to current policies and procedures. MSC's will be responsible for assuring the quality of the PSP and monitoring the execution of the study in accordance with the PSP. In the event there are changes that significantly alter the scale and scope of the study as originally agreed to in the PSP the MSC will notify HQUSACE so

that all levels can reach a new agreement on the conduct of the study. The District is responsible for preparing and using a technically sound PSP and for documenting any and all agreed to changes.

g. The PSP is to be used by the study team to guide the study. It provides the basis from which changes can be assessed and agreement reached among all study participants. Accordingly, the PSP records all agreements reached Concerning the conduct of the study and will therefore serve as a basis for determining that the draft feasibility report has been developed in accordance with established procedures and previous agreements. me processing of the feasibility report, therefore, should be expedited with the development and use of a comprehensive PSP.

h. The current PSP, including documentation of agreements on changes to the conduct of the study, should be submitted along with the other required materials an preparation for the Feasibility Review Conference.

5. Procedures.

a. Development of the ASP should be initiated during the conduct of the reconnaissance study when it appears that proceeding into the feasibility phase is warranted. Negotiation of the ASP may not be completed until after the Reconnaissance Review Conference.

b. A PSP must be comprehensive in Scope, have sufficient information to define~%the products, describe study tasks necessary to produce the products, and define the level of detail necessary for accomplishing each task. In developing and reviewing a PSP the main questions to ask are: WHAT?, WHY?, WHO?, WHEN?, and HOW? Given the scope of study and the kinds of alternatives to be evaluated, the following questions should be used as a guide in developing the tasks necessary for feasibility studies.

(1) What tasks are required? (What do you need to know to make a decision? What information is required to accomplish each task? Is the information available or do you have to collect or derive it?)

(2) Why is each task necessary? (How relevant is it to the decision making? What is lost if you don't do the task or if you accomplish it to a lesser degree?)

(3) How will each task be accomplished? (What techniques, models, procedures, etc. will be used? What assumptions are being made and what is the sensitivity of the decisions based on

Such assumptions?)

(4) Who will accomplish each task? (In-house, Contractor, sponsor) Who provides input to the task and who needs or will use output from this task?

(5) When should/must each task be accomplished and are all parties aware of their commitments?

(6) How much time and money is needed/should be devoted to each task? What is the appropriate level of detail?

(7) What are the Sources of uncertainty regarding the Scope and Cost of study tasks find what provisions should be made to respond to uncertainty?

C. The estimate of costs for the feasibility study will be developed in the PSP in an appropriate work breakdown structure. The study cost estimate will be based on information developed to an appropriate level of detail to minimize the likelihood of substantial changes; supported by associated scopes of study to allow involvement by the non-Federal sponsor. These scopes of study will serve as the basis for assigning tasks and establishing the dollar value for in-kind contributions, should the non-Federal sponsor elect that option. Because of the non-Federal sponsor's need to fully evaluate their ability to provide in-kind Contributions, an estimate of the cost for each task is required.

d. The determination of the dollar value of in-kind products or services will be negotiated between the Federal Government and the non-Federal sponsor as fixed fee items based on a detailed government estimate and sponsor proposal. Applicable Federal regulations, including OMB Circular A-87 will also be applied. The dollar value of the in-kind effort will be established in the PSP. Criteria for acceptance of the product also will be established in the PSP.

e. The PSP should include work items to appropriately reflect the costs for those tasks which non-Federal sponsors have historically accomplished without charge, such as: supervision and administration; study management; attendance at meetings, both public and technical; and overhead and indirect costs which are directly related to the feasibility study. In addition, because of problems experienced on many projects in the past, the sponsor should become more involved in the real estate activities during the feasibility study. More detailed Scones of work may be needed for individual items in the PSP to fully describe the work to be accomplished. Work items will also include those tasks typically necessary to support the review process, from the signing of the report through the ASA(CW)'s request to OMB for

the views of the Administration. These items could include answering comments, attending Washington level meetings (including the non-Federal sponsor), and making minor report revisions as a result of review by higher authority.

f. To ensure that the non-Federal sponsor is afforded an opportunity to participate in any significant effort as a result of Washington level review "review support" for district and non-Federal sponsor costs only will be Included as a separate work item in the ASP. These costs, including any necessary travel, will be limited to those reasonable costs associated with the review and processing of the feasibility report. This item will be 5 percent of the total study cost or $50,000, whichever is less, and will be cost shared equally.

g. The PSP will guide the allocation of study funds among tasks to assure that all aspects of the study are given adequate attention. As a minimum, the PSP should address: product based work tasks including associated milestones and negotiated costs, as well as responsibility for their accomplishment; Corps and other criteria to assess the adequacy of the completed work effort; procedures for reviewing and accepting the work of both parties that can be audited; schedule of performance; coordination mechanism between the Corps and non-Federal sponsor; and references to regulations and other guidance that will be followed in conducting the tasks.

h. The PSP will also address the appropriate level of engineering detail required to prepare the Engineering Appendix to the feasibility report. Engineering studies and analysis should be scoped to the minimum level needed to establish conceptual designs for project features and elements while at the same time form an appropriate basis for further preconstruction engineering and design (FED) design efforts, project construction schedules and cost estimates. The level of detail required in the engineering appendix should be greater if the project will proceed directly from the feasibility report to preparation of plans and specification, without any design memorandum. In addition, the PSP will also describe the work tasks necessary to address all technical aspects of the study including but not limited to, the geotechnical, environmental, economic, hydrology and hydraulic and real estate needs.

I. Uncertainties in project design, cost, and performance can usually be reduced by additional Investigations and analysis. The PSP should address these tradeoffs between the reduction in uncertainty in study results with increased study effort. Care should be taken not to postpone critical studies, such as HTRW,

that may have an important influence on formulation and ultimately on the overall project.

j. Study cost estimates should include allowances for inflation through all applicable work stages so that the local sponsor is fully aware of its total financial commitment. Appropriate contingencies and contingency management should also be included to adequately deal with the uncertainty in the elements of the study.

6. Required Contents of a PSP.

a. Task specific, detailed scope of studies that describes the work to be accomplished, in narrative form, and answers the "what and how" questions. Information pertaining to the "who", "when" and "how much" questions, as discussed in paragraph 5b. above, must also be included.

b. Product based Work Breakdown Structure and Responsibility Assignment Matrix.

c. Schedule of Performance and Milestones (i.e., key decision points, in-progress-reviews, issue resolution meetings).

d. Mechanism for measuring progress and quality of all study efforts.

e. Baseline Feasibility Study Cost Estimate (including an allowance for the non-Federal sponsor's participation in ail reviews, including the Washington level).

f. USACE and other procedures and criteria required to assess the adequacy of the completed work effort and ensure study Conformity to all existing Federal policies and procedures.

g. Coordination mechanisms among the parties (internal and external).

h. References to statutes, regulations, and other guidance needed to conduct work.

I. Other portions of PMP's required by reference 3b are not applicable to PSP's and need not be prepared.

7. Review and Approval Process. The draft PSP should not be submitted until the non-Federal sponsor understands and generally agrees to the proposed scope of work, schedule and cost needed to accomplish the feasibility study. The sponsor should have been actively involved in the development of the draft PSP. This draft PSP will be submitted to HQUSACE with the Reconnaissance Report and the draft Feasibility Cost Sharing Agreement prior to scheduling the Reconnaissance Review Conference (RRC). The draft PSP should also indicate district buy-in through approval by the district ORB. Certification of the draft PSP and the Reconnaissance Report should occur simultaneously at the RRC.

For studies that cannot be certified at the RRC, milestones and responsibilities will be established at the RRC, and documented in the Reconnaissance Guidance Memorandum (RGM), to expedite the completion of the reconnaissance phase. In the event that policy questions or issues preclude preparation of the draft PSP prior to the RRC, an IRC should be requested. The IRC may be as simple as a conference call.

8. Sample ASP. Samples of suggested formats for documentation in PSP's will be provided in the future. The proceedings of a conference on IPMP's (HEC SP-25 - Initial Project Management Plans for Hydrologic Engineering and Economic Analysis provides some useful information to assist in the development of PSP's.

FOR THE COMMANDER:

/s/
JAMES D. CRAIG
Colonel, Corps of Engineers
Executive Director of Civil Works

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This PSP guidebook should be used as a reference manual for preparing individual PSPs. Although the examples that will be shown may not pertain to one's past, current or expected PSPs, these will at least demonstrate the necessary steps to develop PSPs properly. The reader will note that use of this guidebook is flexible, just as are the requirements of the PSPs themselves. The authors and sponsors of this guidebook understand that the complexity, size, and duration of any particular feasibility study will dictate the size and complexity of any particular PSP. Thus, the intent of this guidebook is to provide a foundation for PSP preparers to use creative planning techniques that work for them.

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