

General Investigations Report
Section 905(b)(WRDA 86) Analysis

US Army Corps
of Engineers
Los Angeles District
South Pacific Division

TRES RIOS, ARIZONA RECONNAISSANCE REPORT

April 1997



Section 905(b)(WRDA 86) Analysis - Tres Rios, AZ

1. STUDY AUTHORITY: This study is being conducted under the authority of Section 6 of Public Law 761, Seventy-fifth Congress, June 28, 1938, which reads in part as follows:

“The Secretary of War is hereby authorized and directed to cause preliminary examination and surveys ...at the following localities:...Gila River and tributaries, Arizona.”

In addition to the above authority, Tres Rios was included in Section 321 of WRDA 92 which reads as follows:

“The Secretary may participate in the study and construction of a water resources project in the vicinity of Phoenix, Arizona, for the purpose of providing flood control and improving water quality in the Tres Rios wetlands, Arizona, at a total cost of \$6,500,000.”

This was again modified in Section 304 of WRDA 96 which reads in part as follows:

“Modifies the Tres Rios wetlands project to add ecosystem restoration as a project purpose to increase the authorized project cost from \$6,500,000 million to \$17,500,000 million.”

2. STUDY PURPOSE: The purpose of this feasibility study is to investigate and recommend appropriate solutions to accomplish ecosystem restoration in the Tres Rios area.

3. LOCATION OF PROJECT/CONGRESSIONAL DISTRICT.

a. The study area is located at the confluence of the Salt, Gila, and Agua Fria Rivers, approximately nine miles west of the City of Phoenix, Arizona. A study area map is included as Paragraph 10 of this fact sheet.

b. The study area is located both in the second (D-Ed Pastor) and third (R-Bob Stump) Congressional Districts of Arizona.

4. PRIOR STUDIES, REPORTS AND EXISTING WATER PROJECTS.

a. Prior studies and reports:

(1) Central Maricopa County Drainage Area, Arizona, Reconnaissance Study, U.S. Army Corps of Engineers, Los Angeles District, June 1992.

(2) Phoenix Water Reclamation and Reuse Study, Tres Rios Demonstration Wetlands Conceptual Design, U.S. Bureau of Reclamation, October, 1993.

(3) Section 7 Study for Modified Roosevelt Dam, Arizona, Hydrologic Evaluation of Water Control Plans, Salt River Project to Gila River at Gillespie Dam, U.S. Army Corps of Engineers, Los Angeles District, March, 1996.

(4) Wetlands for Water Quality Management and Habitat Enhancement: Policy and Permitting Issues, U.S. Environmental Protection Agency, U.S. Bureau of Reclamation, and City of Phoenix, January, 1997.

b. Existing water projects:

(1) The Flood Control District of Maricopa County (FCDMC) constructed a bank stabilization and levee project on the north bank of the Salt River in the study reach. The levee was designed to protect the Holly Acres subdivision.

(2) Flows in the Salt River are controlled by a series of upstream dams built by the Bureau of Reclamation (BOR) and operated by the Salt River Project (SRP). The SRP system is comprised of six reservoirs and seven dams on the Salt and Verde Rivers. The dams include Modified Roosevelt Dam, Horse Mesa Dam, Mormon Flat Dam, Stewart Mountain Dam, Granite Reef Dam on the Salt River. Horseshoe Dam and Bartlett Dam are on the Verde River.

(3) In 1995, the Multi-City Subregional Operating Group (SROG), which represents a consortium comprised of the cities of Phoenix, Mesa, Glendale, Tempe, and Scottsdale, and the BOR built a demonstration project within and adjacent to the floodway of the Salt River at 91st Avenue. The demonstration project consists of 12 acres of constructed wetlands which also provides polishing of the effluent from the 91st Avenue treatment plant. U.S. Fish & Wildlife Service and Arizona Game and Fish Department have been extensively involved and are interested in the outcome of further analysis from the data collected at the demonstration project.

PLAN FORMULATION.

a. Identified Problems:

1) Existing Conditions:

a) **Wildlife Habitat:** The study area provides wetland and riparian habitat for numerous species of fish and wildlife, including waterfowl and Federal and State listed threatened and endangered (T&E) species. Effluent from 91st Avenue plant plays a major role in supporting riparian habitat, especially the cattail/bulrush marsh communities which are directly supported by the continuous surface flows. Both wetland and riparian habitats are disappearing at an alarming rate in Arizona and the Southwest.

(1) Natural flood events have been drastically curtailed and/or base flows have been minimized during critical periods, and exotic species such as salt cedar (*Tamarix chinensis*), have been favored. Salt cedar is more tolerant of extreme conditions, particularly of low soil moisture and higher soil salinities. Salt cedar exudes salt crystals from its leaves in the course of transpiration, "poisoning" the surrounding soils. Native riparian species such as cottonwood and willow, are unable to tolerate the high salinity levels, surrounding soils. Moreover, due to salt cedar's broad seed dispersal window, prolific seed production, effective seed dissemination, rapid growth, and early maturation it has an advantage over native vegetation, often disrupting reproduction of the desirable native flora. Compared with native riparian trees and shrubs, salt cedar has inferior values as wildlife habitat. By virtue of its properties as a fuel source, the presence of salt cedar within a native system increases the probability and intensity of catastrophic wildfires. A catastrophic wildfire can result in high mortality rates of native vegetation and ultimately stimulate successional growth towards monotypic stands of salt cedar.

(2) The Yuma Clapper Rail (*Rallus longirostris yumanensis*), a Federally listed endangered species is found in the study area. A survey conducted by the U.S. Fish and Wildlife Service (USFWS) in May, 1991 found three pair of Yuma Clapper Rail nesting in the study area. The razorback sucker (*Xyrauchen texanus*), also an endangered species, was reintroduced in 1982. The USFWS estimate that the razorback sucker could possibly still inhabit the study area.

(3) Since construction of the Tres Rios demonstration project two years ago, representatives of BOR and the Phoenix Audubon Society have been recording the types of fish and wildlife that have utilized the constructed wetlands. Over 50 types of birds have been observed using the wetlands. Additionally, 5 types of fish, 14 types of mammals, and numerous amphibians have been observed.

b) **Water Quality/Supply:** At the present time, effluent discharges from the 91st Avenue treatment plant meet EPA standards and are of a high quality for habitat

restoration. The current capacity of the treatment plant is 150 MGD. Contractual agreements provide a maximum of approximately 120 MGD to the Palo Verde Nuclear Generating Power Plant through an underground pipeline where it is utilized as cooling water. At present, actual use rates range between 0 MGD, on a frequent basis, to a peak of 90 MGD. SROG also has an obligation for an additional 31.5 MGD with the Buckeye Irrigation District (BID). Delivery of the flows to BID are made utilizing the Salt and Gila River beds. Constructed Wetlands would not be constrained by these agreements. The effluent would first pass through the constructed wetlands prior to delivery to the obligated user.

c) Flood Control: The study area has been subjected to five floods in excess of 100,000 cfs since 1978. The floods occurred in 1978 (two), 1980, 1983, and 1993. These floods resulted in damages to residences and agricultural areas in and around the study area. After the flood in 1993, additional vegetation established itself in the river. FCDMC applied for a 404 Permit to resume channel clearing. The permit was denied due to concerns of the Arizona Game & Fish Department (AZGF). As flows reach 10,000-15,000 cfs, nesting and cover habitat of the Yuma Clapper Rail would be over-topped with high water. Feeding and nesting habitat of the Clapper Rail becomes unavailable, causing stress on this endangered species. The duration and extent to which habitat is unavailable to the species could have a serious impact on its recovery in the study area. Given the scouring effects of higher flows, the cattail/bulrush marsh communities may be destroyed as upstream dam releases approach 30,000-50,000 cfs. During periods of serious flood potential, large volumes of water are released from upstream dams and may cause flood damage in the Phoenix metropolitan area.

d) Recreation: Approximately 20 percent of the Tres Rios study area, on its western border, lies within Estrella Mountain Regional Park. The park is owned and managed by Maricopa County Parks and Recreation Department. Once the County completes its Sun Circle Trail System through this reach of the Gila and Salt Rivers, recreation use patterns are expected to expand throughout the study area. The Sun Circle Trail System, a component of the National Recreation Trail System, comprises a 110 mile loop encompassing the Phoenix metropolitan area. Approximately 70 percent of the Sun Circle trail system is in place.

2) Expected Future Conditions:

a) Wildlife Habitat: A loss of existing riparian habitat, including Threatened & Endangered species habitat, will occur without the continuous surface water flows of effluent discharges from 91st Avenue Wastewater Treatment Plant into the Salt River. In addition, riparian habitat would not be protected from releases from upstream dams which contribute towards washing out Yuma Clapper Rail habitat.

b) Water Quality/ Supply: Current plans involve the elimination of secondary effluent releases from the 91st Avenue wastewater treatment plan in order to meet surface water quality standards. A discontinuation of wastewater discharge will greatly impact riparian habitat, including that of the Yuma Clapper Rail.

c) Flood Control: The existing level of expected annual damages would continue to increase as vegetation (Salt Cedar) within the river channel remains uncontrolled.

d) Recreation: Without a continuous water source in the channel, the Sun Circle Trail, a National Recreation Trail planned to go through the study area, will offer a narrower range of recreation experiences in the Salt River channel. Demand for recreational opportunities will continue to increase.

3) Problems and Opportunities: Reconnaissance phase studies have identified opportunities to accomplish the following:

- a) to restore Salt River riparian habitat
- b) to restore continuous surface flows from the 91 st Avenue plant.
- c) to restore wetland habitat
- d) to mitigate flood damages to nesting and cover habitat of the Yuma Clapper Rail.
- e) to mitigate flood damages to Salt River riparian habitat
- f) to reduce flood damages in the Phoenix metropolitan area
- g) to include limited recreation features in conjunction with a potential Federal project.
- h) to facilitate groundwater recharge

b. Alternative Plans: The array of plans that will be considered in the feasibility study include the following:

1) Alternative 1 - No Action

2) Alternative 2 - Vegetation Management in Stream Bed: This alternative would clear salt-cedar in favor of cottonwoods and willows along with cattail/bulrush. This would increase habitat quality but would decrease the amount of vegetation. Anywhere from 1000 feet to the entire channel bottom may be cleared from all phreatophytes. Cottonwood, willow, and other native riparian trees will remain in place. This alternative would result in improved fish and wildlife habitat and improved flood carrying capacity.

3) Alternative 3- Constructed Wetlands and Vegetation Management in Stream Bed without Recharge: This alternative includes the construction of a large scale wetland area (1000

acres) which would provide significant fish and wildlife habitat values while incidentally polishing the future capacity of the 91st Avenue treatment plant. As cattail/bulrush plant communities comprise a significant portion of the proposed wetlands, the project would assist in the recovery of the Yuma Clapper Rail. The construction of a water delivery channel to the wetland units would not only provide flood protection and protection from upstream dam releases to the wetlands habitat itself, but would also provide incidental flood protection to the communities along the north bank of the Salt River from flows up to 100,000 cfs. Recreation opportunities including environmental education would enhance Estrella Mountain Regional Park and the Sun Circle National Recreation Trail when integrated with the Tres Rios wetlands landscape.

4) Alternative 4 - Constructed Wetlands with Recharge and Vegetation Management in Stream Bed: This alternative would be similar to Alternative 3, except that only a portion of the 91st Avenue treatment plant effluent would be ultimately discharged to the river. The City of Phoenix would pursue its plan for groundwater recharge with the balance of the effluent, or recharge the effluent as it passes through the constructed wetlands.

5) Alternative 5 - Constructed Wetlands With Recharge and Levee: The purpose of this alternative is to achieve the benefits of Alternatives 3 and provide a higher lever of flood protection. This alternative would include the features of Alternative 3 plus flood control levees along the north bank and a portion of the south bank of the channel. These additional features would provide flood protection to the residential, industrial and agricultural areas in the study area.

c. Evaluation of Alternatives: At this level of study, it is apparent that the alternatives would result in net environmental benefits through ecosystem restoration. Additional incidental benefits may be derived from flood control, recreation and groundwater supply. Of particular importance is that all of the action alternatives would provide an increased habitat diversity necessary for threatened and endangered species such as the Yuma Clapper Rail. The Project Study Plan will be based on the refinement and analysis of these five alternatives. Based on the limited evaluations to date, it appears that the alternatives would be technically feasible, environmentally sound and could be justified for implementation.

6. FEDERAL INTEREST: Since ecosystem restoration is a high priority budget output and that ecosystem restoration is the primary output of the alternatives to be evaluated, there is a strong Federal interest in conducting the feasibility study. There is also a Federal interest in other related outputs of the alternatives including potential flood control and limited recreation that could be developed within exiting policy.

7. PRELIMINARY FINANCIAL ANALYSIS: The City of Phoenix, as the lead city of SROG, has been identified as the local sponsor for the study. The sponsor is aware that it will be responsible for 50% of the costs for feasibility phase studies. The sponsor is also aware that it will be responsible for: 35% of the implementation costs for the ecosystem restoration project, plus 50% of costs for any separable recreation features, plus 5% and additional cash or LERRD to bring the total to 35% of costs for any separable flood control features, and plus 100% of costs for any separable groundwater recharge features. The local sponsor (City of Phoenix), presently, has funding to initiate the feasibility study

8. RECOMMENDATION: The recommendation resulting from the reconnaissance level investigations is that the Los Angeles District proceed with a cost-shared feasibility study of ecosystem restoration and related purposes, with the City of Phoenix as the local cost-sharing sponsor. A preliminary cost estimate to perform the feasibility study of the Tres Rios, Arizona is \$5 million and the duration is expected to be approximately 3 years. These estimates will be refined in the Project Study Plan.

9. POTENTIAL ISSUES EFFECTING INITIATION OF FEASIBILITY PHASE: Timely approval to proceed with the study, and timely completion and approval of the Project Study Plan, are required to meet the expectations of the local sponsor. There are no other issues effecting the initiation of the feasibility phase.

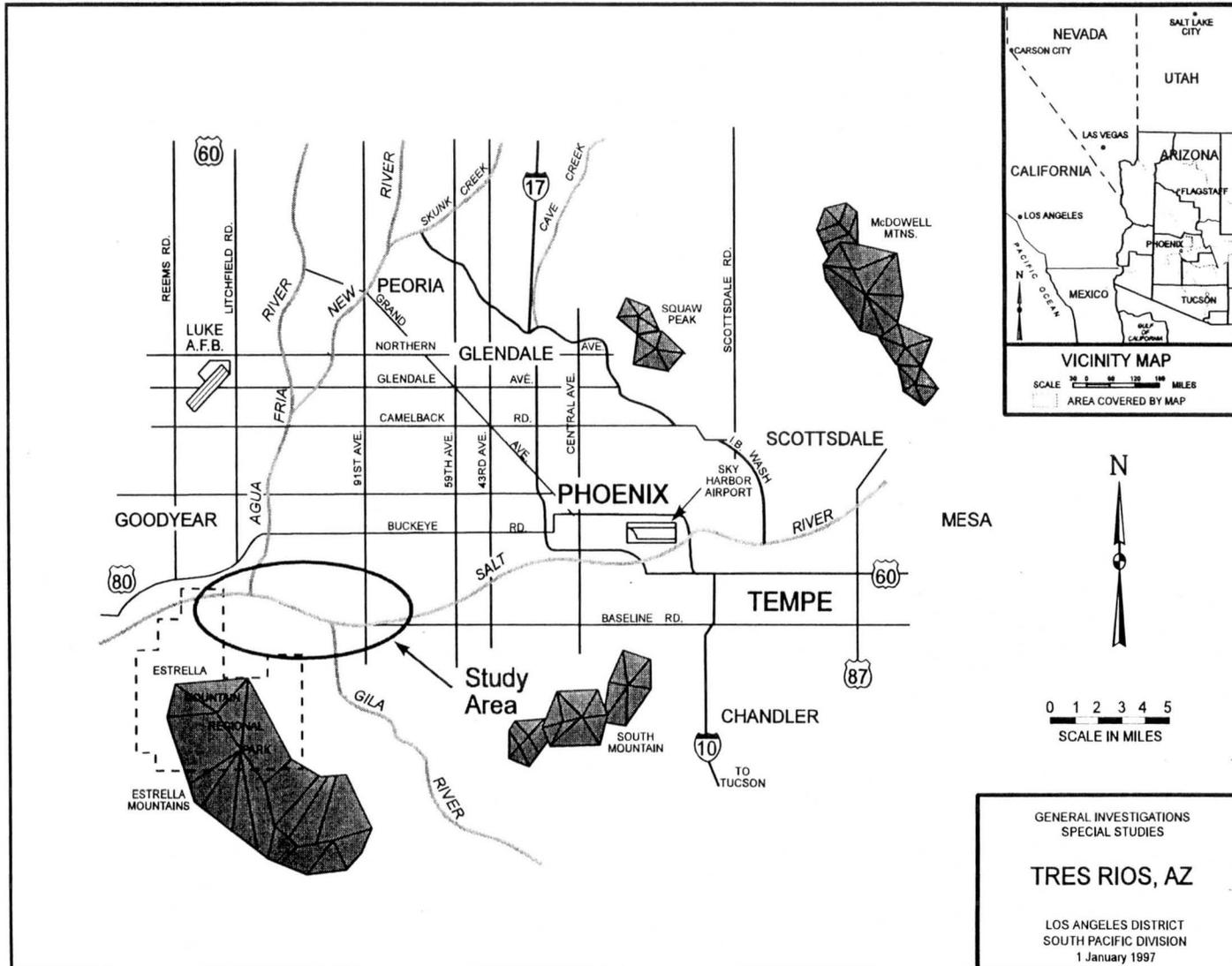
10. PROJECT AREA MAP. (See Page 8).



Robert L. Davis
Colonel, Corps of Engineers
District Engineer

U. S. ARMY ENGINEER DISTRICT

CORPS OF ENGINEERS



8

GENERAL INVESTIGATIONS
SPECIAL STUDIES

TRES RIOS, AZ

LOS ANGELES DISTRICT
SOUTH PACIFIC DIVISION
1 January 1997



City of Phoenix

OFFICE OF THE CITY MANAGER

Winner of the
Carl Bertelsmann
Prize



March 13, 1997

*Rec'd
3/18*
Colonel Robert L. Davis
District Engineer
U.S. Army Corps of Engineers
Los Angeles District
911 Wilshire Boulevard
Los Angeles, California 90017

Dear Colonel Davis:

Re: Tres Rios River Management Program

I would like to express my appreciation for your agency's continued involvement in the development of the Tres Rios River Management Program, which is being advocated by the Multi-City Subregional Operating Group (SROG), consisting of the cities of Phoenix, Glendale, Mesa, Scottsdale and Tempe.

We have reviewed the Tres Rios, Arizona, Reconnaissance Study and Project Study Plan prepared by your office. We support the recommendations of the report and are willing to proceed to negotiate the Feasibility Cost Sharing Agreement (FCSA) which by signing will initiate the Feasibility Study. We anticipate being a local cost sharing sponsor and are aware of the 50/50 cost sharing and understand that 25 percent of the study effort can be in the form of in-kind credit from the local sponsor. We also understand that this is an expedited Reconnaissance Study. We look forward to meeting with you at the Reconnaissance Review Conference in May, 1997, and signing the FCSA in June, 1997.

Again, we sincerely appreciate the Corps' efforts in preparing the Reconnaissance Report and Project Study Plan.

Sincerely,

Frank Fairbanks
City Manager

c: David R. Garcia
Michael Gritzuk
Paul Kinshella

**TRES RIOS, ARIZONA
FEASIBILITY STUDY**

FEASIBILITY COST SHARING AGREEMENT

April 1997

Enclosure 1

-----DRAFT-----
AGREEMENT
BETWEEN THE DEPARTMENT OF THE ARMY
AND
THE CITY OF PHOENIX
FOR THE TRES RIOS, ARIZONA

THIS AGREEMENT is entered into this ____ day, of __, 19_, by and between the Department of the Army (hereinafter the "Government"), represented by the District Engineer executing this Agreement, and the City of Phoenix (hereinafter the "Sponsor"),

WITNESSETH, that

WHEREAS, Public Law 761, seventy-fifth Congress, dated June 28, 1938 authorized and directed the Secretary of War to conduct preliminary examinations and surveys of the Gila River and its tributaries in Arizona, and the Senate Energy and Water Development Appropriation Bill, 1994, dated September 7, 1993 (to accompany House Report 2445) provided funding for the U.S. Army Corps of Engineers to conduct a reconnaissance study investigating restoration of riparian habitat, recreation, water quality and flood control at the confluence of the Gila, Salt, and Agua Fria Rivers known as Tres Rios; and

WHEREAS, the U.S. Army Corps of Engineers has conducted a reconnaissance study investigating restoration of riparian habitat, recreation, water quality and flood control at the confluence of the Gila, Salt, and Agua Fria Rivers known as Tres Rios, and the Senate Energy and Water Development Appropriations Act, 1997 (Public Law 104-206, 108 Stat. 2984 , dated September 30, 1996), pursuant to this authority, and has determined that further study in the nature of a "Feasibility Phase Study" (hereinafter the "Study") is required to fulfill the intent of the study authority and to assess the extent of the Federal interest in participating in a solution to the identified problem; and

WHEREAS, Section 105 of the Water Resources Development Act of 1986 (Public Law 99-662, as amended) specifies the cost sharing requirements applicable to the Study;

WHEREAS, the Sponsor has the authority and capability to furnish the cooperation hereinafter set forth and is willing to participate in study cost sharing and financing in accordance with the terms of this Agreement; and

WHEREAS, the Sponsor and the Government understand that entering into this Agreement in no way obligates either party to implement a project and that whether the Government supports a project authorization and budgets it for implementation depends upon, among other things, the outcome of the Study and whether the proposed solution is consistent with the Economic and

Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies and with the budget priorities of the Administration;

NOW THEREFORE, the parties agree as follows:

ARTICLES I - DEFINITIONS

For the purposes of this Agreement:

A. The term "study costs" shall mean all disbursements by the Government pursuant to this Agreement, from Federal appropriations or from funds made available to the Government by the Sponsor, and all Negotiated Costs of work performed by the Sponsor pursuant to this Agreement. Study Costs shall include, but not be limited to: labor charges; direct costs; overhead expenses; supervision and administration costs; the costs of contracts with third parties, including termination or suspensions charges; and any termination or suspension costs (ordinarily defined as those costs necessary to terminate ongoing contracts or obligations and to properly safeguard the work already accomplished) associated with this Agreement.

B. The term "study period" shall mean the time period for conducting the Study, commencing with the release to the U.S. Army Corps of Engineers Los Angeles District of initial Federal feasibility funds following the execution of this Agreement and ending when the Assistant Secretary of the Army (Civil Works) submits the feasibility report to the Office of Management and Budget (OMB) for review for consistency with the policies and programs of the President.

C. The term "PSP" shall mean the Project Study Plan, which is attached to this Agreement and which shall not be considered binding on either party and is subject to change by the Government.

D. The term "negotiated costs" shall mean the costs of in-kind services to be provided by the Sponsor in accordance with the PSP.

E. The term "contracting officer" shall mean a representative of the Government with the authority to enter into, administer and/or terminate contracts and make related determinations and findings.

F. The term "fiscal year" shall mean one fiscal year of the Government. The Government fiscal year begins on October 1 and ends on September 30.

ARTICLE II - OBLIGATIONS OF PARTIES

A. The Government, using funds and in-kind services provided by the Sponsor and funds appropriated by the Congress of the United States, shall expeditiously prosecute and complete

the Study, in accordance with the provisions of this Agreement and Federal laws, regulations, and policies.

B. In accordance with this Article and Article III of this Agreement, the Sponsor shall contribute cash and in-kind services equal to fifty (50) percent of total Study Costs. The Sponsor may, consistent with applicable law and regulation, contribute up to 25 percent of total Study Costs through the provision of in-kind services. The in-kind services to be provided by the Sponsor, the estimated negotiated costs for those services, and the estimated schedule under which those services are to be provided are specified in the PSP. Negotiated Costs shall be subject to an audit by the Government to determine reasonableness, allocability, and allowability.

C. The Sponsor understand that the schedule of work may require the Sponsor to provide cash or in-kind services at a rate that may result in the Sponsor temporarily diverging from the obligations concerning cash and in-kind services specified in paragraph B of this Article. Such temporary divergences shall be identified in the quarterly reports provided for in Articles III.A. of this Agreement and shall not alter the obligations concerning costs and services specified in paragraph B of this Article or the obligations concerning payment specified in Article III of this Agreement.

D. If, upon the award of any contract or the performance of any in-house work for the Study by the Government or the Sponsor, cumulative financial obligations of the Government and the Sponsor would exceed \$4,335,000, the Government and the Sponsor agree to defer award of that and all subsequent contracts, and performance of that and all subsequent in-house work, for the Study until the Government and the Sponsor agree to proceed, but in no event shall such a deferral exceed two years.

E. No Federal funds may be used to meet the Sponsor's share of Study Costs unless the Federal granting agency verifies in writing that the expenditure of such funds is expressly authorized by statute.

F. The award and management of any contract with a third party in furtherance of this Agreement which obligates Federal appropriations shall be exclusively within the control of the Government. The award and management of any contract by the Sponsor with a third party in furtherance of this Agreement which obligates funds of the Sponsor and does not obligate Federal appropriations shall be exclusively within the control of the Sponsor, but shall be subject to applicable Federal laws and regulations.

ARTICLE III - METHOD OF PAYMENT

A. The government shall maintain current records of contributions provided by the parties, current projections of total Study Costs, and current projections of each party's share of total Study Costs. At least quarterly, the Government shall provide the Sponsor a report setting forth this information. Total Study Costs are currently estimated to be \$3,770,000 and the

Sponsor's share of total Study Costs is currently estimated to be \$1,885,000. In order to meet the Sponsor's cash payment requirements, the Sponsor must provide a cash contribution estimated to be \$942,500. The dollar amounts set forth in this Article are based upon the Government's best estimates, which reflect projected costs, price-level changes, and anticipated inflation. Such cost estimates are subject to adjustment by the Government and are not to be construed as the total financial responsibilities of the Government and the Sponsor.

B. The Sponsor shall provide its cash contribution required under Article II.B. of this Agreement in accordance with the following provisions:

1. For purposes of budget planning, the Government shall notify the Sponsor by September 1 of each year of the estimated funds that will be required from the Sponsor to meet the Sponsor's share of total Study Costs for the upcoming fiscal year.

2. No later than 30 calendar days prior to the scheduled date for the Government's issuance of the solicitation for the first contract for the Study or for the Government's anticipated first significant in-house expenditure for the Study, the Government shall notify the Sponsor in writing of the funds the Government determines to be required from the Sponsor to meet its required share of total Study Costs for the first fiscal year of the Study. No later than 15 calendar days thereafter, the Sponsor shall provide the Government the full amount of the required funds by delivering a check payable to "FAO, USAED, Los Angeles" to the contracting officer representing the Government.

3. For the second and subsequent fiscal years of the Study, the Government shall, no later than sixty (60) calendar days prior to the beginning of the fiscal year, notify the Sponsor in writing of the funds the Government determines to be required from the Sponsor to meet its required share of total Study Costs for that fiscal year, taking into account any temporary divergences identified under Article II.C. of this Agreement. No later than 30 calendar days prior to the beginning of the fiscal year, the Sponsor shall make the full amount of the required funds available to the Government through the funding mechanism specified in paragraph B.2. of this Article.

4. The Government shall draw from the funds provided by the Sponsor such sums as the Government deems necessary to cover the Sponsor's share of contractual and in-house fiscal obligations attributable to the Study as they are incurred.

5. In the event the Government determines that the Sponsor must provide additional funds to meet its share of Study Costs, the Government shall so notify the Sponsor in writing. No later than 60 calendar days after receipt of such notice, the Sponsor shall make the full amount of the additional required funds available through the funding mechanism specified in paragraph B.2. of this Article.

C. Within ninety (90) days after the conclusion of the Study Period or termination of this Agreement, the Government shall conduct a final accounting of Study Costs, including disbursements by the Government of Federal funds, cash contributions by the Sponsor, and credits for the Negotiated Costs of the Sponsor, and shall furnish the Sponsor with the results of this accounting. Within thirty (30) days thereafter, the Government, subject to the availability of funds, shall reimburse the Sponsor for the excess, if any, of cash contributions and credits given over its required share of total Study Costs, or the Sponsor shall provide the Government any cash contributions required for the Sponsor to meet its required share of total Study Costs.

ARTICLE IV - STUDY MANAGEMENT AND COORDINATION

A. To provide for consistent and effective communication, the Sponsor and the Government shall appoint named senior representatives to an Executive Committee consisting of the Los Angeles District Engineer and Deputy District Engineer for Project Management, the Los Angeles District Chief of Planning Division, and the City Manager of the City of Phoenix, Arizona or his designee. The first meeting of the Executive Committee shall be within two months of the signing of this Agreement. Thereafter, the Executive Committee shall meet regularly until the end of the Study Period.

B. Until the end of the Study Period, the Executive Committee shall generally oversee the Study consistently with the PSP.

C. The Executive Committee may make recommendations that it deems warranted to the Government on matters that it oversees, including suggestions to avoid potential sources of dispute. The Government in good faith shall consider such recommendations. The Government has the discretion to accept, reject, or modify the Executive Committee's recommendations.

D. The Executive Committee shall appoint representatives to serve on a Study Management Team. The Study Management Team shall keep the Executive Committee informed of the progress of the Study and of significant pending issues and actions, and shall prepare periodic reports on the progress of all work items identified in the PSP.

ARTICLE V - DISPUTES

Before a party to this Agreement may bring suit in any court concerning an issue relating to this Agreement, the party must first seek in good faith to resolve the issue through negotiation or other forms of non-binding alternative dispute resolution mutually acceptable to the parties.

ARTICLE VI - MAINTENANCE OF RECORDS

A. Within sixty (60) days of the effective date of this Agreement, the Government and the Sponsor shall develop procedures for keeping books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to this Agreement to the extent and in such

detail as will properly reflect total Study Costs. These procedures shall incorporate, and apply as appropriate, the standards for financial management systems set forth in the Uniform Administrative Requirement for Grants and Cooperative Agreements to state and local governments at 32 C.F.R. Section 33.20. The Government and the Sponsor shall maintain such books, records, documents, and other evidence in accordance with these procedures for a minimum of three years after completion of the Study and resolution of all relevant claims arising therefrom. To the extent permitted under applicable Federal laws and regulations, the Government and the Sponsor shall each allow the other to inspect such books, documents, records, and other evidence.

B. In accordance with 31 U.S.C. Section 7503, the Government may conduct audits in addition to any audit that the Sponsor is required to conduct under the Single Audit Act of 1984, 31 U.S.C. Sections 7501-7507. Any such Government audits shall be conducted in accordance with Government Auditing Standards and the cost principles in OMB Circular No. A-87 and other applicable cost principles and regulations. The costs of Government audits shall be included in total Study Costs and shared in accordance with the provisions of this Agreement.

ARTICLE VII - RELATIONSHIP OF PARTIES

The Government and the Sponsor act in independent capacities in the performance of their respective rights and obligations under this Agreement, and neither is to be considered the officer, agent, or employee of the other.

ARTICLE VIII - OFFICIALS NOT TO BENEFIT

No member of or delegate to the Congress, nor any resident commissioner, shall be admitted to any share or part of this Agreement, or to any benefit that may arise therefrom.

ARTICLE IX - FEDERAL AND STATE LAWS

In the exercise of the Sponsor's rights and obligations under this Agreement, the Sponsor agrees to comply with all applicable Federal and State laws and regulations, including Section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 88-352) and Department of Defense Directive 5500.11 issued pursuant thereto and published in 32 C.F.R. Part 195, as well as Army Regulations 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army."

ARTICLE X - TERMINATION OR SUSPENSION

A. This Agreement shall terminate at the end of the Study Period; provided, that prior to such time and upon thirty (30) days written notice, either party may terminate or suspend this Agreement. In addition, the Government shall terminate this Agreement immediately upon any failure of the Sponsor to fulfill its obligations under Article III of this Agreement. In the event

that either party elects to terminate this Agreement, both parties shall conclude their activities relating to the Study and proceed to a final accounting in accordance with Article III.C. of this Agreement. Upon termination of this Agreement, all data and information generated as part of the Study shall be made available to both parties.

B. Any termination of this Agreement shall not relieve the parties of liability for any obligations previously incurred, including the costs of closing out of transferring any existing contracts.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement, which shall become effective upon the date it is signed by the District Engineer for the U.S. Army Corps of Engineers, Los Angeles District.

DEPARTMENT OF THE ARMY

CITY OF PHOENIX

BY _____
Colonel, Corps of Engineers
District Engineer
Los Angeles District

BY _____
City Manager, City of Phoenix,
a municipal corporation,

**TRES RIOS, ARIZONA
FEASIBILITY STUDY**

PROJECT STUDY PLAN

April 1997

Enclosure 2

TABLE OF CONTENTS

| | |
|---|----|
| I. PURPOSE AND SCOPE | 3 |
| II. STUDY AREA | 3 |
| III. STUDY ALTERNATIVES | 3 |
| A. Existing Conditions | 3 |
| B. Problems and Opportunities | 7 |
| C. Alternatives | 9 |
| D. Recommended Alternative | 11 |
| IV. GUIDANCE | 11 |
| V. LOCAL SPONSOR AND IN-KIND SERVICES | 11 |
| VI. FEASIBILITY MILESTONES | 12 |
| VII. WORK TASKS | 12 |
| 01. Coordination and Public Involvement | 13 |
| 02. Institutional Studies | 14 |
| 04. Cultural Resources Studies | 14 |
| 05. Environmental Studies | 15 |
| 06. Fish and Wildlife Studies | 16 |
| 07. Economic Studies | 17 |
| 09. Hydrologic and Hydraulic Studies | 22 |
| 10. Geotechnical Investigations | 27 |
| 11. Design and Cost Estimating | 30 |
| 12. Real Estate Efforts | 32 |
| 13. Study Management | 33 |
| 17. Review Support | 39 |
| 18. Contingency | 47 |
| VIII. STUDY COST SUMMARY | 48 |
| IX. IN-KIND SERVICES | 50 |
| X. CERTIFICATION | 56 |

I. PURPOSE AND SCOPE.

The purpose of this Project Study Plan (PSP) is to identify the work items, funding schedules, and cost estimates required to complete the Feasibility Phase of the Tres Rios, Arizona investigation. The Reconnaissance Phase of this investigation was completed April 1, 1997, and determined that there may be Federal interest in providing habitat restoration in the area of Arizona specified as Tres Rios. A Feasibility Study is the vehicle for completing the assessment of Federal interest. The result of the Feasibility Phase will be a Feasibility Report (including an Environmental Impact Statement) that may recommend water resources plans for implementation. The Feasibility Report will contain sufficient planning and layout to enable engineering and design of plans and specifications to start immediately following receipt of PED funds.

II. STUDY AREA.

The study area is located at the confluence of the Salt, Gila, and Agua Fria Rivers, immediately west of the City of Phoenix, Arizona. Because of the confluence of the three rivers within this close proximity, the study area has been identified as "Tres Rios". In the Spanish language, Tres Rios means "three rivers".

Tres Rios is approximately nine miles west of downtown Phoenix. The upstream boundary of the study area is located at 87th Avenue, just upstream of where the City of Phoenix operates a wastewater treatment plant. The study area extends west from the treatment plant for approximately seven miles through the confluence of both the Gila and Agua Fria Rivers. The study area ends near Bullard Avenue. The Buckeye Irrigation Company diversion canal serves as the location of the end of the study area.

Elevations at the confluence of the Agua Fria and the Gila Rivers are approximately 990 feet above sea level. The South Mountains and Sierra Estrella Mountains, lie south and southwest of the study area, respectively.

III. STUDY ALTERNATIVES.

A. Existing Conditions.

1) Wildlife Habitat.

The study area provides wetland and riparian habitat for numerous species of fish and wildlife including waterfowl and Federal and State listed threatened and endangered species. Both wetland and riparian habitats are disappearing at an alarming rate in Arizona and the Southwest. These habitats are used by a high percentage of Federal and state T&E species. Continued degradation is expected to continue downstream of the treatment plant since outflows from the plant are regulated, thus vegetation experiences a somewhat disrupted growth pattern. In "managed" locations such as the area downstream of the 91st Avenue Water Treatment Plant,

natural flood events have been drastically curtailed and/or base flows have been minimized during critical periods, and exotic species such as salt cedar (*Tamarix chinensis*), may be favored. Salt cedar is more tolerant of extreme conditions, particularly of low soil moisture and higher soil salinities. Salt cedar exudes salt crystals from its leaves in the course of transpiration, "poisoning" the surrounding soils. Native riparian species such as cottonwood and willow, are unable to tolerate the high salinity levels, surrounding soils. Moreover, due to salt cedar's broad seed dispersal window, prolific seed production, effective seed dissemination, rapid growth, and early maturation it has an advantage over native vegetation, often disrupting reproduction of the desirable native flora.

Compared with native riparian trees and shrubs, salt cedar has inferior values as wildlife habitat. The seed of salt cedar is generally too small to be consumed by rodents and birds, and its thin, scaly leaf is unpalatable to native browsing animals and to leaf-eating insects. In contrast, cottonwood and willow harbor a greater abundance of insect life than does salt cedar, so are more beneficial to many bird species. Consequently, as exotic species increase within a cotton-willow ecosystem, wildlife values tend to decline. Tantamount to diminishing wildlife values, salt cedar poses a threat to native vegetation by its highly flammable and combustible characteristics. Therefore, by virtue of its properties as a fuel source, its presence within a native system increases the probability and intensity of catastrophic wildfires. In effect, a catastrophic wildfire can result in high mortality rates of native vegetation, particularly cottonwood (*Populus fremontii*), and ultimately stimulate successional growth towards monotypic stands of salt cedar.

The Yuma Clapper Rail (*Rallus longirostris yumanensis*), a Federally listed endangered species is found in the study area. A survey conducted by the U.S. Fish and Wildlife Service (USFWS) in May, 1991 found three pair of Yuma Clapper Rail nesting in the study area. According to the USFWS, if the proper habitat was provided and managed for the Yuma Clapper Rail, a significant increase in population would be expected in the study area.

The razorback sucker (*Xyrauchen texanus*), also an endangered species, was reintroduced in 1982. The USFWS estimate that the razorback sucker could possibly still inhabit the study area.

Since construction of the Tres Rios demonstration project two years ago, representatives of BOR and the Phoenix Audubon Society have been recording the types of fish and wildlife that have utilized the constructed wetlands. Over 50 types of birds have been observed using the wetlands. Additionally, 5 types of fish, 14 types of mammals, and numerous amphibians have been observed. Most notable is the bobcat, beaver, and javelina. To date, no threatened and endangered species have been observed utilizing the wetlands.

2) Water Quality/Supply.

The U.S. Environmental Protection Agency (EPA) sets water quality standards for discharge of effluent into the Salt River, in particular for the discharge from the 91st Avenue

plant. Arizona Department of Environmental Quality (ADEQ) monitors and enforces the water quality standards. At the present time, effluent discharges from the plant meet EPA standards. However, the effluent is far from meeting safe drinking water standards. Because the river below the treatment plant is almost solely dependant upon effluent flows, the fish within the river are not safe for human consumption.

The current capacity of the treatment plant is 150 MGD. Contractual agreements for this effluent require SROG to provide a maximum of approximately 120 MGD to the Palo Verde Nuclear Generating Power Plant. The effluent water is delivered to the power plant through an underground pipeline where it is utilized as cooling water. At present, the power plant does not utilize the entire 120 MGD. Actual use rates range between 0 MGD, on a frequent basis, to a peak of 90 MGD, which is very rare.

SROG also has an obligation for an additional 31.5 MGD with the Buckeye Irrigation District (BID). The effluent flows are utilized for agricultural water. Delivery of the flows to BID are made utilizing the Salt and Gila River beds. BID operates a diversion structure downstream of the 91st Avenue plant to capture the river flows and divert them into agricultural canals.

These agreements were determined not to be a constraint on use of the effluent for constructed wetlands. The effluent would first pass through the constructed wetlands prior to delivery to the obligated user.

3) Flood Control.

The study area has been subjected to five floods in excess of 100,000 cfs since 1978. The floods occurred in 1978 (two), 1980, 1983, and 1993. These floods resulted in damages to residences and agricultural areas in and around the study area. As a result of the threat of continued flooding, the Flood Control District of Maricopa County (FCDMC) constructed the flood control project mentioned in paragraph 4-04. Because Cliff Dam, a proposed BOR water project, was never constructed and modifications were constructed on Roosevelt Dam, the level of protection provided by the levee is unclear. The level of protection is below 100 year protection in any case.

The 91st Avenue treatment plant has discharged effluent to the Salt River for some time now. The discharge is rich in nutrients. Vegetation has established itself within the floodway of the river. This established vegetation has, to some degree, been found to impede the flood flows of the river. This impeded flow is said to result in more frequent flooding events within the study area due to the constriction to the river from all the uncontrolled vegetation.

As a result of the uncontrolled vegetation within the floodway, FCDMC began a second flood control effort in the study area. This effort involved the mechanical removal of vegetation. The removal was 1000 feet wide and primarily removed phreatophytes such as salt cedar

(tamarix). After the flood in 1993, additional vegetation established itself in the river. FCDMC applied for a 404 Permit to resume channel clearing. The permit was denied due to concerns of the Arizona Game & Fish Department (AZGF). In addition to the vegetation that had sprung up after the 1993 flood, AZGF noticed an increase in wildlife activity in the area. Therefore, AZGF objected to continuing the channel clearing. The uncontrolled growth effects flood protection provided by the existing levee and as growth continues, the effect becomes worse.

As mentioned in previous paragraph, BOR modified the Salt River Project system in 1996. The modifications included an increase in flood control space behind Roosevelt Dam. The flood control space has reduced the discharges in the study area. The following changes occurred in the discharges:

| | 5 yr | 10 yr | 20 yr | 50 yr | 100yr |
|-------------|------------|------------|-------------|-------------|-------------|
| Former Q's | 40,000 cfs | 95,000 cfs | 135,000 cfs | 200,000 cfs | 250,000 cfs |
| Present Q's | 23,500 cfs | 57,000 cfs | 92,000 cfs | 185,000 cfs | 227,000 cfs |

The current level of flood protection provided through the study reach is unclear. The vegetation within the channel remains uncontrolled, but on the other hand, the modifications to Roosevelt Dam reduced discharges downstream. Detailed analysis will be needed to determine the level of existing flood protection and the effect of continued growth within the channel.

4) Recreation.

Approximately 20 percent of the Tres Rios study area, on its western border, lies within Estrella Mountain Regional Park. The park is owned and managed by Maricopa County Parks and Recreation Department. The rugged and scenic Sierra Estrella mountains are the most dominant feature of Estrella Mountain Regional Park. The terrain of these mountains is characterized by very steep slopes, numerous rock out-crops, shallow soils and sparse desert vegetation.

The County has developed a master plan for the 19,200 acre park, located approximately 20 miles southwest of downtown Phoenix. The master plan envisions the preservation of scenic desert wilderness areas while incorporating sensitive development of recreational facilities and activities. The Plan accommodates the expected annual demand of 1,000,000 visitors while insuring that the existing sonoran desert environment remains in its pristine condition. In fact, 90 percent of the park will remain essentially untouched. The remaining 10 percent will be sensitively utilized for educational, camping, picnicking, and sporting activities.

While water is a highly attractive feature for recreationists, park trails and facilities have presently been planned away from the Gila River. Once the County completes its Sun Circle Trail System through this reach of the Gila and Salt Rivers, recreation use patterns are expected

to expand throughout the study area. The Sun Circle Trail System, a component of the National Recreation Trail System, comprises a 110 mile loop encompassing the Phoenix metropolitan area. The trail offers a unique opportunity for hiking, horseback riding and bicycling throughout the urban area. The 110 mile loop and 580 miles of secondary trails are designed to link valley urban areas with county regional parks. Approximately 70 percent of the Sun Circle trail system is in place.

B. Problems and Opportunities.

A variety of water resource problems and opportunities were identified for Tres Rios. Local, State and Federal agencies as well as various interest groups had taken opposing positions on the issue of water quality and related standards for effluent discharge compliance. Associated with the issue of water quality standards is the concern for the cost of upgrading sewage treatment facilities for compliance purposes, water conservation, and wildlife habitat. The City of Phoenix has taken the position to move forward with the aquifer recharge program and thus eliminate its effluent discharge into the Salt River. Impacts to existing riparian habitat and wildlife, including the Yuma Clapper Rail, are expected to be serious. A few of the considerations are listed below.

1) Fish and Wildlife Habitat Restoration.

How the issue of water quality and possible elimination of wastewater discharge into the Salt River is resolved could have a serious impact on riparian habitat including that of the Yuma Clapper Rail. While phreatophytes are expected to continue to occupy the channel due to the high groundwater table in the study area, the cattail/bulrush communities which support habitat for the Yuma Clapper Rail are more dependent upon surface flows. While other, less regular flows occur in the channel, such as upstream dam releases and agricultural tailwater runoff, it appears that effluent from 91st Avenue plant plays a major role in supporting riparian habitat, especially the cattail/bulrush marsh communities which are directly supported by the continuous surface flows.

A second concern pertains to releases of water stored in upstream dams and their impact on riparian habitat and in particular that of the Yuma Clapper Rail. As cattail/bulrush marsh communities are inundated by high waters, feeding and nesting habitat of the Clapper Rail becomes unavailable, causing stress on this endangered species. It appears that this habitat may be completely washed out when upstream dam releases approach 30,000 - 50,000 cfs. Salt River Project administrators report the frequency of releases of this magnitude have occurred 26 times since 1916 with an average duration of 2 to 4 days per release. Protection of this habitat from storage releases from Federally constructed dams, to provide for the flood control component at these facilities, would assist the U.S. Fish and Wildlife Service in their efforts to provide for a recovered population of the Yuma Clapper Rail.

2) Water Quality Improvement.

The concern for wildlife habitat in the study area is further compounded by a water quality issue involving SROG, EPA, ADEQ, AZGF, and other environmental interests. A water source supporting riparian habitat in the study area is secondary effluent from the 91st Avenue wastewater treatment plant operated by the City of Phoenix in conjunction with SROG. Current plans may involve the elimination of this water source in order to meet proposed water quality standards.

Proposed Surface Water Quality Standards (SWQS) and National Pollutant Discharge Elimination System standards administered by ADEQ and EPA, respectively, have prompted the City of Phoenix to conduct an analysis of the costs of upgrading the facility to meet these new discharge requirements. Current estimates include plant upgrades amounting to \$350 million. The SROG cities evaluated the costs of moving forward with a plan for total reuse of the effluent through an aquifer recharge program rather than bearing the high costs of upgrading the existing facility. The estimated cost of a groundwater recharge project is \$150 million. While the recharge project would provide a future water supply, discharges into the Salt River would be eliminated. A discontinuation of wastewater discharge will impact riparian habitat, including that of the Yuma Clapper Rail. The manner in which the water quality issue is resolved will have a direct bearing on wildlife issues at Tres Rios. SROG also evaluated a constructed wetlands project which is estimated at \$89 million.

3) Flood Control.

While storage releases during periods of potential flooding are necessary from a dam safety standpoint, these releases could result in a variety of downstream impacts on the Salt River. During periods of serious flood potential, large volumes of water are released from upstream dams and may cause flood damage in the Phoenix metropolitan area. At the same time, lower volume releases, which may not result in economic losses to public or private property, have an impact on riparian habitat and in particular that of the Yuma Clapper Rail, a Federally listed Threatened and Endangered Species (T&E).

Cattail/bulrush marsh communities provide habitat for the Yuma Clapper Rail. As flows reach 10,000-15,000 cfs, nesting and cover habitat of the Yuma Clapper Rail is over-topped with high water. The duration and extent to which habitat is unavailable to the species could have a serious impact on its recovery in the study area. Given the scouring effects of higher flows, the cattail/bulrush marsh communities, if unprotected, are virtually destroyed as upstream dam releases approach 30,000-50,000 cfs.

The 1,000 foot wide channel clearing has presented issues to the environmental community. While the clearing provides for important flood protection to adjoining properties, vegetation and some habitat is lost. While vegetation patterns have been modified by the clearing, habitat impacts have been mitigated. The Arizona Department of Game and Fish owns

or manages several hundred acres in the area as this area is considered important for fish and wildlife resources, including T&E species.

4) Recreation.

Implementation of a water resources project in the Tres Rios area can open up many water based recreation opportunities. If the water quality from the 91st avenue plant is improved through additional treatment, the Salt and Gila Rivers may be safe for fish consumption. With the addition of a trail system, a riparian habitat can be opened for the pleasure of observing birds, mammals, fish and other wildlife such as being currently observed at the Tres Rios demonstration site.

C. Alternatives.

An analysis of alternative solutions for Tres Rios was performed by the COE in 1992. These solutions were discussed in a previous Reconnaissance study. Because of a change in discharges from Modified Roosevelt Dam and new COE emphasis on Fish and Wildlife Habitat Restoration, these alternatives were examined again.

Alternative 1 - No Action

The No Action Alternative presumes a loss of existing riparian habitat, including T&E species, will occur as the No Action Alternative does not include provisions to secure continuous surface water flows of effluent discharges from 91st Avenue Wastewater Treatment Plant into the Salt River. In addition, riparian habitat would not be protected from releases from upstream dams which contribute towards washing out Yuma Clapper Rail habitat. No measures to improve habitat diversity in the study area is expected. Without a continuous water source in the channel, the Sun Circle Trail, a National Recreation Trail planned to go through the study area, will offer a narrower range of recreation experiences in the Salt River channel. No flood control measures outside of the existing flood control levee. The 1,000 foot clearing operation would not resume. Thus, the existing level of expected annual damages would continue to increase as non-native vegetation within the river channel remains uncontrolled.

Alternative 2 - Vegetation Management in Stream Bed.

This alternative would clear salt-cedar in favor of cottonwoods, willows, and other native species, along with cattail/bulrush. This would increase habitat quality but would decrease the amount of habitat. The remaining higher quality habitat would still be susceptible to inundation. The vegetation management will compliment the existing levee on the north bank. Anywhere from 1000 feet to the entire channel bottom may be cleared from all phreatophytes. Cottonwood, willow, and other native riparian trees will remain in place. All flows from the 91st Avenue treatment facility will cease. This alternative will result in improved flood carrying capacity. However, fish and wildlife habitat will be severely impacted.

Alternative 3- Constructed Wetlands and Vegetation Management in Stream Bed without Recharge

Alternative 3 incorporates a large scale wetlands, capable of polishing the entire effluent from the 91st Avenue Plant while providing flood control and wildlife habitat, and recreation benefits. Approximately 1000 acres wetlands would be used to treat the future capacity of the 91st Avenue Plant's scheduled for 1996 (180 MGD). As part of the wetlands design, a water delivery channel along the channel side of the wetlands will carry secondary effluent from the 91st Avenue Plant to the wetlands units. As it extends the length of the wetlands, it has been determined that the water delivery channel will not only provide flood protection to the wetlands habitat itself, but will also provide an additional benefit of flood protection to the communities along the north bank of the Salt River.

As cattail/bulrush plant communities comprise a significant portion of the wetlands treatment process, the project would assist the USFWS' efforts to provide for a recovered population of the Yuma Clapper Rail. Yuma Clapper Rail habitat would be protected from upstream dam releases as the water delivery channel protects the wetlands from flows of up to 100,000 cfs. Habitat diversity would be substantially increased over the without project condition as wetlands habitat would comprise an area of approximately 1000 acres.

Opportunities for a variety of recreation experiences including environmental education are plentiful as Estrella Mountain Regional Park facilities and activities as well as the Sun Circle National Recreation Trail are fully integrated into the Tres Rios wetlands landscape.

Alternative 4 - Constructed Wetlands with Recharge and Vegetation Management in Stream Bed.

This alternative would provide the benefits of Alternative 3 and also provide additional high quality habitat through the construction of a wetlands. The benefits of this alternative are provide wildlife habitat, water quality, and recreation opportunities via a multi-purpose wetlands and at the same time achieve an improvement in flood flow conveyance through the channel.

A portion of 91st Avenue Wastewater Treatment Plant effluent would be treated in this alternative and ultimately discharges to the river. The City of Phoenix would pursue its plan for groundwater recharge with the balance of its effluent or recharge the effluent as it passes through the constructed wetlands. Habitat diversity would be significantly enhanced over and above the No Action Alternative. Recreation opportunities for Estrella Mountain Regional Park and the Sun Circle Trail would be greatly expanded and would also include an environmental education component.

Alternative 5 - Constructed Wetlands With Recharge Levee and Vegetation Management in Stream Bed.

The purpose of this alternative is to achieve the benefits of Alternatives 4 and provide a higher lever of flood control. The flood control measures and benefits associated with a levee along the north bank and a portion of the south bank of the channel are incorporated into this alternative. Complete flood protection would be provided to the residential, industrial and agricultural areas in the study area. The environmental benefits of Alternative 4 are not only incorporated into this alternative.. A mosaic of plant communities that are complementary to the habitat values provided by the wetlands could be created enhancing habitat diversity. As in the case with Alternative 4, the wetlands would be desgned to accomodate groundwater recharge as the City of Phoenix proceeds with its plans for groundwater recharge.

D. Recommended Alternative.

At this level of study, it is apparent that the alternatives would result in net environmental benefits through ecosystem restoration. Additional incidental benefits may be derived from flood control, recreation and groundwater supply. Of particular importance is that all of the action alternatives would provide an increased habitat diversity necessary for threatened and endangered species such as the Yuma Clapper Rail. The Project Study Plan will be based on the refinement and analysis of these five alternatives. Based on the limited evaluations to date, it appears that the alternatives would be technically feasible, environmentally sound and could be justified for implementation.

IV. GUIDANCE.

The general guidelines and criteria to be followed while conducting this Feasibility Phase are embodied in the Corps of Engineers Planning Guidance Notebook, ER 1105-2-100 and ER 1105-2-210. Specific guidelines for detailed studies are outlined in the work tasks given below. The Government will appoint a Study Manager who will be responsible for providing overall policy and general direction. The Study Manager will work to ensure that Corps policy, local sponsor objectives, and the framework provided by the PSP is followed.

V. LOCAL SPONSOR AND IN-KIND SERVICES.

The City of Phoenix is the non-Federal Sponsor of the Feasibility Phase. The local sponsor is required to provide fifty percent of the Feasibility Phase costs. Up to twenty-five percent of the of the Feasibility Phase costs may be performed by the sponsor as in-kind services. The in-kind services, anticipated to be performed at this time, are detailed by work items given in section IX In-Kind Summary. Acceptance of the in-kind services as complete will be made by the Corps of Engineers.

To ensure timely and responsive completion of the in-kind services, the Sponsor will designate a Study Manager who will be responsible for directing the conduct of all in-kind services. Additionally, the local sponsor's Study Managers will transmit information and coordinate with the Government's Study Manager.

VI. FEASIBILITY MILESTONES.

The start date for the Feasibility Phase and, therefore, all subsequent dates are contingent upon execution of the FCSA and receipt of Federal and local sponsors funds. The Feasibility Phase is to last 37 months. A detailed schedule of specific work items is presented in Appendix B. The specific milestones of the detailed schedule given in Table 1.

| Milestone | Date | Action |
|------------------|-------------|--|
| F1 | 6/97 | Begin Feasibility Phase |
| F2 | 8/97 | Initial Public Workshop |
| F3 | 5/98 | Feasibility Review Conference (Existing Conditions) |
| F4 | 4/99 | Feasibility Review Conference (Plan Formulation) |
| F5 | 9/99 | Submit Draft Feasibility Report and Draft EIS |
| F5A | 10/99 | Feasibility Review Conference |
| F6 | 10/99 | Field Level Coordination |
| F7 | 11/99 | Final Public Workshop |
| F8 | 2/00 | Submit Final Feasibility Report and Final EIS |
| F9 | 3/00 | Division Engineer's Certification/District Engineer's Notice |

VII. WORK TASKS.

The work to be performed consists of a feasibility level of effort according to the task descriptions presented below. Only the major tasks required during the feasibility study are given. The following descriptions are intended to reflect the entire study scope, including work to be performed by the Corps, A-E services, and local sponsors in-kind services. A detailed schedule is given in Appendix B. The costs are summarized in Section VIII.

SUBACCOUNT 01. Coordination and Public Involvement
SCHEDULE DURATION: 06/97 thru 04/00
ESTIMATED TOTAL TASK COST: \$200,000

1. Purpose.

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 the planning effort with the efforts other Federal, state, and local agencies.

2. Subtasks.

01.A Public Involvement Plan.

Public involvement techniques will be decided and a schedule with specific milestones will be developed into a Public Involvement Plan. During the formulation of the Public Involvement Plan, the number and types of meetings, workshops, and newsletters will be determined. A mailing list will be prepared to include all potentially interested parties.

01.B Conduct Initial 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. Public input will be obtained and analyzed.

01.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.

01.D Conduct Final Public Workshop (F7 Milestone).

A Final Public Meeting will be held to present the findings of the Draft Feasibility Report and Draft Environmental Impact Statement. Direct input from the public will be obtained for incorporation into the Final Report and Final EIS.

01.E Documentation.

The end product of the Coordination and Public Involvement Task will be to summarize the information obtained into a Public Involvement Appendix to the Final Feasibility Report.

3. Responsibility.

Planning Section C of the Corps will be responsible for subtasks a, b, c, d, and e. The in-kind services have not been identified yet.

SUBACCOUNT 02. Institutional Studies.
SCHEDULE DURATION: 6/97 thru 4/00
ESTIMATED TOTAL TASK COST: \$90,000

1. Purpose.

The Implementation Studies Task involves determining the financial and legal arrangements required to implement the recommended plans, including methods of financing the project. A financial capability analysis will examine whether or not the Sponsor has the organizational, legal, and financial capability to undertake the required financial obligations for implementing and maintaining the project after it is authorized for construction by Congress.

2. Subtasks.

02.A Financial Planning.

This subtask will begin with a review of the reconnaissance study assessment of local financial interest and capability. Cost sharing, alternative repayment options for any incidental project purposes, and other financial options will be defined. Two financing plans will be determined, a federally supportable plan and a locally preferred plan. If there is a difference between these two plans, then the Sponsors will be required to pay any cost differential.

02.B Documentation and Coordination.

A draft and final financial and cost recovery section of the feasibility report will be prepared. Analysis and documentation will be reviewed and coordinated.

3. Responsibility.

Programs and Project Management Division of the Corps will be responsible for items a, and b. The in-kind services have not been identified yet.

SUBACCOUNT 04. Cultural Resources Studies
SCHEDULE DURATION: 06/97 thru 4/00
ESTIMATED TOTAL TASK COST: \$31,000

The Cultural Resources Studies Task will be conducted in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, 36 CFR 800 "Protection of Historic Properties," and Corps Engineering Regulation 1105-2-100. The Los Angeles District Environmental Branch will conduct this task in cooperation with the State Historic Preservation Officer (SHPO) and other interested parties. This task will determine the impacts of the alternative plans on historical, architectural, and archaeological resources within the various study areas.

Sufficient archival and field surveys will be conducted to identify cultural sites within the study's Area of Potential Effect (APE) and will evaluate the eligibility of all cultural sites for the National Register of Historic Places. If project alternatives are found that will have an effect on sites eligible for the National Register, further consultation with SHPO will occur and the Advisory Council on Historic Preservation and other interested parties will be given an opportunity to comment. If necessary, the Corps may enter into a Memorandum of Agreement with SHPO, ACHP and a non-federal sponsor to stipulate ways to avoid or reduce the effects of project alternatives on cultural resources.

The end product of this task is a detailed report that describes all cultural resources within the APE and assesses the impacts of each project alternative on these resources. The report will also describe the range of additional future preservation or mitigation efforts and the associated costs of these studies. The findings of this task will be documented in a Environmental Studies Appendix to the feasibility report.

The following is an estimate of the tasks, man-days and costs associated with Subaccount 04:

| SUBACCOUNT/TASK | MAN-DAYS | COST |
|--------------------------------|----------|-----------------|
| Literature Search | 10 | 5,000 |
| In-House Field Surveys | 10 | 5,000 |
| Evaluate Effects of Project | 15 | 8,000 |
| Define Mit/Programmatic Agrmnt | 15 | 8,000 |
| Prepare a Technical Appendix | 10 | <u>5,000</u> |
| TOTAL..... | | \$31,000 |

SUBACCOUNT 05. Environmental Studies
SCHEDULE DURATION: 6/97 thru 4/00
ESTIMATED TOTAL TASK COST: \$198,000

The Environmental Studies task will be performed under contract, and will be monitored by the Los Angeles District Environmental Resources Branch. The effort will include incorporation of information obtained from the Fish and Wildlife Studies and Cultural Resources Studies tasks.

The Environmental Studies Task will include all efforts required to coordinate and develop the required NEPA, Section 7 of the Endangered Species Act, and Section 404(b)(1) documentation, including the necessary public notices. Additionally, the Environmental Evaluation (EE) prepared in the reconnaissance phase will be expanded into an Environmental Impact Statement (EIS).

The work performed in the following subtasks will be documented in an Environmental Studies Appendix to the feasibility report.

05.A Establish Without Project Conditions. The EIS will evaluate the environmental effects of the alternative plans. Baseline conditions for water quality, fish and wildlife, endangered species, and other pertinent environmental conditions will be adequately described so that an incremental analysis may be performed.

05.B Habitat and Recreation Planning and Evaluation. Mitigation measures for fish and wildlife and other affected resources will be refined and a monitoring program developed. Any land required for implementation will be identified. Water quality impacts will be determined from the Section 404(b)(1) evaluation. Endangered Species impacts will be determined from biological assessment and consultation with the USFWS. Recreation features will be evaluated.

05.C Documentation and Coordination. The report will be coordinated with Federal, State and local governments and agencies as well as interested groups and individuals. Preparation of the EIS will include ecological and biological support staff services, recreational support staff services, cultural resources support staff services, field reconnaissance where required, and coordination of U.S. Fish and Wildlife Service funding for the Coordination Act Report.

The following is an estimate of the tasks, man-days and costs associated with Subaccount 05:

| SUBACCOUNT/TASK | MAN-DAYS | COST |
|-----------------------------------|----------|------------------|
| Ecological/Biological Support | 25 | 26,000 |
| Constructed Wetlands Design | 30 | 20,000 |
| Prepare Incremental Cost Analysis | 23 | 20,000 |
| DEIS Coord with Technical Team | 23 | 20,000 |
| DEIS Coord with Agencies | 20 | 15,000 |
| DEIS Report Preparation | 40 | 40,000 |
| DEIS Review | 25 | 25,000 |
| FEIS Preparation & Release | 25 | 25,000 |
| Prepare Technical Appendix | 10 | 7,000 |
| TOTAL | | \$198,000 |
| Contract | | \$150,000 |
| In-House | | \$48,000 |

SUBACCOUNT 06. Fish and Wildlife Studies
SCHEDULE DURATION: 6/97 thru 4/00
ESTIMATED TOTAL TASK COST: \$30,000

The Fish and Wildlife Studies will be conducted in accordance with the Fish and Wildlife Coordination Act. The work will be performed by a technical team which, at a minimum, consists of the Corps of Engineers, the US Fish and Wildlife Service (USFWS), the State of

Arizona Game & Fish Department, the State of Arizona Department of Environmental Quality. The technical team will perform data collection, species identification, habitat modeling, and riparian mapping to arrive at the baseline conditions. Through Habitat Evaluation Procedures (HEP), the technical team will develop project alternatives and analyze any project induced environmental effects/benefits. A product of this task is the preparation of a (USFWS) Final Coordination Act Report. The report will define the environmental effects of the selected alternative and incorporate the findings of the technical team and any comments from interested parties.

The following is an estimate of the tasks, man-days and costs associated with Subaccount 06:

| SUBACCOUNT/TASK | MAN-DAYS | COST |
|-------------------|----------|-----------------|
| USFWS - CAR | 45 | <u>30,000</u> |
| TOTAL..... | | \$30,000 |

SUBACCOUNT 07. Economic Studies
SCHEDULE DURATION: 6/97 thru 4/00
ESTIMATED TOTAL TASK COST \$264,000

The Economic Studies will be conducted pursuant to the "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G). The work will be performed by the Los Angeles District Economic Section.

07.A. Environmental Restoration Analysis.

07.A.1. Literature Search. A literature search of research into the quantification of environmental restoration outputs will be conducted. A report summarizing the results of the literature search will be produced and included in the feasibility report as an attachment. No attempt will be made to produce benefit-cost ratios based on any alternate methodologies. The literature search will explore the applicability of methodologies such as contingent valuation, existence values, potential capital cost savings, and others if necessary.

07.A.2. Determine Without Project Conditions. This subtask involves discussions with local sponsors and experts to determine existing riparian habitat and recreation resources and comparing this to riparian habitat and recreation resource use specified in the plan or project.

07.A.3. Incremental Cost Analysis. The components of this particular effort include the following tasks:

07.A.3.a. Display environmental outputs (habitat units) and cost estimates of the management measures increments.

07.A.3.b. Analyze management measures to separate those that can and can't be implemented together.

07.A.3.c. Identify combinations of the combinable management measures' increments, and calculate each combination's output (HUs) and cost (\$).

07.A.3.d. Eliminate economically inefficient solutions (e.g. those solutions which produce the same output but have a higher cost).

07.A.3.e. Eliminate economically ineffective solutions (e.g. those solutions which have a higher cost and produce less output).

07.A.3.f. Calculate average cost of each level of output.

07.A.3.g. Recalculate average costs for additional output.

07.A.3.h. Calculate incremental costs.

07.A.3.i. Compare successive outputs and incremental costs.

07.A.4. Report Documentation. Internal documentation will consist of notes on meetings, telephone conversations, methodology, field trips, assumptions, etc., which will become part of the project files.

07.B. Recreation Analysis

07.B.1. Economics will need to retrieve existing information from local experts such as Arizona State University, Arizona Scorp, and local recreation organizations in order to perform the following:

07.B.1.a. Define recreation market area. Involves discussions with local and other recreation experts to determine recreation market area.

07.B.1.b. Estimate recreation resource (similar recreation provided in study area). Involves gathering information from local sponsor and/or local experts to estimate inventory of recreation in market area.

07.B.1.c. Forecast potential recreation use in study area. Gather information from local sponsors and local experts to determine potential recreation use.

07.B.1.d. Forecast recreation use with project (unit day value).

07.B.2. Report Documentation. Internal documentation will consist of notes on meetings, telephone conversations, methodology, field trips, assumptions, etc., which will become part of the project files.

07.C. Water Conservation Analysis

07.C.1. Define and Describe Study Area. The economic study area will be defined. Detailed demographic estimates and projections for the study area will be collected, including population, employment, income, etc., which will serve as inputs for the water demand and supply analysis.

07.C.2 Project Future Municipal and Industrial Water Use. Detailed water demand projections will be developed for the service area utilizing the IWR-MAIN forecasting software. IWR-MAIN is a computer program which can estimate existing municipal and industrial (M&I) water demands and forecast future M&I water use, allowing for savings from conservation techniques anticipated being used in the future. Model inputs include

07.C.3. Estimate Future Water Supplies. Data will be collected to determine the historical sources of water utilized to meet demand in the service area. Projections for each source of water supply will be developed. In addition, probabilities will be estimated for each future supply source, which will serve as inputs for the sensitivity analysis.

07.C.3.a. Utilizing the supply and demand projections, the expected water deficit/surplus for the service area will be computed. Based upon the sensitivity analysis, a range or probability distribution will also be developed. If a deficit is projected, research will be conducted to determine the potential and most-likely sources which would be utilized to meet the projected demand under without project conditions.

07.C.4. Calculate Projected Water Supply Costs. Based upon supply and demand projections, the water supply costs in the service area will be projected over the period of analysis. This will necessitate gathering historical and projecting future water costs (per acre foot) for each supply source. Variations in water supply costs will be factored into the sensitivity analysis. The net present value and annualized value of projected water supply costs under without project conditions will be determined.

07.C.5. Analyze Benefits for Alternatives. The benefits of water conservation measures will be quantified based upon the expected reductions in projected water supply costs under with and without project conditions. The projected yields from the proposed alternatives will be assumed to displace the yields supplied by the least-cost, without-project alternative. The benefits will be equal to the yields supplied by the proposed alternative times the difference in the marginal water supply costs. Expected average annual benefits will be computed. To address the inherent risk and uncertainty of the analysis, a range or probability distribution of benefits will be derived, based upon the sensitivity analysis conducted for the development of supply, demand and water cost projections.

07.C.6. Report Documentation. Internal documentation will consist of notes on meetings, telephone conversations, methodology, field trips, assumptions, etc., which will become part of the project files.

07.D. Inundation Damage Analysis.

07.D.1. Structural Inundation Damage Analysis.

07.D.1.a. Mapping of overflow and reach delinations with depths.

07.D.1.b. Survey of structural contents within overflow and reach boundaries.

07.D.1.c. Development of sewer treatment plant inundation damage function.

07.D.1.d. Data entry and model setup for economic analysis.

07.D.1.e. Without project structural inundation damage estimation.

07.D.1.f. Structural inundation damage reduction analysis from alternative plans.

07.D.2. Agricultural Inundation Damage Analysis.

07.D.2.a. Agricultural crops budget development.

07.D.2.b. Survey of agricultural crops within study area.

07.D.2.c. Update and modify inundation damage functions for agricultural crops.

07.D.2.d. Data entry and model setup for agricultural damages, including non-crop farm damages.

07.D.2.e. Without project agricultural inundation damage estimation.

07.D.2.f. Agricultural inundation damage reduction from alternative plans.

07.D.3. Report Documentation. Internal documentation will consist of notes on meetings, telephone conversations, methodology, field trips, assumptions, etc., which will become part of the project files.

07.E Prepare Economic Appendix. All data collected and/or developed to support the alternatives will be collected and displayed in an economics appendix to the final feasibility report.

07.F Economic Internal Peer Review.

The following is an estimate of the tasks, work-days and costs associated with Subaccount 07:

| Subaccount | Work-days | Cost |
|------------|-----------|--------|
| A.1 | 10 | 9,600 |
| A.2 | 10 | 9,600 |
| A.3 | 30 | 28,800 |
| A.4 | 5 | 4,800 |
| B.1 | 20 | 19,200 |
| B.2 | 3 | 2,880 |
| C.1 | 15 | 14,400 |
| C.2 | 30 | 28,800 |
| C.3 | 13 | 12,480 |
| C.4 | 10 | 9,600 |
| C.5 | 15 | 14,400 |
| C.6 | 5 | 4,800 |
| D.1 | 35 | 33,600 |
| D.2 | 44 | 42,240 |
| D.3 | 5 | 4,800 |

| Subaccount | Work-days | Cost |
|------------|-----------|-----------|
| E | 20 | 19,200 |
| F | 5 | 4,800 |
| TOTAL | 275 | \$264,000 |

3. Responsibilities.

The Economics Section of the Los Angeles District will be responsible for tasks a, b, c, d and e. The in-kind services for this task have not been identified yet.

SUBACCOUNT 09. Hydrologic and Hydraulic Studies

SCHEDULE DURATION: 6/97 thru 4/00

ESTIMATED TOTAL TASK COST: \$1,131,000

09A - Hydrology (\$760,000)

The following is a listing of subtasks to be performed under Task 09A, Hydrology.

09A.1 Review of Previous Studies. Conduct review of existing literature on constructed wetlands, their hydraulic loading, pollutant monitoring, and their successes and failures. Review the Tres Rios Demonstration Wetlands Project and coordinate with their testing personnel to understand their studies.

09A.2 Volume-Frequency Duration Values for the Salt and Gila Rivers. Provision and modification, as required of Volume-Frequency values resulting from Water Control Study for Modified Theodore Roosevelt Dam.

09A.3 With Project Impacts on Discharge-Frequency Values. Development of Hydrologic Routing Model to evaluate impacts of alternatives on flood flows from the upstream project initiation to Painted Rock Dam. Utilization of foresaid model to compare alternative discharge-frequency relationships.

09A.4 Water Quality Data Collection and Analysis. Water quality data will be collected and analyzed from all different sources. These include water quality data from the Salt River, Gila River, and Agua Fria River, as well as from the wastewater treatment plant, groundwater, urban storm runoff, and nearby landfill sites.

09A.5 Project Alternatives. Design the project configuration of the wetlands according to the Reconnaissance Study. These alternatives include (1) constructed wetlands with recharge, (2) constructed wetlands with recharge and levee, and (3) maximum constructed wetlands without recharge. The design will consider the number, size, location, and shape of the constructed wetlands.

09A.6 Water Budget Analysis and Groundwater Modeling. A detailed water budget analysis will be conducted for the study area. The inflows will include (a) flood releases from the Salt, Gila, Agua Fria, and Hassayampa Rivers, (b) stormwater discharges, (c) wastewater treatment plant discharges, (d) irrigation deliveries, (e) irrigation return flows, (f) dewatering well discharges, and (g) groundwater in gaining reaches. The outflows will include (a) irrigation diversions, (b) riparian consumptive use, (c) groundwater infiltration, (d) evapotranspiration, and (e) surface outflow. The water budget analysis will be used in conjunction with the groundwater modeling. A groundwater flow model and a groundwater quality model will be developed for the study. The models will be used to assist the wetland design and to examine (1) the existing groundwater elevations, (2) the changes in groundwater elevations as a result of the constructed wetlands, (3) the impact of groundwater elevation changes to the nearby crops, habitats, and groundwater users, and (4) groundwater quality impact due to the constructed wetland. The models will also be used to analyze the future without project conditions and the different alternatives of with project conditions. The groundwater flow model will be calibrated before its applications to the project.

09A.7 Water Quality Modeling for the Constructed Wetlands. A numerical analysis for estimating removal rates of specific contaminants will be used in order to estimate the performance of the project and to assist the wetland design. The method to be used will be determined from research during task 09A.1.

09.A.7.a. Water quality outflow computations are only for purposes of estimating net effect of the project. A comparison table will be given which will display the estimates of the wetland outflow versus the outflow requirements of the NPDES.

09.A.7.b. Any detrimental water quality effects of the project will be discussed as if the wetlands were ineffective at treating any subject contaminant.

09.A.7.c. A nitrate removal rate may be required by local agencies in order to ensure the water quality of the project site. Because the wetlands are within the river, and discharge to the wetlands may not meet Arizona Department of Environmental Quality (ADEQ) permit requirements, ADEQ may, upon review of the feasibility document, stipulate further requirements in order to qualify the project for waivers.

09A.8 Monitoring. Generate a monitoring plan for the constructed wetlands. The monitoring plan will identify such items as what will be sampled (water, soil, etc.) where sampling will be done, how often sampling will be performed, who will perform the sampling, what will be done with the results.

09A.9 Operation of Wetlands. A set of operating procedures will be prepared to clearly explain the proper management of the infrastructure. This will include headworks, transmission facilities, and any other wetland project features.

09A.10 Project Sizing and Design Refinement.

09.A.10.a. Project Sizing. Several wetlands designs will be initially presented in order to determine the most effective design above which a washout would occur. The discharge/frequency analysis will examine the more frequent events to help assess the incremental costs of habitat protection.

09.B.10.b. Design Refinement. A water budget will be developed that will include all source water, evaporation, evapotranspiration, etc. to assure that optimal supply is obtained. The location of the wetlands, depths of flow, plant concentrations, plant locations, flow pattern through the wetland, etc. will be developed. Plant types for the wetlands will be determined by Environmental Section according to ability to thrive in the Phoenix climate, reestablishment rate after major river flows, pollutant uptake, impact on wildlife, and ease of removal, if necessary.

09A.11 Risk. Risk analysis will be conducted to evaluate the probability of any adverse impact due to the project. The potential adverse impacts include the flood hazard to the wetlands, the surface water and ground water quality effects, odors, and the impact due to the changes of ground water elevations.

09A.12 Documentation. The end product of the above tasks will be a Hydrology and Water Quality Section in the Engineering Appendix of the Feasibility Report. The section will document the hydrologic and water quality analytical results, and present a wetlands design.

09A.13 Coordination. The products of the above tasks will be fully coordinated with the study team and the local sponsor

The following is an estimate of the tasks, man-days and costs associated with Subaccount 09A, Hydrology:

| SUBTASK | MAN-DAYS | COST |
|---|-------------|------------------|
| 1. Review Previous Studies | 27 | 15,000 |
| 2. Volume/Frequency Analysis | 36 | 20,000 |
| 3. Discharge/Frequency Analysis | 36 | 20,000 |
| 4. Water Quality Data Collection & Analysis | 36 | 20,000 |
| 5. Project Alternatives | 54 | 30,000 |
| 6. Water Budget & Groundwater Modeling | 810 | 450,000 |
| 7. Wetland Water Quality Modeling | 90 | 50,000 |
| 8. Monitoring | 36 | 20,000 |
| 9. Operation of Wetlands | 54 | 30,000 |
| 10. Sizing & Design Refinement | 36 | 20,000 |
| 11. Risk Analysis | 27 | 15,000 |
| 12. Documentation | 36 | 20,000 |
| 13. Coordination | 90 | 50,000 |
| TOTAL | 1278 | \$760,000 |

09B Hydraulic Studies (\$371,000).

1. The hydraulic work for this task will be performed through the use of HEC computer modeling programs and other accepted hydraulic practices typical for the study area. The work will be performed by the Los Angeles District Hydraulic Engineering Section. The end product for the Hydraulic Engineering Task will be to incorporate the information obtained from the subtasks listed below into a Hydraulic Engineering Appendix to the final feasibility report.

09B.1 Flood Hydraulic Analysis. This subtask will start with a review of existing data and an update of a flood hydraulic analysis (HEC-RAS). This effort will determine the appropriate channel conveyance conditions and flood inundation limits for with and without project conditions.

09B.2 Sediment Analysis for Base Line Conditions. This subtask will involve an evaluation of sediment transport effects on the study reach (including immediate adjacent boundary areas). The effort will largely consist of a qualitative geomorphic and limited quantitative type analyses. The appropriate level of detail for the analyses will be sufficient to approximately determine the effects on the study reach during the design flood event as well as an assessment of long term channel effect over the expected project life.

09B.3 Sediment Analysis for the With Project Conditions. This subtask will reassess the study reach, at a commensurate level of detail as described in 09.B above, for a condition that incorporates the project alternatives. This information will assist in the investment analysis of trade-offs between protecting the wetlands from being washed out versus

having the local sponsors incur replacement costs as part of O&M. Both design flooding and long term design life effects will be evaluated for the selected final recommended project alternative.

09B.4 Lateral Channel Stability Analysis. This subtask will augment the sediment analysis. It will only be performed for the recommended alternative. This analysis will assure that no major bank erosion will occur that may endanger project features.

09B.5 Source Supply and Discharge Distribution Design.

09.B.5.a. Salt River Floodwater. This subtask will involve the design of a system to deliver floodwater to the habitat areas exclusive of the wetlands.

09.B.5.b. Storm Drain Water. This subtask will involve the design of a system to deliver water from the storm drain system to the wetland areas.

09.B.5.c. Groundwater. This subtask will involve the design of a delivery system to the wetlands utilizing groundwater as a source.

09.B.5.d. Other Sources. During the course of the study, the primary source of water to support the wetlands and habitat areas outside the wetlands will focus on the above three sources. A combination of these sources may also be necessary. If none of these sources will be feasible, potable water or other sources may be determined.

09.B.5.e. Wetlands Infrastructure. This subtask will include designing hydraulic appurtuances such as headworks and supply lines within the wetlands. The infrastructure would allow water to be directed to, or away from, specific cells, thereby enabling flexibility in water management decisions.

09B.6 Risk and Uncertainty Analysis. This subtask will be developed so that the viability of the alternatives can be quantified. The analysis will include determination of which input variables result in the largest changes in flood inundations. The analysis will assign risk factors to the sensitivity that will result in a confidence level, i.e. the amount of confidence that the flood inundation depths are accurate.

09B.7. Documentation.

All data collected and/or developed will be displayed in a hydraulic appendix to the final feasibility report.

09B.8. Coordination.

All data collected and/or developed will be fully coordinated with the study team and the local sponsor.

| | |
|--|----------|
| 09B.1: Flood Hydraulic Analysis | \$47,000 |
| 09B.2: Sediment Analysis for Base Line conditions | 85,000 |
| 09B.3: Sediment Analysis for With Project conditions | 43,000 |
| 09B.4: Lateral Channel Stability Analysis | 11,000 |
| 09B.5: Discharge Distribution Design Using: | |
| 09B.5.a: Salt River Floodwater | 16,000 |
| 09B.5.b: Storm Drain Water | 31,000 |
| 09B.5.c: Groundwater | 22,000 |
| 09B.5.d: Other Source | 11,000 |
| 09B.5.e: Wetlands Infrastructure | 31,000 |
| 09B.6: Risk and Uncertainty Analysis | 22,000 |
| 09B.7: Documentation | 22,000 |
| 09B.8: Coordination | 30,000 |

2. Responsibilities.

The Hydraulics Section of the Los Angeles District will be responsible for performing all work needed to complete these tasks.

SUBACCOUNT 10. Geotechnical Investigations

SCHEDULE DURATION: 6/97 thru 4/00

ESTIMATED TOTAL TASK COST: \$173,000

Purpose.

The purpose of the Geotechnical Studies task will be to perform any soils, materials, or geotechnical effort to verify feasibility of alternative solutions.

10.A. Geologic Studies

10.A.1 Geologic Framework Research. This task consists of summarizing existing, published information relating to:

- a. Regional and local geology and geomorphology
- b. Groundwater
- c. Seismic and geologic hazard
- d. Excavatability
- e. HTRW potential

This task includes a brief site reconnaissance, as necessary, to familiarize the geologist with the project site.

10.A.2. Sources of Construction Stone. This task will research sources of stone for construction.

10.A.3. Sampling/Testing of Construction Stone. This task consists of the sampling and baseline testing (Specific Gravity, Absorption and Abrasion Loss) of previously untested sources of construction stone.

10.A.4. Documentation, Coordination, Reviews (Geology). This task covers the documentation and technical review of the Geologic studies and will include coordination required in assembling the Geotechnical Appendix.

10.B. Materials Studies

10.B.1. Field Explorations. This task covers field explorations dealing with preliminary soils and foundation conditions as well as determine on-site sources for producing aggregates for concrete, soil cement, and roller compacted concrete (RCC). This task also includes sampling aggregates from commercial sources. Prior to initiating this task a field reconnaissance would be conducted in order to locate sites for trenching and sampling areas, and obtain rights-of-entry.

10.B.2. Laboratory Testing. Soils sampled from the field explorations will undergo tests in order to determine their characteristics in accordance with the Unified Soil Classification System. Detailed laboratory tests will be conducted on materials (on-site and commercial) proposed for aggregates in making concrete, soil cement, and RCC.

10.B.3. Concrete Materials Investigation. This task will address the economics and quality of all concrete making materials available for use in the project.

10.B.4. Constructability Analysis (Materials). The constructability analysis is related to types of equipment required, specification requirements, and construction considerations in support of the cost analysis for each alternative considered.

10.B.5. Documentation, Reviews, and Coordination (Materials). This task will cover the documentation of the Materials studies and will include coordination required in assembling the geotechnical appendix. Members of the M&I Section team will be available to coordinate their work, attend milestone functions and provide reviews.

10.C. Soils Studies

10.C.1. Constructability Analysis. This task will include excavatability, determination of equipments to use, special processing/handling requirements, and soil cement materials.

10.C.2. Slope Stability Analysis. This task will address the slope stability of the levee and the maximum slope for the wetland bank.

10.C.3. Developing Plan of Exploration. This task will address the exploration required for developing the slope stability and toe design parameters for the levees. This task will also address the exploration of wetland design.

10.C.4. Determination and Analysis of SPL Laboratory Soil Test Results. This task will address the required types of soil tests and parameters for the laboratory soil design parameter testing.

10.C.5. Soil Tests. This task will perform soil tests to determine the soil design parameter characteristics.

10.C.6. Levee. This task will address the requirements of the levee design.

10.C.7. Wetland. This task will address the requirements of the wetland design.

10.B.8. Documentation, Reviews, and Coordination (Materials). This task will document the Geotechnical studies. Members of the geotechnical study team will be available to coordinate their work and attend key meeting. This task will include publication of all gathered and/or created data and conclusions into a Geotechnical Appendix to the final feasibility report.

10.D. *The below cost estimates include travel and contracts and effective rate hired labor WITH 100% OVERHEAD.*

Geology Studies

| SUBACCOUNT/TASK | DAYS | COST |
|-------------------------------|------|----------------|
| Geologic Framework Research | 30 | \$3,000 |
| Sources of Construction Stone | 10 | \$1,200 |
| Sampling/Testing of Stone | | |
| Sampling (incl. travel) | 10 | \$1,500 |
| Laboratory testing | 60 | \$3,500 |
| Documentation, Reviews, etc. | 30 | <u>\$3,600</u> |
| SUBTOTAL..... | | \$12,800 |

Materials Studies

| SUBACCOUNT/TASK | DAYS | COST |
|----------------------|------|----------|
| Field Explorations | | |
| Reconnaissance (H/L) | 30 | \$ 6,000 |

| | | |
|----------------------------------|-----|-----------------|
| Right-of-Entry (H/L) | 120 | \$ 2,000 |
| Explorations (H/L) | 45 | \$ 5,500 |
| Contracts | | \$10,000 |
| Travel | | \$ 3,500 |
| Laboratory Testing | | |
| SPD Laboratory | 180 | \$15,000 |
| (Aggregate tests) | | |
| SPL Laboratory | 60 | \$12,000 |
| (Classification) | | |
| Concrete Materials Investigation | 60 | \$ 9,000 |
| Constructability Analysis | 60 | \$ 4,600 |
| Documentation, Reviews, etc | 120 | <u>\$ 3,600</u> |
| SUBTOTAL..... | | \$71,200 |

Soil Studies

| SUBACCOUNT/TASK | DAYS | COST |
|---------------------------------------|------|------------------|
| Constructability Analysis | 50 | \$10,620 |
| Developing Plan of Exploration | 60 | \$3,480 |
| Determination and Analysis Soil Tests | 20 | \$3,400 |
| Laboratory Testing | | |
| SPD Laboratory | 120 | \$41,700 |
| (Soil design parameter tests) | | |
| Levee Design | 120 | \$8,390 |
| Wetland Design | 30 | \$8,230 |
| Documentation, Reviews, etc | 120 | <u>\$ 13,540</u> |
| SUBTOTAL..... | | \$89,360 |

SUBACCOUNT 11. Design and Cost Estimating

SCHEDULE DURATION: 6/97 thru 4/00

ESTIMATED TOTAL TASK COST: \$207,000

Design

1. Purpose.

The purpose of design efforts will be primarily to assist in analysis and location of alternatives.

2. Subtasks.

a. Surveys and Mapping.

New aerial and topographic maps of the various study areas will be obtained. Existing Geographical Information System (GIS) mapping will be reviewed for applicability. Mapping will be utilized for the preparation of plates suitable for inclusion in the feasibility report. The plates will depict both existing and planned facilities.

b. Design Assistance.

The work will include preparation of preliminary designs and plates, assisting in plan formulation, in-house review, response to comments, and support to the Study Manager and other Study Team Members.

c. Quantity Calculations.

Quantities of the various alternatives and flood proofing costs will be made. Details of the quantities will be summarized for estimating purposes.

| Task | Man-Days | Costs |
|----------------------------------|----------|------------------|
| New Aerial Mapping | LS | \$100,000 |
| Prepare Designs for Alternatives | 125 | \$75,000 |
| Develop Quantity Estimates | 35 | \$21,000 |
| Determine O&M Costs | 10 | \$6,000 |
| Develop Baseline Costs (M-CACES) | 45 | \$27,000 |
| Prepare Technical Appendix | 80 | \$48,000 |
| Coordination | 50 | \$30,000 |
| Total | | \$307,000 |

3. Responsibilities.

The Design Branch of the Los Angeles District will be responsible for performing all work needed to complete this task. The in-kind services have not been identified.

Cost Estimating

1. Purpose

Detailed baseline costs for the recommended plans will be developed. Estimates of the costs of without project flood proofing will be performed. All estimates will be reported using the M-CACES format.

2. Responsibilities.

The Design Branch of the Los Angeles District will be responsible for performing all work needed to complete this task.

SUBACCOUNT 12. Real Estate Efforts.

SCHEDULE DURATION: 6/97 thru 4/00

ESTIMATED TOTAL TASK COST: \$40,000

1. Purpose.

The study of the real estate within the study area is of prime importance to the feasibility of regional flood control solutions. The availability of the Arizona State Lands and values of vacant properties are key to a feasible project.

2. Subtasks.

12.A Execute Right of Entry Agreements.

Right of entry agreements to perform on-site study or testing under this PSP will be executed.

12.B. Real Estate Value Assessment.

This subtask will include preparation of preliminary real estate cost estimates for project right-of-way requirements. Areas to be used for local drainage and mitigation will also be considered. Availability of Arizona State Lands will be researched and reported upon.

12.C. Real Estate Acquisition Plan.

A Draft Real Estate Acquisition Plan will be prepared in coordination with the non-Federal sponsors. A model Local Cooperation Agreement (LCA) for construction of selected alternative will be included in the feasibility report. The LCA is a legally binding agreement that sets forth the terms of the relationship between the Federal Government and the local sponsor for construction, operation and maintenance of projects approved through the feasibility process.

12.D. Gross Appraisal of Properties.

This subtask consist of preparation of a Gross Appraisal of all study area properties for the market value of lands at their highest and best use.

12.E. Documentation, Coordination.

The real estate section of the appendix will provide a summarization of all tasks performed in providing the above information, including text and plates. The real estate task will also include in-house report review, response to comments, and support to the Study Manager and others during the study phase.

3. Responsibilities.

The Arizona Projects Office of the Real Estate Division of the Los Angeles District will be responsible for performing all work needed to complete this task.

SUBACCOUNT 13. Study Management

SCHEDULE DURATION: 6/97 thru 4/00

ESTIMATED TOTAL TASK COST: \$209,000

13A. Study Management (\$209,000)

Study management includes all study, project, and program activities, in accordance with current guidelines outlined in ER 1105-2-100, ER 5-7-1, EC 5-1-48, EC 1105-2-206 and EC 1105-2-208 providing detailed information for the work done for others, coordinates with Project Management on technical requirements of Engineering Service Requests (ESR's), establishing study milestones, developing networks to include work activities, task schedules, critical path networks and funding schedules, directing, monitoring, and modifying assigned work items as required and agreed upon by the Sponsor, reviewing results and reports provided by the technical support staff, correspondence, report preparation and review, inter-organization coordination, conference preparation and presentation. Coordinate with the Project Manager involving periodic meetings held with the Sponsors to report on technical issues and the status of the study and in-kind services and credits. Study Management Team meetings will be held on a quarterly basis, or more frequently if necessary.

Study management will ensure that all required tasks and coordinations are performed, resulting in the production of a quality Feasibility Report document. Technical coordination and interdisciplinary planning are the responsibilities of the Study Manager. Study management will monitor the scope and progress of the activities of the study to ensure that the study remains on track, within budget and on schedule, and that any potential impacts on scope, schedule, and cost are fully coordinated with the Executive Committee and resolved.

Study management activities above include all costs associated with Washington-level review.

The following is an estimate of the tasks, man-days and costs associated with Subaccount 13A, Study Management:

| SUBACCOUNT/TASK | MAN DAYS | COST |
|------------------------|----------|--------|
| Manage Study Schedule | 56 | 20,000 |
| Corps/Sponsors Liaison | 30 | 10,000 |
| Coordinate Tech Team | 57 | 20,000 |
| Coordinate Agencies | 40 | 10,000 |
| Conduct/Prepare Briefs | 57 | 20,000 |
| Manage Public Inv | 50 | 6,000 |
| Lead Plan Form Effort | 148 | 66,000 |

| | | |
|-----------------------|----|------------------|
| Lead Feas Report Prep | 90 | 33,000 |
| Coord Env Compliance | 60 | <u>24,000</u> |
| TOTAL..... | | \$209,000 |

13B. Engineering Management (\$60,000)

The Engineering Manager will serve as Engineering Division's coordinator among the various engineering functions to provide quality assurance, appropriate technical representation and participation in study team meetings, resolve technical issues, and insure products are delivered in a timely manner, manage budgets and schedules, and report on study status.

The following is an estimate of the tasks, man-days and costs associated with Subaccount 13B, Engineering Management:

| SUBACCOUNT/TASK | MAN DAYS | COST |
|----------------------------------|----------|-----------------|
| Technical Coordination/Oversight | 30 | 18,500 |
| Engineering Liaison Reporting | 30 | 18,500 |
| Issue Resolution | 20 | 13,000 |
| Coordination of Project Mgt Plan | 15 | <u>10,000</u> |
| TOTAL..... | | \$60,000 |

SUBACCOUNT 14 - PLAN FORMULATION

SCHEDULE DURATION: 6/97 through 4/00

ESTIMATED TOTAL COST \$450,000

Plan formulation includes reviewing and refining the plans selected for study during the reconnaissance phase and other plans developed during the course of the feasibility study. An array of alternatives will be developed and criteria selected in order to evaluate the range of options which will further the objective of restoring riparian habitat within the Salt River. The alternatives will be compared for completeness, effectiveness efficiency and acceptability. The annual and periodic activities and responsibilities for operating and maintaining (O&M) the completed project will be described and closely coordinated with other requirements (e.g., cost estimates and environmental monitoring). The general magnitude of these activities will be described for all alternatives in detail; however, more detail will be provided for the alternative(s) recommended for implementation. All requirements of 33 CFR 208 and other Federal regulations specifying operation and maintenance requirements will be clearly described so that Sponsor's future responsibilities will be known.

Plan formulation will ensure that the report is prepared in accordance with ER 1105-2-100, ER 5-7-1, EC 1105-2-206, EC 1105-2-208, P&G, NEPA, and other pertinent engineering, environmental, and economic guidance and regulations. The report will identify and justify the recommended plan, as well as evaluate the locally-preferred plan, if different from the recommended plan.

The following activities will be accomplished:

14.A. Prepare an assessment of existing conditions. A detailed assessment of present conditions will be used as a baseline reference against which future without project and with-project conditions are contrasted. The assessment will include a mapping and area inventory of all major habitat types, including but not necessarily limited to, cottonwood-willow vegetation, wetland/marsh vegetation and salt cedar (tamarisk). A habitat evaluation method acceptable to the U.S. Army Corps of Engineers, the Arizona Game and Fish Department and the U.S. Fish and Wildlife Service, such as the U.S. Fish and Wildlife Service Habitat Evaluation Procedure (HEP), will be used to assess habitat value.

14.B. Develop a unified formulation model encompassing the HEP model and Hydrologic (HEC) models to be used in forecasting future without and with project conditions.

14.C. A forecast will be made of future without-project conditions within the vicinity of the Salt River as if flows through Tres Rios, Arizona. The forecast techniques used to estimate future without-project conditions will be used for the future with-project conditions. Time periods for future-without-project forecasting will be defined during the course of the study.

14.D. Riparian habitat restoration objectives and opportunities for the study area will be defined. Overall objectives will be quantified in terms of habitat units as defined by the habitat evaluation method adopted for use in the study.

14.E. Consideration of recreation and water quality project purposes will be incorporated into the analysis of alternatives. Selection of a multi-purpose alternative will be subject to Corps policies (i.e., Principles and Guidelines ER 1105-2-100) objectives.

14.F. The physical, economic and institutional constraints to be considered in developing the alternative measures will be defined.

14.G. Alternative measures or groups of measures for riparian restoration will be identified and analyzed. Alternatives will be specific, defined alternatives with costs and outputs that can be estimated with reasonable accuracy. Conceptual designs for both wetland areas and areas outside of the wetlands will be included.

14.H. Costs and environmental outputs of each alternative will be assessed. Costs are to be developed in sufficient detail to define each separable element of each alternative measure or group of measures. Costs will include construction costs, land acquisition and operation and maintenance. Environmental outputs will be measured in terms of habitat units using the habitat evaluation method noted above. Costs and outputs of plan increments will be displayed in a format similar to that shown in EC 1105-2-185 which allows for an incremental cost analysis of the measures under consideration.

14.I. A recommended plan will be selected and clearly justified on biological and technical merits, costs per habitat unit, ability of measure(s) to meet habitat objectives, NED benefits including recreation, implementability and other factors.

The following is an estimate of the tasks, man-days and costs associated with Subaccount 14:

| SUBACCOUNT/TASK | MAN DAYS | COST |
|--------------------------------------|----------|---------------|
| Prepare Existing Conditions | 60 | 40,000 |
| Develop Formulation Model (HEC) | LS | 150,000 |
| Quantify Without-Project Conds | 45 | 40,000 |
| Identify Opportunities & Constraints | 60 | 30,000 |
| Formulate/Evaluate Alternatives | 150 | 150,000 |
| Analysis of Recommended Alternative | 45 | <u>40,000</u> |

TOTAL.....\$450,000

SUBACCOUNT 15 - REPORT PREPARATION

SCHEDULE DURATION: 6/97 through 4/00

ESTIMATED TOTAL COST: \$108,000

The Report Preparation Task will be performed by the Los Angeles District Planning Section C. The work will be in accordance with ER 1105-2-100, Chapter 2, EC 1105-2-206, EC 1105-2-208 and ER 110-2-1150, paragraph 10c. Report preparation includes the compilation of all study team products into an initial draft report and a final report. The work will include collection and assembly of pertinent data, writing, editing, typing, drafting, reviewing, revising, reproducing, and distributing the draft and final Feasibility Reports, Environmental Impact Statement, and related technical documents and appendices.

Planning Section C will be responsible for reproduction and dissemination to facilitate review and revision. All study team members will be involved in the formulation and review of the reports. A Feasibility Review Conference and two comment periods will be held to assure that all comments and views are incorporated.

This task also includes any possible requirements for additional rewriting, unforeseen technical modifications, reformulation, or documentation as a result of the Washington-level review process which take place outside of the end of the feasibility phase (i.e., submittal of the report to the OMB by the ASA).

The following is an estimate of the tasks, man-days and costs associated with Subaccount 15:

| SUBACCOUNT/TASK | MAN DAYS | COST |
|---------------------------------|----------|------------------|
| Compile Technical Team Products | 20 | 10,000 |
| Compose Body of Feas Report | 60 | 30,000 |
| Assemble Technical Appendices | 5 | 3,000 |
| Review and Edit | 25 | 20,000 |
| Reproduction -- | | 40,000 |
| Distribution | 5 | <u>5,000</u> |
| TOTAL..... | | \$108,000 |

SUBACCOUNT 16 - PROGRAMS AND PROJECT MANAGEMENT

SCHEDULE DURATION: 6/97 through 4/00

ESTIMATED TOTAL COST: \$221,000

16A. Programs Management (\$40,000)

Budget preparation for current year and out years, monitoring cost and accounting allocations. In coordination with the Study Manager, ESR's will be issued.

16B. Project Management (\$131,000)

Point of contact responsibilities, and development and negotiation of the PCA, MOA's and other customer agreements. Periodic meetings will be held between the Corps and the Sponsor to report on the status of the study and responsible in-kind services and credits.

Monthly status reports covering selected financial and performance measurements will be provided by the Corps.

Budgetary management responsibilities include tracking and documenting the funds and budget (accounting) of the study,; documenting appropriations, including interpretation of current and future budgetary guidance; submitting project data sheets, justification sheets and other testimonial fact sheets as required; monitoring and reprogramming study funds, executing current year and future funds; processing schedules of obligations and expenditures; monitoring project financial performance and coordinating with study and project managers on project financial performance; assessing District manpower allocations versus available funds, assuming district

operating budget includes appropriate hired labor and contract amounts; coordinating future funds allocations and manpower requirements with other District elements; setting up and documenting all cost key accounts, and reviewing pre-and post-labor reports.

The Project Manager will coordinate with the sponsor for the management of negotiated in-kind services and coordination with Corps review, coordination of cost-sharing procedures, and management of budgets and schedules for the feasibility study. Negotiation of tasks and costs, review of reports, and participation in meetings on study results and issues are included in this task.

16C. Project Management Plan (\$50,000)

Presuming the feasibility study results in a plan recommended for Federal participation, the plans and procedures required for project implementation will be defined by a Project Management Plan (PMP). The PMP will include preparation of pre/post construction hydraulic data collection plans; preparation of a water quality control plan (if found necessary); and the coordination of O&M studies that need to be completed. Management activities will also include coordination and documentation of all M-CACES-generated estimates and revisions to these estimates. The Project Management Plan (PMP) will cover tasks, schedules, costs and management framework and direction for the project through construction.

The following is an estimate of the tasks, man-days and costs associated with Subaccount 16:

| SUBACCOUNT/TASK | MAN DAYS | COST |
|--------------------------------|----------|---------------|
| <u>Programs Management</u> | | |
| Budget Reporting | | |
| L.S. | | <u>40,000</u> |
| | | 40,000 |
| <u>Project Management</u> | | |
| Coordinate Milestones/FCSA | 05 | 4,000 |
| Manage Study Progress | 20 | 15,000 |
| Coordinate Technical Interface | 20 | 15,000 |
| Manage Budget Alloc & Expend | 50 | 39,000 |
| Upper Mgt Reporting | 30 | 23,000 |
| Manage In-Kind Services | 25 | 20,000 |
| Close-Out Study Costs | 20 | <u>15,000</u> |
| | | 131,000 |

| | | |
|--------------------------------|------|------------------|
| <u>Project Management Plan</u> | | |
| Prepare Project Handbook | L.S. | <u>50,000</u> |
| | | 50,000 |
| TOTAL..... | | \$221,000 |

SUBACCOUNT 17. Review Support
SCHEDULE DURATION: NOT APPLICABLE
ESTIMATED TOTAL TASK COST: \$75,000

1. Purpose.

This work includes all costs associated with Corps internal technical review of study products to assure that technical products and processes comply with law, policies, regulations and sound technical practices of the involved disciplines. The independent evaluation will focus on whether the technical results of the study are reasonable for reaching a decision on whether there is potential for project implementation.

Quality Control Plan (QCP)

Introduction.

This Quality Control Plan (QCP) provides an overall plan for producing quality planning, engineering, and real estate products for the Tres Rios Feasibility Study. The Los Angeles District Independent Technical Review Guidelines will be implemented during the preparation of technical products for this study. This document, CESPL-PD OFFICE MEMORANDUM 1105-1-1, dated 1 July 1996, will subsequently be referred to as the Quality Control Office Memorandum (QC-OM). The QC-OM establishes the authority for and scope of the independent review by the District. Independent technical review of study products will be the responsibility of the District. This QCP will be incorporated into the Project Study Plan (PSP).

Statement of QCP Objective.

The objective of this review process is the successful completion and delivery of quality products to customers, within the budget and on time. The QCP is intended to provide a mechanism to appropriately evaluate technical products and processes to ensure they comply with the associated laws, regulations, and sound technical practices of each technical discipline. This process will include the verification of assumptions, methods, procedures, and material used in the technical analyses during the Tres Rios Feasibility Study. The Independent Technical

Review process will be tailored for each document and will include rigorous documentation required to establish accountability.

Statement of QCP Guidelines.

The guidelines presented in the QC-OM will be followed for the technical review of this study. The Los Angeles District Technical Review Standard Operating Procedure is described in Appendix A of the QC-OM. A copy of Appendix A of the QC-OM is attached to this QCP. The guidelines for the Independent Technical Review, presented in Appendix C of the QC-OM, are summarized below.

- a. The QCP will be developed by the Functional Chief(s) with lead responsibility for the project.
- b. The Functional Chief(s) will assign a study manager who will be responsible for coordinating the activities of the study team.
- c. The Functional Chief(s) will assign a technical review team chairperson who will be responsible for coordinating the activities of the technical review team.
- d. A technical review strategy session will be held as soon as possible after the formation of the review team. Technical review team members will be assigned, level of review will be determined, documents requiring review will be identified, and technical and policy issues likely to require input by Division of Headquarters will be identified. Following the strategy session, the draft QCP will be revised and submitted to SPD for review.
- e. Internal review of technical products will be the responsibility of the Functional Chief(s). Such review includes verifying basic assumptions and calculations. This review is performed by the staff responsible for the work and is completed prior to submission of material to the independent technical review team.
- f. Independent review will be the responsibility of the technical review team.
- g. Independent technical review will be performed on products which are produced for milestones. Technical review does not require additional products be prepared specifically for review.
- h. Peer review is the responsibility of the technical review team in order to provide continuous in-progress review for tasks and sub-tasks prior to their compilation into overall study/report documents.

I. The independent technical review must be conducted in a manner that encourages teamwork and partnering between the Study/Design Team and the Review Team. The technical review team must work closely with the Study Team to add value and minimize repetitious work, but at the same time must remain sufficiently uninvolved so that impartiality or perspective is not lost.

j. The independent technical review process requires rigorous documentation to establish accountability. Each technical review action by the technical review team will be documented in the manner described in the QC-OM and summarized in this QCP.

Proposed Deviations from QC-OM and SOP.

The deviations from the QC-OM and SOP proposed here are justified by the unique nature of this QCP. This QCP has been tailored to fit the existing stage of the planning process.

a. This QCP was prepared under the direction and review of the Functional Chief(s), and this meets the intent of the QC-OM. The QCP development process described in the QC-OM will be revised to clarify that the Technical Review Strategy Session is not mandatory but is an optional vehicle available to the Functional Chief(s) to setup the study team, review team and accomplish other tasks including the preparation of the Quality Control Plan.

b. Peer review documentation requirements will be waived unless there is a disagreement concerning products or process.

Functional Chief.

There will only be one Functional Chief for this review process. The Functional Chief for this Feasibility Study is Robert S. Joe, Los Angeles District, Chief of Planning Division. The responsibilities of the Functional Chief are presented in the QC-OM.

Assigned Project Study Team.

The Study Manager for this Feasibility Study is Kelly Ryan. The following table identifies the assigned study team members who will report to the Study Manager. The study team member qualifications are displayed by their grade and area of expertise.

| NAME | SECTION | PHONE | GRADE | EXPERTISE |
|----------------|-------------|----------------|-------|--------------------|
| Alex Watt | CESPL-PD-RQ | (213) 452-3860 | GS-12 | Environmental |
| Glenn Mashburn | CESPL-ED-HH | (213) 452-3549 | GS-12 | Hydraulics |
| Ted Ingersol | CESPL-ED-GG | (213) 452-3586 | GS-12 | Geotechnical |
| James Chieh | CESPL-ED-HE | (213) 452-3571 | GS-12 | Hydrology |
| Mike Hallisy | CESPL-PD-WE | (213) 452-3815 | GS-12 | Economics |
| Mike Ternak | CESPL-PD-WC | (602) 640-2003 | GS-12 | Planning |
| Ted Gula | CESPL-PM-C | (213) 452-4012 | GS-13 | Project Management |
| Bernice Rall | CESPL-RE-AR | (602) 640-2016 | GS-12 | Real Estate |
| John Karakawa | CESPL-ED-DA | (213) 452-3697 | GS-12 | Design |

Proposed Technical Review Team and Qualifications.

The Review Manager for this review process is Eldon Kraft. The following table identifies the proposed technical review team members who will report to the Review Manager. The review team will be responsible for performing the technical review, peer review and documentation described in the QC-OM and presented in this QCP. Their qualifications are displayed below by their grade and area of expertise.

| NAME | ORGANIZATION | PHONE | GRADE | EXPERTISE |
|-----------------|--------------|----------------|-------|--------------------|
| Dave Compas | CESPL-PD-RN | (213) 452-3850 | GS-11 | Environmental |
| Russ Kaiser | CESPL-PD-RN | (213) 452-3846 | GS-11 | Biology |
| Richard Perry | CESPL-PD-RN | (213) 452-3855 | GS-11 | Cultural Resources |
| Kerry Casey | CESPL-ED-HE | (213) 452-3574 | GS-12 | Hydrology |
| S. Stonestreet | CESPL-ED-HH | (213) 452-3556 | GS-12 | Hydraulics |
| John Vivanti | CESPL-ED-GS | (213) 452-3601 | GS-12 | Geotechnical |
| Michael Gorecki | CESPL-PD-WE | (213) 452-3818 | GS-12 | Economics |
| Anothy Risko | CESPL-PD-CS | (213) 452-3792 | GS-13 | Planning |
| Rick Torbik | CESPL-ED-DA | (213) 452-3635 | GS-12 | Design |
| Wilson Eshoo | CESPL-ED-CA | (213) 452-3740 | GS-11 | Cost Estimating |
| Martin Jacobs | CESPL-RE-CW | (213) 452-3155 | GS-11 | Real Estate |

The review team was selected based on their education and experience in areas relevant to the scope of the study. Environmental review staff has a combined 27 years of experience in the application of NEPA requirements to complex environmental problems/opportunities. Hydrologic and Hydraulic review staff has over 20 years combined experience with extensive experience in evaluation hydrologic and hydraulic aspects of environmental mitigation/restoration. Remaining team members possess an average of 12 years Corps

experience and have been involved in environmental restoration studies as either study team or review team members.

Responsibilities of Technical Review Team.

The responsibilities of the technical review team are specifically listed in the QC-OM. In addition, the QC-OM repeatedly emphasizes the need for the team to document the Independent Technical Review Process. The specific requirements for this documentation are presented in the QCP section titled "Documentation of Independent Technical Review Process".

Partnering.

Cooperation, teamwork and partnering between the Study Team and the Review Team are essential to the production of a quality product. The Study Team is responsible for the quality of the product. The Review Team members are responsible for the completeness, thoroughness and accuracy of their reviews. As described in the proposed deviations from the QC-OM and SOP, the review team will work closely with the Study Team to add value and minimize rework, and at the same time remain sufficiently uninvolved to preserve impartiality and perspective.

Seamless Peer Review

Seamless peer review is an in-progress, single discipline, peer review conducted at the work station of the project/study team member for tasks and sub-tasks prior to their compilation into overall study/report documents. It will not substitute for normal internal review of products which is the responsibility of each Study Team member's first line supervisor. The peer review will be conducted as described below. This is a deviation from the procedure proposed in the QC-OM and SOP.

- a. The review team member coordinates informally with his study team member and the first-line supervisor. The review team member is briefed by the study team member and first-line supervisor on the approach being used and any unique or unusual features of the work. The review team member, the study team member and the first-line supervisor discuss the situation and determine when a peer review is necessary. The review team member makes informal notes for his own use and documents that the initial briefing has taken place with an e-mail message or brief memorandum to the review team leader. This documentation will state whether additional peer review is needed and include an estimated scheduled date for the peer review.
- b. If there is a major change in the direction of the assumptions used or the study direction described in the first briefing, it is the responsibility of the study team member to inform the review team member, so that a peer review can be scheduled.

c. It is the responsibility of the study team member to informally notify the review team member when the work has reached a critical decision point or a significant work product has been completed which will be incorporated in one of the documents that will be reviewed by the review team as a whole. A peer review will be held, if determined necessary, by either the review team member, the study team member, or the first-line supervisor.

d. When the preceding determination has been made, the first-line supervisor, the study team member and the review team member will schedule another meeting at which the peer review will occur. If there is a work product suitable for review, it will be provided to the review team member.

e. The peer review will be documented essentially as specified in this QCP and the QC-OM. The documentation will be furnished to the review team leader for inclusion in the technical review documentation file.

Documents to be Reviewed by Technical Review Team.

Formal technical review will occur four times throughout the Feasibility Study: 1) F3 Milestone (existing conditions), 2) F4 Milestone (With Project Conditions), 3) F5 Milestone (Draft Feasibility Report and Draft EIS), and 4) F8 Milestone (Final Feasibility Report and Final EIS). The Study Team will assemble packages for review in advance of the scheduled review period.

Review Schedule.

The technical review will be conducted sufficiently in advance of the scheduled milestones to allow resolution of outstanding issues and incorporation of changes in the milestone product. The following schedule is based upon allowing two weeks for review and one week for the Study Team to develop appropriate responses. The following table displays the proposed dates for completion of the review packages. Final due dates will be provided in the revised QCP after the initial Technical Review Strategy Session.

| MILESTONE PACKAGE | STUDY TEAM COMPLETION DATE | REVIEW START DATE | REVIEW END DATE | REVIEW CONF DATE |
|----------------------------|----------------------------|-------------------|-----------------|------------------|
| F3 Existing Conditions | 16 Apr 98 | 16 Apr 98 | 30 Apr 98 | 7 May 98 |
| F4 With Project Conditions | 18 Mar 99 | 18 Mar 99 | 1 Apr 99 | 8 Apr 99 |
| F5 Draft Report & DEIS | 21 Aug 99 | 21 Aug 99 | 3 Sep 99 | 10 Sep 99 |
| F8 Final Report & FEIS | 30 May 00 | 30 May 00 | 13 Jun 00 | 20 Jun 00 |

Documentation of Independent Technical Review Process.

The QC-OM repeatedly emphasizes that the independent technical review process requires rigorous documentation to establish accountability, and that accountability through proper documentation is key to quality control. Therefore, each technical review action by the technical review team will be immediately documented in the manner described in the QC-OM and summarized in this QCP. The review team members will give their review documentation to the review team leader, and the review team leader maintains a review documentation file. This file will be readily available to all members of the Study Team and the Review Team. The files will also be available to higher headquarters during quality assurance reviews, Washington level policy reviews and review conferences, The review learn files will be transferred to project files at the time of dissolution of the Review Team.

a. Contents of review Documentation File. The documentation to be placed in the review team file will include the following: (documentation includes hard copy of e-mail messages)

- (1) The draft QCP, subsequent revised draft QCPS, the final QCP and documents revising the QCP.
- (2) The QC-OM used to prepare the QCP.
- (3) The F4 Report,
- (4) The F5 Report.
- (5) The Final Feasibility Report and Final EIS.
- (6) The NOR from the F4 conference prepared by the review team chairperson.
- (7) The NOR from the F5 conference prepared by the review learn chairperson.
- (8) The MFRs and checklists from peer reviews prepared by review team members, including the e-mail scheduling message.
- (9) The review NORs and checklists prepared by the review team members following review of the F4 and F5 documents.
- (10) Formal assessments to the Functional Chiefs on the review of the F4 and F5 documents. Assessments are prepared by the review team chairperson.
- (12) Documents related to resolving significant disagreements between the study and review learns.

(13) The lessons learned -report for use in improving the review process prepared by the review team chairperson.

b. Documentation for in-process peer review. The following documentation is required as part of the in-process peer review process, when applicable as described in this QCP:

(1) The scheduling or e-mail message stating that the initial briefing has taken place and that a subsequent in-process peer review will or will not be necessary. If the initial briefing identifies no need for further in-process peer review, documentation of this conclusion and the basis for it will be the only in-process peer review documentation required. If a subsequent in-process peer review is necessary, a tentative schedule will be provided. This document will be furnished to the review team leader.

(2) If a subsequent in-process peer review is required. The review team member will prepare a checklist similar to that presented in Appendix B of the QC-OM. The checklist will be initialed by the supervisor responsible for the product reviewed, in order to indicate that the supervisor acknowledges the review has taken place.. This document will be furnished to the review team leader.

(3) After any in-process peer review the review team member will prepare an MFR to the review team leader to supplement the checklist. The MFR will include an evaluation of the adequacy of data, assumptions, acceptability of techniques and procedures used, level of detail, compliance with policy and guidelines, consistency of results, accuracy and comprehensiveness. This MFR is required only to the extent necessary to supplement the checklist. If all points can be addressed in the checklist, the MFR is not required.

(4) If any documentation is generated in the resolution of significant disagreements, copies will be furnished to the review team leader.

Review Comments

In order to enhance communication of review comments, and to ensure that each expressed review concern is relevant to the decision to be made, all comments shall contain the following four elements:

a. A clear statement of the concern. The information deficiency or incorrect application of policy or procedures in the report will be identified.

b. The basis of the concern. The appropriate law, ASA (CW)/Corps policy, guidance, or procedure that has not been properly followed will be referenced; unless the concern is solely based on the type/quality of data presented.

c. The significance of the concern. The importance of the concern with regard to plan formulation, economic feasibility, cost sharing, Federal interest, environmental compliance, and public acceptability will be indicated.

d. The specific actions needed to resolve the concern. The actions that must take place to resolve the concern will be identified.

Policy Issues Which Require Clarification.

No policy issues requiring clarification have been identified at this time.

Technical Issues Likely to Require Guidance from Higher Headquarters.

No technical issues requiring clarification have been identified at this time.

Views of the Local Sponsors.

The City of Phoenix is the local sponsor for the Feasibility Study. They fully support the study and have requested the Corps expedite the study schedule.

Schedule for Periodic Review and Update of the QCP.

The QCP will be reviewed at the following occasions: After the completion of the review of each of the study documents identified above. When the lessons learned report is prepared. If it is necessary to revise the QCP, it will be revised by memo or e-mail message. All QCP revisions will be part of the review documentation file.

SUBACCOUNT 18. Contingency
SCHEDULE DURATION: NOT APPLICABLE
ESTIMATED TOTAL TASK COST: \$342,700

1. Purpose.

A ten percent contingency has been added to the total work effort. The purpose of applying a contingency is to allow for changes in the cost estimates for the various work items should the actual work reveal that additional effort is needed. The contingency amount applies to both Corps in-house efforts as well as in-kind service efforts.

2. Subtasks.

There are no subtasks to this item.

3. Responsibilities.

Programs and Project Management Division of the Los Angeles District will be responsible for monitoring and reporting budgetary progress. There are no in-kind services for this task.

VIII. STUDY COST SUMMARY.

The total amount to perform the Feasibility Phase is currently estimated to be \$3,770,000. This total cost includes both Corps costs, Sponsor cash and in-kind services, and contingency. The total cost includes direct and indirect costs. A breakdown of the study costs by task is given in Table 2 below. For a Detailed breakdown of the study costs by subtask, refer to Appendix C.

**TABLE 2 (x\$1000)
Study Cost Summary**

| TASK/SUBTASK | TOTAL COST | VALUE OF IN-KIND SERVICE | VALUE OF CORPS EFFORT |
|---|-------------------|---------------------------------|------------------------------|
| 01. Coordination and Public Involvement | 200 | 200 | 0 |
| 02. Institutional Studies | 90 | 50 | 40 |
| 04. Cultural Resources | 31 | 0 | 31 |
| 05. Environmental Studies | 198 | 0 | 198 |
| 06. Fish and Wildlife Studies | 30 | 0 | 30 |
| 07. Economic Studies | 264 | 0 | 264 |
| 09. Hydrologic and Hydraulic Studies | 1131 | 450 | 681 |
| 10. Geotechnical Investigations | 173 | 0 | 173 |
| 11. Design and Cost Estimating | 207 | 0 | 207 |
| 12. Real Estate Efforts | 40 | 0 | 40 |
| 13. Study Management | 209 | 42.5 | 167 |
| 14. Plan Formulation | 450 | 150 | 300 |
| 15. Feasibility Report Preparation | 108 | 0 | 108 |
| 16. Programs and Project Management | 221 | 50 | 171 |
| 17. Review Support | 75 | 0 | 75 |
| 18. Contingency (10%) | 342.7 | 0 | 342.7 |
| TOTAL STUDY COST | 3770 | 942.5 | 2827.5 |

IX. IN-KIND SERVICES.

For accounting and administrative purposes, all tasks including in-kind services provided by the Sponsors are categorized by cost subaccount as described in the Scope of Activities. Acceptance of the product of in-kind services will be at the purview of the Corps. The following pages contain detailed descriptions of the tasks to be performed as in-kind services by the non-Federal Sponsors. Any applicable guidance for specific work items is specified at the appropriate locations in the detailed task descriptions (Scope of Activities), and will be provided at the beginning of work, or earlier. The general guidelines and criteria embodied in the Planning Guidance Notebook (ER 1105-2-100), EC 1105-2-206 and EC 1105-2-208 will provide overall direction for the Government and the Sponsors in problem identification, plan formulation, impact assessment, evaluation, and report preparation during the feasibility phase. Up to 25% of total Feasibility Study costs may be performed by the non-federal sponsors as in-kind services.

To insure timely and responsive completion of the in-kind services, the Sponsors and the Government will all designate a study manager whose responsibility is to conduct the feasibility study. The study managers will establish a coordination procedure that will permit daily contact. The Sponsors' study manager will be responsible for directing the conduct of all in-kind services and for transmitting the information to the Government at the required times. The Government's study manager will be responsible for providing overall policy and general direction for the in-kind services, incorporation the Sponsors' work into other study elements and coordination the in-house review of the Sponsors' work. Together, the respective study managers will resolve any comments produced by the in-house review and will agree on the procedure for completing the in-kind work to the satisfaction of both parties.

SUBACCOUNT 01 - Coordination and Public Involvement

IN-KIND SERVICES: \$200,000

PERFORMED BY: The City of Phoenix, Arizona

The Sponsors will perform the following services:

1. Formulate a Public Involvement Plan that satisfies Corps requirements and the NEPA process.
2. Coordinate with Federal, state, county and civic organizations and individuals throughout the study period.
3. Assist the Corps of Engineers in periodically advising other non-Federal interests of study progress and findings at key decision points.
4. Prepare materials for mailing in advance of public involvement workshops. This will include graphical presentation drawings depicting potential alternatives.

5. Organize and provide a meeting place for at least 3 public workshops.
6. Provide a summary documenting public involvement activities for inclusion in the feasibility report and EIS documents.

SUBACCOUNT 02 - Institutional Studies

IN-KIND SERVICES: \$50,000

PERFORMED BY: The City of Phoenix, Arizona

The Sponsors will conduct the necessary financial analyses for the preparation of the Sponsors' Financing Plan and the Statement of Financial Capability to the extent of involvement of the Sponsors.

The Financing Plan will be a clear and convincing description of the Sponsors' intention to meet its financial obligations for project construction in accordance with the project funding schedule. The Financing Plan will include a schedule of estimated Federal and non-Federal expenditures by Federal fiscal year (including Federal outlays, Sponsors' contributions, lands, easements, rights-of-way, relocations, and disposal areas (LERR&D)). The total shares displayed in the schedule should exactly reflect cost-sharing policy and agree with figures presented in the Local Cooperation Agreement (LCA). The Financing Plan will also include a schedule of the sources and uses of non-Federal funds during and after construction by Federal fiscal year. These include outlays and income during construction (cash payments, LERR&D, associated costs, bond-related costs, funds on hand, revenues, appropriations, grants, interest, and bond proceeds) and outlays after construction (bond debt service, government repayments, operation costs, maintenance costs, and rehabilitation costs).

The Statement of Financial Capability is intended to provide evidence of the Sponsors' authority to use the identified funding sources and the Sponsors' capability to obtain remaining funds, if any. It should be signed by the appropriate empowered official(s) representing the Sponsors. The Statement of Financial Capability is Sponsors and project specific and will be at a level of detail necessary to show such capability:

1. Where capability is clear (sufficient funds available, large revenue base, good bond rating) evidence of this is all that needs to be provided.
2. Where capability is unclear (Sponsors rely on full faith and credit to obtain remaining funds), a credit analysis demonstrating the Sponsors' credit worthiness is required.
3. If non-guaranteed debt is used to obtain remaining funds (limited tax, particular revenue source), an analysis should be included demonstrating that projected revenues or proceeds are reasonably certain and are sufficient to cover the Sponsors' stream of costs over time.

4. If third party contributions are to be used, comparable data (separate financing plan and statement of capability) for the third party should be included along with evidence of the third party's legal commitment to the Sponsors.

The Financing Plan and signed Statement of Financial Capability must be presented to the Los Angeles District for review and assessment in the 14th month of the study.

SUBACCOUNT 09 - Hydrology and Hydraulics Investigations

IN-KIND SERVICES: \$450,000

PERFORMED BY: The City of Phoenix, Arizona

1. The Sponsors will cooperate with and assist the Hydrology Section with the following services:

09A.6 Water Budget Analysis and Groundwater Modeling. A detailed water budget analysis will be conducted for the study area. The inflows will include (a) flood releases from the Salt, Gila, Agua Fria, and Hassayampa Rivers, (b) stormwater discharges, (c) wastewater treatment plant discharges, (d) irrigation deliveries, (e) irrigation return flows, (f) dewatering well discharges, and (g) groundwater in gaining reaches. The outflows will include (a) irrigation diversions, (b) riparian consumptive use, (c) groundwater infiltration, (d) evapotranspiration, and (e) surface outflow. The water budget analysis will be used in conjunction with the groundwater modeling. A groundwater flow model and a groundwater quality model will be developed for the study. The models will be used to assist the wetland design and to examine (1) the existing groundwater elevations, (2) the changes in groundwater elevations as a result of the constructed wetlands, (3) the impact of groundwater elevation changes to the nearby crops, habitats, and groundwater users, and (4) groundwater quality impact due to the constructed wetland. The models will also be used to analyze the future without project conditions and the different alternatives of with project conditions. The groundwater flow model will be calibrated before its applications to the project.

SUBACCOUNT 13 - Study Management

IN-KIND SERVICES: \$42,500

PERFORMED BY: The City of Phoenix, Arizona

The Sponsors will participate with the Corps of Engineers in managing study activities. Policy, general guidance, and overall study direction will be furnished by an Executive Committee. Committee membership is specified in the feasibility cost-sharing agreement (FCSA). The Executive Committee will meet or confer by telephone on an as-needed basis. Non-Federal members of the Executive Committee will participate with Corps of Engineers members in Issue Resolution Conferences, review of progress reports and recommendations prepared by the Study

Management Team, decisions regarding report preparation and project recommendations, and resolution of any disputes.

The Executive Committee will be assisted by a Study Management Team consisting of staff level personnel. The Study Management Team will coordinate on all matters relating to prosecution of the study and compliance with the FCSA, including cost estimates, schedules, work elements, financial transactions, and recommendations to the Executive Committee. The Study Management Team will meet or confer on a regular basis approximately four to six times per year.

For day-to-day management, the Sponsors and the Corps of Engineers will each designate a study manager whose responsibility is to complete the feasibility study. The Sponsors' study manager will be responsible for insuring the timely completion of all in-kind services and the transfer of all information to the Corps of Engineers for input to other work tasks or for inclusion in the feasibility report. The respective study managers will also be responsible for preparing, negotiating, and monitoring contracts with others.

The Sponsors will participate in discussions with the Corps of Engineers pertaining to the requirements of the Local Cooperation Agreement (LCA). A model LCA will be provided prior to initiation of this task. The purposes of the LCA are to define the respective roles and cost obligations of the Federal government and the project sponsor, and to provide the local assurances necessary for the project authorization. The discussions of the LCA will occur primarily in months 1 through 12 of the feasibility study.

SUBACCOUNT 15 - Plan Formulation
IN-KIND SERVICES: \$150,000
PERFORMED BY: The City of Phoenix, Arizona

The Sponsors will perform the following services:

Plan formulation includes reviewing and refining the plans selected for study during the reconnaissance phase and other plans developed during the course of the feasibility study. An array of alternatives will be developed and criteria selected in order to evaluate the range of options which will further the objective of restoring riparian habitat within the Salt River. The alternatives will be compared for completeness, effectiveness efficiency and acceptability. The annual and periodic activities and responsibilities for operating and maintaining (O&M) the completed project will be described and closely coordinated with other requirements (e.g., cost estimates and environmental monitoring). The general magnitude of these activities will be described for all alternatives in detail; however, more detail will be provided for the alternative(s) recommended for implementation. All requirements of 33 CFR 208 and other Federal regulations specifying operation and maintenance requirements will be clearly described so that Sponsor's future responsibilities will be known.

Plan formulation will ensure that the report is prepared in accordance with ER 1105-2-100, ER 5-7-1, EC 1105-2-206, EC 1105-2-208, P&G, NEPA, and other pertinent engineering, environmental, and economic guidance and regulations. The report will identify and justify the recommended plan, as well as evaluate the locally-preferred plan, if different from the recommended plan.

The following activities will be accomplished:

1. Participate in the development of an updated assessment of modern historic conditions by researching and providing aerial photographs, previous reports and other pertinent information that may be available to or known to the Sponsors, and by assistance to the Corps of Engineers in the interpretation of past data.
2. Assist in preparing an assessment of existing conditions. A detailed assessment of present conditions will be used as a baseline reference against which future without project and with-project conditions are contrasted. The assessment will include a mapping and area inventory of all major habitat types, including but not necessarily limited to, cottonwood-willow vegetation, wetland/marsh vegetation and salt cedar (tamarisk). A habitat evaluation method acceptable to the U.S. Army Corps of Engineers, the Arizona Game and Fish Department and the U.S. Fish and Wildlife Service, such as the U.S. Fish and Wildlife Service Habitat Evaluation Procedure (HEP), will be used to assess habitat value.
3. Assist in forecasting future without-project conditions within the vicinity of the Salt River as if flows through Phoenix, Arizona. The forecast techniques used to estimate future without-project conditions will be used for the future with-project conditions.
4. Riparian habitat restoration objectives and opportunities for the study area will be defined. Overall objectives will be quantified in terms of habitat units as defined by the habitat evaluation method adopted for use in the study.
5. Consideration of recreation and water quality project purposes will be incorporated into the analysis of alternatives. Selection of a multi-purpose alternative will be subject to Corps policies (i.e., Principles and Guidelines ER 1105-2-100) objectives.
6. The physical, economic and institutional constraints to be considered in developing the alternative measures will be defined.
7. Assist in developing and analyzing alternatives for riparian restoration. Alternatives will be specifically defined such that costs and outputs are accurately estimated.
8. Advise and provide information to the Corps of Engineers regarding costs and environmental outputs of each alternative. Cooperate with the Corps of Engineers in the

development of the alternative details, construction costs, land acquisition costs, operation and maintenance costs and environmental outputs. Benefits associated with habitat restoration outputs will be displayed in a format similar to that shown in EC 1105-2-185 which allows for an incremental cost analysis.

9. Participate with the Corps of Engineers and other agencies in an initial screening of alternatives for the purpose of selecting and agreeing upon those that will be evaluated in detail in the study.
10. Review and comment on the development and evaluation of alternatives by the Corps team. Participate in a meeting or series of meetings in which a recommended plan is developed for presentation and elaboration in the report.
11. Participate in the selection of an alternative, considering biological and technical merits, costs per habitat unit, ability of measure(s) to meet habitat objectives, NED benefits of recreation proposals, implementability and other factors.

SUBACCOUNT 16 - PROGRAMS AND PROJECT MANAGEMENT

IN-KIND SERVICES: \$50,000

PERFORMED BY: The City of Phoenix, Arizona

16B. Project Management (\$50,000)

Point of contact responsibilities, and development and negotiation of the PCA, MOA's and other Corps agreements. Periodic meetings will be held between the Corps and the Sponsor to report on the status of the study and responsible in-kind services and credits.

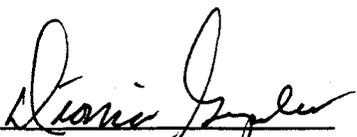
Budgetary management responsibilities include tracking and documenting the funds and budget (accounting) of the study, submitting project fact sheets, and other testimonial fact sheets as required; monitoring and reprogramming study funds, executing current year and future funds; processing schedules of obligations and expenditures; monitoring project financial performance and coordinating with study and project managers on project financial performance; assessing Sponsor manpower allocations versus available funds, assuming Sponsor operating budget includes appropriate hired labor and contract amounts; coordinating future funds allocations and manpower requirements with other City elements; setting up and documenting all cost accounts, and reviewing pre-and post-labor reports.

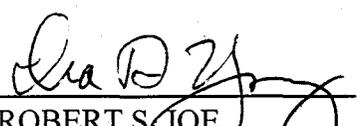
The Sponsor's Project Manager will coordinate with the Corps for the management of negotiated in-kind services and coordination with Corps review, coordination of cost-sharing procedures, and management of budgets and schedules for the feasibility study. Negotiation of tasks and costs, review of reports, and participation in meetings on study results and issues are included in this task.

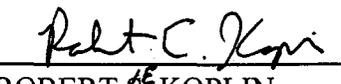
X. CERTIFICATION.

This is to certify that the undersigned have reviewed, and concur in the scope, structure, and cost estimate for the subject study in the amount of \$3,770,000.00 based on October 1996 price and salary levels.

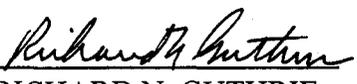
Los Angeles District:

ba

BRIAN M. MOORE
Deputy District Engineer
For Project Management

z

ROBERT S. JOE
Chief, Planning Division


ROBERT S. KOPLIN
Chief, Engineering Division

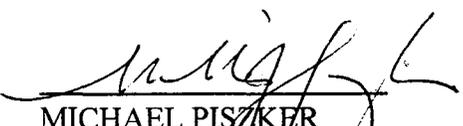

MARTIN DENSE
Chief, Resource Management


RICHARD N. GUTHRIE
Chief, Real Estate Division


STEPHEN E. TEMMEL
Office of Counsel


GEORGE L. BEAMS
Chief, Con-Ops Division


THOMAS D. MCKERCHER
Chief, Contracting Division

 4/1/97
MICHAEL PISZKER
Act. Program Analysis Officer

**TRES RIOS, ARIZONA
FEASIBILITY STUDY**

DETAILED STUDY SCHEDULE

April 1997

FEASIBILITY STUDY SCHEDULE

TRES RIOS, ARIZONA

X:\TRESRIOS\TRESRIOS.MPP

| ID | Task Name | Start | Finish | Duration | Predecessors | Early Start | Early Finish | Late Start | Late Finish | Critical |
|----|--|----------|----------|----------|---------------|-------------|--------------|------------|-------------|----------|
| 1 | F1 - FEASIBILITY STUDY START | 6/22/97 | 6/22/97 | 0d | | 6/22/97 | 6/22/97 | 5/2/97 | 5/2/97 | Yes |
| 2 | | | | | | | | | | |
| 3 | 01 - PUBLIC INVOLVEMENT | 6/23/97 | 12/30/99 | 659d | | 6/23/97 | 12/30/99 | 9/19/97 | 3/28/00 | No |
| 4 | Coordinate with Agencies/Org | 6/23/97 | 10/8/99 | 600d | 1 | 6/23/97 | 10/8/99 | 12/10/97 | 3/28/00 | No |
| 5 | PI Plan, Initial Mailing List | 6/23/97 | 8/22/97 | 45d | 1 | 6/23/97 | 8/22/97 | 1/26/00 | 3/28/00 | No |
| 6 | Prepare Materials | 6/23/97 | 12/29/99 | 658d | | 6/23/97 | 12/29/99 | 9/19/97 | 3/28/00 | No |
| 7 | F2 - Public Workshop (Initial Pub Mtg) | 8/22/97 | 8/22/97 | 0d | | 8/22/97 | 8/22/97 | 11/20/97 | 11/20/97 | No |
| 8 | F7 - Final Public Meeting | 11/17/97 | 11/17/97 | 0d | | 11/17/97 | 11/17/97 | 1/26/00 | 1/26/00 | No |
| 9 | Obtain and Analyze Input | 8/22/97 | 7/22/99 | 500d | 7 | 8/22/97 | 7/22/99 | 4/29/98 | 3/28/00 | No |
| 10 | Prepare Minutes, Appendix | 8/25/97 | 12/30/99 | 614d | 7 | 8/25/97 | 12/30/99 | 11/20/97 | 3/28/00 | No |
| 11 | | | | | | | | | | |
| 12 | 02 - INSTITUTIONAL STUDIES | 5/25/98 | 4/9/99 | 230d | | 5/25/98 | 4/9/99 | 6/23/99 | 3/28/00 | No |
| 13 | Financial Analysis & Planning | 5/25/98 | 2/26/99 | 200d | 1SS+240d | 5/25/98 | 2/26/99 | 6/23/99 | 3/28/00 | No |
| 14 | Documentation and Coordination | 3/1/99 | 4/9/99 | 30d | | 3/1/99 | 4/9/99 | 2/16/00 | 3/28/00 | No |
| 15 | | | | | | | | | | |
| 16 | 03 - CULTURAL RESOURCES STUDIES | 6/23/97 | 2/12/99 | 430d | | 6/23/97 | 2/12/99 | 1/14/98 | 9/7/99 | No |
| 17 | Literature Search | 6/23/97 | 11/7/97 | 100d | 1 | 6/23/97 | 11/7/97 | 1/14/98 | 6/2/98 | No |
| 18 | Field Surveys | 11/10/97 | 3/27/98 | 100d | 17 | 11/10/97 | 3/27/98 | 6/3/98 | 10/20/98 | No |
| 19 | Evaluate NRI-HP Eligibility/Effects of Project | 3/30/98 | 8/14/98 | 100d | 18 | 3/30/98 | 8/14/98 | 10/21/98 | 3/9/99 | No |
| 20 | Define Mitigation/Programmatic Agreement | 8/17/98 | 1/1/99 | 100d | 19 | 8/17/98 | 1/1/99 | 3/10/99 | 7/27/99 | No |
| 21 | Prepare Technical Appendix | 1/4/99 | 2/12/99 | 30d | 20 | 1/4/99 | 2/12/99 | 7/28/99 | 9/7/99 | No |
| 22 | | | | | | | | | | |
| 23 | 04 - ENVIRONMENTAL STUDIES | 6/23/97 | 10/15/99 | 605d | | 6/23/97 | 10/15/99 | 12/3/97 | 3/28/00 | No |
| 24 | Recreation Analysis/Evaluation | 10/27/97 | 12/19/97 | 40d | 25SS+90d | 10/27/97 | 12/19/97 | 10/16/98 | 12/10/98 | No |
| 25 | Ecological/Biological Support | 6/23/97 | 1/1/99 | 400d | 1 | 6/23/97 | 1/1/99 | 12/3/97 | 6/15/99 | No |
| 26 | Constructed Wetlands Design Review | 8/17/98 | 9/25/98 | 30d | 64 | 8/17/98 | 9/25/98 | 5/5/99 | 6/15/99 | No |
| 27 | Incremental Cost Analysis | 7/6/98 | 8/14/98 | 30d | 60 | 7/6/98 | 8/14/98 | 1/8/99 | 2/18/99 | No |
| 28 | DEIS Coordination | 9/15/97 | 3/26/99 | 400d | 25SS+60d | 9/15/97 | 3/26/99 | 2/25/98 | 9/7/99 | No |
| 29 | DEIS Report Preparation | 3/29/99 | 5/21/99 | 40d | 28,35,21,32 | 3/29/99 | 5/21/99 | 9/8/99 | 11/2/99 | No |
| 30 | DEIS Review | 5/24/99 | 8/13/99 | 60d | 29 | 5/24/99 | 8/13/99 | 11/3/99 | 1/25/00 | No |
| 31 | FEIS Preparation & Release | 8/16/99 | 10/15/99 | 45d | 30,36FF,8 | 8/16/99 | 10/15/99 | 1/26/00 | 3/28/00 | No |
| 32 | Prepare Technical Appendix | 1/4/99 | 3/26/99 | 60d | 24,25,26,27 | 1/4/99 | 3/26/99 | 6/16/99 | 9/7/99 | No |
| 33 | | | | | | | | | | |
| 34 | 05 - FISH AND WILDLIFE STUDIES | 10/27/97 | 9/10/99 | 490d | | 10/27/97 | 9/10/99 | 12/2/98 | 3/28/00 | No |
| 35 | USFWS - Draft Coord Act Rpt | 10/27/97 | 7/31/98 | 200d | 25SS+90d | 10/27/97 | 7/31/98 | 12/2/98 | 9/7/99 | No |
| 36 | Final Coordination Act Report | 8/16/99 | 9/10/99 | 20d | 35,30 | 8/16/99 | 9/10/99 | 3/1/00 | 3/28/00 | No |
| 37 | | | | | | | | | | |
| 38 | 06 - ECONOMIC STUDIES | 9/23/97 | 4/23/99 | 414d | | 9/23/97 | 4/23/99 | 6/26/98 | 4/1/99 | Yes |
| 39 | Literature Search | 9/23/97 | 3/9/98 | 120d | | 9/23/97 | 3/9/98 | 6/26/98 | 12/10/98 | No |
| 40 | Recreation Demand Analysis | 3/10/98 | 5/11/98 | 45d | 39,24 | 3/10/98 | 5/11/98 | 12/11/98 | 2/11/99 | No |
| 41 | Incremental Cost Analysis | 3/15/99 | 4/23/99 | 30d | 27,102FF | 3/15/99 | 4/23/99 | 2/19/99 | 4/1/99 | Yes |
| 42 | W/O Proj Cond | 9/23/97 | 12/5/97 | 54d | 1 | 9/23/97 | 12/5/97 | 11/30/98 | 2/11/99 | No |
| 43 | Economics Appendix | 3/8/99 | 4/23/99 | 35d | 39,40,41FF,42 | 3/8/99 | 4/23/99 | 2/12/99 | 4/1/99 | Yes |
| 44 | | | | | | | | | | |
| 45 | 07 - SURVEY & MAPPING | 6/23/97 | 8/14/98 | 300d | | 6/23/97 | 8/14/98 | 5/2/97 | 6/26/98 | Yes |
| 46 | Contract Nego & Award | 6/23/97 | 12/5/97 | 120d | 1 | 6/23/97 | 12/5/97 | 5/2/97 | 10/16/97 | Yes |

FEASIBILITY STUDY SCHEDULE

TRES RIOS, ARIZONA

X:\TRESRIOS\TRESRIOS.MPP

| ID | Task Name | Start | Finish | Duration | Predecessors | Early Start | Early Finish | Late Start | Late Finish | Critical |
|----|---|----------|----------|----------|-----------------|-------------|--------------|------------|-------------|----------|
| 47 | Ground Control | 12/8/97 | 2/27/98 | 60d | 46 | 12/8/97 | 2/27/98 | 10/17/97 | 1/8/98 | Yes |
| 48 | Aerial Mapping | 3/2/98 | 5/22/98 | 60d | 47 | 3/2/98 | 5/22/98 | 1/9/98 | 4/2/98 | Yes |
| 49 | Gravel Pit Survey | 3/2/98 | 5/22/98 | 60d | 47 | 3/2/98 | 5/22/98 | 1/9/98 | 4/2/98 | Yes |
| 50 | Prepare Aerials/Field Check | 5/25/98 | 8/14/98 | 60d | 48,49 | 5/25/98 | 8/14/98 | 4/3/98 | 6/26/98 | Yes |
| 51 | | | | | | | | | | |
| 52 | 08 - HYDROLOGY & HYDRAULIC INVESTIGA | 6/23/97 | 4/26/99 | 481d | | 6/23/97 | 4/26/99 | 6/13/97 | 3/28/00 | Yes |
| 53 | 08A - HYDROLOGY | 6/23/97 | 4/26/99 | 481d | | 6/23/97 | 4/26/99 | 6/13/97 | 3/28/00 | Yes |
| 54 | Review Previous Studies | 6/23/97 | 8/1/97 | 30d | 1 | 6/23/97 | 8/1/97 | 6/13/97 | 7/24/97 | Yes |
| 55 | Discharge/Freq Analysis | 6/23/97 | 7/24/97 | 24d | | 6/23/97 | 7/24/97 | 8/4/97 | 9/4/97 | No |
| 56 | Water Sources | 8/4/97 | 12/5/97 | 90d | 54 | 8/4/97 | 12/5/97 | 7/25/97 | 11/27/97 | Yes |
| 57 | Volume/Freq Analysis | 12/8/97 | 2/27/98 | 60d | 56,69 | 12/8/97 | 2/27/98 | 11/28/97 | 2/19/98 | Yes |
| 58 | Water Quality | 12/8/97 | 2/27/98 | 60d | 56 | 12/8/97 | 2/27/98 | 11/18/98 | 2/9/99 | No |
| 59 | Monitoring | 11/9/98 | 12/7/98 | 21d | 61 | 11/9/98 | 12/7/98 | 10/12/99 | 11/9/99 | No |
| 60 | Project Alternatives | 3/2/98 | 7/3/98 | 90d | 57,82 | 3/2/98 | 7/3/98 | 2/20/98 | 6/25/98 | Yes |
| 61 | Water Quality from Wetlands | 8/17/98 | 11/6/98 | 60d | 60,64 | 8/17/98 | 11/6/98 | 7/20/99 | 10/11/99 | No |
| 62 | Groundwater Analysis | 12/8/97 | 4/10/98 | 90d | 56 | 12/8/97 | 4/10/98 | 8/26/98 | 12/29/98 | No |
| 63 | Groundwater Treatment Design | 4/13/98 | 5/22/98 | 30d | 62 | 4/13/98 | 5/22/98 | 12/30/98 | 2/9/99 | No |
| 64 | Operations of Wetlands | 5/25/98 | 8/14/98 | 60d | 58,63 | 5/25/98 | 8/14/98 | 2/10/99 | 5/4/99 | No |
| 65 | Sizing and Design Refinement | 12/8/98 | 4/26/99 | 100d | 26,59,73FF,81FF | 12/8/98 | 4/26/99 | 11/10/99 | 3/28/00 | No |
| 66 | Risk Analysis | 7/6/98 | 9/25/98 | 60d | 60 | 7/6/98 | 9/25/98 | 1/5/00 | 3/28/00 | No |
| 67 | Documentation | 10/14/97 | 4/26/99 | 400d | 54,65FF,66FF | 10/14/97 | 4/26/99 | 9/16/98 | 3/28/00 | No |
| 68 | 08B - HYDRAULICS | 7/25/97 | 9/25/98 | 306d | | 7/25/97 | 9/25/98 | 9/5/97 | 3/28/00 | No |
| 69 | Flood Hydraulic Analysis | 7/25/97 | 10/16/97 | 60d | 55 | 7/25/97 | 10/16/97 | 9/5/97 | 11/27/97 | No |
| 70 | Sediment Analysis for Base Conditions | 10/17/97 | 2/19/98 | 90d | 69 | 10/17/97 | 2/19/98 | 9/4/98 | 1/7/99 | No |
| 71 | Sediment Analysis for With-Project Co | 2/20/98 | 4/2/98 | 30d | 70 | 2/20/98 | 4/2/98 | 1/8/99 | 2/18/99 | No |
| 72 | Lateral Channel Stability Analysis | 10/17/97 | 11/27/97 | 30d | 69 | 10/17/97 | 11/27/97 | 1/8/99 | 2/18/99 | No |
| 73 | Supply Disch/Dist Design | 7/6/98 | 9/25/98 | 60d | 60 | 7/6/98 | 9/25/98 | 1/5/00 | 3/28/00 | No |
| 74 | Risk Analysis | 7/6/98 | 9/25/98 | 60d | 60,69 | 7/6/98 | 9/25/98 | 1/8/99 | 4/1/99 | No |
| 75 | Documentation | 8/17/98 | 9/25/98 | 30d | 69,74FF,71,72 | 8/17/98 | 9/25/98 | 2/19/99 | 4/1/99 | No |
| 76 | | | | | | | | | | |
| 77 | 9 - GEOTECHNICAL INVESTIGATIONS | 6/23/97 | 1/19/99 | 412d | | 6/23/97 | 1/19/99 | 9/5/97 | 3/28/00 | No |
| 78 | 09A - GEOLOGY | 6/23/97 | 11/20/98 | 370d | | 6/23/97 | 11/20/98 | 9/5/97 | 3/28/00 | No |
| 79 | Framework Study | 10/13/97 | 2/13/98 | 90d | 1SS+80d | 10/13/97 | 2/13/98 | 4/9/99 | 8/12/99 | No |
| 80 | Constructability Analysis | 7/6/98 | 8/14/98 | 30d | 60 | 7/6/98 | 8/14/98 | 9/24/99 | 11/4/99 | No |
| 81 | Field Infiltration Tests | 7/6/98 | 11/20/98 | 100d | 60 | 7/6/98 | 11/20/98 | 11/10/99 | 3/28/00 | No |
| 82 | HTRW Assessment | 6/23/97 | 12/5/97 | 120d | 1 | 6/23/97 | 12/5/97 | 9/5/97 | 2/19/98 | No |
| 83 | Water Well Design | 5/25/98 | 8/14/98 | 60d | 63,79 | 5/25/98 | 8/14/98 | 8/13/99 | 11/4/99 | No |
| 84 | Documentation | 8/17/98 | 8/17/98 | 1d | 80,83 | 8/17/98 | 8/17/98 | 11/5/99 | 11/5/99 | No |
| 85 | 09B - MATERIALS | 2/9/98 | 8/17/98 | 136d | | 2/9/98 | 8/17/98 | 4/19/99 | 11/5/99 | No |
| 86 | Constructability Analysis | 7/6/98 | 8/14/98 | 30d | 60 | 7/6/98 | 8/14/98 | 9/24/99 | 11/4/99 | No |
| 87 | Field Explor/Lab - Tempe | 2/9/98 | 4/10/98 | 45d | 107 | 2/9/98 | 4/10/98 | 4/19/99 | 6/18/99 | No |
| 88 | Field Explor/Lab - Phoenix | 2/9/98 | 4/10/98 | 45d | 107 | 2/9/98 | 4/10/98 | 4/19/99 | 6/18/99 | No |
| 89 | Concrete Materials | 7/6/98 | 8/14/98 | 30d | 60 | 7/6/98 | 8/14/98 | 9/24/99 | 11/4/99 | No |
| 90 | Documentation | 8/17/98 | 8/17/98 | 1d | 86,89 | 8/17/98 | 8/17/98 | 11/5/99 | 11/5/99 | No |
| 91 | 09C - SOILS | 6/23/97 | 1/19/99 | 412d | | 6/23/97 | 1/19/99 | 11/28/97 | 3/28/00 | No |
| 92 | Constructability Analysis | 7/6/98 | 8/14/98 | 30d | 60 | 7/6/98 | 8/14/98 | 9/27/99 | 11/5/99 | No |

FEASIBILITY STUDY SCHEDULE

TRES RIOS, ARIZONA

X:\TRESRIOS\TRESRIOS.MPP

| ID | Task Name | Start | Finish | Duration | Predecessors | Early Start | Early Finish | Late Start | Late Finish | Critical |
|-----|--|----------------|-----------------|-------------|----------------|----------------|-----------------|----------------|----------------|------------|
| 93 | Slope Stability Analysis | 4/13/98 | 7/3/98 | 60d | 87,88 | 4/13/98 | 7/3/98 | 8/16/99 | 11/5/99 | No |
| 94 | Foundation | 4/13/98 | 8/28/98 | 100d | 87,88 | 4/13/98 | 8/28/98 | 6/21/99 | 11/5/99 | No |
| 95 | Develop Explor Plan | 6/23/97 | 12/5/97 | 120d | 1 | 6/23/97 | 12/5/97 | 11/28/97 | 2/12/99 | No |
| 96 | Technical Appendix | 8/31/98 | 1/19/99 | 102d | 84,90,92,93,94 | 8/31/98 | 1/19/99 | 11/8/99 | 3/28/00 | No |
| 97 | | | | | | | | | | |
| 98 | 10 - DESIGN, QUANTITY, & COST ESTIMATIN | 8/17/98 | 5/21/99 | 200d | | 8/17/98 | 5/21/99 | 6/26/98 | 3/28/00 | Yes |
| 99 | Prepare Designs | 8/17/98 | 11/6/98 | 60d | 50,60 | 8/17/98 | 11/6/98 | 6/26/98 | 9/17/98 | Yes |
| 100 | Develop Quantity Estimates | 11/9/98 | 12/18/98 | 30d | 99 | 11/9/98 | 12/18/98 | 9/18/98 | 10/29/98 | Yes |
| 101 | Determine O&M Costs | 12/21/98 | 1/29/99 | 30d | 100 | 12/21/98 | 1/29/99 | 1/22/99 | 3/4/99 | No |
| 102 | Develop Baseline Costs (M-CACES) | 12/21/98 | 4/23/99 | 90d | 100 | 12/21/98 | 4/23/99 | 10/30/98 | 3/4/99 | Yes |
| 103 | Prepare Technical Appendix | 4/26/99 | 5/21/99 | 20d | 101,102 | 4/26/99 | 5/21/99 | 3/5/99 | 4/1/99 | Yes |
| 104 | M-CACES Approval by SPD | 5/21/99 | 5/21/99 | 0d | 103 | 5/21/99 | 5/21/99 | 3/28/00 | 3/28/00 | No |
| 105 | | | | | | | | | | |
| 106 | 11 - REAL ESTATE STUDIES | 12/8/97 | 1/29/99 | 300d | | 12/8/97 | 1/29/99 | 2/15/99 | 3/28/00 | No |
| 107 | Execute Right of Entry Agreements | 12/8/97 | 2/6/98 | 45d | 95 | 12/8/97 | 2/6/98 | 2/15/99 | 4/16/99 | No |
| 108 | Determine Real Estate Values | 7/6/98 | 8/14/98 | 30d | 60 | 7/6/98 | 8/14/98 | 9/1/99 | 10/12/99 | No |
| 109 | Prepare Real Estate Acquisition Plan | 8/17/98 | 12/18/98 | 90d | 108 | 8/17/98 | 12/18/98 | 10/13/99 | 2/15/00 | No |
| 110 | Prepare Gross Appraisal | 8/17/98 | 11/6/98 | 60d | 108 | 8/17/98 | 11/6/98 | 11/24/99 | 2/15/00 | No |
| 111 | Technical Appendix | 12/21/98 | 1/29/99 | 30d | 109,110 | 12/21/98 | 1/29/99 | 2/16/00 | 3/28/00 | No |
| 112 | | | | | | | | | | |
| 113 | 12 - STUDY MANAGEMENT | 6/23/97 | 3/24/00 | 720d | | 6/23/97 | 3/24/00 | 6/25/97 | 3/28/00 | No |
| 114 | Study Management | 6/23/97 | 3/24/00 | 720d | 1 | 6/23/97 | 3/24/00 | 6/25/97 | 3/28/00 | No |
| 115 | Engineering Management | 6/23/99 | 12/3/99 | 118d | | 6/23/99 | 12/3/99 | 10/15/99 | 3/28/00 | No |
| 116 | | | | | | | | | | |
| 117 | 13 - PLAN FORMULATION | 1/3/97 | 4/2/99 | 585d | | 1/3/97 | 4/2/99 | 9/24/97 | 3/28/00 | No |
| 118 | Prepare Existing Conditions | 6/23/97 | 1/27/98 | 157d | 1 | 6/23/97 | 1/27/98 | 9/24/97 | 4/30/98 | No |
| 119 | Estimate Future w/o Project Conditions | 1/3/97 | 3/27/97 | 60d | | 1/3/97 | 3/27/97 | 1/5/00 | 3/28/00 | No |
| 120 | Identify Opportunities & Constraints | 1/28/98 | 4/21/98 | 60d | 118 | 1/28/98 | 4/21/98 | 5/1/98 | 3/28/00 | No |
| 121 | F3 Conference | 5/21/98 | 5/21/98 | 0d | 120SF+30d | 5/21/98 | 5/21/98 | 6/11/98 | 6/11/98 | No |
| 122 | Formulate/Evaluate Alternatives | 5/21/98 | 12/16/98 | 150d | 121 | 5/21/98 | 12/16/98 | 6/12/98 | 1/7/99 | No |
| 123 | Identify Recommended Plan | 12/17/98 | 3/10/99 | 60d | 122 | 12/17/98 | 3/10/99 | 1/8/99 | 4/1/99 | No |
| 124 | F4 Conference | 4/2/99 | 4/2/99 | 0d | 43,75,103,123 | 4/2/99 | 4/2/99 | 4/2/99 | 3/28/00 | Yes |
| 125 | | | | | | | | | | |
| 126 | 14 - REPORT PREPARATION | 1/28/98 | 2/23/00 | 540d | | 1/28/98 | 2/23/00 | 1/11/00 | 3/28/00 | No |
| 127 | F3, F4, F5 and Final Rpt Prep | 1/28/98 | 4/15/98 | 56d | | 1/28/98 | 4/15/98 | 1/11/00 | 3/28/00 | No |
| 128 | F5 - Submit Draft Report & DEIS | 9/21/99 | 9/21/99 | 0d | 127,29,67,111 | 9/21/99 | 9/21/99 | 3/28/00 | 3/28/00 | No |
| 129 | F5A - Feasibility Review Conference | 10/22/99 | 10/22/99 | 0d | | 10/22/99 | 10/22/99 | 3/28/00 | 3/28/00 | No |
| 130 | F8 - Submit Final Report & FEIS | 2/23/00 | 2/23/00 | 0d | 10,30,31 | 2/23/00 | 2/23/00 | 3/28/00 | 3/28/00 | No |
| 131 | | | | | | | | | | |
| 132 | 15 - PROGRAMS AND PROJECT MANAGME | 6/23/97 | 2/25/00 | 700d | | 6/23/97 | 2/25/00 | 7/23/97 | 3/28/00 | No |
| 133 | Programs Management | 8/4/97 | 2/25/00 | 670d | 134SS+30d | 8/4/97 | 2/25/00 | 9/3/97 | 3/28/00 | No |
| 134 | Project Management | 6/23/97 | 2/25/00 | 700d | 1 | 6/23/97 | 2/25/00 | 7/23/97 | 3/28/00 | No |
| 135 | Project Management Plan (PMP) | 6/23/97 | 11/7/97 | 100d | | 6/23/97 | 11/7/97 | 11/10/99 | 3/28/00 | No |
| 136 | PMP Approved by PRB | 11/7/97 | 11/7/97 | 0d | 135 | 11/7/97 | 11/7/97 | 3/28/00 | 3/28/00 | No |
| 137 | | | | | | | | | | |
| 138 | 16 - QUALITY CONTROL AND REVIEW | 7/21/99 | 12/22/99 | 111d | | 7/21/99 | 12/22/99 | 2/2/00 | 3/28/00 | No |

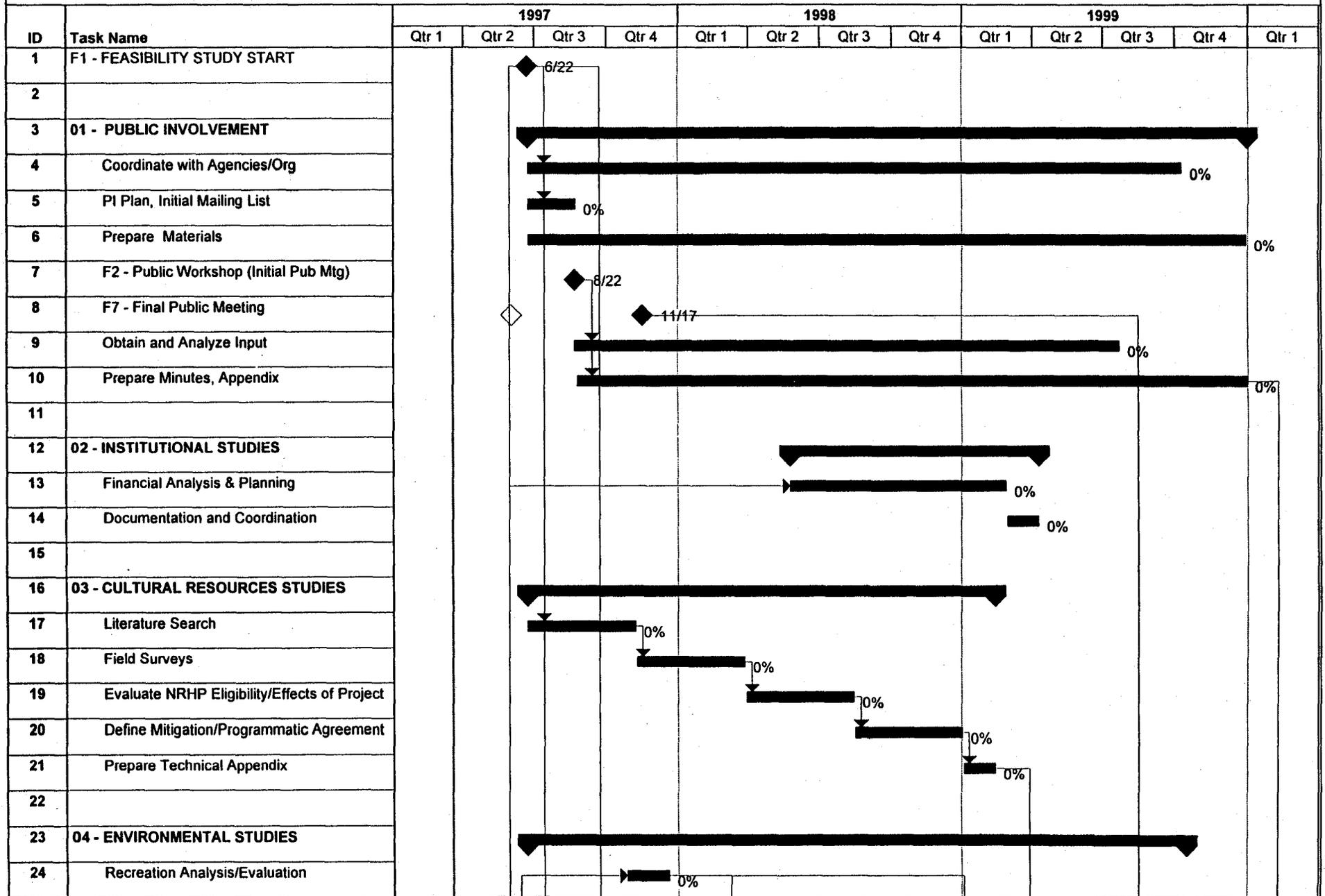
FEASIBILITY STUDY SCHEDULE

TRES RIOS, ARIZONA

X:\TRESRIOS\TRESRIOS.MPP

| ID | Task Name | Start | Finish | Duration | Predecessors | Early Start | Early Finish | Late Start | Late Finish | Critical |
|-----|-------------------------------------|----------|----------|----------|-----------------|-------------|--------------|------------|-------------|----------|
| 139 | Draft Review | 7/21/99 | 8/23/99 | 24d | | 7/21/99 | 8/23/99 | 2/24/00 | 3/28/00 | No |
| 140 | F5A - Feasibility Review Conference | 10/22/99 | 10/22/99 | 0d | | 10/22/99 | 10/22/99 | 3/28/00 | 3/28/00 | No |
| 141 | F6 - Field Level Coordination | 12/9/99 | 12/9/99 | 0d | 140SS+35d | 12/9/99 | 12/9/99 | 3/28/00 | 3/28/00 | No |
| 142 | Final Review | 10/28/99 | 12/22/99 | 40d | | 10/28/99 | 12/22/99 | 2/2/00 | 3/28/00 | No |
| 143 | | | | | | | | | | |
| 144 | 17 - CONTINGENCIES | 6/23/97 | 3/28/00 | 722d | 1 | 6/23/97 | 3/28/00 | 6/23/97 | 3/28/00 | Yes |
| 145 | | | | | | | | | | |
| 146 | F9 - DIV ENG CERT/DIST ENG NOTICE | 3/28/00 | 3/28/00 | 0d | 114,115,133,134 | 3/28/00 | 3/28/00 | 3/28/00 | 3/28/00 | Yes |

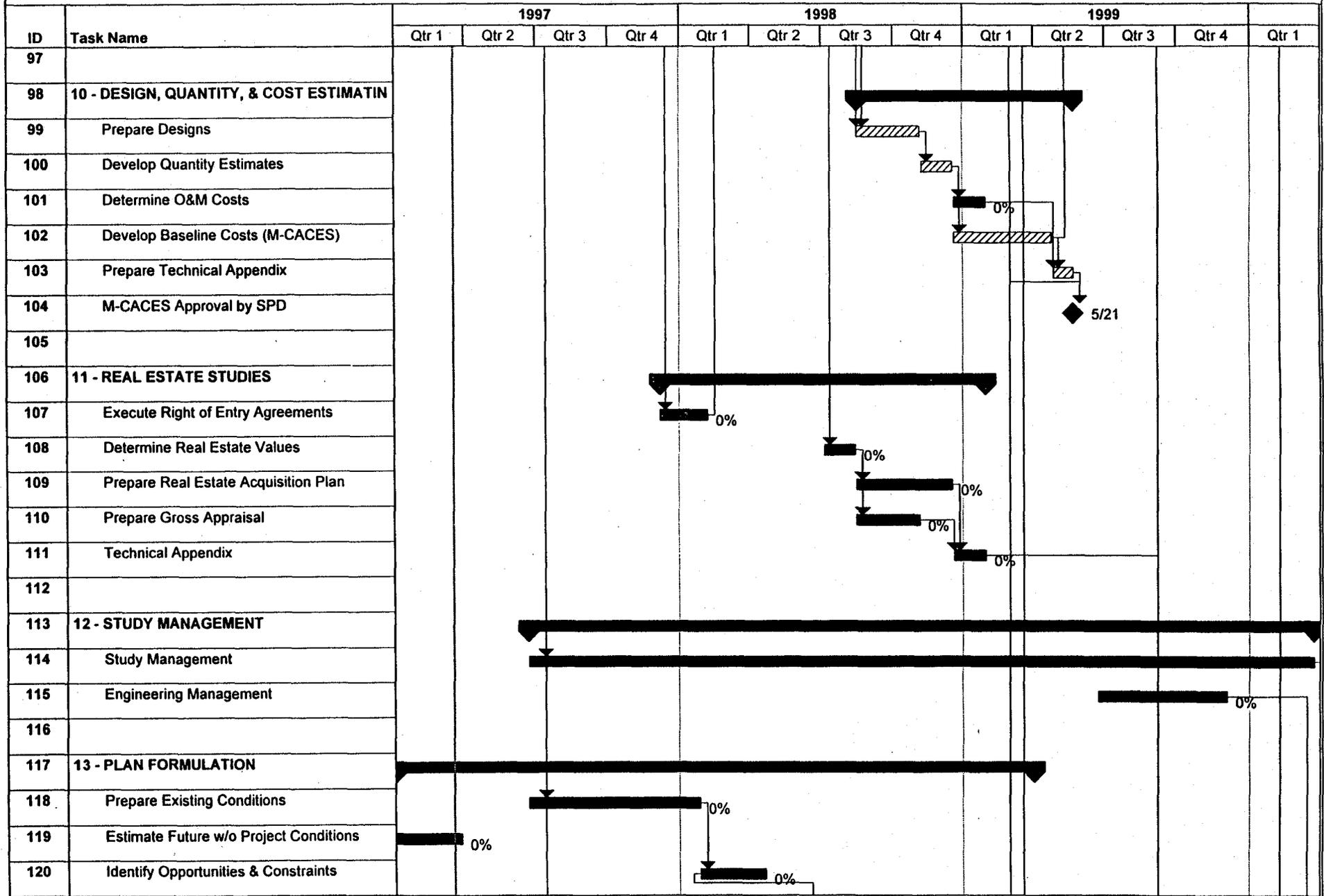
TRES RIOS FEASIBILITY STUDY SCHEDULE



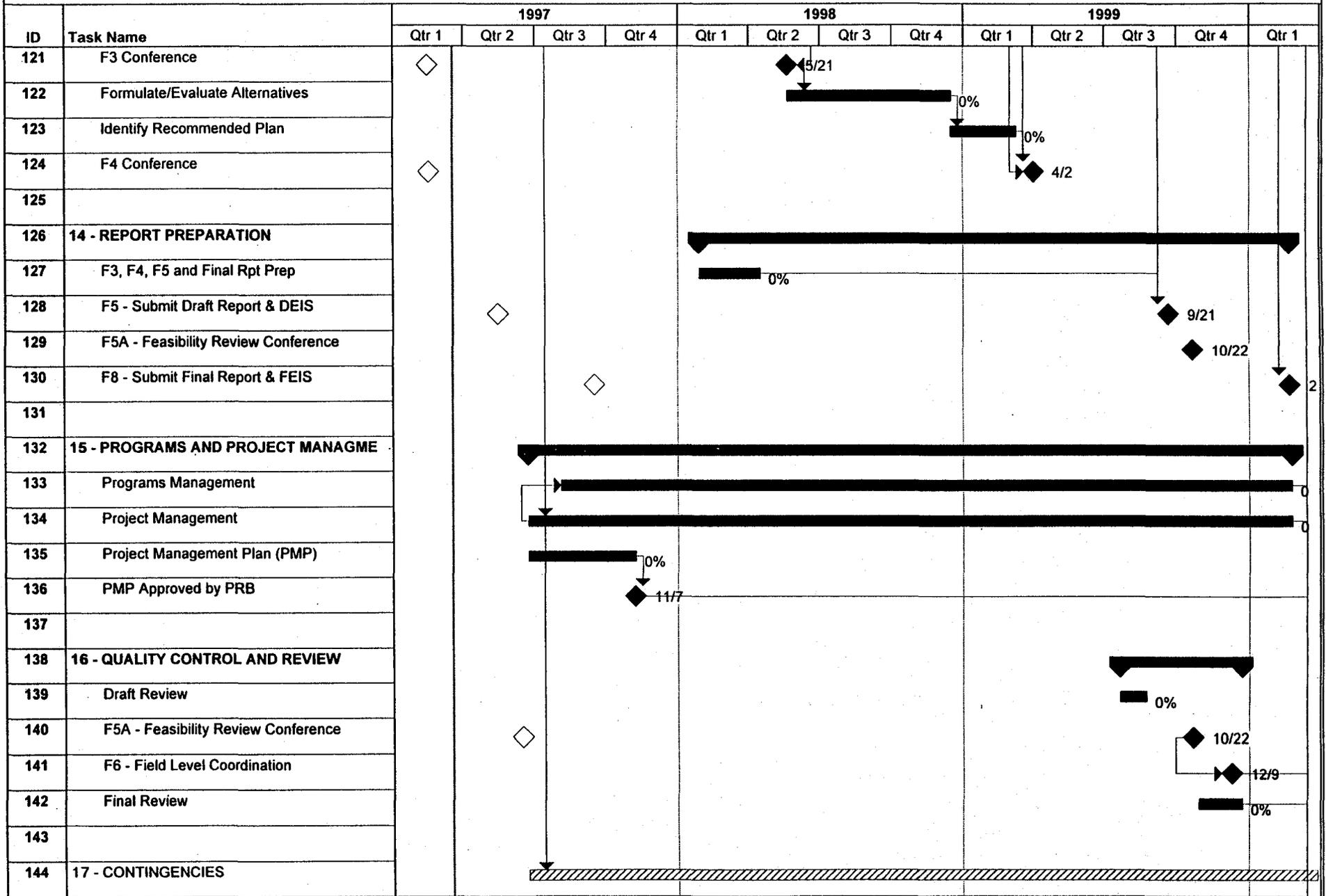
TRES RIOS FEASIBILITY STUDY SCHEDULE

| ID | Task Name | 1997 | | | | 1998 | | | | 1999 | | | | Qtr 1 |
|----|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | |
| 73 | Supply Disch/Dist Design | | | | | | | 0% | | | | | | |
| 74 | Risk Analysis | | | | | | | 0% | | | | | | |
| 75 | Documentation | | | | | | | 0% | | | | | | |
| 76 | | | | | | | | | | | | | | |
| 77 | 9 - GEOTECHNICAL INVESTIGATIONS | | | | | | | | | | | | | |
| 78 | 09A - GEOLOGY | | | | | | | | | | | | | |
| 79 | Framework Study | | | | | | | 0% | | | | | | |
| 80 | Constructability Analysis | | | | | | | | 0% | | | | | |
| 81 | Field Infiltration Tests | | | | | | | | | | | | 0% | |
| 82 | HTRW Assessment | | | | | | | | | | | | | |
| 83 | Water Well Design | | | | | | | | 0% | | | | | |
| 84 | Documentation | | | | | | | | | | | | | |
| 85 | 09B - MATERIALS | | | | | | | | | | | | | |
| 86 | Constructability Analysis | | | | | | | | | | | | | |
| 87 | Field Explor/Lab - Tempe | | | | | | | | | | | | | |
| 88 | Field Explor/Lab - Phoenix | | | | | | | | | | | | | |
| 89 | Concrete Materials | | | | | | | | | | | | | |
| 90 | Documentation | | | | | | | | | | | | | |
| 91 | 09C - SOILS | | | | | | | | | | | | | |
| 92 | Constructability Analysis | | | | | | | | | | | | | |
| 93 | Slope Stability Analysis | | | | | | | | | | | | | |
| 94 | Foundation | | | | | | | | | | | | | |
| 95 | Develop Explor Plan | | | | | | | | | | | | | |
| 96 | Technical Appendix | | | | | | | | | | | | | |

TRES RIOS FEASIBILITY STUDY SCHEDULE



TRES RIOS FEASIBILITY STUDY SCHEDULE



TRES RIOS FEASIBILITY STUDY SCHEDULE

| ID | Task Name | 1997 | | | | 1998 | | | | 1999 | | | | Qtr 1 |
|-----|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | |
| 145 | | | | | | | | | | | | | | |
| 146 | F9 - DIV ENG CERT/DIST ENG NOTICE | | | | ◇ | | | | | | | | | |