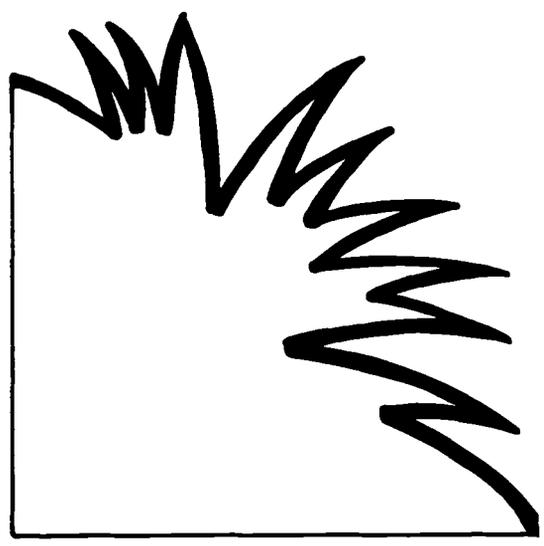
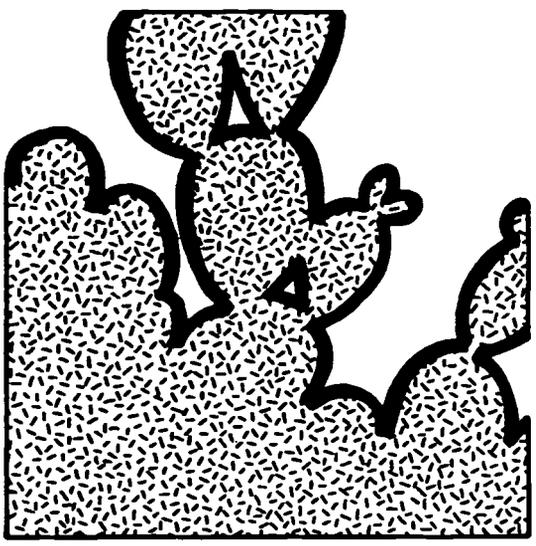
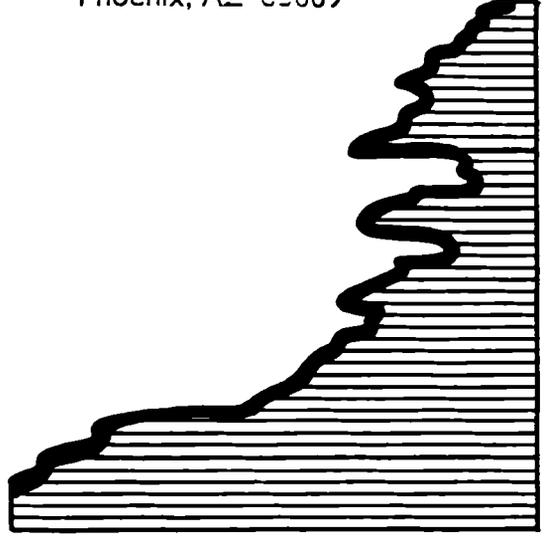
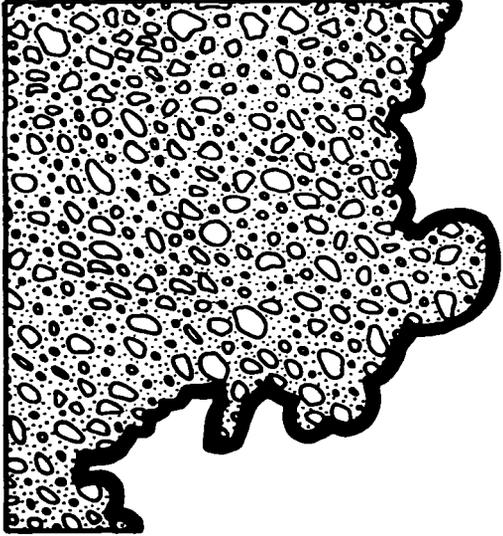


DICK PERREAULT
4/91

Property of
City of MC Library
2000
Phoenix, AZ 85009



WILDLIFE HABITAT MASTERPLAN



DRAFT
4/25/90
HNTB



**HOWARD NEEDLES TAMMEN & BERGENDOFF
ARCHITECTS ENGINEERS PLANNERS**

*Two Renaissance Square
Suite 1100
10 North Central
Phoenix, Arizona 85004
(602) 528-4300*

*for tomorrow
meeting with
J. mpe.
Lynn*

**PRELIMINARY COST ESTIMATE
FOR WILDLIFE HABITAT MITIGATION
(PUBLIC NOTICE 90-105-CL)**

RIPARIAN STRAND (20 ACRES)

	<u>QUANTITY</u>	<u>UNIT COST</u>	<u>TOTAL COST</u>
o 15 Gal. Trees	540	\$80	\$ 43,200
o 1 Gal. Shrub	3500	\$8	\$ 28,000
o Hydroseed	18 Acres	\$1750/Acre	\$ 31,500
o Soil Prep	348,480 CF	.60/CF	\$ 209,088
o Irrigation	40%		\$ 41,080
Subtotal Landscape			\$ 352,868
o Partial Stream Lining Pump Facility Piping			\$ 800,000
Subtotal Stream			\$ 800,000
<u>TOTAL RIPARIAN STRAND</u>			\$1,152,868

MITIGATION SITE (13.6 ACRES)

o 5 Gal. Trees	1360	\$50	\$ 68,000
o Hydroseed	8/Acres	1500/Acre	\$ 12,000
o Irrigation	40%		\$ 32,000
Subtotal Landscape			\$ 112,000
o Signage & Trail			\$ 11,000
Subtotal			\$ 11,000
<u>TOTAL MITIGATION SITE</u>			\$ 123,000

Partners: Charles T. Houghton PE, Daniel J. Seips PE, John L. Cotton PE, Francis X. Hall PE, Robert S. Cornu PE, Dennis A. Dupes PE, William Lave FAIA, Robert D. Miller PC, James L. Tuttle, Jr. PE, Hugh C. Sobel PE, Cary C. Goodman AIA, Corson H. Stanley, Jr. PE, Harvey K. Hammond, Jr. PE, Stephen G. Cassard PE, John W. Wright, Jr. PE, Richard D. Buckman PE, Richard L. Farnan AIA, Douglas E. Pruvost PE
Associates: Kendall T. Lincoln CPA, Robert W. Smith PE, Harry D. Rantou PE, Ralph E. Floezen PE, Stanley J. Mast PC, Walter Branko PE, James O. Russell PE, Rose L. Jurkut AIA, Frank T. Lamm PC, H. Jerome Butler PE, Missa M. Caniere PE, Michael P. Kourou PE, Bernard L. Prince PC, Stephen D. Quinn PE, Saul A. Jacobson PE, Ewing H. Miller FAIA, Douglas C. Myers PC, Carl J. Mullen PE, Daniel F. Becker PE, Donald R. Kouth PE, Arnold L. Hurler PE, Thomas L. Williams AIA, Dennis C. Franklin PE, John C. Kloke PE, Rodney P. Mule PE, Steven M. Rogg AIA, Robert A. Leck PE, Glenn D. Sedulek PE, Benjamin A. Wheeler PE, Roger S. Austin PE, John D. Donohue PE, Charles L. O'Reilly, Jr. PE, Robert M. Stein PE, Douglas A. Boyd AIA, Raymond J. McCabe PE, Thomas A. Skinner PE, Paul A. Yurkew PE, F. Christopher D'Amico ASLA AICP, Richard W. Franking AIA, James T. Kuhn AIA, Terry K. Miller AIA, Robert C. Ward PE
Patrons: Anthony M. Arisler AIA, Brian R. ...



HOWARD NEEDLES TAMMEN & BERGENDOFF
ARCHITECTS ENGINEERS PLANNERS

Two Renaissance Square
Suite 1100
40 North Central
Phoenix, Arizona 85004
(602) 528-4300

FACSIMILE COVER SHEET

Transmittal Date/Time: July 11, 1990

Number of Pages (including cover sheet): 2

To: DON PERICK

FAX Number: 269-4601

Message:
FORWARDED TO YOU PER DAVE HACKERS REQUEST.
IF YOU SHOULD HAVE QUESTIONS REGARDING THESE
COSTS, PLEASE CALL.

From: WAYNE COLTRANK
(Name)

HOWARD NEEDLES TAMMEN & BERGENDOFF
TWO RENAISSANCE SQUARE, SUITE 1100
40 NORTH CENTRAL
PHOENIX, ARIZONA 85004
(602) 528-4300
FAX Number: (602) 528-4301

RESOLUTION FCD 89-13

FLOOD CONTROL DISTRICT INVOLVEMENT IN THE DESIGN AND CONSTRUCTION OF CHANNELIZATION OF THE SALT RIVER WITHIN THE CITY OF TEMPE, BETWEEN APPROXIMATELY MILL AVENUE AND McCLINTOCK DRIVE

WHEREAS, The Board of Directors of the Flood Control District of Maricopa County (FCDMC) adopted Resolution FCD 87-5 on April 20, 1987, directing the Chief Engineer and General Manager of the FCDMC to negotiate and prepare Intergovernmental Agreements with the Arizona Department of Transportation (ADOT) for the FCDMC's assumption of maintenance responsibilities of the Salt River Channel to be constructed by ADOT between 40th Street and Mill Avenue; and,

WHEREAS, the Intergovernmental Agreements with ADOT, SRP, Phoenix, and Tempe have been signed and construction of the Salt River Channel west of Mill Avenue has commenced; and

WHEREAS, The Board of Directors of the FCDMC adopted Resolution FCD 89-06 on April 28, 1989, directing the Chief Engineer and General Manager of the FCDMC to negotiate and prepare an IGA with the City of Tempe for channelization of the Salt River utilizing land rights owned or controlled by the FCDMC and for FCDMC's assumption of the responsibility for future operation and maintenance of the channel; and

WHEREAS, The City of Tempe is preparing an engineering consultant design contract for the preparation of construction plans and specifications for the channelization of the Salt River between approximately Mill Avenue and McClintock Drive and requests a commitment for support and cost sharing for the design and construction of the channel from the FCDMC; and

WHEREAS, The Arizona Department of Transportation (ADOT) is preparing construction plans and specifications for the East Papago Freeway between Mill Avenue and McClintock Drive and ADOT intends to start construction of this segment of the freeway, which will require construction in portions of the floodplain, in mid-1990 and complete construction by the end of 1991; and

WHEREAS, ADOT's policy for cost-sharing in flood control and alternative drainage projects is to contribute no more than the amount that would have had to have been spent to protect an ADOT facility or to provide for the least cost freeway drainage features. ADOT is willing to cost-share, in an amount as yet undetermined, for the construction of the channel and to manage the construction, if the channel can be constructed concurrently with their freeway project; and

WHEREAS, the FCDMC is supportive of the channelization concept and believes that public funds can be saved by concurrently constructing the channel and freeway projects; and

WHEREAS, it is estimated that design of the channel will not cost more than \$600,000 and that the cost to construct the channel between approximately Mill Avenue and McClintock Drive will not exceed \$15 million.

NOW, THEREFORE, BE IT RESOLVED, that the Board of Directors of the FCDMC directs the Chief Engineer and General Manager of the FCDMC to negotiate and prepare an IGA with the City of Tempe and others, if appropriate, for cost sharing the preparation of final plans and specifications for the construction of the Salt River Channel between approximately Mill Avenue and McClintock Drive. The FCDMC cost share shall not exceed fifty percent of the preparation costs or \$300,000. This IGA shall be subject to the ratification and approval of this Board; and

BE IT FURTHER RESOLVED, that the Chief Engineer and General Manager is directed to negotiate and prepare an IGA, with the City of Tempe, ADOT, the Board of Regents, and others, as appropriate for the cost-sharing of the implementation of the Salt River Channel between approximately Mill Avenue and McClintock Drive, the total estimated construction costs of which are \$15 million, and that the cost to the FCDMC will be that portion of the construction costs that cannot be borne nor contributed to by ADOT. This IGA shall be subject to the ratification and approval of this Board; and

BE IT FURTHER RESOLVED, that the Chief Engineer and General Manager is authorized to coordinate with ADOT and others, as appropriate, for channelization of the Salt River east of McClintock Drive to the vicinity of Alma School Road.

Dated this 20th day of November, 1989

ATTEST:


Clerk of the Board


Chairman, Board of Directors
Flood Control District of Maricopa County

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
AGENDA INFORMATION FORM

Contract Lease: NEW RENEWAL AMENDMENT CANCELLATION
(If existing record Encumbrance No. below)

LOW ORG NO 6900 DEPARTMENT Flood Control District CONTROL NUMBER FCD-1056

ENCUMBRANCE NO _____ AGENCY Public Works CONTROL NUMBER PW-1056

1. BRIEF DESCRIPTION OF PROPOSAL AND REQUESTED BOARD ACTION: The Flood Control District, through IGA's with ADOT, Phoenix, Tempe, and SRP, has agreed to operate and maintain a channel that is presently being constructed in the Salt River between 40th Street and Mill Avenue. The City of Tempe has developed the concept of a channel which will extend from approximately Mill Avenue to McClintock Drive.

On April 28, 1989, the Board of Directors adopted Resolution FCD 89-06, directing the Chief Engineer and General Manager of the District to prepare an IGA with the City to allow the use of District-owned and controlled property for the channel. The District would also operate and maintain the channel upon its completion. The City has asked the District to share the cost of the design and construction of the channel. Total cost is estimated to be \$600,000 for the design and \$15 million for the construction.

On October 25, 1989, the Flood Control Advisory Board approved and recommended that the Board of Directors adopt Resolution FCD 89-13, concerning the District's cost sharing in the design and construction of a channel in the Salt River between approximately Mill Avenue and McClintock Drive.

2. Compliance with Maricopa County Procurement Code N/A N/A
article paragraph Procurement Officer

3. CONTINUED FROM MEETING OF _____ **4. THIS DEPARTMENT WILL CAUSE PUBLICATION**
DISCUSSED IN MEETING OF _____ **CLERK OF THE BOARD TO CAUSE PUBLICATION**

5. MOTION: It is moved that the Flood Control District of Maricopa County Board of Directors... adopt Resolution FCD 89-13, concerning the District's cost sharing in the design and construction of a channel in the Salt river between approximately Mill Avenue and McClintock Drive.

6. FINANCIAL: Expenditure Revenue Budgeted Contingency Budget Amendment Transfer Grant or other
 \$ _____
Total Fund Financial Officer Date

7. PERSONNEL:

Personnel Director Date

8. FLOOD CONTROL DISTRICT:
[Signature] 10-26-89
Action Recommended by Date

9. MATERIALS MANAGEMENT:
A. _____
Materials Management Director Date
B. _____
W/MBE Representative Date

10. LEGAL: Approved as to form and within the powers and authority granted under the laws of the state of Arizona to the Flood Control District of Maricopa County Board of Directors.
[Signature] 11-2-89
General Counsel Date

11. INFORMATION SYSTEMS: _____
FISC Date

12. APPROVED FOR AGENDA:

Approving Official Date

13. OTHER:

Signature Date

15. RECOMMENDATION OF COUNTY MANAGER:
 Approve Disapprove
 Comments:

County Manager Date

14. BOARD OF DIRECTORS: Action taken:
 Approved Amended Disapproved Deleted
 Forwarded to: [Signature] NOV 20 1989
(Date and type of meeting) Clerk of the Board Date

RESOLUTION FCD 89-06

FLOOD CONTROL DISTRICT SUPPORT FOR THE CITY OF TEMPE'S PLAN FOR CHANNELIZATION OF THE SALT RIVER WITHIN THE CITY OF TEMPE.

WHEREAS, the Board of Directors of the Flood Control District of Maricopa County (FCDMC) adopted Resolution FCD 87-5 on April 20, 1987, directing the Chief Engineer and General Manager of the FCDMC to negotiate and prepare Intergovernmental Agreements with the Arizona Department of Transportation (ADOT) for the FCDMC's assumption of maintenance responsibilities of the Salt River Channel to be constructed by ADOT between 40th Street and Mill Avenue; and

WHEREAS, ADOT will commence construction of the Salt River Channel and the East Papago Freeway in mid 1989. Construction of the freeway embankments will require that significant quantities of borrow material be imported by ADOT. A potential source of this borrow material is located in the Salt River between Mill Avenue and McClintock Drive; and

WHEREAS, the City of Tempe has developed a conceptual flood control channelization plan for the Salt River between 48th Street and Price Road; and

WHEREAS, the FCDMC owns fee title to certain parcels of land and has flowage easements on other parcels of land in the Salt River between Mill Avenue and McClintock Drive. Portions of the land owned and managed by the FCDMC will be required for implementation of Tempe's channelization plan; and

WHEREAS, the City of Tempe requests that the FCDMC assume the operation and maintenance of the flood control channel to be built to the FCDMC's design standards within the City of Tempe; and

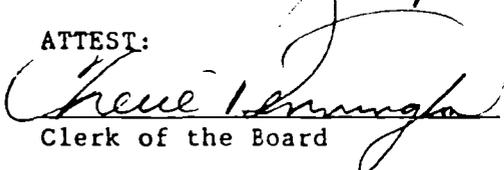
WHEREAS, the FCDMC is supportive of the City of Tempe's channelization plan and is willing to assume operation and maintenance of the channel if it is designed and constructed to FCDMC standards and criteria.

NOW, THEREFORE, BE IT RESOLVED, that the Board of Directors of the FCDMC directs the Chief Engineer and General Manager of the FCDMC to negotiate and prepare an Intergovernmental Agreement with the City of Tempe for the channelization of the Salt River within the City of Tempe utilizing land rights owned or controlled by the FCDMC and concerning the FCDMC's assumption of the responsibility for future operation and maintenance of the channel subject to the ratification and approval of this Board; and

BE IT FURTHER RESOLVED, that the Chief Engineer and General Manager is authorized to coordinate and negotiate agreements with the City of Tempe and other public agencies concerning the potential non-flood control usage of FCDMC owned lands in the vicinity of the channelization project, and the structures and areas included in the channel maintenance agreement identified above, subject to the approval and ratification of this Board.

DATED THIS 20th day of April, 1989

ATTEST:


Clerk of the Board


Chairman, Board of Directors
Flood Control District of
Maricopa County

4

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
AGENDA INFORMATION FORM

LOW ORG. NO. 6900 DEPARTMENT: Flood Control CONTROL NUMBER: FCD-952

ENCUMBRANCE NO. _____ DIVISION: Public Works CONTROL NUMBER: PW-952

1. BRIEF DESCRIPTION OF PROPOSAL AND REQUESTED BOARD ACTION: It is requested that the Board approve Resolution FCD 89-06 concerning the use of District owned lands in the channelization of the Salt River between Mill Ave. and McClintock Drive, Tempe. Construction of the ADOT channel to the west, the East Papago Freeway, and related highways will start this summer. The City of Tempe has identified borrow material in the Salt River for use by ADOT if an approximate 1,000 foot wide channel with in-channel lakes is excavated. ADOT has indicated an interest in excavating and buying the materials.

The area proposed for excavation is owned by Tempe, ASU, BLM, Tempo Investments and the District. Revenue from the sale of the materials will be used to pay for construction and stabilization of the flood control channel. Staff supports Tempe's channelization plan and recommends the District assume O&M of the project when completed. No District funds will be used in the channel excavation or construction.

The Flood Control Advisory Board recommended adoption of Resolution FCD 89-06 at its Procured in accordance with Maricopa County Procurement Code n/a article n/a paragraph n/a March, 1989 meeting.

2. CONTINUED FROM MEETING OF DISCUSSED IN MEETING OF _____	3. THIS DEPARTMENT WILL CAUSE PUBLICATION CLERK OF THE BOARD TO CAUSE PUBLICATION
--	---

4. MOTION: It is moved that the Flood Control District of Maricopa County Board of Directors ... adopt Resolution FCD 89-06, concerning the use of District owned lands in a plan for channelization and management of the Salt River floodplain, and concerning the District assuming responsibility for the future maintenance of the channel.

5. FINANCIAL: ___ Budgeted ___ Contingency ___ Budget Amendment ___ Transfer ___ Grant or other

No funds involved

\$ _____ Flood Control Ray Smith 4-4-89
Total Cost/Revenue Fund Financial Officer Date

6. PERSONNEL:

Personnel Director Date

7. FLOOD CONTROL DISTRICT:
DeGregorio 3-29-89
Action Recommended by Date

8. MATERIALS MANAGEMENT:

Materials Management Director Date

9. LEGAL Approved as to form and within the powers and authority granted under the laws of the State of Arizona to the Flood Control District of Maricopa County Board of Directors

[Signature] 3-29-89
General Counsel Date

10. OTHER: _____

(Signature) Date

11. APPROVED FOR AGENDA:
A. Wayne Collins 3-29-89
Approving Official Date

12. BOARD OF DIRECTORS: Action taken:
___ Approved ___ Amended ___ Disapproved ___ Deleted
Continued to: _____
(Date and type of meeting)

13. RECOMMENDATION OF COUNTY MANAGER:
 Approve ___ Disapprove
Comments: [Signature]
County Manager Date

Cherie Pennington APR 17 1989
Clerk of the Board Date

APRIL 25, 1990

DRAFT
TEMPE RIO SALADO
WILDLIFE HABITAT MASTER PLAN

PURSUANT TO PUBLIC NOTICE
90-105-CL

FOR THAT PORTION OF THE SALT
RIVER FROM SOUTHERN PACIFIC
RAILROAD BRIDGE TO McCLINTOCK DRIVE
IN
TEMPE, ARIZONA

PREPARED BY:

HOWARD NEEDLES TAMMEN & BERGENDOFF
2207 EAST CAMELBACK
PHOENIX, ARIZONA
(602) 954-7420

FLOOD CONTROL DISTRICT RECEIVED		
JUL 06 1990		
	CH ENG	P & PM
	DEP	HYDRO
	SAF	LMGT
	PRD	FILE
	CA	
	ENGR	
REMARKS		

DRAFT
TEMPE RIO SALADO
WILDLIFE HABITAT MITIGATION
OUTLINE

- I. INTRODUCTION
 - A. Introduction
 - B. Report Outline
 - C. Purpose
 - D. Scope
 - E. Master Plan Process

- II. PROJECT AREA
 - A. General Setting
 - B. Physical Characteristics
 - C. Wildlife

- III. Rio Salado Wildlife Habitat Master Plan
 - A. Overview
 - B. Potential Mitigation Zones
 - C. Proposed Mitigation Zone
 - 1. Site Analysis
 - 2. Planting Installation
 - D. Riparian Strand

- IV. Operation and Maintenance

- V. Monitoring and Documentation
 - A. Establishing Study Sites
 - B. Stratified Random Sampling
 - C. Measurements
 - D. Report Submittal

- VI. Phasing and Implementation Costs
 - A. Implementation Schedule for Mitigation
 - 1. Mesquite Habitat
 - 2. Riparian Strand
 - B. Probable Construction Costs
 - 1. Mesquite Habitat
 - 2. Riparian Strand

VII. Impacts of Mitigation Master Plan

- A. Temporal Impacts
- B. Direct Impacts

APPENDICES

- A. General Timeline for Rio Salado Construction Activities
- B. Plant Species Presently Occurring in the Salt River
- C. Undesireable Plant Species
- D. Known Wildlife Inhabitants of the Salt River
- E. Mitigation Zone Soil Test Results
- F. Suggested Seed Mixes and Potential Revegetation Techniques for the Rio Salado Park
- G. Proof of Ownership
- H. U.S. Fish and Wildlife Service Response to Public Notices 89-272-CL and 90-105-CL

GLOSSARY OF TERMS

REFERENCES

WILDLIFE MASTER PLAN
LIST OF FIGURES

<u>#</u>	<u>TITLE</u>
1.	404 PERMIT AREA
2.	RIO SALADO PARK BOUNDARIES
3.	PROJECT LOCATION
4.	CHANNEL SECTIONS
5.	KNOWN LANDFILLS
6.	EXISTING HABITAT
7.	WILDLIFE HABITAT MASTER PLAN
7A.	PROPOSED SITES FOR ADOT MITIGATION
8.	ZONE C CROSS SECTIONS
9.	PROPOSED MITIGATION ZONE
10.	GRIDDED TREE PATTERN
11.	RANDOM TREE PATTERN
12.	HERBIVORE PROTECTION
13.	RIPARIAN STRAND
14.	PLANTING CONCEPT
15.	IRRIGATION CONCEPT
16.	CHANNEL PLANTING GRADATION
17.	PLACEMENT OF PLOTS
18.	DESIGN OF SUBPLOTS
19.	STRATIFIED RANDOM SAMPLING

DII483.2

I. INTRODUCTION

Introduction

The City of Tempe has applied to the U.S. Army Corps of Engineers for a dredge and fill permit to allow for flood control channelization of the Salt River between McClintock Road and the Railroad Bridge west of Mill Avenue (Figure #1). This application is regulated by the Guidelines of Section 404 of the Clean Water Act. An Environmental Assessment of the proposed channelization prepared by the City indicates that wildlife habitat will be lost due to project construction and refers to this master plan document as the site-specific proposal to mitigate for habitat losses.

Report Outline

This report will document the habitat restoration measures that are proposed by the City of Tempe to compensate for project losses. Section II of this report borrows heavily from the documentation of the existing conditions of the Salt River found in the Environmental Assessment and familiarizes the reader with current river conditions as a preface to discussing the habitat restoration strategy. The reader is encouraged to review the EA for detailed baseline conditions within the Salt River. A detailed proposal for wildlife habitat mitigation is presented in Section III, including the specific steps of an implementation strategy to successfully replace the lost habitat. Sections V and VI outline the City of Tempe's commitments for operating, maintaining and monitoring the progress of the habitat restoration. The probable costs for implementing the habitat replacement, as detailed in this report, is shown in Section VII. Finally, an identification of potential impacts of the mitigation proposal is included in Section VIII.

Purpose

The U.S. Fish and Wildlife Service and the Arizona Game and Fish Department in their joint comments on the permit application, have identified 23 acres of Cottonwood/Honey Mesquite habitat and 113 acres of desert scrub located from McClintock Road to the Railroad bridge. In a 12/22/89 letter, the U.S. Fish and Wildlife Service stated that they had no objection to issuing the subject permit should the City implement 13 acres of Honey Mesquite Habitat restoration, create a riparian habitat from 48th Street to Mill Avenue and meet other mitigation conditions. The comments further requested that a habitat restoration plan be prepared by the City of Tempe to delineate specific steps that will be undertaken with regards to conditions outlined in the letter.

In a February 20th meeting with the U.S. Fish and Wildlife Service an outline was provided to the City of Tempe which identified specific aspects of the restoration plan for which information was being requested. Those aspects are: analysis of existing soils, the

proposed site, an implementation schedule, site preparation, proposed species composition and density, planting methods, water availability, watering methods, plant survival goals, guarantee period, weed control, pre-and post-project photo-documentation, and annual and final reports.

The purpose of this report is to detail, as specifically as possible, the information requested by these agencies. Section III of this report delineates the City of Tempe response.

Scope

This document is a specific response to the requests made by the agencies having purview over wildlife habitat. The discussions herein will be limited to restoration and implementation of replacement habitat. No inferences should be made regarding strategies for, or reintroduction of, wildlife into the project area by the City of Tempe.

Master Plan Process

The process for development of the Wildlife habitat Master Plan is divided into the following steps:

- o Data Gathering
- o Concept Development
- o Agency Discussions
- o Master Plan Completion
- o Negotiation with the Arizona Department of Transportation
- o Proposed Mitigation Zone and Implementation Strategy.

Data Gathering - Background information was gathered from previous studies of the Rio Salado, updated aerial photographs, construction plans for the levee west of the Railroad Bridge and the East Papago Freeway. Consultant reports for the Rio Salado Park, project files and personal meetings with the staff of City of Tempe's Community Development and Water and Waste Water Departments and attendance at Rio Salado Task Force meetings were used to acquire project data. This information was compiled for use in the Concept Development step.

Concept Development - The Master Plan team conducted meetings with representatives of the Arizona State University Center for Environmental Studies to review existing data on the project, discuss effective mitigation strategies and locate potential habitat restoration sites within the Rio Salado project area. These work efforts resulted in a Conceptual Rio Salado Wildlife Mitigation Master Plan (2/15/90).

Agency Discussions - The conceptual master plan was presented to the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service and Arizona Game and Fish Department for initial discussion and comment. Specific comments were incorporated into the proposed mitigation procedures contained in this report.

Master Plan Completion - Modifications were made to the conceptual Master Plan based on comments and requirements supplied by the affected agencies. The completed Master Plan identifies the potential zones for habitat restoration within the Rio Salado Park.

Negotiations with ADOT - ADOT has need to replace approximately 37 acres of habitat that were lost during construction of the Hohokam Expressway. The City of Tempe is desirous of having ADOT's habitat replacement occur in Tempe (where it originally was lost) and has requested ADOT to consider the Rio Salado Project. A series of discussions/negotiations have occurred as a result of this potentially mutually beneficial situation. Figure #7A shows the project areas recommended by Tempe for ADOT's mitigation.

Proposed Mitigation Zone - Section III of this document represents a full disclosure of the locations, materials and methods proposed by the City of Tempe to restore the habitat being lost during construction of their Railroad Bridge - McClintock Road Channel. ADOT will be preparing an independent proposal for development for their 37 acres of habitat within the Rio Salado Park.

Numerous meetings have been held with specialists in native seed collection and nursery stock; aquatic development; revegetation; irrigation design; civil, hydraulic and storm water engineering and City of Tempe Parks and Recreation staff to develop the proposed plan. The plan represents a consensus of these specialists' ideas which would provide the highest quality and success of wildlife mitigation within the Rio Salado project.

II. PROJECT AREA

General Setting

Although the 404 permit area under consideration by the Corps of Engineers includes only the (2) two mile reach between McClintock Drive and Mill Avenue, the Master Plan considers the entire river reach west to the Hohokam Expressway (Figure #2). The City of Tempe has historically considered this length of the river as making up the Rio Salado Park, and its City Council adopted these park boundaries in March 1989. Prior to that date, studies of this river have included the Master Plan area as a single planning unit. For those reasons, the Project Area used in this report is considered from the Hohokam Expressway (west) to McClintock Drive (east).

The Salt River has been degraded because of the the loss of natural vegetation due to the control of discharges (no flow) from upstream dams, effect of storm flows eroding the river banks, sand and gravel operations within the channel, prevalence of scattered illegal dumping along its length and general disregard over the last few years (Figure #3). One's initial perception of the river is that of a wide, lifeless wasteland; a perception which is supported by the lack of water or vegetation (Figure #4). Cobbly sand predominates in the channel bottom.

Cottonwoods and willows that presently exist are relegated to the channel edges where they are protected from potentially high releases that occur in the channel. These riparian trees are utilizing perched water, storm water that enters the river, and seasonal low-flow releases. These areas are located near where concentrated overland flows or storm water drain pipes discharge. Scrub grasses are located in pockets throughout the river bottom and particularly in depressions where water collects. An eroded dyke between Mill Avenue and Rural Road that was associated with a parking expansion program at Arizona State University has caused collection of runoff in that area and has resulted in a greater plant massing at that spot. In general, the remnant cottonwood trees, abundant Salt Cedar and intermittent patches of scrub vegetation are insignificant visual features along the river channel and offer little relief to the vast expanse of barren river bottom.

The land along the river is owned primarily by the City of Tempe, Maricopa County, Arizona State University and a private land owner have holdings on the south bank of Mill Avenue. The Rio Salado Parkway travels east-west about 200 feet south of and parallel to the south bank of the channel from McClintock Drive to Priest Drive in the west end. Vacant land fills the area between the Parkway and the river, except at the ASU golf course which has several links adjacent to the river. A small cluster of commercial development is located on the north bank of the river at Rural Road, constituting the only development on the north bank. ADOT and Salt River Project retain ownership of parcels along the north bank west of Mill Avenue. Sky Harbor Boulevard and East Papago Freeway parallel the river along the north bank for the entire length of the Park.

The channel section through this reach is broad and undefined to the north. Tempe Butte is a prominent geologic landmark on the south bank, rising several hundred feet above the river. The Papago Buttes to the north are clearly visible from the project area and Papago Park, a naturally vegetated municipal park, is directly north of Mill Avenue although separated from the river by the East Papago Freeway. The ASU Sun Devil Stadium, Hayden Flour Mill and SRP's Papago Center are the dominant man-made features within the view corridor of the project which includes views of the urban development of the city adjacent to the south bank. At this time construction of the Salt River channelization by ADOT (Project #88-149-RD) and the new Priest Drive bridge over the river have physically altered the natural character of the river in the western portion of the project. This construction has severely disrupted any sense of a natural river in this reach.

Figure #5 identifies (5) five known former landfills within the project area (Dames & Moore, 1987). These landfills are not visible on the surface and represent a low probability for environmental impact for the project. Sites #59 and #61 have been developed over by the ASU golf course and a parking lot respectively. Sites #47

and #48 have been covered over, although scattered dumping is prevalent over the entire site west of Priest Drive. It is assumed that ADOT's channelization has removed the debris content of site #60.

Physical Characteristics

The project area is dominated by large expanses of cobble and rubble, 113 acres of desert scrub, and 23 acres of Cottonwood/Honey Mesquite (USF&W, 1989). The cottonwoods and mesquite are primarily located in clusters west of Mill Avenue although they are also found adjacent to the A.S.U. golf course south of the confluence with Indian Bend Wash. The Cottonwoods, Willows and Mesquites that occur in the project area consist of individual clusters of trees (2-9 boles), possibly sprouts from one tree or trees.

The desert scrub consists of a combination of plant types including numerous native shrubs, xeric grasses, woody herbaceous growth, intrusions of exotic plants transported from the surrounding urban area, and a continuously changing array of volunteer annuals. Scrub areas occur in irregular random locations within the river bed. They are found at river banks, channel depressions, and near other features which collect storm water. Desert Broom, Quail Bush, Arrowweed, Brome Grass, Brittlebush, Burrobush, and Thistle are among the most common scrub species found. Salt cedar, an exotic plant with little habitat value occurs as the dominant plant in the river bottom.

Figure #6 shows the location of wildlife habitat within the river prior to channelization by ADOT or the project proposed by the City of Tempe. A detailed listing of plant species presently occurring in the Salt River, including undesirable species can be found in Appendices B and C.

A wide variety of aquatic organisms exist in the Salt River channel during flow periods (Amalfi, 1990). Because flows are often brief and drought conditions usually exist, relatively few organisms are capable of surviving long periods of desiccation. Based on studies of other ephemeral streams it is possible to identify, those organisms that could be expected to exist in the dry channel. These would include flatworms, nematodes, isopods, crayfish, elminthid beetles, and small crustaceans. Blue-green and green algae are common in dried river beds and would likely be found in the Salt River.

Soils within the river bed are very gravely sands to very fine sandy loam of alluvial deposits (SCS 1974). The depth of alluvian varies from less than 20 feet at Priest Drive to more than 150 feet at the eastern end of the project near McClintock Drive. Permeability ranges from moderate to very rapid (.63 to 20.0 inches/hour). The USDA Soil Conservation Services classifies alluvial soils as having severe limitations that make them unsuitable for recreation development and restrict their use. Typically, their salinity values are less than 2MMHOS/CM.

Native soils within the study area are potentially subject to contamination from several sources. During storm events, runoff makes its way into the Salt River channel either by overland flows or through collector systems. Overland flows transport various materials including sediment, oils, and lawn fertilizers typically associated with the surrounding urban setting. Minimal toxicity is associated with overland flows (Amalfi, 1988).

Discharge from storm water collection systems would include potentially toxic materials generally associated with leakages from automobiles such as heavy metals, coolant, grease, oil, and gasoline. Storm water discharge points exist within the project area and are subject to EPA National Pollutant Discharge Elimination System requirements. These discharge points deposit into the river along the south bank. However, municipal testing at these storm water discharge points has not indicated contaminants in sufficient quantities to discount use of soils from the river channel for use in the project (Tempe, 1989).

There are no known sources of persistent pesticides, and municipal records show only two minor petroleum spills within the western end of the project area. No information has been uncovered to indicate the contamination of soils from storm water discharge, illegal dumping or former landfills along the south bank of the river.

In 1987-88 wells were sunk into the Salt River channel to determine the depth to underground water (Schmidt, 1988). These wells indicated that ground water was present less than 25' below the existing channel west of the ASU Stadium. From the Stadium east the depths ranged from 25-50'. Depth to water varies substantially, depending on the presence or absence of flood releases down the river.

Toward McClintock Drive, fluctuations from 50 to 130 foot depths during periods of non flow would be typical. In the western portion of the Park depths of 20-50 feet would typical during sustained dry periods in the channel. There are a few perched water table locations within the project area. Water levels generally are within 6 to 7 feet from the surface, particularly at Mill Avenue and directly south of the Papago Buttes where underground water enters the alluvium of the river.

Wildlife

The project has are no known special aquatic sites or wetlands as defined in the 40 CFR 230.10(2)(3) Guidelines. Although some organisms may be living in the river, no fish species inhabit the project area due to the lack of permanent water sources. Some fish may be transported into the project during floods but they soon expire as the pools dry up. There are no known endangered or threatened wildlife species in this reach of the Salt River.

Birds, small mammals, reptiles and other kinds of animals are residents of the project area. A partial list of the species found in the river channel would include Roadrunners, Great Blue Heron, Doves, Hawks, Hummingbirds, Gambel's Quail, Desert Cottontails and Jackrabbits, Snakes, Toads, Lizards and Turtles. It is reasonable to expect that other bird species associated with upstream habitats may frequent the area if habitat improvements are made. Those may include Ducks, other Hawks, Kestrels, Thrashers, and Swallows (Ohmart, 1982). A list of known and expected inhabitants can be found in Appendix D.

III. RIO SALADO WILDLIFE HABITAT MASTER PLAN

Overview

To facilitate appropriate siting for the mitigation of habitat losses associated with the project, this inventory/assessment study was undertaken by the City's consultant Howard Needles Tammen & Bergendoff. A prime objective of this study is to indentify potential land areas where mitigation could occur. The results of the assessment are shown in the Wildlife Habitat Master Plan (Figure #7). Each area identified on the plan has been evaluated for its ability to support habitat restoration activities, and the evaluation of each site follows in this report.

It should be noted that this master plan will be utilized not only to meet the specific mitigation requirements associated with the 404 permit but will also be used to arrive at an appropriate land use allocation for future development along the river. Planning for and dedicating land areas for wildlife, as proposed in this plan will preclude other land use designations in the future. The wildlife values integral to the plan will be incorporated into future development guidelines to assure a river corridor with greater wildlife habitat quality than presently exists. The City of Tempe wishes to create a habitat-rich environment in the Salt River and is actively pursuing inclusion of wildlife into the overall development of the Rio Salado Park with this Master Plan.

Potential Mitigation Zones

The Wildlife Habitat Master Plan indentifies (5) five zones of potential habitat restoration. Zones A and C are located above the 100 year flood level. Zones B and D are found within the channelized area of the Salt River. Also identified in the plan is the preferred mitigation zone proposed by the City and the location of a riparian strand requested by the Service. The Proposed Mitigation Zone and riparian strand will be discussed separately later in this report.

Zone A would take advantage of the opportunity created when the natural ground slope tapers into the back of the (higher) levee and creates a pocket to capture runoff water. Because the relationship of longitudinal elevations of the levee and natural ground are

constantly changing due to the riverbank morphology, scattered pockets of potential habitat development area will be created. These are irregular and intermittent. The greatest potential to utilize these pockets occurs west of Mill Avenue along the south bank where the undisturbed terrain is higher than the levee under construction. Opportunities exist to implement these habitat areas when development occurs along the south bank or as funding becomes available.

It is anticipated that these zones would be planted with groups of Mesquite trees (bosques) with scattered understory shrubs and herbaceous plant species. The extent of these zones has not been quantified although plots not less than (5) five acres in size would be typical at each zone.

Zone C is a contiguous strip of land between the north levee and the East Papago Freeway/Hohokam Expressway road network. The area ranges from 100' to 400' in width and is nearly (3) three miles in length. An objective of development of this zone would be the buffering of the Rio Salado Park from the freeways. Few activities are projected to occur in this zone; the primary use (except for wildlife habitat) would be a hiking/biking trail. Surface grades in this zone would range from flat to 3:1 (horizontal to vertical) in narrower spots.

Approximately (42) forty two acres are located within this zone if ADOT's control of access fencing is adjusted to within 15' of the edge of roadway; twenty four acres are found in the portion west of Priest Drive. The zone is compatible with a diverse planting scheme for habitat. At this time there is an agreement between the City and ADOT to permit ground contouring in the Priest-to-Mill Avenue segment as shown in Section B-B of Figure #8. The creation of terraces and depressions in the segment provides the opportunity to establish upland or riparian habitat stands.

Zone B would comprise the largest habitat area. This vegetative type would occur throughout the channel from east to west. Typical vegetation in this zone would include desert grasses, forbes and native shrubs, with a canopy of large shrubs and trees including Screwbean Mesquite, Honey Mesquite, Desert Willow, Featherbush and potentially Cottonwoods. Mesquite bosques would be located along the levees and upper terraces to compliment vegetation in Zones A and C and provide semi-contiguous mesquite patches along the channel length.

The channel bottom could potentially contain (400) four hundred acres of riparian and desert scrubland habitat. Approximately (20) twenty acres of channel bottom would be emergent and riparian in nature (at an average of 75' in width) adjacent to the perennial stream from Mill Avenue to Hohokam Expressway. The remaining 380 acres would be mixed tree, grass and scrub vegetation varying with the mesic to xeric conditions.

Zone D would consist of various aquatic macrophytes and primary emergents that would filter either effluent water provided by the City or storm water from the Price Road Tunnel collector planned to discharge into the river upstream of McClintock Road. This habitat area has great promise for creating a richly diverse wetland for wildlife. Studies are presently on going to determine how much water is available to create a wetland environment and to ascertain the compatibility of Salt River bed soils. Zone D would likely occur adjacent to the Price Road Drainage Tunnel being constructed as part of the Outer Loop Freeway drainage master plan.

Proposed Mitigation Zone

The U.S. Fish and Wildlife Service has determined that 13 acres of contiguous Honey Mesquite habitat and development of the braided stream from Mill Avenue west to Hohokam Freeway would be sufficient compensation for project losses. The Mesquite habitat must be protected from flooding and/or be out of the 100 year flood way. Using these criteria, the City has located a suitable site within the Park boundaries for the Mesquite habitat.

The City of Tempe is proposing that an area north of the East Papago Freeway between Mill Avenue and Rural Road be the Mitigation Zone for the 13 acres of Mesquite habitat (Figure #9). This area has several advantages which make it an excellent candidate for habitat restoration. The site is entirely owned by the City and is available for immediate restoration activities in the northern portions. Therefore, temporal losses of habitat would be significantly reduced or eliminated. The site will be protected from 100 year flows in the Salt River with construction of the channelization levees. A dense strand of diverse vegetation presently exists in the zone and the additional habitat development proposed in this report will enhance the quality and size of this established wildlife habitat area, especially if the vegetation includes habitat of higher wildlife value such as Cottonwood and Willow.

This zone is a unique opportunity for wildlife along the Salt River in the Park. A SRP canal supports an abundance of existing vegetation in a narrow strip (+20') through this site. Mature Cottonwoods, Mesquites and emergent vegetation are associated with the canal seepage. Wildlife such as ducks, fish and turtles have been observed in the canal. At least (13) thirteen additional acres of habitat area could be accommodated here, excluding the existing vegetation, with development of the freeway sideslopes to within 15' of the roadway. Although it is located north of the East Papago, the site has physical access to the river through the Mill Avenue overpass of the freeway. The access under the East Papago is nearly 200 feet wide.

Site Analysis

The western end of the Papago Park site contains the former building and appurtenant facilities of the Riviera Motel. The motel is no longer operating as such, and ADOT has entered a lease-agreement with the City of Tempe for the use of the motel site as a public park. The motel site is also under consideration for the location of the north bound lanes of a new Mill Avenue bridge. The new bridge will be located either east or west of the present bridge, with only the eastern alignment potentially affecting the motel site. The Tempe recreation facilities at Curry Road and Mill Avenue are expected to remain in place unless eliminated by the eastern bridge alignment.

The proposed site sits astride uplifted bedrock formations that create a ridge from the Papago Buttes to the Tempe Butte on the south bank of the river. This geomorphologic phenomenon causes the bedrock depths to be less than 15' deep at the Mill Avenue bridge. As a consequence of the hardpan ridge, alluvial deposits and ground water depths are relatively shallow in and around the mitigation site. Additionally, the SRP canal is at the approximate northern limit of alluvial deposits that make up the primary soils in the river. Terrace areas above the channel banks are covered with 0-15 feet of fine-grained alluvial material. From the canal northward the soils change to layers of alluvium and colluvium over bedrock. Rock outcrops are evident in Papago Park north and east of the mitigation zone. Ground water depths range from 12 feet after recharging by flows to 85 feet during dry periods at a well site east of Mill Avenue bridge (Pewe, 1986).

Soil testing (Appendix E) has determined that surficial soils at test location #1 have normal pH levels, low to moderate salinity values and nominal soil fertility ratings. No testing has been done north of the canal or for the roadway embankment presently in place which is used to elevate the freeway in the area east of Mill Avenue. The roadway embankment is fill material excavated from upstream river locations, and the fertility results are assumed to be consistent with results of other river locations tested and recorded herein.

An inventory is currently underway by the ASU Center for Environmental Studies to document the location, density and species composition of existing vegetation within the Proposed Mitigation Zone. The results of this inventory will be made available to the Service when completed. Appendix B identifies a non site-specific list of plants prepared by the Center known to occur within the project area.

Planting Installation

The proposed mitigation zone will be planted with 5 gallon Velvet Mesquite trees (Prosopis velutina) obtained from a local nursery.

The trees will be planted at a rate of (100) one hundred trees per acre in either a gridded or random pattern (Figures #10 and #11) as agreed upon by the U.S. Fish and Wildlife Service. Planting pits will be backfilled with a 1/3 to 2/3 mixture by volume of a nitrogen-stabilized wood mulch and excavated soil. Herbivore control will be as shown in Figure #12 and will remain in place for at least six months after planting or until tree branches reach higher than 2 feet above the ground.

Two 20-10-5 fertilizer tablets will be placed in the planting pit with each tree. The plant pits will be augered to a diameter of 15-18" and a depth of 2 feet with the sides roughened by hand to reduce glazing. Excess excavated material shall be wasted on site. Plant pits will be filled twice in succession with water to insure adequate percolation. Backfill material will be water puddled after 2/3 of the mix has been placed around the plant. The Mesquites can be planted at any time of the year.

Potable water will be provided to the site from a point of connection north of the former Riveria Motel site along Curry Road. The City will provide a connection location and metering of water for the habitat restoration. The water will be delivered to the trees via a fully automated irrigation system. Piping will be buried underground and will utilize a combination of PVC (polyvinylchloride) pipe and polyethelene tubing with distribution emmitters to each tree. The electronic control (zone) valves will be selected to operate on potable or reuse water which will become available to the project. (A supply line will be incorporated into the new Mill Avenue bridge to supply reuse water to the Rolling Hills Golf Course from a south Tempe treatment plant). Water will be applied to each plant at rates necessary to maintain healthy growth. Climatological data and evapotranspiration (ET) rates acquired from the City of Tempe or ASU will be used to adjust water applications on a weekly basis.

Based on the site selection, soil testing, planting procedures, maintenance, monitoring and management described herein, the City of Tempe will guarantee a 90% survival of Honey Mesquite trees (90 trees per acre) at the conclusion of the monitoring period.

It is anticipated that the Mesquite tree plantings will be put out for public bid to qualified landscape contractors. HNTB has confirmed that the Mesquite varieties will be commercially available in sufficient quantities from local sources. No lead time will be required from the Advertisement for Bid to secure the necessary plants. The selected contractor will contractually be required to post surity guarantees in the form of payment and performance bonds for the work under contract. A standard 10% retainage of fees would be typical for the successful low bidder until acceptable completion of the project is achieved.

Riparian Strand

The riparian strand (Figure #13) will be developed in concert with the revegetation of the channel bottom considered in Zone B. The channel bed, excluding the riparian strand, will be broadcast seeded using seeds of Catclaw, Quailbush, Large Leaf Bursage, Desert Broom, Burrobrush, Desert Marigold, Sand Dropseed, Virgin's Bower and other assorted desert plants (Appendix F). Additionally, selected wildflower seeds will be placed at preferred locations to provide seasonal color for river bottom visitors (Figure #14). Bosques will be established from 15 gallon size container plants of Honey or Velvet Mesquites in the channel bottom.

Grass, forb and shrub species will be established by broadcast seeding at a rate of 20 lbs PLS/acre for the seedmix listed in Appendix F. Planting and seeding will be accomplished between October 15th and January 15th. Prior to seeding, the project area will be pre-irrigated to encourage germination of weed seed. Undesireable species will be eradicated by hand or mechanical means.

Fertilizers will not be incorporated in the seedbed preparation if reuse water is used to irrigate the channel plantings (Figure #15).

After the seed has been broadcast the site will be dragged in an acceptable method to cover the seeds. The seeded area will be mulched with wheat or barley straw at a rate of 3,000 lbs/acre. The straw mulch will be tacked with a mucilage tackifier to prevent blowing and to encourage plant growth. Outbreaks of weeds will be controlled manually or with a well controlled application of a salt-based contact herbicide. On-going maintenance as identified in a later section will handle undesireable species eradication.

The City of Tempe will initiate a series of test plots to be located in the channel section being completed by ADOT. Seed mix samples with varying species composition and seed ratios will be planted in one-tenth acre test sections. The Center for Environmental Studies at ASU will monitor the germination, growth and survival in the test areas. These samples will then be reviewed with the Service and successful seed mixes will be substituted for those identified herein and used to revegetate the channel bottom.

The majority of seeds proposed at this time for the channel of Rio Salado are commercially available and will be ordered at least 6 months prior to the fall planting season. However, due to the magnitude of quantities of seed necessary to revegetate the river bed, the City of Tempe will have need to issue "contract collection" awards to the few firms in the Valley specializing in native seed collection. Additional "experimental" species will probably be introduced into the channel to determine their viability.

With the above pre-project activities, cover rates of at least 30% for grasses and ground covers and 15% for shrubs are expected for the project. Target goals may be modified pending the results of the test plots and actual seed mix utilized in the channel. Updated target goals will be established and agreed upon prior to construction.

The riparian strand will be planted with hydrophytic plants common in desert riparian areas (Figure #16). Examples of these would be Cattails, Bulrush, Seep Willow, Burrobrush, Knot Grass, Screwbean Mesquite and Desert Willow Trees. Planting techniques with these plants would vary with the particular species eventually chosen for the project. Container plants, seeds, plugs, sprigs, cuttings or pole planting will be used. HNTB is continuing research on the successful restoration of riparian habitats with the assistance of the ASU Center for Environmental Studies and expects to develop plant-specific procedures for the riparian plantings.

The riparian strand would not be developed until such time that the upstream improvements (lakes, inflatable dams, etc.) have been completed. At this time it is estimated that these improvements will be completed in 1993 to 1995. The riparian strand could occur concurrently with upstream improvements, but in no case would its schedule be accelerated so that it would be without the flood protection afforded by those improvements. A specific timeline for the riparian strand is unavailable at this time but will be provided to the Service when known. The schedule of construction activities for the perennial stream and riparian stream will be approved by the Service prior to installation.

At this time, the source of water for the perennial stream has not determined. The potential sources include reuse water from two City of Tempe sewage treatment plants, potable water, or treated storm water discharges into the Salt River. The City is presently preparing a water management plan for the Park based on a supply/demand analysis study. The thrust of this analysis will include evaluation of the quality and quantity of potential water sources, a needs easement for the Park, clarification of the environmental requirements associated with introducing water into the Salt River and the feasibility of alternative scenarios for conveyance of the appropriate waters to the project.

Until the water sources are determined, the City's specific proposal for planting along the stream cannot be finalized. The chemical characteristics of each water source will likely be different and require distinctly different planting and maintenance activities. When the study information becomes available, the City will present its specific proposal for development of the riparian stream for review by the Service. No construction activities will be undertaken by the City without full concurrence by the U.S. Fish and Wildlife Service.

V. OPERATIONS AND MAINTENANCE

The habitat restoration will be maintained by the City or an appointed designatee for a five year establishment period. Plantings will be groomed only when necessary to encourage healthy growth or when conflicts with the trails proposed in the Mitigation Zone are untenable from a public safety perspective. The City's intent is to allow the habitat to develop in the most natural character possible, without human interference. This intent is consistent with a complementary objective to reduce or eliminate the maintenance requirements for the entire Rio Salado Park.

Plantings will be maintained at least once per week by Tempe personnel. Maintenance would include removing trash and litter, repairing herbivore protection, grooming of plants, evaluating and adjusting the irrigation system performance and correcting deficiencies which may detrimentally affect the growth of the plants. Plant replacements will be on an as needed basis. Undesirable plant species will be removed in a timely manner as agreed upon by the Service for each species. The maintenance schedule will be adjusted to reflect the seasonal demands of the growing seasons.

The Tempe Parks and Recreation Board will designate the habitat area as a "Wildlife Refuge" and provide accompanying management practices in perpetuity for this area. Horse-mounted police from the City will patrol the site on trails that will traverse the zone from east to west. Along the northern boundary, an unimproved trail will be installed to intercept park patrons who may make their way south from the main activity portions of Papago Park. The trail will clearly indicate the boundaries of the wildlife refuge area.

VI. MONITORING AND DOCUMENTATION

It is recommended that the ASU Center for Environmental Studies provide vegetation monitoring for the mitigation site. The monitoring of the habitat replacement will be part of a larger monitoring/evaluation program for the entire Rio Salado Park. Botanists at the Center are experienced in ecological methods which are necessary for accurate data collection and have devised the following sampling techniques based on past, successful studies in the southwest.

In that capacity the Center will formally monitor the project site twice a year, once in early March during the late winter season and again soon after summer monsoons in early September. Informal surveys will be conducted every other month, providing opportunities to observe the vegetation between monitoring periods and to evaluate possible changes in plant vigor. If action is warranted from these surveys, recommendations for corrective action will be made to the City, thereby avoiding delays until the next formal monitoring period.

Establishing Study Sites

The project area will be stratified into various vegetation types (e.g., mesquite, riparian, desert scrub). Within each type, up to ten permanent rectangular plots (e.g., 5 m x 20 m) will be randomly placed. Permanent plots will also be used as photographic points to provide consistent and verifiable records of data over time.

The permanent plots will be placed randomly along baselines, as shown in Figure #17. At the least, opposite corners of the plot will be permanently marked. The vegetation strata to be measured (e.g. tree, shrub, herbaceous) will dictate the size and shape of plots and subplots. Figure #18 illustrates how plots and subplots may be located in a nested arrangement. For each permanent plot the present plan calls for the tree plots to be 5 m x 20 m, two shrub subplots of 2 m x 4 m each, and four herbaceous vegetation subplots of .5m x 2m each.

Stratified Random Sampling

The overall design of the Park needs to be considered in the establishment of sampling procedures. The project area will contain a variety of vegetation types, such as Mesquite bosques, riparian areas, desert scrub, and streamside emergents. Included in the design are sidewalks, bike-paths, and urban fishing spots. The sampling procedure utilized will stratify the project area by vegetation type, by use, and by anything that creates a difference in the vegetation (e.g. irrigation techniques). Figure #19 illustrates stratification (near sidewalk, away from sidewalk) of a Mesquite bosque grading into an upland vegetation.

Measurements

Vegetation Measurements

Quantitative monitoring will be conducted in March or early April when plants have leafed out and many species are flowering, and again in September or early October to determine the condition of the plants after summer monsoons and heat stress. Measurements of species density, cover, frequency, growth and health status will be taken for tree, shrub, and herbaceous species.

Density

The number of individuals per a given area. Measurement of plant density will include living and dead plants. Measurement of tree and shrub densities are not as dependent on the season as measurements of herbaceous vegetation because of the need for flowering for species identification.

Cover

Cover for this study is the amount of area beneath the canopy of a given plant presented as a per unit or actual area. Two types of cover for trees will be measured. The first is the amount of area a tree species covers inside the plot, and the second is the amount of cover per individual of trees within the plot. For the first few years tree cover may not extend much beyond the plot. Through time many of the trees will grow and increase in size and aerial coverage. This over-hang of vegetation outside of the sampling plot will be accounted for through measurement of cover of individuals. Measurements of cover will be taken in the spring after the trees and perennial shrubs species have leafed out and in the fall after canopy growth. Measurements of percent cover for herbaceous vegetation will be taken in the spring and fall.

Frequency

Frequency is the percentage of plots a species is present and is influenced by the size and shape of the unit. It is a useful index for monitoring changes in distribution patterns of plant species over time.

Growth

Growth will be determined as increase in dbh and/or canopy cover for trees, canopy diameter for shrubs and aerial cover for herbaceous plants.

Vigor

A list of descriptive characteristics with numerical rankings will be used to evaluate the vigor of the trees, shrubs and herbaceous vegetation. Characteristics such as color, foliage density, and physical shape of the plant will be used.

Other measurements will be monitored for particular vegetation types.

Diameter at breast height (DBH) will be taken for trees.

Fruit productivity for the mesquite trees will be measured to estimate the supply available for wildlife and reproductive health of the tree. One technique for measuring this is to place a wire hoop at the outer perimeter of the canopy of the tree and count the number of leaves, spikes, and pods in a vertical column above the hoop.

Foliage density measurements of the trees, when sufficiently mature, will be obtained by using a spherical densiometer. Four readings will be taken at a set distance from the trunk of the tree. Measurements of foliage density will also be made for each 5 x 20 m plot, readings to be taken into the plot from each corner.

Browse condition for the shrubs and the herbaceous vegetation will be evaluated to determine damage from herbivores.

Report Submittal

After completion of the October monitoring, the Center or the selected consultant will prepare an annual vegetation monitoring report for the City that will be submitted to the Army Corps of Engineers, Environmental Protection Agency, and Fish and Wildlife Service in November. The report will include information obtained during the two formal monitoring periods of that year and any important observations noted in the informal surveys performed between the monitoring periods. Evaluation of the project will be based on this annual information and on comparisons with previous years. Trends and patterns that can be deducted will be discussed in the report. In areas where vegetation mitigation appears to be unsuccessful, a more intense evaluation will be conducted to determine the probable cause. This may include investigation of soil and water conditions. Corrective recommendations will be given to the City.

VII. PHASING AND IMPLEMENTATION COSTS

Phasing

Figure #9 shows the phasing proposed for the Mitigation Zone. Phase I includes the majority of this zone (8.6 acres) and constitutes all land areas unaffected by freeway construction. Phase II is the development of ADOT right-of-way land (approximately 3:1 slopes). This phase is necessary because creation of the freeway sideslopes adjacent to the Mitigation Zone will not be completed until after the Mill Avenue overpass is finished. Phase III is the habitat restoration on the Riviera Motel site which will be used by ADOT for a construction office through the duration of the freeway construction. Therefore, the motel site will be the last phase of habitat development possible.

Phase I mitigation can occur immediately after the existing plant inventory, preliminary site work and removal of miscellaneous on-site debris. It is expected that these activities would require approximately two months to complete. Based on preliminary timetables prepared by ADOT, the Mill Avenue overpass is scheduled for completion in December 1991. The side slope preparation would occur earlier; therefore Phase II would be initiated by Fall of 1991. Phase III would become available for habitat restoration in December 1992.

For additional information on project construction activities within the Park refer to Appendix A.

Implementation Costs

The probable costs in 1990 dollars for developing the mitigation phases as discussed herein are outlined below:

Phase I (8.6 acres)

Planting, 860 trees @ 5 gallon	\$ 21,500.00
Irrigation	\$ 50,000.00
Unimproved Trail, 3,000 linear feet	\$ 6,000.00
Signage, "Wildlife Refuge" signs	\$ 5,000.00
Subtotal	<u>\$ 82,500.00</u>

Phase II (3.9 acres)

Planting, 390 trees @ 5 gallon	\$ 9,750.00
Irrigation	\$ 8,580.00
Subtotal	<u>\$ 18,330.00</u>

Phase III (1.1 acres)

Planting, 110 trees @ 5 gallon	\$ 2,750.00
Irrigation	\$ 2,420.00
Subtotal	<u>\$ 5,170.00</u>

Mesquite Habitat Total \$106,000.00

Riparian Strand

No estimate is projected at this time, although probable costs for this item would exceed \$750,000 for 20 acres of riparian development.

VIII. IMPACTS OF PROPOSED MITIGATION

Project losses will be replaced with the implementation of the mitigation plan proposed herein (USF&W, 1989). Development of this site with Mesquite habitat or greater wildlife value plantings will enhance the quality and size of an existing habitat area, and because Phase I of the habitat restoration can be implemented concurrently with Tempe's channelization activities, temporal losses of habitat will be significantly reduced.

When built out, the Rio Salado Park habitat will far exceed the losses incurred in the Park from all channelization efforts, incorporating the wildlife values implicit in the Master Plan. Additionally, development of the riparian strand could potentially permit the reintroduction of native fish species into the Salt River.

No impacts would occur due to introduction of water into the river to support the riparian vegetation. It is assumed that this water would meet prevailing water quality parameters established by the Arizona Department of Environmental Quality or the U.S. Environmental Protection Agency.

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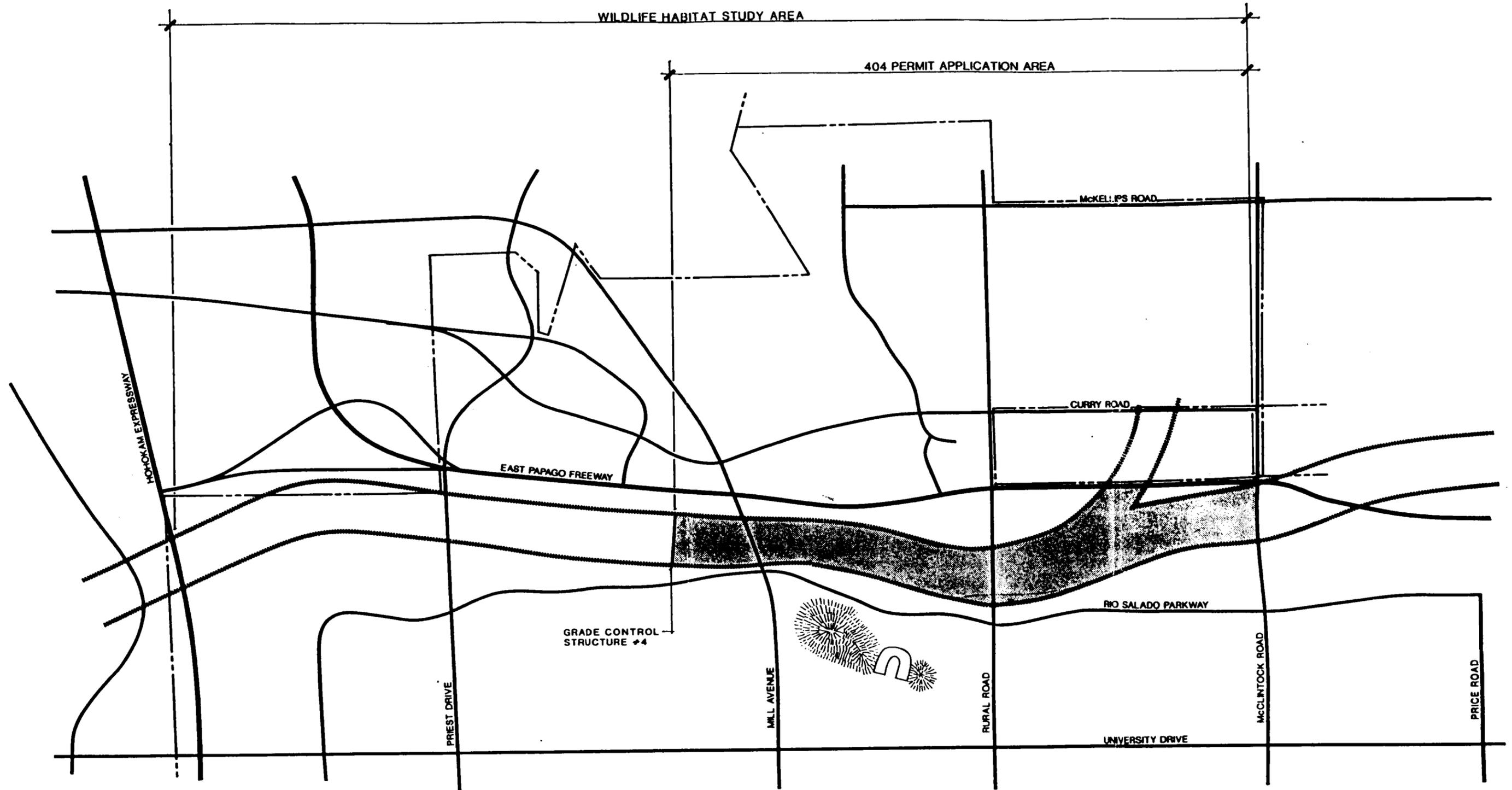


Figure #1

404 PERMIT & STUDY AREA

TEMPE RIO SALADO PROJECT
WILDLIFE HABITAT
MASTERPLAN

HNTB
HOWARD NEEDLES TAMMEN & BERENSON
ARCHITECTS ENGINEERS PLANNERS
AND INTERIORS, INC.
20017 BAYVIEW AND RAZA ROAD SUITE 400
IRVING, TEXAS 75039
PHONE 972-748-7400

City of Tempe
March 12, 1990

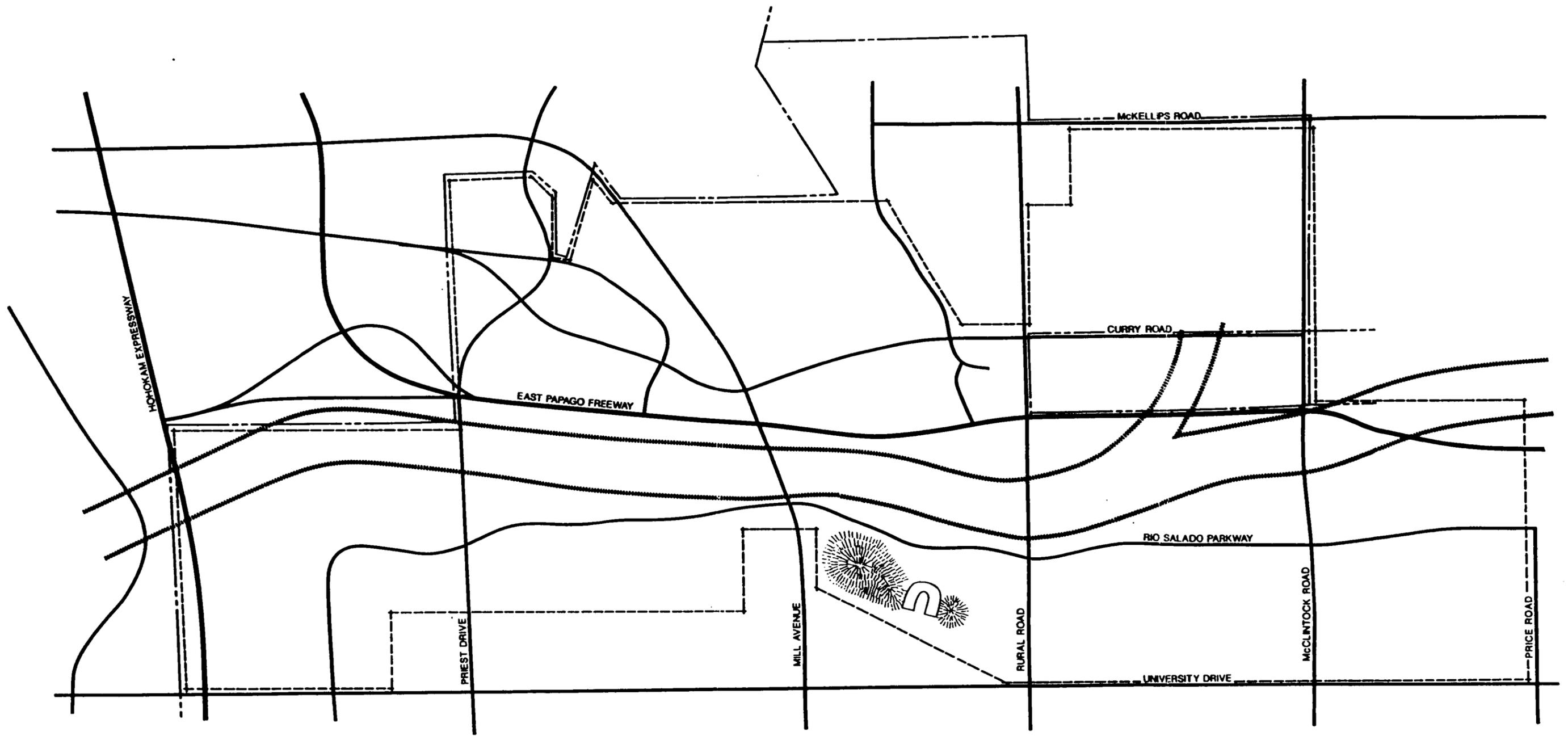


Figure #2

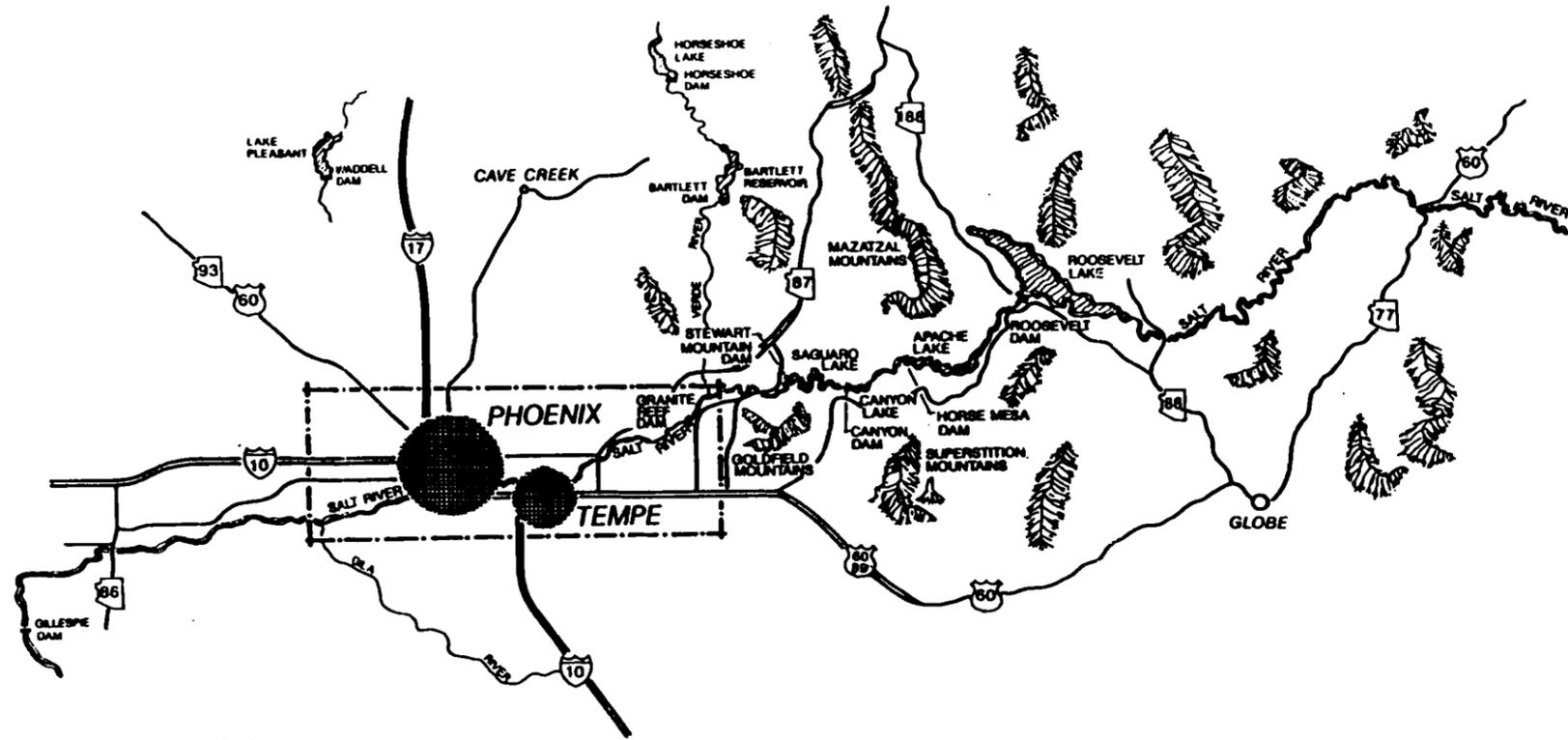
RIO SALADO OVERLAY DISTRICT

TEMPE RIO SALADO PROJECT WILDLIFE HABITAT MASTERPLAN

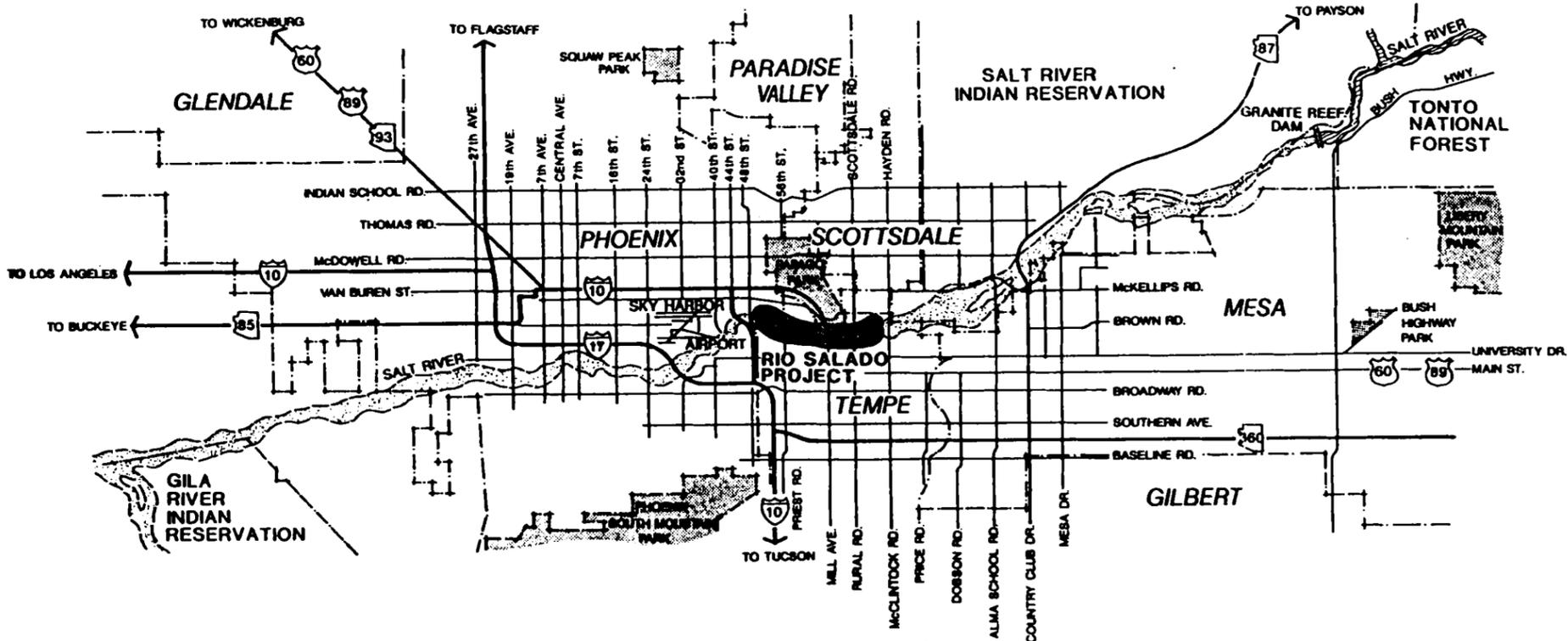
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 FAX: 303.733.7401

City of Tempe

March 12, 1990



AREA LOCATION



SITE LOCATION

Figure #3

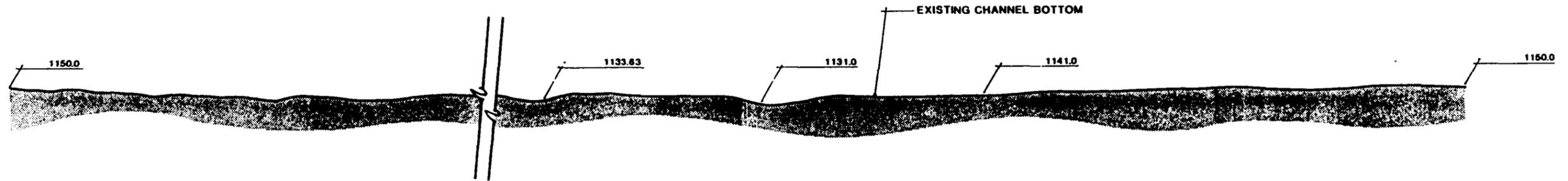
PROJECT LOCATION

TEMPE RIO SALADO PROJECT WILDLIFE HABITAT MASTERPLAN

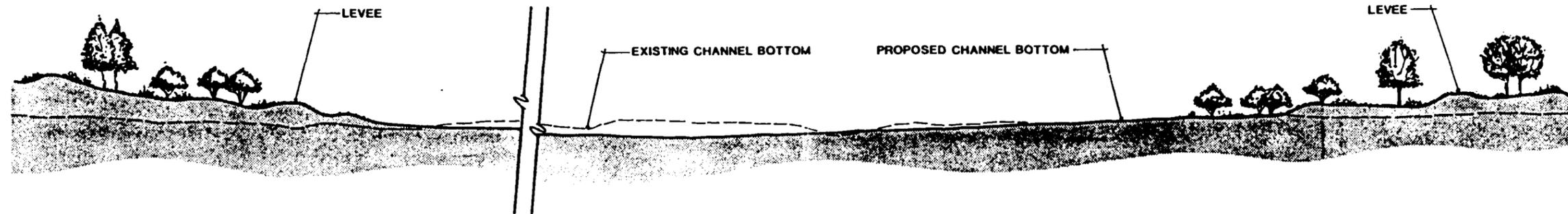
HNTB
HOWARD NEEDLES TAMMEN & BERENSONOFF
ARCHITECTS ENGINEERS PLANNERS
AND INTERIOR DESIGNERS
2307 EAST CAMP LANE, SUITE 407
PHOENIX, ARIZONA 85016
(602) 954-7400

City of Tempe

March 12, 1990



EXISTING CHANNEL
SCALE: 1"=50'-0"



PROPOSED CHANNEL
SCALE: 1"=50'-0"

Figure #4

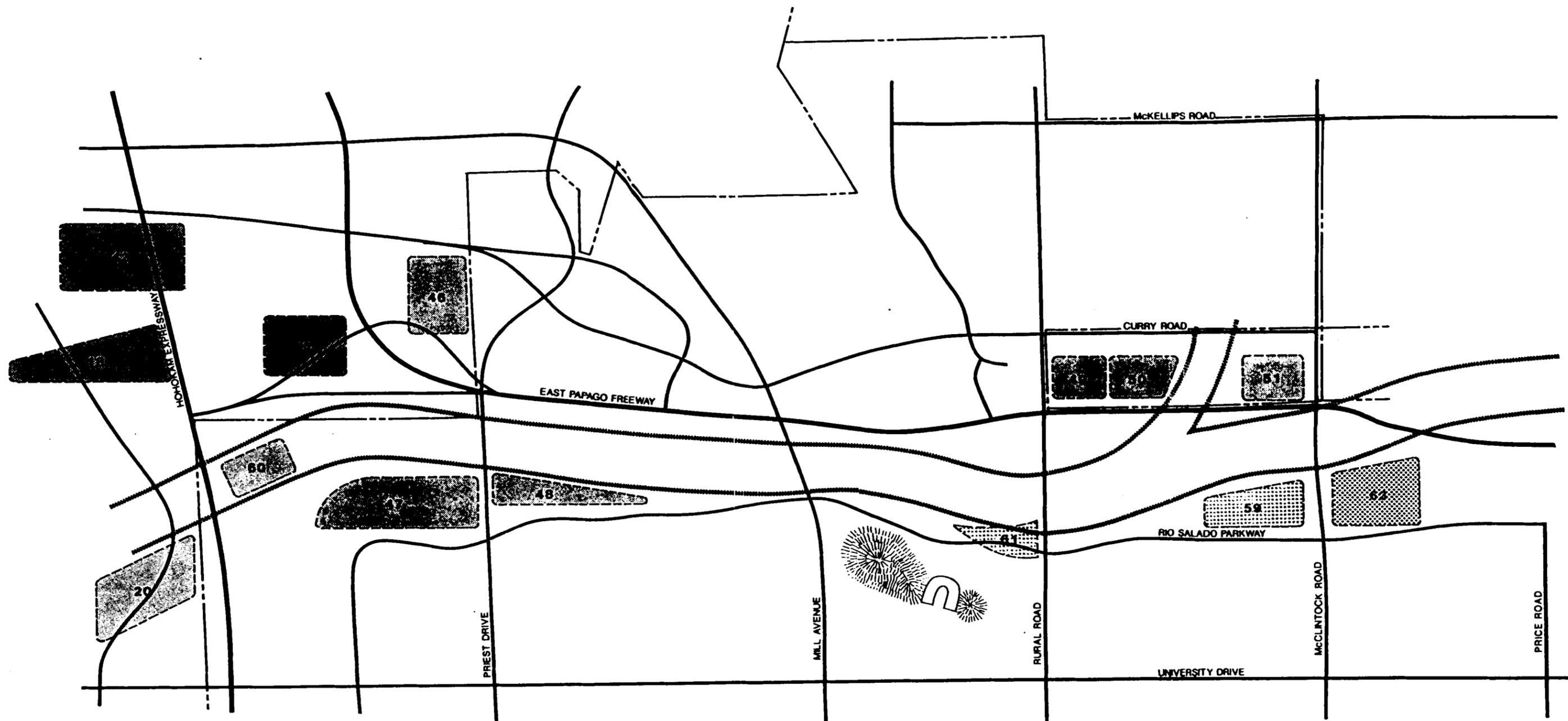
CHANNEL SECTIONS

**TEMPE RIO SALADO PROJECT
WILDLIFE HABITAT
MASTERPLAN**

HNTB
HOWARD NEEDLES TAMMEN & BERGENDOFF
ARCHITECTS ENGINEERS PLANNERS
AND/OR CONSULTING FIRM
8801 EAST CAMELBACK ROAD, SUITE 400
PHOENIX, ARIZONA 85018
602-954-1400

City of Tempe

March 12, 1990



HAZARD RANK
 (NUMBERS AND RANK; DAMES & MOORE STUDY, SEPT. 10, 1987)

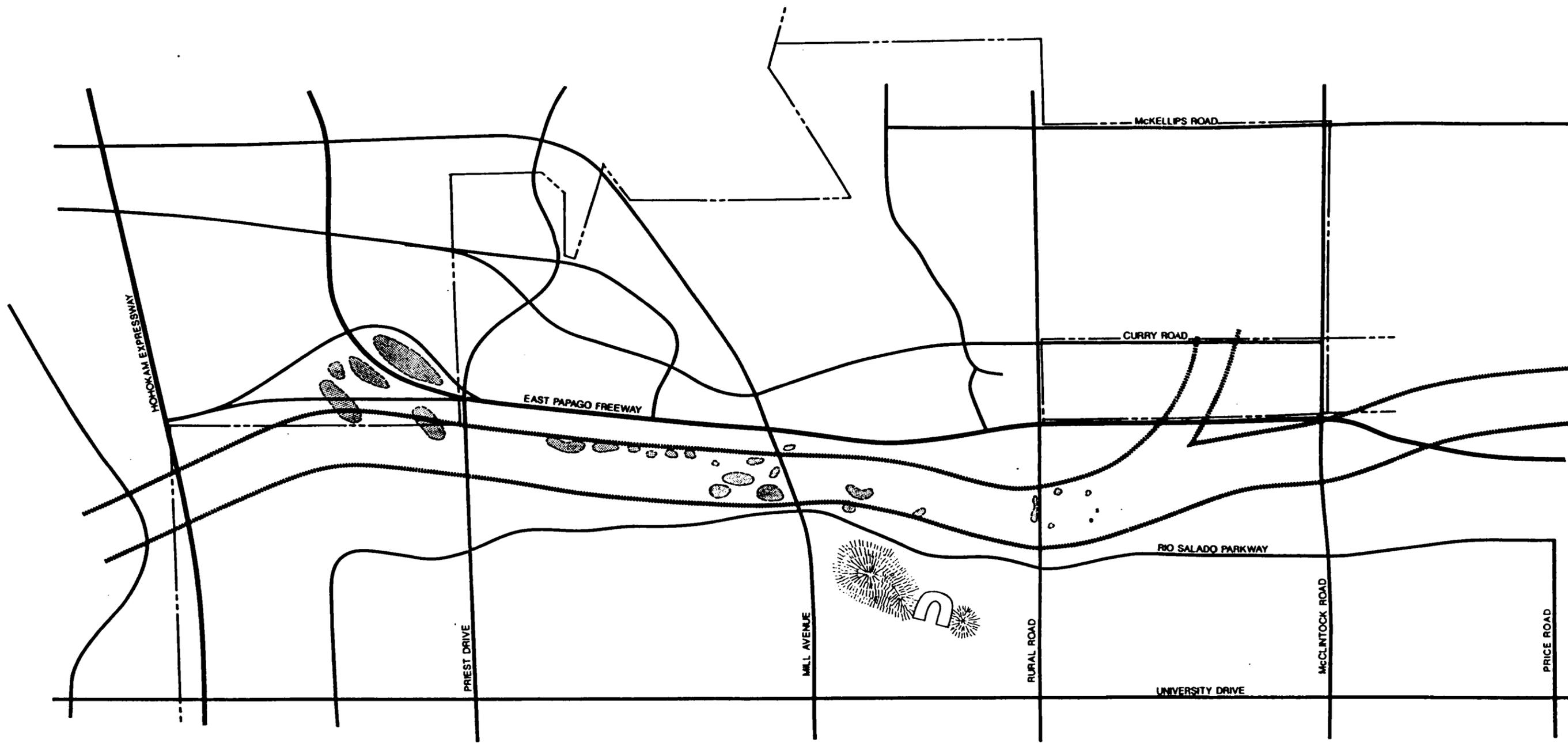
-  PROBABLE ENVIRONMENTAL IMPACT
-  POSSIBLE ENVIRONMENTAL IMPACT
-  LOW PROBABILITY OF ENVIRONMENTAL IMPACT
-  NOT ENOUGH INFORMATION TO RANK

Figure #5

ENVIRONMENTAL IMPACTS

**TEMPE RIO SALADO PROJECT
 WILDLIFE HABITAT
 MASTERPLAN**

HNTB
 HOWARD NEEDLES TAMMEN & BERGENOFF
 ARCHITECTS ENGINEERS PLANNERS
 AND ENVIRONMENTAL SCIENTISTS
 2001 EAST CAMELBACK ROAD SUITE 400
 PHOENIX, ARIZONA 85016
 (602) 954-7400



EXISTING WILDLIFE HABITAT IDENTIFIED BY U.S. FISH & WILDLIFE DEPT.

Figure #6

EXISTING HABITAT

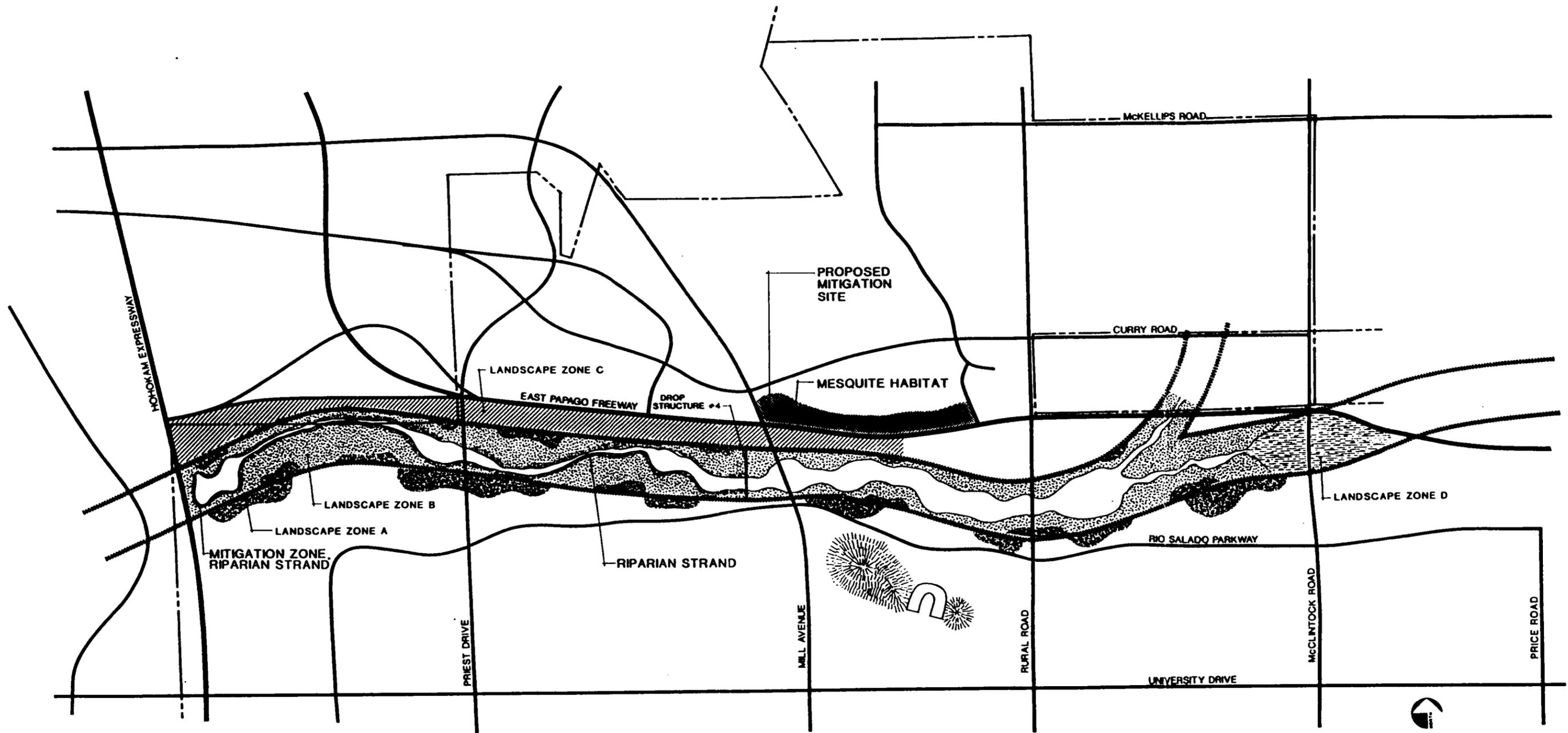
TEMPE RIO SALADO PROJECT WILDLIFE HABITAT MASTERPLAN

HNTB

HOWARD NEEDLES TAMMEN & BERENDOFF
 ARCHITECTS INC. 2000 W. BROADWAY, SUITE 2000
 DENVER, COLORADO 80202
 303 733 7400
 303 733 7401

City of Tempe

March 12, 1990



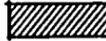
-  MESQUITE HABITAT
-  RIPARIAN STRAND
-  LANDSCAPE ZONE A
-  LANDSCAPE ZONE B
-  LANDSCAPE ZONE C
-  LANDSCAPE ZONE D

Figure #7

WILDLIFE HABITAT MASTERPLAN

TEMPE RIO SALADO PROJECT WILDLIFE HABITAT MASTERPLAN

HNTB
 HOKUSAI, HENSEL, TAYLOR & BERENSON
 ARCHITECTS, ENGINEERS, PLANNERS
 ANCHOR CHAIR FOR THE
 2807 EAST McDowell Road Suite 401
 Phoenix, Arizona 85016
 602-954-7400

City of Tempe
 March 12, 1990

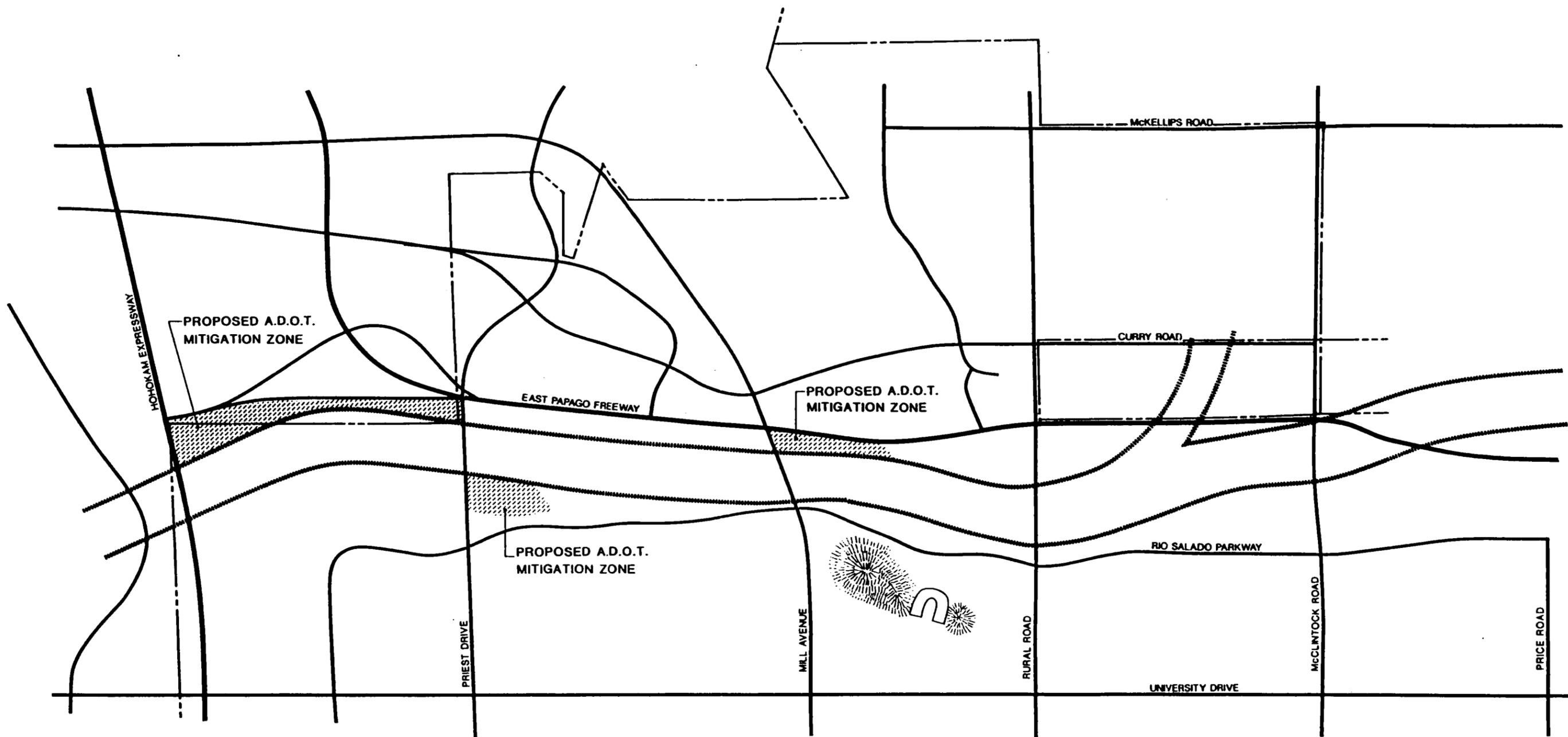


Figure #7A

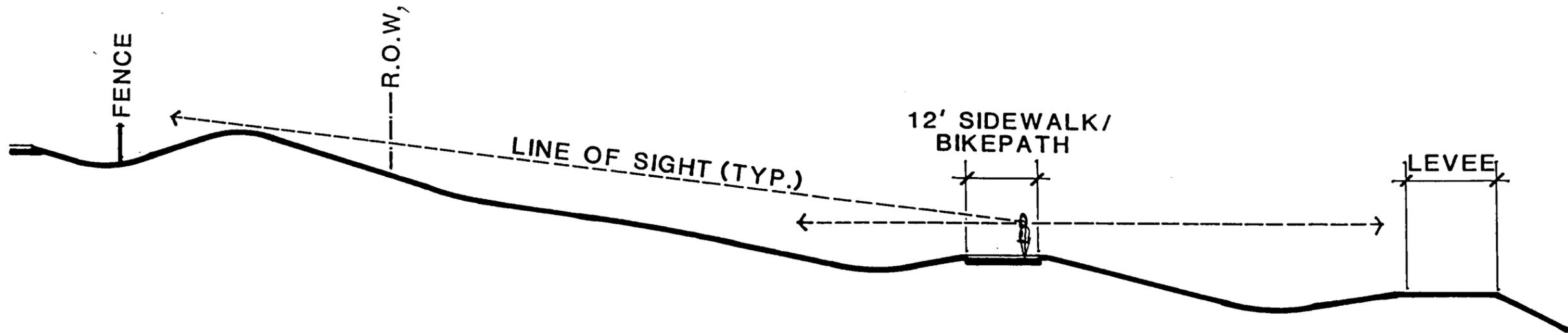
PROPOSED SITES FOR A.D.O.T. MITIGATION

TEMPE RIO SALADO PROJECT
WILDLIFE HABITAT
MASTERPLAN

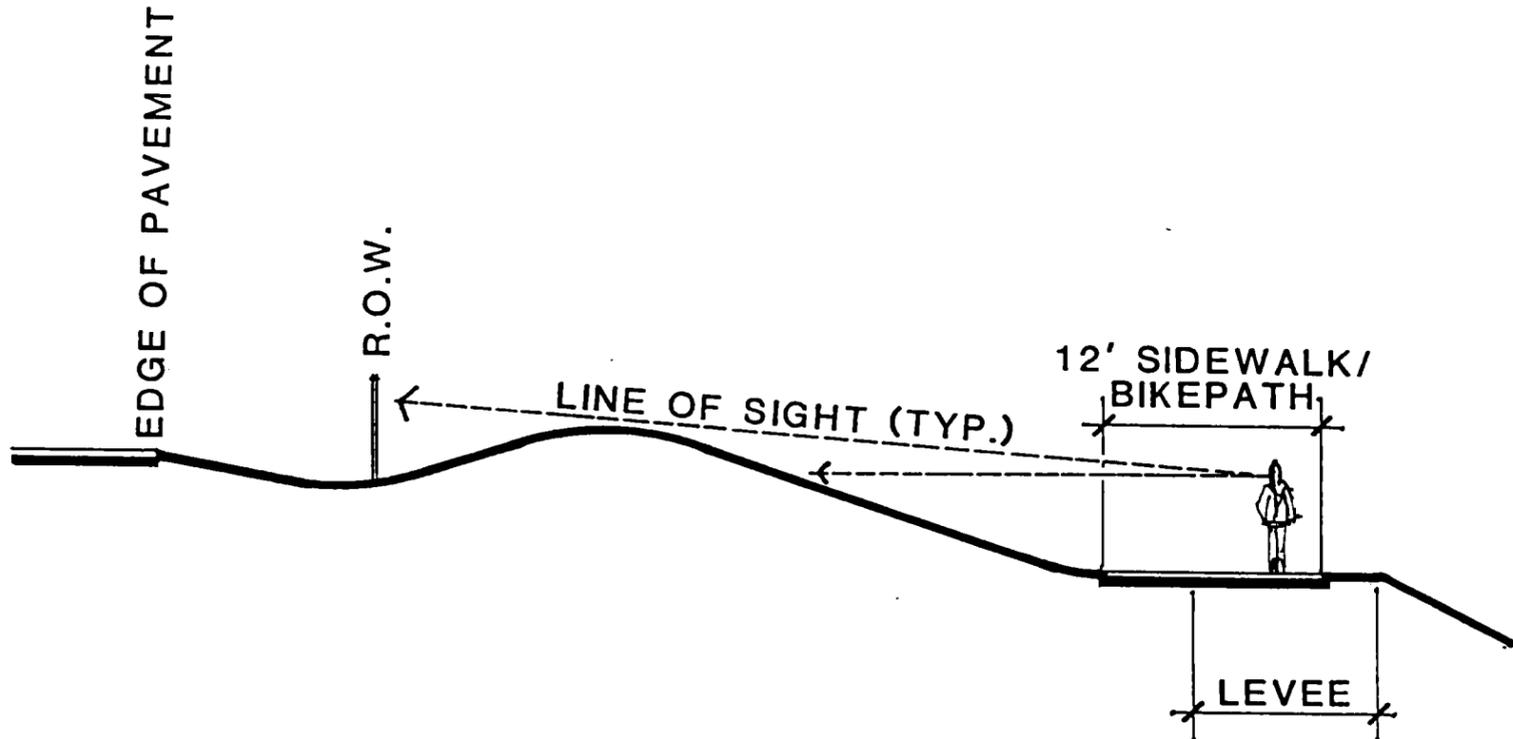
HNTB
HOWARD NEEDLES TAMM & BERENSON
ARCHITECTS ENGINEERS PLANNERS
AND ENVIRONMENTAL SCIENTISTS
2001 B BIRD FLYING LANE, P.O. BOX 1118, 467
MILWAUKEE, WISCONSIN 53210
TEL: 414-764-7400

City of Tempe

March 12, 1990



SECTION B-B



SECTION A-A

FIGURE #8

CROSS SECTIONS

TEMPE RIO SALADO PROJECT
WILDLIFE HABITAT
MASTERPLAN



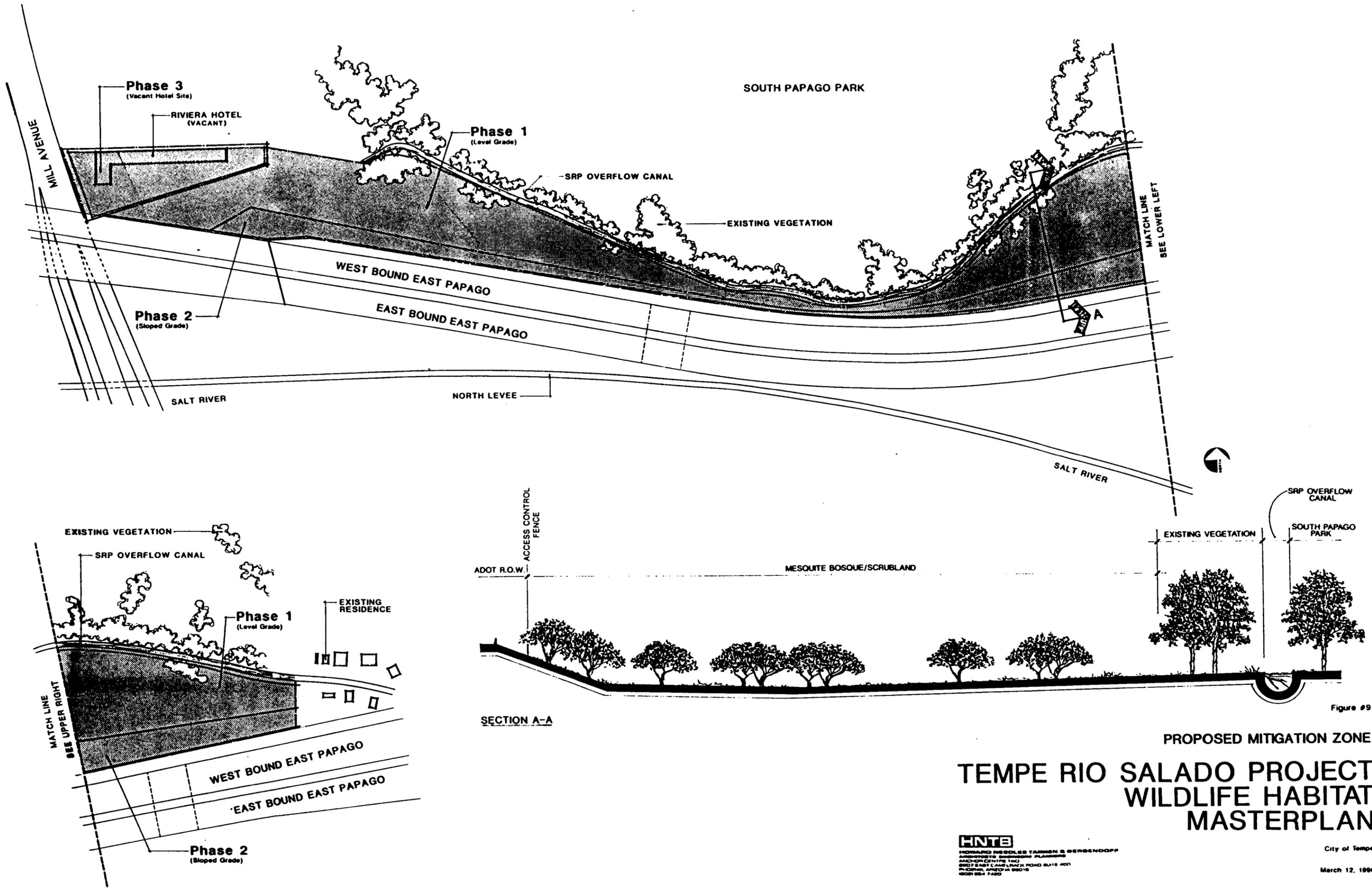
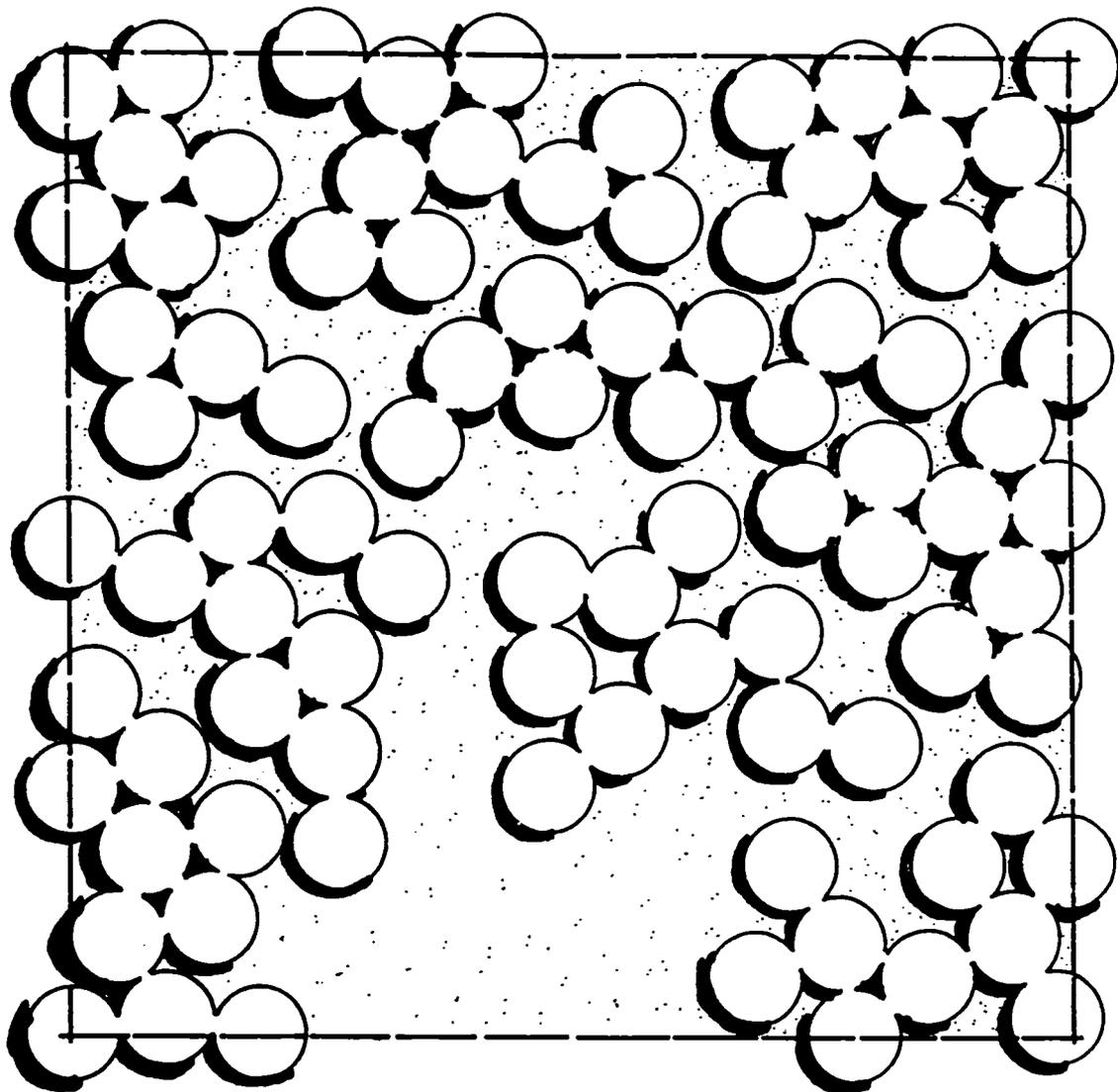


Figure 99

PROPOSED MITIGATION ZONE
**TEMPE RIO SALADO PROJECT
 WILDLIFE HABITAT
 MASTERPLAN**

HNTB
 HOWARD NEEDLES TAMMEN & BERENDOFF
 ARCHITECTS ENGINEERS PLANNERS
 AND CITY PLANNERS INC.
 800 EAST CAMP LANE, SUITE 400
 PHOENIX, ARIZONA 85014
 602/954-7400

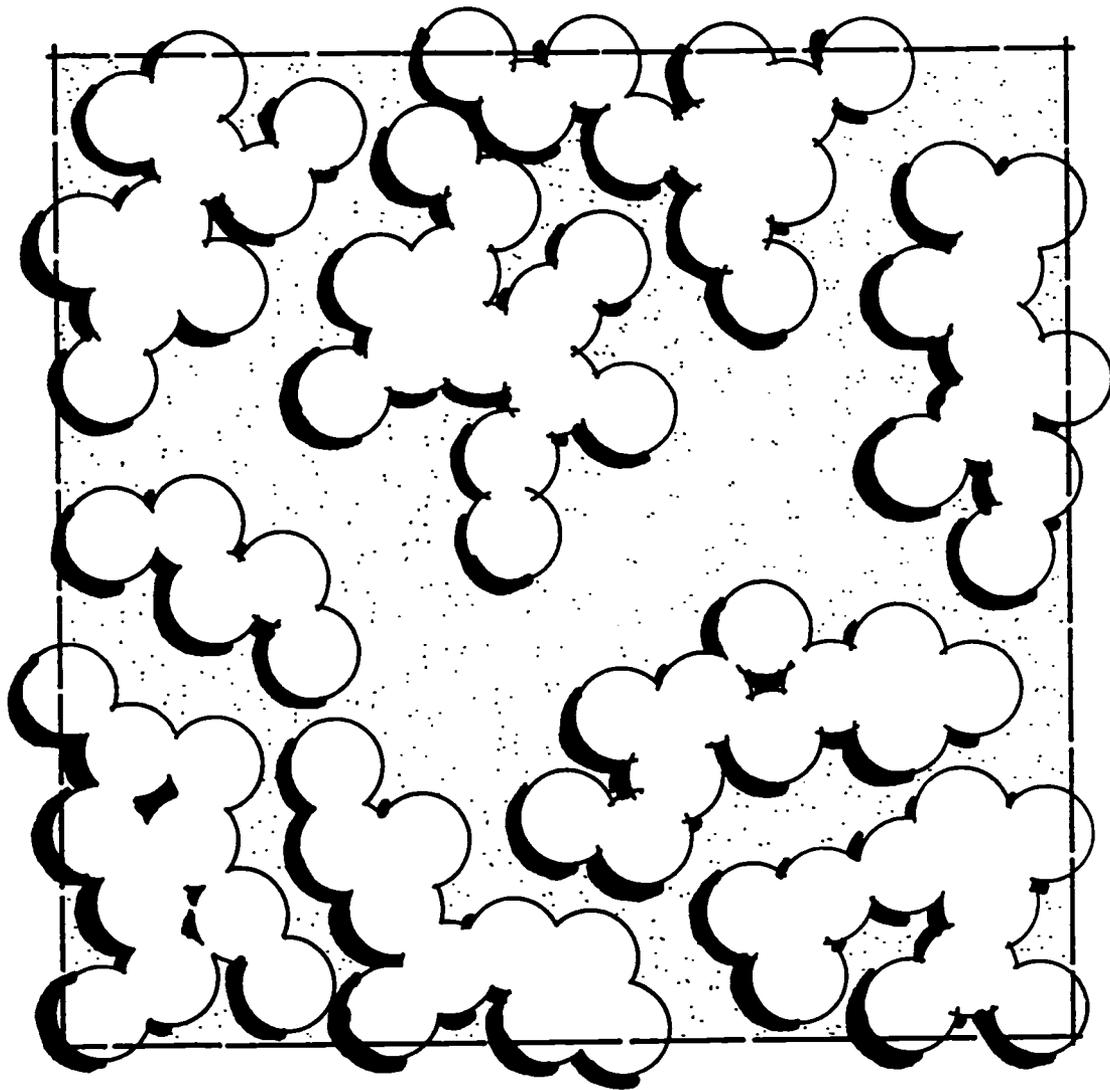


90 Trees Per Acre

FIGURE #10

GRID TREE PATTERN

TEMPE RIO SALADO PROJECT
WILDLIFE HABITAT
MASTERPLAN



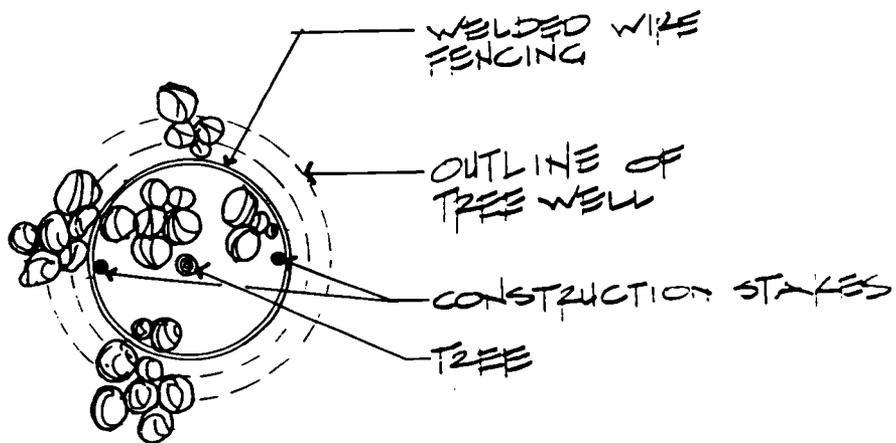
90 Trees Per Acre

FIGURE #11

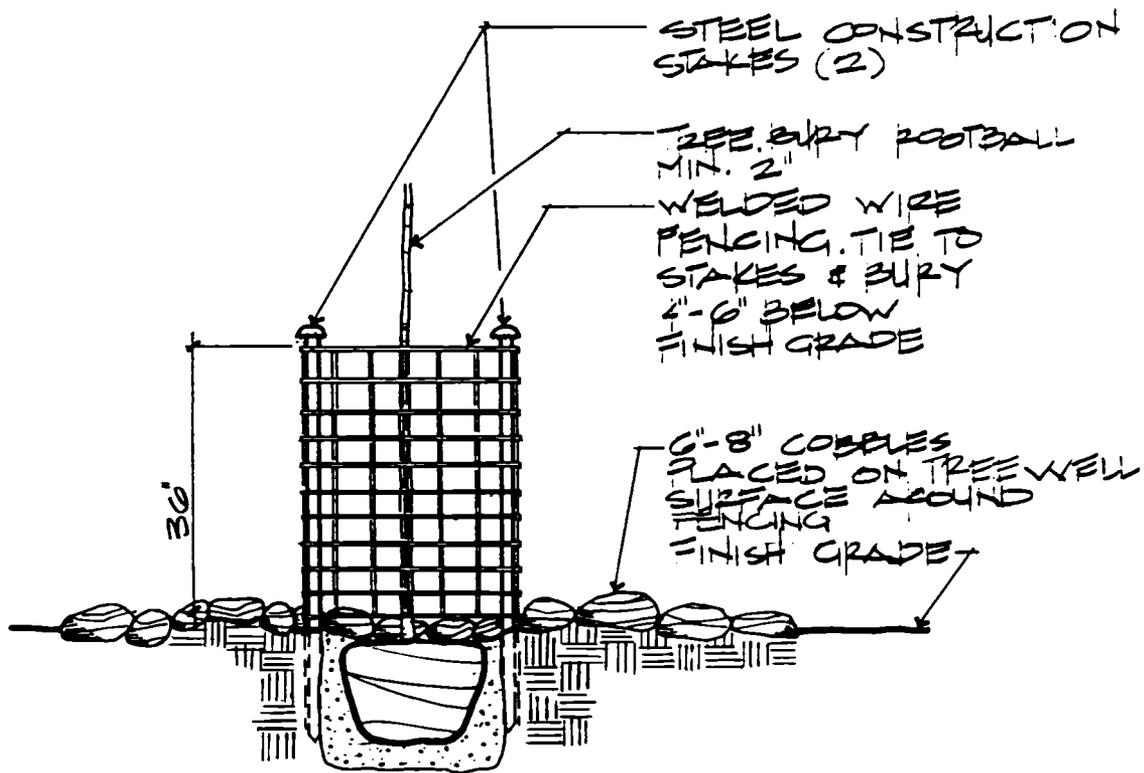
RANDOM TREE PATTERN

TEMPE RIO SALADO PROJECT
WILDLIFE HABITAT
MASTERPLAN

HNTB



PLAN

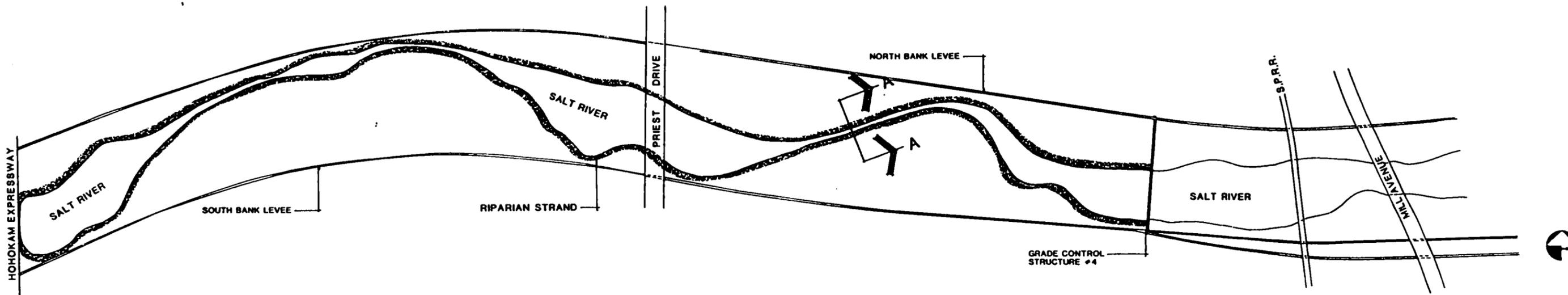


ELEVATION

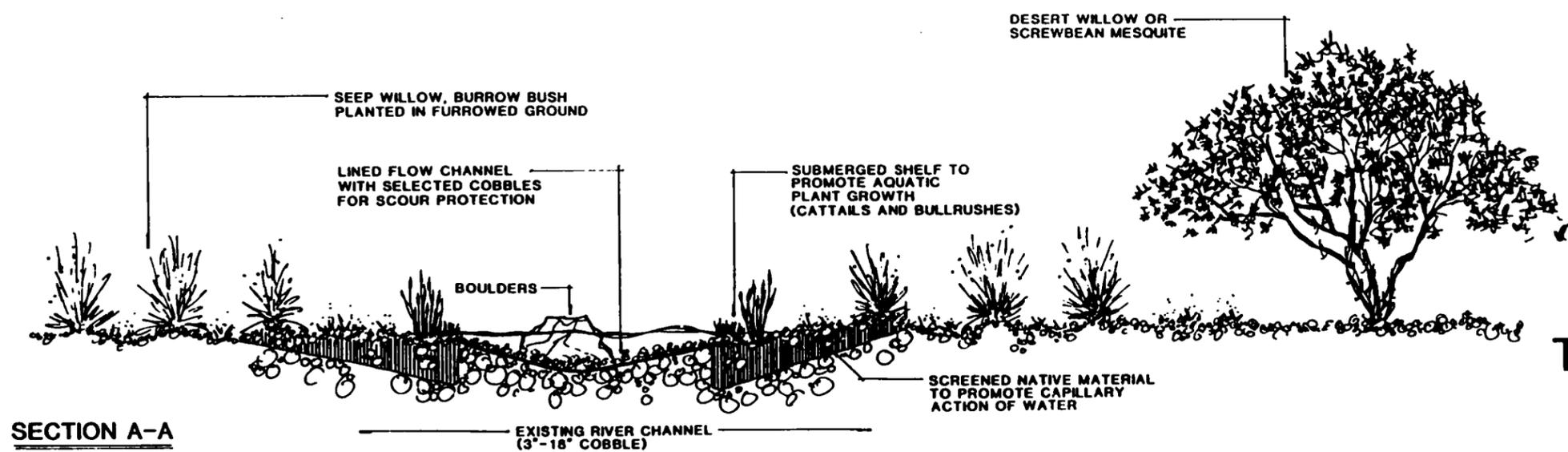
FIGURE #12

HERBIVORE PROTECTION

TEMPE RIO SALADO PROJECT
WILDLIFE HABITAT
MASTERPLAN



WEST OF MILL AVENUE



SECTION A-A

Figure #13
MITIGATION ZONE
RIPARIAN STRAND

TEMPE RIO SALADO PROJECT WILDLIFE HABITAT MASTERPLAN

HNTB
HOWARD NEEDLES TAMMEN & BERGENDOFF
ARCHITECTS ENGINEERS PLANNERS
AND CITY PLANNERS
800 F STREET, CANTON, MASSACHUSETTS 01921
PH: 617-552-4000 FAX: 617-552-4001
WWW.HNTB.COM

City of Tempe
March 12, 1999

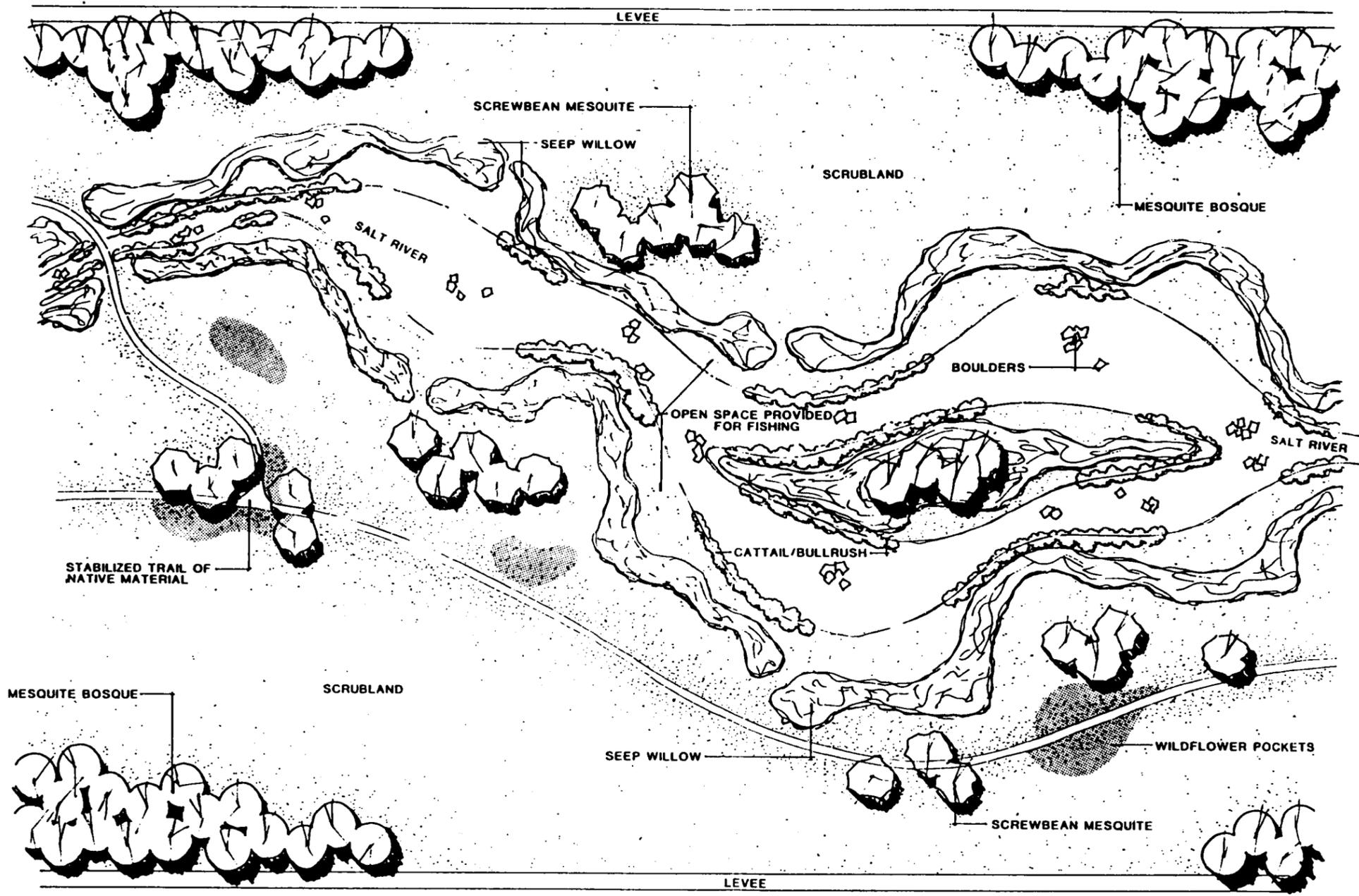


Figure #14

PLANTING CONCEPT

TEMPE RIO SALADO PROJECT
WILDLIFE HABITAT
MASTERPLAN

HNTB
HOWARD NEEDLES TAMMEN & BERGENDOFF
ARCHITECTS ENGINEERS PLANNERS
1000 AVENUE OF THE STARS
SUITE 1000
FARMINGTON HILLS, MI 48334
PH 248 854-1100
FAX 248 854-1101

City of Tempe

March 12, 1990

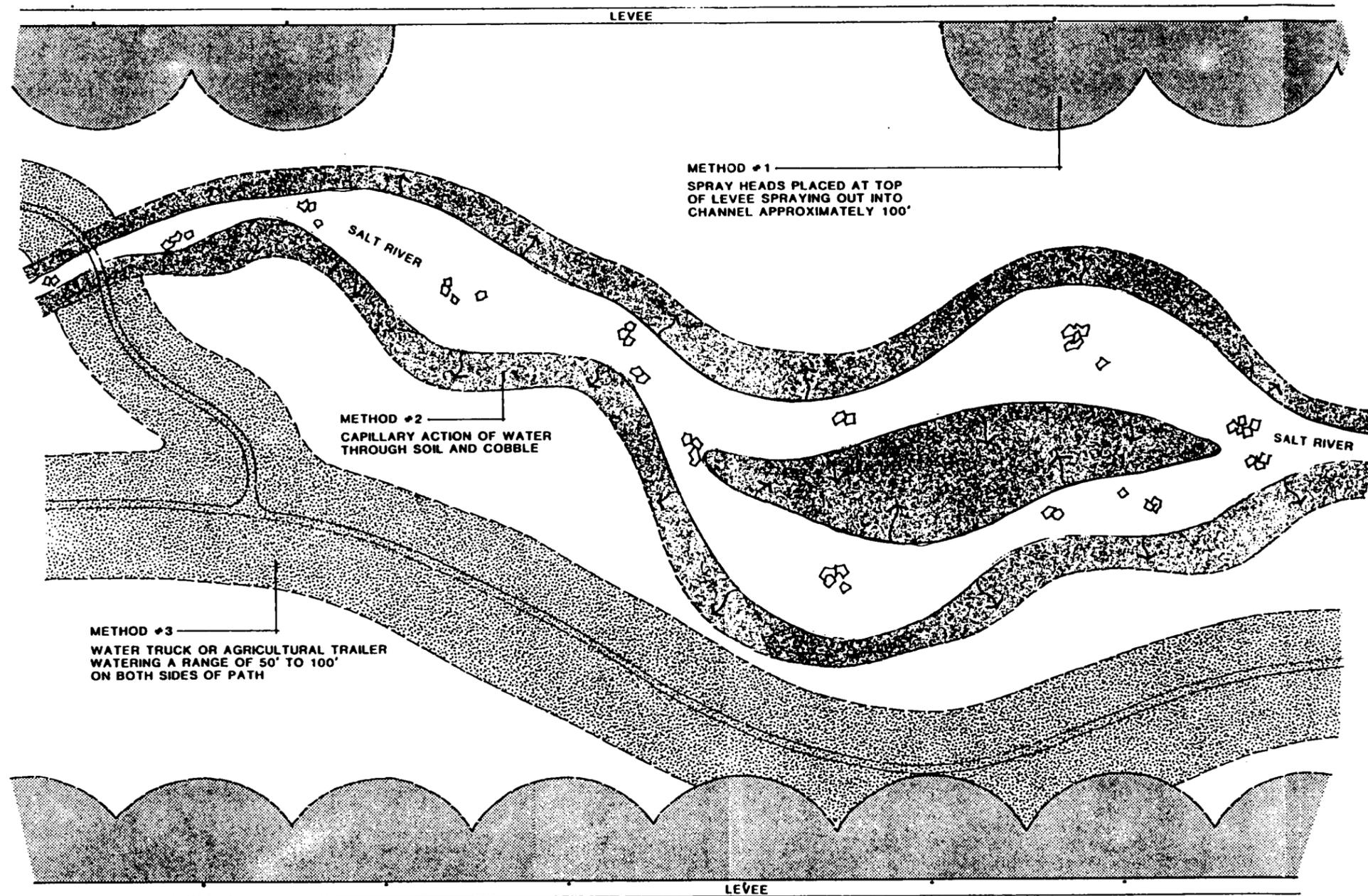


Figure #15

IRRIGATION CONCEPT

TEMPE RIO SALADO PROJECT
 WILDLIFE HABITAT
 MASTERPLAN

HNTB
 HOWARD NEEDLES TAMMEN & BERENSON
 ARCHITECTS ENGINEERS PLANNERS
 1000 WEST WASHINGTON AVENUE
 SUITE 1000 DENVER COLORADO 80202
 PHONE 303.733.1000 FAX 303.733.1001
 WWW.HNTB.COM

City of Tempe
 March 17, 2011

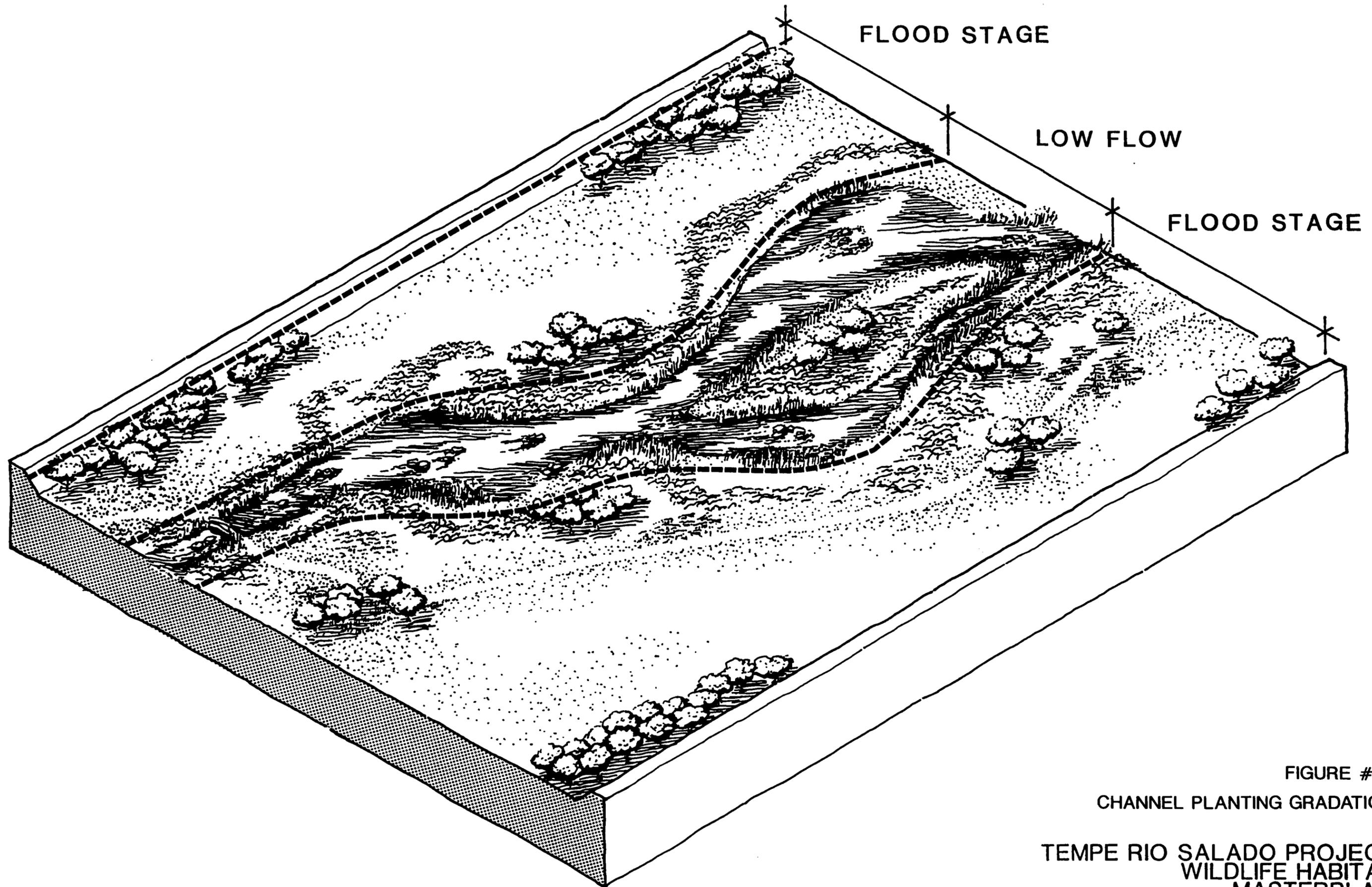


FIGURE #16
CHANNEL PLANTING GRADATION
TEMPE RIO SALADO PROJECT
WILDLIFE HABITAT
MASTERPLAN

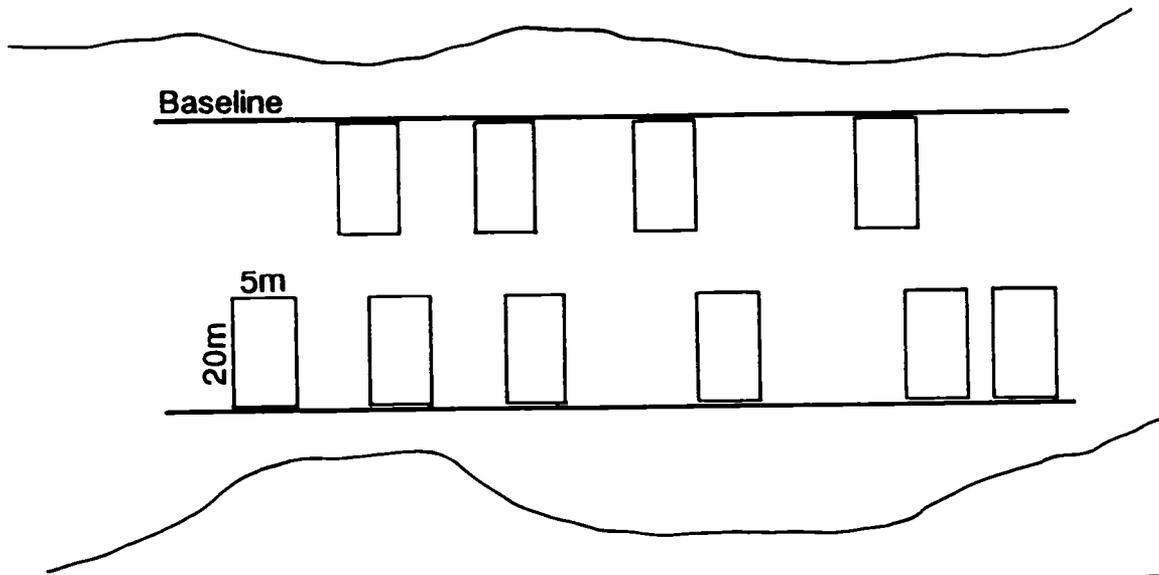


FIGURE # 17

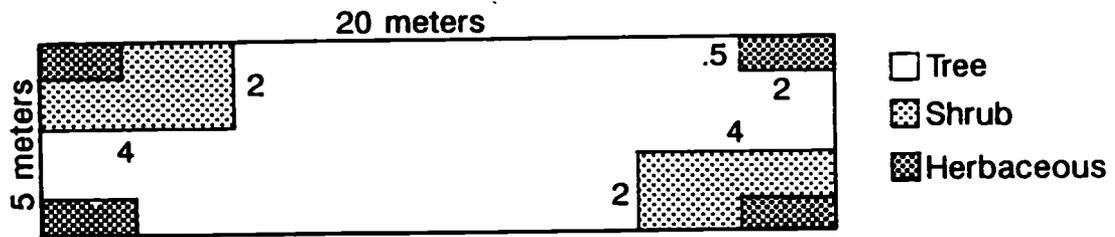


FIGURE # 18

PLACEMENT AND DESIGN
OF PLOTS AND SUBPLOTS
TEMPE RIO SALADO PROJECT
WILDLIFE HABITAT
MASTERPLAN

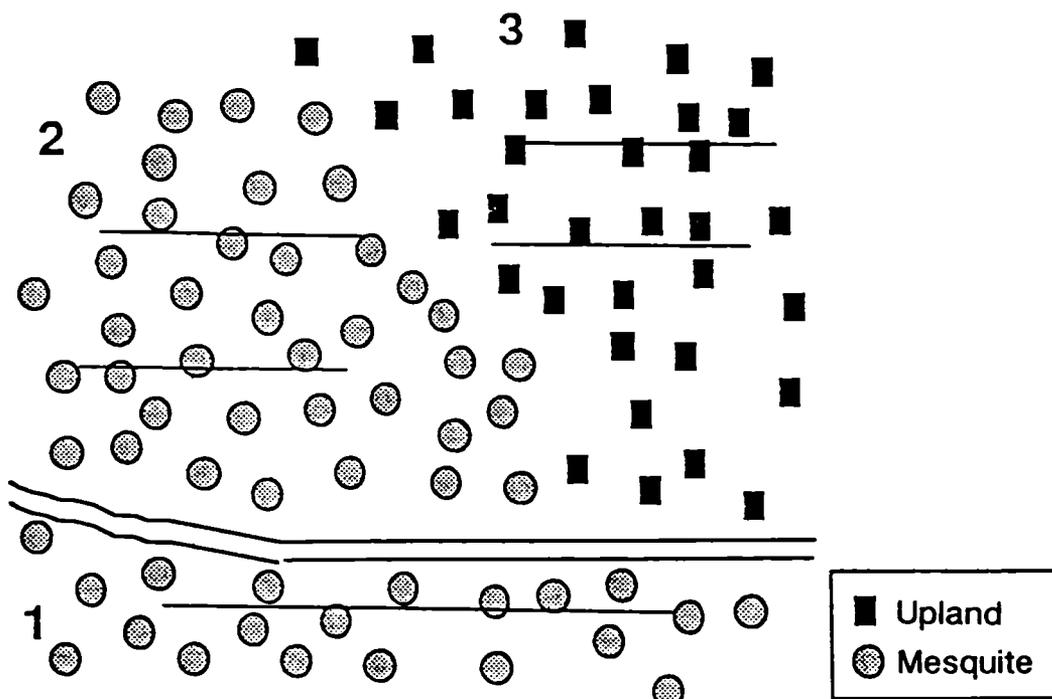


FIGURE #19

STRATIFIED RANDOM SAMPLING

TEMPE RIO SALADO PROJECT
 WILDLIFE HABITAT
 MASTERPLAN

APPENDICES

- A. General Timeline for Rio Salado Construction Activities
- B. Plant Species Presently Occurring in the Salt River
- C. Undesirable Plant Species
- D. Known Wildlife Inhabitants of the Salt River
- E. Mitigation Zone Soil Test Results
- F. Suggested Seed Mixes and Potential Revegetation Techniques for Rio Salado Park
- G. Proof of Ownership
- H. U.S. Fish and Wildlife Response to Public Notices 89-272-CL and 90-105-CL

APPENDIX A

GENERAL TIMELINE FOR RIO SALADO CONSTRUCTION ACTIVITIES

The following chart identifies the present schedule of freeway construction projects affecting the Rio Salado project:

<u>PROJECT</u>	<u>ADVERTISEMENT FOR BIDS</u>	<u>EXPECTED COMPLETION</u>
1. East Papago Bridges & Roadbed Construction (including Tempe's channelization)	August 1990	December 1991
2. East Papago Paving, Signage and Striping	July 1991	December 1992
3. ADOT Channelilzation	Underway	January 1991
4. East Papago Freeway Indian Bend Wash to Outer Loop	July 1991	December 1991
5. East Papago Freeway Indian Bend Wash Bridge	December 1990	December 1991
6. Priest Avenue Bridge	Underway	1991
7. Hohokam Freeway Bridge	Underway	January 1991
8. Mill Avenue Bridge	Unknown	1993?

APPENDIX B

The Salt River in 1868 was very different from the Salt River today. W. H. Ingalls described the area around Tempe at that time as "...low and inclined to be swampy; with timber cottonwood along the banks, and mesquite and willow brush." Present conditions of the Salt River support primarily xeric adapted or weedy plant species. Riparian species do exist in this area, but not in the density that might be expected for a river system with a drainage area of 14,500 mi².

Regulated flows for the Salt River are managed by upstream dams and cause decrease in flow intensity, flows equalized over the year, and removal of suspended sediment in the water (Fenner, et al. 1985). These impacts have modified the types of plant species that inhabit the river. Plant species that have been identified in the Salt River between the Hohokam and McClintock are given in Table 1. Of these species, some are considered undesirable by the Fish and Wildlife Service and by the applicant and are presented in Table 2. Cottonwoods (Populus fremontii) and willows (Salix gooddingii) are present in small clusters along the edges of the channel. A research project studying the growth of these cottonwoods identified less than 100 trees in the 4 mile reach of the proposed project area (Randall, per. comm.). As obligate riparian species, these trees are dependent on an almost constant source of water. Perched water tables, drainage areas, or leakage from irrigation canals may be the water sources these trees are utilizing. Because regulated flows do not coincide with the timing of seed dispersal of these species and do not carry suspended sediment to create alluvial seedbeds, recruitment in these trees has been seen to be very limited.

Salt cedar (Tamarix chinensis), an exotic and aggressive invader, is the dominant tree species in the Salt River, as well as in other rivers of the Southwest (Warren and Turner, 1975). Salt cedar is considered undesirable because it outcompetes many of the native plants by producing seed within one year and wind dispersing numerous seeds twice a year and use of salt cedar by wildlife has been shown to be less than for native communities (Ohmart and Anderson, 1982).

Arrowweed (Tessaria sericea), although considered an undesirable species by the Fish and Wildlife Service is not included in Table 2.

This plant is native and is a common pioneer species in disturbed areas. Flooding disturbance in riparian areas is a natural event and arrowweed is filling an open niche. Therefore, the applicant will monitor arrowweed in the project area and will only remove such plants when they appear to be outcompeting with other natives causing decrease in diversity.

The other species included on the list of undesirable plants are exotic species and weeds that have invaded from the surrounding urban areas, or have come in from upstream flows.

Removal of undesirable plant species will be accomplished several times a year by physical removal. Due to the prolific nature of salt cedar, studies have shown that after the aerial portion of the tree is cut, application of Picloram or Dicamba to the root stump was lethal in over 90% of the treatments (Hollingsworth, et al., 1979). However, no widespread application of herbicides will be used due to possible contamination of the ground water. The City of Tempe will hire a qualified botanist to identify seedlings of the undesirable and weedy species and demonstrate proper identification to volunteer laborers. So not to disturb wildlife or plantings, volunteers will walk and hand weed the project area.

References

- Fenner, P., W. W. Brady, and D. R. Patton. 1985. Effects of regulated water flows on regeneration of Fremont cottonwood. *Journal of Range Management* 38(2):135-138.
- Hollingsworth, E. B., P. C. Quimby, and D. C. Jaramillo. 1979. Control of saltcedar by subsurface placement of herbicides. *Journal of Range Management* 32(4):288-291.
- Ingalls, W. H., 1868. Cadastral Survey Notes of the Salt and Gila Meridan.
- Ohmart, R. D. and B. W. Anderson. 1982. North American Desert Riparian Ecosystems. G. L. Bender (ed.) Reference handbook on the deserts of North America. Greenwood Press, Westport, Conn., London, England. 594 pp.

TABLE 1. PLANT SPECIES PRESENTLY OCCURRING IN THE SALT RIVER

<u>Abronia</u> sp.	Sand-verbena
<u>Amsinckia intermedia</u>	Fiddle-neck
<u>Atriplex canescens</u>	Four-wing salt-bush
<u>Atriplex lentiformis</u>	Quail bush
<u>Baccharis salicifolia</u>	Seepwillow
<u>Baccharis arthroides</u>	Desert broom
<u>Brassica tournefortii</u>	Brassica
<u>Bromus</u> sp.	Brome grass
<u>Capsella Bursa-pastoris</u>	Shepherds purse
<u>Cirsium neomexicanum</u>	Thistle
<u>Cercidium floridum</u>	Blue Palo Verde
<u>Cynodon dactylon</u>	Bermuda grass
<u>Crypthantha circumscissa</u>	Cryptantha
<u>Cyperus</u> sp.	Flat-sedge
<u>Datura meteloides</u>	Desert thorn apple
<u>Dithyrea wislizenii</u>	Spectacle pod
<u>Encelia farinosa</u>	Brittlebush
<u>Eriogonum deflexum</u>	Skeleton weed, Buckwheat
<u>Erodium cicutarium</u>	Heron's bill
<u>Euphorbia</u> sp.	Spurge
<u>Haplopappus tenuisetus</u>	Turpentine brush
<u>Heterotheca subaxillaris</u>	Camphor weed
<u>Hordeum jubatum</u>	Foxtail barley
<u>Hymenoclea monogyra</u>	Burrobrush
<u>Lepidium lasiocarpum</u> var. <u>Wrightii</u>	Peppergrass
<u>Lycium exsertum</u>	Wolfberry
<u>Lycium</u> sp.	Wolfberry
<u>Malva parviflora</u>	Cheese-weed
<u>Mentzelia pumila</u>	Stick-leaf, blazing star
<u>Nicotiana glauca</u>	Desert tree tobacco
<u>Parkinsonia aculeata</u>	Parkinsonia
<u>Pennisetum setaceum</u>	Fountain grass
<u>Plantago insularis</u>	Indian wheat

<u>Populus fremontii</u>	Fremont Cottonwood
<u>Prosopis velutina</u>	Velvet mesquite
<u>Portulaca suffrutescens</u>	Purslane
<u>Salix gooddingii</u>	Goodding Willow
<u>Salsola kali</u>	Russian thistle
<u>Sambucus mexicana</u>	Mexican elder
<u>Schismus sp.</u>	Schismus
<u>Sisymbrium irio</u>	Wild mustard, rocket
<u>Solanum elaeagnifolium</u>	White horse-nettle
<u>Sonchus oleraceus</u>	Cow thistle
<u>Sorghum halepense</u>	Johnson grass
<u>Suaeda torreyana</u>	Seep weed
<u>Tamarix chinensis</u>	Salt cedar
<u>Tessaria sericea</u>	Arrowweed
<u>Veronica polita</u>	Speedwell
<u>Washingtonia filifera</u>	California fan palm
<u>Xanthium saccharatum</u>	Cocklebur

APPENDIX C

TABLE 2. Undesirable Plant Species* that presently exist in the Salt River (Feb. 1990)

SPECIES	COMMON NAME
<u>Brassica tournefortii</u>	Brassica
<u>Bromus</u> sp.	Brome grass
<u>Cirsium neomexicanum</u>	Thistle
<u>Cynodon dactylon</u>	Bermuda grass
<u>Hordeum jubatum</u>	Foxtail barley
<u>Nicotiana glauca</u>	Desert tree tobacco
<u>Parkinsonia aculeata</u>	Parkinsonia
<u>Salsola kali</u>	Russian thistle
<u>Schismus</u> sp.	Schismus
<u>Sisymbrium irio</u>	Wild mustard, rocket
<u>Sonchus oleraceus</u>	Cow thistle
<u>Sorghum halepense</u>	Johnson grass
<u>Tamarix chinensis</u>	Salt cedar
<u>Xanthium saccharatum</u>	Cocklebur

* Undesirable plants are considered exotics and/or weedy species

APPENDIX D

Wildlife Habitat

The Fish and Wildlife Service has identified 113 acres of desert scrub and 23 acres of cottonwood/mesquite (letter dated December 22, 1989). These vegetation types are usually found in stratified clusters along the edge of the channel and make up 11.4% and 2.3% , respectively, of the total project area. The desert scrub consists of salt cedar (Tamarix chenensis), desert broom (Baccharis sarothroides), burrobrush (Hymenoclea monogyra), and arrowweed (Tessaria sericea). Together with the cottonwood/mesquite they provide shade, protection from predators, sources of food (primarily insects nesting around the shrubs) and nesting habitats for wildlife. Personal observations of K. E. Randall, a graduate student conducting research on the cottonwoods in this area, provides the following list of known inhabitants of the area:

BIRDS

Great Blue Heron	Greater Roadrunner
Rock Dove	Black-chinned Hummingbird
Mourning Dove	Northern Mockingbird
Inca Dove	European Starling
Grackle	House Finch
House Sparrow	Gambel's Quail
Verdin	Goldfinch
Hawk	Killdeer

SNAKES

Coachwhip
Gopher snake

MAMMALS

Cottontail rabbit

Others (not identifiable)

Toads
Lizards

There is a reasonable expectation that with habitat improvements in the Salt River, other species of birds from habitats upstream will frequent this area. Ohmart's 1982 studied observed these common bird species upstream:

Horned grebe	Black-crowned night heron
Pintail ducks	Green-winged ducks
Red-tailed hawk	Harris Hawk
American Kestrel	Common Gallinule
American Avocet	Yellow-billed Cuckoo
Barn Owl	Screech Owl
Common Flicker	Western Kingbird
Black Phoebe	Cliff Swallow
Crissal Thrasher	Ruby-crowned Kinglet
Phainopepla	Loggerhead Shrike
Yellow Warbler	Western Meadowlark
Hooded Oriole	Summer Tanager
Blue Gosbeak	Green-tailed Towhee

REFERENCES

Ohmart, R. D. 1982. Past and Present biotic communities of the lower Colorado River mainstem and selected tributaries. Vol IV. Bureau of Reclamation Contract No. 7-07-30-V009.

APPENDIX E

Soil test results are unavailable
at this time and will be submitted
as an addenda to this report.

APPENDIX F

QUOTATION

FROM

WILD SEED, INC.
P.O. BOX 27751
TEMPE, AZ. 85285

RIO SALADO RIPARIAN PROJECT
RIPARIAN MIX
INQUIRY NO. _____

DATE REVISED: MARCH 6, 1990

TERMS _____

DELIVERY _____

PRICES QUOTED ARE F.O.B.:

TO

MR. WAYNE COLEBANK
HNTB
2207 EAST CAMELBACK ROAD
PHOENIX, AZ. 85016

WE ARE PLEASED TO QUOTE ON YOUR INQUIRY AS FOLLOWS:

QUANTITY	DESCRIPTION	PRICE	AMOUNT
<u>PLS#/ACRE</u>	<u>SPECIES</u>		
1.0	<u>ACACIA GREGGII</u> CATCLAW		
2.0	<u>ATRIPLEX LENTIFORMIS</u> QUAILBUSH		
0.5	<u>VITIS ARIZONICUS</u> ARIZONA GRAPE		
1.5	<u>SAMBUCUS MEXICANA</u> MEXICAN ELDERBERRY		
2.0	<u>AMBROSIA AMBROSIODES</u> LARGE LEAF BURSAGE		
0.5	<u>BACCHARIS SAROTHROIDES</u> DESERT BROOM		
2.0	<u>ERIOGONUM FASCICULATUM</u> BUCKWHEAT		
1.0	<u>HAPLOPAPPUS LARICIFOLIUS</u> BURRO SUXH		
1.0	<u>GYMENOCLEA MONOGYRA</u> - BURROBRUSH		
2.0	<u>ARISTIDA PURPUREA</u> PURPLE THREE AWN		
1.0	<u>BAILEYA MULTIRADIATA</u> DESERT MARIGOLD		
0.75	<u>SPOROBOLIS CRYPTANDRUS</u> SAND DROPSEED		
1.0	<u>CLEMATIS DRUMMONDII</u> VIRGIN'S BOWER		
1.0	<u>SITANION HYSTRIX</u> SQUIRREL TAIL		
1.0	<u>VIGUIERIA ANNUA</u> ANNUAL GOLDEN EYE		
1.0	<u>HELIANTHUS ANNUUS</u> NATIVE SUNFLOWER		
<p>RECOMMENDED PLANTING RATE IS 19.25 PLS#/ACRE</p> <p>ALL SEED SPECIFIED IN PLS POUNDS. PLS = PURE LIVE SEED = PURITY X GERMINATION</p> <p>ESTIMATED COST OF SEED/ACRE IS \$750.00/ACRE</p> <p>THIS IS NOT A QUOTATION.</p>			

QUOTED BY: RITA JO ANTHONY

QUOTATION

FROM

WILD SEED, INC.
P.O. BOX 27751
TEMPE, AZ. 85285

RIO SALADO RIPARIAN PROJECT

INQUIRY NO. ARID MIX

DATE FEBRUARY 26, 1990

TERMS _____

DELIVERY _____

PRICES QUOTED ARE F.O.B.:

TO

MR. WAYNE COLEBANK
HNTB
2207 EAST CAMELBACK ROAD
PHOENIX, AZ. 85016

WE ARE PLEASED TO QUOTE ON YOUR INQUIRY AS FOLLOWS:

QUANTITY	DESCRIPTION	PRICE	AMOUNT
<u>PLS#/ACRE</u>	<u>SPECIES</u>		
1.0	<u>CELTIS PALLIDA</u> DESERT HACKBERRY		
2.0	<u>ATRIPLEX POLYCARPA</u> CATTLE SPINACH		
2.0	<u>ATRIPLEX LENTIFORMIS</u> QUAILBUSH		
0.5	<u>CUCURBITA SP.</u> WILD GOURD		
1.5	<u>ACACIA GREGGII</u> CATCLAW ACACIA		
1.5	<u>CERCIDIUM MICROPHYLLA</u> FOOTHILLS PALO VERDE		
0.5	<u>LYCIUM SP.</u> WOLFBERRY		
0.5	<u>ZIZYPHUS OBTUSIFOLIA</u> GRAYTHORN		
3.0	<u>ARISTIDA PURPUREA</u> PURPLE THREE AWN		
1.0	<u>BAILEYA MULTIRADIATA</u> DESERT MARIGOLD		
1.0	<u>KALLSTROEMIA GRANDIFLORA</u> ARIZONA POPPY		
1.0	<u>LARREA TRIDENTATA</u> CREOSOTE		
2.0	<u>ENCELIA FARINOSA</u> BRITTLEBUSH		
2.5	<u>AMBROSIA DELTOIDEA</u> BURSAGE		
1.0	<u>SPOROBOLIS CRYPTANDRUS/S.</u> AIRIODES DROPSEED		
<p>RECOMMENDED PLANTING RATE IS 21 PLS#/ACRE.</p> <p>ALL SEED IS SPECIFIED IN PLS POUNDS. PLS = PURE LIVE SEED = PURITY X GERMINATION</p> <p>THIS IS NOT A QUOTATION.</p> <p>ESTIMATED COST OF SEED/ACRE IS \$675.00/ACRE</p>			

QUOTED BY:

RITA JO ANTHONY

Revegetation of area

Plant List of Candidate Species

Table 3 is a list of plants that are likely to inhabit riparian areas at the elevation of the Salt River. This list was compiled from several sources: 1) inventory of plants presently existing in the Salt River channel, 2) herbaceous inventory conducted on the Hassayampa River Preserve in 1989 by Lynn Wolden (unpubl ms), 3) herbarium specimens at Arizona State University of plants collected in the Salt River, and 4) historic accounts of plants from this area taken when the river flowed.

Table 3 is a list of plants that might be used in revegetating this area. Plants that are not present in the river now are labeled restoration. The availability of some of these depends on commercial seed companies ability to find these species and in collectable quantities. Companies will not collect seed if there is a question of depletion of a natural seed source. Natural phenomeon will also play a part in availability of species. Sufficient rains are necessary for good seed production in many cases.

Plants labeled as present should be collectable from surrounding areas, thus insuring genetic stability.

REVEGETATION TECHNIQUES

Streamside emergents

Buckner and Wheeler (1988) describe a technique used in Colorado to revegetate an area with cattails (*Typha latifolia*) and hard-stem bulrush (*Scirpus acutus*). Seeds were collected in November and December, a time when seeds were ripe. Seeds were spread in March using three methods of seeding: 1) Cattail spikes were shattered and mixed with masonry sand and hand broadcast, 2) unshattered spikes were poked into the ground, and 3) cattail seed was dispersed upwind of project areas. The poking method (#2) seemed the most successful. Recommendations by these researchers are:

- Use live topsoil to aid in establishing vegetation quickly. This topsoil should contain bulbs, rhizomes, and microorganisms necessary for successful germination.

- Clay textured soils allow minimum infiltration of water.
- Protect seedlings from wave action of water.
- Cattail can be propagated by seed and can result in near-mature stands within four months of germination.

Herbaceous

Many of the shrubs will be hydroseeded. However, to get the system started, cuttings and transplants will be used and successful techniques in this area are described below.

Aldon (1970) researched planting techniques for Four-wing salt-bush (Atriplex canescens). This species is a nutritious all-season forage plant that provides excellent food and cover for wildlife. Seeds were used to grow transplants which were field planted at 4 to 6 weeks old. This study recommends: 1) grow transplants from native seed, 2) plant with plant bands at ground level, not in depressions, 3) plant in low areas that will receive some flood waters, but water will not submerge the new transplants for longer than 30 hours, and 4) plant soon after area has been flooded to insure some soil moisture (19% in this study).

Everett, et al. (1978) analyzed potential of propagation from stem cuttings of shrubs and the following recommendations were made: use semihardwood cuttings; cuttings from vegetative and reproductive phenologic stages rooted better than cuttings taken during dormancy.

Riparian trees

Propagation of cottonwoods and willows has been utilized in many revegetation projects in the Southwest (York, 1985; Anderson, et al., 1984; Pollock, 1982; Hudak, 1979). The pole-planting techniques suggested from these studies will be used in this project. 1) cuttings will be taken when the trees are dormant (November-January), 2) cuttings with intact apical meristems will be used primarily achieving more vertical growth, 3) soil will be tilled to insure adequate root penetration, 4) after determining ground water depth, cuttings will be planted to this depth thus insuring an adequate water supply.

Pole plantings and seedlings will need to be protected from herbivores. Screen mesh cages will be placed around seedlings until they reach a height where their foliage is beyond the reach of such herbivores as cottontails and gophers. The Nature Conservancy has planted trees and shrubs in styroform cups to protect their roots from allometric responses of surrounding vegetation (Reiner and Griggs, 1989). These practices are costly and time consuming and will be implanted as seen reasonable to do so.

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TABLE 3

<u>Lemna gibba</u> Aquatic	Duckweed Restoration
<u>Potamogeton foliosus</u> Aquatic	Leafy pondweed Restoration
<u>Aristida californica var. glabrata</u> Arid area grass	Three-awn Restoration
<u>Aristida purpurea</u> Arid area grass	Purple three awn Restoration WSI Arid
<u>Bouteloua aristidoides</u> Arid area annual grass	Needle grama Restoration
<u>Bouteloua barbata var. barbata</u> Arid area annual grass	Six weeks grama Restoration
<u>Muhlenbergia dumosa</u> Arid area perennial grass	Muhly Restoration
<u>Panicum virgatum</u> Arid area perennial grass	Switchgrass Restoration
<u>Sporobolus airoides</u> Arid area perennial grass	Alkali sacaton Restoration WSI
<u>Sporobolus cryptandrus</u> Arid area perennial grass	Sand dropseed Restoration WSI
<u>Eriogonum deflexum</u> Arid area ground cover	Skeleton weed, buckwheat Present
<u>Euphorbia sp.</u> Arid area ground cover	Euphorbia Present
<u>Lepidium lasiocarpum var. Wrightii</u> Arid area ground cover	Peppergrass Present
<u>Baileya multiradiata</u> Arid annual forb	Desert marigold Restoration WSI
<u>Chaenactis stevioides var. thomberi</u> Arid area forb	Esteve pincushion Restoration
<u>Heliotropium curassavicum</u> Arid area forb	Quail plant Restoration

<u>Kallstroemia grandiflora</u> Arid area annual forb	Arizona poppy Restoration WSI
<u>Mentzelia pumila</u> Arid area forb	Stick-leaf, blazing star Present
<u>Psilostrophe cooperi</u> Arid area forb	Paper flower daisy Restoration
<u>Stephanomeria pauciflora</u> Arid area forb	Desert straw Restoration
<u>Acacia greggii</u> Arid area shrub	Cat-claw acacia, Uña de Gato Restoration WSI
<u>Allenrolfea occidentalis</u> Arid area shrub	Iodine bush Restoration
<u>Ambrosia deltoidea</u> Arid area shrub	Bursage Restoration WSI (Arid)
<u>Ambrosia deltoidea</u> Arid area shrub	Bursage Restoration WSI
<u>Atriplex canescens</u> Arid area shrub	Four-wing salt-bush Present
<u>Atriplex lentiformis</u> Arid area shrub	Quail bush Present WSI
<u>Atriplex polycarpa</u> Arid area shrub	Cattle spinach Restoration WSI
<u>Baccharis sarothroides</u> Arid area shrub	Desert Broom Present WSI
<u>Celtis pallida</u> Arid area shrub (can tolerate moist soils)	Desert hackberry Restoration WSI
<u>Datura meteloides</u> Arid area shrub	Desert thorn apple Present
<u>Hymenoclea monogyra</u> Arid area shrub	Burrobrush Present WSI
<u>Larrea tridentata</u> Arid area shrub	Creosote bush Present WSI

<u>Lycium sp.</u> Arid area shrub	Wolfberry Present	WSI Rip & Arid
<u>Proboscidea parviflora</u> Arid area shrub	Devil's claw Restoration	
<u>Zizyphus obtusifolia</u> Arid area shrub	Graythorn Restoration	WSI Rip & Arid
<u>Prosopis glandulosa</u> Upland area tree	Honey mesquite Restoration	
<u>Prosopis juliflora var. velutina</u> Upland area tree	Velvet mesquite Present	
<u>Cercidium floridum</u> Arid area tree (Typical of washes)	Blue Palo Verde Present	
<u>Cercidium microphyllum</u> Arid area tree	Little leaf Palo Verde Restoration	WSI
<u>Olneya tesota</u> Arid area tree	Desert Iron wood Restoration	
<u>Amaranthus palmeri</u> Mesquite bosque perennial grass	Palmer's amaranth Restoration	
<u>Hilaria rigida</u> Mesquite bosque/CTW understory perennial	Big galleta Restoration	
<u>Sitanion hystrix</u> Mesquite bosques perennial grass	Squirrel-tail Restoration	
<u>Sporobolus wrightii</u> Mesquite bosques perennial grass	Sacaton Restoration	
<u>Eriogonum fasciculatum</u> Riparian area ground cover	Buckwheat Restoration	WSI Rip
<u>Abutilon parvulum</u> Mesquite bosque understory forb	Small-leaved Abutilon Restoration	
<u>Amaranthus fimbriatus</u> Mesquite bosque/CTW understory forb	Fringed amaranth Restoration	
<u>Aristolochia watsoni</u> Mesquite bosque/CTW perennial forb	Indian root Restoration	

<u>Baileya multiradiata</u> Riparian annual forb	Desert marigold Restoration WSI
<u>Brickellia coulteri</u> Mesquite bosque understory forb	Brickellia Restoration
<u>Clematis drummondii</u> Mesquite bosque/CTW understory forb	Clematis, Virgin's bower Restoration WSI
<u>Cucurbita foetidissima</u> Mesquite bosque/CTW understory forb	Buffalo gourd Restoration WSI
<u>Panicum obtusum</u> Mesquite bosque understory forb	Vine mesquite Restoration
<u>Cucurbita digitata</u> Mesquite bosque/CTW perennial vine	Coyote melon Restoration WSI
<u>Lycium exsertum</u> Riparian shrub	Wolfberry Present WSI (Rip & Arid)
<u>Lycium sp.</u> Riparian area shrub	Wolfberry Present WSI Rip & Arid
<u>Maurandya antirrhiniflora</u> Mesquite bosque/CTW understory vine	Blue snapdragon vine Restoration
<u>Sarcostemma sp.</u> Mesquite bosques vine	Climbing milkweed Restoration
<u>Vitis arizonica</u> Mesquite bosque vine	Arizona grape Restoration WSI
<u>Ambrosia ambrosiodes</u> Riparian area shrub	Large leaf bursage Restoration WSI
<u>Baccharis salicifolia</u> Riparian area shrub	Seepwillow Present
<u>Haplopappus laricifolius</u> Riparian area shrub	Burrobush Restoration WSI
<u>Hymenoclea monogyra</u> Riparian area shrub	Burrobrush Present WSI
<u>Suaeda torreyana</u> Riparian shrub	Desert seepweed Present Indicator of saline

<u>Zizyphus obtusifolia</u> Riparian area shrub	Graythorn Restoration WSI Rip & Arid
<u>Chilopsis linearis</u> Riparian area tree	Desert willow Restoration
<u>Populus fremontii</u> Riparian area tree	Fremont cottonwood Present
<u>Salix gooddingii</u> Riparian area tree	Goodding willow Present
<u>Sambucus mexicana</u> Riparian area tree (moist soils)	Mexican elderberry Present WSI
<u>Prosopis glandulosa</u> Riparian area tree	Honey mesquite Restoration
<u>Prosopis juliflora var. velutina</u> Riparian area tree	Velvet mesquite Present
<u>Arundo donax</u> Streamside emergent	Giant reed Restoration
<u>Juncus sp.</u> Streamside emergent	Rush Restoration
<u>Scirpus sp.</u> Streamside emergent	Bulrush Restoration
<u>Typha domingensis</u> Streamside emergent	Southern cat-tail Restoration
<u>Distichlis spicata</u> Streamside perennial grass (Rhizomous)	Desert saltgrass Restoration
<u>Leptochloa uninervis</u> Streamside annual grass	Mexican sprangletop Restoration
<u>Muhlenbergia rigens</u> Streamside bunch grass	Deer grass, muhly Restoration
<u>Paspalum distichum</u> Streamside perennial grass (Rhizomous)	Knotgrass Restoration
<u>Aster spinosus</u> Streamside forb	Spiny aster Restoration

Castilleja minor
Streamside forb

Indian paint brush
Restoration

Erigeron divergens
Streamside forb

Spreading fleabane, wild-daisy
Restoration

Polygonum fusiforme
Streamside forb

Smart weed
Restoration

Polygonum interruptus
Streamside forb

Ditch polypogon
Restoration

Tessaria sericea
Streamside forb

Arrowweed
Present

Vioulera annua
Streamside forb

Annual golden eye
Restoration

Equisetum sp.
Streamside herbaceous

Horsetials, scouring rushes
Restoration

Phragmites australis
Streamside herbaceous

Common reed
Restoration

Tidestromia lanuginosa
Streamside herbaceous

Woolly tidestromia
Restoration

APPENDIX G

Ownership documents are not
available and will be submitted
as an addenda to this report.

APPENDIX H



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

ECOLOGICAL SERVICES
3616 W. Thomas, Suite 6
Phoenix, Arizona 85019

December 22, 1989

Colonel Charles Thomas
District Engineer
Attn: Regulatory Branch
P.O. Box 2711
Los Angeles, California 90053-2325

Re: Public Notice 89-272-CL

Dear Colonel Thomas:

The Fish and Wildlife Service (Service) has reviewed Public Notice 89-272-CL dated November 30, 1989. The City of Tempe has requested a Department of the Army (Corps) Section 404 permit to construct a bank stabilized floodway, grade control structures, and instream lakes in the Salt River at the Rio Salado District limits east of McClintock Drive to 48th Street, Tempe, Maricopa County, Arizona.

This report was prepared under the authority of and in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). It represents the coordinated views of the Department of the Interior. The recommendations in this report have been coordinated with the Arizona Game and Fish Department.

The proposed project includes construction of a bank stabilized floodway, grade control structures, and instream lakes. In addition, construction features such as material stockpiles, temporary access facilities, temporary roads, temporary diversion dikes, retaining walls, and headwalls will be included in the project area.

The project area is characterized as an ephemeral river with flows regulated by upstream releases from six dams operated by the Salt River Project. The Salt River is generally dry although occasional flows during the last 10 years have exceeded 150,000 cubic feet per second. The project area is dominated by large expanses of cobble and rubble, 113 acres of desert scrub, and 23 acres of cottonwood/honey mesquite. This area is part of a continuous wildlife corridor in the Salt River that provides foraging and/or breeding habitat for Gambel's quail, desert cottontail, verdin, red-tailed hawk, and other migratory birds. These areas provide some of the last remaining habitat for many

resident and migratory birds, mammals, and reptiles in urban environments and should be considered important amenities for public use activities such as wildlife observation.

The Service recognizes the opportunity to restore conditions of a desert riparian river system with all its recreational and aesthetic benefits to the public and to fish and wildlife resources is great and should be taken in consideration with the Rio Salado Project concept. However, this project must comply with the Environmental Protection Agency (EPA) 404(b)(1) Guidelines. Compliance with these Section 404(b)(1) Guidelines can be further addressed by the EPA.

The Department of the Interior has no objection to issuance of the subject permit provided that the following eleven special conditions are included in the subject permit:

1. The applicant will provide 13 acres of contiguous honey mesquite habitat or the equivalent and create a riparian habitat along the braided portion of the Salt River channel that will contain perennial water from Mill Avenue to 48th Street. This area will be designated as a wildlife refuge area as described on the Tempe Rio Salado Park Map adopted by city council on March 16, 1989, and be limited in use to activities that will not adversely affect the riparian habitat or fish and wildlife. This wildlife refuge area will be maintained by the applicant or the applicant's designee for the life of the project;

2. A revegetation plan for the above described mitigation will be developed by the applicant; coordinated with and subject to approval by the Service, the Arizona Game and Fish Department (Department), and the District Engineer upon commencement of the channelization activity. In addition, the applicant will be required to coordinate with the Nature Conservancy and the Center for Environmental Studies at Arizona State University for expertise on riparian restoration methodology. As a minimum, this plan will include information on soils analysis, site selection, implementation schedule, site preparation, species composition and density, planting methods, water availability, watering methods, plant survival, guarantee period, weeding, pre- and post-project photodocumentation, and annual and final reports;

3. The applicant will use native vegetation exclusively throughout the project area in all landscape applications and mitigation requirements and maintain the removal of non-natives such as salt cedar and Russian thistle for the life of the project. Naturally occurring native vegetation will remain with growth encouraged unless adversely effecting the project

purpose. Native vegetation removal will be coordinated by the Service and the District Engineer;

4. All waters entering the project area must comply with State of Arizona water quality standards, and where point discharge is evident, compliance with the EPA National Pollutant Discharge Elimination System will be satisfied;

5. The channelization of the Salt River in the project area will not increase the velocity or adversely change the quality of the water that flows downstream from the project area;

6. The construction or establishment of any commercial or private development along the reclaimed Salt River channel will not be used as further justification for future upstream flood control projects;

7. On sheet 3 of 4 in the Public Notice illustrating Typical Cross Section, the soil cement dike design as discussed in the meeting with the applicant on December 5, 1989, will be changed to a single vertical structure with no horizontal section and a 3:1 rock gabion vertical dike replacing the outside soil cement vertical structure as pictured;

8. In order to maintain the integrity of the Salt River as a wildlife movement corridor throughout the project area, the applicant will plant emergent vegetation such as roundstem bulrush and cattails along one side of the instream lakes as illustrated in the fore-mentioned Tempe Rio Salado Park Map;

9. A sufficient resolution addressing the concerns and meeting the needs of public health and potential environmental contamination from the EPA superfund site located upstream from the project area between Hayden Road and Price Road adjoining the Salt River channel will be adopted;

10. Development and implementation of the fishing program proposed within the project area will be subject to coordination with and approval of the Service and the Department; and

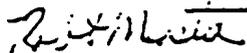
11. The channel bottom will contain a graded or incised low flow channel as recommended by the City of Tempe and approved by the District Engineer.

Please provide this office with a copy of the issued permit as soon as it is available. As a reminder, the national and local Memoranda of Agreement between the Army Corps of Engineers and the Fish and Wildlife Service specifies that written notification is required through the Notice of Intent to Issue

process if these recommended conditions are not incorporated into the subject permit.

If we can be of further assistance, please contact Jeff Krausmann or Sam F. Spiller (Telephone: 602/379-4720).

Sincerely,



Robert Mesta
Acting Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque,
New Mexico (FWE/HC)
Director, Arizona Game and Fish Department, Phoenix,
Arizona
Regional Supervisor, Arizona Game and Fish Department,
Mesa, Arizona (Attn: Dave Walker)
Regional Administrator, Environmental Protection Agency,
Region IX, San Francisco, California (Wetlands W-7-2)
(Attn: Mary Butterwick)
Director, Arizona Department of Environmental Quality,
Phoenix, Arizona (Attn: Ed Swanson)
City of Tempe, Planning and Zoning, Tempe, Arizona
(Attn: Steve Nielsen)
Regulatory Branch, Army Corps of Engineers, Arizona Area
Office, Phoenix, Arizona (Attn: Robert Dummer)
William P. Belt, Arizona Department of Transportation,
Environmental Planning Services, 205, South 17th Avenue,
Room 240 E, Phoenix, Arizona 85007
Director, Center for Environmental Studies, Arizona State
University, Tempe, Arizona 85287-1201



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

ECOLOGICAL SERVICES
3616 W. Thomas, Suite 6
Phoenix, Arizona 85019

MAR 27

March 23, 1990

Colonel Charles Thomas
District Engineer
Attn: Regulatory Branch
P.O. Box 2711
Los Angeles, California 90053-2325

OK

Re: Public Notice 90-105-CL

Dear Colonel Thomas:

The Fish and Wildlife Service (Service) has reviewed Public Notice 90-105-CL dated February 22, 1990. The City of Tempe has requested a Department of the Army (Corps) Section 404 permit to construct a bank stabilized floodway and grade control structures in the Salt River at McClintock Drive to just west of Mill Avenue, Tempe, Maricopa County, Arizona.

This report was prepared under the authority of and in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). It represents the coordinated views of the Department of the Interior. The recommendations in this report have been coordinated with the Arizona Game and Fish Department.

The proposed project includes construction of a bank stabilized floodway and grade control structures. In addition, construction features such as material stockpiles, temporary access facilities, temporary roads, temporary diversion dikes, retaining walls, and headwalls will be included in the project area.

The project area is characterized as an ephemeral river with flows regulated by upstream releases from six dams operated by the Salt River Project. The Salt River is generally dry although occasional flows during the last 10 years have exceeded 150,000 cubic feet per second. The project area is dominated by large expanses of cobble and rubble, 113 acres of desert scrub, and 23 acres of cottonwood and mesquite. This area is part of a continuous wildlife corridor in the Salt River that provides foraging and/or breeding habitat for Gambel's quail, desert cottontail, verdin, red-tailed hawk, and other migratory birds.

These areas provide some of the last remaining habitat for many resident and migratory birds, mammals, and reptiles in urban environments and should be considered important amenities for public use activities such as wildlife observation.

The Service recognizes the opportunity to restore a desert riparian river system with all its recreational and aesthetic benefits to the public and to fish and wildlife resources is great and should be taken in consideration with the Rio Salado Project concept. However, this project must comply with the Environmental Protection Agency (EPA) 404(b)(1) Guidelines. Compliance with these Section 404(b)(1) Guidelines will be further addressed by the EPA.

The Department of the Interior has no objection to issuance of the subject permit provided that the following eight special conditions are included in the subject permit:

1. The applicant, in conjunction with Howard, Needles, Tammen and Bergendoff Architects/Engineers/Planners is currently developing a comprehensive wildlife mitigation plan for the Tempe Rio Salado Project. A preliminary Wildlife Habitat Masterplan (PWHM) has been submitted to the Service and will be followed by a detailed mitigation report subject to approval by the Service, the Arizona Game and Fish Department (Department), and the District Engineer before commencement of the channelization activity. As a minimum, this detailed mitigation report will include information on soils analysis, site selection, implementation schedule, site preparation, species composition and density, planting methods, water availability, watering methods, plant survival, guarantee period, weeding, pre- and post-project photodocumentation, and annual and final reports. This mitigation plan will continue to be coordinated with Arizona State University Center for Environmental Studies, the Department and the Service;

2. The applicant will provide the appropriate documentation and a detailed map of the mitigation site boundaries and proof of ownership, lease or rights to use;

3. As part of this proposed wildlife mitigation plan the applicant will provide a minimum of 13 acres of contiguous velvet mesquite habitat or the equivalent in the area indicated in the PWHM (Figure #7, PWHM) upon commencement of the channelization activity. In addition, the applicant will develop riparian habitat along the Salt River Channel as described in detail in the PWHM;

4. Mitigation areas will not be available for unsupervised public use until after a period of habitat establishment. This habitat establishment period will consist of a minimum of five years with site inspections by the Service, the District Engineer and the Department;

5. A restriction in an interagency agreement or a deed restriction will be implemented to insure all mitigation areas will be limited in use to activities that will not adversely affect the riparian habitat or fish and wildlife and will be maintained by the applicant or the applicant's designee for the life of the project;

6. The applicant will use native vegetation exclusively throughout the project area in all landscape applications and mitigation requirements and maintain the removal of non-natives such as salt cedar and Russian thistle for the life of the project. Naturally occurring native vegetation will remain with growth encouraged unless adversely affecting the project purpose. Native vegetation removal will be coordinated by the Service and the District Engineer;

7. The channelization of the Salt River in the project area will not increase the velocity or adversely change the quality of the water that flows downstream from the project area;

8. The construction or establishment of any commercial or private development along the reclaimed Salt River channel will not be used as further justification for future upstream flood control projects.

Please provide this office with a copy of the issued permit as soon as it is available. As a reminder, the national and local Memoranda of Agreement between the Army Corps of Engineers and the Fish and Wildlife Service specifies that written notification is required through the Notice of Intent to Issue process if these recommended conditions are not incorporated into the subject permit.

If we can be of further assistance, please contact Jeff Krausmann or Sam F. Spiller, Field Supervisor (Telephone: 602/379-4720).

Sincerely,

Lesley A. Fitzpatrick

Lesley A. Fitzpatrick
Acting Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque,
New Mexico (FWE/HC)
Director, Arizona Game and Fish Department, Phoenix,
Arizona (Attn: Dave Walker)
Regional Supervisor, Arizona Game and Fish Department,
Mesa, Arizona (Attn: Joan Scott)
Regional Administrator, Environmental Protection Agency,
Region IX, San Francisco, California (Wetlands W-7-2)
(Attn: Mary Butterwick)
Director, Arizona Department of Environmental Quality,
Phoenix, Arizona (Attn: Ed Swanson)
City of Tempe, Planning and Zoning, Tempe, Arizona
(Attn: Steve Nielsen)
Regulatory Branch, Army Corps of Engineers, Arizona' Area
Office, Phoenix, Arizona (Attn: Cindy Lester)
Manager, Environmental Planning Services, Arizona
Department of Transportation, 205 South 17th Avenue,
Room 240 E, Phoenix, Arizona 85007
Director, Center for Environmental Studies, Arizona State
University, Tempe, Arizona 85287-1201

GLOSSARY OF TERMS

ADOT - The Arizona Department of Transportation

CES - The Arizona State University Center for Environmental Studies

Park or Rio Salado Park - The planning overlay district adopted by the Tempe City Council on March 16, 1989 (Resolution 89.11). The park boundaries generally include all land areas between Hohokam Freeway and Price Road.

Project - The activities associated with a Section 404 permit for bank stabilization and erosion control in the Salt River, pursuant to Public Notice 90-105-CL requested from the U.S. Army Corps of Engineers.

Service - The United States Fish & Wildlife Service, Phoenix, Arizona

DII483.2/sc

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