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GRANITE REEF WASH
FLOOD PREVENTION PROJECT

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CITY OF SCOTTSDALE
SCOTTSDALE, ARIZONA

AND

EAST MARICOPA NATURAL RESOURCE CONSERVATION DISTRICT

HOHOKAM RESOURCE CONSERVATION & DEVELOPMENT PROJECT

Prepared with assistance from
U.S. Department of Agriculture
Soil Conservation Service
Phoenix, Arizona
September, 1975

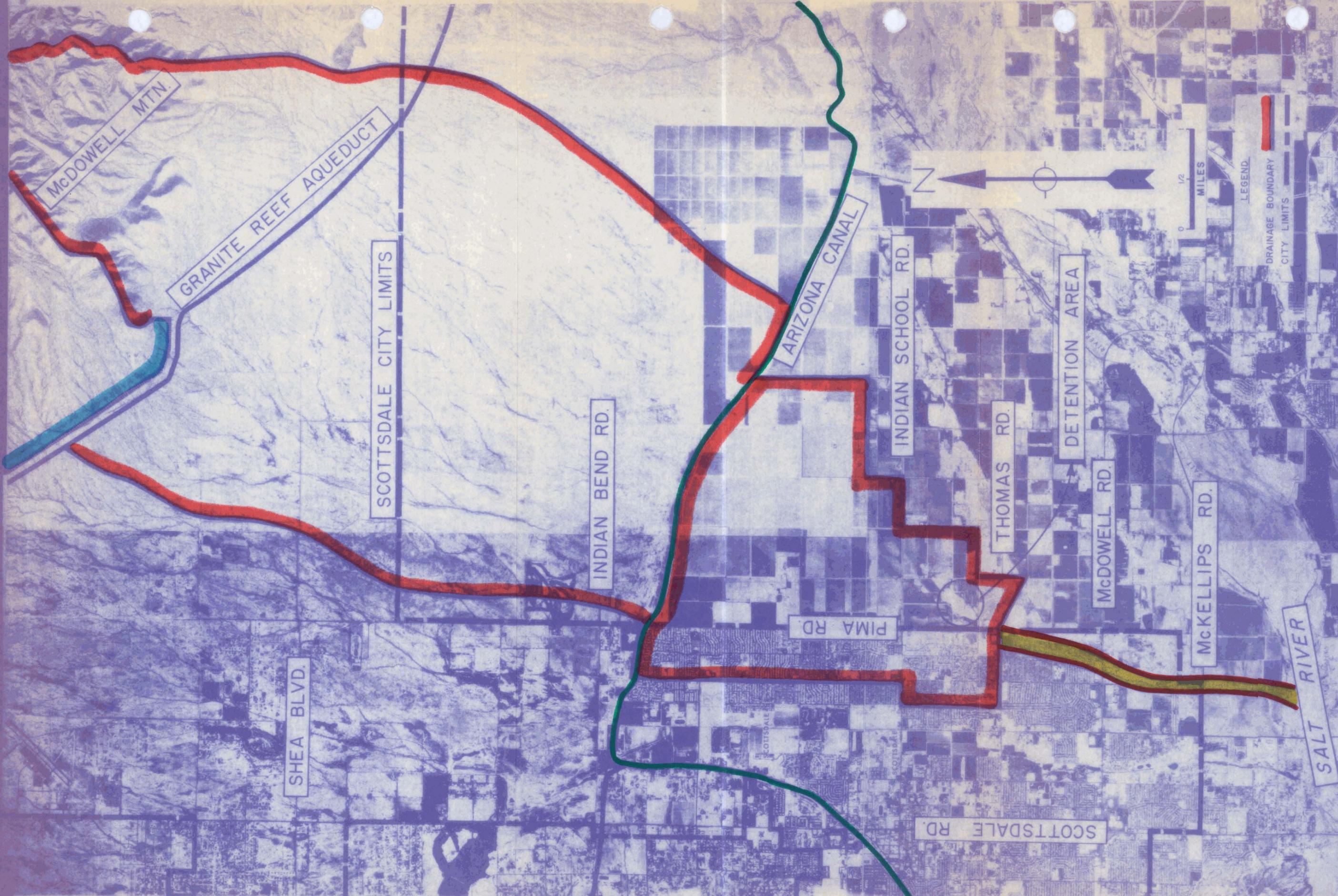
Prepared under the authority of Section 102
of the Food and Agriculture Act of 1962
(Public Law 87-703), and of the Soil Conserva-
tion Act of April 27, 1935, (16 U.S.C.-590a-f)

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I. LAND USE AND SITE MAP



McDOWELL MTN.

GRANITE REEF AQUEDUCT

SCOTTSDALE CITY LIMITS

INDIAN BEND RD.

ARIZONA CANAL

INDIAN SCHOOL RD.

THOMAS RD.

DETENTION AREA

McDOWELL RD.

McKELLIPS RD.

SALT RIVER

SCOTTSDALE RD.

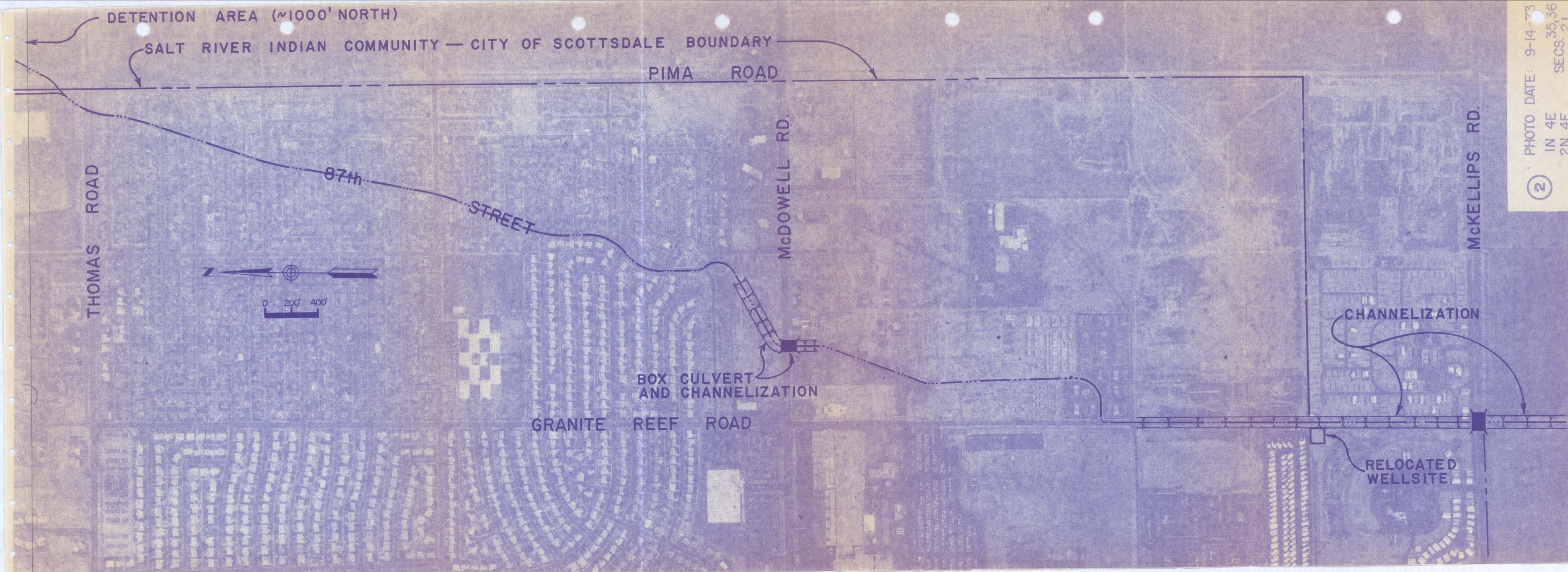


0 1/2 MILES

LEGEND

- DRAINAGE BOUNDARY (thick red line)
- CITY LIMITS (dashed black line)

PHOTO DATE: 9-14-73
IN 4E 35,36
2N 4E SECS. 21
②



DETENTION AREA (~1000' NORTH)

SALT RIVER INDIAN COMMUNITY — CITY OF SCOTTSDALE BOUNDARY

PIMA ROAD

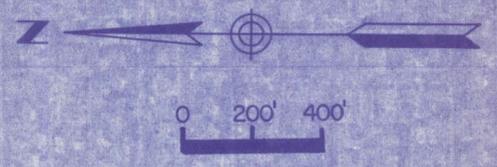
THOMAS ROAD

87th

STREET

McDOWELL RD.

McKELLIPS RD.



CHANNELIZATION

BOX CULVERT AND CHANNELIZATION

GRANITE REEF ROAD

RELOCATED WELLSITE

II. SUMMARY

Granite Reef Wash is tributary to the Salt River at a point 1/2 mile east of Hayden Road. From this point, it runs three miles north and east through the Salt River Indian Community and City of Scottsdale, to the concentration point of the tributary area at the Pima and Thomas Road intersection, thence northeast again into the Salt River Indian Community.

The tributary area is bounded by the Indian Bend Wash tributary area on the west, irrigated cropland on the east, and the Arizona Canal on the north, totaling approximately 8 square miles.

The City of Scottsdale and East Maricopa Natural Resource Conservation District have sponsored this project as a flood prevention measure due to periodic and repeated flooding which has occurred along the wash. The primary objective of this project is to reduce the level of flow in the wash to that capacity which can be developed. The plan calls for construction of a combination of open channels, box culverts and levees which will establish the maximum release rate possible from a proposed detention area upstream of the concentration point at Thomas and Pima Road.

The total cost of the project is over \$700,000, with the majority of the design and contract administration to be done by the City of Scottsdale, with backup technical assistance by the S.C.S. Operation and maintenance will also be the responsibility of the City.

Recreation features may be added as a separate measure in a future phase.

III. PLAN NARRATIVE

A. DESCRIPTION OF THE PLANNING AREA:

Location and History

The concentration point for the area tributary to Granite Reef Wash is at the intersection of Thomas and Pima Roads, as shown on the site map. This tributary area can be divided into two hydrologically independent areas. The smaller of the two is approximately 2 square miles of urbanized land within the City of Scottsdale; the larger portion of the tributary area lies to the east within the Salt River Indian Community; the majority of the 6 sq. mi. area on S.R.I.C. is flood irrigated, sparsely populated, desert farmland. The area is characterized by flat slopes (0.5% or less) falling from north to south.

Historically, the tributary area extended into the McDowell Mountain Range to the north. In the late 1800's, the Arizona Canal was built by the Bureau of Reclamation to supply irrigation water to the Salt River valley. This canal forms a dike, impounding flood waters north of the canal; the area around Pima Road and the Arizona Canal has had a history of canal breaks which pass through the tributary area. The U. S. Corps of Engineers' Indian Bend Wash Project will divert water upstream of the Arizona Canal over to the Indian Bend Wash (a mile west of the Granite Reef Wash). This diversion will, therefore, limit the northern boundary of the

tributary area to the Arizona Canal as shown.

The City of Scottsdale is undertaking an aggressive storm drainage program in the upstream reaches of the tributary area which will divert additional storm water from the Granite Reef Wash west to the Indian Bend Wash. The Granite Reef Wash runs from the Salt River Indian Community at Thomas and Pima southwest two miles through urbanized area within the City of Scottsdale. As the wash crosses McKellips Road, it again enters the Salt River Indian Community flowing one mile south to the outfall, the Salt River Bed. The wash consists of inverted crown streets and open earth channels as it passes through the City of Scottsdale to the Salt River Indian Community.

Hydrology and Climate*

Granite Reef Wash contains flows only during and immediately after storms. Three types of storms produce rain in the area: general winter storms, general summer storms, and local thunderstorms. Most floods are "flash floods" as the result of thunderstorm rainfall that occurs unexpectedly with little or no time to warn affected communities of impending danger to life and property. The natural stream channels are shallow, poorly defined, and inadequate to carry storm waters through urbanized areas without damage. Increased urban encroachment on the flood plain further aggravated the flood problems along the wash.

a. Other than immediately following the heavier rains, little streamflow occurs in Granite Reef Wash because climatic and drainage-area characteristics are not conducive to continuous runoff. A series of variable-length, parallel, ephemeral streams descend from the slopes of the mountains to the alluvial plains, where the channels are poorly defined and braided. The series of parallel streams in the upper reaches of the tributary areas feed into Granite Reef Wash, which carries floodwaters to the Salt River in its very wide, shallow cross section. Some runoff is lost to channel percolation in the wash. There are no stream flow records for this wash.

Climate
b. The arid and subtropical climate is characterized by short, mild winters with clear days and cool nights; long hot summers (with daytime temperatures usually exceeding 100 degrees Fahrenheit); low annual rainfall; low relative humidity; and a high water evaporation rate. The 90-year mean annual precipitation ranges from about 7.8 inches per year at the Salt River to about 14.0 inches per year in the higher mountains. The rainfall is divided about equally between the summer and winter seasons. Mean maximum and minimum January temperatures range from approximately 65 to 35 degrees Fahrenheit in the valley and from about 50 to 25 degrees in the mountains. Mean daily temperatures during July vary from 105 to 75 degrees in the lower portions of the region and from 90 to 60 degrees in the higher mountains. Although prevailing winds are generally rather light, moderate winds often occur in conjunction with general winter storms, particularly in the higher elevations, and in the spring when low pressure develops over Nevada. Summer thunderstorms often produce strong gusty winds over local areas.*

*Extracted in part from Indian Bend Wash - Design Memorandum No. 2
(Los Angeles District, U.S.C.E., May, 1975)

Problems and Potentials; Economic Evaluation, Benefits and Effects

Historically, the area has experienced extensive flooding causing damage to residential and commercial development in the urbanized area; the irrigation system running along and across the southern reach of the wash has been repeatedly damaged by floodwaters. In addition, because the wash runs generally north to south, the areas on the east side of this wash have been periodically severed from the larger portion of the City to the west.

The City is presently installing a \$400,000 forty-eight inch storm drain below 87th Street to provide improved access across the inverted crown street reach of the wash. Also, as mentioned previously, the City of Scottsdale has budgeted more than \$2,000,000 for storm drains which would divert water from the urban tributary area to the north. The larger portion of the tributary area will, however, continue to drain to the Granite Reef Wash which has, at present, the potential for severe repeated flood damage.

This project would increase the capacity of the wash through the City of Scottsdale and Salt River Indian Community. Since this capacity is limited and less than the tributary area has the potential for generating, the project includes a flood detention structure to meter flows out at the rate determined by the limited capacity downstream.

The potentials for development of a flood detention area, both for the Salt River Indian Community and the City of Scottsdale, appears to far outweigh any possible problems. From an economic, social and environmental perspective, the results of such an effort would prove beneficial to all concerned. Further, this preferred site offers many less problems than may be expected at any alternative locations.

The following summary analysis describes the foreseeable assets and/or liabilities involved in this project:

<u>ASSESSMENT FACTORS</u>	<u>POTENTIALS</u>	<u>PROBLEMS</u>
Land Use	Maintain existing use of cropland, pastureland; production potential increased due to management of drainage and availability of irrigation water.	
Economic	Flood damage reduction. Improved home value for downstream residents. Potential for extended recreational development can provide economic benefits to Indian Community. Provision of increased level of irrigation water for Indian Community.	

ASSESSMENT FACTORS

POTENTIALS

PROBLEMS

Social

Protection of residential and industrial population.

Possible safety problem if neighborhood children have access.

Recreation

Planting grasses on earthen dam and surrounding borrow area will provide compatible open space/recreation area.

May be stocked for fishing and/or used for small boats.

Potential toxic chemicals from agriculture may prohibit fish habitat.

Landscape Quality

Positive water-land relationships.

Will need to provide vegetative buffer area along Pima Rd.

Adjacent landscape (crop-land and mountains) offers excellent opportunity for scenic vistas.

Fish/Wildlife

By providing adequate ground cover and plant material near water's edge, may provide diversified habitat near urban environment.

Depending on water quality, may provide biological productivity, especially fish habitat.

Cost of providing vegetative cover and future maintenance.

Must provide balanced ecological system to avoid such problems as high insect population, stagnation, etc.

Water Management (Including erosion/sediment, agricultural pollutants, drainage, irrigation)

Improvement of channelizing water across Pima Road.

Controlled runoff.

Provide groundwater recharge.

If not chemically toxic, may provide livestock watering pond.

Reduced erosion and deposition downstream.

Reduced flooding on agriculture lands south of McKellips.

Agricultural pollutants may affect groundwater quality and potential water uses.

Sediment buildup will require periodic cleaning

ASSESSMENT FACTORS

POTENTIALS

PROBLEMS

Air Quality

Provision of landscaping along Pima will improve noise and air quality problems from traffic.

Initial production of noise and particulate matter during construction.

Soil Information:

A comprehensive soil survey has been conducted by the S.C.S. in cooperation with Arizona Agricultural Experiment Station. For detailed soils information, refer to Soil Survey - Eastern Maricopa and Northern Pinal Counties Area, Arizona, November, 1974.

B. MEASURE SPONSOR'S OBJECTIVES - PRIMARY AND SECONDARY:

Primary - (1) Decrease flood peaks to manageable levels through the use of a detention basin located at the concentration point on undeveloped property (see site map).

(2) Provide 100 year flood protection with channelization and flood proofing of areas adjacent to the wash. This may include levees, open channels, and underground drains.

(3) Provide emergency vehicle access.

Secondary - (1) Recharge the ground water basin with flood waters.

(2) Preserve existing vegetation and wildlife habitats where feasible.

C. ALTERNATIVES CONSIDERED:

Alternative locations for the detention basin have been examined. The City has a park south and west of the chosen site which was considered for use as a detention area. The problems involved with the diversion of large quantities of water and relocation of existing park facilities make this site marginally acceptable. The remainder of the area near the concentration point is either residentially or industrially developed.

Because of urban encroachment, relocating or "green belting" the wash is considered unfeasible. The only recourse available is to make the most hydraulically efficient use of the channel as it exists. The resulting capacity of the system is less than the 100 year storm level (the desired level of protection); therefore, peak flows will be reduced at the concentration point to manageable levels.

D. INSTALLATION:

Open channel will be constructed south of McKellips Road to the Salt River channel (4500 L.F.), and the existing open channel north of McKellips will be enlarged to an existing S.R.P. well site (1300 L.F.). The well site will be relocated approximately 50 feet west to remove the severe obstruction that now exists at this point in the channel.

The channel is developed from this well site north to just south of McDowell, although levees may be required in portions of this reach which lack capacity.

At McDowell Road, a single 8' x 5' box culvert and poorly defined dip section control the capacity of the upstream system. This program would include constructing a concrete flume past an existing well site south of McDowell; adding an additional 8' x 10' box, and improving the channel immediately upstream. The upstream channel takes two 90° turns, winding its way from where the wash leaves 87th Street to the McDowell crossing. The realignment of the existing channel would return the channel to its natural location.

From where the wash leaves 87th Street upstream to the Thomas and Pima intersection, the wash has been developed as an inverted crown roadway with a 48" underground storm drain. Additional channel work is not possible through this area which is totally developed. The maximum capacity without flooding in this reach of the wash will establish the release rate possible from the proposed detention area upstream. Preliminary studies indicate that 70 to 100 ac.-ft. of storage will cut the peak flows in half. The detention area proposed would accept waters primarily from the agricultural portion of the watershed.

Right-of-way for all construction would be secured by drainage easements or fee title.

Local financing will be primarily by the City of Scottsdale; State and Maricopa County Flood Control District funds may also be available. The City will provide a portion of the local share of the costs, by preparation of the studies, detailed plans and specifications. Administration of the contracts will be handled by the City of Scottsdale. The quantity and value of this work will be determined by mutual agreement immediately prior to the signing of the project or engineering services agreement, and will be set forth in the agreement.

Table I summarizes preliminary cost estimates for the various portions of the work.

TABLE I
INSTALLATION COSTS

DESCRIPTION OF WORK	C O S T S				TOTAL
	PLANNING AND ADMN.	DESIGN	RIGHT-OF-WAY	CONST.	
Salt River to McKellips	\$ 2,500	\$ 8,500	\$ 50,000	\$ 65,000	\$126,000
McKellips to Well Site	500	2,500	-0-	20,000	23,000
S.R.P. Well Site	1,000	6,000	-0-	45,000	52,000
McDowell Crossing & Channelization	2,000	5,000	65,000	40,000	112,000
Detention Area	5,000	15,000	155,000	100,000	275,000
TOTAL	\$ 11,000	\$37,000	\$ 270,000	\$270,000	\$588,000
			Contingency (20%)		118,000
			TOTAL		\$706,000

E. OPERATION AND MAINTENANCE:

The City of Scottsdale will be responsible for the operation and maintenance of the improvements installed. An operation and maintenance agreement will be entered into between the City of Scottsdale and the S.C.S. setting forth operation and maintenance requirements prior to execution of a project or engineering services agreement. Operation and maintenance work will normally include such actions as clearing and grubbing the detention area and channels, repairing dikes, and patching street sections.

Inspection of the improvements will be made annually by the City of Scottsdale, East Maricopa Natural Resource Conservation District, and the Soil Conservation Service for a period of three years. Annual inspections after the third year will be made by the City of Scottsdale. Inspection reports will be supplied to the Soil Conservation Service annually. Upon request, the Hohokam Resource Conservation and Development Project will provide technical assistance for needed maintenance work.

F. UNIFORM RELOCATION ASSISTANCE AND REAL PROPERTY ACQUISITION ACT:

The costs of relocation payments will be shared by the measure sponsor and the Service.

Investigation has disclosed that under present conditions, the R.C. & D. measures will not result in the displacement of any person, business, or farm operation. However, if relocations become necessary, relocation payments will be cost shared in accordance with mutually acceptable percentages.

