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FINAL

APACHE JUNCTION-GILBERT WATERSHED

ARIZONA

SUPPLEMENTAL WATERSHED PLAN AGREEMENT NO. 2

AND

SUPPLEMENTAL WATERSHED PLAN NO. 2

JUNE 1978

A303.903

SUPPLEMENTAL WATERSHED PLAN AGREEMENT NO. 2

between the

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

BOARD OF SUPERVISORS OF PINAL COUNTY

EAST MARICOPA NATURAL RESOURCE CONSERVATION DISTRICT

(Referred to herein as Sponsors)

State of Arizona

and the

SOIL CONSERVATION SERVICE

United States Department of Agriculture

(Hereinafter referred to as SCS)

Whereas, the Watershed Plan Agreement for the Apache Junction-Gilbert Watershed, State of Arizona, executed by the Sponsors named therein and the SCS, became effective on the 13th day of May 1963; and

Whereas, a Supplemental Watershed Plan Agreement for the Apache Junction-Gilbert Watershed, State of Arizona, executed by the Sponsors named therein and SCS, modifying said Watershed Plan Agreement became effective on the 1st day of March 1967; and

Whereas, in order to carry out the watershed plan for said watershed, it has become necessary to modify said Watershed Plan Agreement, as supplemented; and

Whereas, the State of Arizona, by legislative action of Senate Bill 1053, dated March 24, 1972, changed the names of the Soil Conservation Districts under its jurisdiction to Natural Resource Conservation Districts; and

Whereas, the Congress in establishing the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646) has placed further responsibilities upon the Sponsors and SCS; and

Whereas, it has been found necessary to modify the watershed plan by changing the capacity of the Roosevelt Water Conservation District Floodway; and

Whereas, a supplemental watershed plan which modifies the watershed plan, dated January 1963, for said watershed has been developed through the cooperative efforts of the Sponsors and SCS; which plan is annexed to and made a part of this agreement:

Now, therefore, the Sponsors and SCS hereby agree upon the following modifications of the terms, conditions, and stipulations of said watershed plan agreement, as supplemented:

1. The name of the East Maricopa Soil Conservation District is changed to East Maricopa Natural Resource Conservation District.

2. Paragraph number 1 is modified to read as follows:
   The Sponsors will acquire, with other than P.L. 566 funds, such land rights as will be needed in connection with the works of improvement (estimated cost $2,684,500).

3. Paragraph number 3 is modified to read as follows:
   The total construction cost will be borne by SCS (estimated cost $5,051,500).

4. Paragraph number 4 is modified to read as follows:
   The total engineering cost will be borne by SCS (estimated cost $515,300).

5. Paragraph number 5 is modified to read as follows:
   The Sponsors and SCS will each bear the cost of Project Administration which it incurs (estimated cost $53,700 and $883,900 respectively).

6. Paragraph number 12 is modified to read as follows: This plan may be amended, revised, or terminated only by mutual agreement of the parties hereto except that SCS may terminate financial and other assistance in whole, or in part, at any time it determines that the Sponsors have failed to comply with the conditions of this agreement. In this case, SCS shall promptly notify the Sponsors in writing of the determination and the reasons for the termination, together with the effective date. Payments made to the Sponsors or recoveries by SCS under the projects terminated shall be in accord with the legal rights and liabilities of the parties. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between the SCS and the sponsor(s) having specific responsibilities for the particular structural measure involved.

7. A paragraph number 15 is added as follows: The Sponsors assure that comparable replacement dwellings will be available for individuals and persons displaced from dwellings, and will provide relocation assistance advisory services and relocation assistance, make the relocation payments to displaced persons, and otherwise comply with the real property acquisition policies contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646, 84 Stat. 1894) effective as of January 2, 1971, and the Regulations issued by the Secretary of Agriculture pursuant thereto. The costs of relocation payments will be shared by the Sponsors and the SCS as follows:

	Sponsors (Percent)	SCS (Percent)	Estimated Relocation Payment Costs (Dollars)
Relocation Payments:	34.4	65.6	27,800

8. A paragraph number 16 is added as follows:
The program conducted will be in compliance with all requirements respecting nondiscrimination as contained in the Civil Rights Act of 1964, as amended, and the regulations of the Secretary of Agriculture (7 CFR 15.1-15.12), which provide that no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any activity receiving federal financial assistance.

9. A paragraph number 17 is added as follows:
The Maricopa County Board of Supervisors recently approved changes to the subdivision regulations that require detention facilities be included in all new subdivision plats to detain a 100-year, two-hour storm. The Board of Supervisors will enforce these regulations in such a manner that the volume of storm water to be stored, for the area between the system of floodwater retarding structures and the Roosevelt Water Conservation District Floodway will equal or exceed one (1) inch over the newly developed area.

The Sponsors and SCS further agree to all other terms, conditions, and stipulations of said Watershed Plan Agreement, as supplemented, not modified herein.

Flood Control District of Maricopa County By Hawley Atkinson
3335 W. Durango Street
Phoenix, Arizona 85009

Title CHAIRMAN, BOARD OF DIRECTORS

Date MAR 29 1979

The signing of this agreement was authorized by a motion of the governing body of the Flood Control District of Maricopa County adopted at a meeting held on MAR 26 1979

Clerk Rhea Woodall By _____

Board of Supervisors of Pinal County
P. O. Box 827
Florence, Arizona 85232

By Jimmie B. Kerr

Title Chairman
BOARD OF SUPERVISORS
PINAL COUNTY, ARIZONA

Date 4-9-79

The signing of this agreement was authorized by a motion of the governing body of the Board of Supervisors of Pinal County adopted at a meeting held on April 9, 1979

Clerk Jay Bateman Date 4-9-79

East Maricopa
Natural Resource Conservation District
110 North Oregon
Chandler, Arizona 85224

By Jim Miller
Jim Miller

Title Chairman

Date 3-13-1979

The signing of this agreement was authorized by a motion of the governing body of the East Maricopa Natural Resource Conservation District adopted at a meeting held on March 13, 1979

Clerk Mark W. Weber Date 3/13/79

Appropriate and careful consideration has been given to the environmental statement prepared for this project and to the environmental aspects thereof.

Soil Conservation Service
United States Department of Agriculture

Approved by:

Thomas G. Rockenbaugh

Thomas G. Rockenbaugh
State Conservationist

4-18-79

Date

FINAL

SUPPLEMENTAL WATERSHED PLAN NO. 2

APACHE JUNCTION-GILBERT WATERSHED

Maricopa and Pinal Counties, Arizona

INTRODUCTION

This plan supplement is developed to (1) reflect a Sponsor's name change from the East Maricopa Soil Conservation District to the East Maricopa Natural Resource Conservation District, (2) implement the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, and (3) reflect modification of the Roosevelt Water Conservation District (RWCD) Floodway.

There is no change in purpose or scope.

The status of the land treatment program was assessed. The land treatment measures planned are essentially installed. No changes in the land treatment program are made in this supplement.

The Apache Junction-Gilbert Watershed Plan was approved for operations on May 13, 1963, and supplemented on March 1, 1967.

Of the three structural measures that were proposed in the Work Plan, two have been constructed. They are the Powerline Floodwater Retarding Structure and Powerline Floodway. The RWCD Floodway remains to be constructed.

WORKS OF IMPROVEMENT TO BE INSTALLED

The RWCD Floodway is an interrelated flood control feature of the Buckhorn-Mesa, Apache Junction-Gilbert, and Williams-Chandler Watersheds. This floodway will collect and transport flood flows for about 27 miles through these watersheds.

The RWCD Floodway capacity is to be increased over that shown in the plan. This results from improved evaluation procedures and additional runoff potential due to urbanization.

This supplement modifies the RWCD Floodway within the Apache Junction-Gilbert Watershed. The Williams-Chandler Watershed is also being supplemented. The Buckhorn-Mesa Watershed has been supplemented.

The modification of the RWCD Floodway in the Apache Junction-Gilbert Watershed will include enlarging and deepening of about seven miles of existing floodway. The improvement of the existing floodway extends from Apache Boulevard, the northern boundary of the watershed, to Ray Road, the northern boundary of the Williams-Chandler Watershed. The location is as described in the 1963 watershed plan and is shown on the revised project map.

This floodway is to be constructed primarily as a trapezoidal earthen channel and will have a maintenance road on each side of the floodway. The floodway will be seeded to native grass species. Areas seeded to native grass species will not be irrigated. Pertinent data can be seen on Table 3A (Revised). It is designed to convey floodwaters resulting from a storm occurring on the average of once every 100 years.

From Apache Boulevard to Ray Road, there are six short reaches of floodway lined with rock. Rock lined sections are required for grade control and channel stability.

For the reach of channel between Apache Boulevard and Ray Road, a typical cross section of the present channel has a depth of about 9 feet and a bottom width of 60 feet. Soils encountered in the reach are primarily moderately plastic sandy clays which are generally calcareous and range from stiff to very stiff. Lenses of dense to very dense clayey sand and sandy, clayey silt are common within the clay. Indurated caliche and calcareous siltstone occur beneath these soils. During construction when pockets of soil are encountered that cannot withstand the design velocity, they will be overexcavated and replaced with compacted soils that can withstand the design velocity.

To allow runoff from urban and agricultural lands to enter the floodway, pipe inlets will be placed intermittently along the length of the channel and through the upslope dike which serves as a maintenance road. A collector ditch will convey floodwaters to these pipe inlets. Lined sections of the upslope channel bank will be constructed to allow overland runoff to flow into the floodway. Entrance conditions of large washes into the floodway will be transitional and, where needed, junction structures will be provided. At points where sediment would enter the floodway, sediment traps will be constructed. These structures are planned to collect the annual bedload material before it gets into the main channel. Floodwaters will flow through these structures and on into the floodway. Sediment from large contributing areas will be either deposited in the floodway or a contributing drainageway. The floodway will be maintained to its designed capacity.

In this reach, about 192 acres will be needed for construction. Of this total, about 59 acres are being used for the existing floodway, 90 acres are being used for agricultural purposes, 23 acres have riparian vegetation, and 20 acres have desert vegetation.

Where possible and feasible, excavated material from the floodway will be used for such purposes as: leveling irrigated fields, extending runways at the Williams Air Force Base, raising road fills, filling abandoned gravel pits, and by subdividers for shaping subdivisions and raising pads for housing. There have been indications made at public meetings and by individuals that a substantial portion of the excavated material will be used in these ways. Arrangements for use of the material on individual properties will be made immediately before construction of any segment of the floodway.

That portion of the excavated material that cannot be put to a useful purpose will be placed in designated disposal areas. The maximum depth of material placed will be 10 feet above ground. The disposal areas will be shaped for moisture retention. These areas will be seeded to native grass species at the end of each construction season. Areas seeded to native grass species will not be irrigated. Tree and shrub plantings will follow where necessary or desirable and will be irrigated for two growing seasons or less depending on the species' ability to become established.

The local Sponsors will obtain an easement for placement of the spoil in the designated disposal areas. In these cases, development of the land will be at the discretion of the landowner. Where the land is purchased by the Sponsors, the land may be made available for public or private use or may be sold at the option of the local Sponsors. The Soil Conservation Service and the Sponsors will jointly develop a spoil disposal plan for the project as required for each reach of construction.

There is a need for six disposal areas ranging in size from 8 to 44 acres and totaling about 150 acres. Of this total, 106 acres are presently used for agricultural purposes, 33 acres are in desert shrub, and 11 acres are in riparian vegetation.

Spoil disposal areas are to be mutually agreed to by the Service and the Sponsors. When spoil material excavated from the floodway is to be disposed of outside of agreed to areas, the additional cost of overhaul will be borne by the Sponsors.

Desert riparian vegetation lost will be mitigated. Mitigation of the loss of wildlife habitat due to construction of the floodway will be accomplished by planting desert riparian vegetation within the right-of-way of the floodway and upslope of the collector ditch. This would consist of planting paloverde and ironwood trees and seeding native grass species on 20 acres of land. Trees and shrubs will be irrigated for two growing seasons or less depending on the species' ability to become established.

All road crossings will be landscaped on the upslope side of the floodway. In this reach, there is not sufficient area available to landscape the downslope side because the RWCD Irrigation Canal is adjacent to the floodway. Approximately 100 feet on each side of the road will be landscaped. These areas will be seeded to native grasses and planted to native trees and shrubs. Trees and shrubs will be irrigated for two irrigation seasons or less depending on the species' ability to become established.

The construction of this seven-mile reach of floodway will require the purchase or easement of about 192 acres of land along with the relocation of about 6 dedicated county road bridges, 1 dedicated state highway bridge, 700 feet of water pipelines, 8,800 feet of telephone lines, 4,300 feet of electric lines, 300 feet of gas pipelines, 2 owner-occupied dwellings, and 3 businesses.

Land subsidence and earth fissures have created no problems relative to the function and operation of the existing floodway and water distribution systems. No problems are foreseen for the proposed floodway; however, earth fissures may occur in the future. Survey monuments will be installed during construction. These monuments together with existing monuments will be checked periodically by the Soil Conservation Service and the Sponsors to determine changes in elevations. Also, periodic field checks will be made during the effective economic life of the floodway to determine the extent of development of earth fissures in the area. If earth fissures should develop and intersect the floodway, normal inspection and maintenance measures would minimize the possibility for structural failure.

Soil Conservation Service policy requires that care be exercised during construction to preserve and protect the natural landscape and to minimize soil erosion, water, air, and noise pollution. All construction work will be done in conformance with this policy. Plans may include watering haul roads and earth fills to suppress dust, reducing erosion by mulching of exposed areas, and burying unsalvageable material. State and federal laws and regulations will be observed in minimizing air and noise pollution.

Public use will be controlled by the Flood Control District of Maricopa County. If future use is of such a magnitude as to damage the structure or create health and safety problems, the district will limit public access.

The Soil Conservation Service will work with the Sponsors and qualified archeologists before and during the construction of the floodway. The Soil Conservation Service will comply with its procedures as outlined in the Federal Register (Vol. 42, No. 137 - July 18, 1977). Compliance includes consulting with the State Historic Preservation

Officer, making archeological reconnaissance surveys, developing a mitigation plan and having it reviewed by the Advisory Council on Historic Preservation. Surface collection and monitoring during construction may be required on other sites.

EXPLANATION OF INSTALLATION COSTS

Land treatment measures are as contained in the watershed plan. They include construction and management-type practices normally planned, installed, and maintained by individuals or groups of landusers to efficiently use and protect the land and water resurces. The land treatment cost summary is in Table 1 (Revised).

The estimated monetary costs for installing structural measures are shown on Table 2 (Revised). As built costs were used for the Powerline Floodwater Retarding Structure and Floodway. Cost estimates for the RWCD Floodway are based on 1977 prices for similar work.

The construction costs are estimated at $5,051,500, to be borne by P.L. 566 funds. The estimated remaining construction costs of $3,820,500 include the cost of landscaping, establishment of vegetation for a one-year period, and a contingency factor of 15 percent.

The watershed plan, as supplemented, included installation services costs and administration of contracts costs. This supplement modifies the plan, as supplemented, by deleting the cost breakdown for installation services and administration of contracts and establishing a new cost breakdown for engineering services, relocation payments, and project administration.

Engineering services costs estimated at $515,300 are to be borne by P.L. 566 funds. This includes the direct cost of engineers and other technicians for surveys, investigations, design, and preparation of plans and specifications for structural measures, including the vegetative work associated with these measures. It does not include the cost of similar services for land rights or for project administration.

Relocation payments are estimated to be $27,800 and include costs of relocating two families and three businesses. Relocation payments will be shared by the Sponsors and SCS and are based on the ratio of P.L. 566 funds to the total project cost excluding relocation payments as described in this supplement. The percentages to be used are 34.4 percent other funds and 65.6 percent P.L. 566 funds.

Project administration costs include administrative costs associated with the installation of planned measures, including the cost of contract

administration, relocation assistance advisory services, administrative functions connected with relocation payments, review of engineering plans prepared by others, government representatives, and necessary inspection service during installation to insure that project measures are installed in accordance with plans and specifications.

The Sponsors and SCS will each bear the cost of project administration which it incurs, estimated at $53,700 and $883,900, respectively. These costs are based on experience in administering similar projects. Project administration costs borne by sponsor funds include review of engineering plans, contract administration, all relocation assistance advisory services, and other administrative costs of the Sponsors associated with the project. The SCS costs for project administration include the costs for necessary inspection services during construction and administrative costs related to the project.

Land rights costs estimated at $2,684,500 are to be borne by other funds. The separation of estimated land rights costs by structural measures is shown in Table 2 (Revised).

EFFECTS OF WORKS OF IMPROVEMENT

The floodway will provide an adequate outlet to the Gila River for one floodwater retarding structure proposed for the Buckhorn-Mesa Watershed and structures installed in the Apache Junction-Gilbert and Williams-Chandler Watersheds, thus assuring the damage reduction planned for these watersheds. The level of protection in the project area is not changed by this Supplement.

The areas directly disturbed by construction activities include an estimated 192 acres committed to the construction of the floodway and maintenance roads, and 150 acres to be used for spoil disposal areas. In the reach of floodway between Apache Boulevard and Ray Road there is an estimated 59 acres at present being used for the existing floodway, 90 acres are being used for agricultural purposes, 20 acres have desert vegetation, and 23 acres have riparian vegetation.

The excavated material coming from the construction of this floodway can be used by private individuals or placed in 6 disposal areas ranging in size from 8 acres to 44 acres and totaling about 150 acres. Some 33 acres of the total are in desert shrub, 11 are in riparian vegetation, and 106 acres are being used for agricultural purposes.

The disturbed areas will be seeded to native grass species. Tree and shrub plantings will follow where necessary or desirable. Approximately 20 acres within the floodway right-of-way will be planted to desert riparian vegetation, including paloverde and ironwood. These plantings mitigate wildlife habitat losses from floodway and spoil disposal areas disturbed during construction.

Wildlife populations that depend on habitat destroyed during construction will be lost. These populations are expected to be reestablished when planted vegetation becomes sufficiently mature to satisfy food, cover, and nesting requirements.

The floodway and associated maintenance roads will have a visual impact on the rapidly developing area. The reaches most affected will be where the channel has a wide bottom width and is parallel to roads, at road crossings, and where it is in proximity to urban areas.

The landscape design goal is to minimize the visual impact of the floodway. A visual resource analysis has been performed that identifies the landscape quality and also gives guidelines for landscape designs. Specifically, it has been determined that the areas with the greatest visual impact will receive the maximum landscape treatment. Landscaping will include seeding native grass species and planting native trees and shrubs along the upslope side of the floodway on both sides of the roads. As the trees grow they will block the view of the floodway from most viewers.

Disposal areas will also have a visual impact. To lessen this impact, these areas will be planted to native vegetation. However, the Sponsors could dispose of the spoil elsewhere, thus the visual impact of these disposal areas could diminish in time.

Air pollution in the form of dust will occur during the construction period. Noise levels and traffic disruption around construction sites will increase.

There will be no closures of dedicated or accepted roads and bridges resulting from the project. Seven road bridges will be reconstructed. Travel time to any point in the project area will not be significantly influenced.

Utility services will be interrupted for short periods of time during construction. About 700 feet of water pipelines, 8,800 feet of telephone lines, 4,300 feet of electric lines, and 300 feet of gas pipelines will be relocated. Interruptions will be held to a minimum. There are two families and three businesses to be relocated.

The construction of the Roosevelt Water Conservation District Floodway can minimize the chance of floodwaters breaching the RWCD Irrigation Canal. The interruption of irrigation waters can stop normal surface irrigation flows to cropland within the watershed. Delays of irrigation can directly reduce crop yields.

Erosion and flood plain scour will be reduced in the areas protected from flooding. These problems will be materially reduced. In areas protected, it will not be necessary to fill and relevel yards and fields after flooding. Topsoil will be protected, and the fields will be more productive.

Flood control will aid in stabilizing the agricultural industry in the immediate area. It will also reduce the frequency and amount of flooding on agricultural lands. Impacts of agriculture on water quality are the additions of nutrients from fertilizers and animal wastes and from pesticides applied to crops and livestock. With this project, these impacts will be reduced.

PROJECT BENEFITS

Table 5 (Revised) reflects the values of agricultural products converted to current normalized prices while agricultural and nonagricultural property values are current prices.

The residential and commercial damageable values found in the plan are adjusted to reflect increases in future damageable values throughout the evaluation period. Adjustments are based on expected increases in the per capita personal income and personal income expenditures that are estimated by the Bureau of Economic Analysis, Department of Commerce, and the Economic Reserarch Service, U. S. Department of Agriculture. These are for the Gila-Salt Water Resource Planning Subarea.

COMPARISON OF BENEFITS AND COSTS

The structural measures described in this supplement are economically feasible. The total average annual benefits to accrue from the installation of the proposed structural measures are estimated to be $1,220,500. The average annual cost of installing the structural works is estimated to be $281,500 and the cost of operation, maintenance and replacement is estimated to be $40,430 annually. The total average annual cost is estimated to be $321,930. The ratio of average annual benefits to average annual cost is 3.8 to 1.0. Secondary benefits were not evaluated.

PROJECT INSTALLATION

Responsibilities for installation of project measures are as listed in the watershed work plan unless otherwise noted below.

The Flood Control District of Maricopa County will assume the responsibility for the operation and maintenance of the RWCD Floodway and spoil disposal areas.

The Ray Road to Apache Boulevard reach of the RWCD Floodway is scheduled to begin after the Rittenhouse Road to Ray Road reach is completed in the Williams-Chandler Watershed.

The Sponsors, as part of project administration, will (1) provide personally or by first class mail written notice of displacement and appropriate application forms to each displaced person, (2) assist in filing applications, (3) review and take action on applications for relocation assistance, (4) review and process grievances in connection with displacements, and (5) make relocation payments. These functions will be performed by the Flood Control District of Maricopa County.

Prior to entering into agreements that obligate funds of the Soil Conservation Service, the Flood Control District of Maricopa County will develop a code of conduct governing the performance of its officers, employees, or agents in contracting with or expending P.L. 566 funds; and a financial management system for control, accountability, and disclosure of P.L. 566 funds received and for control and accountability for property and other assets purchased with P.L. 566 funds.

Program income earned during the grant period will be reported on the Sponsor's request for advance or reimbursement from the Soil Conservation Service.

OPERATION AND MAINTENANCE

The Flood Control District of Maricopa County will be responsible for operation and maintenance of the RWCD Floodway. The District will obtain all necessary funds for operation, maintenance, and replacement from taxes or assessments levied by the Sponsors.

Operation and maintenance costs are estimated to average $40,430 annually and includes $33,000 for the RWCD Floodway. This includes the cost or the fair market value of materials, equipment, services, and facilities needed to operate the project and to make repairs and replacements necessary to maintain structural measures in sound operating condition during the evaluated life of the project.

An operation and maintenance agreement will be entered into between the Sponsors and the Soil Conservation Service prior to the signing of a project agreement. An operation and maintenance plan will be prepared for the floodway. All phases of operation and maintenance of the floodway will comply with applicable local, state, and federal regulations. Guidelines regarding operation and maintenance procedures are given in the Arizona Watershed Operation and Maintenance Handbook. Sponsors of the project have copies of the handbook on file.

The Sponsors' responsibility for operation and maintenance begins when a part of or all of the work of installing the floodway, related

appurtenances, and vegetative work are completed and accepted or area determined complete by the Soil Conservation Service. This responsibility shall continue until the expiration of the evaluated life of all the installed project measures. This does not relieve the Sponsors' liability which continues throughout the life of the measure or until the measure is modified to remove potential loss of life or property.

It is planned that the landscaped areas adjacent to road crossings and trees and shrubs will be irrigated for two growing seasons or less depending on the species' ability to become established. Areas seeded to native grass species will not be irrigated.

The responsible Sponsors' representative will inspect the floodway at least annually and after each storm or after the occurrence of any other unusual condition that might adversely affect the floodway. The Soil Conservation Service will make inspections to determine whether or not project measures are operating properly, and that all operation and maintenance is performed in a timely manner and in compliance with the operation and maintenance agreement. A written report will be made of each inspection. A copy of each report will be provided by the inspecting party to the other party within ten days of the date on which the inspection was made. The report will describe the conditions found and list any corrective action needed with a time frame to complete each action.

Representatives of the federal, state, and county governments will have access at all times to the floodway for official activities.

Surveying monuments installed during construction together with existing monuments will be checked periodically by the Soil Conservation Service and the Sponsors to determine changes in elevations in the vicinity of the floodway.

From experience, the Sponsors have determined that vandalism occurs frequently and is prevalent on most existing flood control structures. Plant life, fences, irrigation systems, and concrete and rock structures are often severely damaged. This may occur throughout the life of the structure and is, therefore, a very costly and time consuming problem for the Sponsors. The design and construction of the floodway will take into consideration features to minimize vandalism.

The Soil Conservation Service will work with the Sponsors to ensure that the design of the floodway considers the most efficient and economical maintenance practices.

TABLE 1 - ESTIMATED INSTALLATION COST (Revised)

Apache Junction-Gilbert Watershed, Arizona

Installation Cost Item	Unit	Number Non-Federal Land	Estimated Cost (Dollars) 1/ P.L. 566 Funds SCS 2/	Other Funds SCS 2/	Total
LAND TREATMENT					
Cropland	3/	3/		610,810	610,810
Technical			12,320	39,980	52,300
TOTAL LAND TREATMENT			12,320	650,790	663,110
STRUCTURAL MEASURES					
Floodwater Retarding Structure	No.	1	415,800	2,000	417,800
Channel Work					
(M) 4/	Mi.	7.3	4,220,700	2,633,400	6,854,100
(O) 4/	Mi.	8.7	948,500	60,700	1,009,200
Subtotal - Structural Costs			5,585,000	2,696,100	8,281,100
PROJECT ADMINISTRATION					
Construction Inspection			688,600		688,600
Other			195,300	53,200	248,500
Relocation Assistance Advisory Services				500	500
Subtotal - Administration			883,900	53,700	937,600
TOTAL STRUCTURAL MEASURES			6,468,900	2,749,800	9,218,700
TOTAL PROJECT			6,481,220	3,400,590	9,881,810

1/ Price base: Land Treatment - 1962 prices, Structural Measures - 1977 Prices for RWCD Floodway and as built costs for Powerline Floodwater Retarding Structure and Floodway.

2/ Federal agency responsible for assisting in installation of works of improvement.

3/ The land treatment individual practices, units or costs are to be found in the 1963 Watershed Plan. The land treatment program is not modified by this supplement and has been essentially installed.

4/ Type of channel before project: (M) - manmade ditch or previously modified channel; (O) - none or practically no defined channel.

August 1977

TABLE 2 - ESTIMATED COST DISTRIBUTION (Revised)

Apache Junction-Gilbert Watershed, Arizona

(Dollars) 1/

Item	Installation Cost - PL-566 Funds				Installation Cost - Other Funds				Total Installation Cost
	Construction	Engineering	Relocation Payments	Total PL-566	Land Rights	Water Rights	Relocation Payments	Total Other	
STRUCTURAL MEASURES									
Floodwater Retarding Structure-Powerline	375,200	40,600		415,800	2/	3/ 2,000		2,000	417,800
Channel Work									
RWCD Floodway (M) 4/ 122+00 - 505+00	3,820,500	382,000	18,200	4,220,700	5/ 2,623,800		9,600	2,633,400	6,854,100
Powerline Floodway (0) 4/	855,800	92,700		948,500	6/ 60,700			60,700	1,009,200
Subtotal-Structural	5,051,500	515,300	18,200	5,585,000	2,684,500	2,000	9,600	2,696,100	8,281,100
PROJECT ADMINISTRATION	xxx	xxx	xxx	883,900	xxx	xxx	xxx	7/ 53,700	937,600
GRAND TOTAL	5,051,500	515,300	18,200	6,468,900	2,684,500	2,000	9,600	2,749,800	9,218,700

1/ Price base 1977 prices for RWCD Floodway and as built costs for Powerline Floodwater Retarding Structure and Floodway.

2/ Rights-of-way provided by Arizona State Land Department.

3/ Includes $2,000 for pipe installed through floodwater retarding structure to furnish stockwater.

4/ Type of channel before project: (M) - manmade ditch or previously modified channel; (0) none or practically no defined channel.

5/ Includes $1,564,300 for rights-of-way, $320,800 for State Highway 60, $652,800 for six dedicated county roads, $21,300 for relocation of a gas line, $18,500 for relocation of a powerline, $21,600 for relocation of a telephone line, $15,000 for relocation of a water line, and $9,500 for survey, legal fees, and other costs.

6/ Rights-of-way provided by Arizona State Land Department and $22,300 for rights-of-way purchased by the Flood Control District of Maricopa County, $30,000 for bridge installation, $1,400 for relocation of one telephone line, and $7,000 for survey, legal fees, and other costs.

7/ Includes $2,700 for State of Arizona dam filing fees.

TABLE 3A - STRUCTURAL DATA (Revised)

CHANNEL WORK

Apache Junction-Gilbert Watershed, Arizona

Channel Reach Name and Sta.	Drainage Area sq.mi.	100 Yr. Frequency Design Discharge cfs	Water Surface Elevation Feet msl	Hydraulic Gradient ft./ft.	Channel Dimensions: Bottom Gradient ft./ft.	Bottom Width ft.	Bottom Elevation ft.msl	Side Slopes	"n" Value Aged	"n" Value As Built	Velocities Aged 1/ ft/sec	Velocities As Built 2/ ft/sec	Excavation Volume cu.yds.	3/ Type of Work	4/ Existing Channel Type	5/ Present Flow Condition
RWCD Floodway																
122+00	5.6		1343.6				1336.4									
		2000		-	-	Rock	Transition	3:1	.037	.037	2.8	1.7	1,900	II	M	E
122+41	5.6		1343.4				1336.3									
		2000		0.0028	0.0035	33		3:1	.037	.037	6.1	4.1	8,100	II	M	E
124+18	5.6		1342.9				1335.7									
		2300		-	-	Rock	Transition	3:1	.037	.037	5.9	3.9	10,100	II	M	E
126+46	5.6		1342.8				1335.4									
		2300		0.00026	0.00030	90		3:1	.027	.024	2.8	1.7	118,900	II	M	E
153+18	5.6		1342.1				1334.6									
		2300		-	-	Rock	Transition	3:1	.037	.037	2.7	1.6	5,300	II	M	E
154+38	5.6		1341.6				1334.4									
		2300		0.0019	0.0030	30		3:1	.037	.037	6.3	4.4	11,700	II	M	E
157+00	5.6		1341.1				1333.7									
		2300		-	-	Rock	Transition	3:1	.037	.037	5.9	4.1	10,700	II	M	E
159+40	5.6		1341.0				1333.4									
		2300		0.00026	0.00030	90		3:1	.027	.024	2.7	1.7	33,800	II	M	E
167+00	5.6		1340.8				1333.1									
		2300		-	-	Earth	Transition	3:1	.027	.024	2.7	1.7	4,200	II	M	E
168+00	9.9		1340.8				1333.1									
		3100		0.00027	0.00030	110		3:1	.027	.024	3.1	1.9	168,800	II	M	E
208+00	12.1		1339.7				1331.9									
		3500		0.0000	0.00030	110		3:1	.027	.024	3.4	2.1	4,400	II	M	E
209+04	12.1		1339.7				1331.9									
		3500		-	-	Rock	Transition	3:1	.037	.037	3.4	2.1	5,100	II	M	E
210+24	12.1		1339.1				1331.7									
		3500		0.0029	0.0030	50		3:1	.037	.037	6.6	4.3	9,100	II	M	E
215+00	12.1		1337.7				1330.3									
		3500		-	-	Rock	Transition	3:1	.037	.037	6.5	4.2	1,400	II	M	E
217+40	12.1		1337.6				1329.9									
		3500		0.00043	0.00030	110		3:1	.027	.024	3.4	2.1	3,900	II	M	E
224+30	12.1		1337.3				1329.7									
		3500		-	-	Earth	Transition	3:1	.027	.024	3.5	2.2	400	II	M	E
225+00	23.9		1337.3				1329.7									
		4800		0.00045	0.00030	140		3:1	.027	.024	3.9	2.4	185,300	II	M	E
254+00	23.9		1336.0				1328.8									
		4800		0.0020	0.00030	140		3:1	.037	.037	4.1	2.8	3,200	II	M	E
254+50	23.9		1335.9				1328.8									
		4800		0.0000	0.0100	140		3:1	.037	.037	4.2	2.9	6,400	II	M	E
255+50	23.9		1335.9				1327.8									
		4800		0.0000	0.00030	140		3:1	.037	.037	3.6	2.2	3,200	II	M	E
256+00	23.9		1335.9				1327.8									

TABLE 3A - STRUCTURAL DATA (Revised)

(Continued)

CHANNEL WORK

Apache Junction-Gilbert Watershed, Arizona

Channel Reach Name and Sta.	Drainage Area sq.mi.	100 Yr. Frequency Design Discharge cfs	Water Surface Elevation Feet msl	Hydraulic Gradient ft./ft.	Channel Dimensions: Bottom Gradient ft./ft.	Bottom Width ft.	Bottom Elevation ft.msl	Side Slopes	"n" Value Aged	"n" Value As Built	Velocities Aged 1/ ft/sec	Velocities As Built 2/ ft/sec	Excavation Volume cu.yds.	3/ Type of Work	4/ Existing Channel Type	5/ Present Flow Condition
RWCD Floodway (Cont'd)																
256+00	23.9		1335.9				1327.8									
		4800		0.00034	0.00030	140		3:1	.027	.024	3.6	2.2	281,000	II	M	E
300+00	33.1		1334.4				1326.5									
		4900		0.00039	0.00030	140		3:1	.027	.024	3.8	2.3	199,300	II	M	E
333+40	33.1		1333.1				1325.5									
		4900		-	-	Rock	Transition	3:1	.037	.037	3.9	2.4	7,800	II	M	E
334+70	33.1		1332.5				1325.3									
		4900		0.0027	0.0032	75		3:1	.037	.037	7.0	4.5	33,400	II	M	E
340+30	33.1		1331.0				1323.5									
		4900		-	-	Rock	Transition	3:1	.037	.037	6.7	4.3	15,500	II	M	E
342+90	33.1		1330.8				1323.1									
		4900		0.00045	0.00030	140		3:1	.027	.024	3.9	2.5	120,000	II	M	E
363+00	33.1		1329.9				1322.5									
		4900		0.0000	0.00030	140		3:1	.037	.037	4.0	2.9	3,000	II	M	E
363+50	33.1		1329.9				1322.5									
		4900		0.0000	0.0100	140		3:1	.037	.037	4.1	3.0	6,500	II	M	E
364+50	50.2		1329.9				1321.5									
		5100		-	-	Rock	Transition	3:1	.037	.037	3.5	2.2	3,500	II	M	E
365+00	50.2		1329.9				1321.5									
		5100		0.00028	0.00030	150		3:1	.027	.024	3.5	2.2	367,000	II	M	E
418+00	55.1		1328.4				1319.9									
		5300		0.00031	0.00030	150		3:1	.027	.024	3.6	2.4	368,400	II	M	E
469+50	55.1		1326.8				1318.3									
		5300		-	-	Earth	Transition	3:1	.027	.024	3.6	2.4	3,600	II	M	E
470+00	71.1		1326.8				1318.3									
		5900		0.00029	0.00025	170		3:1	.027	.024	3.6	3.0	220,300	II	M	E
501+00	71.1		1325.9				1317.5									
		5900		0.00077	0.00124	170		3:1	.027	.024	3.6	3.0	9,300	II	M	E
502+29	100.1		1325.8				1317.4									
		6500		0.0000	0.00025	170		3:1	.037	.037	4.0	3.5	8,600	II	M	E
503+49	100.1		1325.8				1317.4									
		6500		-	-	Rock	Transition	3-2:1	.037	.037	4.2	3.6	2,200	II	M	E
503+79	100.1		1325.7				1317.4									
		6500		-	-	Conc.	Transition	2:1	.014	.014	5.5	3.9	8,700	II	M	E
505+00	100.1		1325.5				1316.4									

1/ Velocity associated with design discharge.
2/ Velocity associated with 10-year frequency discharge in unlined channel.
3/ I - Establishment of new channel including necessary stabilization measures.
II - Enlargement or realignment of existing channel.
L - Concrete lined.
4/ M - Man-made ditch or previously modified channel.
O - None or practically no defined channel.
5/ E - Ephemeral - flows only during periods of surface runoff, otherwise dry.

August 1977

TABLE 4 - ANNUAL COST (Revised)

Apache Junction-Gilbert Watershed, Arizona

(Dollars) 1/

Evaluation Unit	Amortization of Installation Cost 2/	Operation, Maintenance and Replacement Cost	Total
Floodwater Retarding Structure and Channel Work	252,900	40,430	293,330
Project Administration	28,600	xxx	28,600
GRAND TOTAL	281,500	40,430	321,930

1/ Price base 1977 prices for RWCD Floodway and as built costs for Powerline Floodwater Retarding Structure and Floodway.

2/ Amortized @ 2-7/8 percent interest rate for 100 years.

August 1977

TABLE 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS
(Revised)

Apache Junction-Gilbert Watershed, Arizona

(Dollars) 1/

Item	Estimated Average Annual Damage Without Project	With Project	Damage Reduction Benefits
Floodwater			
Crop and Pasture	229,010	33,780	195,230
Other Agricultural	190,080	19,470	170,610
Nonagricultural (Residential, retail commercial, roads, etc.)	2,738,920	399,650	2,339,270
Subtotal	3,158,010	452,900	2,705,110
Sediment			
Crop and Pasture	52,970	5,320	47,650
Other Agricultural	46,310	3,090	43,220
Nonagricultural	338,460	49,350	289,110
Subtotal	437,740	57,760	379,980
Erosion			
Flood Plain Scour	30,510	1,950	28,560
	30,510	1,950	28,560
Indirect	408,110	70,180	337,930
Total in this watershed	4,034,370	582,790	3,451,580
Benefits accruing to measures in the Buckhorn-Mesa Watershed 2/	xxx	xxx	2,388,600
Benefits outside watershed 3/	xxx	xxx	169,850
Damage reduction benefits from measures in this watershed	xxx	xxx	1,232,830

1/ Current normalized prices for agricultural products and current prices for agricultural and nonagricultural properties.
2/ Benefits from damage reductions in this watershed accruing to measures in the Buckhorn-Mesa Watershed.
3/ Benefits from damage reductions in the Williams-Chandler Watershed, accruing to measures in the Apache Junction-Gilbert Watershed.

August 1977

TABLE 6 - COMPARISON OF BENEFITS AND COSTS
(Revised)

Apache Junction-Gilbert Watershed, Arizona

(Dollars)

Evaluation Unit	Average Annual Damage Reduction Benefits 1/	Average Annual Cost 2/	Benefit Cost Ratio
Floodwater Retarding Structure and Channel Work	1,220,500	293,330	4.2:1.0
Project Administration	xxx	28,600	xxx
GRAND TOTAL	1,220,500	321,930	3.8:1.0

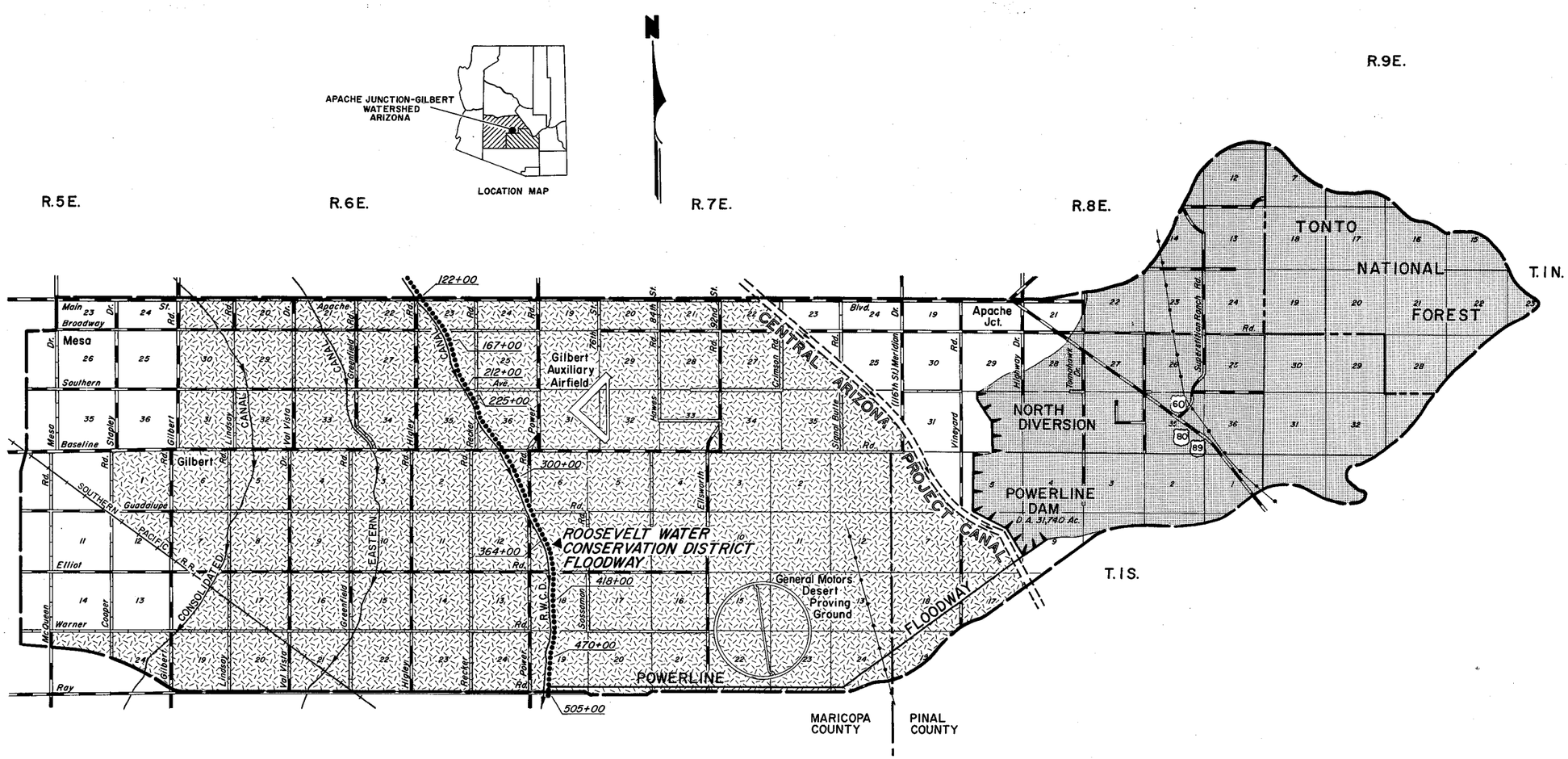
1/ In addition, land treatment measures will provide estimated flood damage reduction benefits of $12,330 annually.

2/ From Table 4.

August 1977

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE



LEGEND

RANGE AND TOWNSHIP LINE	
SECTION LINE	
SECTION NUMBER	33
PAVED ROAD	
GRADED ROAD	
UNIMPROVED ROAD	
RAILROAD	
POWER LINE	
CANAL	
COUNTY LINE	
NATIONAL FOREST BOUNDARY	
WATERSHED BOUNDARY	
CENTRAL ARIZONA PROJECT CANAL	
DRAINAGE AREA CONTROLLED BY STRUCTURE	
AREA BENEFITED	
FLOODWATER RETARDING STRUCTURE (EXISTING)	
ROOSEVELT WATER CONSERVATION DISTRICT FLOODWAY	
DRAINAGE AREA ACREAGE	1,234 Ac.

PROJECT MAP

APACHE JUNCTION-GILBERT WATERSHED

MARICOPA AND PINAL COUNTIES, ARIZONA

SEPTEMBER 1976

0 1 2 3 4

SCALE IN MILES