

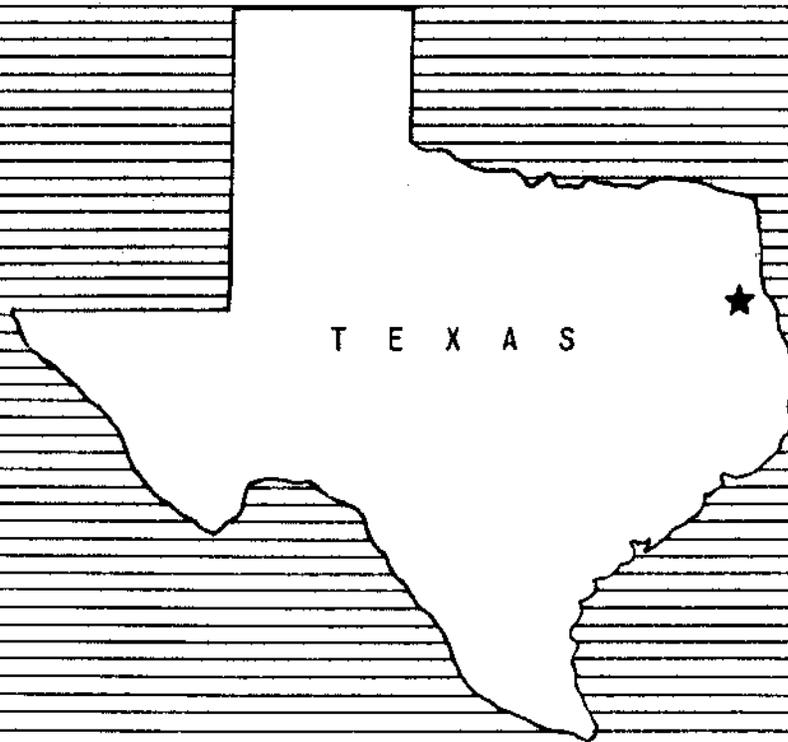
SUPPLEMENTAL WATERSHED

WORK PLAN NO. II

**FOR WATERSHED PROTECTION, FLOOD PREVENTION,
RECREATION, AND NON-AGRICULTURAL WATER MANAGEMENT**

ATTOYAC BAYOU WATERSHED

**NACOGDOCHES, RUSK, SHELBY, AND SAN AUGUSTINE
COUNTIES, TEXAS**



AUGUST 1971

TABLE OF CONTENTS

	<u>Page</u>
Purpose of the Supplemental Work Plan	1
Problems Relating to Water Management	1
Basis for Project Formulation	2
Works of Improvement To Be Installed	2
Explanation of Installation Costs	3
Effects of Works of Improvement	4
Project Benefits	5
Comparison of Benefits and Costs	5
Project Installation	5
Financing Project Installation	7
Provisions for Operation and Maintenance	7
 Tables:	
Revised Table 1 - Estimated Project Installation Cost	9
Revised Table 2 - Estimated Structural Cost Distribution	10
Revised Table 2A - Cost Allocation and Cost-Sharing Summary	11
Revised Table 3 - Structure Data - Floodwater Retarding Structures	12
Revised Table 4 - Annual Cost	13
Revised Table 6 - Comparison of Benefits and Costs for Structural Measures	14

ures:

Figure 5 - Project Map

SUPPLEMENTAL WATERSHED WORK PLAN AGREEMENT No. II

Between the

Attoyac Bayou Watershed Authority
Local Organization

Nacogdoches County Commissioners Court
Local Organization

Rusk County Commissioners Court
Local Organization

Shelby County Commissioners Court
Local Organization

Nacogdoches Soil and Water Conservation District
Local Organization

Rusk Soil and Water Conservation District
Local Organization

Shelby Soil and Water Conservation District
Local Organization

Piney Woods Soil and Water Conservation District
Local Organization

City of Center
Local Organization

State of Texas
(hereinafter referred to as the Sponsoring Local Organization)

and the

Soil Conservation Service
United States Department of Agriculture
(hereinafter referred to as the Service)

Whereas, the Watershed Work Plan Agreement for the Attoyac Bayou Watershed, State of Texas, executed by the Sponsoring Local Organization named therein and the Service, became effective on the 14th day of July 1965; and

Whereas, the Supplemental Watershed Work Plan Agreement for the Attoyac Bayou Watershed, State of Texas, executed by the Sponsoring Local Organization and the Service became effective on the 30th day of August 1971; and

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

Whereas, it has become necessary to modify the Watershed Work Plan, as supplemented, by deleting Floodwater Retarding Structure No. 16 and adding Multiple-Purpose Structure No. 16; and

Whereas, it has become necessary to modify the Watershed Work Plan, as supplemented, to reflect current policy and terminology relative to engineering and project administrative costs; and

Whereas, the City of Center agrees to become a Sponsoring Local Organization; and

Whereas, a Supplemental Watershed Work Plan No. II which modifies the Watershed Work Plan dated May 1964, as supplemented, for said watershed has been developed through the cooperative efforts of the Sponsoring Local Organization and the Service; which plan is annexed to and made a part of this agreement; and

Now therefore, the Sponsoring Local Organization and the Service hereby agree upon the following modifications of the terms, conditions, and stipulations of said Watershed Work Plan Agreement, as supplemented:

1. Paragraph numbered 1 in the Watershed Work Plan Agreement is modified to read as follows:

Except as herein after provided, the Sponsoring Local Organization will acquire, in accordance with the provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646, 84 Stat. 1894) without cost to the Federal Government such land rights as will be needed in connection with the works of improvement. (Estimated cost \$1,089,580) The percentages of this cost to be borne by the Sponsoring Local Organization and the Service are as follows:

<u>Works of Improvement</u>	<u>Sponsoring Local Organization (percent)</u>	<u>Service (percent)</u>	<u>Estimated Land Rights Cost (dollars)</u>
Multiple-Purpose Structure No. 23 and Basic Recreational Facilities			
Payment to landowners for about 1,100 acres and cost of modification of improvements	50.00	50.00	101,980
Legal fees, survey costs, flowage easements, and other cost.	100.00	0	7,500
All other structural measures	100.00	0	980,100

2. Paragraph numbered 2 in the Watershed Work Plan Agreement is modified to read as follows:

The Sponsoring Local Organization will acquire or provide assurance that landowners or water users have acquired such water rights pursuant to State law as may be needed in the installation and operation of the works of improvement (Estimated Cost \$3,300).

3. Paragraph numbered 3 in the Watershed Work Plan Agreement is modified to read as follows:

The percentages of construction costs of structural measures to be paid by the Sponsoring Local Organization and the Service are as follows:

<u>Works of Improvement</u>	<u>Sponsoring Local Organization</u> (percent)	<u>Service</u> (percent)	<u>Estimated Construction Cost</u> (dollars)
Multiple-Purpose Structure No. 16	52.86	47.14	387,600
Multiple-Purpose Structure No. 23	27.40	72.60	287,100
Basic Recreational Facilities	50.00	50.00	77,450
All Other Structural Measures	0	100.00	4,006,990

4. Paragraph numbered 4 in the Watershed Work Plan Agreement is modified to read as follows:

The percentages of the engineering costs to be borne by the Sponsoring Local Organization and the Service are as follows:

<u>Works of Improvement</u>	<u>Sponsoring Local Organization</u> (percent)	<u>Service</u> (percent)	<u>Estimated Engineering Cost</u> (dollars)
Multiple-Purpose Structure No. 16 A&E Contract	52.86	47.14	19,880
Multiple-Purpose Structure No. 23	0	100.00	14,355
Basic Recreational Facilities A&E Contract	50.00	50.00	3,760
All Other Structural Measures	0	100.00	228,980

- 5. Paragraph numbered 5 in the Watershed Work Plan Agreement is modified to read as follows:

The Sponsoring Local Organization and the Service will each bear the costs of Project Administration which it incurs, estimated to be \$17,000 and \$726,040 respectively.

The Sponsoring Local Organization and the Service further agree to all other terms, conditions, and stipulations of said Watershed Work Plan Agreement, as supplemented, not modified herein.

Attoyac Bayou Watershed Authority
Local Organization

By *Wilmer Lyons*

Title *Chairman*

Address *Rt 2 Center*

Date *May 12, 1972* Zip code *75935*

The signing of this agreement was authorized by a resolution of the governing body of the Attoyac Bayou Watershed Authority
Local Organization

adopted at a meeting held on *May 12, 1972*

Jim Fayler
(Secretary, Local Organization)

Address *Davison, Tex 75946*

Date *May 12, 1972* Zip Code

Nacogdoches County Commissioners Court
Local Organization

By Carl S. Burrows
Title County Judge
Address 101 West Main
Nacogdoches, Texas 75961
Date May 8, 1972 Zip code

The signing of this agreement was authorized by a resolution of the governing body of the Nacogdoches County Commissioners Court Local Organization adopted at a meeting held on May 8, 1972

Wm J. Kipp
(Secretary, Local Organization)
Address 101 West Main
Nacogdoches, Texas 75961
Date May 8, 1972 Zip Code

Nacogdoches Soil and Water Conservation District
Local Organization

By Belton Latimer
Title Chairman
Address Box C
Garrison, Texas 75946
Date May 12, 1972 Zip Code

The signing of this agreement was authorized by a resolution of the governing body of the Nacogdoches Soil and Water Conservation District Local Organization adopted at a meeting held on May 12, 1972

J. E. Deen
(Secretary, Local Organization)
Address Rt. 7, Box 456
Nacogdoches, Texas 75961
Date May 12, 1972 Zip Code

Shelby County Commissioners Court
Local Organization

By *V. V. Tate*

Title County Judge

Address Center, Texas 75935
Zip code

Date April 24, 1972

The signing of this agreement was authorized by a resolution of the governing body of the Shelby County Commissioners Court
Local Organization
adopted at a meeting held on April 24, 1972

A. B. Youngblood
(Secretary, Local Organization)

Address Center, Texas 75935
Zip Code

Date April 24, 1972

Shelby Soil and Water Conservation District
Local Organization

By *C. S. Tucker*

Title Chairman

Address Timpson 75975
Zip Code

Date March 28, 1972

The signing of this agreement was authorized by a resolution of the governing body of the Shelby Soil and Water Conservation District
Local Organization
adopted at a meeting held on March 28, 1972

J. P. ...
(Secretary, Local Organization)

Address Center 75935
Zip Code

Date March 28, 1972

Rusk Soil and Water Conservation District
Local Organization

By Judson Turner
Title Chairman
Address Henderson Tex Zip code
Date 5-10-72

The signing of this agreement was authorized by a resolution of the governing body of the Rusk Soil and Water Conservation District Local Organization adopted at a meeting held on May 10th 1972

(M. M. Adams)
(Secretary, Local Organization)
Address Henderson Texas 75642 Zip Code
Date 5-10-72

Rusk County Commissioners Court
Local Organization

By J. R. Felt
Title County Judge
Address Henderson, Tex Zip Code
Date 5/8/72

The signing of this agreement was authorized by a resolution of the governing body of the Rusk County Commissioners Court Local Organization adopted at a meeting held on 5/8/72

Walter H. Barker
(Secretary, Local Organization)
Address P.O. Box 750 Zip Code
Date 5-8-72

Piney Woods Soil and Water Conservation District
Local Organization

By W.H. Paul

Title Chairman

Address San Augustine Texas 75972
Zip Code

Date May 9, 1972

The signing of this agreement was authorized by a resolution of the governing body of the Piney Woods Soil and Water Conservation District
Local Organization

adopted at a meeting held on May 9, 1972

W.D. Lewis
(Secretary, Local Organization)

Address San Augustine Texas 75972
Zip Code

Date May 9, 1972

City of Center
Local Organization

By Mary Truesdale

Title Mayor

Address Center, Texas 75935
Zip Code

Date April 11, 1972

The signing of this agreement was authorized by a resolution of the governing body of the City of Center
Local Organization

adopted at a meeting held on April 11, 1972

William S. Byrd
(Secretary, Local Organization)

Address Center, Texas 75935
Zip Code

Date April 11, 1972

Soil Conservation Service
United States Department of Agriculture

By Harold Baker
Acting State Conservationist

Date 5-15-72

SUPPLEMENTAL
WATERSHED WORK PLAN NO. II
FOR
WATERSHED PROTECTION, FLOOD PREVENTION, RECREATION,
AND NON-AGRICULTURAL WATER MANAGEMENT

ATTOYAC BAYOU WATERSHED
Nacogdoches, Rusk, Shelby, and San Augustine Counties, Texas

Prepared Under the Authority of the Watershed
Protection and Flood Prevention Act, (Public
Law 566, 83rd Congress, 68 Stat. 666), as
amended.

Prepared by:

Attoyac Bayou Watershed Authority

Nacogdoches County Commissioners Court

Rusk County Commissioners Court

Shelby County Commissioners Court

Nacogdoches Soil and Water Conservation District

Rusk Soil and Water Conservation District

Shelby Soil and Water Conservation District

Piney Woods Soil and Water Conservation District

City of Center

With Assistance By:

U. S. Department of Agriculture
Soil Conservation Service

U. S. Forest Service

August 1971

SUPPLEMENTAL

WATERSHED WORK PLAN NO. II

ATTOYAC BAYOU WATERSHED

Nacogdoches, Rusk, Shelby, and San Augustine Counties, Texas
August 1971

PURPOSE OF THE SUPPLEMENTAL WORK PLAN

It has become necessary to modify the watershed work plan, as supplemented, for Attoyac Bayou watershed to delete floodwater retarding structure No. 16 and add multiple-purpose structure No. 16 for the purpose of providing additional municipal and industrial water supply for the city of Center. In order to simplify cost-sharing arrangements, it is necessary to modify the watershed work plan, as supplemented, to reflect current terminology relative to engineering and project administration costs. Cost of all structural measures not constructed and for technical assistance for installation of planned land treatment measures are updated to 1971 price levels to reflect current cost estimates and reaffirm economic feasibility.

The following are changes and modifications made in appropriate parts of the work plan, as supplemented.

Problems Relating to Water Management

The economy of Shelby County and the City of Center is dependent on income from agricultural products such as poultry and timber and their processing. Shelby County leads the state in poultry products, and many of the poultry products are processed in Center. Poultry processing plants require a large volume of water. There is presently one processing plant operating in the city that has plans for expansion when water becomes available. In addition, it is anticipated that another plant will be constructed provided adequate water is available.

The city of Center's present water supply, which is obtained from a reservoir on Mill Creek in the Sabine River Basin, is not adequate to meet its immediate needs. Water rationing has become necessary during periods of heavy use and short supply. The increasing water usage has resulted primarily from the growth in the poultry processing industry.

The city's engineer has projected the 2005 year population to be 7,980 and estimates that the domestic water use will increase to an average daily use of 1.5 million gallons a day by the year 2005. The anticipated average daily needs for industrial water will be 3.0 million gallons in the very near future. The city's present water source will supply about 1.2 million gallons per day.

Following is a history of the growth rate of Center:

<u>Year</u>	<u>Population</u>	<u>Year</u>	<u>Population</u>
1910	1,684	1950	4,323
1920	1,838	1960	4,510
1930	2,510	1970	4,989
1940	3,010		

Basis for Project Formulation

The city's objective is to provide an adequate water supply to meet the domestic needs of its population and to provide a water supply to attract industry to the city to provide employment to the residents.

The city recognized its problem several years ago and initiated a study to determine the most feasible source of additional water. Alternate methods of obtaining the additional water have been studied. These included development of ground water, a single purpose structure on Attoyac Bayou, transporting water from Toledo Bend Reservoir, and incorporating storage in a multiple-purpose structure to be located slightly downstream from planned floodwater retarding structure No. 16 on Sandy Creek. These studies revealed that the multiple-purpose structure was the most feasible. It is less costly and will provide a quality of water at least equal to Toledo Bend Reservoir water, which is the next most feasible source.

The city does not expect the yield from Multiple-Purpose Structure No. 16 to supply its entire needs. The yield in combination with the present water supply is expected to supply the city's projected needs to at least the year 2005.

Works of Improvement To Be Installed

The supplemental watershed work plan agreement provides for the substitution of a multiple-purpose structure for flood prevention and municipal and industrial use in lieu of floodwater retarding structure No. 16. The structure will be downstream from the original location of floodwater retarding structure No. 16. This structure will hereinafter be designated as Multiple-Purpose Structure No. 16. The total storage capacity in the reservoir will be 13,150 acre-feet, consisting of 464 acre-feet for sediment, 5,735 acre-feet for floodwater, and 6,951 acre-feet for municipal and industrial uses. The municipal and industrial storage includes allowances for the release of a minimum of 19 acre-feet per month to maintain the low flows in the stream.

A combination of principal spillway capacity and retarding storage will assure that the emergency spillway will have less than 2 percent chance of use at the end of its design life. The principal spillway will be the drop inlet type with a cantilever outlet. The principal spillway will have two stages. The elevation of the low stage will be at 298.0 m.s.l., which is the elevation of the 100-year submerged sediment capacity plus the capacity for the municipal and industrial water storage. The elevation of the high stage is 302.0 m.s.l, which is the elevation reached by routing the hydrograph from the 5-year frequency event through the reservoir.

Site 16 is underlain by soft sedimentary rocks of the Wilcox Group. A remnant of the Carrizo Sand occurs high above the steep left (south) abutment. The regional dip of these beds is south at approximately 50 feet per mile. The Wilcox beds at the site consist of soft shale, sandy shale, possibly some lignitic shale, and soft, non-cemented sandstone. The alluvium is mainly a clayey sand (SC) with some silty sand (SM) near the stream channel. It ranges from 10 to possibly 15 feet thick over residual stiff sandy clay (CL) and clayey sand (SC) soils weathered from the bedrock. A high water table occurs in the alluvium at about a depth of 5 feet.

The embankment foundation consists mainly of yielding clayey materials. The high water table in the alluvium will limit the use of borrow from this area and will necessitate use of hillside borrow areas. Drainage measures will be required and the possibility of lignite beds in the foundation will need to be investigated further prior to final structural design.

It will be necessary to modify or move portions of several utility lines and a pipeline in order to install the structure. Also it will be necessary to close, change the location, or raise portions of four county roads which will be affected by the structure. Preliminary investigations indicate that installation of the structure will not cause the displacement or relocation of any dwelling, business, or farming operation.

All applicable state water laws will be complied with in the design and construction of the structural measure, as well as those pertaining to storage, maintenance of quality, and use of water. All state and local health requirements will be complied with in the installation, operation, and maintenance of the structure.

Water quality studies, which were made at the direction of the city's engineer, indicate that water will be of excellent quality for all intended uses.

Preliminary investigations made by the consulting engineer employed by the city indicated that the reservoir had good water holding characteristics and seepage losses would not be excessive.

Explanation of Installation Costs

The installation cost of Multiple-Purpose Structure No. 16 is estimated to be \$691,310, of which \$245,316 will be paid from Public Law 566 funds and \$445,994 from other funds. The local cost includes \$204,885 for construction, \$224,800 for land rights, \$3,000 for project administration, \$2,800 for water rights, and \$10,509 for engineering services. The estimated value of land rights includes \$12,200 for legal fees and land surveys, \$139,600 for value of land, and \$73,000 for modification of utility lines, county roads, and a pipeline.

Construction and engineering costs were allocated by the "Use of Facilities Method," which distributes joint costs in proportion to capacity. The

following tabulation shows the allocation of storage to purpose for this structure:

Flood Prevention		:Municipal and Industrial:		Total	
Acre-Feet	Percent	Acre-Feet	Percent	Acre-Feet	Percent
6,199	47.14	6,951	52.86	13,150	100.00

The cost sharing summary for the construction and engineering costs is shown in the following tabulation:

Item	:Estimated:		: Estimated Sponsors' :		: Estimated PL 566	
	Cost	Cost	Cost	Cost	Cost	Cost
	: Dollars	: Percent	: Dollars	: Percent	: Dollars	: Dollars
Construction	387,600	52.86	204,885	47.14	182,715	
Engineering Services	19,880	52.86	10,509	47.14	9,371	
Total	407,480		215,394		192,086	

Cost estimate for a water supply outlet works is not included. Design of the outlet works will not be incorporated into the design of the structure.

Effects of Works of Improvement

The dependable yield of Multiple-Purpose Structure No. 16 will be about 3.3 million gallons of excellent quality water per day. This supply, in conjunction with the city's present water supply, will provide the 5,000 residents of the city of Center with a dependable water supply based upon projected needs. It will also provide a dependable supply of industrial water to the poultry processing plants, upon which so many residents depend for their livelihood.

The 523 surface-acre reservoir which will be created will offer excellent opportunities for incidental recreation. The city has no plans for developing the reservoir for recreational purposes at this time. They plan to allow use of the lake by the public on a limited basis as long as this does not interfere with maintaining the water quality. The city will require that adequate sanitary facilities meeting local and state health standards be provided prior to recreation use.

About 190 acres of pasture and 350 acres of woodland will be required for the water supply pool and the dam and spillway. No agricultural production can be expected from this acreage after project installation.

Fish and wildlife resources will generally benefit by the creation of the reservoir. The reservoir will provide additional habitat for fish and

nesting areas for waterfowl. Allowances have been made in the operation plan for the structure to release water out of the structure to sustain the low flows of the creeks downstream from the reservoir. This will benefit the fish and wildlife resources. There will be some adverse effects upon the ground-nesting birds due to the loss of habitat.

There will be no significant change in the effect upon downstream flooding. Approximately 45 acres of benefited flood plain will be lost because the structure was relocated downstream. There will be no significant change in flood prevention benefits because flood damages to the acreage is minor under without project conditions.

Project Benefits

The inclusion of a municipal and industrial water supply in this multiple-purpose structure will enable the city of Center to provide needed water to the poultry processing plants. Without supplemental water the city will lose tax revenue and will be unable to provide the services needed by its populace. The inclusion of this storage capacity in the reservoir will result in an average annual net savings to the city of at least \$64,000 when compared to the cost of an equal amount of water purchased and transported from Toledo Bend Reservoir, the next least expensive alternate source.

In addition to the supply of water, the 523 surface acres will provide an estimated \$1,058 in incidental recreation. It will provide fishing, hunting, and a limited amount of picnicking and other water-based recreation.

Comparison of Benefits and Costs

The total average annual cost of all planned structural measures and basic recreational facilities (amortized total installation cost, plus operating and maintenance) is \$264,163. These measures are expected to produce average annual primary benefits of \$364,832. The ratio of primary benefits to cost will be 1.4:1.0. The ratio of total average annual project benefits (\$400,792) to the average annual cost of structural measures and basic recreational facilities (\$264,163) is 1.5:1.0 (table 6).

Project Installation

The city of Center will be responsible for the installation of Multiple-Purpose Structure No. 16. The city will act as the contracting agency and will make arrangements for necessary legal, administrative, and clerical personnel, facilities, supplies and equipment to advertise, award, and administer the contracts. The city has the right of eminent domain under applicable state laws and has the financial resources necessary to fulfill its responsibilities.

The city will take the following actions pertaining to the structure:

1. Obtain all land rights, in accordance with the provisions of the Uniform Relocation Assistance and Real Property Acquisition

Policies Act of 1970, needed for construction, operation, and maintenance and take related land rights action conforming to Service policy requirements.

2. Be responsible for working with the Service during construction of works of improvement. The city will designate in writing an individual to serve as liaison between the city and the Service during the construction of works of improvement.
3. Determine the legal adequacy of land rights and use its power of eminent domain to obtain all land rights not donated.
4. Provide for the modification of utility lines, roads, privately owned improvements, and the pipeline as necessary for installation of the structure.
5. Arrange with the Soil Conservation Service for the negotiation of an architectural and engineering contract with a private engineering firm to prepare construction plans and specifications relative to municipal water supply.
6. Provide at its own expense for professional engineers or other technical specialists to inspect or review the inspection of those features of construction work related to water supply to the extent that it elects to do so.
7. Will determine that the reservoir will hold water without undue losses due to seepage or evaporation.

Technical assistance will be provided by the Soil Conservation Service in review of plans and specifications and construction inspection services for Multiple-Purpose Structure No. 16. The city of Center will make whatever inspections it desires at its own expense. The Service will also negotiate an A&E contract with a private engineering firm for the preparation of the plans and specifications for Multiple-Purpose Structure No. 16.

Multiple-Purpose Structure No. 16 will be installed pursuant to the following conditions:

1. The requirements for land treatment in the drainage area above the multiple-purpose structure have been met.
2. All land rights have been obtained.
3. Water rights have been obtained for storage of the municipal and industrial water.
4. Utilities such as powerlines and telephone lines have been moved or permission has been granted to inundate the properties involved.
5. Reimbursable agreements between the Service and the city of Center have been executed relative to the share of construction costs and A&E contracts cost.

6. A project agreement has been executed.
7. An operation and maintenance agreement has been executed.
8. Public Law 566 funds are available.

Financing Project Installation

The city of Center will be responsible for the local share of the cost of installing Multiple-Purpose Structure No. 16. The city is in sound financial condition and interest is high in developing a dependable water supply for the city. The city has approved a \$1,000,000 bond issue to pay for its share of the cost of installing the structure and other water supply system facilities. The Department of Housing and Urban Development has agreed to purchase the bonds. The Department has also approved a grant of \$818,500 to assist in paying the city's share of the total water supply system installation cost.

Financial and other assistance to be furnished by the Soil Conservation Service is contingent on the appropriation of funds for this purpose. In addition, all prerequisite conditions will be met before Public Law 566 funds will be made available for the installation of the structure.

Provisions for Operation and Maintenance

Multiple-Purpose Structure No. 16 will be operated and maintained by the city of Center. The estimated average annual operation and maintenance cost of the structure is \$400.

The Service and the sponsors will make a joint inspection annually or after unusually severe floods, or in the event of other unusual conditions that may adversely affect the works of improvement, for three years following installation of the structure. Inspection after the third year will be made annually by the sponsors. The Service will participate in annual inspections as often as it elects to do so after the third year. Inspection items are those items which may need maintenance. Items of inspection and maintenance will include, but will not be limited to, condition of principal spillways, earth fills, emergency spillways, vegetative cover, fences, gates, and vegetative growth in the reservoir.

The city will be responsible for and promptly perform or have performed, without cost to the Service, all maintenance of the structure as determined to be needed by either the sponsors or the Service immediately following completion of the structure by the contractor. The city will be responsible for maintenance of vegetation associated with the structure after the initial vegetation work is adequately completed, as determined by the Service, but not later than three years following completion.

The Soil Conservation Service, through the soil and water conservation districts, will participate in operation and maintenance only to the extent of furnishing technical assistance to aid in inspections and technical

guidance and information necessary for the operation and maintenance program.

Provisions will be made for free access of representatives of the sponsoring local organizations and of federal representatives to inspect and provide maintenance to the structure and its appurtenances at any time.

The city will prepare a report of all maintenance inspections. A copy of this report will be submitted to the Service representative. The city will keep summary control records in support of proper maintenance having been performed on the works of improvement.

An operation and maintenance agreement will be executed by the parties hereto prior to the signing of the initial project agreement and the issuance of invitations to bid on construction of the structural measures. The agreement will set forth specific details on procedure in line with recognized assignments of responsibility.

REVISED TABLE 1 - ESTIMATED PROJECT INSTALLATION COST

Attoyac Bayou Watershed, Texas

Installation Cost Item	: Unit	: Number : To Be : Applied	Estimated Cost (Dollars) ^{1/}		
			: Public Law : 566 Funds	: Other	: Total
LAND TREATMENT					
Soil Conservation Service					
Cropland	Acre	1,400	-	39,500	39,500
Grassland	Acre	16,200	-	677,500	677,500
Technical Assistance			114,480	30,030	144,510
SCS Subtotal			114,480	747,030	861,510
Forest Service					
Forest Land	Acre	6,100	-	29,500	29,500
Technical Assistance			12,500	14,200	26,700
FS Subtotal			12,500	43,700	56,200
TOTAL LAND TREATMENT			126,980	790,730	917,710
STRUCTURAL MEASURES					
<u>Construction</u>					
Soil Conservation Service					
Floodwater Retarding Structures	No.	21	1,852,000	-	1,852,000
Stream Channel Improvement	Ft.	258,525	2,154,990	-	2,154,990
Multiple-Purpose Structures	No.	2	391,150	283,550	674,700
Basic Recreational Facilities	No.	1	38,725	38,725	77,450
SCS Subtotal			4,436,865	322,275	4,759,140
Subtotal - Construction			4,436,865	322,275	4,759,140
<u>Engineering Services</u>					
Soil Conservation Service			254,586	12,389	266,975
Subtotal - Engineering			254,586	12,389	266,975
<u>Project Administration</u>					
Soil Conservation Service					
Construction Inspectinn			319,350	4,800	324,150
Other			406,690	12,200	418,890
Subtotal - Administration			726,040	17,000	743,040
<u>Other Costs</u>					
Land Rights			50,990	1,038,590	1,089,580
Water Rights			-	3,300	3,300
Subtotal - Other			50,990	1,041,890	1,092,880
TOTAL STRUCTURAL MEASURES			5,468,481	1,393,554	6,862,035
TOTAL PROJECT			5,595,461	2,184,284	7,779,745
SUMMARY					
Subtotal SCS			5,582,961	2,140,584	7,723,545
Subtotal FS			12,500	43,700	56,200
TOTAL PROJECT			5,595,461	2,184,284	7,779,745

^{1/} Price Base: 1971 prices for all costs except for two constructed floodwater retarding structures, which are actual costs.

August 1971

REVISED TABLE 2 - ESTIMATED STRUCTURAL COST DISTRIBUTION
Attoyac Bayou Watershed, Texas
(Dollars)

Structure Site Number or Name	Installation Cost - Public Law 566 Funds			Installation Cost - Other Funds			Total Installation Cost
	Construction	Engineering	Land	Construction	Engineering	Land	
Floodwater Retarding							
Structures							
11 and 18A ^{2/}							
1	192,640	12,430	-	-	-	50,800	255,870
2	122,520	7,350	-	-	-	40,900	170,770
3	74,200	5,190	-	-	-	9,100	88,490
4	100,380	6,020	-	-	-	15,900	122,300
5	160,220	8,010	-	-	-	56,000	224,230
6	95,740	5,740	-	-	-	23,300	124,780
7	80,340	5,620	-	-	-	16,600	102,560
8	51,760	4,140	-	-	-	6,900	62,800
9	74,050	5,180	-	-	-	15,100	94,330
10	58,790	4,700	-	-	-	11,400	74,890
11	64,780	4,530	-	-	-	17,500	86,810
12	63,430	4,440	-	-	-	12,900	80,770
13	100,830	6,050	-	-	-	19,100	125,980
14	147,650	7,380	-	-	-	38,200	193,230
15	103,820	6,230	-	-	-	18,700	128,750
16	68,820	4,820	-	-	-	29,200	102,840
17	53,260	4,260	-	-	-	42,900	100,420
18	98,140	5,890	-	-	-	8,900	112,930
19	80,040	5,600	-	-	-	13,600	99,240
20	60,590	4,240	-	-	-	35,300	100,130
21	1,552,000	117,820	-	-	-	482,300	2,452,120
22	1,445,140	72,260	-	-	-	164,700	1,682,100
Subtotal	565,940	28,300	-	-	-	80,400	674,640
Channel Improvements							
Attoyac Bayou	91,110	6,380	-	-	-	17,700	110,190
Nacolinche Creek	52,800	4,220	-	-	-	15,200	72,320
Wanders Creek	2,154,990	111,160	-	-	-	273,000	2,539,150
West Creek	182,715	3/9,371	-	204,885	3/10,309	224,800	635,080
Subtotal	208,435	14,355	49,490	73,665	-	56,990	408,435
Multiple-Purpose Structures							
Basic Recreational							
Facilities	38,725	3/1,880	1,500	38,725	3/1,880	1,500	42,103
Subtotal	329,875	23,606	50,990	322,275	12,389	283,290	621,254
Project Administration	4,436,865	254,586	4/50,990	322,275	12,389	1,038,590	5,762,605
GRAND TOTAL	4,436,865	254,586	50,390	322,275	12,389	5/1,038,590	6,562,035

1/ Price Base: 1971 prices except for floodwater retarding structures No. 11 and No. 18A, which are actual costs.
2/ Constructed
3/ Architectural & Engineering Contract
4/ Includes \$14,900 for modification of fixed improvements
5/ Includes \$32,400 for legal fees and surveys and \$244,540 for modification of fixed improvements

REVISED TABLE 3 - STRUCTURE DATA - FLOODWATER RETARDING STRUCTURES
Attoyac Bayou Watershed, Texas

Item	Unit	Structure No.:	
		16	Total
Class of Structure		A	
Drainage Area	Sq. Mi.	14.03	150.63
Controlled	Sq. Mi.	-	6.20
Curve No. (1-Day)(AMC II)		68	xxx
Tc	Hrs.	7.6	xxx
Elevation Top of Dam	Ft.	311.4	xxx
Elevation Crest Emergency Spillway	Ft.	307.0	xxx
Elevation Crest High Stage Inlet	Ft.	302.0	xxx
Elevation Crest Low Stage Inlet	Ft.	298.0	xxx
Maximum Height of Dam	Ft.	55	xxx
Volume of Fill	Cu. Yds.	407,000	2,761,700
Total Capacity	Ac. Ft.	13,150	68,331
Sediment Pool (Lowest Ungated Outlet)	Ac. Ft.	-	1,636
Sediment Submerged 1st 50 Years	Ac. Ft.	207	2,039
Sediment Submerged 2nd 50 Years	Ac. Ft.	222	2,186
Sediment Aerated	Ac. Ft.	35	738
Water Supply	Ac. Ft.	6,951	6,951
Recreation	Ac. Ft.	-	6,617
Retarding	Ac. Ft.	5,735	49,800
Between High and Low Stage	Ac. Ft.	2,275	2,275
Surface Area			
Sediment Pool (Principal Spillway Crest)	Acres	-	965
Water Supply Pool	Acres	523	523
Recreation Pool	Acres	-	585
Retarding Pool	Acres	753	5,963
Principal Spillway			
Rainfall Volume (Aeral)(1-Day)	Inch	10.50	xxx
Rainfall Volume (Aeral)(10-Day)	Inch	18.10	xxx
Runoff Volume (10-Day)	Inch	9.93	xxx
Capacity of Low Stage (Maximum)	C.F.S.	69	xxx
Capacity of High Stage (Maximum)	C.F.S.	292	xxx
Frequency Operation-Emergency Spillway	% Chance	1.2	xxx
Size of Conduit	Inch	42	xxx
Emergency Spillway			
Rainfall Volume (ESH)(Aeral)	Inch	11.00	xxx
Runoff Volume (ESH)	Inch	6.85	xxx
Type		Veg.	xxx
Bottom Width	Ft.	250	xxx
Velocity of Flow (V _c)	Ft./Sec.	5.7	xxx
Slope of Exit Channel	Ft./Ft.	0.100	xxx
Maximum Water Surface Elevation	Ft.	308.1	xxx
Freeboard			
Rainfall Volume (FH)(Aeral)	Inch	18.60	xxx
Runoff Volume (FH)	Inch	13.94	xxx
Maximum Water Surface Elevation	Ft.	311.4	xxx
Capacity Equivalents			
Sediment Volume	Inch	0.62	xxx
Retarding Volume	Inch	7.65	xxx
Water Supply Volume	Inch	9.29	xxx
Recreation Volume	Inch	-	xxx

August 1971

REVISED TABLE 4 - ANNUAL COST
 Attoyac Bayou Watershed, Texas
 (Dollars)

Evaluation Unit	: Amortization : of : Installation : Cost ^{1/}	: Operation : and : Maintenance : Cost ^{2/}	: Total
Floodwater Retarding Structures 1 through 15, 17 through 22, 49 miles of Channel Improvement, Multiple-Purpose Structure No. 16, and Multiple-Purpose Struc- ture No. 23, including Basic Recreation Facilities	201,170	^{3/} 38,588	239,758
Project Administration	24,405	xxx	24,405
GRAND TOTAL	225,575	38,588	264,163

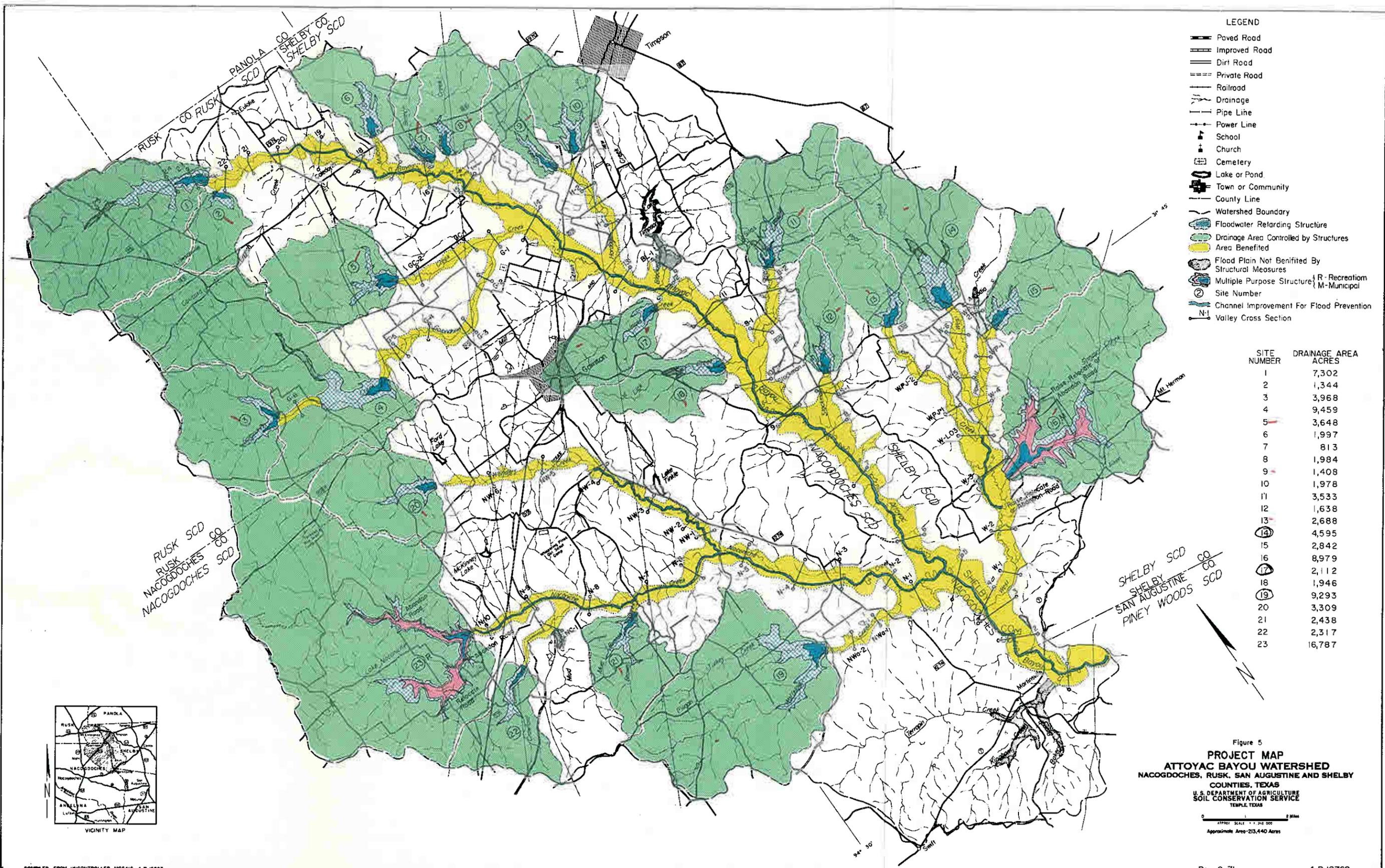
- ^{1/} Price base: 1971 prices for all structural measures except floodwater retarding structures Nos. 11 and 18A, which are actual costs. All costs for structural measures except multiple-purpose structure No. 16 amortized at 3.125 percent for 100 years. Multiple-purpose structure No. 16 amortized at 3.250 percent for 100 years.
- ^{2/} Long-term prices as projected by ARS, September 1957.
- ^{3/} Operation, maintenance, and replacement costs assigned to the basic recreation facilities, \$22,500 annually.

August 1971

REVISED TABLE 6 - COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES
Attoyac Bayou Watershed, Texas
(Dollars)

Evaluation Unit	Average Annual Benefits ^{1/}										Total	Average Annual Cost ^{3/}	Benefit-Cost Ratio				
	Flood Prevention			Damage Reduction		Recreation		Industrial and Municipal		Water Supply							
	Intensive	Incidental	More	Other ^{2/}	Land Use	Recreation	Supply	Industrial	Municipal	and	Water	Recreation	Supply	Development	Secondary	Cost ^{3/}	Ratio
Floodwater Retarding Structures 1 through 15, 17 through 22; 49 miles of Channel Improvement; Multiple-Purpose Structure No. 16; and Multiple-Purpose Structure No. 23, including Basic Recreational Facilities ^{4/}	91,299	5,524	111,990	183	64,000	75,000	16,836	35,960	400,792	239,758	1.7:1.0						
Project Administration	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	24,405	xxx
GRAND TOTAL^{5/}	91,299	5,524	111,990	183	64,000	75,000	16,836	35,960	400,792	264,163	1.5:1.0						

1/ Price base: Long-term prices as projected by ARS, September 1957.
 2/ Benefits from outside the watershed.
 3/ From table 4.
 4/ Interrelated measures.
 5/ In addition, it is estimated that land treatment measures will provide flood damage reduction benefits of \$7,364 annually.



- LEGEND**
- Paved Road
 - Improved Road
 - Dirt Road
 - Private Road
 - Railroad
 - Drainage
 - Pipe Line
 - Power Line
 - School
 - Church
 - Cemetery
 - Lake or Pond
 - Town or Community
 - County Line
 - Watershed Boundary
 - Floodwater Retarding Structure
 - Drainage Area Controlled by Structures
 - Area Benefited
 - Flood Plain Not Benefited By Structural Measures
 - Multiple Purpose Structure { R - Recreation, M - Municipal
 - Site Number
 - Channel Improvement For Flood Prevention
 - Valley Cross Section

SITE NUMBER	DRAINAGE AREA ACRES
1	7,302
2	1,344
3	3,968
4	9,459
5	3,648
6	1,997
7	813
8	1,984
9	1,408
10	1,978
11	3,533
12	1,638
13	2,688
14	4,595
15	2,842
16	8,979
17	2,112
18	1,946
19	9,293
20	3,309
21	2,438
22	2,317
23	16,787

Figure 5
PROJECT MAP
ATTOYAC BAYOU WATERSHED
NACOGDOCHES, RUSK, SAN AUGUSTINE AND SHELBY
COUNTIES, TEXAS
 U.S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE
 TEMPLE, TEXAS

Graphic Scale: 1" = 2400'
 Approximate Area - 213,440 Acres

