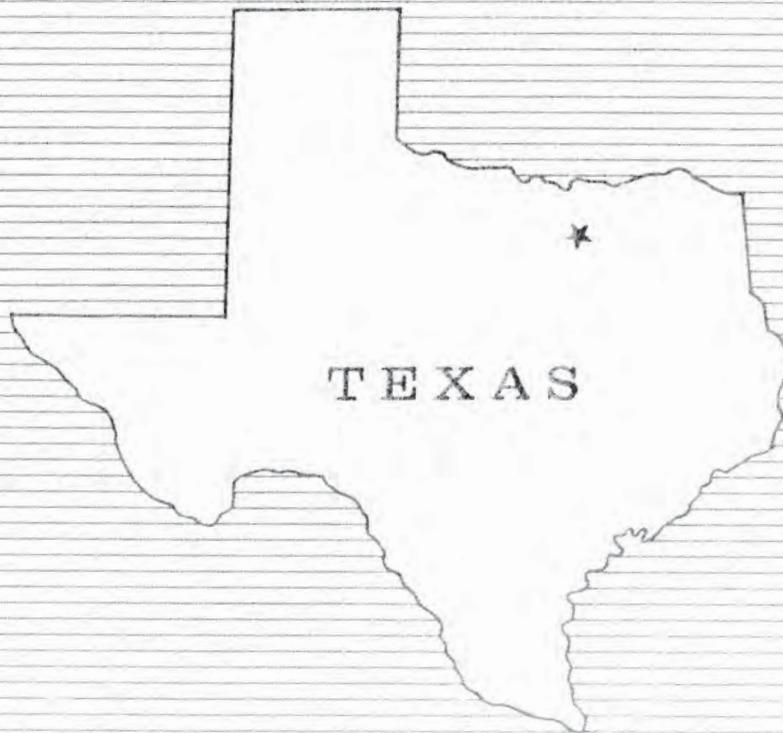


SUPPLEMENTAL PLAN NO. III
FOR WATERSHED PROTECTION AND FLOOD PREVENTION
BIG SANDY CREEK WATERSHED
OF THE TRINITY RIVER WATERSHED

CLAY, JACK, MONTAGUE, TARRANT and WISE COUNTIES, TEXAS



SUPPLEMENTAL WATERSHED PLAN NO. III

BIG SANDY CREEK WATERSHED
of the
Trinity River Watershed
Clay, Jack, Montague, Tarrant, and Wise Counties, Texas

Plan Prepared and Works of Improvement
To Be Installed Under the Authority
of the Flood Control Act of 1944,
as Amended and Supplemented

Prepared By:

Little Wichita Soil and Water Conservation District
Wise Soil and Water Conservation District
Upper Elm-Red Soil and Water Conservation District
Upper West Fork Soil and Water Conservation District
Montague County Commissioners Court
Wise County Commissioners Court
City of Bowie, Texas
Wise County Water Control and Improvement District No. 1

With Assistance By:

U.S. Department of Agriculture
Soil Conservation Service

In Cooperation With:

Forest Service, USDA
and
Fish and Wildlife Service, USDI

June 1979

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SUPPLEMENTAL WATERSHED PLAN AGREEMENT NO. III

Between the

Little Wichita Soil and Water Conservation District
Local Organization

Wise Soil and Water Conservation District
Local Organization

Upper Elm-Red Soil and Water Conservation District
Local Organization

Upper West Fork Soil and Water Conservation District
Local Organization

Montague County Commissioners Court
Local Organization

Wise County Commissioners Court
Local Organization

City of Bowie
Local Organization

Wise County Water Control and Improvement District No. 1
Local Organization

(hereinafter referred to as the Sponsoring Local Organization)

State of Texas

and the

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

Whereas, the Watershed Plan Agreement for Big Sandy Creek Watershed, Trinity River Watershed, State of Texas, executed by the Sponsoring Local Organization named herein and the Service, became effective on the 18th day of January 1956; and

Whereas, Supplemental Watershed Plan Agreement No. I, executed by the Sponsoring Local Organization named herein and the Service, became effective on the 13th day of December 1971; and

Whereas, Supplemental Watershed Plan Agreement No. II, executed by the Sponsoring Local Organization named herein and the Service, became effective on the 26th day of April, 1976; and

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

Whereas, it has become necessary to modify the Watershed Plan, as supplemented, by deleting floodwater retarding structures Nos. 7, 17, 19, 21, 22, and 25, and adding floodwater retarding structures Nos. 1A, 1B, 1C, 1D, 8A, 13A, 13B, 13C, 14A, 17A, 22A, 22B, 23A, 24A, 24B, 24C, 24D, 25A, 26 through 44, 31 grade stabilization structures, and land stabilization measures on 825 acres of critically eroded lands; and

Whereas, the City of Bowie will benefit from the reduction in sedimentation of Lake Amon G. Carter, the city's water supply; the Wise County Water Control and Improvement District No. 1 will benefit from reduction of floodwater and sediment damages to their works of improvement; and the Little Wichita Soil and Water Conservation District will benefit through land treatment measures to be applied; and the City of Bowie and the Wise County Water Control and Improvement District No. 1 agree to become sponsors of the watershed project; and

Whereas, a Supplemental Watershed Plan No. III, which modifies the Watershed Plan dated August 1955, 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;

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

1. The Sponsoring Local Organization will acquire, with other than Public Law 534 funds, such land rights as will be needed in connection with the works of improvement.
(Estimated cost \$1,013,570.)
2. The Sponsoring Local Organization assures 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 Sponsoring Local Organization and the Service as follows:

	<u>Sponsoring Local Organization</u> (percent)	<u>Service</u> (percent)	<u>Estimated Relocation Cost</u> (dollars)
Relocation Payments	74.98	25.02	<u>1/0</u>

1/ Investigation has disclosed that under present conditions the project 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 the percentages shown.

- 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.
- The percentages of construction costs of structural measures to be paid by the Sponsoring Local Organization and by 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)
Floodwater Retarding Structures	0.00	100.00	5,884,290
Land Stabilization Measures	0.00	100.00	828,150

- 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)
Floodwater Retarding Structures	0.00	100.00	365,920
Land Stabilization Measures	0.00	100.00	110,320

- The Sponsoring Local Organization and the Service will each bear the costs of project administration which it incurs, estimated to be \$28,500 and \$1,201,290, respectively.
- The costs shown in this agreement represent preliminary estimates. In finally determining the costs to be borne by the parties hereto, the actual costs incurred in the installation of works of improvement will be used.

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

Little Wichita
Soil and Water Conservation District

Local Organization
308 N. Bridge
Henrietta, Texas 76365
Address Zip Code

By: Joe Ben Whitaker
Title Chairman
Date 7-9-79

The signing of this agreement was authorized by a resolution of the governing body of the Little Wichita Soil and Water Conservation District adopted at a

Local Organization
meeting held on 7-9-79

Wilbi R. Shuman
Secretary, Local Organization

Rt. 2, Box 238
Wichita Falls, Texas 76301
Address Zip Code

7-9-79
Date

Wise
Soil and Water Conservation District
Local Organization
Box 158
Decatur, TX 76234
Address Zip Code

By Jim J. Hornbeck
Title Chairman
Date 7-13-79

The signing of this agreement was authorized by a resolution of the governing body of the Wise Soil and Water Conservation District adopted

at a meeting held on 7-13-79 Local Organization

Y. M. Cummins
Secretary, Local Organization
7-13-79
Date

Rt. 1 Decatur, TX 76234
Address Zip Code

Wise County Commissioners Court
Local Organization P.O. Box 423
Decatur, Texas 76234
Address Zip Code

By Charles R. Lulhite
Title County Judge
Date JUNE 29, 1979

The signing of this agreement was authorized by a resolution of the governing body of the Wise County Commissioners Court adopted at a meeting

held on 6-29-79 Local Organization

Laverne Farnam
Secretary, Local Organization
6-29-79
Date

Box 359 Decatur 76234
Address Zip Code

Wise County Water
Control and Improvement District No. 1
Local Organization
P.O. Box 303
BRIDGEPORT, TEXAS 76076
Address Zip Code

By W. W. Ray
Title President
Date July 3, 1979

The signing of this agreement was authorized by a resolution of the governing body of the Wise County Water Control and Improvement District

No. 1 adopted at a meeting held on 30 JULY 1979 Local Organization

G. L. Lehmann
Secretary, Local Organization
30 JULY 1979
Date

Rt. 1 Box 33 Paradise 76073
Address Zip Code

Soil and Water Conservation District
Local Organization Box 340
Hainesville Texas 76240
Address Zip Code
By JH Bayler
Title Chairman
Date 7-16-79

The signing of this agreement was authorized by a resolution of the governing body of the Upper Elm-Red Soil and Water Conservation District adopted at

Local Organization
a meeting held on 7-16-79 at 805 Lambert Rd.
Sherman, Texas 75090
Secretary, Local Organization Address Zip Code
7-16-79
Date

City of Bowie
Local Organization
115 E Tarrant
Bowie Texas 76230
Address Zip Code
By Terry T Morgan
Title Mayor
Date 8-8-79

The signing of this agreement was authorized by a resolution of the governing body of the City of Bowie adopted

Local Organization
at a meeting held on 8-8-79 at 115 E Tarrant
Bowie Texas 76230
Secretary, Local Organization Address Zip Code
8-8-79
Date

Montague County Commissioners Court
Local Organization
Box 122, Montague Texas 76251
Address Zip Code
By Charles H. Coffield
Title County Judge
Date 7-16-79

The signing of this agreement was authorized by a resolution of the governing body of the Montague County Commissioners Court adopted

Local Organization
at a meeting held on July 16, 1979 at P.O. Box 77, Montague, Tx 76251
Christine Coals
Secretary, Local Organization Address Zip Code
July 16, 1979
Date

Upper West Fork
Soil and Water Conservation District
Local Organization
Box 639
Jacksonville, FL
Address 76056
Zip Code

By Henry J. Richard
Title Chairman
Date 7/9/79

The signing of this agreement was authorized by a resolution of the governing body of the Upper West Fork Soil and Water Conservation District adopted at a Local Organization

meeting held on 7/9/79.

[Signature]
Secretary, Local Organization
7/9/79
Date

Box 639
Jacksonville, FL
Address 76056
Zip Code

Soil Conservation Service
United States Department of Agriculture

Approved by:

C. Budd Houston **ACTING**
State Conservationist

AUG 22 1979
Date

SUPPLEMENTAL WATERSHED PLAN NO. III

BIG SANDY CREEK WATERSHED
(Trinity River Watershed)
Clay, Montague, Wise, Jack, and Tarrant Counties, Texas

June 1979

PURPOSE OF THE SUPPLEMENTAL WATERSHED PLAN

The Big Sandy Creek watershed plan was developed in 1955. New legislation has broadened the authority of the Soil Conservation Service and provides an opportunity for wider participation by the sponsors in resource development in watershed projects. It was requested that the watershed plan be supplemented to provide opportunity for greater development of the watershed resources.

The evaluation procedures used in this supplemental watershed plan are based on the following factors and conditions:

1. Updated land use and crop distribution.
2. Without project conditions (assuming no floodwater retarding structures installed and with Lake Amon G. Carter in place).
3. Actual installation costs for the 13 constructed floodwater retarding structures.
4. Installation costs of structural measures to be constructed based on 1977 prices.
5. The installation costs for structures Nos. 1, 2, 3, 4, 5A, 5B, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 23, and 24 amortized 100 years at 2½ percent. Installation costs for structures Nos. 1A, 1B, 1C, 1D, 8A, 13A, 13B, 13C, 14A, 17A, 22A, 22B, 23A, 24A, 24B, 24C, 24D, 25A, and 26 through 44; 31 grade stabilization structures; and land stabilization measures amortized 100 years at 3¼ percent.

The watershed plan, as supplemented, for Big Sandy Creek watershed is modified to make the following changes:

1. Add land treatment measures for stabilization of critical sediment source areas on approximately 1,455 acres of the Lyndon B. Johnson National Grasslands. These areas will be treated with planned measures such as shaping, vegetating, and appurtenant structural measures.
2. Delete floodwater retarding structures Nos. 7, 17, 19, 21, 22, and 25, and add floodwater retarding structures Nos. 1A, 1B, 1C, 1D, 8A, 13A, 13B, 13C, 14A, 17A, 22A, 22B, 23A, 24A, 24B, 24C, 24D, 25A, and 26 through 44. Structures Nos. 1A, 1B, 1C, 1D, and 8A will provide

much needed additional control in the upper reaches of the watershed. Structures Nos. 13A, 13B, 13C, 14A, 17A, 22B, 23A, 24A, 24B, 24C, 24D, and 26 through 44 will provide needed control and flood protection to the central and lower reaches of the watershed. Structures Nos. 7 and 25 are being deleted to eliminate serious involvement with important county roads. Structure No. 17 is being deleted because it will not be needed with the addition of structure No. 17A. Structures Nos. 19, 21, and 22 are being deleted because they will not be needed with the addition of structure No. 22A.

3. Add critical area stabilization consisting of 31 grade stabilization structures and land stabilization measures on about 825 acres of critically eroded land. Much of the upland area in the Cross Timbers Land Resource Area, which comprises a large portion of the watershed, is dissected by moderate to severe gully systems. Many of the moderate gully systems are healing due to conversion of cropland to grassland and critical area treatment applied by owners and operators of the land. However, on the more extensive and deeper gully systems on the highly erodible soils active erosion is still occurring, resulting in land loss and depreciation, reduced productivity of surrounding land, and sedimentation of the streams and tributaries, and contributing to an unsightly appearance to the landscape. The needed treatment of these deeper gully systems is too costly for private landowners to bear. The installation of the critical area stabilization is an essential part of the project.
4. Add the following organizations as sponsors: City of Bowie, Texas; and Wise County Water Control and Improvement District No. 1.

In order to simplify cost-sharing arrangements, it is necessary to modify the watershed plan, as supplemented, to reflect current terminology relative to engineering and project administration costs. For all structural measures not constructed and technical assistance for installation of planned land treatment measures, costs are updated to 1977 price levels to reflect current cost estimates and reaffirm economic feasibility. Also, all damages and benefits were updated from the long-term prices as projected by USDA, Agricultural Research Service - Agricultural Marketing Service, September 1957, to current normalized prices as set forth in "Agricultural Price Standards for Watershed Related Land Resources Planning" United States Water Resources Council, November 1975.

5. Change evaluation period from 50 years to 100 years to reflect the planned life of the structural measures. Investigation of structures already installed indicated that they have sufficient sediment storage for the project to have a 100-year life.

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

PLANNED PROJECT

Land Treatment

This supplemental watershed plan provides for the application of land treatment measures on 9,350 acres of the LBJ National Grasslands, which is administered by the U. S. Forest Service. The land was purchased in many small tracts under authority of Public Law 210, 75th Congress, taken out of cultivation, and seeded to native grasses. These lands are severely eroded with both gully and sheet erosion.

Thirty grazing allotments of this land in the Big Sandy Creek watershed are in need of land treatment measures for control of accelerated erosion. An estimated area of 1,455 acres containing 306,000 linear feet of gullies are in need of critical area stabilization. The stabilization of these gullies calls for 708 acres of sloping and shaping, 184 structures, and 37,000 feet of diversion terraces. All disturbed areas will be seeded, fertilized, and mulched, using a mixture containing native grasses and at least one legume. This is in addition to the regular range management program activities which are strongly oriented to watershed protection and improvement.

Technical assistance for land treatment measures on the LBJ National Grasslands will be provided by the Forest Service.

Structural Measures

The supplemental watershed plan agreement provides for the deletion of floodwater retarding structures Nos. 7, 17, 19, 21, 22, and 25; the addition of floodwater retarding structures Nos. 1A, 1B, 1C, 1D, 8A, 13A, 13B, 13C, 14A, 17A, 22A, 22B, 23A, 24A, 24B, 24C, 24D, 25A, and 26 through 44; the addition of 31 grade stabilization structures; and the addition of land stabilization measures.

Floodwater retarding structures Nos. 1A, 1B, 1C, and 1D are located on tributaries for which no control was provided in the original plan. All of these structures are located on tributaries which drain into Lake Amon G. Carter. The drainage area controlled by these four structures totals 7.74 square miles and will offset the control lost by the deletion of structure No. 7.

Floodwater retarding structures Nos. 8A, 13A, 13B, 13C, and 14A are located on unnamed tributaries and are added to provide needed flood protection. They will control 3.89 square miles. Floodwater retarding structure No. 17A is located on Pringle Creek and will provide control on 16.08 square miles. It will eliminate the need for structure No. 17, which is being deleted.

Floodwater retarding structure No. 25A is located on the upper reaches of Chicken Creek. It will control part of the same drainage area which was controlled by deleted structure No. 25.

Floodwater retarding structures Nos. 22A, 22B, 23A, 24A, 24B, 24C, 24D, and 26 through 44 are being added to provide additional control and flood protection. These 26 structures will control 69.55 square miles.

The watershed plan as supplemented provides for the construction, during an 8-year installation period, of a total of 44 floodwater retarding structures, and critical area stabilization consisting of 31 grade stabilization structures and land stabilization measures on about 825 acres of critically eroded land on 28 separate areas. Thirteen floodwater retarding structures in the watershed have been constructed. All of these structural measures will provide the desired protection to the watershed and reduction in floodwater and sediment damages to flood plain land.

The locations of all the structural measures are shown on the revised project map (figure 2). Runoff from 43 percent of the watershed above valley section 1 will be retarded by the structural measures (figure 1).

Installation of the structural measures may require changes in location or modification of known existing improvements as follows:

Structure No.	Item
1	County road, two oil wells
1A	County road
1B	County road
1C	Pipeline, disposal well
9	Powerline
15	County road
17A	Two county roads, powerline, pipeline, oil well
22A	Telephone line, powerline, pipeline, oil well, county road
31	Oil well and tank battery
33	Gas well
38	Powerline
39	Oil well
40	Pipeline
41	Pipeline

Under present conditions, there are no apparent displacements of persons, farm operations, or businesses as a result of project installation. In the event that displacements do occur, necessary relocations will be carried out under the provisions of Public Law 91-646, Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

All proposed structures are located on outstanding minerals. The National Forests in Texas will examine each site to determine any valid outstanding mineral claim. If field examination shows any Federal mineral ownership that would be affected by construction, U.S. Geological Survey will be notified.

The supplemental watershed plan has been briefed to avoid excessive duplication of similar information presented in the Environmental Impact Statement. The EIS should be reviewed for pertinent information regarding the planned project, environmental setting, water and related land resource problems, environmental impacts, project alternatives, and the irreversible and irretrievable commitment of resources.

INSTALLATION COSTS - MONETARY

Costs of land treatment to be applied on the LBJ National Grasslands are estimated to be \$771,020. Of this total, \$459,500 are PL 534 funds for the installation of critical area stabilization measures. The balance of \$311,520 is Forest Service P&M range and watershed funds scheduled to be used for the going management programs. The estimated costs of land treatment on the LBJ National Grasslands to be borne by PL 534 funds are as follows:

AlLOTment Number	AlLOTment Size (acres)	Sloping and Shaping (acres)	Structures (number)	Terraces (feet)	Rehabilitation Total Cost PL 534 (dollars)
1	95	-	-	-	-
2	185	17	-	-	6,380
3	580	34	5	1,000	16,660
4	240	17	2	-	7,880
5	80	8	-	-	3,000
6	240	5	-	-	1,880
7	120	5	5	-	5,620
8	260	34	9	1,000	20,910
9	740	67	16	2,500	44,050
11	80	17	-	-	6,380
12	80	8	-	-	3,000
14	245	34	8	1,700	21,520
15	860	8	-	-	3,000
16	410	50	18	3,000	35,230
18	55	-	-	-	-
19	170	7	-	-	2,620
20	20	-	-	-	-
21	315	35	5	3,500	17,560
22	90	7	-	-	2,800
23	50	15	2	-	7,120
26	155	-	-	-	-
34	205	34	9	1,400	22,220
35	180	20	6	1,000	16,010
36	550	67	20	4,500	45,090
37	85	12	5	600	8,470
38	85	7	7	300	8,630
39	370	34	12	4,000	26,600
40	25	-	-	-	-
41	1,360	108	30	7,100	80,870
43	250	14	6	2,500	10,500
44	155	14	5	1,000	10,140
45	325	20	4	-	11,060
51	90	-	-	-	-
52	55	-	1	-	750
71	985	-	7	1,900	8,300
72	140	10	2	-	5,250
73	80	-	-	-	-
Total		708	184	37,000	459,500

The total installation cost of the structural measures is estimated to be \$9,432,040. This includes actual costs of \$822,320 spent for installation of 13 floodwater retarding structures that have been constructed. Public Law 534 costs are \$8,389,970 and local costs are \$1,042,070.

Estimated Public Law 534 costs for the planned structural measures covered by this supplement include \$6,712,440 for construction, \$476,240 for engineering services, and \$1,201,290 for project administration.

The estimated local costs for the planned structural measures covered by this supplement include \$1,013,570 for land rights and \$28,500 for project administration. The estimated cost of land rights includes \$12,270 for legal fees, \$1,240,390 for value of land and easements, and \$63,730 for modification or replacement of existing improvements.

The local costs for project administration include sponsors' costs relative to contract administration, overhead and organization costs, and cost of construction inspections they desire to make at their own expense.

The construction cost includes the engineer's estimate and a 10 percent allowance for contingencies. The engineer's estimate was made by determining the amount or quantity of specific items that will be needed for construction of each individual structure. Such items include, but are not limited to, land clearing, embankment fill, excavation, concrete pipe, concrete, fencing, and vegetation. The unit cost for the specific items was based on actual cost of structural measures in similar areas modified to conditions found in this watershed.

Engineering services and project administration costs are based on an analysis of previous work in similar areas. Engineering services costs include, but are not limited to, detailed surveys, geological investigations, laboratory reports, designs, and cartographic services.

Federal costs for project administration include the costs of construction inspection, contract administration, and maintenance of Soil Conservation Service records and accounts.

Value of land, easements, and rights-of-way was estimated by representatives of the local sponsors and concurred in by the Soil Conservation Service.

Under present conditions there are no apparent displacements of persons, farm operations, or businesses as a result of installation of the project. However, in the event that displacements do occur, all associated relocation costs will be shared, with flood prevention funds providing 25.02 percent and local funds providing 74.98 percent. This is in accordance with arrangements set forth in the supplemental watershed work plan agreement No. I, which became effective on December 13, 1971.

INSTALLATION AND FINANCING

Federal assistance for installing the works of improvement described in this supplemental plan will be provided under the authority of the Flood Control Act of 1944, as amended and supplemented.

The Soil Conservation Service will contract for the construction of 44 floodwater retarding structures; 31 grade stabilization structures; and land stabilization measures on 825 acres located on 28 separate areas.

The local sponsors will provide, at no cost to Public Law 534 funds, all the land rights needed for the construction of the floodwater retarding structures and land stabilization measures.

The City of Bowie will provide funds for the local share of the costs for floodwater retarding structures Nos. 1, 1A, 1B, 1C, 1D, and 3.

The Commissioners Court of Montague County will provide funds for the local share of the costs of installing floodwater retarding structures Nos. 8A, 9, 13A, 13C, 22A, 22B, and 23, the grade stabilization structures, and land stabilization measures located in Montague County.

The Wise County Commissioners Court and the Wise County Water Control and Improvement District No. 1 will share equally in providing the local share of the cost of installing the structural measures located in Wise County.

The Wise County Water Control and Improvement District No. 1 is authorized by law "to levy, assess, and collect taxes for the construction of dams and other flood control measures." Revenue from taxes can be used for acquiring the land rights needed to install the structural measures.

Financial and other assistance to be furnished by the Soil Conservation Service is contingent on the appropriation of funds for this purpose. In addition, the following prerequisite conditions will be met before federal funds will be made available for the installation of the structural measures:

1. The requirements for land treatment in the drainage areas above the floodwater retarding structures have been met.
2. All necessary land and water rights have been obtained for all structural measures, or the sponsors have furnished a written statement to the effect that they have the means of obtaining land rights, and the exact date by which all land rights will have been obtained. Following is the proposed schedule, by 6-month periods, for obtaining needed land rights:

1st 6-month period	Floodwater retarding structures Nos. 1, 1A, 1B, 1C, 1D, 3, 8A, 9, 13A, 13B, 13C, 14A, 15, and 29; grade stabilization structures Nos. 101, 130, and 131; land stabilization treatment areas Nos. 1, 30, and 31
2nd 6-month period	Floodwater retarding structures Nos. 22B, 23, 23A, 24, 24A, and 31; grade stabilization structures Nos. 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, and 116; land stabilization treatment areas Nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, and 16
3rd 6-month period	Floodwater retarding structures Nos. 24B, 24C, 24D, 26, 27, 29, and 30; grade stabilization structures Nos. 117, 118, 119, 120, and 122; land stabilization treatment areas Nos. 17, 18, 33, 35, and 36
4th 6-month period	Floodwater retarding structures Nos. 16, 25A, 28, 31, 32, 33, and 34; grade stabilization structures Nos. 121, 123, 124, and 125; and land stabilization treatment area No. 34
5th 6-month period	Floodwater retarding structures Nos. 17A, 35, and 36; grade stabilization structures Nos. 126, 127, and 128; land stabilization treatment areas Nos. 27 and 28
6th 6-month period	Floodwater retarding structures Nos. 1, 3, 37, 38, and 39; and land stabilization treatment area No. 32
7th 6-month period	Floodwater retarding structures Nos. 40, 41, and 22A
8th 6-month period	Floodwater retarding structures Nos. 42, 43, and 44; grade stabilization structure No. 129; and land stabilization treatment area No. 29

3. County roads affected by floodwater retarding structures Nos. 1, 1A, 1B, 15, 17A, and 22A have been raised, moved, or closed or a court order has been executed authorizing temporary inundation and designating a suitable alternate route.
4. Utilities, such as powerlines, telephone lines, and pipelines, have been modified or permission has been granted to inundate the properties involved.

5. Project agreements have been executed.
6. Operation and maintenance agreements have been executed with the Little Wichita Soil and Water Conservation District, the Wise County Water Control and Improvement District No. 1, and the City of Bowie. Operation and maintenance agreements with the respective commissioners courts of Montague and Wise Counties are currently in force.

The U.S. Forest Service will install with Public Law 534 funds the land treatment measures on the LBJ National Grasslands. The estimated schedule of obligations for the installation period is as follows:

Estimated Schedule of Obligations for Land Treatment
on LBJ National Grasslands

<u>Year</u>	<u>PL 534</u>	<u>Other^{1/}</u>	<u>Total</u>
1978	19,280	28,290	47,570
1979	32,360	31,090	63,450
1980	52,780	33,000	85,780
1981	63,650	35,780	99,430
1982	98,580	37,560	136,140
1983	101,040	36,450	137,490
1984	91,810	36,450	128,260
1985	-	36,450	36,450
1986	-	36,450	36,450
Total	459,500	311,520	771.020

^{1/} Other includes U. S. Forest Service P&M Range Funds, P&M Watershed funds for Ranger District overhead for design, supervision, management, and maintenance of the land stabilization treatment measures accomplished with PL 534 funds, and conservation practices with the grazing permittees.

The estimated schedule of obligations for the installation of all the planned structural measures included in this supplement is as follows:

Schedule of Obligations for Planned Structural Measures

Fiscal:		PL 534	Other	
Year :	Measure	Funds	Funds	Total
		(dollars)	(dollars)	(dollars)
First	Floodwater retarding structures Nos. 1A, 1B, 1C, 1D, 8A, 9, and 29	836,470	130,680	967,150
	Grade stabilization structures Nos. 101, 130, and 131	65,570	1,850	67,420
	Land stabilization measure areas Nos. 1, 30, and 31	5,570	1,170	6,740
Second	Floodwater retarding structures Nos. 13A, 13B, 13C, 23, 23A, 24, and 31	913,580	95,430	1,009,010
	Grade stabilization structures Nos. 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, and 116	526,590	22,900	549,490
	Land stabilization measure areas Nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, and 16	175,730	27,260	202,990
Third	Floodwater retarding structures Nos. 22B, 24A, 24B, 24C, and 24D	645,780	68,830	714,610
	Grade stabilization structures Nos. 117 and 118	49,360	1,500	50,860
	Land stabilization measure areas Nos. 17, 18, 35, and 36	27,410	4,960	32,370
Fourth	Floodwater retarding structures Nos. 14A, 15, 16, 17A, and 25A	872,720	122,150	994,870
	Grade stabilization structures Nos. 119, 120, and 122	86,430	1,650	88,080
	Land stabilization measure area No. 33	14,820	2,050	16,870
Fifth	Floodwater retarding structures Nos. 1, 3, 26, 27, 30, and 32	750,740	114,800	865,540
	Grade stabilization structures Nos. 121, 123, 124, 125, 126, 127, and 128	162,450	6,650	169,100
	Land stabilization measure areas Nos. 27, 28, and 32	16,120	3,560	19,680
Sixth	Floodwater retarding structures Nos. 28, 33, 34, 35, and 36	690,370	52,650	743,020
	Land stabilization measure area No. 34	4,930	800	5,730
Seventh	Floodwater retarding structures Nos. 37, 38, 39, and 40	566,540	63,030	629,570
Eighth	Floodwater retarding structures Nos. 41, 42, 43, 44, and 22A	1,244,010	199,800	1,443,810
	Grade stabilization structure No. 129	28,890	1,250	30,140
	Land stabilization measure area No. 29	2,200	470	2,670
TOTAL		7,686,280	923,440	8,609,720

The foregoing schedule can be adjusted from year to year as deemed necessary to facilitate construction.

OPERATION, MAINTENANCE, AND REPLACEMENT

The estimated annual operation and maintenance cost is \$14,860 for the 57 floodwater retarding structures and \$2,640 for the grade stabilization structures.

The U.S. Forest Service will maintain all land treatment measures they install on the federally owned LBJ National Grasslands.

Operation of the floodwater retarding structures will be the responsibility of the soil and water conservation district governing the portion of the watershed where the structures are located.

The Montague County Commissioners Court will be responsible for maintenance of floodwater retarding structures Nos. 1D, 5B, 6, 8, 8A, 9, 10, 11, 12, 13, 13A, 13C, 18, 20, 22A, 22B, and 23; and grade stabilization structures Nos. 101, 102, 103, 104, 105, 106, 107, 108, 109, 111, 112, 113, 114, 115, 130, and 131. The Little Wichita Soil and Water Conservation District, with assistance from the Clay County Commissioners Court, will be responsible for maintenance of floodwater retarding structures Nos. 1, 1A, 1B, 1C, 2, 3, 4, and 5A. The Wise County Commissioners Court and the Wise County Water Control and Improvement District No. 1 will be equally responsible for maintenance of floodwater retarding structures Nos. 13B, 14, 14A, 15, 16, 17A, 23A, 24, 24A, 24B, 24C, 24D, 25A, and 26 through 44; and grade stabilization structures Nos. 110, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, and 129. Funds for maintenance will come from the general funds of the counties and the water control and improvement district. These funds are supported by existing taxes and are adequate and available for this purpose.

Operation and maintenance agreements have been signed by the following sponsors:

Wise Soil and Water Conservation District
Upper Elm-Red Soil and Water Conservation District
Upper West Fork Soil and Water Conservation District
Montague County Commissioners Court
Wise County Commissioners Court

The floodwater retarding structures will be inspected at least annually and after each heavy rain by representatives of the appropriate sponsors and the designated Soil Conservation Service representative. A Forest Service Officer will accompany all inspections of structures located on the LBJ National Grasslands. A written report will be made within 10 days of the date on which the inspection was made and a copy provided to the designated Soil Conservation Service representative.

Sponsors will control the handling, storage, and application of herbicides and pesticides that may be necessary for operation and maintenance of all the structural measures. Only approved and authorized reagents and compounds will be used. These applications will be compatible with current laws regulating their use. In addition to sound and prudent judgment, ordinances and standards concerned with the disposal or storage of unused chemicals, empty containers, contaminated paraphernalia, etc., will be observed and applied.

Provision will be made for free access for representatives of the sponsoring local organizations and for federal representatives to inspect and provide for maintenance of all the structures and their appurtenances at any time.

An operation and maintenance agreement will be executed by the Little Wichita Soil and Water Conservation District, the City of Bowie, and the Wise County Water Control and Improvement District No. 1 and the Service prior to the signing of project agreements with these sponsors. The agreement will set forth specific details on procedure in line with recognized assignments of responsibility and will be in accordance with the Texas Watersheds Operation and Maintenance Handbook. An operation and maintenance plan will be prepared for each structure.

TABLE 1 - ESTIMATED PROJECT INSTALLATION COST
Big Sandy Creek Watershed, Texas
(Tinity River Watershed)

LAW TREATMENT Item	Acres	No.	Number		Installation Cost		Estimated Cost (Dollars) 1/		Other Funds		Total		
			Federal	Non-	Federal	Non-	Federal	Non-	Federal			Non-	
									Land	Federal		Land	Federal
Crop Land	26,100	6	26,100	-	-	-	-	-	-	358,300	358,300		
Pastureland	39,160	51	39,160	-	-	-	-	-	-	1,773,900	1,773,900		
Rangeland	102,980	31	102,980	-	-	-	-	-	-	1,596,800	1,596,800		
Critical Area Stabilization	1,455	8	1,455	-	-	-	-	-	-	194,000	194,000		
Technical Assistance	-	-	-	-	-	-	-	-	-	744,800	744,800		
TOTAL LAND TREATMENT	xxx	xxx	xxx	xxx	1,520,800	1,980,300	311,520	3,923,000	4,234,520	6,714,320	6,714,320		
STRUCTURAL MEASURES													
Construction													
Floodwater Retarding Structures	No.	51	648,860	-	5,235,430	5,884,290	-	-	-	-	5,884,290		
Critical Area Stabilization Structures	No.	23	161,300	-	487,200	648,500	-	-	-	-	648,500		
Land Stabilization Measures	Acres	825	-	-	179,650	179,650	-	-	-	-	179,650		
Subtotal - Construction	xxx	xxx	810,160	-	5,702,280	6,712,440	-	-	-	-	6,712,440		
Engineering Services	-	-	-	-	415,300	476,240	-	-	-	-	476,240		
Project Administration	-	-	-	-	-	-	-	-	-	-	-		
Construction Inspection	-	-	-	-	524,580	605,010	-	-	-	-	605,010		
Other	-	-	-	-	521,890	596,280	3,000	-	-	25,500	624,780		
Subtotal - Administration	xxx	xxx	156,820	-	1,046,470	1,201,290	3,000	-	-	25,500	1,229,790		
Other Costs	-	-	-	-	-	-	-	-	-	-	-		
Land Rights	-	-	-	-	-	-	84,480	-	-	929,090	1,013,570		
TOTAL STRUCTURAL MEASURES	xxx	xxx	xxx	xxx	1,025,920	8,389,970	87,480	-	-	954,590	1,062,070		
TOTAL PROJECT	xxx	xxx	xxx	xxx	1,025,920	10,370,270	87,480	311,520	4,877,590	5,276,590	15,666,860		

1/ Price base: Actual cost for 13 floodwater retarding structures (Nos. 2, 4, 5A, 5B, 6, 8, 10, 11, 12, 13, 14, 18, and 20) constructed. The remaining 44 floodwater retarding structures, critical area stabilization, and land treatment at 1977 prices.
 2/ Federal agency responsible for assisting in installation of works of improvement.
 3/ Includes only area estimated to be adequately protected during the project installation period. Treatment will be applied throughout the watershed; dollar amounts apply to total land areas, not just to adequately protected areas.

TABLE 2 - ESTIMATED COST DISTRIBUTION

Big Sandy Creek Watershed, Texas

(Trinity River Watershed)

(Dollars)^{1/}

Item	: Installation Cost - Public Law 534 Funds			: Installation Cost-Other Funds:		
	: Construction	: Engineering	: Total PL 534 Funds	: Land Rights	: Total Other	: Total Installation Cost
Floodwater Retarding Structures (Constructed) Nos. 2, 4, 5A, 5B, 6, 8, 10, 11, 12, 13, 14, 18, and 20	563,400	39,440	602,840	112,130	112,130	714,970
Floodwater Retarding Structures Nos.						
1	89,780	6,280	96,060	37,150	37,150	133,210
1A	51,970	4,160	56,130	10,800	10,800	66,930
1B	42,100	3,370	45,470	5,700	5,700	51,170
1C	57,960	4,640	62,600	16,230	16,230	78,830
1D	125,100	7,510	132,610	22,450	22,450	155,060
3	112,150	6,730	118,880	30,850	30,850	149,730
8A	79,930	5,600	85,530	6,900	6,900	92,430
9	146,690	8,800	155,490	44,200	44,200	199,690
13A	68,580	4,800	73,380	5,530	5,530	78,910
13B	71,100	4,980	76,080	6,250	6,250	82,330
13C	65,030	4,550	69,580	6,000	6,000	75,580
14A	74,640	5,220	79,860	8,200	8,200	88,060
15	91,320	6,390	97,710	15,300	15,300	113,010
16	149,450	8,970	158,420	19,250	19,250	177,670
17A	328,800	15,910	344,710	68,450	68,450	413,160
22A	581,900	37,800	619,700	134,600	134,600	754,300
22B	91,400	6,400	97,800	14,000	14,000	111,800
23	116,640	7,000	123,640	16,850	16,850	140,490
23A	118,070	7,080	125,150	13,200	13,200	138,350
24	156,200	7,810	164,010	26,500	26,500	190,510
24A	116,170	6,970	123,140	12,200	12,200	135,340
24B	104,320	6,260	110,580	13,800	13,800	124,380
24C	113,210	6,790	120,000	15,350	15,350	135,350
24D	97,710	6,840	104,550	10,980	10,980	115,530
25A	72,960	5,110	78,070	8,450	8,450	86,520
26	69,660	4,880	74,540	10,000	10,000	84,540
27	115,620	6,940	122,560	12,800	12,800	135,360
28	74,780	5,230	80,010	8,450	8,450	88,460
29	172,730	8,640	181,370	20,900	20,900	202,270
30	104,020	6,240	110,260	8,700	8,700	118,960
31	150,480	7,520	158,000	17,600	17,600	175,600
32	117,610	7,060	124,670	12,300	12,300	136,970
33	78,150	5,470	83,620	8,500	8,500	92,120
34	201,040	10,050	211,090	15,600	15,600	226,690
35	134,520	8,070	142,590	10,250	10,250	152,840
36	75,250	5,270	80,520	7,350	7,350	87,870
37	77,930	5,460	83,390	7,950	7,950	91,340
38	122,590	7,360	129,950	20,050	20,050	150,000
39	95,540	6,690	102,230	15,530	15,530	117,760
40	165,350	8,270	173,620	17,500	17,500	191,120
41	81,600	5,710	87,310	24,050	24,050	111,360
42	126,530	7,590	134,120	14,050	14,050	148,170
43	112,990	6,780	119,770	13,450	13,450	133,220
44	121,320	7,280	128,600	11,150	11,150	139,750
Subtotal-Floodwater Retarding Structures	5,884,290	365,920	6,250,210	937,500	937,500	7,187,710
Grade Stabilization Structures Nos.						
101	16,400	2,130	18,530	650	650	19,180
102	31,700	4,760	36,460	2,300	2,300	38,760
103	31,400	4,080	35,480	1,550	1,550	37,030
104	27,200	3,540	30,740	1,350	1,350	32,090
105	17,200	2,240	19,440	2,050	2,050	21,490
106	10,000	1,300	11,300	450	450	11,750
107	27,200	3,540	30,740	950	950	31,690

(See footnotes at end of table.)

TABLE 2 - ESTIMATED COST DISTRIBUTION - Continued

Big Sandy Creek Watershed, Texas
(Trinity River Watershed)

(Dollars)^{1/}

Item	Installation Cost - Public Law 534 Funds			Installation Cost-Other Funds:		
	Construction	Engineering	Total PL 534 Funds	Land Rights	Total Other	Total Installation Cost
SS - Continued						
108	25,800	3,350	29,150	2,050	2,050	31,200
109	15,900	2,070	17,970	850	850	18,820
110	26,100	3,390	29,490	3,150	3,150	32,640
111	30,500	4,580	35,080	2,300	2,300	37,380
112	20,500	3,080	23,580	1,050	1,050	24,630
113	24,700	3,210	27,910	1,100	1,100	29,010
114	18,600	2,420	21,020	700	700	21,720
115	31,900	4,150	36,050	1,300	1,300	37,350
116	37,600	4,890	42,490	1,750	1,750	44,240
117	20,300	2,640	22,940	950	950	23,890
118	14,300	1,860	16,160	550	550	16,710
119	25,600	3,330	28,930	450	450	29,380
120	16,700	2,500	19,200	550	550	19,750
121	11,800	1,530	13,330	450	450	13,780
122	17,500	2,280	19,780	650	650	20,430
123	9,300	1,210	10,510	750	750	11,260
124	15,000	2,250	17,250	1,850	1,850	19,100
125	29,200	3,800	33,000	1,450	1,450	34,450
126	15,300	1,990	17,290	950	950	18,240
127	15,400	2,000	17,400	550	550	17,950
128	16,500	2,480	18,980	650	650	19,630
129	20,500	2,670	23,170	1,250	1,250	24,420
130	14,000	1,820	15,820	650	650	16,470
131	14,400	1,870	16,270	550	550	16,820
Subtotal-Grade Stabilization Structures	648,500	86,960	735,460	35,800	35,800	771,260
Land Stabilization Treatment Areas						
Nos.						
1	1,830	240	2,070	480	480	2,550
2	760	100	860	220	220	1,080
3	10,740	1,400	12,140	2,180	2,180	14,320
4	9,910	1,290	11,200	2,180	2,180	13,380
5	1,320	180	1,500	370	370	1,870
6	3,890	510	4,400	730	730	5,130
7	13,640	1,770	15,410	2,480	2,480	17,890
8	1,740	230	1,970	570	570	2,540
9	5,980	780	6,760	1,480	1,480	8,240
10	21,360	2,780	24,140	4,480	4,480	28,620
11	14,630	1,900	16,530	2,980	2,980	19,510
12	6,730	870	7,600	1,730	1,730	9,330
13	6,480	840	7,320	1,230	1,230	8,550
14	14,960	1,940	16,900	2,880	2,880	19,780
15	10,740	1,400	12,140	2,980	2,980	15,120
16	4,630	600	5,230	770	770	6,000
17	4,260	550	4,810	980	980	5,790
18	4,190	540	4,730	980	980	5,710
27	3,280	430	3,710	1,230	1,230	4,940
28	3,640	470	4,110	980	980	5,090
29	1,610	210	1,820	470	470	2,290
30	600	80	680	220	220	900
31	1,640	210	1,850	470	470	2,320
32	5,110	660	5,770	1,350	1,350	7,120
33	10,820	1,410	12,230	2,050	2,050	14,280
34	3,600	470	4,070	800	800	4,870
35	2,910	380	3,290	950	950	4,240
36	8,650	1,120	9,770	2,050	2,050	11,820
Subtotal-Land Stabilization Measures	179,650	23,360	203,010	40,270	40,270	243,280

See footnotes at end of table.)

TABLE 2 - ESTIMATED COST DISTRIBUTION - Continued

Big Sandy Creek Watershed, Texas
 (Trinity River Watershed)
 (Dollars)^{1/}

Item	Installation Cost - Public Law 534 Funds			Installation Cost-Other Funds:		
	Construction	Engineering	Total	Land Rights	Total Other	Total
			Funds			Installation Cost
Subtotal-Structural Measures	6,712,440	476,240	7,188,680	1,013,570	1,013,570	8,202,250
Project Administration	xxx	xxx	1,201,290	xxx	28,500	1,229,790
GRAND TOTAL	6,712,440	476,240	8,389,970	^{2/} 1,013,570	1,042,070	9,432,040

^{1/} Price Base: Actual cost for 13 floodwater retarding structures (Nos. 2, 4, 5A, 5B, 6, 8, 10, 11, 12, 13, 14, 18, and 20) constructed. The remaining 44 floodwater retarding structures, 31 grade stabilization structures, and land stabilization measures at 1977 prices.

^{2/} Includes \$63,730 for modification of existing improvements and \$12,270 for legal fees.

June 1979

TABLE 3 - STRUCTURAL DATA - DAMS WITH PLANNED STORAGE CAPACITY

Big Sandy Creek Watershed, Texas
(Trinity River Watershed)

ITEM	UNIT	STRUCTURE NUMBER												
		I	IA	IB	IC	ID	3	8A	9	11A	13B			
Class of Structure		A	A	A	A	A	A	A	A	A	A	A	A	A
Drainage Area	Sq. Mi.	4.25	1.25	0.63	1.71	4.15	1/A	4.70	6.00	0.62	0.72			
Controlled	Sq. Mi.	78	76	75	77	74	4.29	78	70	76	72			
Runoff Curve No. (1-day) (AMC II)		1041.0	1026.0	1020.0	1023.0	1018.2	1043.3	952.0	922.5	951.5	955.4			
Elevation Top of Dam	Ft.	1037.0	1023.0	1017.0	1020.0	1013.5	1036.0	949.0	918.0	948.5	952.4			
Elevation Crest Emergency Spillway	Ft.	-	-	-	-	-	-	941.2	906.3	942.3	947.0			
Elevation Crest High Stage Inlet	Ft.	-	-	-	-	-	-	936.8	901.5	938.3	943.3			
Elevation Crest Low Stage Inlet	Ft.	-	-	-	-	-	-	936.8	901.5	938.3	943.3			
Elevation Crest Lowest Ungated Outlet	Ft.	1026.2	1013.4	1009.7	1010.0	999.2	1022.8	936.8	899.5	938.3	943.3			
Maximum Height of Dam	Ft.	29	20	22	29	38	39	45	39	41	33			
Volume of Fill	Cu. Yd.	60,700	37,200	19,000	23,900	112,600	65,100	63,600	140,400	56,200	49,900			
Total Capacity ^{2/}	Ac. Ft.	1,186	337	137	438	1,027	1,429	270	1,859	183	183			
Sediment Submerged ^{3/}	Ac. Ft.	154	48	25	53	122	191	39	237	32	34			
Sediment Aerated	Ac. Ft.	27	9	4	9	31	48	16	41	14	15			
Sediment Pool (Lowest Ungated Outlet) ^{4/}	Ac. Ft.	154	48	25	53	122	191	39	158	32	34			
Floodwater Retarding	Ac. Ft.	1,005	280	108	376	874	1,190	215	1,581	137	134			
Between High and Low Stage	Ac. Ft.	-	-	-	-	-	-	40	256	26	31			
Surface Area														
Sediment Pool (Lowest Ungated Outlet)	Ac.	47	14	9	18	28	42	10	37	7	9			
Sediment Pool (Low Stage Inlet)	Ac.	47	14	9	18	28	42	10	49	7	9			
Floodwater Retarding Pool	Ac.	173	50	24	62	102	153	30	154	23	24			
Principal Spillway Design														
Rainfall Volume (Areal) (1-day)	In.	7.60	7.60	7.35	7.40	7.85	9.10	7.45	7.80	7.25	7.60			
Rainfall Volume (Areal) (10-day)	In.	12.55	12.55	12.20	12.25	12.90	14.80	12.25	13.00	12.00	12.55			
Runoff Volume (10-day)	In.	6.75	6.97	6.42	6.79	6.37	8.04	6.94	6.82	6.57	6.08			
Capacity of Low Stage (Max.)	C.F.S.	-	-	-	-	-	-	2.8	18.0	1.9	2.2			
Capacity of High Stage (Max.)	C.F.S.	61	26	29	34	68	172	34	115	35	33			
Diameter of Conduit	In.	24	18	18	18	24	36	18	30	18	18			
Emergency Spillway Design														
Frequency Operation - Emer. Spillway	% Chance	3.1	3.1	3.7	3.6	2.6	1.2	3.5	2.5	3.9	3.1			
Rainfall Volume (ESH) (Areal) ^{5/}	In.	6.70	6.70	6.70	6.70	7.90	9.30	6.70	7.90	6.70	6.70			
Runoff Volume (ESH)	In.	4.22	3.99	3.88	4.09	4.84	6.61	4.09	5.18	3.99	3.57			
Type		Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.			
Bottom Width	Ft.	120	50	50	100	200	200	60	200	50	50			
Velocity of Flow (V)	Ft./Sec.	0.0	0.0	3.7	0.0	5.3	7.2	0.0	2.9	0.0	1.9			
Slope of Exit Channel	Ft./Ft.	.056	.070	.096	.077	.061	.070	.086	.065	.038	.055			
Max. Reservoir Water Surface Elevation	Ft.	1036.5	1022.5	1017.5	1019.7	1014.8	1038.4	948.7	918.9	948.2	952.5			
Freeboard Design														
Rainfall Volume (FH) (Areal) ^{5/}	In.	12.90	9.60	9.60	9.60	12.90	16.20	9.60	12.90	9.60	9.60			
Runoff Volume (FH)	In.	10.04	6.63	6.50	6.75	9.46	13.26	6.75	9.89	6.63	6.12			
Max. Reservoir Water Surface Elevation	Ft.	1041.0	1025.1	1019.0	1022.2	1018.2	1043.3	951.1	922.5	950.4	954.5			
Capacity Equivalents														
Sediment Volume	In.	0.80	0.86	0.86	0.68	0.69	0.95	1.10	0.87	1.38	1.27			
Floodwater Retarding Volume	In.	4.45	4.19	3.21	4.12	3.95	4.75	4.28	4.48	4.14	3.50			

(See footnotes at end of table.)

TABLE 3 - STRUCTURAL DATA - DAMS WITH PLANNED STORAGE CAPACITY
Big Sandy Creek Watershed, Texas
(Trinity River Watershed)

ITEM	UNIT	STRUCTURE NUMBER												
		13C	14A	15	16	17A	9/22A	22B	23	23A	24			
Class of Structure		A	A	A	A	A	A	A	A	A	A	A	A	A
Drainage Area Controlled	Sq. Mi.	0.73	0.88	3.30	3.35	1/16.08	1/27.72	1.26	2.60	1.84	1.84	3.86		
Runoff Curve No. (1-day) (AMC II)	Sq. Mi.	77	75	77	77	3.35	2.62	76	76	75	75	73		
Elevation Top of Dam	Ft.	924.5	854.5	889.4	886.2	881.2	943.0	975.0	931.0	883.0	883.0	913.0		
Elevation Crest Emergency Spillway	Ft.	921.5	851.5	885.0	981.5	877.5	940.0	972.0	928.0	880.0	880.0	908.5		
Elevation Crest High Stage Inlet	Ft.	914.2	845.1	872.6	971.1	855.5	923.8	966.8	920.6	872.9	872.9	900.2		
Elevation Crest Low Stage Inlet	Ft.	909.8	841.0	864.5	965.0	845.7	918.1	963.3	914.8	867.5	867.5	896.0		
Elevation Crest Lowest Ungated Outlet	Ft.	909.8	841.0	864.5	965.0	842.3	918.1	963.3	914.8	867.5	867.5	894.4		
Maximum Height of Dam	Ft.	34	33	45	36	61	47	23	37	40	40	45		
Volume of Fill ^{2/}	Cu. Yd.	47,100	59,900	87,300	174,900	342,400	476,300	62,200	91,500	100,700	100,700	133,900		
Total Capacity ^{2/}	Ac. Ft.	251	321	926	991	6,844	10,855	439	780	617	617	1,251		
Sediment Submerged ^{3/}	Ac. Ft.	53	74	76	81	377	779	92	148	141	141	229		
Sediment Aerated	Ac. Ft.	23	32	32	35	163	155	39	63	61	61	50		
Sediment Pool (Lowest Ungated Outlet) ^{4/}	Ac. Ft.	53	74	76	81	200	116	92	148	141	141	168		
Floodwater Retarding Between High and Low Stage Surface Area	Ac. Ft.	175	215	818	875	6,304	9,921	308	569	415	415	972		
Sediment Pool (Lowest Ungated Outlet)	Ac.	10	14	12	18	40	20	19	24	14	14	33		
Sediment Pool (Low Stage Inlet)	Ac.	10	14	12	18	59	124	19	24	14	14	40		
Floodwater Retarding Pool	Ac.	24	34	83	96	420	671	65	78	61	61	128		
Principal Spillway Design														
Rainfall Volume (Areal) (1-day)	In.	7.35	7.50	7.50	7.70	10.25	10.50	7.35	7.30	7.40	7.40	8.20		
Rainfall Volume (Areal) (10-day)	In.	12.20	12.40	12.40	12.80	16.75	17.00	12.20	12.05	12.25	12.25	13.45		
Runoff Volume (10-day)	In.	6.89	6.59	6.64	6.89	9.20	6.86	6.66	6.35	6.27	6.27	6.65		
Capacity of Low Stage (Max.)	C.F.S.	2.2	2.6	9.9	10.0	56.8	9.0	3.7	7.8	5.5	5.5	11.6		
Capacity of High Stage (Max.)	C.F.S.	33	33	71	66	284	71	29	67	34	34	73		
Diameter of Conduit	In.	18	18	24	24	42	48	18	24	18	18	24		
Emergency Spillway Design														
Frequency Operation - Emer. Spillway	% Chance	3.7	3.3	3.4	2.8	0.4	0.4	3.7	3.9	3.6	3.6	2.0		
Rainfall Volume (ESH) (Areal) ^{5/}	In.	6.70	6.70	7.90	7.90	7.51	7.38	6.70	6.70	6.70	6.70	7.90		
Runoff Volume (ESH)	In.	4.09	3.88	5.18	5.18	4.82	3.50	3.99	3.99	3.88	3.88	4.73		
Type		Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.		
Bottom Width	Ft.	50	60	150	130	300	400	80	120	100	100	100		
Velocity of Flow (V _e)	Ft./Sec.	0.0	0.0	4.2	2.9	0.0	0.0	0.0	1.5	0.0	0.0	0.0		
Slope of Exit Channel	Ft./Ft.	.063	.062	.062	.053	.070	.047	.036	.069	.030	.030	.075		
Max. Reservoir Water Surface Elevation Freeboard Design	Ft.	920.9	850.5	886.2	982.7	872.5	933.3	971.4	928.0	879.6	879.6	908.7		
Rainfall Volume (FH) (Areal) ^{5/}	In.	9.60	9.60	12.90	12.90	12.26	12.47	9.60	9.60	9.60	9.60	12.90		
Runoff Volume (FH)	In.	6.75	6.50	8.89	8.89	9.28	7.88	6.63	6.63	6.50	6.50	9.32		
Max. Reservoir Water Surface Elevation Capacity Equivalents	Ft.	923.5	853.3	889.4	986.2	881.2	942.5	973.6	930.7	882.3	882.3	913.0		
Sediment Volume	In.	1.95	2.25	0.61	0.64	0.63	0.63	1.95	1.52	2.06	2.06	1.36		
Floodwater Retarding Volume	In.	4.49	4.59	4.65	4.91	7.35	6.71	4.59	4.11	4.23	4.23	4.72		

(See footnotes at end of table.)

TABLE 3 - STRUCTURAL DATA - DAMS WITH PLANNED STORAGE CAPACITY

Big Sandy Creek Watershed, Texas
(Trinity River Watershed)

ITEM	UNIT	STRUCTURE NUMBER				Other IJ Structures	TOTAL
		41	42	43	44		
Class of Structure							
Drainage Area	Sq. Mi.	A 1.47	A 2.88	A 3.24	A 2.00	37.90	164.26
Controlled	Sq. Mi.	-	-	-	-	-	10.26
Runoff Curve No. (1-day)(AMC II)		76	77	81	81	xxx	xxx
Elevation Top of Dam	Ft.	808.5	753.8	779.7	782.5	xxx	xxx
Elevation Crest Emergency Spillway	Ft.	805.5	749.0	774.5	779.5	xxx	xxx
Elevation Crest High Stage Inlet	Ft.	-	-	-	-	xxx	xxx
Elevation Crest Low Stage Inlet	Ft.	-	-	-	-	xxx	xxx
Elevation Crest Lowest Ungated Outlet	Ft.	-	-	-	-	xxx	xxx
Maximum Height of Dam	Ft.	796.3	732.6	753.0	761.5	xxx	xxx
Volume of Fill ^{2/}	Cu. Yd.	32	46	54	44	xxx	xxx
Total Capacity ^{2/}	Ac. Ft.	54,200	119,800	103,400	115,100	858,380	5,254,380
Sediment Submerged ^{3/}	Ac. Ft.	427	749	893	571	10,747	53,716
Sediment Aerated	Ac. Ft.	99	134	95	65	1,261	7,218
Sediment Pool (Lowest Ungated Outlet) ^{4/}	Ac. Ft.	24	33	16	12	300	2,307
Floodwater Retarding	Ac. Ft.	99	134	95	65	1,261	6,274
Between High and Low Stage	Ac. Ft.	304	582	782	494	9,186	44,191
Surface Area	Ac. Ft.	-	-	-	-	-	4,009
Sediment Pool (Lowest Ungated Outlet)	Ac.	20	16	14	12	306	1,234
Sediment Pool (Low Stage Inlet)	Ac.	20	16	14	12	306	1,353
Floodwater Retarding Pool	Ac.	52	63	66	49	1,087	4,789
Principal Spillway Design							
Rainfall Volume (Areal) (1-day)	In.	7.40	7.50	7.70	7.45	xxx	xxx
Rainfall Volume (Areal) (10-day)	In.	12.30	12.45	12.80	12.35	xxx	xxx
Runoff Volume (10-day)	In.	6.68	6.67	7.70	7.50	xxx	xxx
Capacity of Low Stage (Max.)	C.F.S.	-	-	-	-	xxx	xxx
Capacity of High Stage (Max.)	C.F.S.	33	72	78	36	xxx	xxx
Diameter of Conduit	In.	18	24	24	18	xxx	xxx
Emergency Spillway Design							
Frequency Operation - Emer. Spillway	% Chance	3.5	3.3	2.7	3.4	xxx	xxx
Rainfall Volume (ESH) (Areal) ^{5/}	In.	6.70	6.70	7.90	6.70	xxx	xxx
Runoff Volume (ESH)	In.	3.99	4.09	5.64	4.52	xxx	xxx
Type		Veg.	Veg.	Veg.	Veg.	xxx	xxx
Bottom Width	Ft.	100	120	120	100	xxx	xxx
Velocity of Flow (V)	Ft./Sec.	0.0	1.9	5.6	0.0	xxx	xxx
Slope of Exit Channel	Ft./Ft.	.095	.058	.060	.045	xxx	xxx
Max. Reservoir Water Surface Elevation	Ft.	805.4	750.8	776.2	778.8	xxx	xxx
Freeboard Design							
Rainfall Volume (FH) (Areal) ^{5/}	In.	9.60	12.90	12.90	9.60	xxx	xxx
Runoff Volume (FH)	In.	6.63	9.89	10.45	7.26	xxx	xxx
Max. Reservoir Water Surface Elevation	Ft.	807.7	753.8	779.7	782.3	xxx	xxx
Capacity Equivalents							
Sediment Volume	In.	1.57	1.09	0.64	0.72	xxx	xxx
Floodwater Retarding Volume	In.	3.88	3.79	4.52	4.63	xxx	xxx

(See footnotes at end of table.)

TABLE 3 - STRUCTURAL DATA - DAMS WITH PLANNED STORAGE CAPACITY

Big Sandy Creek Watershed, Texas
(Trinity River Watershed)

- 1/ Does not include drainage area controlled by upstream structures.
- 2/ Crest of emergency spillway.
- 3/ One hundred years. Includes volume in sediment pool (lowest ungated outlet).
- 4/ Capacity below lowest ungated outlet, excluding anticipated borrow. Capacity, including borrow, does not exceed 200 acre-feet for any of the 44 floodwater retarding structures.
- 5/ Storm duration is six hours.
- 6/ Structure has two principal spillways.

June 1979

TABLE 3A - STRUCTURAL DATA - GRADE STABILIZATION STRUCTURES^{1/}

Big Sandy Creek Watershed, Texas
(Trinity River Watershed)

ITEM	UNIT	STRUCTURE NUMBER												
		101	102	103	104	105	106	107	108	109	110			
Class of Structure		A	A	A	A	A	A	A	A	A	A	A	A	A
Drainage Area	Ac.	90	416	134	174	75	75	26	138	307	77	474		
Runoff Curve No. (1-Day) (AMC II)		73	73	73	75	73	73	73	73	73	73	73		
Elevation Top of Dam	Ft.	1061.0	948.5	986.0	986.0	952.0	947.0	947.0	958.0	904.7	913.0	916.0		
Elevation Crest Emergency Spillway	Ft.	1059.0	946.5	984.0	984.0	950.0	945.0	945.0	956.0	902.7	911.0	914.0		
Elevation Crest Principal Spillway	Ft.	1056.0	936.0	982.0	980.0	947.0	943.0	943.0	953.0	898.0	908.0	908.0		
Maximum Height of Dam	Ft.	16	19	17	23	18	15	15	24	15	19	16		
Volume of Fill	Cu. Yd.	7,410	20,100	24,700	14,580	9,700	3,000	3,000	12,280	19,950	7,130	14,510		
Total Capacity	Ac. Ft.	13	65	60	39	13	11	11	19	95	20	118		
Below Principal Spillway Crest	Ac. Ft.	6	6	42	17	4	6	6	9	39	9	29		
Retarding	Ac. Ft.	7	59	18	22	9	5	5	10	56	11	89		
Surface Area														
Principal Spillway Crest	Ac.	1.8	2.0	8.0	3.0	1.4	1.5	1.5	2.4	8.5	2.6	9.0		
Emergency Spillway Crest	Ac.	3.2	10.3	10.8	8.2	5.7	2.2	2.2	4.2	15.2	4.5	21.5		
Principal Spillway Design														
Capacity (Maximum)	C.F.S.	28	59	28	33	29	11	11	63	58	33	53		
Diameter of Conduit	In.	18	24	18	18	18	12	12	24	24	18	24		
Emergency Spillway														
Frequency Operation	% Chance	3.5	3.7	2.4	3.7	1.8	1.0	1.0	2.5	1.4	1.0	2.8		
Type		Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.		
Bottom Width	Ft.	30	30	30	30	30	30	30	30	30	30	30		

^{1/} Dams with planned storage capacity. Product of storage and effective height of dam is less than 3000.

TABLE 3A - STRUCTURAL DATA - GRADE STABILIZATION STRUCTURES^{1/} - Continued

Big Sandy Creek Watershed, Texas
(Trinity River Watershed)

ITEM	UNIT	STRUCTURE NUMBER												
		111	112	113	114	115	116	117	118	119	120			
Class of Structure		A	A	A	A	A	A	A	A	A	A	A	A	A
Drainage Area	Ac.	301	122	250	147	256	310	136	51	46	46	46	46	46
Runoff Curve No. (1-Day) (AMC II)		73	73	73	73	73	73	73	73	73	73	73	73	73
Elevation Top of Dam	Ft.	948.0	943.0	959.0	974.0	937.0	924.0	957.0	936.0	1017.0	991.0	991.0	991.0	991.0
Elevation Crest Emergency Spillway	Ft.	946.0	941.0	957.0	972.0	935.0	922.0	955.0	934.0	1015.0	989.0	989.0	989.0	989.0
Elevation Crest Principal Spillway	Ft.	940.0	937.0	952.0	968.0	930.0	916.0	952.0	932.0	1013.0	987.0	987.0	987.0	987.0
Maximum Height of Dam	Ft.	22	25	26	22	18	27	27	21	33	20	20	20	20
Volume of Fill	Cu. Yd.	16,600	10,530	9,650	7,260	21,270	25,190	11,230	5,770	15,960	8,200	8,200	8,200	8,200
Total Capacity	Ac. Ft.	54	12	25	28	34	54	56	15	15	7	7	7	7
Below Principal Spillway Crest	Ac. Ft.	9	1	6	16	8	16	38	10	11	4	4	4	4
Retarding	Ac. Ft.	45	11	19	12	26	38	18	5	4	3	3	3	3
Surface Area														
Principal Spillway Crest	Ac.	3.0	0.2	2.2	2.5	3.0	3.2	5.3	2.0	1.7	1.4	1.4	1.4	1.4
Emergency Spillway Crest	Ac.	13.2	5.6	5.6	3.3	7.8	11.2	6.1	2.8	2.2	2.1	2.1	2.1	2.1
Principal Spillway Design														
Capacity (Maximum)	C.F.S.	61	32	110	63	60	67	24	32	37	31	31	31	31
Diameter of Conduit	In.	24	18	30	24	24	24	18	18	18	18	18	18	18
Emergency Spillway														
Frequency Operation	% Chance	2.7	3.7	2.2	2.5	3.3	3.0	3.3	1.0	1.0	1.1	1.1	1.1	1.1
Type		Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.
Bottom Width	Ft.	50	30	50	30	30	50	30	30	30	30	30	30	30

^{1/} Dams with planned storage capacity, Product of storage and effective height of dam is less than 3000.

TABLE 3A - STRUCTURAL DATA - GRADE STABILIZATION STRUCTURES^{1/} - Continued
 Big Sandy Creek Watershed, Texas
 (Trinity River Watershed)

ITEM	UNIT	STRUCTURE NUMBER				
		121	122	123	124	125
Class of Structure		A	A	A	A	A
Drainage Area	Ac.	56	52	80	125	256
Runoff Curve No. (1-Day) (AMC II)		73	74	73	73	73
Elevation Top of Dam	Ft.	977.5	894.0	988.0	952.0	905.0
Elevation Crest Emergency Spillway	Ft.	975.5	892.0	986.0	950.0	903.0
Elevation Crest Principal Spillway	Ft.	973.0	890.0	984.0	946.0	900.0
Maximum Height of Dam	Ft.	17	25	12	13	30
Volume of Fill	Cu. Yd.	4,600	7,600	2,460	7,500	14,730
Total Capacity	Ac. Ft.	6	13	19	25	41
Below Principal Spillway Crest	Ac. Ft.	3	8	12	8	22
Retarding	Ac. Ft.	3	5	7	17	19
Surface Area						
Principal Spillway Crest	Ac.	1.0	2.1	3.4	2.4	4.2
Emergency Spillway Crest	Ac.	1.6	2.7	4.3	6.2	8.2
Principal Spillway Design						
Capacity (Maximum)	C.F.S.	29	35	25	26	110
Diameter of Conduit	In.	18	18	18	18	30
Emergency Spillway						
Frequency Operation	% Chance	3.7	1.0	2.8	2.6	2.0
Type		Veg.	Veg.	Veg.	Veg.	Veg.
Bottom Width	Ft.	30	30	30	30	50

^{1/} Dams with planned storage capacity. Product of storage and effective height of dam is less than 3000.

TABLE 3A - STRUCTURAL DATA - GRADE STABILIZATION STRUCTURES^{1/} - Continued
 Big Sandy Creek Watershed, Texas
 (Trinity River Watershed)

ITEM	UNIT	STRUCTURE NUMBER						TOTAL
		127	128	129	130	131		
Class of Structure		A	A	A	A	A	A	
Drainage Area	Ac.	29	98	70	96	51	4,584	
Runoff Curve No. (1-Day) (AMC II)		73	73	73	73	73	xxx	
Elevation Top of Dam	Ft.	887.0	797.0	790.5	961.5	930.0	xxx	
Elevation Crest Emergency Spillway	Ft.	885.0	795.0	788.5	959.5	928.0	xxx	
Elevation Crest Principal Spillway	Ft.	883.0	792.0	785.0	956.0	925.0	xxx	
Maximum Height of Dam	Ft.	27	22	29	20	12	xxx	
Volume of Fill	Cu. Yd.	8,070	7,850	10,250	6,930	6,160	348,510	
Total Capacity	Ac. Ft.	12	21	14	18	10	952	
Below Principal Spillway Crest	Ac. Ft.	8	13	3	9	4	388	
Retarding	Ac. Ft.	4	8	11	9	6	564	
Surface Area								
Principal Spillway Crest	Ac.	2.0	2.1	1.5	2.0	1.4	89.0	
Emergency Spillway Crest	Ac.	2.5	3.4	3.8	3.4	2.2	187.4	
Principal Spillway Design								
Capacity (Maximum)	C.F.S.	8	32	35	31	25	xxx	
Diameter of Conduit	In.	12	18	18	18	18	xxx	
Emergency Spillway								
Frequency Operation	% Chance	1.2	3.1	1.0	2.5	1.0	xxx	
Type		Veg.	Veg.	Veg.	Veg.	Veg.	xxx	
Bottom Width	Ft.	30	30	30	30	30	xxx	

^{1/} Dams with planned storage capacity. Product of storage and effective height of dam is less than 3000.

TABLE 4 - ANNUAL COST

Big Sandy Creek Watershed, Texas
(Trinity River Watershed)

(Dollars)^{1/}

Evaluation Unit	: Amortization : of : Installation : Cost ^{2/}	: Operation, : Maintenance, : and : Replacement : Cost	: Total
57 floodwater retarding structures; 31 grade stabilization structures; and land stabilization measures	265,940	17,500	283,440
Project Administration	41,660	-	41,660
GRAND TOTAL	307,600	17,500	325,100

^{1/} Price Base: Actual costs for 13 floodwater retarding structures (2, 4, 5A, 5B, 6, 8, 10, 11, 12, 13, 14, 18, and 20) constructed; other 44 floodwater retarding structures, 31 grade stabilization structures, and land stabilization measures at 1977 prices.

^{2/} Structures Nos. 1, 2, 3, 4, 5A, 5B, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 23, and 24 amortized 100 years at 2½ percent. Structures Nos. 1A, 1B, 1C, 1D, 8A, 13A, 13B, 13C, 14A, 17A, 22A, 22B, 23A, 24A, 24B, 24C, 24D, 25A, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, and 44; 31 grade stabilization structures; and land stabilization measures amortized 100 years at 3¼ percent.

June 1979

TABLE 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS

Big Sandy Creek Watershed, Texas
(Trinity River Watershed)

(Dollars)^{1/}

Item	:Estimated Average Annual Damage :		Damage Reduction ^{2/} Benefits ^{2/}
	: Without Project	: With Project	
Floodwater			
Crop and Pasture	440,482	160,327	280,155
Other Agricultural	97,016	57,543	39,473
Non-Agricultural			
Road and Bridge	224,064	137,156	86,908
Subtotal	761,562	355,026	406,536
Sediment			
Overbank Deposition	53,237	14,416	38,821
Reservoir ^{3/}	60,701	33,410	27,291
Subtotal	113,938	47,826	66,112
Erosion			
Flood Plain Scour	4,417	2,092	2,325
Gullies	23,689	12,792	10,897
Subtotal	28,106	14,884	13,222
Indirect	90,361	41,774	48,587
TOTAL	993,967	459,510	534,457

^{1/} Price Base: Current normalized prices (November 1975) for cropland and pasture; 1975 prices for all other.

^{2/} Excludes effects of accelerated land treatment measures.

^{3/} Sediment damages to Amon Carter and Eagle Mountain Lakes.

TABLE 6 - COMPARISON OF BENEFITS AND COSTS

Big Sandy Creek Watershed, Texas
(Trinity River Watershed)

(Dollars)

Evaluation Unit	AVERAGE ANNUAL BENEFITS ^{1/}				Total	Average Annual Cost ^{3/}	Benefit-Cost Ratio
	Damage Reduction ^{2/}	Intensive Land Use	More				
57 floodwater retarding structures; 31 grade stabilization structures; and land stabilization measures	367,188	167,269	534,457	283,440	1.9:1.0		
Project Administration	-	-	-	41,660	-		
GRAND TOTAL	367,188	167,269	534,457	325,100	1.6:1.0		

^{1/} Price Base: Current normalized prices (November 1975) for cropland and pasture; 1975 prices for all other.

^{2/} From Table 5.

^{3/} From Table 4.



Figure 1
PROBLEM LOCATION MAP
BIG SANDY CREEK WATERSHED
OF THE
TRINITY RIVER WATERSHED
TEXAS

APPROXIMATE SCALE - MILES
 0 1 2 3 4 5 6 7 8 9 10
 APPROXIMATE SCALE - KILOMETERS
 0 1 2 3 4 5 6 7 8 9 10
 BASE COMPILED FROM USGS QUADRANGLES
 AND GENERAL HIGHWAY MAP.



