

**SUPPLEMENTAL  
WORK PLAN NUMBER II**

**DENTON CREEK  
WATERSHED**

OF THE TRINITY RIVER WATERSHED  
MONTAGUE, WISE, DENTON, COOKE, AND  
TARRANT COUNTIES, TEXAS



Prepared By  
SOIL CONSERVATION SERVICE  
U. S. DEPARTMENT OF AGRICULTURE  
Temple, Texas  
OCTOBER 1968

# TABLE OF CONTENTS

	<u>Page</u>
<b>SUPPLEMENTAL WATERSHED WORK PLAN NUMBER II</b>	
<b>INTRODUCTION . . . . .</b>	1
Authority . . . . .	1
Purpose . . . . .	1
Change in Major Features . . . . .	1
<b>SUMMARY OF PLAN . . . . .</b>	1
<b>DESCRIPTION OF THE WATERSHED (OLIVER CREEK PORTION) . . . . .</b>	2
<b>WATERSHED PROBLEMS . . . . .</b>	3
Floodwater Damage . . . . .	3
Erosion Damage . . . . .	3
Sediment Damage . . . . .	3
<b>BASIS FOR PROJECT FORMULATION . . . . .</b>	4
<b>WORKS OF IMPROVEMENT TO BE INSTALLED . . . . .</b>	4
Land Treatment Measures . . . . .	4
Structural Measures . . . . .	5
<b>EXPLANATION OF INSTALLATION COSTS . . . . .</b>	5
<b>EFFECTS OF WORKS OF IMPROVEMENT . . . . .</b>	5
<b>PROJECT BENEFITS . . . . .</b>	6
<b>COMPARISON OF BENEFITS AND COSTS . . . . .</b>	6
<b>PROVISIONS FOR OPERATION AND MAINTENANCE . . . . .</b>	6
Structural Measures . . . . .	6
 <b><u>TABLES</u></b>	
Table 1 - Estimated Project Installation Cost . . . . .	7
Table 1A - Status of Watershed Works of Improvement . . . . .	8
Table 2 - Estimated Structural Cost Distribution . . . . .	9
Table 3 - Structure Data - Floodwater Retarding Structures . . . . .	10
Table 4 - Annual Cost . . . . .	11
Table 5 - Estimated Average Annual Flood Damage Reduction Benefits . . . . .	12
Table 6 - Comparison of Benefits and Costs for Structural Measures . . . . .	13
Table 7 - Construction Units . . . . .	14
 <b><u>FIGURES</u></b>	
Figure 1 - Problem Location Map . . . . .	15
Figure 2 - Project Map . . . . .	16

SUPPLEMENTAL WATERSHED WORK PLAN AGREEMENT NUMBER II

between the

Denton-Wise Soil and Water Conservation District  
(Local Organization)

Upper Elm-Red Soil and Water Conservation District  
(Local Organization)

Dalworth Soil and Water Conservation District  
(Local Organization)

Upper West Fork Soil and Water Conservation District  
(Local Organization)

City of Decatur, Texas  
(Local Organization)

Montague County Commissioners Court  
(Local Organization)

Wise County Commissioners Court  
(Local Organization)

Denton County Commissioners Court  
(Local Organization)

STATE OF Texas  
(hereinafter referred to as the 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 Denton Creek Watershed, State of Texas, executed by the Sponsoring Local Organization named herein and the Service, became effective on the 18th day of October, 1956; and

Whereas, the Supplemental Watershed Work Plan Agreement executed by the Sponsoring Local Organization named herein and the Service, became effective on the 5th day of July, 1966; and

Whereas, in order to carry out the watershed work plan for said watershed, it has become necessary to modify said Watershed Work Plan Agreement to provide for installation, operation, and maintenance of works of improvement; and

Whereas, it was found necessary to modify the work plan to add three floodwater retarding structures; and

Whereas, a Supplemental Watershed Work Plan which modifies the Watershed Work Plan dated June 1956, 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

Whereas, the County will benefit from installation of works of improvement through reduction of damages to property, including county roads and bridges located in the flood plain of the watershed. Therefore, the Wise County Commissioners Court agrees to obtain necessary land rights and operate and maintain the structural measures included in this supplement.

Now, therefore, in view of the foregoing considerations, the Sponsoring Local Organization and the Secretary of Agriculture, through the Service, hereby agree on the Supplemental Work Plan Number II, and further agree that the works of improvement as set forth in said plan can be installed in the remaining 7 years of the installation period.

It is mutually agreed that in installing and operating and maintaining the works of improvement substantially in accordance with the terms, conditions, and stipulations, provided for in the Supplemental Watershed Work Plan Number II:

1. The Sponsoring Local Organization will acquire such land, easements, or rights-of-way as will be needed in connection with works of improvement. (Estimated cost \$45,130)

The percentages of this cost to be borne by the Sponsoring Local Organization and the Service, as provided in the attached work plan, are as follows:

<u>Works of Improvement</u>	<u>Sponsoring Local Organization</u> (percent)	<u>Service</u> (percent)	<u>Estimated Cost</u> (dollars)
Floodwater Retarding Structures Nos. 29, 30 and 31	100.00	0	43,130 <sup>1/</sup>

1/ Includes \$600 legal fees.

2. The Sponsoring Local Organization in accordance with the Supplemental Watershed Work Plan 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 operations of 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 Nos. 29, 30, and 31	0	100.00	222,650

- The percentages of cost for installation services 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 Installation Service Cost</u> (dollars)
Floodwater Retarding Structures Nos. 29, 30 and 31	0	100.00	50,650

- The Service will award and administer the contracts covering construction of all structural works of improvement.

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

Denton-Wise Soil and Water Conservation District  
Local Organization

By Bob Kleudasil  
RFD, Lewisville, Texas 75067  
Title Chairman  
Date 6-3-69

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

adopted at a meeting held on 6-3-69

Lemuel W. Taylor  
(Secretary, Local Organization)  
Date 6-3-69

-----  
Upper Elm-Red Soil and Water Conservation District  
Local Organization

By Harold Skye  
Rt. 1, Sherman, Texas 75090  
Title Chairman  
Date 8-14-1969

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

adopted at a meeting held on 8-14-1969

Hinda Selark  
(Secretary, Local Organization)  
Date 8-14-1969

Dalworth Soil and Water Conservation District  
Local Organization

By Law E. Lupton  
Rt. 2, Box 357, Mesquite, Texas 75149  
Title Chairman  
Date 9-16-69

The signing of this agreement was authorized by a resolution of the govern-  
ing body of the Dalworth Soil and Water Conservation District  
Local Organization

adopted at a meeting held on 9-16-69

D.H. Skinn  
(Secretary, Local Organization)  
Date 9-16-69

Montague County Commissioners Court  
Local Organization

By E. G. Jones  
Montague, Texas 76251  
Title County Judge  
Date July 18, 1969

The signing of this agreement was authorized by a resolution of the govern-  
ing body of the Montague County Commissioners Court  
Local Organization

adopted at a meeting held on \_\_\_\_\_

Glen Prieble  
GLEN PRIEBLE  
COUNTY CLERK  
MONTAGUE COUNTY, TEXAS  
(Secretary, Local Organization)  
Date July 18, 1969

Upper West Fork Soil and Water Conservation District  
Local Organization

By Ellis Henderson  
Rt. 3, Jacksboro, Texas 76056  
Title Chairman

Date 7 August 1969

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

adopted at a meeting held on 7 August 1969

Jim Cummins  
(Secretary, Local Organization)

Date 7 August 1969

City of Decatur, Texas  
Local Organization

By William W. Renshaw  
Decatur, Texas 76234

Title Mayor

Date July 8 1969

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

adopted at a meeting held on July 8 1969

William W. Renshaw  
(Secretary, Local Organization)

Date July 8 1969

**SUPPLEMENTAL**  
**WATERSHED WORK PLAN NUMBER II**  
**DENTON CREEK WATERSHED**  
**Of the Trinity River Watershed**  
**Montague, Wise, Denton, Cooke, and Tarrant 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**

**Participating Agencies**

**Denton-Wise Soil and Water Conservation District  
Upper Elm-Red Soil and Water Conservation District  
Dalworth Soil and Water Conservation District  
Upper West Fork Soil and Water Conservation District  
City of Decatur  
Montague County Commissioners Court  
Wise County Commissioners Court  
Denton County Commissioners Court**

**Prepared By:**

**Soil Conservation Service  
U. S. Department of Agriculture**

**October 1968**

SUPPLEMENTAL  
WATERSHED WORK PLAN NUMBER II  
DENTON CREEK WATERSHED  
Temple, Texas

ADDENDUM

Since the preparation of this supplemental watershed work plan, the Federal interest rate for benefit and cost evaluations has been increased from 3.25 percent to 4.625 percent. This change is applicable to the three flood-water retarding structures to be installed in the Oliver Creek portion of the watershed.

As a result, annual equivalent costs for the installation of these structural measures will increase from \$12,970 to \$16,440. The total average annual cost of structural measures (amortized total installation cost, plus operation and maintenance costs) will be increased to \$16,790. Average annual benefits, excluding secondary benefits, accruing to structural measures will change to \$16,877, resulting in a benefit-cost ratio of 1.00 to 1.0.

Total average annual project benefits, including secondary benefits, will change to \$19,800, resulting in a benefit-cost ratio of 1.18 to 1.0.

**SUPPLEMENTAL**

**WATERSHED WORK PLAN NUMBER II**

**DENTON CREEK WATERSHED  
of the Trinity River Watershed  
Montague, Wise, Denton, Cooke, and Tarrant Counties, Texas**

October 1968

**INTRODUCTION**

**Authority**

The Denton Creek Watershed Flood Prevention Project will be carried out under the authority of the Soil Conservation Act of 1935 (Public Law No. 46, 74th Congress), the Flood Control Act of 1936 (Public Law No. 738, 74th Congress), and the Flood Control Act of 1944 (Public Law No. 534, 78th Congress), as amended and supplemented.

**Purpose**

The purpose of this supplement is to modify the 1965 supplemental work plan to include structural works of improvement for watershed protection and flood prevention on Oliver Creek tributary of Denton Creek.

**Change in Major Features**

This supplement will add three floodwater retarding structures on Oliver Creek for a total of 89 floodwater retarding structures for the watershed.

The Denton Creek Supplemental Watershed Work Plan of June 1965 includes a combination of land treatment measures for watershed protection and structural works of improvement for flood prevention. The planning and application of the land treatment measures and structural measures will be carried out in accordance with provisions of the 1965 supplement. Land treatment and structural measures installed to date are shown on table 1A. One multiple-purpose structure and 52 floodwater retarding structures of the 86 planned have been installed.

The Oliver Creek portion of the watershed was re-evaluated in order to determine the feasibility of a project on this tributary.

**SUMMARY OF PLAN**

The flood plain of Oliver Creek watershed consists of 1,765 acres, excluding 164 acres of stream channels. Six major floods inundating more than half of the flood plain occurred during the 30-year period covered by the evaluation series.

Additional structural measures to be installed during the remainder of the 10-year installation period include three floodwater retarding structures. It is estimated that the cost for installing these structural measures will be \$318,430. Flood prevention funds will bear \$273,300 and other funds \$45,130.

Prior to the installation of the project, the estimated average annual flood damage on Oliver Creek amounts to \$5,168. Damages remaining on Reach 1, main stem of Denton Creek, with the project as planned in the 1965 supplement and without structural measures on Oliver Creek, amount to \$14,457.

Average annual damage reduction benefits are expected to be \$3,834 on Oliver Creek. Approximately 30 additional landowners and operators will benefit from the project on Oliver Creek. An additional \$1,473 is expected in further damage reduction on Reach 1, main stem, resulting in a total damage reduction benefit of \$5,307. It is estimated that benefits from more intensive land use, incidental recreation, and secondary benefits will amount to \$15,327.

The project will result in a 75 percent reduction in average annual area flooded on Oliver Creek and an additional 5 percent reduction on Reach 1.

The estimated annual operation and maintenance cost will be \$350. The capitalized value of this will be \$8,593.

#### DESCRIPTION OF THE WATERSHED (OLIVER CREEK PORTION)

The Oliver Creek portion of this watershed consists of Oliver Creek and its tributaries. Oliver Creek originates near the town of Decatur, Wise County, Texas. This creek flows in a southeasterly direction and joins Denton Creek about one mile northeast of Justin. Grapevine Reservoir is located approximately seven miles below the confluence of Oliver and Denton Creeks.

The watershed drained by Oliver Creek at valley section No. 1 (figure 1) contains an area of 37,312 acres (58.3 square miles), of which 35,446 acres are in farms and ranches. The remaining 1,866 acres, about 5 percent, are in roads, railroads, and other miscellaneous uses.

The land use on the flood plain, exclusive of area in channels and proposed pool areas, is as follows:

<u>Land Use</u>	<u>Acres</u>	<u>Percent</u>
Cropland	918	52
Pasture	794	45
Miscellaneous <u>1/</u>	<u>53</u>	<u>3</u>
Total	1,765	100

1/ Includes roads, railroads, etc.

Land use in the Oliver Creek portion of the watershed is estimated as follows: cropland, 37 percent; pasture and rangeland, 58 percent; and 5 percent in miscellaneous uses.

### WATERSHED PROBLEMS

#### Floodwater Damage

The flood plain of Oliver Creek consists of 1,765 acres, excluding 164 acres of stream channels (figure 1). This area will be inundated by the runoff from the largest storm considered in the 30-year evaluation series (1930 through 1959).

During this 30-year period, there were 6 major floods that covered more than half of the flood plain and 70 minor floods covering less than half of the flood plain.

Based on the floods considered in the 30-year evaluation series, annual direct floodwater damages without the program of land treatment and structural measures on Oliver Creek are estimated to total \$3,863. These damages consist of \$3,566 of crop and pasture, \$212 of other agricultural damage, and \$85 of road and bridge damage.

Annual direct floodwater damages in Reach 1 on the main stem of Denton Creek, without structures on Oliver Creek tributary and with project conditions as in the 1965 supplemental work plan, are \$13,049 which includes \$10,280 crop and pasture damage, \$1,914 other agricultural damage, and \$855 road and bridge damage.

#### Erosion Damage

Sediment source studies indicate that erosion rates range from low to moderate. There are no critical sediment source areas in the Oliver Creek portion of the watershed. The estimated annual erosion rates average 4.1 tons per acre or 1.5 acre-feet per square mile. In the upland area, sheet erosion accounts for 95 percent and gully and streambank erosion for 5 percent of the annual soil loss.

The area affected by flood plain erosion is small. It is estimated that this process causes loss of productivity on an average of 27 acres of flood plain annually and is distributed as follows: 18 acres damaged 10 percent and 9 acres damaged 20 percent. This represents an average annual monetary damage of \$105.

#### Sediment Damage

Moderately low sediment loads are being carried by Oliver Creek. Overbank deposition is minor in extent and damage from the silty clay and clayey silt materials is insignificant.

The annual loss of storage capacity to Grapevine Reservoir from sediment originating in Oliver Creek watershed is estimated to average 29 acre-feet.

The annual damage to the reservoir by depletion of its capacity is estimated to be \$730.

#### BASIS FOR PROJECT FORMULATION

After the Supplemental Work Plan of the Denton Creek watershed was prepared in June 1965, the sponsoring local organizations requested that a new evaluation be made of the Oliver Creek portion of the watershed. The objective of this request was to include structural measures for the Oliver Creek tributary to obtain an acceptable level of protection from floodwater and sediment damages, and to investigate a possible multiple-purpose structure that would include recreation and municipal water supply for the City of Decatur.

The following specific objectives were agreed to:

1. Continue to establish land treatment measures during the remaining project installation period which contribute directly to watershed protection and flood prevention.
2. Attain a reduction of 65 to 75 percent in average annual floodwater and sediment damages.
3. Provide municipal water storage and water-based recreational facilities for the City of Decatur.

Alternate systems of structural measures were evaluated to obtain the most economical system that would meet project objectives.

The most economical structure location was used to obtain cost estimates for the additional storage for the City of Decatur. After several months of study by the city council and their consulting engineer, it was determined that the city was not financially able to participate in the construction of the multiple-purpose structure. Therefore, this portion of the original request was dropped from further consideration.

It was determined that a project for watershed protection and flood prevention meets local needs and that no other group or individual is interested in obtaining additional storage capacities for any other purposes.

Land treatment measures and floodwater retarding structures are the most feasible means of meeting project objectives.

#### WORKS OF IMPROVEMENT TO BE INSTALLED

##### Land Treatment Measures

An effective conservation program under the leadership of the soil and water conservation districts is now underway.

Land treatment measures to be installed on Denton Creek watershed during the remainder of the installation period are shown in table 1.

### Structural Measures

A total of three floodwater retarding structures are required to provide the desired protection and reduction in floodwater and scour damage to flood plain lands of Oliver Creek.

The cost of installing these structures is \$318,430. The capacity of the three floodwater retarding structures totals 5,677 acre-feet. Of this amount, 817 acre-feet is provided for sediment accumulation over a 50-year period.

Runoff from 33.7 percent of the Oliver Creek portion of the watershed will be retarded. Floodwater detention represents an average of 4.64 inches from the area upstream from the structures which is equivalent to 1.56 inches from the watershed upstream from valley section 1. The amount of runoff controlled by each structure is shown in table 3.

Details on quantities, cost, and design features of structural measures are shown in tables 1, 1A, 2, and 3.

### EXPLANATION OF INSTALLATION COSTS

The local cost for the three floodwater retarding structures is estimated to be \$45,130, which consists of \$41,330 for land, easements, and rights-of-way, \$3,200 for relocating and clearing obstacles, and \$600 for legal fees.

Construction costs for the three floodwater retarding structures are estimated to be \$222,650, which includes the engineer's estimate and a 10 percent allowance for contingencies. The cost of installation services is estimated to be \$50,650, including engineering and administration costs. The total construction and installation services cost for these measures is \$273,300 and will be borne by flood prevention funds.

The total cost of the three single-purpose floodwater retarding structures is estimated to be \$318,430.

The three structures on Oliver Creek (Construction Unit 6) will be added to the schedule of obligations of the 1965 supplemental plan for installation during the 10th year.

### EFFECTS OF WORKS OF IMPROVEMENT

With the installation of the project on Oliver Creek, average annual flooding will be reduced from 444 to 111 acres on the Oliver Creek flood plain. Annual flooding on Reach 1 of Denton Creek averages 1,236 acres with the 1965 supplemental work plan installed. The Oliver Creek project will reduce the 1,236 acres of annual flooding to 1,125 acres.

The annual flood plain scour damages on 27 acres on Oliver Creek is expected to be reduced 77 percent. The Oliver Creek portion of the project will reduce scour damages on 101 acres on Reach 1 an additional 5 percent.

It is estimated that 29 acre-feet of sediment from the Oliver Creek tributary is being deposited annually in Grapevine Reservoir. This damage will be reduced to 15 acre-feet annually with the project installed.

It is expected that intensification will occur on approximately 668 acres of the flood plain.

Approximately 30 landowners and operators on Oliver Creek will be directly benefited by the installation of the project.

The sediment pools of the three floodwater retarding structures will provide incidental recreation for an estimated 2,450 visitor-days annually.

Secondary benefits were considered to be equal to 10 percent of the direct primary benefits plus 10 percent of the increased cost that primary producers will incur in connection with increased production.

#### PROJECT BENEFITS

Total average annual benefits expected to result from installation of land treatment and structural measures are estimated to be \$20,634.

Damages on Oliver Creek will be reduced from \$5,168 to \$1,334, a benefit of \$3,834 annually. Approximately 7 percent of this damage reduction will result from land treatment. An additional annual benefit of \$1,473 will result from further damage reduction on Reach 1 of Denton Creek from installation of structural measures.

Benefits from more intensive land use are estimated to be \$10,400 annually.

Incidental recreation benefits accruing to the floodwater retarding structures will amount to an estimated \$1,960 annually. These sites will be open for public recreation use with the landowner's permission.

Local secondary benefits are estimated to be \$2,967 annually.

#### COMPARISON OF BENEFITS AND COSTS

Primary benefits accruing to structural measures include damage reduction, more intensive land use, and incidental recreation. These average annual benefits of \$17,312 annually as compared to the annual cost of \$13,320, which includes operation and maintenance, gives a benefit-cost ratio of 1.30:1.

Total benefits, including secondary benefits, accruing to structural measures annually amount to \$20,279, giving a benefit-cost ratio of 1.52:1.

#### PROVISIONS FOR OPERATION AND MAINTENANCE

##### Structural Measures

The Wise County Commissioners Court will be responsible for operation and maintenance of floodwater retarding structures 29, 30, and 31.

TABLE 1 - ESTIMATED PROJECT INSTALLATION COST  
Denton Creek Watershed, Texas  
(Trinity River Watershed)

Installation Cost Item	Unit	Federal	Non-Federal	Number	Estimated Cost (Dollars)						
					Flood Prevention Funds		Federal : Non-Federal		Other Funds 1/		
					Land	Total	Land	Total	Land	Total	
<b>LAND TREATMENT</b>											
Soil Conservation Service											
Cropland	Acre	-	25,085	-	-	-	-	318,291	-	318,291	318,291
Pastureland	Acre	-	28,118	-	-	-	-	844,815	-	844,815	844,815
Rangeland	Acre	-	37,813	-	-	-	-	81,425	-	81,425	81,425
Technical Assistance (Accelerated)											
SCS Subtotal		-	91,016	-	12,659	232,740	245,399	-	-	245,399	245,399
Forest Service											
Rangeland	Acre	7,680	-	7,680	199,080	-	-	-	-	199,080	199,080
FS Subtotal		7,680	-	7,680	199,080	-	-	-	-	199,080	199,080
<b>TOTAL LAND TREATMENT 2/ 3/</b>		<b>7,680</b>	<b>91,016</b>	<b>98,696</b>	<b>211,739</b>	<b>232,740</b>	<b>444,479</b>	<b>1,244,531</b>	<b>1,244,531</b>	<b>1,889,010</b>	<b>1,889,010</b>
<b>STRUCTURAL MEASURES</b>											
Soil Conservation Service											
Floodwater Retarding Structures	No.	-	37	-	-	1,964,542	1,964,542	-	-	1,964,542	1,964,542
Stream Channel Improvement	Mile	-	43.26	-	-	2,370,797	2,370,797	-	-	2,370,797	2,370,797
Sediment Control Structure	No.	7	66	73	41,077	376,047	417,124	-	-	417,124	417,124
Diversions	Foot	1,700	122,235	123,935	1,363	76,272	77,635	-	-	77,635	77,635
Vegetation	Acres	-	3,415	3,415	-	100,965	100,965	-	-	100,965	100,965
Multiple-Purpose Structure 28	No.	-	1	1	-	179,160	179,160	-	-	179,160	179,160
Municipal Outlet Structure	No.	-	1	1	-	-	-	131,185	131,185	131,185	131,185
Basic Recreational Facilities	No.	-	1	1	-	-	-	27,500	27,500	27,500	27,500
SCS Subtotal		-	-	-	-	13,965	13,965	13,965	13,965	27,930	27,930
Other Costs											
Land, Easements, and Rights-of-Way											
Legal Fees											
Subtotal - Construction 4/		-	-	-	42,440	5,081,748	5,124,188	-	-	172,650	5,296,838
Installation Services											
Soil Conservation Service											
Engineering Services											
Other											
SCS Subtotal		-	-	-	2,942	790,270	793,212	-	12,284	12,284	805,496
Subtotal - Installation Services		-	-	-	250	453,687	453,937	-	10,392	10,392	464,329
Other Costs											
Land, Easements, and Rights-of-Way											
Legal Fees											
Subtotal - Other Costs		-	-	-	3,192	1,243,957	1,247,149	-	22,676	22,676	1,269,825
<b>TOTAL STRUCTURAL MEASURES 2/</b>		<b>3,192</b>	<b>1,243,957</b>	<b>1,247,149</b>	<b>1,247,149</b>	<b>6,912,756</b>	<b>6,912,756</b>	<b>1,797,163</b>	<b>1,797,163</b>	<b>8,710,419</b>	<b>8,710,419</b>
<b>TOTAL PROJECT SUMMARY</b>											
Subtotal - SCS		58,291	6,655,385	6,713,676	500	1,797,163	1,797,663	8,511,339	8,511,339	199,080	199,080
Subtotal - FS		199,080	-	199,080	-	-	-	-	-	-	-
<b>TOTAL PROJECT</b>		<b>257,371</b>	<b>6,655,385</b>	<b>6,912,756</b>	<b>500</b>	<b>1,797,163</b>	<b>1,797,663</b>	<b>8,710,419</b>	<b>8,710,419</b>	<b>1,889,010</b>	<b>1,889,010</b>

1/ Includes reimbursement from ACP funds under going program.

2/ Measures to be installed during the remainder of the project installation period.

3/ 1963 prices.

4/ 1963 prices for remaining structures in 1965 supplement and 1968 prices for Sites 29, 30, and 31.

**TABLE 1A - STATUS OF WATERSHED WORKS OF IMPROVEMENT**  
 Denton Creek Watershed, Texas  
 (Trinity River Watershed)

Price Base: 1963

Installation Cost Item	Unit	Applied to Date <sup>1/</sup>	Estimated Cost (Dollars) <sup>2/</sup>		
			Federal Land	Non-Federal Land	Total
<b>LAND TREATMENT</b>					
Soil Conservation Service					
Conservation Cropping System	Acre	35,650	-	60,917	60,917
Contour Farming	Acre	12,110	-	17,638	17,638
Cover and Green Manure Crop	Acre	26,072	-	191,530	191,530
Crop Residue Use	Acre	42,646	-	52,880	52,880
Hayland Planting	Acre	2,592	-	55,745	55,745
Pasture & Hayland Renovation	Acre	7,838	-	134,213	134,213
Pasture Planting	Acre	27,053	-	434,043	434,043
Pasture Proper Use	Acre	40,811	-	183,989	183,989
Range Deferred Grazing	Acre	12,916	-	15,573	15,573
Range Proper Use	Acre	105,891	-	52,945	52,945
Range Seeding	Acre	6,275	-	77,952	77,952
Rotation Grazing	Acre	12,875	-	17,690	17,690
Brush and Weed Control	Acre	18,558	-	299,164	299,164
Diversion	Foot	248,301	-	58,462	58,462
Farm Pond	No.	1,246	-	462,916	462,916
Grade Stabilization Structure	No.	38	-	51,909	51,909
Grassed Waterway or Outlet	Foot	1,008	-	28,722	28,722
Terrace, Gradient	Foot	2,479,700	-	105,912	105,912
Soil Conservation Service Subtotal				2,302,200	2,302,200
Forest Service			260,673	-	260,673
Forest Service Subtotal				260,673	260,673
<b>TOTAL LAND TREATMENT</b>			260,673	2,302,200	2,562,873
<b>STRUCTURAL MEASURES</b>					
Soil Conservation Service					
Floodwater Retarding Structures	No.	52	457,167	2,958,201	3,415,368
Multiple-Purpose Site 1C	No.	1	-	80,989	80,989
Sediment Control Structures	No.	25	55,729	-	55,729
<b>TOTAL STRUCTURAL MEASURES <sup>3/</sup></b>			512,896	3,039,190	3,552,086
<b>TOTAL</b>			773,569	5,341,390	6,114,959

<sup>1/</sup> As of June 30, 1968.

<sup>2/</sup> Includes reimbursement from ACP funds under going programs.

<sup>3/</sup> Actual construction cost for 52 floodwater retarding structures, one multiple-purpose structure, and 25 sediment control structures built prior to June 30, 1968.

Supplement Number II  
October 1968

TABLE 2 - ESTIMATED STRUCTURAL COST DISTRIBUTION 1/  
 Denton Creek Watershed, Texas  
 (Trinity River Watershed)

(Dollars) 2/

Structure Site Number or Name	Installation Cost - Federal Funds				Installation Cost - Other Funds				Total Installation Cost		
	Construction	Engineering	Services	Installation	Construction	Engineering	Services	Installation			
Subtotal 1965 Supplement as Revised	7,523,928	1,239,060	670,795	96,940	9,530,723	182,220	13,904	11,252	516,966	724,342	10,255,065
Oliver Creek 29	105,510	13,720	9,090	-	128,320	-	-	-	23,550	23,550	151,870
30	62,890	9,430	5,510	-	77,830	-	-	-	10,800	10,800	88,630
31	54,250	8,140	4,760	-	67,150	-	-	-	10,780	10,780	77,930
Subtotal Oliver Creek	222,650	31,290	19,360	-	273,300	-	-	-	45,130	45,130	318,430
<b>GRAND TOTAL</b>	<b>7,746,578</b>	<b>1,270,350</b>	<b>690,155</b>	<b>96,940</b>	<b>9,804,023</b>	<b>182,220</b>	<b>13,904</b>	<b>11,252</b>	<b>562,096</b>	<b>769,472</b>	<b>10,573,495</b>

1/ Does not include work plan preparation cost.

2/ Price Base: Actual contract cost for 52 floodwater retarding structures, one multiple-purpose structure, and 25 sediment control structures built prior to June 30, 1968; 1963 prices for remaining structures in 1965 supplement and 1968 prices for Sites 29, 30, and 31.

Supplement Number II  
 October 1968

TABLE 3 - STRUCTURE DATA - FLOODWATER RETARDING STRUCTURES  
Denton Creek Watershed, Texas  
(Trinity River Watershed)

Item	Unit		Structure Number		Subtotal : Oliver Creek	Total From Plan : Dated June 1965	Total
	29	30	31	A			
Class of Structure	Sq. Mi.		A	A	xxx	xxx	xxx
Drainage Area			83	83	19.66	239.57	239.23
Curve No. (1-day) (AMC II)	Hrs.		2.04	1.41	xxx	xxx	xxx
Tc			861.3	865.0	xxx	xxx	xxx
Elevation Top of Dam	Ft.		854.5	860.0	xxx	xxx	xxx
Elevation Crest Emergency Spillway	Ft.		834.0	845.5	xxx	xxx	xxx
Elevation Crest - Principal Spillway	Ft.		829.9	845.5	xxx	xxx	xxx
Elevation Crest Lowest Ungated Outlet	Ft.		58	45	xxx	xxx	xxx
Maximum Height of Dam 1/	Ft.		176,130	107,430	397,220	7,817,928	8,215,148
Volume of Fill	Cu.Yds.		3,399	1,227	5,677	78,548	84,225
Total Capacity	Ac.Ft.		196	198	529	8,672	9,201
Sediment Pool (Lowest Ungated Outlet)	Ac.Ft.		411	135	744	9,760	10,504
Sediment Submerged 50 Years (Includes Sediment Pool)	Ac.Ft.		41	19	73	2,282	2,355
Sediment Aerated	Ac.Ft.		-	-	-	8,367	8,367
Beneficial Use	Ac.Ft.		2,947	1,010	4,860	58,139	62,999
Retarding	Ac.Ft.						
Surface Area	Acres		40	30	98	1,607	1,705
Sediment Pool (Lowest Ungated Outlet)	Acres		58	30	116	437	553
Sediment Pool-Principal Spillway Crest	Acres		-	-	-	728	728
Beneficial Use	Acres		236	112	453	6,514	6,967
Retarding Pool							
Principal Spillway							
Rainfall Volume (areal) (1-day) 2/	In.		7.25	7.25	xxx	xxx	xxx
Rainfall Volume (areal) (10-day) 2/	In.		12.00	12.00	xxx	xxx	xxx
Runoff Volume (10-day)	In.		6.79	7.35	xxx	xxx	xxx
Capacity (Maximum)	cfs		185	64	xxx	xxx	xxx
Frequency Operation - Emer. Spillway	% Chance		2.6	2.8	xxx	xxx	xxx
Size of Conduit	In.		36	24	xxx	xxx	xxx
Emergency Spillway							
Rainfall Volume (ESH) (areal) 3/	In.		6.70	6.70	xxx	xxx	xxx
Runoff Volume (ESH)	In.		4.74	4.74	xxx	xxx	xxx
Type	Veg.				xxx	xxx	xxx
Bottom Width	Ft.		240	120	xxx	xxx	xxx
Velocity of Flow (V <sub>e</sub> )	Ft./Sec.		0	0	xxx	xxx	xxx
Slope of Exit Channel	Ft./Ft.		.040	.040	xxx	xxx	xxx
Maximum Water Surface Elevation	Ft.		-	-	xxx	xxx	xxx
Freeboard							
Rainfall Volume (FH) (areal) 4/	In.		13.63	13.70	xxx	xxx	xxx
Runoff Volume (FH)	In.		11.44	11.51	xxx	xxx	xxx
Maximum Water Surface Elevation	Ft.		861.3	865.0	xxx	xxx	xxx
Capacity Equivalents							
Sediment Volume	In.		0.69	1.03	xxx	xxx	xxx
Retarding Volume	In.		4.50	4.79	xxx	xxx	xxx
Spillway Storage 5/	In.		3.01	2.93	xxx	xxx	xxx

1/ Measured from centerline of stream channel to effective top of dam.

2/ Value of P taken from Engineering-Hydrology, Chapter 21, National Engineering Handbook, Section 4.

3/ Value of P taken from Figure 1, Spillway Design Storm, Engineering-Hydrology Memorandum TX-1.

4/ Value of P taken from Figure 2, Freeboard Storm, Engineering-Hydrology Memorandum TX-1.

5/ Storage from emergency spillway above to top of dam.

6/ Includes conditions after June 1965.

**TABLE 4 - ANNUAL COST**  
**Denton Creek Watershed, Texas 1/**  
**(Trinity River Watershed)**

(Dollars)

Evaluation Unit	: Amortization: : of : Installation: : Cost	: Operation : and : Maintenance: : Cost	: Total
86 floodwater retarding structures; 43.26 miles of stream channel im- provement; land stabilization measures consisting of 98 sediment control structures, 123,935 feet of diversions, 2,077 acres of grass seeding, and 350,370 feet of fencing; 2 multiple-purpose structures; and basic recrea- tional facilities.	408,080 <u>2/</u>	35,720 <u>3/</u>	443,800
3 floodwater retarding structures (Oliver Creek)	12,970 <u>4/</u>	350	13,320
<b>TOTAL</b>	421,050	36,070 <u>5/</u>	457,120

1/ Includes all revisions to date.

2/ Installation costs based on 1963 prices and actual contract cost for structures constructed prior to June 30, 1968, amortized for 50 years at 3 1/8 percent.

3/ Includes operation, maintenance, and replacement costs for basic recreational facilities.

4/ Installation costs based on 1968 prices and amortized for 50 years at 3 1/4 percent.

5/ Long-term prices as projected by ARS, September 1957.

Supplement Number II  
October 1968

**TABLE 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS**  
 Denton Creek Watershed, Texas 1/  
 (Trinity River Watershed)

(Dollars) 2/

Item	: Estimated Average Annual Damage:		Damage Reduction Benefits
	: Without Project	: With Project	
<b>Floodwater</b>			
Crop and Pasture	297,284	80,241	217,043
Other Agricultural	44,386	6,452	37,934
Nonagricultural (Road and Bridge)	24,670	3,187	21,483
Subtotal	366,340	89,880	276,460
<b>Sediment</b>			
Overbank Deposition	58,217	1,735	56,482
Reservoir <u>3/</u>	11,646	6,047	5,599
Subtotal	69,863	7,782	62,081
<b>Erosion</b>			
Flood Plain Scour	5,961	1,650	4,311
Gullies	2,320	812	1,508
Subtotal	8,281	2,462	5,819
Indirect	44,449	10,139	34,310
<b>TOTAL</b>	<b>488,933</b>	<b>110,263</b>	<b>378,670</b>

1/ Includes all revisions to date.

2/ Price Base: Long-term as projected by ARS, September 1957.

3/ Sediment damage to Grapevine Reservoir.

Supplement Number II  
 October 1968

TABLE 6 - COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES  
 Denton Creek Watershed, Texas 1/  
 (Trinity River Watershed)

(Dollars) 2/

Evaluation Unit	AVERAGE ANNUAL BENEFITS										Benefit-Cost Ratio
	Flood Prevention	Damage : Changed	Reduction : Land Use	Incidental : Municipal	Water : Recreation	Water : Management	Nonagricultural	Water Management	Agricultural : Water	Annual : Cost	
86 floodwater retarding structures; 43.26 miles of stream channel improvement; land stabilization measures consisting of 98 sediment control structures, 123,935 feet of diversions, 2,077 acres of grass seeding, and 350,370 feet of fencing; 2 multiple-purpose structures; and basic recreational facilities.	340,977	52,618	31,660	25,650	93,000	560	55,377	599,842	443,800	1.35:1	
Structures No. 29, 30, and 31 Oliver Creek	4,52	10,400	1,960	-	-	-	2,967	20,279	13,320	1.52:1	
<b>TOTAL</b>	<b>345,929 3/</b>	<b>63,018</b>	<b>33,620</b>	<b>25,650</b>	<b>93,000</b>	<b>560</b>	<b>58,344</b>	<b>620,121</b>	<b>457,120</b>	<b>1.36:1</b>	

1/ Includes all revisions to date.  
 2/ Price base: Long-term as projected by ARS, September 1957, for Line Item 1.  
 3/ In addition, it is estimated that land treatment measures will provide flood damage reduction benefits of \$32,741 annually.

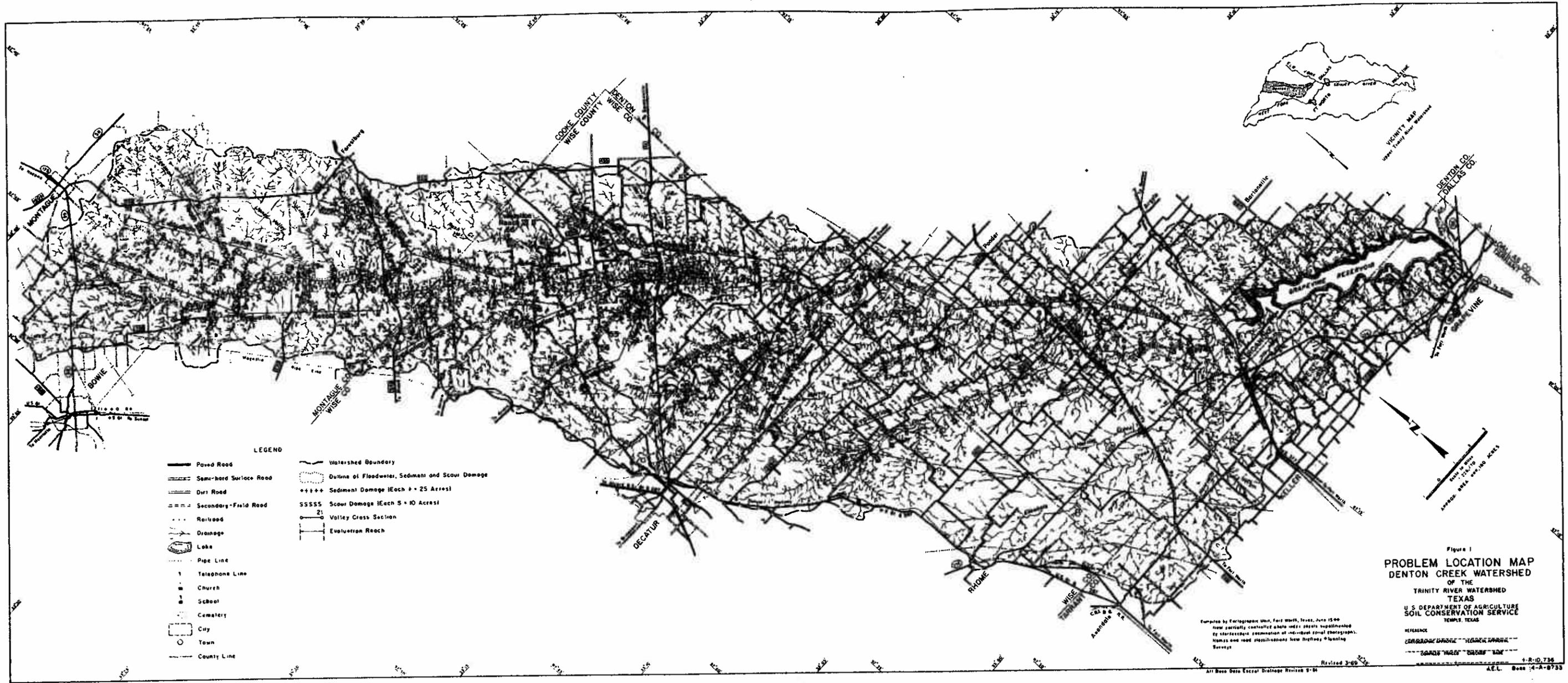
Supplement Number II  
 October 1968

TABLE 7 - CONSTRUCTION UNITS  
 Denton Creek Watershed, Texas  
 (Trinity River Watershed)

(Dollars)

<u>Measures in Construction Unit</u>	: Annual : Benefit	: Annual : Cost
<u>Construction Unit 6</u>		
Floodwater Retarding Structures 29, 30, and 31	20,279	13,320

Supplement Number II  
 October 1968



- LEGEND**
- Paved Road
  - Semi-hard Surface Road
  - Dirt Road
  - Secondary-Field Road
  - Railroad
  - Drainage
  - Lake
  - Pipe Line
  - Telephone Line
  - Church
  - School
  - Cemetery
  - City
  - Town
  - County Line
  - Watershed Boundary
  - Outline of Floodwater, Sediment and Scour Damage
  - ++++ Sediment Damage (Each + = 25 Acres)
  - SSSSS Scour Damage (Each S = 10 Acres)
  - Valley Cross Section
  - Evaporation Reach

Figure 1  
**PROBLEM LOCATION MAP**  
**DENTON CREEK WATERSHED**  
 OF THE  
 TRINITY RIVER WATERSHED  
 TEXAS  
 U.S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE  
 TEMPLE, TEXAS

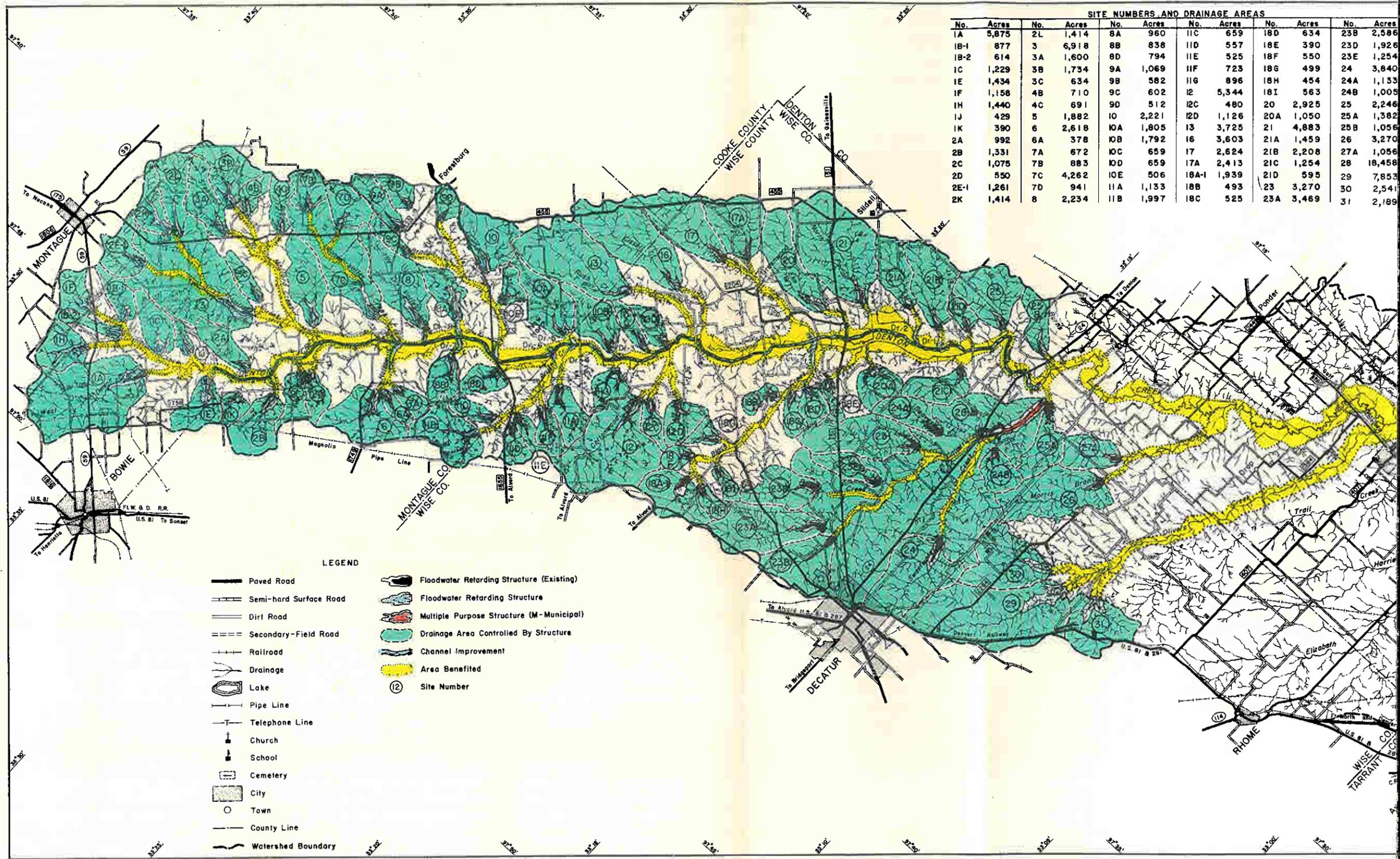
Compiled by Cartographic Unit, Fort Worth, Texas, June 1960  
 from partially controlled photo maps; details supplemented  
 by stereoscopic examination of uncontrolled aerial photographs.  
 Names and road designations from highway planning  
 surveys.

Revised 3-66

All Base Data Except Drainage Revised 9-64

REFERENCE  
 CARROLL COUNTY "ROADS" MAP  
 "COUNTY MAPS" "ROADS" MAP

4-R-10, 726  
 A.E.L. Base 4-A-8733



SITE NUMBERS AND DRAINAGE AREAS									
No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres
1A	5,875	2L	1,414	8A	960	11C	659	18D	634
1B-1	877	3	6,918	8B	838	11D	557	18E	390
1B-2	614	3A	1,600	8D	794	11E	525	18F	550
1C	1,229	3B	1,734	9A	1,069	11F	723	18G	499
1E	1,434	3C	634	9B	582	11G	896	18H	454
1F	1,158	4B	710	9C	602	12	5,344	18I	563
1H	1,440	4C	691	9D	512	12C	480	20	2,925
1J	429	5	1,882	10	2,221	12D	1,126	20A	1,050
1K	390	6	2,618	10A	1,805	13	3,725	21	4,883
2A	992	6A	378	10B	1,792	16	3,603	21A	1,459
2B	1,331	7A	672	10C	659	17	2,624	21B	2,208
2C	1,075	7B	883	10D	659	17A	2,413	21C	1,254
2D	550	7C	4,262	10E	506	18A-1	1,939	21D	595
2E-1	1,261	7D	941	11A	1,133	18B	493	23	3,270
2K	1,414	8	2,234	11B	1,997	18C	525	23A	3,469
								23B	2,586
								23D	1,926
								23E	1,254
								24	3,840
								24A	1,133
								24B	1,005
								25	2,246
								25A	1,382
								25B	1,056
								26	3,270
								27A	1,056
								28	18,458
								29	7,853
								30	2,541
								31	2,189

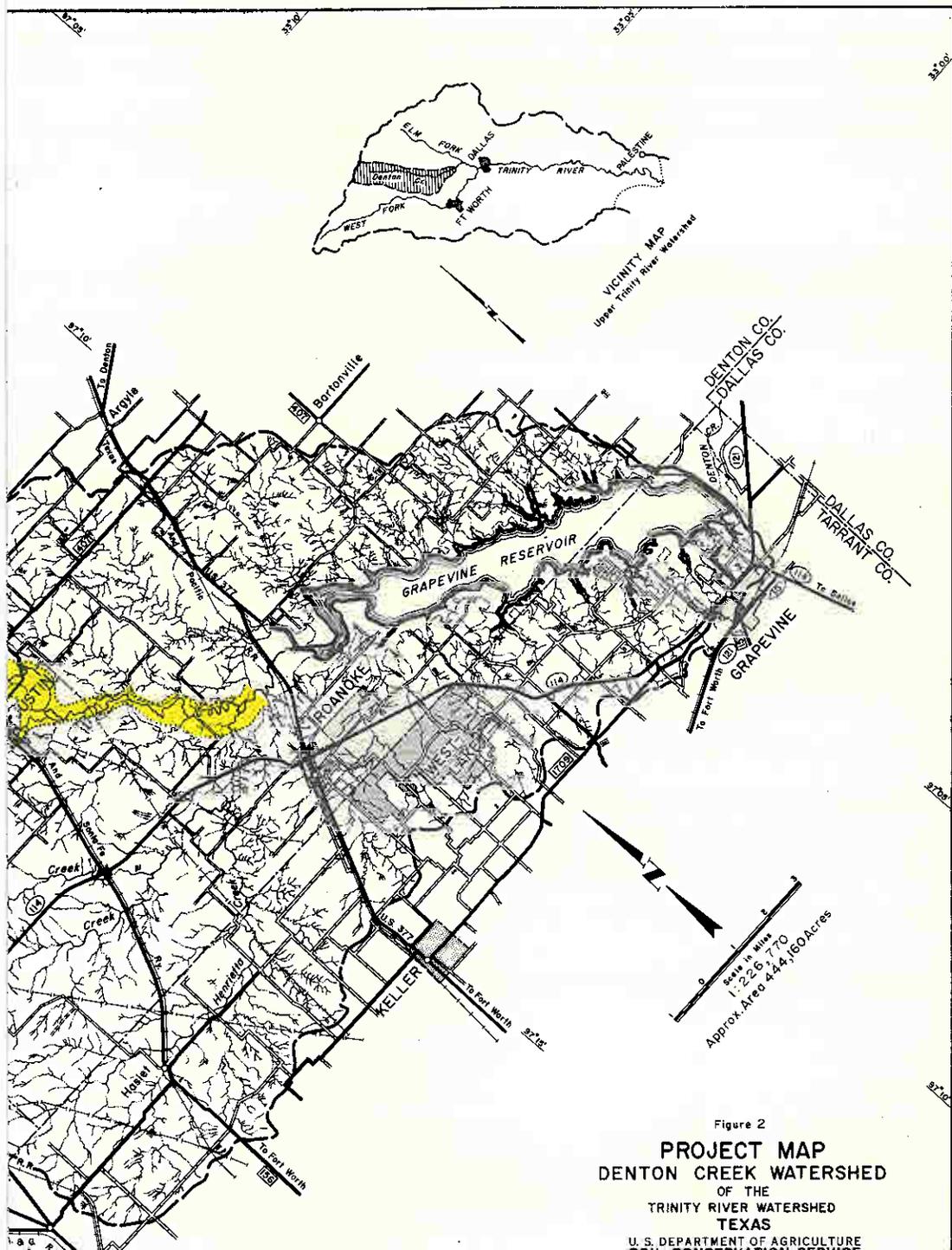


Figure 2  
**PROJECT MAP**  
**DENTON CREEK WATERSHED**  
 OF THE  
 TRINITY RIVER WATERSHED  
 TEXAS  
 U. S. DEPARTMENT OF AGRICULTURE