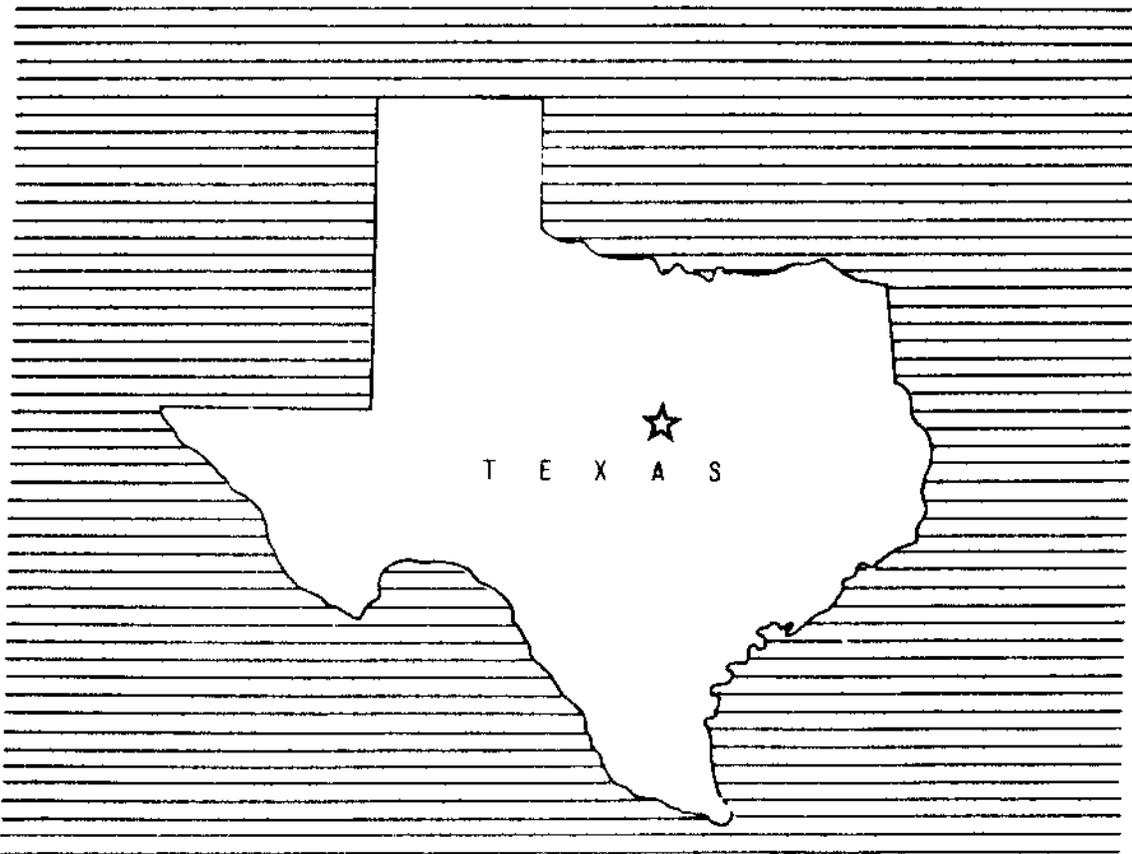


SUPPLEMENTAL  
WORK PLAN No.II

FOR WATERSHED PROTECTION AND FLOOD PREVENTION

UPPER BOSQUE RIVER  
WATERSHED

ERATH, HAMILTON, and BOSQUE COUNTIES, TEXAS



November 1973

SUPPLEMENTAL WATERSHED WORK PLAN AGREEMENT NO. II

between the  
Bosque Soil and Water Conservation District  
Local Organization

Hamilton-Coryell Soil and Water Conservation District  
Local Organization

Upper Leon Soil and Water Conservation District  
Local Organization

North Bosque Water Control and Improvement District  
Local Organization

Erath County Commissioners Court  
Local Organization

Hamilton County Commissioners Court  
Local Organization

Bosque County Commissioners Court  
Local Organization

State of Texas

(hereinafter referred to as the Sponsoring Local Organization)

and the

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

Whereas, the Watershed Work Plan Agreement for the Upper Bosque River Watershed, State of Texas, executed by the Sponsoring Local Organization named therein and the Service, became effective on the 6th day of March, 1964; and

Whereas, the Supplemental Watershed Work Plan Agreement for Upper Bosque River Watershed, State of Texas, executed by the Sponsoring Local Organization and the Service, became effective on the 16th day of August, 1971; and

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

Whereas, it has been found necessary to modify the Watershed Work Plan Agreement, as supplemented, to provide for deletion of floodwater retarding structure No. 16; and

Whereas, a Supplemental Watershed Work Plan which modifies the Watershed Work Plan dated February 1963 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 further agree to all other terms, conditions, and stipulations of said Watershed Work Plan Agreement, as supplemented, not modified herein.

Bosque Soil and Water Conservation District  
Local Organization

By James Watson  
Title Chairman  
Address Bluff Dale, Texas 76433  
Zip Code  
Date 3/14/74

The signing of this agreement was authorized by a resolution of the governing body of the Bosque Soil and Water Conservation District adopted at a meeting held on March 23, 1972  
Local Organization

J. W. Haddock  
(Secretary, Local Organization)  
Address Meridian, Texas 76665  
Zip Code  
Date 3/14/74

Hamilton-Coryell Soil and Water Conservation District  
Local Organization

By Walter Perryman  
Title Chairman  
Address Gatesville, Texas 76528  
Zip Code  
Date 4/23/74

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

Paul Harrison  
(Secretary, Local Organization)  
Address Gatesville, Texas 76528  
Zip Code  
Date 4/23/74

Upper Leon Soil and Water Conservation District  
Local Organization

By [Signature]

Title Chairman

Address Dublin, Texas 75446  
Zip Code

Date 3/22/74

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

adopted at a meeting held on May 8, 1972

[Signature]  
(Secretary, Local Organization)

Address De Leon, Texas 76444  
Zip Code

Date 3/22/74

North Bosque Water Control and Improvement District  
Local Organization

By [Signature]

Title Chairman

Address Stephenville, Texas 76401  
Zip Code

Date 2/26/74

The signing of this agreement was authorized by a resolution of the governing body of the North Bosque Water Control and Improvement District Local Organization

adopted at a meeting held on March 27, 1972

[Signature]  
(Secretary, Local Organization)

Address Stephenville, Texas 76401  
Zip Code

Date 2/26/74

Erath County Commissioners Court  
Local Organization

By Edwin L. Keller

Title County Judge, Acting

Address Stephenville, Texas 76401

Date 4/5/74 Zip Code

The signing of this agreement was authorized by a resolution of the governing body of the Erath County Commissioners Court adopted at a meeting held on March 21, 1972  
Local Organization

Bill Croft  
(Secretary, Local Organization)

By Susan Dudley, Deputy  
Address Stephenville, Texas 76401

Date 4/5/74 Zip Code

Hamilton County Commissioners Court  
Local Organization

By Herman H. Standifer

Title County Judge

Address Hamilton, Texas 76531

Date 4/23/74 Zip Code

The signing of this agreement was authorized by a resolution of the governing body of the Hamilton County Commissioners Court adopted at a meeting held on April 10, 1972  
Local Organization

Genevieve Clark  
(Secretary, Local Organization)

Address Hamilton, Texas 76531

Date 4/23/74 Zip Code

Bosque County Commissioners Court  
Local Organization

By C.K. Wood

Title Co. Judge

Address MERIDIAN, TEXAS 76665  
Zip Code

Date 4-29-74

The signing of this agreement was authorized by a resolution of the governing body of the Bosque County Commissioners Court adopted at a meeting held on \_\_\_\_\_  
Local Organization

April 10, 1974

James B. Bill  
(Secretary, Local Organization)

Address Meridian Texas 76665  
Zip Code

Date April 29, 1974

Soil Conservation Service  
United States Department of Agriculture

By J.W. Alkatt  
Acting State Conservationist

Date MAY 2 1974

SUPPLEMENTAL  
WATERSHED WORK PLAN NO. II  
FOR  
WATERSHED PROTECTION AND FLOOD PREVENTION  
  
UPPER BOSQUE RIVER WATERSHED  
Erath, Hamilton, and Bosque Counties, Texas

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

Prepared By:

Bosque Soil and Water Conservation District  
(Sponsor)

Hamilton-Coryell Soil and Water Conservation District  
(Sponsor)

Upper Leon Soil and Water Conservation District  
(Sponsor)

North Bosque Water Control and Improvement District  
(Sponsor)

Erath County Commissioners Court  
(Sponsor)

Hamilton County Commissioners Court  
(Sponsor)

Bosque County Commissioners Court  
(Sponsor)

With Assistance By:

U.S. Department of Agriculture  
Soil Conservation Service

November 1973

TABLE OF CONTENTS

	Page
SUPPLEMENTAL WATERSHED WORK PLAN AGREEMENT NO. II . . . . .	1
PURPOSE OF THE SUPPLEMENTAL WORK PLAN . . . . .	1
WORKS OF IMPROVEMENT TO BE INSTALLED . . . . .	1
EFFECTS OF WORKS OF IMPROVEMENT . . . . .	1
PROJECT BENEFITS . . . . .	2
COMPARISON OF BENEFITS AND COSTS . . . . .	2
PROVISIONS FOR OPERATION AND MAINTENANCE . . . . .	3

TABLES

Revised Table 1 - Estimated Project Installation Cost . . . .	4
Revised Table 2 - Estimated Structural Cost Distribution . .	5
Revised Table 4 - Annual Cost . . . . .	6
Revised Table 5 - Estimated Average Annual Flood Damage Reduction Benefits. . . . .	7
Revised Table 6 - Comparison of Benefits and Costs for Structural Measures . . . . .	8

PLATES

Plate 6 - Revised Project Map	
-------------------------------	--

SUPPLEMENTAL

WATERSHED WORK PLAN NO. II

WATERSHED PROTECTION AND FLOOD PREVENTION

UPPER BOSQUE RIVER WATERSHED  
Erath, Hamilton, and Bosque Counties, Texas

November 1973

PURPOSE OF THE SUPPLEMENTAL WORK PLAN

It has become mutually desirable to modify the watershed work plan for Upper Bosque River watershed to delete floodwater retarding structure No. 16.

The site location of floodwater retarding structure No. 16 is adjacent to the developed area of Stephenville. Since the development of the original work plan, land values have increased greatly. The cost of acquiring land rights necessary for installation of a floodwater retarding structure at the planned location precludes economic feasibility of the structure when related to the minor effect resulting from deletion. There is no other feasible alternate site location that would provide the level of protection planned originally.

WORKS OF IMPROVEMENT TO BE INSTALLED

Structural Measures

Floodwater retarding structure No. 16 is deleted. All other planned structural measures have been constructed or are under construction.

EFFECTS OF WORKS OF IMPROVEMENT

With the installation of the combined programs of land treatment and structural measures, average annual flooding is reduced from 11,510 to 4,671 acres.

The deletion of floodwater retarding structure No. 16 will change the reduction in average annual monetary floodwater, sediment, erosion, and

indirect damages in evaluation reaches A, C, D, E, F, and G. The change in damage reductions is shown in the following tabulation:

<u>Average Annual Damage Reduction</u>			
Evaluation:	Damage Reduction	:	Damage Reduction
Reach :	As Planned	:	As Revised
	(percent)		(percent)
A	59		57
C	64		63
D	86		85
E	66		64
F	75		73
G	61		58
Reaches Not Effected	78		78
<b>TOTAL</b>	<b>71</b>		<b>69</b>

The deletion of floodwater retarding structure No. 16 will not have an effect on any other evaluation reach.

#### PROJECT BENEFITS

The estimated average annual monetary damage (revised table 5) within the watershed will be reduced from \$233,405 to \$68,689, or 69 percent. Crop and pasture damages will be reduced from \$89,574 to \$32,462, or 64 percent. Other agricultural damage such as loss of fences, farming equipment, livestock, and other property, will be reduced from \$59,352 to \$17,233, or 71 percent. Nonagricultural damages to urban, transportation, and other properties will be reduced from \$28,450 to \$3,817, or 87 percent. The overbank deposition of damaging sediment upon flood plain soils, now occurring at the rate of \$13,220 annually, will be reduced to \$2,485, or 81 percent. Flood plain scour damages will be reduced from \$19,920 to \$6,107, or 69 percent.

The monetary value of the incidental recreation is estimated to average \$8,303 annually.

Other benefits of \$8,420 from reduction in damages to Bosque River flood plain from bottom of watershed to Waco Reservoir and \$2,051 from reduction in sediment deposition to Waco Reservoir can be expected to accrue annually.

Although not considered pertinent from a national viewpoint, secondary benefits will amount to \$16,759 annually in the immediate locale.

#### COMPARISON OF BENEFITS AND COSTS

The total average annual cost of structural measures is \$136,432. These measures produce average annual benefits, excluding secondary benefits, of \$177,028, resulting in a benefit-cost ratio of 1.3:1.0.

The ratio of total average annual project benefits, including secondary benefits accruing to structural measures, is estimated to be \$193,787, giving a benefit-cost ratio of 1.4:1.0 (revised table 6).

PROVISIONS FOR OPERATION AND MAINTENANCE

Structural Measures

There will be no changes in the provisions for operation and maintenance of the floodwater retaining structures.

The estimated average annual operation and maintenance cost is \$5,143, based on long-term prices as projected by ARS, September 1957.

**REVISED TABLE 1 - ESTIMATED PROJECT INSTALLATION COST**

Upper Bosque River Watershed, Texas

Installation Cost Items	Unit	Number to be Applied	Estimated Cost (Dollars) <sup>1/</sup>		
			Public Law 566 Funds	Other Funds	Total
<b>LAND TREATMENT</b>					
Soil Conservation Service					
Conservation Cropping System	Acre	43,107	-	0	0
Contour Farming	Acre	23,705	-	85,969	85,969
Cover and Green Manure Crops	Acre	19,967	-	1,676,016	1,676,016
Crop Residue Use	Acre	43,107	-	552,942	552,942
Pasture Planting	Acre	5,360	-	134,000	134,000
Pasture Proper Use	Acre	9,632	-	50,687	50,687
Range Deferred Grazing	Acre	32,479	-	195,222	195,222
Range Proper Use	Acre	95,252	-	657,709	657,709
Range Seeding	Acre	2,819	-	33,828	33,828
Brush Control (Range)	Acre	12,674	-	126,740	126,740
Diversions	Feet	193,689	-	19,369	19,369
Grassed Waterway	Acre	355	-	24,850	24,850
Farm Ponds	No.	121	-	60,500	60,500
Terraces, Gradient	Feet	471,031	-	23,552	23,552
Technical Assistance			102,200	93,600	195,800
SCS Subtotal			102,200	3,734,984	3,837,184
<b>TOTAL LAND TREATMENT</b>			102,200	3,734,984	3,837,184
<b>STRUCTURAL MEASURES</b>					
<u>Construction</u>					
Soil Conservation Service					
Floodwater Retarding					
Structures	No.	27	2,957,270	-	2,957,270
Subtotal - Construction			2,957,270	-	2,957,270
<u>Installation Services</u>					
Soil Conservation Service					
Engineering Services			653,800	-	653,800
Other			380,850	-	380,850
Subtotal - Installation Services			1,034,650	-	1,034,650
<u>Other Costs</u>					
Land, Easements, and Rights-of-Way			-	293,502	293,502
Administration of Contracts			-	13,500	13,500
Subtotal - Other Costs			-	307,002	307,002
<b>TOTAL STRUCTURAL MEASURES</b>			3,991,920	307,002	4,298,922
<b>TOTAL PROJECT</b>			4,094,120	4,041,986	8,136,106

<sup>1/</sup> Price Base: 1962 for Land Treatment; actual costs for all other

<sup>2/</sup> It is expected that this level of application of the management and recurring type practices will be reached by the end of the project period.

REVISED TABLE 2 - ESTIMATED STRUCTURE COST DISTRIBUTION

Upper Bosque River Watershed, Texas  
(Dollars) L/

Item	Installation Cost - Public Law 566 Funds			Installation Cost			Total Installation Cost
	Construction	Installation Services	Other	Adm. of P. L. 566	Contracts	Land Rights	
Floodwater Retarding Structures No. 1 through 15 and 17 through 28	2,957,270	653,800	380,850	3,991,920	13,500	293,502	307,002
GRAND TOTAL	2,957,270	653,800	380,850	3,991,920	13,500	293,502	307,002
							4,298,922

L/ Price Base: Actual Costs

Supplement No. II  
November 1973

REVISED TABLE 4 - ANNUAL COST

Upper Bosque River Watershed, Texas  
(Dollars)

Evaluation Unit	: Amortization : of : Installation : Cost <u>1/</u>	: Operation : and : Maintenance : Cost <u>2/</u>	: Total
Floodwater Retarding Structures Nos. 1 through 15 and 17 through 28 <u>3/</u>	131,289	5,143	136,432
<b>GRAND TOTAL</b>	<b>131,289</b>	<b>5,143</b>	<b>136,432</b>

1/ Price Base: Actual prices amortized for 100 years at 2.875 percent.

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

3/ Interrelated measures.

Supplement No. II  
November 1973

REVISED TABLE 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS

Upper Bosque River Watershed, Texas  
(Dollars) 1/

Item	Estimated Average Annual Damage		Damage Reduction Benefit
	Without Project	With Project	
Floodwater			
Crop and Pasture	89,574	32,462	57,112
Other Agricultural	59,352	17,233	42,119
Nonagricultural			
Urban	17,240	2,186	15,054
Transportation	10,031	1,627	8,404
Other	1,179	4	1,175
Subtotal	177,376	53,512	123,864
Sediment			
Overbank Deposition	13,220	2,485	10,735
Erosion			
Flood Plain Scour	19,920	6,107	13,813
Indirect	22,889	6,585	16,304
TOTAL	233,405	68,689	164,716

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

Supplement No. II  
November 1973

REVISED TABLE 6 - COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

Upper Bosque River Watershed, Texas  
(Dollars)

Evaluation Unit	AVERAGE ANNUAL BENEFITS <sup>1/</sup>				Average:		
	Damage : Reduction : <sup>2/</sup>	Recreation : Other : <sup>3/</sup>	Secondary : Total :	Flood Prevention	Annual : Cost :	Benefit : Cost Ratio	
Floodwater Retarding Structures 1 through 15 and 17 through 28 <sup>5/</sup>	158,254	8,303	10,471	16,759	193,787	136,432	1.4:1.0
GRAND TOTAL	158,254 <sup>6/</sup>	8,303	10,471-	16,759	193,787	136,432	1.4:1.0

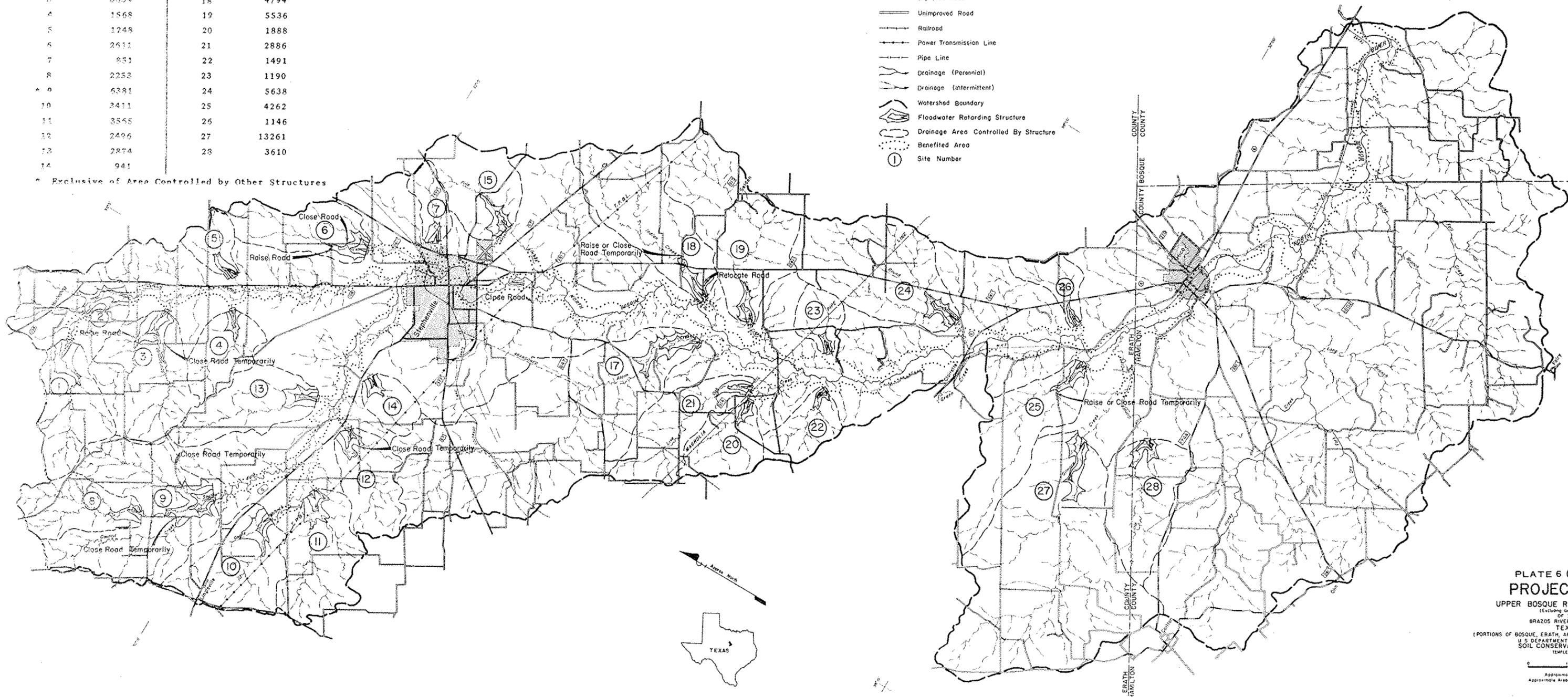
- <sup>1/</sup> Price Base: Long-term prices as projected by ARS, September 1957.
- <sup>2/</sup> Benefits from recreation incidental to installation of floodwater retarding structures.
- <sup>3/</sup> Includes \$8,420 from reduction in damages to Bosque River flood plain from bottom of watershed to Waco Reservoir and \$2,051 from reduction in sediment deposition to Waco Reservoir.
- <sup>4/</sup> From Revised Table 4.
- <sup>5/</sup> Interrelated measures.
- <sup>6/</sup> In addition, it is estimated that land treatment measures will provide flood damage reduction benefits of \$6,462.

Site Numbers and Drainage Areas in Acres

No.	Area	No.	Area
1	2925	15	2771
2	3296	17	13197
3	3824	18	4794
4	1568	19	5536
5	1248	20	1888
6	2611	21	2886
7	851	22	1491
8	2252	23	1190
9	6381	24	5638
10	2411	25	4262
11	3545	26	1146
12	2496	27	13261
13	2874	28	3610
14	941		

\* Exclusive of Area Controlled by Other Structures

- LEGEND**
- Paved Road
  - Improved Road
  - Unimproved Road
  - Railroad
  - Power Transmission Line
  - Pipe Line
  - Drainage (Perennial)
  - Drainage (Intermittent)
  - Watershed Boundary
  - Floodwater Retarding Structure
  - Drainage Area Controlled By Structure
  - Benefited Area
  - Site Number



**PLATE 6 (REVISED)**  
**PROJECT MAP**  
 UPPER BOSQUE RIVER WATERSHED  
 (Excluding Grease Creek)  
 OF THE  
 BRAZOS RIVER WATERSHED  
 TEXAS  
 (PORTIONS OF BOSQUE, ERATH, AND HAMILTON COUNTIES, TEXAS)  
 U.S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE  
 TEMPLE, TEXAS

0 1 2 Miles  
 Approximate Scale  
 Approximate Area-235,520-Acres