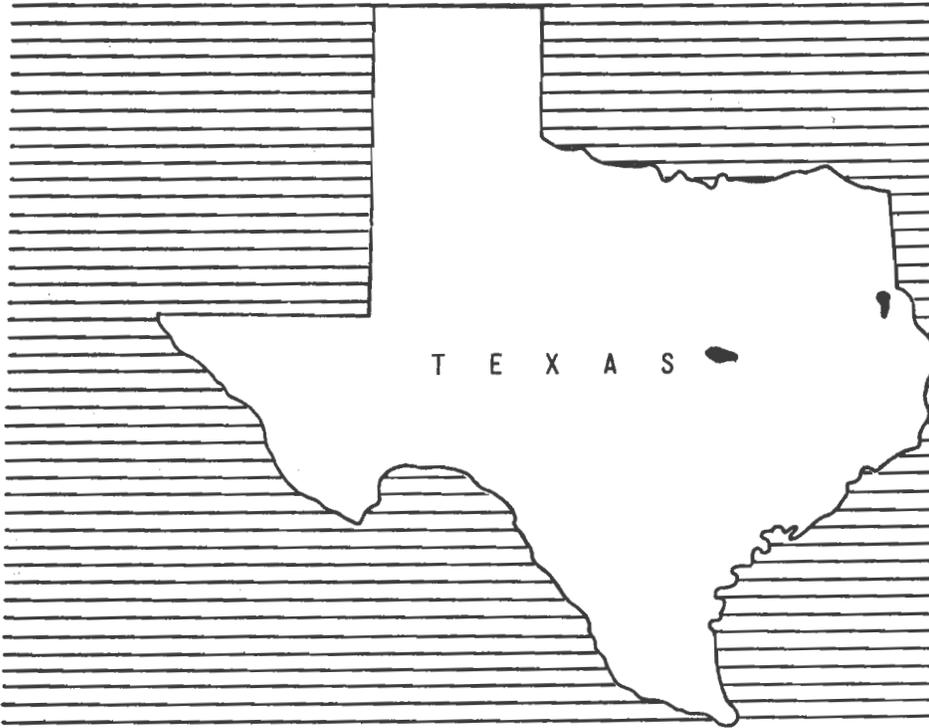


SUPPLEMENTAL WORK PLAN

- FOR WATERSHED PROTECTION
AND FLOOD PREVENTION

COW BAYOU WATERSHED

McLENNAN AND FALLS COUNTIES, TEXAS



December 1964

SUPPLEMENTAL WATERSHED WORK PLAN AGREEMENT

between the

McLennan County Soil Conservation District
Local Organization

Central Texas Soil Conservation District
Local Organization

(Hereinafter referred to as the Districts)

McLennan County Commissioners Court
Local Organization

Falls County Commissioners Court
Local Organization

(Hereinafter referred to as the Counties)

In the State of _____ Texas _____

and the

United States Department of Agriculture
Soil Conservation Service

(Hereinafter referred to as the Service)

Whereas, the Supplemental Watershed Work Plan Agreement for the Cow Bayou Watershed, State of Texas, executed by the sponsoring local organizations named therein and the Service, became effective on the 9th day of January, 1964; and

Whereas, it has been found necessary to modify the revised watershed work plan to increase the scope of the project by providing for the treatment of 11 critical sediment source areas; and

Whereas, a Supplement which modifies the Revised Watershed Work Plan dated April, 1963, for said watershed has been developed through cooperative efforts of the Sponsoring Local Organizations and the Service, which supplement is annexed to and made a part of this agreement;

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

1. Paragraph numbered 1 is modified to read as follows:

The Districts will acquire without cost to the Federal Government

such land, easements, or rights-of-way, as will be needed in connection with the works of improvement. (Estimated cost \$138,532).

2. Paragraph numbered 2 - No change.

3. Paragraph numbered 3 is changed to read as follows:

The percentages of construction costs of the added structural measures to be paid by the Districts and by the Service are as follows:

<u>Added Works of Improvement</u>	<u>Districts (percent)</u>	<u>Service (percent)</u>	<u>Estimated Construction Cost (dollars)</u>
20 Floodwater Retarding Structures	0	100	710,000
11 Critical Areas	0	100	99,330

The Districts will pay all of the costs allocated to purposes other than flood prevention and irrigation, drainage, and other agricultural water management (none anticipated).

4. Paragraph numbered 4 - No change.

5. Paragraph numbered 5 - No change.

6. Paragraph numbered 6 is changed to read as follows:

The Revised Watershed Work Plan and the supplement annexed hereto may be amended or revised and this agreement may be modified or terminated only by mutual agreement of the parties hereto.

7. The program conducted will be in compliance with all requirements respecting non-discrimination as contained in the Civil Rights Act of 1964 and the regulations of the Secretary of Agriculture (7C.F.R. Sec. 15.1 - 15.13), which provide that no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any activity receiving Federal financial assistance.

8. Paragraph numbered 7 is changed to read as follows:

All terms, conditions, and stipulations of the supplemental watershed work plan agreements and the revised work plan remain unchanged, except as modified herein or in the annexed Supplemental Watershed Work Plan, including Tables 1, 1a, 1b, 2, 3, 3a, 4, 5, and 6.

McLennan County Soil Conservation District
Local Organization

By Dave Simons
Dave Simons
Title Chairman
Date 2/26/65

The signing of this agreement was authorized by a resolution of the governing body of the McLennan County Soil Conservation District
Local Organization

adopted at a meeting held on February 16, 1965

Max Sturdivant
(Secretary, Local Organization)
Max Sturdivant

Date February 26, 1965

Central Texas Soil Conservation District
Local Organization

By J. E. Goad
J. E. Goad
Title Chairman
Date 2-23-65

The signing of this agreement was authorized by a resolution of the governing body of the Central Texas Soil Conservation District
Local Organization

adopted at a meeting held on February 23, 1965

Jerry Bedrich
(Secretary, Local Organization)
Jerry Bedrich
Date February 23, 1965

McLennan County Commissioners Court

Local Organization

By Raymond R. Marmino
Raymond R. Marmino
Title County Judge
Date 3-1-65

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

Local Organization

adopted at a meeting held on MARCH 1, 1965

Attest: FLOYD MITCHELL, County Clerk
McLennan County, Texas
By Charles L. Bramlett, Deputy
(Secretary, Local Organization)
Charles L. Bramlett
Date MARCH 1, 1965

Falls County Commissioners Court

Local Organization

By R. W. Hailey Sr.
R. W. Hailey, Sr.
Title County Judge
Date February 23, 1965

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

Local Organization

adopted at a meeting held on February 23, 1965

Margaret M. Denard
(Secretary, Local Organization)
By Laura B. Johnson, Deputy
Date Feb. 23, 1965
Laura B. Johnson

Soil Conservation Service
United States Department of Agriculture

By _____
State Conservationist

Date _____

SUPPLEMENTAL
WATERSHED WORK PLAN
FOR
WATERSHED PROTECTION AND FLOOD PREVENTION

Cow Bayou Watershed
McLennan and Falls Counties, Texas

Prepared under the Authority of the Soil Conservation Act of 1935 (Public Law 46 and 74th Congress) as Implemented by the Watershed Protection Item in the Department of Agriculture Appropriation Act, 1954.

Prepared by:

McLennan County Soil Conservation District
(Sponsor)

Central Texas Soil Conservation District
(Sponsor)

McLennan County Commissioners Court
(Sponsor)

Falls County Commissioners Court
(Sponsor)

With Assistance by:

U. S. Department of Agriculture
Soil Conservation Service
December 1964

SUPPLEMENTAL
WATERSHED WORK PLAN

COW BAYOU WATERSHED
McLennan and Falls Counties, Texas
December 1964

Purpose

This supplement to the revised work plan for the Cow Bayou watershed provides for the treatment of 11 critical sediment source areas as shown on figure 4, revised. These measures are needed to prevent the destruction of agricultural land by serious gully erosion and to stabilize active sediment sources that contribute to channel filling and overbank deposition. The sponsors have not been successful in getting the landowners to install these measures with ASCS assistance. Ten of these seriously eroding areas are located in Falls County. This county has been designated as a Redevelopment Area under Section 5(a) and 5(b) of the Area Redevelopment Act, May 1, 1961 (Public Law 87-27). One of the seriously eroding areas is located in McLennan County near the Falls County line. Although McLennan County has not been designated as a Redevelopment Area, economic conditions in this part of the county are similar to those in Falls County.

Change in Scope

The scope of the project is changed to include treatment of 11 critical sediment source areas. The average annual damages shown in the revised work plan for without project conditions have been adjusted to reflect the damages caused by gully erosion. This resulted in a slight increase in indirect damages. The treatment of the 11 critical areas will result in additional damage reduction from overbank deposition and elimination of damages caused by gully erosion. All other features of the revised work plan remain the same.

Change in Major Features

No change.

SUMMARY OF PLAN

General Summary

The estimated installation cost, \$2,334,411, is changed to \$2,283,363. The amount to be paid from special Federal funds, \$1,141,329, is changed to \$1,089,531.

Land Treatment Measures

No change.

Structural Measures

Replace the last two sentences with the following: "Debris basins which will be installed in four of the critical sediment source areas will have a total of 135 acre feet of capacity for storing sediment during the 50-year life of the structures. The total cost of the structural measures is \$1,972,069, of which \$1,203,263, represents the cost of structural measures remaining to be installed. The local share of this remaining cost is \$138,532, which includes the value of land, easements, and rights-of-way. The structures will be installed during a 2-year period."

Damages and Benefits

The last three sentences of the first paragraph should be changed to: "The estimated average annual damage without the project totals \$168,220 at long-term price levels. The estimated average annual damage will be reduced to \$45,143 with the project installed. Average annual damage reduction benefits accruing to the project will be \$123,077 and are distributed as follows:

Floodwater damage reduction	\$80,511
Sediment damage reduction	
Overbank deposition	9,039
Erosion damage reduction	
Flood plain scour	21,214
Gullies	1,124
Indirect damage reduction	11,189"

Change the last two sentences of the last paragraph to: "Redevelopment benefits from project employment of presently unemployed local labor are expected to total \$1,741 annually. The ratio of the average annual benefits accruing to structural measures (\$134,136) to the average annual cost of these measures (\$84,571) is 1.6 to 1.0."

Provisions for Financing Local Share of Installation Costs

No change.

Operation and Maintenance

Change the last three sentences to: "The Central Texas and the McLennan County Soil Conservation Districts will be responsible for the operation of all floodwater retarding structures and structures installed on the 11 critical areas which have been or will be constructed within their district area of the watershed. The McLennan County and the Falls County Commissioners Courts will maintain all structures (including those installed in the 11 critical areas) in their respective portions of the watershed. The average annual cost of operating and maintaining the structural measures is estimated to be \$6,102 at long-term price levels."

DESCRIPTION OF THE WATERSHED

Physical Data

No change.

Economic Data

No change.

Land Treatment Data

No change.

WATERSHED PROBLEMS

Floodwater Damage

No change.

Sediment Damage

To the first paragraph add "These are located in critical sediment source areas CA-1, CA-2, CA-4, and CA-5 (figure 4, revised)."

Erosion Damage

Add a third paragraph: "Overfalls resulting from channel degradation have created gullies, which are destroying land and causing unstable outlets in waterways for terrace systems. Sediment from this process is delivered to the stream channels."

These areas are located in CA-3, CA-6, CA-7, CA-8, CA-9, CA-10, and CA-11. The monetary value of damages which are caused by gully erosion is \$1,124 per year."

Problems Relating to Water Management

No change.

PROJECTS OF OTHER AGENCIES

No change.

BASIS FOR PROJECT FORMULATION

Add the following as a specific objective named by local interests:

- "3. Provide for the treatment of 11 critical sediment source areas to protect the flood plain from overbank deposition and to prevent destruction of agricultural land from gully erosion."

Change the last sentence in the last paragraph to: "The recommended system of 20 floodwater retarding structures, with the existing structures, and the treatment of 11 critical sediment source areas, meets the project objectives by providing the desired level of protection for the watershed."

WORKS OF IMPROVEMENT TO BE INSTALLED

Land Treatment Measures

No change.

Structural Measures

In the first paragraph the estimated total installation cost of the 20 floodwater retarding structures, \$1,254,311, is changed to \$1,082,782.

After the first paragraph add "Eleven critical sediment source areas will be treated to provide additional protection from overbank deposition to the flood plain land and to prevent further destruction of agricultural land from gully erosion. Measures to be installed as a part of this treatment include debris basins, grade stabilization structures, and diversion terraces. The estimated total installation cost of these measures is \$120,481."

To the third paragraph add: "The installation of debris basins in critical areas CA-1, CA-2, CA-4, and CA-5 will provide 135 acre-feet of capacity for accumulation of sediment over a 50-year period. Details on quantities, costs, and design features of supplemental structural measures are shown in tables 1, 2, and 3A."

EXPLANATION OF INSTALLATION COSTS

To the second paragraph add "The required local costs for the treatment of the 11 critical sediment source areas are estimated to be \$750."

Delete the fourth paragraph and substitute the following: "The cost of the 20 additional floodwater retarding structures to be borne by Federal funds is \$710,000 for construction and \$235,000 for installation services. All of these structures are currently under construction. The portion of the cost of treating the 11 critical sediment source areas to be borne by Federal funds is \$99,330 for construction and \$20,401 for installation services. Federal funds in the amount of \$664,701 have been spent for installing the 9 existing floodwater retarding structures. The estimates of the construction costs for the 20 floodwater retarding structures currently under construction are based on the actual bid submitted by the contractor plus a reasonable allowance for contingencies. The cost of establishing vegetation on the dams and emergency spillways is based on current Service experience in the Cow Bayou and similar areas. The engineer's estimate of construction costs for treating the 11 critical sediment source areas is based on unit costs of similar structures in the Waco Work Unit area. Ten percent of the engineer's estimate was added as contingency to provide funds for unpredictable construction costs."

EFFECTS OF WORKS OF IMPROVEMENT

In paragraph 5 the area on which damaging overbank deposition of sediment occurs after project installation, 483 acres, should be changed to 347 acres.

PROJECT BENEFITS

The first paragraph and the table should be changed to the following: "The average annual monetary floodwater, sediment, erosion, and indirect damages (table 5) within the watershed will be reduced from \$168,220 to \$45,143, a reduction of 73 percent."

"The average annual damage reduction is presented as follows:

<u>Average Annual Damages</u>			
<u>Evaluation</u>	<u>Without</u>	<u>With</u>	<u>Reduction</u>
<u>Reach</u>	<u>Project</u>	<u>Project ^{1/}</u>	<u>(percent)</u>
	(dollars)	(dollars)	
1	65,944	10,941	83
2	37,882	20,495	46
3	39,842	6,788	83
4	14,806	5,331	64
5	4,651	1,201	74
6	3,859	387	90
Gullies	1,236	0	100
<u>Total</u>	<u>168,220</u>	<u>45,143</u>	<u>73</u>

^{1/} Includes land treatment measures."

COMPARISON OF BENEFITS AND COSTS

This section should be changed to:

"The average annual cost of structural measures (amortized total installation cost, plus operation and maintenance) is \$84,571. The installation of the structural measures is expected to produce average annual primary benefits of \$123,296. The ratio of primary benefits to cost will be 1.5 to 1.0.

"Total benefits, including secondary benefits, from the structural measures will provide a benefit cost ratio of 1.6 to 1.0 (table 6)."

PROJECT INSTALLATION

All of the structural measures will be completed during the 1965 fiscal year.

TABLE 1 - ESTIMATED PROJECT INSTALLATION COST ^{1/}
Cow Bayou Watershed, Texas

		Installation Period July 1963 - July 1966			
Installation Cost Item	:	:	Estimated Cost (Dollars) ^{2/}		
			Number to Be Applied	Going Federal Program and Other	Total
Unit	:	:	Funds ^{3/}	:	:
LAND TREATMENT					
SCS Subtotal	:	:	24,800	1,055,300	1,080,100
TOTAL LAND TREATMENT	:	:	24,800	1,055,300	1,080,100
STRUCTURAL MEASURES					
Soil Conservation Service					
Floodwater Retarding					
Structures	No.	20	710,000	-	710,000
Critical Areas	No.	11	99,330	-	99,330
SCS Subtotal	:	:	809,330	-	809,330
Subtotal - Construction	:	:	809,330	-	809,330
Installation Services					
Soil Conservation Service					
Engineering Services	:	:	170,919	-	170,919
Other	:	:	84,482	-	84,482
SCS Subtotal	:	:	255,401	-	255,401
Subtotal - Installation Services	:	:	255,401	-	255,401
Other Costs					
Land, Easements, and					
Rights-of-way	:	:	-	138,532	138,532
Subtotal - Other	:	:	-	138,532	138,532
TOTAL STRUCTURAL MEASURES	:	:	1,064,731	138,532	1,203,263
Work Plan Preparation	:	:	31,000	-	31,000
TOTAL PROJECT	:	:	1,120,531	1,193,832	2,314,363
SUMMARY					
Subtotal SCS	:	:	1,120,531	1,193,832	2,314,363
TOTAL PROJECT	:	:	1,120,531	1,193,832	2,314,363

- ^{1/} Does not include expenditures of watershed protection (Pilot) funds or accomplishments resulting therefrom prior to July 1963. (See table 1A).
^{2/} Price Base: 1964.
^{3/} Watershed protection (Pilot) funds only.

Supplement
December 1964
(Replaces table 1
in revised work
plan)

TABLE 1B - TOTAL ESTIMATED INSTALLATION COSTS 1/
Cow Bayou Watershed, Texas

Installation Cost Item	:	:	:	Estimated Cost (Dollars) 2/		
				Number to Be Applied	Federal Funds 3/	Going Program and Other
<u>LAND TREATMENT</u>						
SCS Subtotal				46,800	3,083,600	3,130,400
TOTAL LAND TREATMENT				46,800	3,083,600	3,130,400
<u>STRUCTURAL MEASURES</u>						
Soil Conservation Service						
Floodwater Retarding						
Structures	No.	29		1,249,044	-	1,249,044
Critical Areas	No.	11		99,330	-	99,330
SCS Subtotal				1,348,374	-	1,348,374
Subtotal - Construction				1,348,374	-	1,348,374
<u>Installation Services</u>						
Soil Conservation Service						
Engineering Services				249,483	-	249,483
Other				131,575	-	131,575
SCS Subtotal				381,058	-	381,058
Subtotal - Installation Services				381,058	-	381,058
<u>Other Costs</u>						
Land, Easements, and						
Rights-of-way					242,637	242,637
Subtotal - Other					242,637	242,637
TOTAL STRUCTURAL MEASURES				1,729,432	242,637	1,972,069
Work Plan Preparation				50,012	-	50,012
TOTAL PROJECT				1,826,244	3,326,237	5,152,481
<u>SUMMARY</u>						
Subtotal SCS				1,826,244	3,326,237	5,152,481
TOTAL PROJECT				1,826,244	3,326,237	5,152,481

- 1/ Tables 1 and 1A combined.
 2/ Price Base: 1964
 3/ Watershed protection (Pilot) funds only.

Supplement
 December 1964
 (Replaces table 1B
 in revised work
 plan)

TABLE 2 - ESTIMATED STRUCTURAL COST DISTRIBUTION

Cow Bayou Watershed, Texas
(Dollars) 1/

Structure Site Number	Federal Installation Cost		Non-Federal Installation Cost		Total Installation Costs	
	Construction	Engineering	Construction	Engineering		
1, 2, 3, 4, 5, 6, 7, 8 and 10 11B, 11C, 11E, 12, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30	539,044	78,564	47,093	664,701	104,105	768,806 2/
Subtotal	710,000	159,000	76,000	945,000	137,782	1,082,782 3/
CA-1	16,720	2,006	1,428	20,154	150	20,304
CA-2	15,070	1,808	1,287	18,165	50	18,215
CA-3	10,890	1,307	930	13,127	50	13,177
CA-4	10,560	1,267	901	12,728	50	12,778
CA-5	15,400	1,848	1,315	18,563	50	18,613
CA-6	5,720	586	488	6,894	100	6,994
CA-7	5,500	660	470	6,630	50	6,680
CA-8	8,580	1,030	733	10,343	100	10,443
CA-9	3,850	462	329	4,641	50	4,691
CA-10	2,750	330	235	3,315	50	3,365
CA-11	4,290	515	366	5,171	50	5,221
Subtotal	99,330	11,919	8,482	119,731	750	120,481
GRAND TOTAL	1,348,374	249,483	131,575	1,729,432	242,637	1,972,069

1/ Price Base: 1964, except for Sites 1 through 10 and 11B through 30.

2/ Constructed prior to 1962, actual cost.

3/ Under construction, value of low bid with allowance for contingency and estimated cost for establishing vegetation.

Supplement
December 1964
(Replaces table 2 in revised work plan)

TABLE 3A - STRUCTURES DATA - CRITICAL AREAS
Cow Bayou Watershed, Texas

Item	Unit	Structure Number					
		CA-1	CA-2	CA-3	CA-4	CA-5	CA-6
Debris Basin	Acre	192	70	-	26	205	-
Drainage Area	Ao. Ft.	31	46	-	25	33	-
Storage Capacity	Ao. Ft.	37	15	-	6	71	-
Sediment		68	61	-	31	104	-
Principal Spillway Surchage	Cu. Yd.	38,200	38,700	-	17,700	26,800	-
Total		82	82	-	85	85	-
Volume of Fill							
Average Curve No.-Condition II							
Principal Spillway	C.F.S.	96	18	-	12	10	-
Discharge Rate							
Emergency Spillway							
Type							
Percent Chance of Use 1/		Veg.	Veg.		Veg.	Veg.	
Storm Rainfall 2/	Inch	4.1	1.28	-	1.0	1.0	-
Storm Runoff	Inch	6.02	4.68	-	4.35	4.49	-
Discharge Rate 3/	C.F.S.	4.00	2.80	-	2.78	2.90	-
Bottom Width	Foot	68	5	-	5	0	-
Capacity Equivalents		30	30	-	30	30	-
Sediment	Inch	1.95	7.90	-	11.80	1.90	-
Principal Spillway Surchage	Inch	2.30	2.60	-	2.60	4.16	-
Diversion	Foot	2,400	-	900	-	-	-
Grade Stabilization Structure							
Drainage Area	Acre	-	-	244	6 4/	195 4/	365
Volume of Fill	Cu. Yd.	-	-	20,100	3,700	1,900	2,500
Drop	Foot	-	-	7.0	19.0	12.5	14.0
Average Curve No.-Condition II		-	-	85	85	85	85
Required Capacity 5/	C.F.S.	-	-	160	59	243	376

(Footnotes on last page of Table 3)

TABLE 3A - STRUCTURE DATA - CRITICAL AREAS
Cow Bayou Watershed, Texas

Item	Unit	Structure Number				Total
		CA-7	CA-8	CA-9	CA-10	
Debris Basin	Acre	-	-	-	-	493
Drainage Area	Ac. Ft.	-	-	-	-	135
Storage Capacity	Ac. Ft.	-	-	-	-	129
Sediment	Ac. Ft.	-	-	-	-	264
Principal Spillway Surchage	Cu. Yd.	-	-	-	-	121,400
Total						XXX
Volume of Fill						XXX
Average Curve No.-Condition II						XXX
Principal Spillway	C.F.S.	-	-	-	-	XXX
Discharge Rate						XXX
Emergency Spillway						XXX
Type						XXX
Percent Chance of Use 1/						XXX
Storm Rainfall 2/	Inch	-	-	-	-	XXX
Storm Runoff	Inch	-	-	-	-	XXX
Discharge Rate 3/	C.F.S.	-	-	-	-	XXX
Bottom Width	Foot	-	-	-	-	XXX
Capacity Equivalents						XXX
Sediment	Inch	-	-	-	-	XXX
Principal Spillway Surchage	Inch	-	-	-	-	XXX
Diversion	Foot	-	-	-	-	XXX
Grade Stabilization Structure						
Drainage Area	Acre	77	122	188	147	1,562
Volume of Fill	Cu. Yd.	7,600	16,900	2,700	1,600	60,300
Drop	Foot	13.5	20.0	8.0	18.0	XXX
Average Curve No.-Condition II		85	85	85	85	XXX
Required Capacity 5/	C.F.S.	162	138	225	180	197

1/ Is the average number of times the emergency spillway will be expected to function in 100 years.
 2/ Based on method outlined in Texas Engineering Handbook, Hydrology, Section 4, using values obtained from Technical Paper No. 40 for calculated durations.
 3/ Values obtained from routings, using procedure outlined in Texas Engineering Handbook, Section 17.
 4/ Excluding the area from which runoff is controlled by debris basin above.
 5/ Based on Conservation Practices Specifications TX-10.

TABLE 4 - ANNUAL COST

Cow Bayou Watershed, Texas

(Dollars)

Evaluation Unit	: Amortization of : Installation : Cost <u>1/</u>	: Operation and : Maintenance : Cost <u>2/</u>	: Total
29 Floodwater Retarding Structures and Treatment of 11 Critical Areas	78,469	6,102	84,571
TOTAL	78,469	6,102	84,571

1/ Price Base: 1964 prices amortized at 3.125 percent for 50 years.

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

Supplement
December 1964
(Replaces table 4
in revised work
plan)

TABLE 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS

Cow Bayou Watershed, Texas

(Dollars) ^{1/}

Item	: Estimated Average Annual Damage :		: Damage : Reduction : Benefits
	: Without : Project	: With : Project	
Floodwater			
Crop and Pasture	81,846	23,857	57,989
Other Agriculture	13,429	3,934	9,495
Road and Bridge	18,049	5,022	13,027
Subtotal	113,324	32,813	80,511
Sediment Overbank Deposition	12,211	3,172	9,039
Erosion			
Flood Plain Scour	26,268	5,054	21,214
Gullies	1,124	0	1,124
Subtotal	27,392	5,054	22,338
Indirect	15,293	4,104	11,189
TOTAL	168,220	45,143	123,077

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

Supplement
December 1964
(Replaces table 5 in
revised work plan)

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

Evaluation Unit	AVERAGE ANNUAL BENEFITS 1/				Total	Average Annual Cost	Benefit : Cost Ratio
	Flood Prevention	Damage : Incidental	Reduction : Recreation	Secondary : Redevelopment			
29 Floodwater Retarding Structures and Treatment of 11 Critical Areas	117,755	3,800	10,840	1,741	134,136	84,571	1.6:1
GRAND TOTAL	3/ 117,755	3,800	10,840	1,741	134,136	84,571	1.6:1

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

2/ From Table 4.

3/ In addition, it is estimated that land treatment measures will provide flood damage reduction benefits of \$5,322 annually.

Supplement
 December 1964
 (Replaces Table 6
 in revised work
 plan)

Site Numbers and Drainage Areas in Acres

No.	Acres	No.	Acres
1	966	17	506
2	2818	18	506
3	896	19	294
4	3360	20	304
5	2228	21	640
6	1276	22	416
7	3502	23	621
8	1082	24	248
10	1819	25	435
11-B	558	26	435
11-C	480	27	744
11-E	378	28	579
12	966	29	1298
15	3104	30	1934
16	1517		



LEGEND

- Watershed Boundary
- Paved Road
- Improved Road
- Dirt Road
- Railroad
- County Line
- Levee
- Drainage
- Towns
- Communities
- Pipe Line
- Existing Floodwater Retarding Structure
- Planned Floodwater Retarding Structure
- Structure Site Number
- Drainage Area Controlled by Structure
- Benefited Area
- Critical Sediment Source Area
- CA-3**

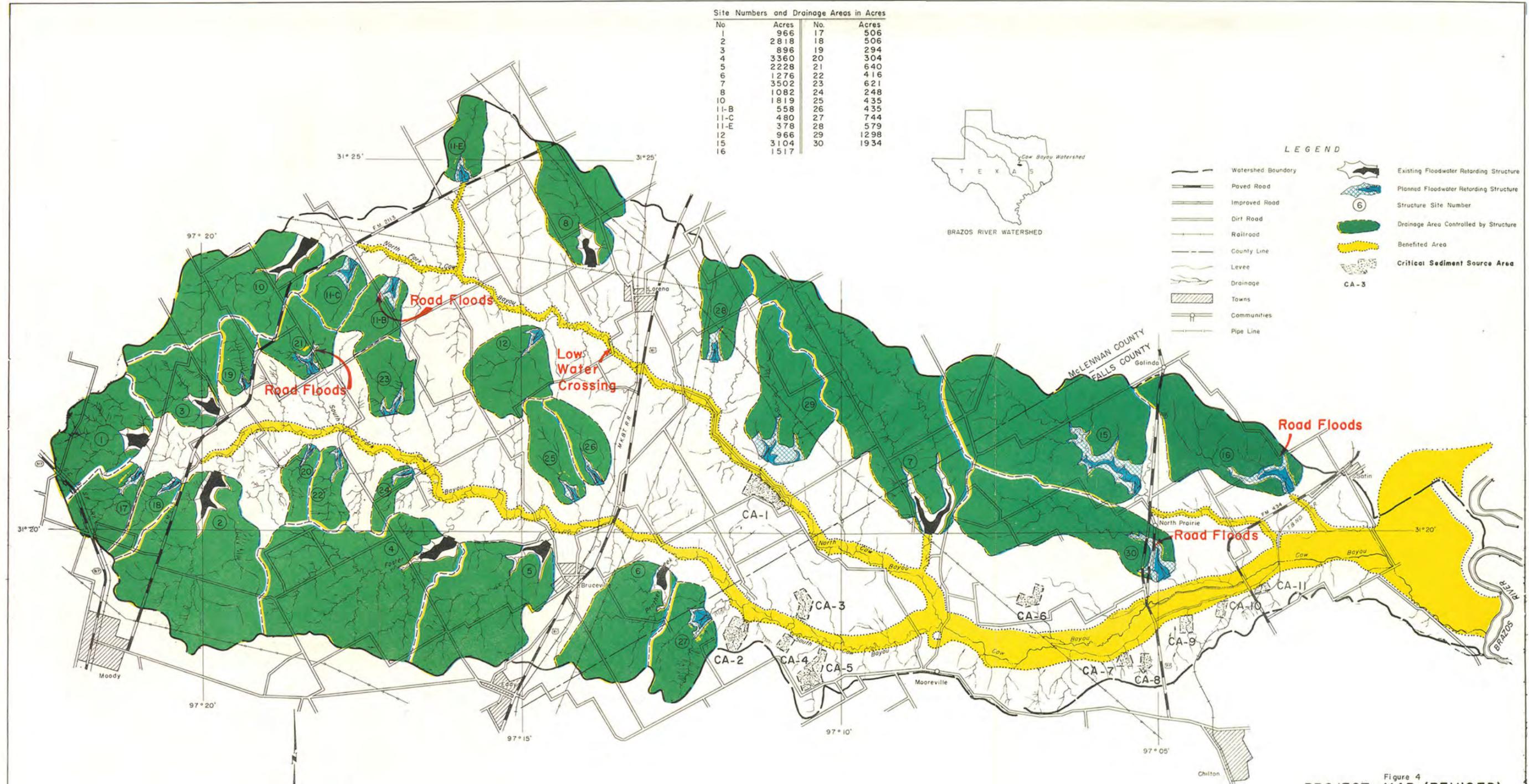


Figure 4
PROJECT MAP (REVISED)
 COW BAYOU WATERSHED
 FALLS AND McLENNAN COUNTIES
 TEXAS
 U.S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE
 TEMPLE, TEXAS