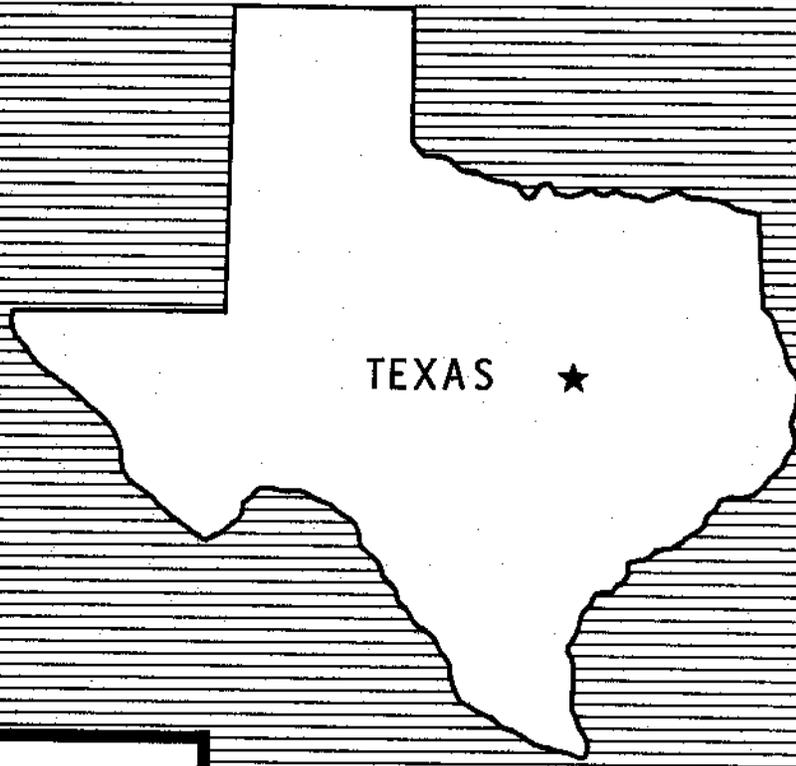
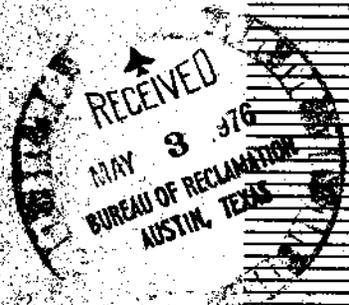


SUPPLEMENTAL WORK PLAN NO. II
FOR WATERSHED PROTECTION AND FLOOD PREVENTION

CASTLEMAN CREEK
WATERSHED

MC LENNAN COUNTY, TEXAS



July 1974

TABLE OF CONTENTS

	<u>Page</u>
SUPPLEMENTAL WATERSHED WORK PLAN AGREEMENT NO. II.	1
PURPOSE OF THE SUPPLEMENTAL WORK PLAN	1
Works of Improvement to be Installed	2
Structural Measures.	2
Explanation of Installation Costs.	2
Effects of Works of Improvement.	2
Project Benefits	3
Comparison of Benefits and Costs	4
Provisions for Operation and Maintenance	4
 TABLES	
Revised Table 1 - Estimated Project Installation Cost.	5
Revised Table 2 - Estimated Structural Cost Distribution	6
Revised Table 3 - Structural Data Structures with Planned Storage Capacity	7
Revised Table 4 - Annual Cost.	8
Revised Table 5 - Estimated Average Annual Flood Damage Reduction Benefits.	9
Revised Table 6 - Comparison of Benefits and Costs for Structural Measures.	10

SUPPLEMENTAL
WATERSHED WORK PLAN NO. II
FOR
WATERSHED PROTECTION AND FLOOD PREVENTION

CASTLEMAN CREEK WATERSHED
McLennan County, 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:

Castleman Creek Watershed Association

McLennan County Commissioners Court

McLennan County Soil and Water Conservation District

With Assistance By:

U. S. Department of Agriculture
Soil Conservation Service

July 1974

SUPPLEMENTAL WATERSHED WORK PLAN AGREEMENT NO. II

Between the

Castleman Creek Watershed Association
Local Organization

McLennan County Commissioners Court
Local Organization

McLennan County Soil and Water Conservation District
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 Castleman Creek Watershed, State of Texas, executed by the Sponsoring Local Organization named therein and the Service, became effective on the 14th day of July 1965; and

Whereas, the Supplemental Watershed Work Plan Agreement No. I executed by the Sponsoring Local Organization named herein, and the Service became effective on the 20th day of August 1971; and

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

Whereas, it has become necessary to modify the Watershed Work Plan, as supplemented, by deleting Floodwater Retarding Structure No. 5A, deleting special treatment of critical sediment source area CA-2, and deleting 2.56 miles of channel work; and

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

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

4. 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.

Castleman Creek Watershed Association
Local Organization

By Wendell C. Creek
Title Chairman
Address Lubbock, Texas 79605
Zip Code
Date Sept. 18, 1975

The signing of this agreement was authorized by a resolution of the governing body of the Castleman Creek Watershed Association
Local Organization
adopted at a meeting held on Sept. 18, 1975

W. F. Redding, Vice Chairman
(Secretary, Local Organization)
Address Lubbock, Texas 79605
Zip Code
Date Sept. 18, 1975

McLennan County Commissioners Court
Local Organization

By Bob L. Thonick
Title County Judge
Address 2nd Floor Court House
Waco, Texas 76701
Zip Code
Date October 6, 1975

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 October 6, 1975

FRANK DENNY, County Clerk
(Secretary, Local Organization)
By Marianne G. Berkeley, deputy
Address P.O. Box 1724, Waco 76703
Zip Code
Date October 6, 1975

SUPPLEMENTAL
WATERSHED WORK PLAN NO. II

CASTLEMAN CREEK WATERSHED
McLennan County, Texas

PURPOSE OF THE SUPPLEMENTAL WORK PLAN

It has become necessary to modify the work plan, as supplemented, for Castleman Creek watershed to make the following changes:

1. Delete floodwater retarding structure No. 5A. Since completion of the work plan, urban development in the detention pool of the site has made it economically impractical to install the structure.
2. Delete special treatment of critical sediment source area CA-2. This area is presently being used for a sanitary landfill by the city of Robinson and is no longer a critical sediment source area. No further special treatment is needed.
3. Delete 2.56 miles of channel work. Detailed studies indicate that 1.20 miles of clearing and snagging work at the lower end of Castleman Creek will not be needed to meet project objectives. Planned channel work of .36 mile at the upper end of Trib C is not needed because this portion of the existing channel has been modified by the landowner. Studies have also indicated that .62 mile of planned channel work at the upper end of Castleman Creek is not warranted due to changed land use on the flood plain. An additional .38 mile of channel work is deleted to adjust planned channel distance to actual installed distance.

In order to simplify cost-sharing arrangements, it is necessary to modify the watershed work plan, as supplemented, to reflect current terminology relative to engineering and project administration costs. 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, soil testing and analyses, designs, and cartographic services. Project administration costs include the cost of construction inspections, contract administration, and maintenance of Soil Conservation Service records and accounts. Costs for all structural measures not constructed and technical assistance for installation of planned land treatment measures are updated to 1973 price levels to reflect current cost estimates and reaffirm economic feasibility.

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

Evaluation Reach	2-Year		5-Year		25-Year	
	Without Project (acres)	With Project (acres)	Without Project (acres)	With Project (acres)	Without Project (acres)	With Project (acres)
1	540	80	632	198	683	308
2	60	39	66	48	73	58
3	1,740	278	2,655	740	4,074	1,423
Total	2,340	397	3,353	986	4,830	1,789

Most of the interruption, delay, and additional travel caused by flooded roads and washed-out bridges will be eliminated by the project. The average annual reduction in all nonagricultural damages will be 89 percent.

Based on past experience in the use of similar structures existing in a nearby watershed, it is expected that the project will have an average use of 3,960 visitor-days annually for the useful life of the sediment pools.

Project Benefits

The average annual damages (table 5) within the watershed will be reduced from \$113,319 to \$17,050, a reduction of 85 percent. Land treatment measures will reduce damages by \$4,910 annually.

The average annual floodwater, sediment, and scour damage reduction in the benefited area is presented as follows for each evaluation reach:

Evaluation Reach	Without Project (dollars)	With Project (dollars)	Reduction (percent)
1	10,870	967	91
2	47	15	68
3	92,100	14,517	84
Total	103,017	15,499	85

It is estimated that the project will produce secondary benefits averaging \$8,870 annually in the local area.

REVISED TABLE 1 - ESTIMATED PROJECT INSTALLATION COST
 Castleman Creek Watershed, Texas

Installation Cost Year	Unit	Number	Estimated Cost (Dollars) ^{1/}			Total
			PC 506 Funds:		Other	
			Non-Federal	Non-Federal	Non-Federal	
			Land	Land	Land	
		ACS ^{2/}	SCS ^{2/}	SCS ^{2/}		
LAND TREATMENT						
Cropland	Acre	2,800	-	35,600	35,600	
Grassland	Acre	5,000	-	132,300	132,300	
Technical Assistance (Accelerated)			12,480	18,450	30,930	
TOTAL LAND TREATMENT			12,480	186,350	198,830	
STRUCTURAL MEASURES						
<u>Construction</u>						
Floodwater Retarding Structures	No.	6	396,147	-	396,147	
Channel Work (S) ^{3/}	Mile	11.0	293,436	-	293,436	
Critical Areas	No.	4	15,537	-	15,537	
Subtotal - Construction			705,120	-	705,120	
<u>Engineering Services</u>			69,585	-	69,585	
<u>Project Administration</u>						
Construction Inspection			91,471	1,100	92,571	
Other			106,063	3,300	109,363	
Subtotal - Administration			197,534	4,400	201,934	
<u>Other Costs</u>						
Land Rights				218,119	218,119	
TOTAL STRUCTURAL MEASURES			972,239	222,519	1,194,758	
TOTAL PROJECT			984,719	408,869	1,393,588	

1/ Price Base: Actual costs for floodwater retarding structures Nos. 1, 2, 3, and 6 already constructed, 11.0 miles of channel work under construction, and critical areas CA-1, CA-3, CA-4, and CA-5 already completed; floodwater retarding structures Nos. 4 and 5 at 1973 prices.

2/ Federal agency responsible for assisting in installation of works of improvement.

3/ Type of channel before project: (S) - An unmodified, well-defined natural channel.

REVISED TABLE 2 - ESTIMATED STRUCTURAL COST DISTRIBUTION
 Castleman Creek Watershed, Texas

(Dollars) 1/

Structure Site Number or Name	Installation Cost - Public Law 566 Funds			Installation Cost-Other Funds			Total Installation Cost
	Construction	Engineering	Public Law 566	Total	Land Rights	Other	
Floodwater Retarding Structures (Constructed) Nos. 1, 2, 3, and 6	309,672	31,159	340,831	141,799	141,799		482,630
Floodwater Retarding Structures Nos. 4	56,000	5,635	61,635	12,750	12,750		74,385
7	30,475	3,066	33,541	2,850	2,850		36,391
Subtotal	86,475	8,701	95,176	15,600	15,600		110,776
Subtotal - Floodwater Retarding Structures	396,147	39,860	436,007	157,399	157,399		593,406
Channel work (N) 2/ (Under Construction)	293,436	28,062	321,498	60,470	60,470		381,968
Critical Areas (Constructed) CA-1, CA-3, CA-4, and CA-5	15,537	1,663	17,200	250	250		17,450
Subtotal - Watershed	705,120	69,585	774,705	218,119	218,119		992,824
Project Administration	xxx	xxx	197,534	xxx	xxx	4,400	201,934
GRAND TOTAL	705,120	69,585	972,239	218,119	218,119	222,519	1,194,758

1/ Price Base: Actual costs for floodwater retarding structures Nos. 1, 2, 3, and 6 already constructed; 11.0 miles of channel work under construction; and critical areas CA-1, CA-3, CA-4, CA-5 already constructed; floodwater retarding structures Nos. 4 and 7 at 1973 prices.

2/ Type of channel before project: (N) - An unmodified, well-defined natural channel.

REVISED TABLE 1 - STRUCTURAL DATA
STRUCTURES WITH PLANNED STORAGE CAPACITY
 Castleman Creek Watershed, Texas

Item	Unit	Total
Drainage Area (Total)	Sq. Mi.	21.81
Controlled		2.24
Curve No. (1-Day) (AMC 11)		xxx
TC	Hr.	xxx
Elevation Top of Dam	Ft.	xxx
Elevation Crest Emergency Spillway	Ft.	xxx
Elevation Crest Principal Spillway	Ft.	xxx
Elevation Crest Lowest Ungated Outlet	Ft.	xxx
Maximum Height of Dam	Ft.	xxx
Volume of Fill	Cu. Yd.	731,097
Total Capacity ^{1/}	Ac. Ft.	9,179
Sediment (100-Year)	Ac. Ft.	2,926
Sediment Submerged ^{2/}	Ac. Ft.	2,697
Sediment Aerated	Ac. Ft.	229
Sediment Pool (Lowest Ungated Outlet)	Ac. Ft.	787
Retarding	Ac. Ft.	6,253
Surface Area		
Sediment Pool (Lowest Ungated Outlet)	Acre	162
Sediment Pool (Principal Spillway Crest)	Acre	229
Retarding Pool	Acre	814
Principal Spillway Design		
Rainfall Volume (Areal) (1-Day)	Inch	xxx
Rainfall Volume (Areal) (10-Day)	Inch	xxx
Runoff Volume (10-Day)	Inch	xxx
Capacity (Maximum)	C.F.S.	xxx
Frequency Operation - Emergency Spillway	% Chance	xxx
Size of Conduit	Inch	xxx
Emergency Spillway Design		
Rainfall Volume (ESH) (Areal)	Inch	xxx
Runoff Volume (ESH)	Inch	xxx
Type		xxx
Bottom Width	Ft.	xxx
Velocity of Flow (V_c)	Ft./Sec.	xxx
Slope of Exit Channel	Ft./Ft.	xxx
Maximum Reservoir Water Surface Elevation	Ft.	xxx
Freeboard Design		
Rainfall Volume (FH) (Areal)	Inch	xxx
Runoff Volume (FH)	Inch	xxx
Maximum Reservoir Water Surface Elevation	Ft.	xxx
Capacity Equivalents		
Sediment Volume	Inch	xxx
Retarding Volume	Inch	xxx

^{1/} At crest of emergency spillway

^{2/} Includes volume in sediment pool (lowest ungated outlet)

REVISED TABLE 4 - ANNUAL COST
 Castleman Creek Watershed, Texas
 (Dollars)^{1/}

Evaluation Unit	: Amortization : of : Installation : Cost ^{2/}	: Operation : and : Maintenance : Cost	: Total
Floodwater Retarding Structures Nos. 1, 2, 3, 4, 6, and 7; Treatment of 4 Critical Areas; and 11.0 Miles of Channel Work	32,524	5,080	37,604
Project Administration	6,615	xxx	6,615
GRAND TOTAL	39,139	5,080	44,219

^{1/} Price Base: Actual costs for floodwater retarding structures Nos. 1, 2, 3, and 6 already constructed; 11.0 miles of channel work under construction; and critical areas CA-1, CA-3, CA-4, and CA-5 already completed; floodwater retarding structures 4 and 7 at 1973 prices.

^{2/} 100 years @ 3.125 percent interest.

July 1974

TABLE 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS

Castlemen Creek Watershed, Texas

(Dollars)^{1/}

Item	Estimated Average Annual Damage:		Damage Reduction Benefits
	Without Project	With Project	
Floodwater			
Crop and Pasture	80,979	14,261	75,718
Other Agricultural	6,823	772	6,051
Non-Agricultural			
Road and Bridge	2,805	320	2,485
Subtotal	99,607	15,353	84,254
Sediment			
Overbank Deposition	309	68	241
Erosion			
Flood Plain Scour	3,101	78	3,023
Indirect	10,302	1,551	8,751
TOTAL	113,319	17,050	96,269

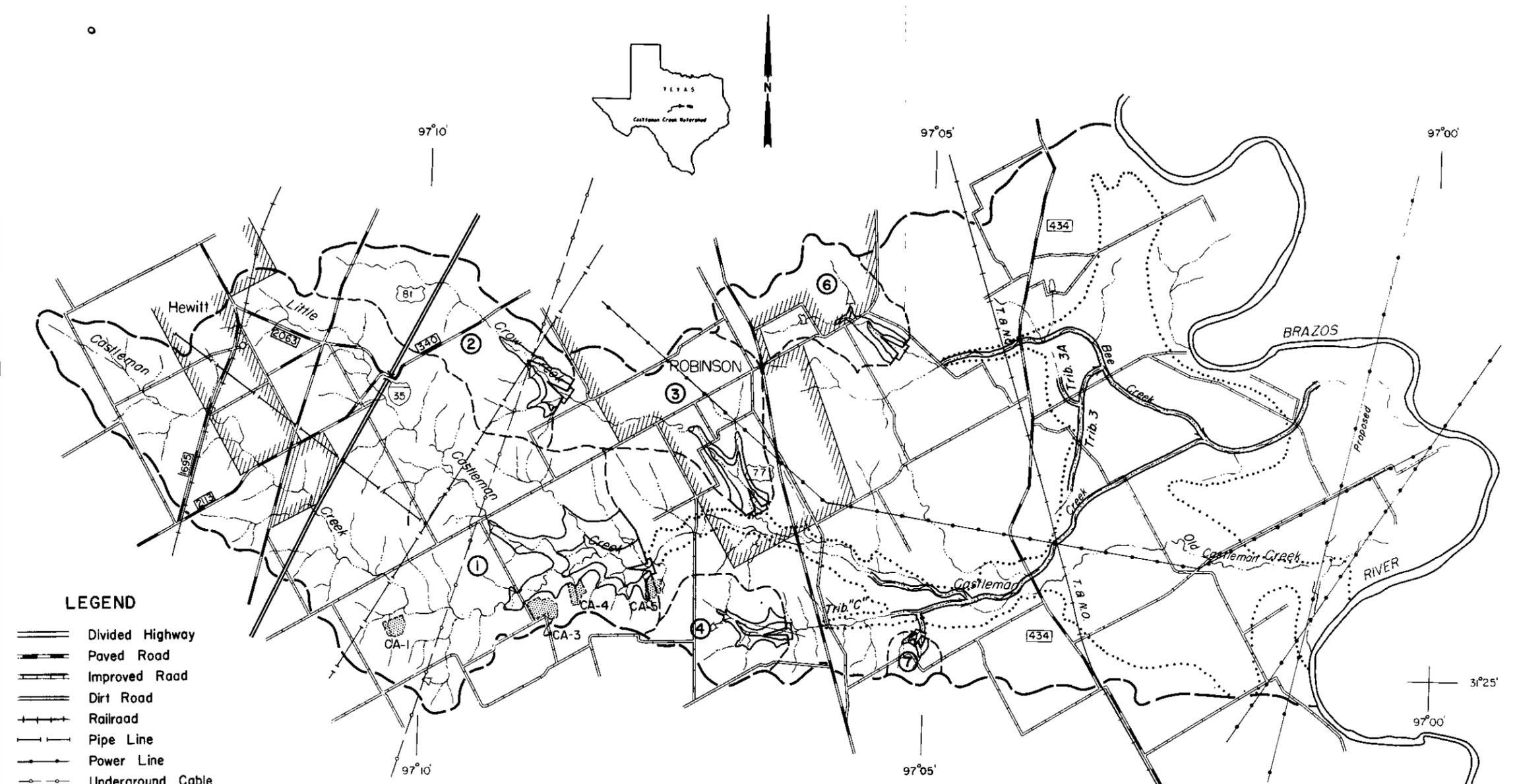
^{1/} Price base: Long-term prices as projected by ARS, September 1957.

July 1974

ANALYSIS OF THE VALUE OF BENEFITS AND COSTS OF FLOOD CONTROL MEASURES
Castroville Creek Watershed, Texas
(Dollars)

Exclusion Unit	NET BENEFIT VALUE OF BENEFITS				Benefit : Cost Ratio
	Damage Reduction	Recreation	Incidental	Total	
Floodwater Retardings structures 1, 2, 3, 4, 6, and 7; Treatment of Critical Areas; and 11.0 miles of Channel Work	91,359	1,160	8,870	101,389	37,904 2.7:1.0
Project Administration	xxx	xxx	xxx	xxx	6,615 xxx
GRAND TOTAL	91,359	1,160	8,870	101,389	44,524 2.3:1.0

1/ Price Base: Long-term prices as projected by ARS, September 1957.
2/ From table 4
3/ Interrelated measures
4/ In addition, it is estimated that land treatment measures will provide flood damage reduction benefits of \$4,910 annually.



LEGEND

- Divided Highway
- Paved Road
- Improved Road
- Dirt Road
- Railroad
- Pipe Line
- Power Line
- Underground Cable
- Town or Community
- Drainage
- Watershed Boundary
- Floodwater Retarding Structure (Completed or Under Construction)
- Drainage Area Controlled by Structure
- Area Benefited
- Channel Work - Flood Prevention
- Site Number
- Critical Area

Site Numbers and Drainage Areas in Acres

No.	Area
1	8,026
2	1,434
3	1,363
4	627
6	922
7	154

Figure 4
PROJECT MAP
CASTLEMAN CREEK WATERSHED
 McLENNAN COUNTY, TEXAS

Graphic Scale
 Approximate Area - 29,850 Acres

Base Compiled from Mosaic 4-R-18474

NOVEMBER 1973 4-R-19204