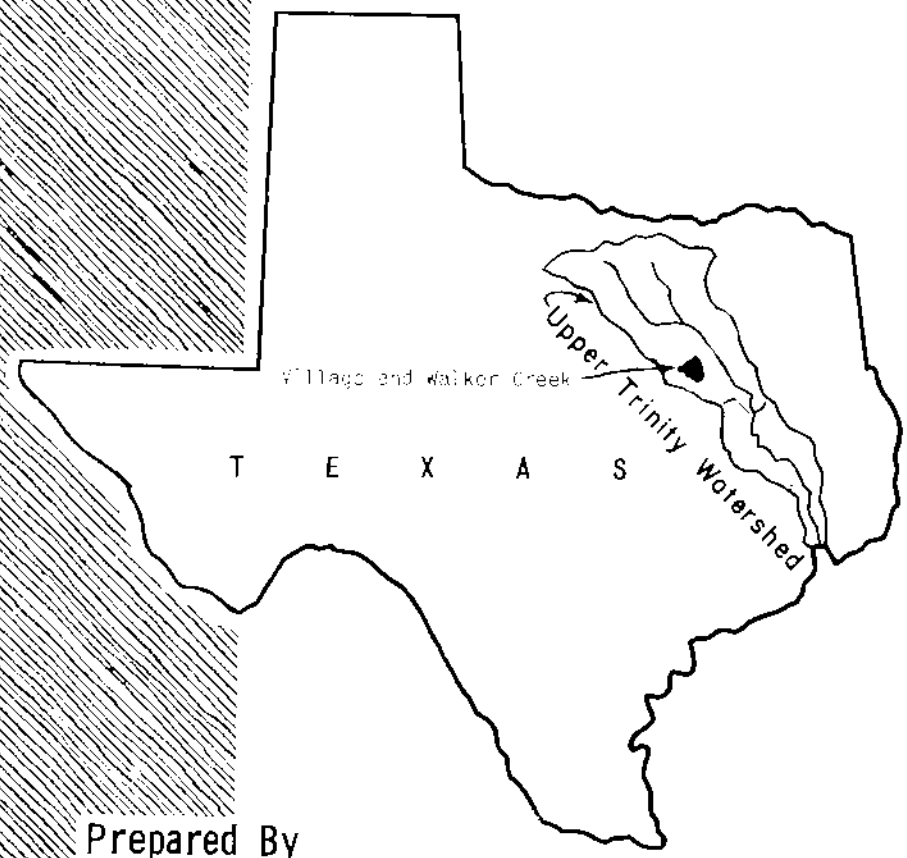
SUPPLEMENTAL WORK PLAN

VILLAGE AND WALKER CREEK WATERSHED

OF THE TRINITY RIVER WATERSHED
ELLIS AND NAVARRO COUNTIES, TEXAS



Prepared By
SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE
Temple, Texas
November 1962

MINOR WORK PLAN REVISIONS

Watershed Name		Date Approved
Village and Walker Creek		
1. Smith Creek Portion	- Relocation of Structure Site No. 5, addition of Site 8A and division of Smith Creek into two Hydrologic Units.	2-4-62
2. Structure Site No. 11 - Village Creek	- Deletion of the original Site 11 and the relocation of a new Site approximately 500 ft. downstream.	2-10-64
3. Smith Creek Tributary, Revision of Construction Units	- Approve Construction Units 1,2,3, and 4.	5-10-67

SUPPLEMENTAL WATERSHED WORK PLAN AGREEMENT

between the

Ellis-Prairie Soil Conservation District
Local Organization

Navarro-Hill Soil Conservation District
Local Organization

(Hereinafter referred to as the Districts)

Ellis County Commissioners Court
Local Organization

(Hereinafter referred to as the County)

Ellis County Levee Improvement District No. 2
Local Organization

(Hereinafter referred to as the Levee District)

In the State of Texas

and the

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

Whereas, the Watershed Work Plan Agreement for Village and Walker Creek Watershed, State of Texas, executed by the sponsoring local organizations named therein and the Service, became effective on the 6 day of January, 1961; 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; and

Whereas, it has been found necessary to modify the watershed work plan to include 1.97 miles of stream channel improvement for flood prevention, of which 1.24 miles were included in the original work plan; a drop structure for grade stabilization; 4.2 miles of floodwater diversions; 3.56 miles of multiple-purpose stream channel improvement; and 19.3 miles of multiple-purpose mains and lateral ditches, all of which will permit the addition of agricultural water management as a project purpose;

Whereas, a Supplemental Watershed Work Plan which modifies the watershed work plan dated June, 1960 for said watershed has been developed through the cooperative efforts of the Sponsoring Local Organizations and the Service, which plan 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 Watershed Work Plan Agreement:

1. The Ellis County Levee Improvement District No. 2 hereby agrees to become one of the local organizations sponsoring said watershed project.

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

   The District and/or the County will acquire without cost to the Federal Government such lands, easements, or rights-of-way needed in connection with the Works of Improvement in the original Work Pl Agreement executed 6 January 1961. The Ellis County Levee Improvement District No. 2 will acquire without costs to the Federal Government such additional lands, easements or rights-of-w as will be needed as a result of the modifications in the Supplemer Watershed Work Plan.

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

   The percentages of construction costs for structural measures to be paid by the Sponsoring Local Organizations and by the Service are as follows:

Works of Improvement	Sponsoring Local Organizations (Percent)	Service (percent)	Estimate Constructio (dollar
Single Purpose (Flood Prevention)			
Floodwater retarding structures, floodwater diversion, stream channel improvement and grade stabilization structure	None	100	844,5
Multiple-Purpose (Flood Prevention and Drainage)			
Stream channel improvement	17.0	83.0	86,4
Drainage Ditch No. 1 (with laterals 2 through 8)	13.5	86.5	75,5
Drainage Ditch No. 9 (with laterals 10 through 12)	24.9	75.1	21,2
Drainage Ditch No. 13	12.1	87.9	14,4
Drainage Ditch No. 14	34.4	65.6	7,3

The percentages of the cost for installation services to be borne by the Sponsoring Local Organizations and the Service are as follows

Works of Improvement	Sponsoring Local Organizations (percent)	Service (percent)	Esti Instal Servic (dol
Single Purpose (Flood Prevention)			
Floodwater retarding structures, floodwater diversion, stream channel improvement and grade stabilization structure	0	100	254,4
Multiple-Purpose (Flood Prevention and Drainage)			
Stream channel improvement and mains and laterals with appurtenant structures	0	100	58,7

4. Paragraph numbered 7 is modified to read as follows:

   The County will be responsible for the operation and maintenance of the 4.2 miles of floodwater diversion (No. 2), 1.97 miles of single-purpose channel improvement, and the drop structure for grade stabilization. The Levee District will be responsible for the operation and maintenance of 3.3 miles of main and group lateral ditches and appurtenant structures. The Levee District and the County will be responsible jointly for operation and maintenance of 3.56 miles of multiple-purpose channel improvement.

5. The Service will award and administer the contracts covering the construction of all works of improvement, and will bear all contract administration costs.

6. The costs for Works of Improvement reflected in the Work Plan represent preliminary estimates. In finally determining the costs to be borne by the parties hereto, the actual costs incurred in the installation of Works of Improvement will be used.

7. This agreement does not constitute a financial document to serve as a basis for the obligation of Federal funds, and financial and other assistance to be furnished by the Service in carrying out the Watershed Work Plan, as revised, is contingent on the appropriation of funds for this purpose.

   The contribution of the Levee District to the installation cost for agricultural water management (drainage) will be provided for in a separate agreement to be entered into between the Service, the Districts, the County, and the Levee District prior to incurring any such costs. Such

agreement will set forth in detail the financial and working arrangements and other conditions that are applicable to the agricultural water management (drainage).

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.

Ellis-Prairie Soil Conservation District

By: Miles Hastings

Title: Chairman

Date: July 9, 1963

The signing of this agreement was authorized by resolution of governing body of the Ellis-Prairie Soil Conservation District adopted at a meeting held July 9, 1963.

Marvin Borders
Secretary

Date: 7-9-1963

Navarro-Hill Soil Conservation Dist

By: C. M. Newton Jr

Title: Chairman

Date: July 19, 1963

The signing of this agreement was authorized by resolution of governi body of the Navarro-Hill Soil Conservation District adopted at a meeting held 7-19, 1963.

W. H. Price
Secretary

Date: 7-19-63

Ellis County Commissioners Court

By: Milton Hatzfeld

Title: County Judge

Date: July 19, 1963

The signing of this agreement was authorized by a resolution of the governing body of the Ellis County Commissioners Court, adopted at a meeting held on July 19, 1963.

Charles W. Huff
Clerk of Ellis County Court

Date: July 19, 1963

Ellis County Levee Improvement Dist No.

By: J. Roy Glaspy

Title: Chairman

Date: 7-26-63

The signing of this agreement was authorized by resolution of the gov body of the Ellis County Levee Impr ment District No. 2, adopted at a m held 7-26, 1963.

M. R. Burden
Secretary

Date: 7-26-63

UNITED STATES DEPARTMENT OF AGRICUL
Soil Conservation Service

By: ______

Title: ______

Date: ______

SUPPLEMENTAL WORK PLAN

VILLAGE AND WALKER CREEK WATERSHED
Of the Trinity River Watershed
Ellis and Navarro 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

Ellis-Prairie Soil Conservation District
Navarro-Hill Soil Conservation District
Ellis County Commissioners Court
Ellis County Levee Improvement District
No. 2

Prepared By:

Soil Conservation Service
U. S. Department of Agriculture

November 1962

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SUPPLEMENTAL WORK PLAN

VILLAGE AND WALKER CREEK WATERSHED
Of the Trinity River Watershed
Ellis and Navarro Counties, Texas
November 1962

INTRODUCTION

Authority

The Village and Walker Creek watershed project will be carried out under the authority of the Soil Conservation Act of 1935 (Public Law 46, 74th Congress), the Flood Control Act of 1944 (58 Stat. 887), as amended and supplemented, and the Act of May 13, 1960 (Public Law 86-468).

Purpose and Scope of Supplemental Work Plan

The purpose of this supplemental work plan is to incorporate agricultural water management as a project purpose in the Village and Walker Creek Watershed Work Plan of June 1960, as revised January 4, 1962. The revision added floodwater retarding structure Site No. 8A and relocated flood water retarding structure Site No. 5.

During development of the original work plan, the need was recognized for drainage improvements on approximately 10,000 acres of watershed land. The sponsoring local organizations and local landowners showed a keen interest in the drainage aspects for which assistance had been made available by an amendment to Section 8 of Public Law 566. The sponsors initiated action to complete legal and financial requirements necessary to carry out local responsibilities in connection with planning and installation of works of improvement for agricultural drainage.

In may 1961, the local sponsors requested that their watershed work plan be revised to include agricultural water management (drainage) as a project purpose. Ellis County Levee Improvement District No. 2 joins as a project sponsor.

SUMMARY OF PLAN
(As Supplemented)

The Village and Walker Creek Watershed Work Plan of 1960, as revised, included land treatment measures for watershed protection supplemented by structural works of improvement for flood prevention. Installation of these measures is being carried out in accordance with provisions of the plan.

The work plan as supplemented proposes the installation, during an 8-ye period, of a project for the protection and development of the watershe The plan, as revised and supplemented, includes 19 floodwater retarding structures, 14.7 miles of stream channel improvement, 4.2 miles of floo water diversion, and 19.3 miles of main ditches and group laterals with appurtenances. (Figures 3 and 3A.)

Of the total installation cost, $2,925,161, an amount of $1,499,362 wil be paid from Federal funds and the remaining $1,425,799 will be borne b other interests. In addition, the Ellis County Commissioners Court, El Prairie Soil Conservation District, Navarro-Hill Soil Conservation Dist and the Ellis County Levee Improvement District No. 2, as sponsoring lo organizations, will bear the entire cost of operation and maintenance which is estimated to be $17,041 annually.

The estimated total cost of the structural measures is $1,653,251. Of this amount, $1,328,566 will be borne by Federal funds and $324,685 wil be borne by other than Federal funds.

When the entire project has been installed, the expected average annual benefits of $152,614, as compared to the average annual cost of $79,782, reveal a benefit-cost ratio of 1.9 to 1.

This supplement applies to the Smith Creek portion of the watershed to improve flood prevention and to add agricultural water management as a project purpose to the previously revised work plan. It provides for needed modification of planned stream channel improvement on Smith Creek construction of mains and laterals with appurtenances, and a floodwater diversion at an added installation cost of $495,890. These changes will add $32,358 of annual equivalent cost to the revised work plan project cost and provide for an additional $84,579 in average annual benefits. The works of improvement added by this supplement will have a benefit-cost ratio of 2.6 to 1.

DESCRIPTION OF WATERSHED

There are 9,958 acres included in the leveed portion of the watershed on which agricultural water management is being added as a project purpose. It has been determined that 8,650 acres within this area will be benefit both by drainage and flood prevention.

The land use for the area benefited by drainage is as follows:

Land Use	Acres	Percent
Cropland	7,620	88.1
Pasture	630	7.3
Miscellaneous 1/	400	4.6
Total	8,650	100.0

1/ Includes roads, levee, borrow area, gravel pit, etc.

The improved drainage will benefit 38 owners of fertile Trinity River b land which is protected from outside floodwater by levees and floodwate diversions. The current value of this land exceeds $300 per acre.

WATERSHED PROBLEMS

Floodwater Damage

The area of Trinity River bottomland protected by levees is being damag by floodwater due to lack of proper drainage. The floodwater causing t damage results primarily from excessive rainfall occurring within the boundaries of the area (figure 1).

Sediment Damage

Sediment damage within the area needing agricultural drainage is slight The extreme western portion of the leveed area is bounded by steeply sloping uplands. Sediment produced from this area is damaging 10 acres of cropland each year. The productive capacity of the soil is reduced approximately 20 percent by this deposition or $145 annually at long-term price levels.

The Smith Creek stream channel in the past has filled with sediment at a accelerated rate, thereby reducing channel capacity. This resulted in more frequent flooding and impaired drainage within the leveed area; however, works of improvement included in the original work plan will alleviate this condition.

Erosion Damage

Erosion rates are low in the leveed area; however, severe erosion on 442 acres of adjacent steeply sloping land to the west creates a sediment problem within the leveed area. This area is characterized by fine-textured, slowly permeable soils, with poor to fair vegetative cover and slopes ranging up to 12 percent. The estimated average annual soil loss is 23 tons per acre.

Problems Relating to Water Management

Drainage improvement is needed on a major portion of the leveed area of Trinity River bottomland. The soils are deep, heavy, slowly permeable clays of the Trinity series, a portion of which consists of depressions and lacks natural outlets for proper surface drainage.

Proper drainage has not been attained because of inadequate outlets. Sediment deposits have filled the stream channels, impairing the natural flow of water. In the past, outlets through the levee have not function effeciently due to improper design and lack of maintenance.

PROJECTS OF OTHER AGENCIES

The Trinity River Authority has an over-all plan for the full developme of water resources in the Trinity River Basin. This includes plans for canalization of the river for navigation purposes in the future. Major reservoirs upstream, constructed by the Corps of Engineers and other agencies, will complement the Village and Walker Creek watershed projec by reducing the floodstage on the Trinity River, thereby making it possible to provide a high level of protection in the lower reaches. A levee providing protection to approximately 10,000 acres was constructe by the Ellis County Levee Improvement District No. 2, and is maintained by the district with assistance from the U. S. Corps of Engineers. Flo water diversion No. 1 was constructed and is maintained by the levee district. Both the levee and diversion are essential to proper functio ing of this project.

BASIS FOR PROJECT FORMULATION

Investigations were made and surveys conducted to determine measures ne for drainage. A meeting was held by the sponsoring local organizations June 19, 1962, at which time needed measures, cost allocation and cost sharing were discussed by representatives of the Soil Conservation Serv The estimated cost to the local sponsors was furnished at this meeting. The objective of the local people is to obtain adequate facilities for drainage within the leveed area.

Floods and the lack of adequate outlets to drain the wet lands have pre- vented full development of the flood plain and bottom land in the water

The heavy investment in the flood plain, together with its high producti potential and intensity of use, prompted the sponsors to request a proje that would provide protection from the flood hazard and meet the needs f improved drainage.

It was agreed to include the necessary multiple-purpose stream channel improvement, diversion, and ditches with appurtenances which would meet these needs.

WORKS OF IMPROVEMENT TO BE INSTALLED

Land Treatment Measures

An effective conservation program under the leadership of the soil conse vation districts is now under way. In addition to soil and water conser tion and management practices necessary for proper land use and treatmer included in the original work plan, installation of on-farm drainage systems is needed to reach the project objectives.

Structural Measures

The planned structural measures include 1.97 miles of stream channel im ment for flood prevention, of which 1.24 miles was included in the orig plan, with a drop structure for grade stabilization; 3.56 miles of mult purpose stream channel improvement; 19.3 miles of multiple-purpose main lateral ditches; and 4.2 miles of floodwater diversion. These measures will provide desired protection from flooding and permit installation o on-farm drainage systems within the area protected by levees.

The original plan included 3.52 miles of stream channel improvement for flood prevention. Additional surveys indicated that the flood preventi channel needed to be extended 0.73 mile upstream and 1.28 miles downstr to provide the desired degree of flood protection and to reach a suitab outlet. The total channel improvement needed on Smith Creek is 5.53 mi Because the lower 3.56 miles will provide drainage outlets, it is desig to serve as a multiple-purpose channel.

One drop type structure for grade stabilization is included to reduce velocities in the improved stream channel. This structure is considere as an appurtenance to the single-purpose stream channel improvement.

The 4.2 miles of floodwater diversion will provide floodwater and sedim damage protection to the leveed bottom lands by diverting runoff from 4 acres of steep hillside land.

Capacities of the 19.3 miles of multiple-purpose main ditches and group laterals are based on Southwestern Drainage Curves from Section 16 of t National Engineering Handbook. The mains and laterals will provide adequate outlets for on-farm drainage systems and will have sufficient capacity to provide a degree of flood protection that will permit efficient agricultural development of the area. Four main ditches discharge through the existing levee. Their outlets will be equipped with headwall automatic flap gate type structures that will prevent outside floodwater from entering the leveed area.

The 46 appurtenant grade stabilization structures on ditches 1 and 9 wil be used to control erosion where small shallow ditches enter the deeper ditches. These structures will be used where it is not practical to slope and sod outlets to prevent erosion. A typical grade stabilization structure is shown as figure 2.

Planned structural measures are shown on figures 3 and 3A.

Details of quantities, costs, and design features of structural measures are shown in tables 1, 2, 3A, 3B, and 3C.

EXPLANATION OF INSTALLATION COSTS

The required local costs for structural measures included in this supple are estimated to be $170,935. These costs consist of $34,394 for constr tion and $136,541 for land, easements, and rights-of-way.

The estimated value of land required for rights-of-way is based on appra als made by the sponsors and concurred in by the Service. The Texas Highway Department and utility companies furnished cost estimates for modification of their facilities. Costs of water gaps are based on esti mates of material plus an allowance for labor and equipment which might be required. Unit costs for bridges were determined in consultation wit county and State highway officials.

The share of the cost of structural measures to be borne by Federal fund is $244,392 for construction and $80,563 for installation services.

The engineer's estimates of construction costs were based on unit costs for each type of structural measure constructed in similar areas. The unit costs were modified to reflect special conditions such as clearing of timber and site preparation. Geological investigations were limited to surface observations and borings with power equipment along the route of the improved channels. More detailed investigations will be needed b fore construction begins. Ten percent of the engineer's estimate was ad as a contingency to provide funds for unpredictable construction costs.

Installation services include engineering and administrative costs based on Service experience for similar works.

Allocation of costs to purpose and cost sharing within such purpose are shown in table 2A. Flood prevention funds will bear all costs of install tion services and the entire construction costs of single-purpose flood prevention structures. Local interests will bear all the costs of land, easements, rights-of-way, and relocation of roads and obstacles. Constru tion cost of multiple-purpose structures will be shared between flood pre vention funds and local interests.

Cost allocation between multiple-purpose structural measures for flood prevention and agricultural water management was determined by procedures outlined in the Watershed Protection Handbook, Part 1, Chapter 1, Section 1132.2.

The first alternative was used for the multiple-purpose portion of Smith Creek channel. In accordance with this procedure, the cost of a single-purpose channel for drainage was $61,620. For a single-purpose flood prevention channel, the estimated cost was $123,632. The estimated cost of a multiple-purpose flood prevention and drainage channel was $127,220.

The cost allocated to drainage is 33.263 percent ($42,317), and that all cated to flood prevention is 66.737 percent ($84,903).

The second alternative was used to allocate the costs between flood prev tion and drainage for mains and laterals 1 through 14. By using this procedure, 50 percent of the costs were allocated to drainage and 50 per cent to flood prevention.

At the time cost sharing was discussed with the sponsors, secondary bene fits formed the basis for sharing costs. In accordance with agreement made at that time, the shares of agricultural water management costs to be paid from Federal funds and contributed by sponsors are based upon th relationship of other benefits and identifiable benefits respectively to total benefits, but with Federal assistance limited to that currently available for other similar type programs.

Secondary benefits, $67,132 annually, constitute about 64 percent of the total annual benefits of $104,625 accruing to agricultural water manage- ment (table 2B). The portion of the cost allocated to agricultural wate management that will be paid from flood prevention funds is limited to 48 percent. The total installation cost of structural measures allocate for agricultural water management (drainage), $166,604, will be shared $79,970 by flood prevention funds and $86,634 (52 percent) by other funds

EFFECTS OF WORKS OF IMPROVEMENT

Installed on-farm drainage systems will function adequately following construction of the major outlets, except during periods of high stage on the Trinity River when the outlets are blocked temporarily.

The project structural measures will benefit directly 38 owners of the 8,650 acres of agricultural land on which benefits were claimed for project justification.

The works of improvement included in the original work plan, as revised, without supplemental structural measures, will reduce flood damage in the Smith Creek portion of the watershed by 62 percent. The structural measures included in this supplement will eliminate 86 percent of the remaining damage.

Benefits from enhancement on the 8,650 acres of flatland protected by levees and on which drainage systems are to be installed were divided equally between drainage and flood prevention. These benefits will accrue on 2,980 acres of inherently wet soils and 5,670 acres of slowly permeable soils which would benefit from drainage. Damage from flooding occurring in this area because of delayed outflow during high stages on the Trinity River was deducted from the increase in production expected with drainage measures installed.

Additional benefits which are expected by extension of stream channel im ment upstream from that in the original work plan, as revised, were cons These benefits are expected to be offset by added runoff contributed by floodwater diversion for storms which exceed 2.5 inches.

PROJECT BENEFITS

Benefits accruing to structural measures included in the 1960 Work Plan, revised, for Village and Walker Creek watershed are unchanged. Addition benefits from enhancement to be brought about by installation of measure for agricultural water management were divided equally between flood pre tion and drainage.

The estimated average annual floodwater, erosion, sediment, and indirect damage in Smith Creek will be reduced by the measures included in this supplement from $11,120 to $1,528, a reduction of 86 percent. Annual damage reductions attributable to the supplemental project average $8,14 for crop and pasture damage, $299 for other agricultural damage, $14 for road and bridge damage, $71 for flood plain scour, $203 for damage from sediment deposition, and $859 for indirect damage (table 5).

The total flood damage reduction benefits, including the reduction of indirect damages, are estimated to average $9,592 annually.

The high level of protection will make it possible to develop the land t its fullest potential. Maximum investments for fertilizers, insecticide and farm machinery which are needed for optimum yields can be made witho the risk of heavy losses because of frequent floods and wet land.

It is estimated that enhancement type primary benefits of $74,987 will accrue from installation of the structural measures. These are allocate equally to flood prevention and drainage since benefits from each source are not separable. Total primary benefits from the supplementary measur will be $84,579 annually.

Secondary benefits amounting to $67,132 annually will result from the improved drainage. These benefits were used to calculate cost sharing but not for project justification.

COMPARISON OF BENEFITS AND COSTS

The average annual equivalent cost of the structural measures (amortized from total installation cost, plus operation and maintenance) is estimat to be $32,358. When the structures are installed, they are expected to produce average annual benefits of $84,579, a benefit of $2.61 for each dollar of cost.

PROJECT INSTALLATION

Structural Measures

The Soil Conservation Service will contract for the construction of 3.56 miles of multiple-purpose stream channel improvement and 1.97 miles of single-purpose stream channel improvement with appurtenant structure, 4.2 miles of floodwater diversion, and 19.3 miles of main and lateral ditches with appurtenant structures (figure 3A). The Soil Conservation Service will prepare plans and specifications, supervise construction, prepare contract payment estimates, make final inspections, certify completion, and perform related tasks for the installation of these structural measures.

The sponsoring local organizations will furnish all necessary land, easements, and rights-of-way, and arrange for necessary road and utility changes for all structural measures at no cost to the Federal Government.

The structural measures included in this supplement will not be installed until upstream floodwater retarding structures on Smith Creek have been built. Mains and laterals will be installed after stream channel improvement has been completed.

FINANCING PROJECT INSTALLATION

Federal assistance for carrying out the works of improvement on non-Federal land, as described in this supplemental work plan, will be provided under the authority of the Flood Control Act of 1944, as amended and supplemented.

The qualified voters of the Ellis County Levee Improvement District No. 2 approved a tax within the district that is levied and collected annually for acquiring rights-of-way, construction of works of improvement, and operation and maintenance purposes within the levee district.

The structural measures will be constructed pursuant to the following conditions:

1. Land, easements, and rights-of-way have been obtained for all structural measures, or a written statement is furnished by the Ellis County Commissioners Court or the Ellis County Levee Improvement District No. 2 that its right of eminent domain will be used, if needed, to secure any remaining easements within the project installation period, and that sufficient funds are available and will be used to pay for these easements, permits, and rights-of-way.

2. Project and operation and maintenance agreements have been executed.

3. Flood prevention funds are available.

The various features of cooperation between the cooperating parties have been covered in appropriate memoranda of understanding and working agreements.

PROVISIONS FOR OPERATION AND MAINTENANCE

Structural Measures

The estimated annual operation and maintenance cost is $645 for the floo water diversions, $1,264 for the single-purpose channel and appurtenant grade stabilization structure, $2,102 for the multiple-purpose channel, and $9,528 for main and lateral ditches with their appurtenant structure based on long-term price levels. The Ellis County Commissioners Court will be responsible for operation and maintenance of the 4.2 miles of floodwater diversion (No. 2), 1.97 miles of single-purpose channel impro ment, and the drop structure for grade stabilization, all of which are located outside the levee district. Ellis County Levee Improvement District No. 2 will be responsible for operation and maintenance of 3.3 miles of existing floodwater diversion (No. 1), and 19.3 miles of main and group lateral ditches with appurtenant structures. The levee distri and commissioners court will be jointly responsible for operation and maintenance of 3.56 miles of multiple-purpose channel improvement.

The Ellis County Commissioners Court will accomplish maintenance work through the use of contributed labor and equipment, by contract, by force account, or a combination of these methods. In August of each year, the Ellis County Commissioners Court will transfer to the Road and Bridge Fund sufficient moneys for adequate annual maintenance of structural measures outside the levee district.

The Ellis County Levee Improvement District No. 2 will establish a perma nent reserve fund to be used for operation and maintenance of structural measures from tax revenue being collected by the district.

The stream channel improvement, including grade stabilization structure, will be inspected by representatives of the Ellis-Prairie Soil Conservation District, Ellis County Commissioners Court, and Ellis County Levee Improvement District No. 2 after each heavy streamflow, or at least annually. A Soil Conservation Service representative will participate in inspections at least annually. For the improved channel and floodwat diversions, items of inspection will include, but will not be limited to, the need for removal or control of woody vegetation, removal of sediment bars, corrective measures to prevent gully erosion or head cutting inside

drains, and the condition of the grade stabilization structures.

The Soil Conservation Service, through the Ellis-Prairie Soil Conservati District, will participate in operation and maintenance only to the exte of furnishing technical assistance to aid in inspections and technical guidance and information necessary for the operation and maintenance program.

Provisions will be made for free access of representatives of sponsoring local organizations and Federal representatives to inspect and provide maintenance for all structural measures and their appurtenances at any time.

The Ellis County Commissioners Court and the Ellis County Levee Improvem District No. 2 will execute a specific operation and maintenance agreeme prior to the issuance of invitation to bid on construction of the struct measures.

TABLE 2 - ESTIMATED STRUCTURAL COST DISTRIBUTION 1/
Village and Walker Creek Watershed, Texas
(Trinity River Watershed)
(Dollars) 2/

Structure Site Number or Name	Federal Installation Cost				Non-Federal Installation Cost			Total Installation Costs
	Construction	Installation Services: Engineering	Installation Services: Other	Total Federal	Construction	Other 3/	Total Non-Federal	
Stream Channel Improvement								
Multiple-Purpose	71,777	11,236	7,447	90,460	14,650	22,110	36,760	127,220
Single-Purpose 4/	49,696	9,035	4,471	63,202	-	7,934	7,934	71,136
Subtotal	121,473	20,271	11,918	153,662	14,650	30,044	44,694	198,356
Floodwater Diversion								
No. 2	23,960	5,990	2,284	32,234	-	16,726	16,726	48,960
Subtotal	23,960	5,990	2,284	32,234	-	16,726	16,726	48,960
Drainage Ditches								
No. 1 (with Laterals 2, 3, 4, 5, 6, 7, and 8) 4/	65,422	16,551	7,019	88,992	10,171	65,051	75,222	164,214
No. 9 (with Laterals 10, 11 and 12) 4/	15,978	5,317	2,027	23,322	5,291	8,950	14,241	37,563
No. 13	12,729	4,633	1,458	18,820	1,751	14,990	16,741	35,561
No. 14	4,830	2,355	740	7,925	2,531	780	3,311	11,236
Subtotal	98,959	28,856	11,244	139,059	19,744	89,771	109,515	248,574
GRAND TOTAL	244,392	55,117	25,446	324,955	34,394	136,541	170,935	495,890

1/ Does not include work plan preparation cost.

2/ Price Base: 1961.

3/ Includes easements, rights-of-way, legal fees, and removing obstacles.

4/ [illegible]

TABLE 2A - COST ALLOCATION AND COST SHARING SUMMARY

Village and Walker Creek Watershed, Texas
(Trinity River Watershed)

(Dollars) 1/

Item	Purpose: Flood Prevention	Purpose: Drainage	Total
COST ALLOCATION			
Single-Purpose			
Stream Channel Improvement with Grade Stabilization Structure	71,136	-	71,13
Floodwater Diversion	48,960	-	48,96
Subtotal	120,096	-	120,09
Multiple-Purpose			
Stream Channel Improvement	84,903	42,317	127,22
Main Ditch No. 1, with Laterals and Appurtenances	82,107	82,107	164,21
Main Ditch No. 9, with Laterals and Appurtenances	18,781	18,782	37,56
Main Ditch No. 13	17,781	17,780	35,56
Main Ditch No. 14	5,618	5,618	11,23
Subtotal	209,190	166,604	375,79
Total	329,286	166,604	495,89
COST SHARING			
Flood Prevention Funds			
Construction	190,686	53,706	244,39
Installation Services			
Engineering	36,952	18,165	55,11
Other	17,347	8,099	25,44
Total Flood Prevention Funds	244,985	79,970	324,95
Other			
Construction	-	34,394	34,39
Easements, Rights-of-Way, Legal Fees, and Removing Obstacles	84,301	52,240	136,54
Total Other	84,301	86,634	170,93
Total	329,286	166,604	495,89

1/ Price Base: 1961.

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TABLE 2B - BASIS FOR SHARING AGRICULTURAL WATER MANAGEMENT COSTS

Village and Walker Creek Watershed, Texas

(Trinity River Watershed)

(Dollars) 1/

Purpose	Estimated Average Annual Water Management Benefits			
	Direct Identifiable		Other	
	Dollars	Percent	Secondary 2/	Total
Drainage	37,493	35.8	67,132	104,625

1/ Price Base: 1961

2/ Not used for project justification.

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TABLE 3A - STRUCTURE DATA - CHANNELS
Village and Walker Creek Watershed, Texas
(Trinity River Watershed)

Station Numbering for Reach		Water-shed Area 1/	Equivalent Drainage Area	Required Drainage Capacity 2/	Planned Channel Capacity	Average Bottom Width	Average Side Slope	Average Depth	Average Grade	Average Velocity in Channel	Volume of Excavation
Station (100 ft.)	Station (100 ft.)	(sq.mi.)	(sq.mi.)	(c.f.s.)	(c.f.s.)	(ft.)		(ft.)	(pct.)	(ft./sec.)	(1,000 cu. yds.)
Main Ditch No. 1											
30+00	56+00	0.45	0.45	21	25	4	3:1	2.4	.05	0.92	
56+00	83+00	1.18	1.18	52	56	6	3:1	3.2	.05	1.13	
83+00	95+50	1.83	1.83	72	74	8	3:1	3.8	.03	1.00	
95+50	109+00	2.42	2.42	84	84	10	3:1	3.8	.03	1.03	
109+00	127+50	2.47	2.47	86	88	10	3:1	4.8	.01	0.75	
127+50	160+50	2.99	2.99	100	105	10	3:1	5.2	.01	0.79	
160+50	210+00	3.33	3.33	109	114	10	3:1	5.4	.01	0.81	
210+00	236+50	4.26	4.26	135	135	12	3:1	5.6	.01	0.84	
236+50	255+00	4.94	4.94	150	158	14	3:1	5.8	.01	0.87	
255+00	330+00	8.25	8.25	237	239	20	3:1	6.0	.01	1.05	
										Total Ditch 1	196.40
Lateral No. 2											
30+00	43+00	0.13	0.13	8	9	"V"	3:1	2.2	.03	0.59	
										Total Lateral 2	0.92
Lateral No. 3											
51+50	71+00	0.30	0.30	15	15	3	3:1	2.5	.02	0.58	
										Total Lateral 3	3.92
Lateral No. 4											
28+00	30+00	0.21	0.21	11	11	"V"	3:1	2.3	.04	0.70	
30+00	55+00	0.40	0.40	19	19	3	3:1	2.4	.04	0.75	
										Total Lateral 4	5.24
Lateral No. 5											
30+00	53+00	0.31	0.31	16	20	4	3:1	2.0	.07	0.99	
53+00	76+00	0.31	0.31	16	16	4	3:1	2.4	.02	0.58	
76+00	104+00	0.89	0.89	37	36	6	3:1	3.2	.02	0.72	
104+00	127+00	0.99	0.99	38	44	6	3:1	3.2	.03	0.88	
127+00	160+00	1.99	1.99	77	83	8	3:1	3.8	.03	1.12	
160+00	187+00	2.73	2.73	92	92	8	3:1	4.0	.03	1.15	

TABLE 3A - STRUCTURE DATA - CHANNELS - Continued
Village and Walker Creek Watershed, Texas
(Trinity River Watershed)

Station Numbering for Reach		Watershed Area 1/	Equivalent Drainage Area	Required Drainage Capacity 2/	Planned Channel Capacity	Average Bottom Width	Average Side Slope	Average Depth	Average Grade	Average Velocity in Channel	Volume of Excavation
Station	Station	(sq.mi.)	(sq.mi.)	(c.f.s.)	(c.f.s.)	(ft.)		(ft.)	(pct.)	(ft./sec.)	(1,000 cu. yds.)
(100 ft.)	(100 ft.)										
Lateral No. 6											
50+00	61+00	0.15	0.15	9	11	"V"	3:1	2.0	.08	0.90	
										Total Lateral 6	0.94
Lateral No. 7											
15+00	42+00	0.31	0.31	18	18	3	3:1	2.7	.02	0.61	
42+00	98+00	0.59	0.59	26	27	3	3:1	3.2	.02	0.68	
										Total Lateral 7	8.20
Lateral No. 8											
46+00	67+00	0.13	0.13	7	7	4	3:1	1.5	.05	0.67	
										Total Lateral 8	1.27
Main Ditch No. 9											
27+00	35+93	2.43	2.43	84	89	10	3:1	4.0	.03	1.05	
35+93	83+00	3.42	3.42	112	116	12	3:1	5.2	.01	0.81	
										Total Ditch 9	29.55
Lateral No. 10											
3+60	10+20	0.19	0.19	10	11	"V"	3:1	1.9	.06	0.76	
10+20	30+00	0.69	0.69	29	30	4	3:1	2.4	.08	1.17	
30+00	42+00	0.86	0.86	35	38	4	3:1	2.6	.08	1.22	
42+00	50+00	1.22	1.22	70	68	8	3:1	3.6	.025	0.91	
50+00	99+00	2.34	2.34	81	85	10	3:1	4.0	.025	0.96	
										Total Lateral 10	13.06
Lateral No. 11											
15+00	19+00	0.04	0.04	3	3	"V"	3:1	1.5	.03	0.45	
19+00	27+00	0.09	0.09	6	7	"V"	3:1	2.0	.03	0.55	
										Total Lateral 11	3/
Lateral No. 12											
30+00	76+00	0.43	0.43	22	26	3	3:1	2.6	.05	0.92	
										Total Lateral 12	6.58
Main Ditch No. 13											
30+00	41+80	0.23	0.23	12	15	4	3:1	2.0	.04	0.75	
41+80	57+00	0.39	0.39	20	24	4	3:1	2.5	.04	0.85	
57+00	70+00	0.55	0.55	27	31	4	3:1	2.8	.04	0.90	
70+00	95+00	1.05	1.05	47	47	8	3:1	4.0	.01	0.59	
95+00	108+50	1.32	1.32	52	59	8	3:1	4.2	.01	0.68	
108+50	168+50	1.83	1.83	66	72	8	3:1	4.6	.01	0.72	

TABLE 3A - STRUCTURE DATA - CHANNELS - Continued
Village and Walker Creek Watershed, Texas
(Trinity River Watershed)

Station Numbering for Reach		Water-shed Area 1/	Equivalent Drainage Area	Required Drainage Capacity 2/	Planned Channel Capacity	Average Bottom Width	Average Side Slope	Average Depth	Average Grade	Average Velocity in Channel	Volume of Excavation
Station (100 ft.)	Station (100 ft.)	(sq.mi.)	(sq.mi.)	(c.f.s.)	(c.f.s.)	(ft.)		(ft.)	(pct.)	(ft./sec.)	(1,000 cu. yds.)
Main Ditch No. 14											
30+00	36+50	0.17	0.17	10	10	"V"	3:1	2.2	.04	0.68	
36+50	47+00	0.54	0.54	25	28	4	3:1	2.8	.04	0.81	
47+00	70+50	0.54	0.54	25	25	6	3:1	3.2	.01	0.50	
										Total Ditch 14	6.93
Floodwater Diversion No. 2											
0+00	50+00	0.16	-	412	427	16	3.5:1	5.0	.10	2.55	
50+00	105+00	0.50	-	753	772	24	3.5:1	5.9	.10	2.93	
105+00	220+00	0.73	-	1,095	1,107	35	3.5:1	6.2	.10	3.15	
										Total Floodwater Diversion No. 2	108.91
Stream Channel Improvement 4/											
32+50	51+00	24.70	-	1,812	1,812	65	2:1	10.2	.020	2.08	
51+00	75+80	23.30	-	1,625	1,632	60	2:1	10.0	.020	2.04	
75+80	107+40	22.45	-	1,582	1,575	60	2:1	9.8	.020	2.02	
107+40	158+80	16.24	-	1,485	1,480	60	2:1	9.5	.020	1.98	
158+80	175+60	16.12	-	1,466	1,541	50	2:1	7.5	.069	3.16	
175+60	220+60	15.63	-	1,393	1,617	50	2:1	7.7	.069	3.21	
220+60	239+70	7.07	-	1,346	1,363	45	2:1	6.8	.092	3.42	
239+70	292+00	6.70	-	1,288	1,291	45	2:1	6.6	.092	3.36	
292+00	324+50	4.95	-	1,118	1,133	60	2:1	4.5	.160	3.65	
										Total Stream Channel Improvement	544.74

1/ Excludes area controlled by floodwater retarding structures.
2/ Drainage curve (Delta) $40M^{5/6}$.
3/ Existing channel capacity exceeds requirement.
4/ Channel capacity includes release flows from floodwater retarding structures.

TABLE 3B - STRUCTURE DATA

GRADE STABILIZATION STRUCTURES

Village and Walker Creek Watershed, Texas

(Trinity River Watershed)

Designation	Structure Site Number	Drainage Area 1/ (acres)	Drop (feet)	Concrete (cu.yds.)	Type Structure	Numb
Stream Channel Improvement	101	3,610	6.4	120	Drop	1
Ditch No. 1 and Laterals				117	Chutes	39
Ditch No. 9 and Laterals				21	Chutes	7

1/ Exclusive of areas controlled by floodwater retarding structures.

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TABLE 3C - STRUCTURE DATA

OUTLETS

Village and Walker Creek Watershed, Texas

(Trinity River Watershed)

Designation	Concrete (cu.yds.)	Type Structure	Size	Number
Ditch No. 1	14.0	Automatic drainage gate (flap type)	5' x 6'	2
Ditch No. 9	11.0	Automatic drainage gate (flap type)	3' x 4'	2
Ditch No. 13	10.0	Automatic drainage gate (flap type)	3' x 3'	1
Ditch No. 14	10.0	Automatic drainage gate (flap type)	3' x 3'	1

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TABLE 4 - ANNUAL COST 1/

Village and Walker Creek Watershed, Texas

(Trinity River Watershed)

(Dollars)

Evaluation Unit	Amortization of Installation Cost 2/	Operation and Maintenance Cost 3/	Total
Stream Channel Improvement, Floodwater Diversion and Drainage Ditches 1 through 14, including Appurtenances.	18,819	13,539	32,358
TOTAL	18,819	13,539	32,358

1/ Does not include work plan preparation costs.

2/ Amortization period, 50 years; interest rate, 2-7/8 percent.

3/ Based on 1961 prices.

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TABLE 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS

Village and Walker Creek Watershed, Texas
(Trinity River Watershed)
(Dollars) 1/

Item	Estimated Average Annual Damage: Without Supplemental Project	With Supplemental Project	Damage Reduction Benefits
Floodwater			
Crop and Pasture	9,513	1,367	8,146
Other Agricultural	315	16	299
Nonagricultural (Roads and Bridges)	14	0	14
Subtotal	9,842	1,383	8,459
Sediment			
Overbank Deposition	59	1	58
Other	145	0	145
Subtotal	204	1	203
Erosion			
Flood Plain Scour	76	5	71
Indirect	998	139	859
TOTAL	11,120	1,528	9,592

1/ Price Base: Long-term, ARS, September 1957.

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TABLE 6 - COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

Village and Walker Creek Watershed, Texas

(Trinity River Watershed)

(Dollars)

Evaluation Unit	AVERAGE ANNUAL BENEFITS 1/				Average Annual Cost 2/	Benefit-Cost Ratio
	Flood Prevention		Agricultural Water Management			
	Damage Reduction	More Intensive Land Use	Drainage	Total		
Stream Channel Improvement, Floodwater Diversion, and Drainage Ditches 1 through 14, including Appurtenances	9,592	37,494	37,493	84,579	32,358	2.6:1
TOTAL	9,592	37,494	37,493	84,579	32,358	2.6:1

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

2/ From table 4.

TABLE 1 - ESTIMATED PROJECT INSTALLATION COST

Village and Walker Creek Watershed, Texas
(Trinity River Watershed)
Price Base: 1961

Installation Cost Item	Unit	Number	Estimated Cost (Dollars) Federal	Non-Federal 1/	Total Proj Tota
LAND TREATMENT					
Soil Conservation Service					
Conservation Cropping System	Acre	31,690	-	-	-
Contour Farming	Acre	27,000	-	27,000	27
Cover and Green Manure Crop	Acre	22,760	-	158,396	158
Crop Residue Use	Acre	30,310	-	60,620	60
Grasses and Legumes in Rotation	Acre	6,974	-	42,700	42
Land Clearing	Acre	240	-	18,000	18
Pasture and Hayland Renovation	Acre	9,000	-	116,818	116
Pasture Planting	Acre	9,163	-	109,781	109
Pasture Proper Use	Acre	20,183	-	70,641	70
Brush and Weed Control	Acre	7,067	-	183,742	183
Diversion	Foot	147,840	-	5,322	5
Farm Ponds	No.	408	-	89,760	89
Grade Stabilization Structures	No.	25	-	25,000	25
Grassed Waterway or Outlet	Acre	792	-	44,334	44
Land Smoothing	Acre	3,000	-	15,000	15
Main or Lateral	Foot	330,000	-	33,000	33
Field Ditch	Foot	418,000	-	20,900	20
Terrace, Gradient	Foot	5,079,360	-	80,100	80
Technical Assistance (Accelerated)			154,296	-	154
SCS Subtotal			154,296	1,101,114	1,255
TOTAL LAND TREATMENT			154,296	1,101,114	1,255
STRUCTURAL MEASURES 2/					
Soil Conservation Service					
Floodwater Retarding Structures	No.	19	672,350	-	672,
Floodwater Diversion	Foot	22,000	23,960	-	23,
Drainage Main or Lateral 3/	Foot	101,990	98,959	19,744	118,
Stream Channel Improvement 3/	Foot	77,600	220,020	14,650	234,
SCS Subtotal			1,015,289	34,394	1,049,
Subtotal - Construction			1,015,289	34,394	1,049,
Installation Services					
Soil Conservation Service					
Engineering Services			216,755	-	216,
Other			96,522	-	96,
Subtotal - Installation Services			313,277	-	313,
Other Costs					
Land, Easements and Rights-of-way			-	285,691	285,
Legal Fees			-	4,600	4,
Subtotal - Other			-	290,291	290,
TOTAL STRUCTURAL MEASURES			1,328,566	324,685	1,653,
WORK PLAN PREPARATION			16,500	-	16,
TOTAL PROJECT			1,499,362	1,425,799	2,925,
SUMMARY					
Subtotal SCS			1,499,362	1,425,799	2,925,
TOTAL PROJECT			1,499,362	1,425,799	2,925,

1/ Excludes moneys that were reimbursed from Federal funds (ACFS) to private interest.

2/ Prices used in 1960 Work Plan, as revised, were adjusted to 1961 price base.

3/ Includes appurtenant structures.

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INVESTIGATIONS AND ANALYSES

Hydrologic Investigations

Investigations and studies were made on the area to be considered for dr age. The steps taken for this study were as follows:

1. Engineering surveys were made to collect topographic information necessary to plan the drainage system and floodwater diversion No. 2.

2. A reservoir operations type study for a 21-year period (1939-1959) was made on the area within the levees and flooding on the inside area was correleated with simultaneous stages on the Trinity River. The study indicated the depth-duration relationship of flooding on the area protected by levees and permitted an evaluation of expected benefits.

   A study of the possibilities for a pumping plant system revealed that the costs of such a system were prohibitive when compared to expected benefits.

3. The mains and laterals for the drainage were planned to follow existing natural drains except where deviations proved to be more desirable. The portion of the watershed considered for drainage is classified as bottomland and the delta area curve is applicable. All the laterals and main ditches were designed using curves based on the formula, $Q = 40M^{5/6}$ where:

   Q = required ditch capacity in cubic feet per second
   M = drainage area in square miles

   This delta curve is shown in Figure 6-6, Chapter 6, Section 16, National Engineering Handbook.

   The drainage ditches and appurtenant structures are sized to permit passage of the designed flow within a 24-hour period, except for periods of high stage on the Trinity River.

4. Stream channel improvement previously planned for Smith Creek was reexamined and a portion was modified to permit its use as a multiple-purpose channel.

   The segment planned for multiple-purpose use required enlarging and deepening to permit flow from the main ditches of the drainage system.

More detailed surveys revealed that a grade stabilization structure is needed on the single-purpose portion of the channel. A structure is included at a location which will permit it to serve both as a grade stabilization structure for the stream channel and as a side inlet for flow from the floodwater diversion No. 2.

Sedimentation Investigations

A detailed study of the sediment sources above proposed floodwater diver No. 2 was made. Field surveys included: mapping soil units by slope in percent; slope length in feet; present land use; present land treatment cropland; present cover condition classes on pasture; land capability classes; lengths, widths, and depths of all gullies; and the estimated annual lateral erosion of gullies.

Channel Stability Investigations

Borings were made along the proposed Smith Creek channel improvement and along the planned main ditches and laterals. These soils are cohesive and classified as CL and CH under the Unified Soil Classification System Investigations indicate that the proposed channel, ditches and laterals will be excavated in relatively stable materials.

Economic Investigations

In preparing the supplement to include drainage for the Village and Walk Creek watershed, a breakdown of acreages by soil units was made for the 10,400 acres concerned. Present and expected future land use, showing production returns for soil units 4b and $4a_1$, were determined. Similar information was also developed for soil units 4 and 4Z on which a lesser degree of benefits per acre could be expected. No benefits from a drainage system were claimed for other soil units.

Present land use was mapped in the field and estimates of normal yields were based on production records supplemented by information from agricu tural workers with experience in the area. Expected increases in yields with drainage for various crops were based on Drainage Survey Report prepared for the U. S. Study Commission-Texas by the Soil Conservation Service and adjusted to local soil and climatic conditions.

Complete drainage of the leveed area when the Trinity River is at high stage is impossible without pumping. This possibility was investigated for those periods when rainfall records showed need for drainage concurrently with high stages of the Trinity River, but pumping was determined not to be economically feasible. The average annual damage to flooded areas at such times with the drainage system installed was determined and deducted from the expected increase in income from enhancement.

Construction of floodwater diversion No. 2 was determined to be a less costly alternative than controlling runoff from its 442 acres of hillsid drainage area by means of group waterways and increased size of ditch No. 1. Expected benefit from reduction of sediment deposition on the flood plain with the diversion was also determined.

Benefits from increased income due to changed land use were separated from other enhancement benefits with drainage. Additional input costs i production were allowed to offset part of income from increased yields.

Cost of on-farm drainage and allowance for operation and maintenance was estimated on the basis of Drainage Survey Report, U. S. Study Commission Texas, and this was deducted as an associated cost.

Cost allocation and cost sharing was discussed with the sponsors.

Table A - Summary of Benefits From More Intensive Use of Benefited Land

Village and Walker Creek Watershed, Texas
(Trinity River Watershed)

Land Use	Unit of Production	Without Project - Before Drainage: Acres	Yield Per Acre	Gross Income (dollars)	Production Cost (dollars)	Net Return (dollars)	With Project - After Drainage: Acres	Yield Per Acre	Gross Income (dollars)	Production Cost (dollars)	Net Return (dollars)
Soil Units 4a1 and 4b											
Cotton	Lb.	670	250	50,250	39,624	10,626	810	420	102,060	64,427	37,633
Grain Sorghum	Cwt.	310	15	8,510	4,842	3,668	440	30	24,156	8,193	15,963
Johnsongrass	Ton	620	0.8	9,523	6,758	2,765	520	2	19,968	10,660	9,308
Idle	-	300	-	-	-	-	60	-	-	-	-
Oats	Bu.	450	25	9,225	8,968	257	580	35	16,646	11,849	4,797
	AUM		2	1,863	112	1,751		3	3,602	145	3,457
Woods	-	200	-	-	-	-	80	-	-	-	-
Pasture	AUM	170	1.5	528	-	528	230	3	1,428	-	1,428
Miscellaneous	-	260	-	-	-	-	260	-	-	-	-
Total		2,980		79,899	60,304	19,595	2,980		167,860	95,274	72,586
Soil Units 4 and 4Z											
Cotton	Lb.	2,040	375	229,500	151,246	78,254	2,250	420	283,500	178,965	104,535
Grain Sorghum	Cwt.	950	20	34,770	15,789	18,981	1,040	32	60,902	19,781	41,121
Johnsongrass	Ton	170	1.5	4,896	2,805	2,091	150	2	5,760	3,075	2,685
Idle	-	350	-	-	-	-	-	-	-	-	-
Oats	Bu.	500	35	14,350	10,215	4,135	620	45	22,878	12,977	9,901
	AUM		2.5	2,588	125	2,463		3	3,850	155	3,695
Wheat	Bu.	400	25	16,000	8,156	7,844	450	30	21,600	9,288	12,312
	AUM		1.5	1,242	100	1,142		2	1,863	112	1,751
Alfalfa	Ton	260	3.0	21,294	7,345	13,949	290	3.6	28,501	9,584	18,917
Sudan	Ton	600	1.2	13,824	10,260	3,564	500	1.5	14,400	9,750	4,650
Woods	-	100	-	-	-	-	30	-	-	-	-
Pasture	AUM	160	1.5	497	-	497	200	3	1,242	-	1,242
Miscellaneous	-	140	-	-	-	-	140	-	-	-	-
Total		5,670		338,961	206,041	132,920	5,670		444,496	243,687	200,809

Gross Benefit from Drainage	120,880
Less Remaining Drainage Without Pumping	2,280
Less Associated Costs 1/	10,492
Added Overhead and Taxes	12,975
Net Benefit from Drainage and Flood Prevention	95,133
Discounted Annual Benefits (78.8 percent) 2/	74,987

1/ Includes clearing costs; installation and maintenance of on-farm drainage.
2/ Discounted for 5-year lag at 5 percent interest and 85 percent participation

Table B - Cost Allocation and Cost-Sharing
Village and Walker Creek Watershed, Texas
(Trinity River Watershed)
(Dollars)

Multiple-Purpose Channel - Coat Allocation

Item	Single-Purpose: Drainage	Single-Purpose: Flood Prevention	Multiple-Purpose: Flood Prevention and Drainage
Engineer's Estimate			
Construction	29,480	83,600	86,427
Installation Services			
Engineering Services	7,370	12,540	11,236
Administration and Miscellaneous	2,810	5,532	7,447
Land, Easements and R/W	21,960	21,960	22,110
Total Installation Cost	61,620	123,632	127,220
Allocation to Purpose	42,317	84,903	127,220
Percent	33.263	66.737	100.00

Computation of Allocation:

$$\frac{61,620}{61,620 + 123,632} = \frac{61,620}{185,252} = 0.33263$$

$127,220 x 0.33263 = $42,317 for Drainage

$127,220 - $42,317 = $84,903 for Flood Prevention

Costs on Ditches No. 1, 9, 13, and 14 with Laterals and Appurtenances were allocated 50 percent to Flood Prevention and 50 percent to Drainage.

Multiple-Purpose Channel - Cost-Sharing

Item	Flood Prevention: Flood Prevention Funds	Flood Prevention: Other	Flood Prevention: Total	Agricultural Water Management: Flood Prevention Funds	Agricultural Water Management: Other	Agricultural Water Management: Total	Total	Recapitulation: Flood Prevention Funds	Recapitulation: Other
Construction	57,679	-	57,679	14,098	14,650	28,748	86,427	71,777	14,650
Installation Services	7,499	-	7,499	3,737	-	3,737	11,236	11,236	-
Administration of Contracts	4,970	-	4,970	2,477	-	2,477	7,447	7,447	-
Land, Easements and R/W	-	14,755	14,755	-	7,355	7,355	22,110	-	22,110
Total Installation Costs	70,148	14,755	84,903	20,312	22,005	42,317	127,220	90,460	36,760
Allocated to Purpose - Percent			66.737			33.263	100.00	71.1	28.9
Cost-Sharing within Purpose - Percent	82.62	17.38	100.00	48.0	52.0	100.00			

Ditches No. 1, 9, 13 and 14 With Laterals and Appurtenances

Item	Flood Prevention: Flood Prevention Funds	Flood Prevention: Other	Flood Prevention: Total	Agricultural Water Management: Flood Prevention Funds	Agricultural Water Management: Other	Agricultural Water Management: Total	Total	Recapitulation: Flood Prevention Funds	Recapitulation: Other
Construction	59,351	-	59,351	39,608	19,744	59,352	118,703	98,959	19,744
Installation Services	14,428	-	14,428	14,428	-	14,428	28,856	28,856	-
Administration of Contracts	5,622	-	5,622	5,622	-	5,622	11,244	11,244	-
Land, Easements and R/W	-	44,886	44,886	-	44,885	44,885	89,771	-	89,771
Total Installation Costs	79,401	44,886	124,287	59,658	64,629	124,287	248,574	139,059	109,515
Cost Allocation - Percent			50.00			50.00	100.00	55.94	44.06
Cost-Sharing - Percent	63.9	36.1	100.00	48.00	52.00	100.00			

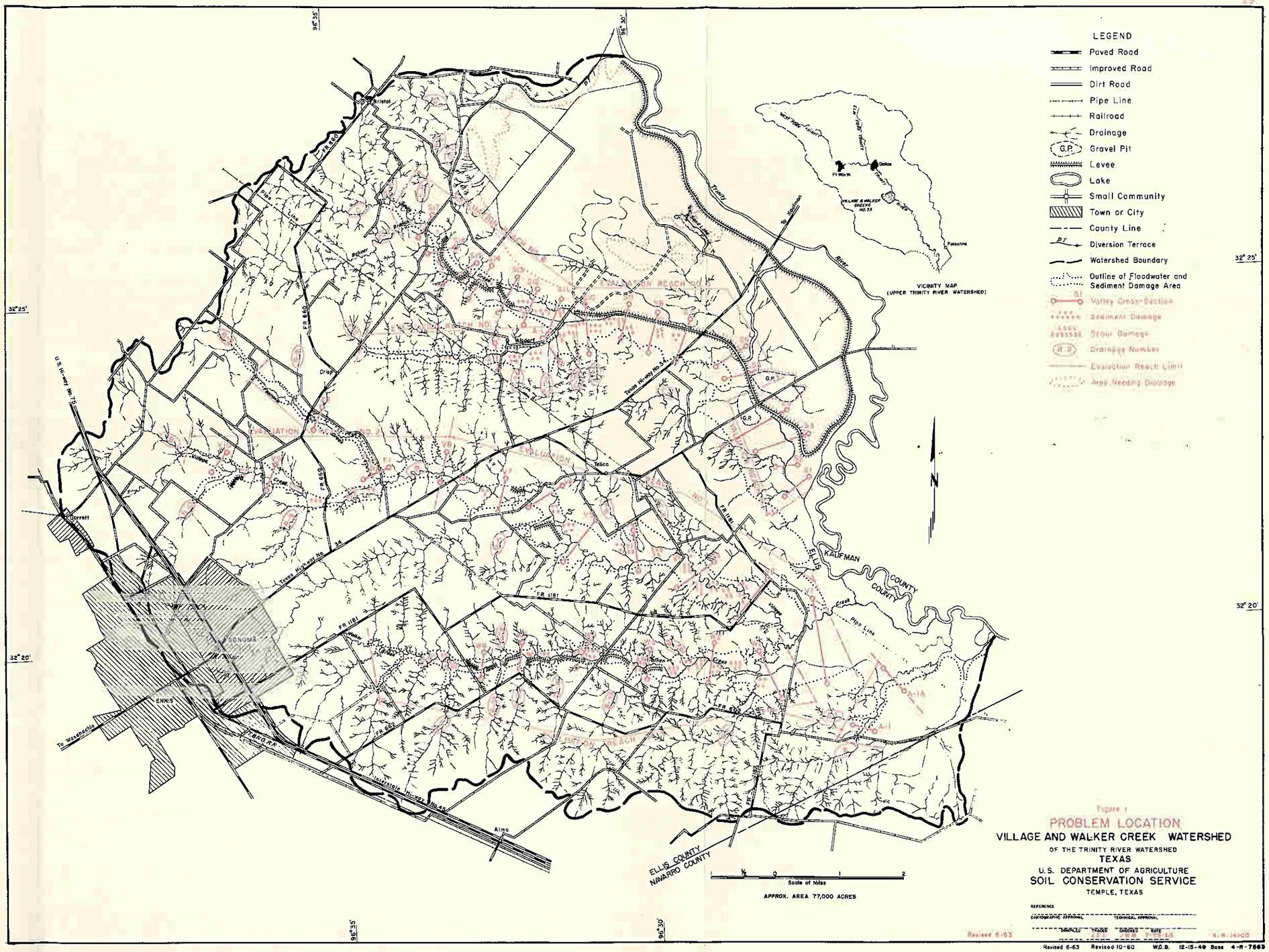


Figure 1

PROBLEM LOCATION

VILLAGE AND WALKER CREEK WATERSHED

OF THE TRINITY RIVER WATERSHED

TEXAS

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

TEMPLE, TEXAS

REFERENCE

CARTOGRAPHIC APPROVAL | TECHNICAL APPROVAL

DRAWN | TRACED | CHECKED | DATE

Revised 6-63 | Revised 10-60 | W.O.S. 12-15-49 Base 4-R-7665

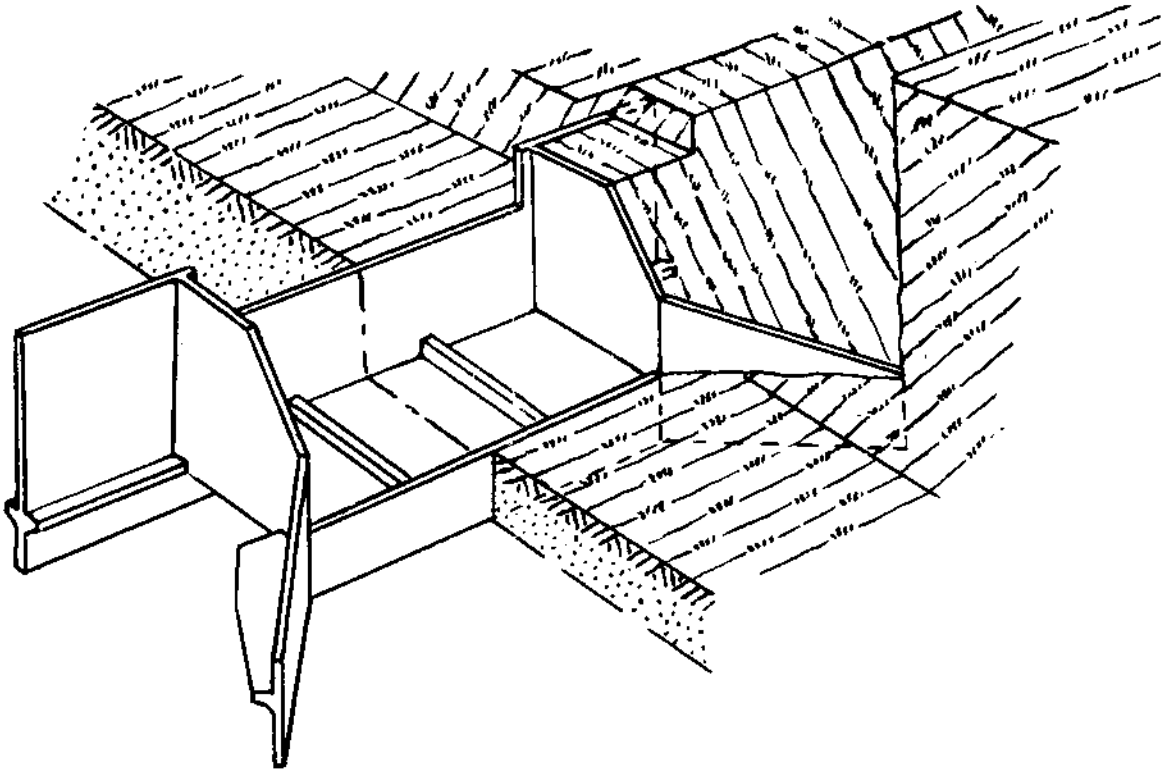
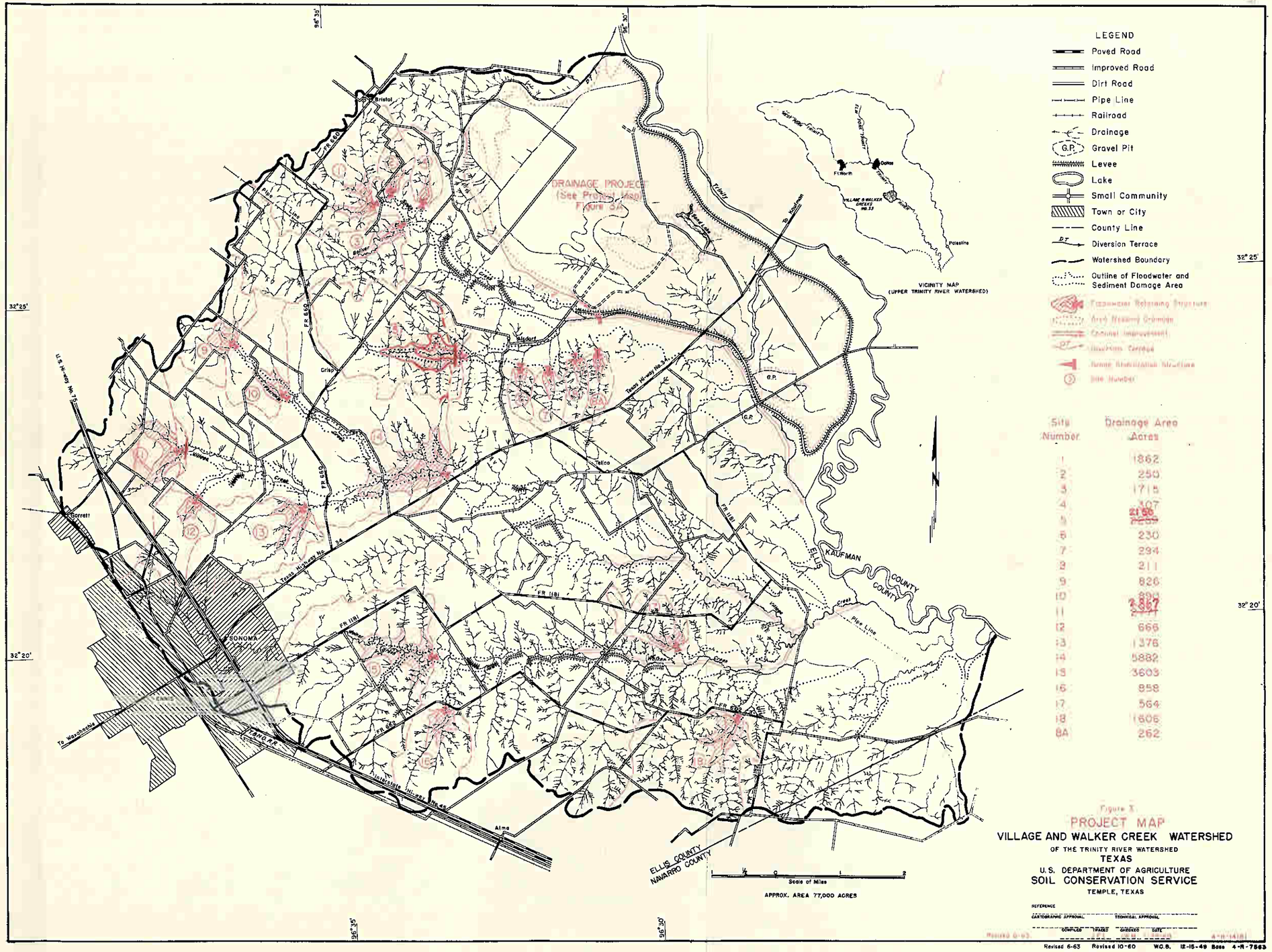


Figure 2

PERSPECTIVE VIEW TYPICAL DROP SPILLWAY

6-63 4-L-1793



Site Number	Drainage Area Acres
1	1862
2	250
3	1715
4	107
5	2196
6	230
7	294
8	211
9	826
10	830
11	2367
12	666
13	1376
14	5882
15	3603
16	858
17	564
18	1606
8A	262

Figure 3

PROJECT MAP

VILLAGE AND WALKER CREEK WATERSHED

OF THE TRINITY RIVER WATERSHED

TEXAS

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

TEMPLE, TEXAS

REFERENCE

CARTOGRAPHIC APPROVAL _____ TECHNICAL APPROVAL _____

COMPILED _____ TRACED _____ CHECKED _____ DATE _____

Revised 6-63 Revised 10-60 W.C.S. 12-15-49 Base 4-R-7563

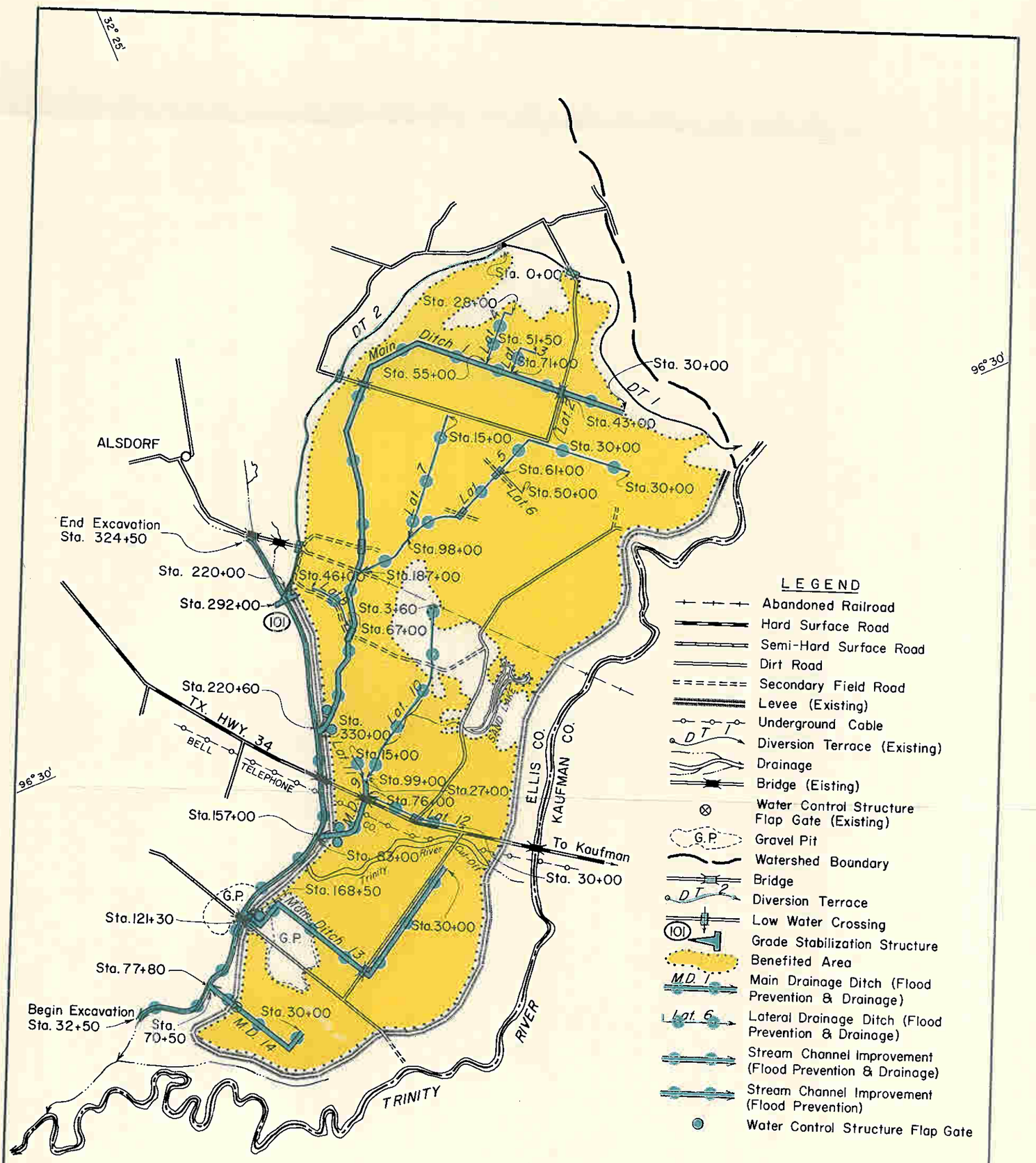


Figure 3A

PROJECT MAP
DRAINAGE
VILLAGE AND WALKER CREEK WATERSHED
OF THE TRINITY RIVER WATERSHED
TEXAS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
TEMPLE, TEXAS

6-63 4-R-17948