

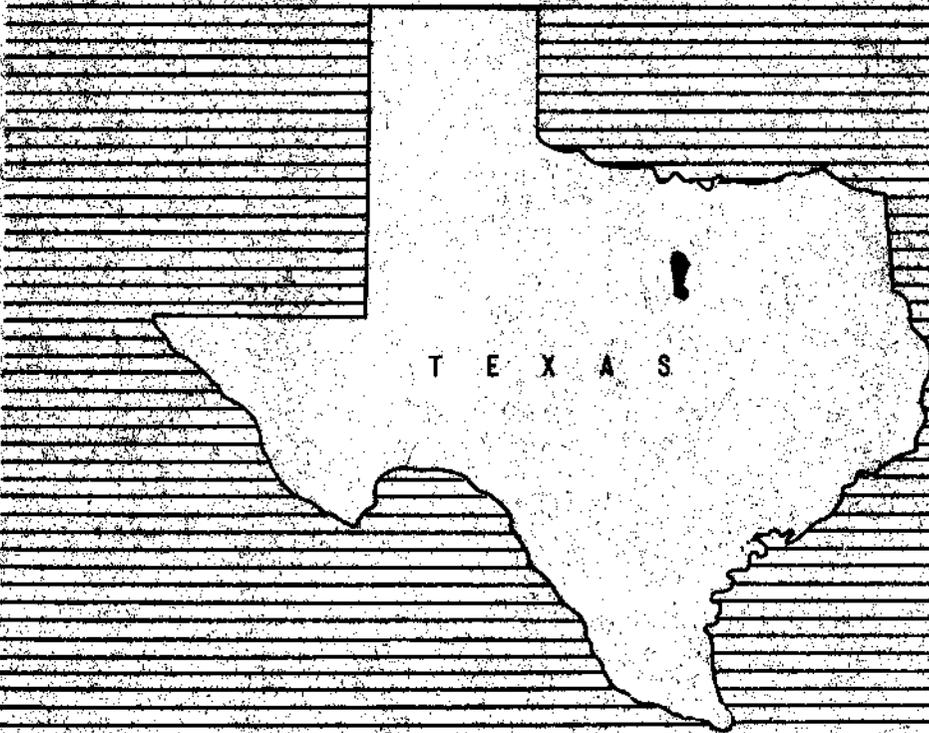
WORK PLAN

FOR

WATERSHED PROTECTION AND FLOOD PREVENTION

**RUCKERS CREEK
WATERSHED**

HOOD AND PARKER COUNTIES, TEXAS



SEPTEMBER 1966

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WATERSHED WORK PLAN AGREEMENT

between the

Hood-Parker Soil and Water Conservation District
Local Organization

Hood County Commissioners Court
Local Organization

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, application has heretofore been made to the Secretary of Agriculture by the Sponsoring Local Organization for assistance in preparing a plan for works of improvement for the Ruckers
Creek Watershed, State of Texas
under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83d Congress; 68 Stat. 666), as amended; and

Whereas the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to the Service; and

Whereas there has been developed through the cooperative efforts of the Sponsoring Local Organization and the Service a mutually satisfactory plan for works of improvement for the Ruckers
Creek Watershed, State of Texas,
hereinafter referred to as the watershed work plan, which plan is annexed to and made a part of this agreement;

Now, therefore, in view of the foregoing considerations, the Sponsoring Local Organization and the Secretary of Agriculture, through the Service, hereby agree on the watershed work plan, and further agree that the works of improvement as set forth in said plan can be installed in about three years.

It is mutually agreed that in installing and operating and maintaining the works of improvement substantially in accordance with the terms, conditions, and stipulations provided for in the watershed work plan:

1. The Sponsoring Local Organization 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 \$ 21,225.)
2. The Sponsoring Local Organization will acquire or provide assurance that landowners or water users have acquired such water rights pursuant to State law as may be needed in the installation and operation of the works of improvement.
3. The percentages of construction costs of structural measures to be paid by the Sponsoring Local Organization and by the Service are as follows:

<u>Works of Improvement</u>	<u>Sponsoring Local Organization</u> (percent)	<u>Service</u> (percent)	<u>Estimated Construction Cost</u> (dollars)
1 Floodwater Retarding Structure	0	100	93,500

4. The percentages of the cost for installation services to be borne by the Sponsoring Local Organization and the Service are as follows:

<u>Works of Improvement</u>	<u>Sponsoring Local Organization</u> (percent)	<u>Service</u> (percent)	<u>Estimated Installation Service Cost</u> (dollars)
1 Floodwater Retarding Structure	0	100	24,237

5. The Sponsoring Local Organization will bear the costs of administering contracts. (Estimated cost \$ 500.)
6. The Sponsoring Local Organization will obtain agreements from owners of not less than 50% of the land above each reservoir and floodwater retarding structure that they will carry out conservation farm or ranch plans on their land.
7. The Sponsoring Local Organization will provide assistance to landowners and operators to assure the installation of the land treatment measures shown in the watershed work plan.
8. The Sponsoring Local Organization will encourage landowners and operators to operate and maintain the land treatment measures for the protection and improvement of the watershed.
9. The Sponsoring Local Organization will be responsible for the operation and maintenance of the structural works of improvement by actually performing the work or arranging for such work in accordance with agreements to be entered into prior to issuing invitations to bid for construction work.
10. The costs shown in this agreement 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.

11. 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 is contingent on the appropriation of funds for this purpose.

Where there is a Federal contribution to the construction cost of works of improvement, a separate agreement in connection with each construction contract will be entered into between the Service and the Sponsoring Local Organization prior to the issuance of the invitation to bid. Such agreement will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

12. The watershed work plan may be amended or revised, and this agreement may be modified or terminated, only by mutual agreement of the parties hereto.
13. No member of Congress, or resident commissioner, shall be admitted to any share or part of this agreement, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.
14. The program conducted will be in compliance with all requirements respecting nondiscrimination as contained in the Civil Rights Act of 1964 and the regulations of the Secretary of Agriculture (7 C.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.

Hood-Parker Soil and Water Conservation District
Local Organization

By Doyle Hutcherson
Doyle Hutcherson
Title Chairman
Date 3/6/67

The signing of this agreement was authorized by a resolution of the governing body of the Hood-Parker Soil and Water Conservation District Local Organization adopted at a meeting held on 3/6/67

Albert Porter
(Secretary, Local Organization)
Albert Porter
Date 3/6/67

Hood County Commissioners Court
Local Organization

By Marion E. Thomas
Marion E. Thomas
Title County Judge
Date 3/6/67

The signing of this agreement was authorized by a resolution of the governing body of the Hood County Commissioners Court Local Organization adopted at a meeting held on 3/6/67

By: Fred Fryer County Clerk ~~(SEE FRYER'S LIST OF COUNTY CLERKS)~~
Fryer Bruce Price
Bruce Price
Date 3/6/67

Soil Conservation Service
United States Department of Agriculture
By _____
State Conservationist
Date _____

WATERSHED WORK PLAN

Ruckers Creek Watershed
Hood and Parker Counties, Texas
September 1966

PREFACE

This work plan for watershed protection and flood prevention in the Ruckers Creek watershed, Texas, was prepared by the Hood-Parker Soil and Water Conservation District and the Hood County Commissioners Court, the local sponsoring organizations. Technical assistance was provided by the Soil Conservation Service of the U. S. Department of Agriculture. The Bureau of Sport Fisheries and Wildlife of the U. S. Department of the Interior collaborated with the Texas Parks and Wildlife Department in the preparation of a reconnaissance report of the fish and wildlife aspects of the watershed.

WORK PLAN
FOR
WATERSHED PROTECTION AND FLOOD PREVENTION

RUCKERS CREEK WATERSHED
Hood and Parker Counties, Texas

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

Prepared By:

Hood-Parker Soil and Water Conservation District
Hood County Commissioners Court

With Assistance By:

U. S. Department of Agriculture
Soil Conservation Service
September 1966

WATERSHED WORK PLAN

Ruckers Creek Watershed
Hood and Parker Counties, Texas
September 1966

SUMMARY OF PLAN

Ruckers Creek watershed comprises an area of 24 square miles in eastern Hood County and the southern portion of Parker County. About 18 percent of the project area is cropland, 78 percent is grassland, and about 4 percent is used for miscellaneous purposes such as roads and farmsteads. Floodwater damage to crops and pastures, other agricultural property, roads, and bridges is the primary problem. The flood plain land itself is damaged by erosion or scouring. Total floodwater and erosion damages in the watershed are estimated to be \$7,342 annually.

This work plan proposes the application and maintenance of needed land treatment measures on 868 acres of cropland and 4,779 acres of grassland at an accelerated rate during the 3-year installation period, in addition to the maintenance of those measures already applied. These measures will improve the hydrologic condition of both cropland and grassland. This improvement in soil and cover will reduce sediment to the floodwater retarding structure and will cause some reduction in flooding. The installation cost of these land treatment measures will be \$80,616. Public Law 566 funds will bear \$1,902 of this cost in order that planning, application, and maintenance of needed measures may be accomplished at an accelerated rate. The floodwater retarding structure will be constructed during the second year of the installation period at an estimated total cost of \$139,462. Local interests will provide all land, easements, rights-of-way, legal services, and contract administration at an estimated value of \$21,725.

Damages, after project installation, will be reduced from \$7,342 to \$2,322 annually. Deposition of sediment in the DeCordova Bend Reservoir, scheduled for construction in the near future on the Brazos River downstream from Ruckers Creek, will be reduced by the project, thus prolonging the useful life of the reservoir. Total benefits will be \$7,317 annually. The ratio of the average annual benefits accruing to structural measures (\$6,708) to the average annual cost of these measures (\$4,867) is 1.4 to 1.0. Approximately 20 operators of 520 acres of agricultural land, as well as non-agricultural properties, will benefit from the project.

The land treatment measures will be maintained by the owners and operators of the land upon which the measures are applied under agreements with the Hood-Parker Soil and Water Conservation District. The floodwater retarding structure will be operated and maintained by the Hood County Commissioners Court.

DESCRIPTION OF THE WATERSHED

Physical Data

Ruckers Creek is a tributary of the Brazos River in North Central Texas. It heads near the town of Cresson, 23 miles southwest of Fort Worth, and flows into the Brazos River near Granbury, the county seat of Hood County. Nolan Branch is the only tributary of significant size. DeCordova Bend Reservoir, scheduled for construction at an early date, is located downstream on the Brazos River and will back water into the lower reach of Ruckers Creek. The total drainage area of the watershed is 15,360 acres or 24 square miles, of which 93 percent is in northeastern Hood County and 7 percent in southern Parker County.

Moderately deep valleys and rolling topography occur on the hard limestones and interbedded thin marls of the Glen Rose formation in the extreme lower part. A gently rolling topography occurs across the lower central third of the watershed on the soft sandstones of the Paluxy formation. The upper half has a moderately rolling topography occurring on soft marls and interbedded hard limestones of the Walnut and Comanche Peak formations. Elevations above mean sea level range from 650 feet at the Brazos River to 1,150 feet on the watershed divide.

About 65 percent of the watershed is in the Grand Prairie Land Resource Area. The Grand Prairie soils consist of clays of shallow to medium depth which have developed from the marl and limestone bedrock materials under a tallgrass prairie vegetation. The major series include the Tarrant and Denton soils. The dominant land use is for rangeland. Soils of the Cross Timbers Land Resource Area are found in the remainder of the watershed. The sandy, post oak timbered soils have developed on the sandstone bedrock material. The dominant series are Stephenville, Windthorst, and Nimrod. Most of these soils are used for cultivation. The alluvial soils have been derived largely from Grand Prairie materials and are of the Frio or Frio-like series. The land use for the watershed is as follows:

<u>Land Use</u>	<u>Acres</u>	<u>Percent</u>
Cropland	2,803	18
Grassland	12,009	78
Miscellaneous ^{1/}	548	4
	<hr/> 15,360	<hr/> 100

^{1/} Roads, railroads, and farmsteads.

The mean annual rainfall is 30.4 inches. The largest monthly amount normally falls in May and the smallest amount normally falls in August. The mean temperature is 67 degrees. The average date of the last freeze

in the spring is March 26 and the average date of the first freeze in the fall is November 13, providing a growing season of 232 days.

Economic Data

Ruckers Creek watershed is located in an area that is dependent upon agriculture for almost half of its total income. Eighty-six percent of the total agricultural income is derived from livestock and poultry and the balance from oats, grain sorghum, peanuts, and hay.

Present flood plain land use is as follows: range, 49 percent; sorghum hay, 26 percent; oats, 18 percent; improved pasture, 3 percent; pecans, 2 percent; corn, 1 percent; and miscellaneous uses, 1 percent. Future trends are toward more grass and livestock production. Farms in the watershed and in Hood County are becoming fewer in number but larger in size. In 1954, Hood County had 803 farms averaging 327 acres in size and valued at \$23,725 each. By 1959 farm numbers had dropped to 603, but average acreage and value had risen to 396 and \$31,862, respectively.

Ruckers Creek watershed has 70 operating farm units averaging 220 acres in size. Most of the farm operators work off the farm from 70 to 80 percent of the time in order to supplement farm income. This is not done by choice, but is necessitated by the small size of the farms and the relatively low production of the upland soils. Agricultural land is not utilized near its potential because 44 percent of the farm operators are 55 or more years of age. Fifty-four percent of the farms gross less than \$2,500 per year. The opportunity for improving local economic conditions is excellent because average farm income is low, off-farm employment opportunities are limited and wage rates are low.

The city of Granbury, located just outside the western boundary of the watershed, has an estimated population of 2,550. It is the county seat of Hood County. In addition to providing adequate merchandise and services for the surrounding populace, Granbury is a marketing center for farm and ranch products. Good highways and rail facilities serve the city for both north-south and east-west travel. Approximately 23 miles of all-weather roads and 7 miles of railroad provide adequate transportation facilities throughout the watershed.

Land Treatment Data

The watershed is served by the Soil Conservation Service Work Unit at Granbury, which assists the Hood-Parker Soil and Water Conservation District.

Farm operators have made good progress in the establishment of land treatment measures needed for the continued utilization and conservation of agricultural land.

The soil and water conservation district has done an excellent job in getting conservation measures planned, applied, and maintained throughout the watershed. Basic soil and water conservation plans, covering 83 percent of the land, have been developed on 47 of the 70 operating units in the watershed.

WATERSHED PROBLEMS

Floodwater Damage

Damage to crops, pastures, and range is extensive. Other agricultural property, roads, and bridges also suffer severe damage. Approximately 520 acres of fertile flood plain suffer damage. Flood plain lands were intensively cultivated from the early 1900's through the 1940's, but flooding, with resultant crop losses, caused the abandonment of much of this fertile land to poor quality range. Major floods, inundating more than 50 percent of the flood plain, occur on an average of once every three or four years. Minor flooding of some portions of the flood plain occurs practically every year. The largest flood of record occurred in 1949. Floods are caused by storms of high intensity and short duration, a type of storm quite common in this area.

Because of the ever-present flood threat to cropland, grassland, and fertile soil, flood plain lands are managed in a manner that results in production well below the actual potential of the land. The value of this land varies from \$100 to \$250 per acre, depending upon location within the watershed. The value of production varies from \$4.13 to \$96.80 under present use.

Under non-project conditions the estimated average annual monetary damage by floodwater is \$5,501. Of this amount, \$4,107 is crop and pasture; \$844, other agricultural property; and \$550, road and bridge. Indirect damage, such as interruption of livestock feeding and management regimen, losses sustained by businessmen of the area, and similar losses, is estimated at \$667 annually.

Erosion Damage

Soil erosion in the form of flood plain scouring has caused moderate damages on 114 acres. This damage has resulted from the repeated removal of the topsoil, usually to plow depths. Damage to the soil in terms of reduced productivity ranges from 5 to 80 percent. The total amounts of topsoil removed in the damaged areas are as follows: 20 percent on 44 acres, 40 percent on 23 acres, 60 percent on 17 acres, 80 percent on 19 acres, and up to 100 percent on 11 acres. The average annual damage from scour is \$1,174.

Sediment Damage

Moderately low sediment loads are being carried by Ruckers Creek. Over-bank deposition is not serious and damage from the sandy loam and loamy materials is not significant. The sediment load delivered to the Brazos River, however, amounts to 15.6 acre-feet annually.

Problems Relating to Water Management

Water for rural domestic and livestock use is obtained from wells, farm ponds and streams.

Opportunities for water-based recreation are limited for residents of this area. The Brazos River is available for fishing. The nearest large lake with facilities for recreation is Benbrook Reservoir, about 25 miles northeast of the watershed.

There is no evidence of stream pollution.

PROJECTS OF OTHER AGENCIES

Ruckers Creek will discharge its water into DeCordova Bend Reservoir, a multiple-purpose reservoir being planned for construction by the Brazos River Authority. The reservoir will be located on the Brazos River below Granbury.

BASIS FOR PROJECT FORMULATION

A meeting was held with the sponsoring local organizations to discuss problems in the watershed and to determine their objectives and the degree of development desired. The Hood-Parker Soil and Water Conservation District listed as objectives the improvement of the low farm income and a level of flood protection to the flood plain of Ruckers Creek that would reduce the average annual damages by 65 to 70 percent. It was agreed that the application of 80 percent of the needed land treatment measures prior to the end of the project installation period is essential in order that project objectives be accomplished. The Hood County Commissioners Court joins the Hood-Parker Soil and Water Conservation District as an active partner to assist them in accomplishing their objectives.

Field investigations indicated that there were only three locations for floodwater retarding structures. One of the sites offered opportunities for multiple-purpose development. This was called to the attention of the sponsors, but no interest was expressed in providing additional storage capacities.

Detailed field surveys and evaluations of potential structures indicated that one floodwater retarding structure would provide the least costly means of meeting objectives of the project sponsors.

WORKS OF IMPROVEMENT TO BE INSTALLED

Land Treatment Measures

The use of each acre of land within its capabilities and its treatment in accordance with its needs has long been recognized as basic in the building of a strong and free community, state or nation. Sponsors of this project are well aware of this fact, and the installation and maintenance of needed land treatment measures is deemed essential. Realizing that adequate soil surveys are the first step in the planning and application of land treatment measures, approximately 7,205 acres of surveys are scheduled for completion during the first year of the 3-year installation period. With this accomplished, planning and application of needed measures can be achieved without interruption and on schedule.

In addition to effectively maintaining those land treatment measures already established (table 1A), additional conservation measures to be applied and maintained include conservation cropping system, contour farming, cover and green manure crops, gradient and parallel terraces, and diversions.

Land clearing, pasture planting, pasture and hayland renovation and management will be applied on marginal cropland and on rangeland now infested with invading brush. Brush will be controlled by both chemical and mechanical means on rangeland. It is expected that proper management of this land will enable native grasses to become re-established; however, some seeding of native and adapted introduced grasses will be accomplished where seed sources are deemed inadequate to assure rapid re-establishment of native grasses. Range proper use and range deferred grazing will assure high production of good quality grasses on a sustained yield basis. Farm ponds will be constructed to provide for more uniform distribution of grazing. These measures, combined with improved livestock management, will result in proper utilization of forage and will reduce heavily overgrazed areas.

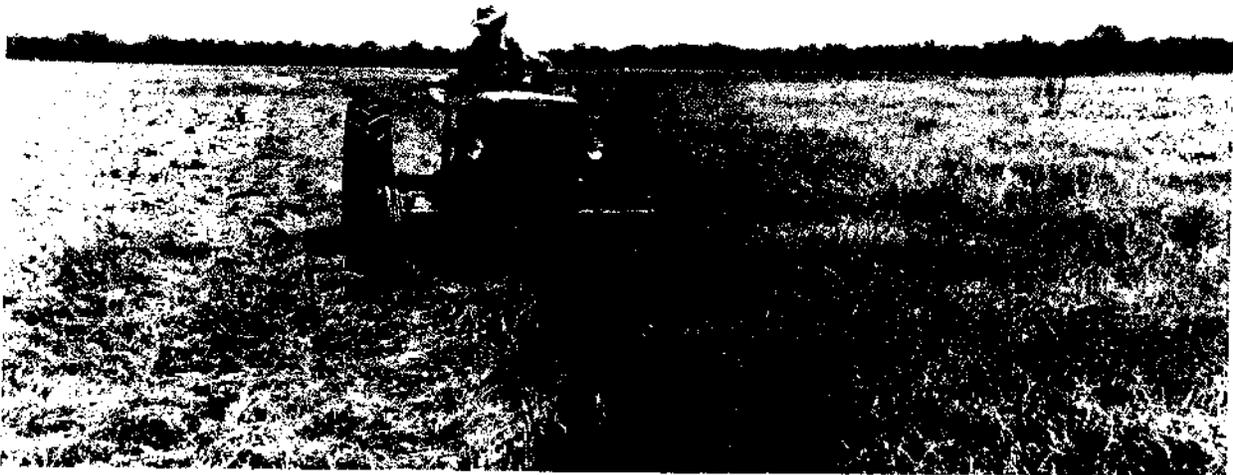
These planned land treatment measures will improve soil cover and condition. This improvement will hold soil and water losses to a minimum, will assure proper functioning of the floodwater retarding structures, will reduce flooding, and will increase the income of the operators of agricultural lands to a comfortable level in harmony with a prosperous and expanding economy.

Structural Measures

One floodwater retarding structure will be constructed to provide flood protection to the agricultural land in the flood plain of Ruckers Creek (figure 2). This structure will detain runoff from 26 percent of the entire watershed.



This range site, when properly managed, will produce great quantities of high quality forage on a sustained yield basis, and will effectively control erosion. Invading trees and brush had rendered this rangeland practically useless for forage production less than one year before photograph was taken. Brush control, range seeding, normal rainfall, and deferment for one growing season made the difference.



Many acres of poor quality rangeland and marginal cropland have been sodded to coastal bermudagrass. This grass, when properly managed, produces large amounts of high quality hay and grazing. Soil erosion on such areas is practically nil.

The total capacity of the floodwater retarding structure is 1,598 acre-feet, of which 300 acre-feet is provided for sediment accumulation over a 100-year period and 1,298 acre-feet is provided for floodwater detention storage. The crest of the principal spillway will be placed at the elevation of the 50-year sediment pool (133 acre-feet). This structure will detain 3.90 inches of runoff from its drainage area.

The structure site is located on the Paluxy sand and Walnut marl formations of Lower Cretaceous age. The geologic structure of these beds is simple with a slight dip to the southeast. Massive, weakly cemented, soft sandstones of the Paluxy formation occur in the foundation and lower parts of the abutments. The soft marls and interbedded thin to medium bedded hard limestones of the Walnut formation occur in the upper abutments and emergency spillway. Limestone-derived terrace gravel deposits occur on the right abutment. The alluvial valley consists of clays and silty, sandy, and gravelly clays (CH and CL) resting on the soft sandstone bedrock.

The estimated cost of the floodwater retarding structure is \$139,462. Figure 1 shows a section of a structure which is typical of the floodwater retarding structure to be installed. Tables 1, 2, and 3 show details on quantities, cost, and design features.

EXPLANATION OF INSTALLATION COSTS

Land treatment measures listed in table 1 will be applied by local interests at an estimated cost of \$80,616. This includes funds for Public Law 46 and PL 566 technical assistance to be furnished by the Soil Conservation Service and Agricultural Conservation Program cost sharing as administered by the Agricultural Stabilization and Conservation Service. Current costs were used for the establishment and application of the various measures. To expedite the application of these measures, \$1,902 of Public Law 566 funds will be provided to accelerate technical assistance during the 3-year installation period. This amount includes \$633 for the completion of soil surveys during the first year.

The total installation cost of the floodwater retarding structure is estimated to be \$139,462. Of this total, \$93,500 is for construction and \$24,237 is for installation services, all of which will be borne by Public Law 566 funds. The local share of the cost is \$21,225 for land, easements, rights-of-way, and legal fees and \$500 for contract administration (table 2).

The construction cost includes the engineer's estimate and contingencies. The engineer's estimate is based on the unit cost of construction items planned for the structure. The unit cost is based on the actual cost of structural measures constructed in similar areas and modified to fit conditions found in this watershed. Ten percent of the engineer's estimate was added as a contingency to provide funds for unpredictable construction costs.

Installation services consist of engineering and administrative costs and are based on Service experience in similar areas. The engineering portion of this cost consists of, but is not limited to, detailed surveys, geological investigations, laboratory reports, designs, cartographic services, and inspection services.

The sponsors' cost for land was based on the appraised value of the land needed for the installation of the structure. Appraisals were based on current prices being paid for land in the area. The estimated cost of legal fees was based on the number of easements to be obtained. The cost of contract administration is based on experience in other watersheds.

The estimated schedule of obligations for the 3-year installation period, covering installation of land treatment and structural measures, is as follows:

Schedule of Obligations				
Fiscal Year :	Measure	Public Law : 566 Funds (dollars)	Other : Funds (dollars)	Total (dollars)
1st	Land Treatment	1,056	26,238	27,294
2nd	Land Treatment and Site 1	118,160	47,963	166,123
3rd	Land Treatment	423	26,238	26,661
TOTAL		119,639	100,439	220,078

EFFECTS OF WORKS OF IMPROVEMENT

The installation of all measures, both land treatment and structural, included in this plan for watershed protection and flood prevention, will benefit approximately 70 farms and ranches in the watershed. This includes 6 family-type farms with agricultural land on the flood plain. Well in excess of 10,000 people will benefit from this project during its life.

Flood protection will be provided to approximately 20 owners and operators of 520 acres of agricultural land (figure 2). Flooding will be completely eliminated from about 160 acres. A major flood will occur about once every 12 years instead of once every 3 years. The area flooded by the 5-year frequency flood will be reduced from 355 acres to 140 acres, a reduction of 61 percent.

Owners and operators of flood plain land will restore approximately 70 acres of pasture to its former state of high productivity as a result of flood reduction. It is not expected that any flood plain land will be shifted from pasture to cropland, nor is it expected that the project will result in any increase in acreage of crops in surplus supply.

Excellent opportunities for the development of on-farm income producing recreation facilities will become available at and in the vicinity of the sediment pool of the floodwater retarding structure. This pool, expected to be open for public use, will provide needed water-based recreation activities, such as fishing, hunting, picnicking, and camping. Such recreation areas are used heavily by youth organizations such as Boy Scouts, Girl Scouts, church organizations, etc. It is expected to furnish approximately 990 visitor-days of recreation annually. Most of the usage will occur from April through September, but it is expected that some use will be made of these facilities throughout the year.

The following excerpts, pertinent to this plan as finalized, are quoted from the report dated July 22, 1966, from the Bureau of Sports Fisheries and Wildlife, Fish and Wildlife Service, U. S. Department of the Interior, Albuquerque, New Mexico:

"Ruckers Creek is an intermittent stream that is dry much of the time. Its flow is dependent upon runoff following rainfall. There is no significant amount of fishing in the stream, a situation not expected to change without the project.

"Construction of the two floodwater retarding reservoirs would provide high-quality fish habitat. If properly managed and opened to public use, the reservoirs would provide good fishing and receive heavy fishing from residents of the watershed.

.....

"The application of land treatment measures generally would improve wildlife habitat. The stirring of the soil done in conjunction with application of the land treatment measures would stimulate weed production which would be beneficial to mourning doves, bobwhites, and other seed-eating birds.

The floodwater retarding reservoirs would provide watering places for wildlife and resting places for migrating waterfowl. Reduction of floods would benefit ground-nesting species in the bottomlands."

Sediment deposition from Ruckers Creek to DeCordova Bend is expected to be reduced by 56 percent as a result of the project. Flood plain scour, now eroding valuable bottomland at a rapid rate, will be reduced by 57 percent.

Secondary benefits will accrue to the trade area as a result of increased business to those who furnish farming equipment, petroleum products, fertilizers, farm supplies, sporting goods, and the various services associated with a farming and ranching community.

PROJECT BENEFITS

The estimated average annual monetary damages (table 5) within the watershed will be reduced from \$7,342 to \$2,322, a reduction of 68 percent. Crop and pasture damages will be reduced from \$4,107 to \$1,121, or 73 percent. Other agricultural damages, such as loss of fences, farm equipment, livestock, and other property, will be reduced from \$844 to \$302, or 64 percent. Road and bridge damage will be reduced from \$550 to \$182, or 67 percent. Flood plain scour damages, now occurring at the rate of \$1,174 annually, will be reduced to \$506, or 57 percent. Benefits from restoration of former productivity as the result of project installation are expected to accrue at the rate of \$1,329 annually. These benefits will result from pasture planting, fertilization, and more intensive management of land now in poor quality, low producing pasture. This loss from the original productivity of this land has been included in the crop and pasture damage and its restoration, a benefit in table 5.

Total project benefits will average \$7,317 annually, of which \$6,708 will be provided by the installation of the floodwater retarding structure and \$609 by the application of land treatment measures (table 6). Of the \$5,020 damage reduction benefits attributable to the project, \$4,769, or 95 percent, is the result of structural measures, with the remaining 5 percent reduction the result of land treatment. Benefits from reduction of sediment delivered to the proposed DeCordova Bend Reservoir will total \$852. Incidental recreation benefits from use of the sediment pool of the floodwater retarding structure will be \$702 annually. Secondary benefits, although not considered pertinent from a national viewpoint, will amount to \$743 annually in the immediate locale. This amount, which excludes indirect benefits in any form, results from \$612 in benefits stemming from the project and \$131 in benefits induced by the project.

The project will afford residents of the watershed a greater sense of security and will provide a more healthful environment in addition to the substantial benefits mentioned above.

COMPARISON OF BENEFITS AND COSTS

The total average annual cost of the floodwater retarding structure (amortized total installation cost, plus operation and maintenance) is \$4,867 (table 4). This structure is expected to produce average annual primary benefits of \$5,965. The benefit-cost ratio without secondary benefits is 1.2 to 1.0. The ratio of total average annual project benefits accruing to this structure (\$6,708) to the average annual cost of this structure (\$4,867) is 1.4 to 1.0 (table 6).

PROJECT INSTALLATION

The project installation period will be three years. Sufficient Public Law 566 funds will be provided to supplement Public Law 46 funds in order that

soil surveys can be completed during the first year, and to assure that adequate technical assistance is available so that all needed land treatment measures will be applied and maintained prior to the end of the installation period. The goal of application and maintenance of 80 percent of needed land treatment by or before the end of the installation period is expected to be accomplished as follows:

Land Use	Fiscal Year			Total
	1st (acres)	2nd (acres)	3rd (acres)	
Cropland	289	289	290	868
Grassland	1,593	1,593	1,593	4,779
TOTAL	1,882	1,882	1,883	5,647

The floodwater retarding structure will be installed during the second year of a 3-year installation period.

The Hood County Commissioners Court will act as the contracting local organization to administer the contracts for the construction of the planned structure. The county will provide the necessary legal, administrative, and clerical personnel, facilities, supplies, and equipment to advertise, award and administer the contract.

The county will select and appoint a contracting officer. His letter of appointment will include a listing of duties, responsibilities, and authorities. The individual appointed as contracting officer shall be available at all times to carry out his duties. He will be selected on the basis of his administrative ability. Legal, accounting, and/or an engineering background would be helpful assets. He will be provided with clerk-typist assistance, available to him at all times. He will also be provided with office space at a recognized location easily accessible to the public and construction contractors.

Arrangements will be made by the contracting officer to handle a formal construction contract bid opening, publicly conducted, and attended by approximately 20 persons. The contracting officer will be provided with transportation facilities so that he will be able to make an inspection trip to the location of the apparent low bidder's equipment plant and to the construction site as necessary to perform his duties.

Land, easements, and rights-of-way will be acquired for Site 1 by Hood County Commissioners Court. The Hood County Commissioners Court has the authority under applicable State law and will exercise the right of

eminent domain, if necessary, to acquire such land, easements, or rights-of-way as will be needed. The legal adequacy of easements, permits, etc., for the construction of Site 1 will be determined by the Hood County Commissioners Court.

Site 1 will be installed during the second year of a 3-year installation period pursuant to the following conditions:

1. The requirements for land treatment in the drainage area above the floodwater retarding structure have been met.
2. All land, easements, rights-of-way, and permits have been obtained.
3. The contracting agency is prepared to discharge its responsibilities.
4. Project and operation and maintenance agreements have been executed.
5. Public Law 566 funds are available.

FINANCING PROJECT INSTALLATION

Federal assistance for carrying out the works of improvement described in this work plan will be provided under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress; 68 Stat. 666), as amended.

The cost of installing the needed land treatment measures during the 3-year installation period will be borne by the landowners and operators of the land on which these measures are installed. The Agricultural Stabilization and Conservation Service will provide financial assistance for the installation of those land treatment measures which are eligible for this assistance. The Farmers Home Administration, local banks, and other lending institutions can arrange financing for the landowners and operators' share of the cost. The Soil Conservation Service will provide funds in the amount of \$6,516 to finance the cost of technical assistance in planning and application of the land treatment measures. This consists of \$1,902 of Public Law 566 funds and \$4,614 to be provided from Public Law 46 funds (table 1).

Funds for the local share of the cost of installing Site 1 will be provided by the Hood County Commissioners Court. It is anticipated that all of the easements to be acquired will be donated. Out-of-pocket cost for contract administration is estimated to be \$500.

Financial and other assistance to be furnished by the Service is contingent on the appropriation of funds for this purpose. In addition, all

prerequisite conditions will be met before Federal funds will be made available for the installation of the structural measures.

PROVISIONS FOR OPERATION AND MAINTENANCE

Land treatment measures will be maintained by the landowners and operators of farms and ranches on which the measures are installed under agreements with the Hood-Parker Soil and Water Conservation District. Representatives of the district will make periodic inspections of the completed land treatment measures to determine maintenance needs. The landowners and operators will be encouraged to perform needed maintenance and management practices. District-owned equipment will be made available for this purpose in accordance with existing working arrangements.

Floodwater retarding structure Site No. 1 will be operated and maintained by the Hood County Commissioners Court. An operations and maintenance agreement will be executed by the county and the Service prior to the issuance of invitation to bid on construction of this structure. The agreement will set forth specific details on procedure in line with recognized assignments of responsibility. The estimated annual operation, maintenance, and replacement cost is \$298, based on adjusted normalized prices.

Inspections will be made in accordance with procedural details of the operation and maintenance agreement. The Hood-Parker Soil and Water Conservation District, and the Hood County Commissioners Court will be represented on each joint inspection group making scheduled inspections of the floodwater retarding structure.

The Service and the sponsors will make a joint inspection annually, or after unusually severe storms, or in the event of other unusual conditions that may adversely affect the structure, for three years following its installation. Inspection after the third year will be made annually by the sponsors. The Service will participate in annual inspections as often as it elects to do so after the third year. Inspection items are those items which may need maintenance. These include, but will not be limited to, the condition of the principal spillway, earth fill or embankment, and vegetative cover of the earth fill and emergency spillway; the need for removal of woody vegetation; and the condition of fences, gates, and other appurtenances installed as a part of the structure.

The Commissioners Court will prepare a report of all maintenance inspections. A copy of the report will be submitted to the Service representative. The county will keep summary control records in support of proper maintenance having been performed.

The Soil Conservation Service, through the Hood-Parker Soil and Water Conservation District, will participate in operation and maintenance by

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 the Hood County Commissioners Court, the Hood-Parker Soil and Water Conservation District, and Federal representatives to inspect and provide for maintenance for Site 1 and its appurtenances at any time.

TABLE 1 - ESTIMATED PROJECT INSTALLATION COST
Ruckers Creek Watershed, Texas

Installation Cost Item	:	:	Number to be Applied	Estimated Cost (Dollars) ^{1/}		
				566 Funds	Other	Total
LAND TREATMENT						
Soil Conservation Service						
Cropland	Acre		868	-	12,261	12,261
Grassland	Acre		4,779	-	61,839	61,839
Technical Assistance				1,902	4,614	6,516
SCS Subtotal				1,902	78,714	80,616
TOTAL LAND TREATMENT				1,902	78,714	80,616
STRUCTURAL MEASURES						
Soil Conservation Service						
Floodwater Retarding						
Structures	No.		1	93,500	-	93,500
SCS Subtotal				93,500	-	93,500
Subtotal - Construction				93,500	-	93,500
Installation Services						
Soil Conservation Service						
Engineering Services				15,895	-	15,895
Other				8,342	-	8,342
SCS Subtotal				24,237	-	24,237
Subtotal - Installation Services				24,237	-	24,237
Other Costs						
Land, Easements, and Rights-of-Way				-	21,225	21,225
Administration of Contracts				-	500	500
Subtotal - Other Costs					21,725	21,725
TOTAL STRUCTURAL MEASURES				117,737	21,725	139,462
TOTAL PROJECT				119,639	100,439	220,078
SUMMARY						
Subtotal - SCS				119,639	100,439	220,078
TOTAL PROJECT				119,639	100,439	220,078

^{1/} Price Base: 1966

September 1966

TABLE 1A - STATUS OF WATERSHED WORKS OF IMPROVEMENT

Ruckers Creek Watershed, Texas

Measures	Unit	Applied to Date	Total Cost (Dollars) ^{1/}
<u>LAND TREATMENT</u>			
<u>Cropland</u>			
Conservation Cropping System	Acre	1,515	-
Contour Farming	Acre	218	-
Cover and Green Manure Crop	Acre	1,289	15,468
Crop Residue Use	Acre	2,304	2,304
Diversion	Foot	20,408	2,857
Terraces, Parallel and Gradient	Foot	54,614	2,731
<u>Grassland</u>			
Pasture and Hayland Management	Acre	1,814	18,140
Pasture and Hayland Renovation	Acre	197	3,940
Pasture and Hayland Planting	Acre	600	18,000
Farm Pond	Number	73	36,500
Land Clearing	Acre	51	1,020
Brush Control	Acre	1,196	11,960
Range Deferred Grazing	Acre	2,765	2,765
Range Proper Use	Acre	4,844	-
Range Seeding	Acre	450	5,400
TOTAL			121,085

^{1/} Price Base: 1966

September 1966

TABLE 2 - ESTIMATED STRUCTURAL COST DISTRIBUTION

Ruckers Creek Watershed, Texas

(Dollars) 1/

Structure Site Number	Installation Cost - Public Law 566 Funds			Installation Cost - Other Funds			Total Installation Cost
	Construction	Services	Other	Total	Other	Total	
	Engi- neering	Other	Adm. of Con- tracts	Law and R/W	Other	Total	Installation Cost
1	15,895	8,342	500	117,737	21,225	21,725	139,462
	79,097.65						
	93,500						
GRAND TOTAL	15,895	8,342	500	117,737	21,225	21,725	139,462

1/ Price Base: 1966

September 1966

TABLE 3 - STRUCTURE DATA
FLOODWATER RETARDING STRUCTURE
 Ruckers Creek Watershed, Texas

Item	Unit	Structure Number
Drainage Area	Sq. Mi.	6.24
Storage Capacity		
Sediment Pool	Ac. Ft.	133
Sediment in Detention Pool	Ac. Ft.	167
Floodwater Pool	Ac. Ft.	1,298
Total	Ac. Ft.	1,598
Surface Area		
Sediment Pool	Acre	33
Floodwater Pool	Acre	173,830 137
Volume of Fill	Cu. Yd.	170,000
Elevation Top of Dam <u>1/</u>	Foot	925.2
Maximum Height of Dam <u>2/</u>	Foot	50
Emergency Spillway		
Crest Elevation	Foot	920.5
Bottom Width	Foot	300
Type		Veg.
Percent Chance of Use		4.0
Average Curve No. - Condition II		76
Emergency Spillway Hydrograph		
Storm Rainfall (6-hour) <u>3/</u>	Inch	6.8
Storm Runoff	Inch	4.1
Velocity of Flow	Ft./Sec.	0.5
Discharge Rate <u>1/</u>	C.F.S.	50
Maximum Water Surface Elevation	Foot	920.8
Freeboard Hydrograph		
Storm Rainfall (6-hour) <u>3/</u>	Inch	14.0
Storm Runoff	Inch	10.8
Velocity of Flow (V_c) <u>4/</u>	Ft./Sec.	9.0
Discharge Rate <u>1/</u>	C.F.S.	7,030
Maximum Water Surface Elevation <u>1/</u>	Foot	925.2
Principal Spillway		
Capacity (Maximum)	C.F.S.	81
Capacity Equivalents		
Sediment Volume	Inch	.40
Sediment in Detention Pool	Inch	.50
Detention Volume	Inch	3.90
Spillway Storage	Inch	2.20
Class of Structure		A

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- 1/ Values obtained from routing.
- 2/ Difference in elevation between the top of the settled dam and the bottom of the stream channel.
- 3/ Based on Engineering Hydrology Memorandum TX-1, "Emergency Spillway and Freeboard Hydrograph Development," August 16, 1965.
- 4/ Obtained from curves drawn from figure 4-R-11472 revised March 1959 and ES-98, dated April 27, 1955, based on flows obtained from routing of hydrographs.

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TABLE 4 - ANNUAL COST

Ruckers Creek Watershed, Texas

(Dollars) 1/

Evaluation Unit	: Amortization of : Installation : Cost <u>1/</u>	: Operation and : Maintenance : Cost <u>2/</u>	: Total
Floodwater Retarding Structure (1)	4,569	298	4,867
TOTAL	4,569	298	4,867

1/ Price Base: 1966. Prices amortized for 100 years at 3.125 percent.

2/ Adjusted normalized prices approved by Water Resources Council April 20, 1966.

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TABLE 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS

Ruckers Creek Watershed, Texas

(Dollars) ^{1/}

Item	: Estimated Average Annual Damage :		: Damage : Reduction : Benefit
	: Without : Project	: With : Project	
Floodwater			
Crop and Pasture	4,107	1,121	2,986
Other Agricultural	844	302	542
Non-Agricultural			
Road and Bridge	550	182	368
Subtotal	5,501	1,605	3,896
Erosion			
Flood Plain Scour	1,174	506	668
Indirect	667	211	456
TOTAL	7,342	2,322	5,020

^{1/} Price Base: Adjusted normalized prices approved by Water Resources Council April 20, 1966.

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TABLE 6 - COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

Ruckers Creek Watershed, Texas

(Dollars) 1/

Evaluation Unit	AVERAGE ANNUAL BENEFITS				Average Annual Cost	Benefit-Cost Ratio
	Damage Reduction	Incidental Recreation	Other	Total		
Floodwater Retarding Structures (1)	4,769	702	494	743	6,708	1.4:1
GRAND TOTAL <u>3/</u>	4,769	702	494	743	6,708	1.4:1

1/ Annual benefits and operation and maintenance costs based on adjusted normalized prices, approved by Water Resources Council, April 20, 1966; construction costs based on 1966 prices.

2/ From reduction of sediment to DeCordova Bend Reservoir.

3/ In addition, it is estimated that land treatment measures will provide damage reduction benefits of \$251 annually in the watershed and \$358 to DeCordova Bend Reservoir.

INVESTIGATIONS AND ANALYSES

Land Use and Treatment

The status of land treatment for the watershed was developed by supervisors of the Hood-Parker Soil and Water Conservation District, with assistance from personnel of the Soil Conservation Service Work Unit at Granbury, Texas. A 50 percent sample of current basic conservation plans for the watershed was analyzed to develop conservation needs data for the entire watershed. Acres to be treated by land use during the 3-year installation period were based upon a study of total conservation needs, accomplishments to date, remaining needs, and the priority of planning and servicing established by the soil and water conservation district.

Technical assistance needs were based on the amount of time now required for soil surveys, development and preparation of basic conservation plans, and application of conservation measures. The amount of Public Law 566 funds needed to assure the application and maintenance of all scheduled land treatment measures prior to the end of the installation period was determined in accordance with paragraph 1121.11 of the Watershed Protection Handbook.

Engineering Investigations

The procedures used to determine the most feasible plan of structural measures to meet the objectives of the sponsoring local organizations that could not be accomplished by land treatment measures were as follows:

1. A base map of the watershed was prepared.
2. Engineering surveys were started after agreement was reached with the sponsors on location of two floodwater retarding structure sites to be studied. All surveys were made in accordance with Watersheds Memorandum TX-2, June 3, 1959, as revised.
3. Criteria outlined in Engineering Memorandum-27 (Rev.), March 19, 1965, and Texas State Manual Supplement 2441 were used to determine the structure classification and principal spillway and emergency spillway design. The elevation of the sediment pool was determined in accordance with Section D, Engineering Memorandum-27, Supplement 1, and Section 3107, Watershed Protection Handbook.

Hydraulic and Hydrologic Investigations

The following steps were taken as part of the hydraulic and hydrologic investigations:

1. The without project hydrologic soil cover complex number for the watershed was developed, using the procedures outlined in chapters 7, 8, and 9 of the National Engineering Handbook, Section 4,

Hydrology. The with project hydrologic soil-cover complex number was determined by considering the effect of changes in land use and treatment that are expected during the installation period. The soil-cover complex number for without project conditions is 76 and for with project conditions is 75.

2. A synthetic storm series for use in evaluating floodwater damages was developed, using 24-hour rainfall amounts from Technical Paper No. 40, Rainfall Frequency Atlas of the United States, U. S. Department of Commerce Weather Bureau, May 1961.
3. The area subject to damage from flooding was determined by stereoscopic photo study, supplemented with information obtained from residents of the watershed and field investigations.
4. The drainage areas for evaluation purposes of each proposed floodwater retarding structure site and each valley cross section were measured on United States Department of the Interior Geological Survey topographic maps.
5. Engineering surveys were made of nine valley cross sections selected to represent the stream hydraulics and flood plain area.
6. Stage-discharge relationships were developed for the valley cross sections by use of Manning's formula.
7. The relationship of peak discharge to runoff was determined by developing hydrographs for the 24-hour, 25-year frequency storm at each valley cross section and proposed floodwater retarding structure. A storage type of stream reach routing, using a variable routing interval, was used in developing the hydrographs.
8. Stage-area inundated curves were developed for each portion of the flood plain represented by a valley cross section.

Acres inundated by 0-1, 1-3, and 3 feet plus depth increments were determined for selected floods. A composite frequency-area inundated curve was developed for without project conditions and to reflect the effect of the planned works of improvement.
9. Detention volumes for the floodwater retarding structures were determined, using Engineering-Hydrology Memorandum TX-2, November 5, 1965 and Engineering Memorandum-27 (Rev.), March 19, 1965.
10. The emergency spillway and freeboard hydrographs were developed using Engineering-Hydrology Memorandum TX-1, "Emergency Spillway and Freeboard Hydrograph Development," August 16, 1965, and Engineering Memorandum-27 (Rev.), March 19, 1965. The dimensions of the emergency spillway were determined by flood routing the

freeboard hydrograph. The Monrobot computer was used to flood route the hydrographs through the structure.

Sedimentation Investigations

Sedimentation investigations were made in accordance with procedures outlined in "Guide to Sedimentation Investigations," South Regional Technical Service Area, U. S. Department of Agriculture, Soil Conservation Service, March 1965.

1. The 100-year sediment storage requirement for the floodwater retarding structure was made as follows:
 - a. The gross erosion was determined for the drainage area for without and with project conditions in accordance with Chapters VII and X of the guide.
 - b. The appropriate sediment delivery ratio and trap efficiency adjustment was made in accordance with Chapter VIII.
 - c. Allowances for differences in density were based on volume weights of 84 pounds per cubic foot for soil in place and 47 pounds per cubic foot for sediment.
 - d. Sediment allocation to pools was made as follows:

<u>Period of Deposition</u>	<u>Pool</u>	<u>Condition of Sediment</u>	<u>Allocation (Percent)</u>
First 50 Years ^{1/}	Sediment	Submerged	45
Second 50 Years	Sediment	Submerged	45
	Detention	Aerated	10

^{1/} Elevation of principal spillway.

2. Sediment damage to the proposed DeCordova Bend Reservoir was based upon adjustment of the watershed gross erosion volume for expected delivery, trap efficiency, and volume weight change for sediment in the reservoir.
3. Sedimentation and scour damage investigations were made by the valley cross-section method, as explained in Chapter XI of the guide. Damage categories, measurements, and summaries of all physical damages were made in accordance with suggested procedures.

Geologic Investigations

A preliminary geologic dam site investigation was made at floodwater retarding structure site No. 1 and a report was prepared in accordance with procedures shown in Chapter 6 of "Guide to Geologic Site Investigations," South Regional Technical Service Area, U. S. Department of Agriculture, Soil Conservation Service, July 1965.

This investigation included studies of valley slopes, alluvium, channel banks, and exposed geologic formations.

Detailed investigations, including exploration with core drilling equipment, will be made prior to construction to determine the suitability and methods of handling foundation and embankment materials.

Economic Investigations

Basic methods used in the economic investigations and analyses are outlined in the "Economics Guide for Watershed Protection and Flood Prevention," U. S. Department of Agriculture, Soil Conservation Service, March 1964. One agricultural reach was evaluated.

Agricultural damage calculations were based on information obtained in interviews with owners and operators of approximately 40 percent of the acreage of the flood plain. Schedules covered past, present, and intended future use; crop distribution under normal conditions; planting dates; yields; historical data on flooding and resultant damages to crops and pastures, as well as to other agricultural property. Verification of information gained by interviews in the field was obtained from local agricultural workers. The land use of the entire flood plain was obtained by field mapping.

The monetary value of the physical damage from flood plain scour was based upon the value of production lost. The value of recovery from this damage was discounted in accordance with the time required for recovery. Indirect damages were estimated to approximate 10 percent of direct damages.

Incidental recreation benefits were evaluated for the sediment pool of the floodwater retarding structure, using a value of \$1 per visitor-day in keeping with recommendations for partially developed facilities in Watersheds Memorandum-57, October 3, 1962. Parking and picnicking areas will be available. Benefits were calculated allowing for full level of use and attractiveness for 40 years, with a gradual diminishing of attractiveness during the next 10 years to zero at the end of 50 years and for the balance of the evaluation period.

The value of easements was determined by local appraisal, giving full consideration to current real estate market values.

Fish and Wildlife Investigations

The following excerpts, pertinent to this plan as finalized, are quoted from the report dated July 22, 1966, from the Bureau of Sports Fisheries and Wildlife, Fish and Wildlife Service, U. S. Department of the Interior, Albuquerque, New Mexico:

"Ruckers Creek is an intermittent stream that is dry much of the time. Its flow is dependent upon runoff following rainfall. There is no significant amount of fishing in the stream, a situation not expected to change without the project.

"Construction of the two floodwater retarding reservoirs would provide high-quality fish habitat. If properly managed and opened to public use, the reservoirs would provide good fishing and receive heavy fishing from residents of the watershed.

"Wildlife species in the watershed include white-tailed deer, bobwhite, mourning dove, fox squirrel, swamp rabbit, cottontail, gray fox, and raccoon.

"Moderate numbers of white-tailed deer and swamp rabbits are present in the lower portion of the watershed. Moderate populations of bobwhites, mourning doves, cottontails, gray foxes, and raccoons occur throughout the entire watershed.

"Hunting for most species of wildlife is moderate and is done primarily by landowners and their friends. There is no trapping in the watershed for fur animals. Raccoons and foxes are run with dogs for sport. Neither wildlife numbers nor the amount of hunting for the aforementioned species are expected to change significantly without the project.

"The application of land treatment measures generally would improve wildlife habitat. The stirring of the soil done in conjunction with application of the land treatment measures would stimulate weed production which would be beneficial to mourning doves, bobwhites, and other seed-eating birds.

"The floodwater retarding reservoirs would provide watering places for wildlife and resting places for migrating waterfowl. Reduction of floods would benefit ground-nesting species in the bottomlands.

"There are some management techniques which would benefit fish and wildlife if adopted in the project plan.

"The dams of the floodwater retarding structures should be sodded to prevent erosion and damage to the dams. The borrowed or barren areas in the reservoir basins should be planted in advance

of impoundment to a grain adaptable to the project area. Such planting would prevent erosion, reduce the amount of sediment entering the reservoirs, and enrich and clarify the impounded waters.

"Where consistent with the objectives of the project, clearing of vegetation in the reservoir basins should be kept to a minimum. Submerged vegetation would provide shelter temporarily for fishes and provide more attractive fishing areas.

"The floodwater retarding reservoirs should be stocked with fish recommended by the Texas Parks and Wildlife Department. Improper stocking would result in unbalanced and stunted fish populations and low quality fishing.

"Wildlife habitat could be improved by planting wildlife food and cover plants on lands such as gullies, eroded areas, along fencerows and driveways. Such plantings would, in addition to providing food and cover for wildlife, aid in beautification of the farmsteads and adjacent areas.

"It is recommended:

- "1. That the dam be sodded and the borrow and barren areas in the reservoir basins be planted to a grain adaptable to the area in advance of impoundment.
- "2. That clearing of vegetation in floodwater retarding reservoir basins be kept to a minimum to provide shelter for fish and more attractive fishing areas.
- "3. That the floodwater retarding reservoirs be stocked with fish recommended by the Texas Parks and Wildlife Department.
4. That planting of wildlife food and cover plants be made in eroded areas, gullies, impoundment enclosures, along fence rows and driveways."

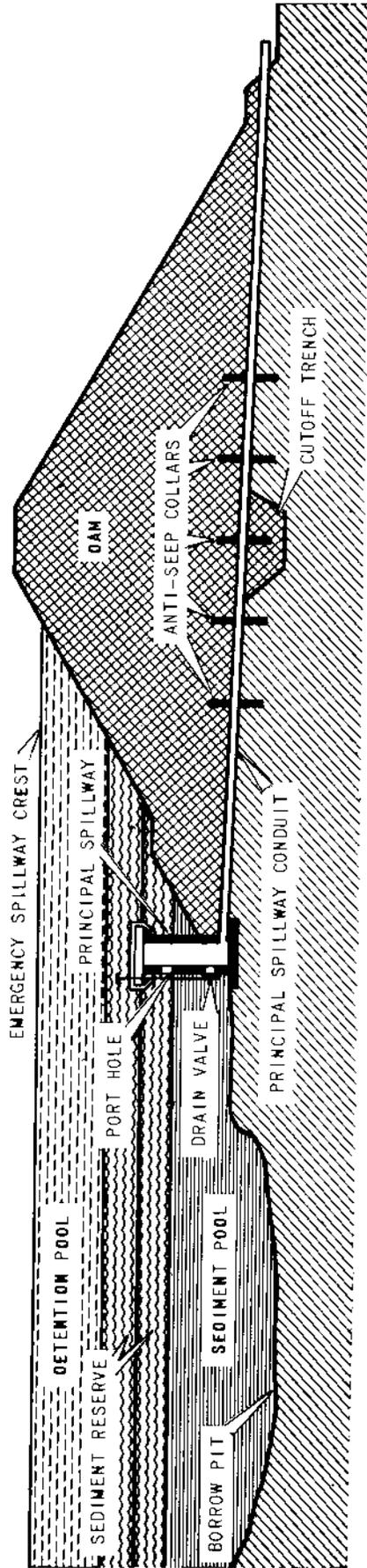


Figure 1
SECTION OF A TYPICAL FLOODWATER RETARDING STRUCTURE

LEGEND

- Paved Road
- - - - - Unimproved Road
- J. S. Highway
- State Highway
- Railroad
- Pipeline
- City or Town
- Church
- School
- Cemetery
- County Line
- Drainage
- Floodwater Retarding Structure
- Drainage Area Controlled by Structure
- Area Benefitted
- ① Site Number
- ② Valley Cross Section
- Scour Damage
- Watershed Boundary

SITE NUMBER 1
 DRAINAGE AREA Acres 3,994

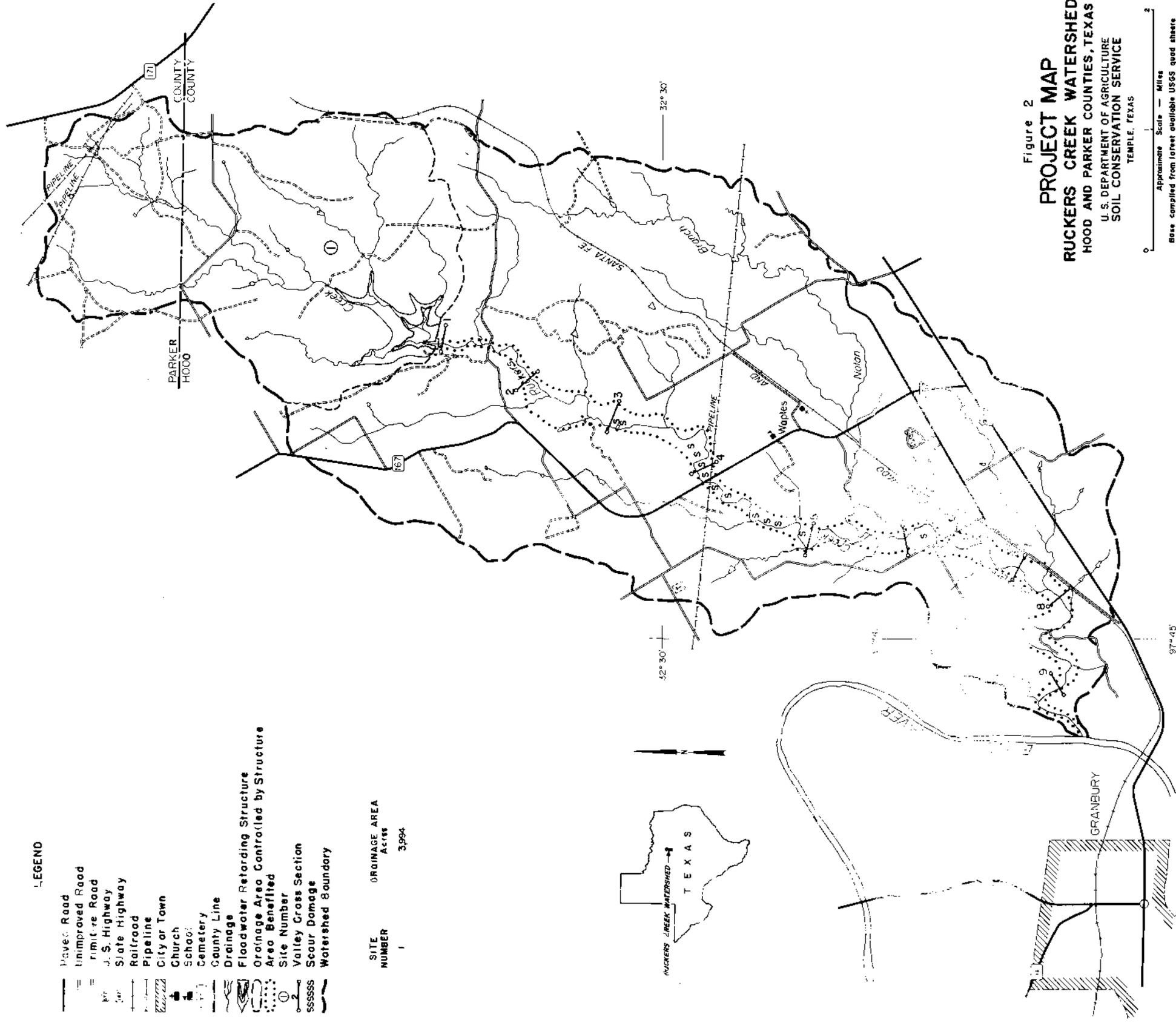


Figure 2
PROJECT MAP
 RUCKERS CREEK WATERSHED
 HOOD AND PARKER COUNTIES, TEXAS
 U. S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE
 TEMPLE, TEXAS

Approximate Scale — Miles
 0 1 2 3
 Base compiled from latest available USGS quad sheets