PRELIMINARY WORK PLAN
For Runoff and Waterflow Retardation
and Soil Erosion Prevention
CLEAR FORK WATERSHED
of the Trinity River Watershed
TX-SCD's 29 and 55 Tr. No. 8
August 1953

DESCRIPTION OF THE WATERSHED

Clear Fork rises near the town of Poolville, in Parker County, Texas, and flows in a southeasterly direction for 40 miles, emptying into Benbrook Reservoir. The watershed ranges from 7 to 12 miles in width, averaging 10 miles. Gourd Neck, Willow, Burgess, Bear, South Bear, Rock and Primrose Creeks are the major tributaries.

Weatherford is the principal municipality, but there are several small villages located in the watershed.

There are 445 miles of roads, of which 102 miles are hard-surfaced and 300 miles are graveled all-weather roads. Of the 110 bridges, 35 are major bridges spanning the larger streams.

The watershed comprises 266,880 acres, (417 square miles) of which 261,984 acres are in farms. The remaining 4,896 acres, about 1.8 percent, are in urban areas, roads, railroads and miscellaneous uses. The bottomland area includes 8,408 acres of flood plain and 488 acres of stream channels.

Soils and Land Use

The Clear Fork watershed lies within two soil conservation problem areas. About 72 percent of the area above Benbrook Reservoir is Grand Prairie and 28 percent is West Cross Timbers.

The Grand Prairie portion of the watershed was originally covered by tall grasses. The soils were developed from limestone and shale formations and consist of dark clays and clay loams. They vary from gray to brown in color and from deep to very shallow. The very shallow soils are fairly well distributed over the Grand Prairie area, mostly on valley slopes, and are not suited to cultivation.

The deeper soils of the Grand Prairie are fairly fertile and suitable for cultivation of general crops. They occur mostly on the more gently sloping divides and in the valley bottoms. The Grand Prairie soils occupy about the lower two-thirds of the watershed. Erosion over most of this area has been moderate due to the types of farming practiced. Some small grains are grown which provide winter cover for the land. About 23 percent of the Grand Prairie is in cultivation, 67 percent pasture, and 10 percent wooded pasture.

The West Cross Timbers area is located at the upper end of the watershed. The area originally was covered with native post oak timber until cleared

for cultivation. Most of the cleared land, except the bottomland soils, lies on rather steep slopes. The soils are mostly medium textured, with some coarse textured surface soils overlying crumbly subsoils. Erosion in the area is severe to very severe due to improper land use, steepness of the slopes, poor vegetative cover and the high detachability of the soil particles. Wind erosion is rather severe on the coarser textured soils. About 44 percent of this area is in cultivation or idle, 28 percent in open pasture and 28 percent in wooded pasture.

Approximately 55 percent of the flood plain is cultivated, 32 percent is in open pasture, and 13 percent in wooded pasture.

Geology and Topography

The watershed lies in two sections of the Central Lowland physiographic province, and contains two lower Cretaceous rock groups.

The western headwater area of the watershed, known as the West Cross Timbers (28 percent of the drainage area), is underlain by the sandy Trinity formation. Underlying most of the eastern part is a series of limestone, marls, and shales of the Fredericksburg and Washita formations (72 percent of the drainage area) which overlie the Trinity sands.

The Fredericksburg limestones outcrop in narrow bands or ridges along the watershed divides of most of the tributary streams in the central and lower reaches of the watershed. In general the Fredericksburg formation lies between the Trinity on the west and the Washita formation on the east. The Washita formation occurs in the central and lower sections of the watershed.

Generally the structure of all the rock formations is fairly uniform. The dip of the formations is approximately southeast at low angles. In general the sandy, easily eroded Trinity formation (West Cross Timbers) has produced medium to coarse textured, fertile soils. The shales, marls and thin limestones of the Fredericksburg and Washita groups (Grand Prairie) have weathered to produce dark brown to black fine textured prairie type soils.

Practically all of the area is topographically mature and has a well developed dendritic drainage system. The topography is rolling, becoming more broken near the headwaters. Local relief along the major stream valleys ranges from a minimum of 50 feet in the lower reaches to about 200 feet near the headwaters. Elevations range from about 1,250 feet above mean sea level at the source to 617 feet in the channel at the Benbrook Reservoir dam.

The Clear Fork has an average slope of 12 feet per mile. The stream channel in the lower reaches is from 70 to 200 feet wide, averaging about 100 feet. The banks are 11 to 23 feet high, with an average of 17 feet. Most of the streams in this area flow over limestone bedrock. Stream channels in the upper reaches average 50 feet wide with banks about 8 feet high. The stream beds in this area are characterized by alternate bars of coarse sand and gravel and ponded pools.

The flood plain averages 2,000 feet wide in the lower reaches and 1,000 feed wide in the upper reaches.

Climate

Temperatures for this area range from 11 degrees below zero to 113 degrees above zero, with a mean temperature of 64.1 degrees Fahrenheit. The average dates of the first and last killing frosts are October 24 and March 25, respectively, an average growing season of 233 days. The average annual rainfall is 31.25 inches with the heaviest precipitation falling during the months of April, May and June.

Water Resources

Benbrook Reservoir is the largest body of surface water within the watershed. The Texas and Pacific Railroad lake has been purchased by the City of Weathorford, and water from this source now supplements water from deep wells for the city's supply. These deep wells, extending into the Trinity sand, are its main source of water. The present use of water in the watershed is principally for municipalities, livestock and domestic purposes. Only a small amount is used for irrigation, but with soil characteristics suitable for irrigation existing on a large portion of the bottomlands, it is anticipated that there will be a demand for a greater water supply in the future.

ECONOMY OF THE WATERSHED

Agricultural Economy

The watershed contains an estimated 762 farms with an average size of 344 acres. The West Cross Timbers in the upper part of the watershed was formerly devoted to general crop farming but has been largely retired from cultivation due to erosion and depletion of soil fertility. It is now used principally for livestock production.

The principal crops grown include alfalfa, small grains, corn and hay crops in the Grand Prairie; and sorghums, corn, peanuts, castor beans and some truck crops in the West Cross Timbers Problem Area in Soil Conservation. Supplemental grazing is also obtained from small grain, vetch and Johnsongrass. Production is still good on the level areas and gentle slopes but the need is apparent for conservation crop rotations on all cropland to increase the organic matter content and productivity of the soil. Large areas of the West Cross Timbers are severely eroded and should be planted to permanent grass. In the Grand Prairie crop land is confined largely to the more gentle slopes.

Because of the frequency of flooding in the upper portion of the watershed (West Cross Timbers), 20 percent of the flood plain area formerly used for high income crops such as corn or cotton is now meadow, pasture or idle land. The lower (Grand Prairie) reach does not flood as frequently and the land use in the flood plain has remained unchanged.

Fifteen neighbor groups of landowners and operators, with membership wholly or partially within the Clear Fork watershed, have been cooperating with their local soil conservation districts in the application and maintenance of land treatment measures on their lands. It is expected that when land treatment practices have been applied and maintained for as long as two or three years, yields in the watershed will be increased approximately one-third.

Urban and Other Influences

One incorporated town and seven small villages in the watershed are largely dependent upon the agricultural production of this area.

Fifty-two miles of State and Federal highways, fifty miles of farm-to-market roads, and three hundred and forty three miles of county roads provide access to almost all parts of the watershed. However, floods frequently make many of these roads impassable and cause delay in getting to market with perishable products.

Clear Fork watershed is served by two railroads, The Gulf Colorado and Santa Fe and the Texas and Pacific, with loading points at Weatherford and Aledo. However, farmers depend on private transportation to move their products to markets in Weatherford and Fort Worth.

FLOOD PROBLEMS AND DAMAGES

Clear Fork and its tributaries flood frequently and cause high annual damages. Flooding occurs about 3 to 4 times a year in the upper portion of the watershed and 1 to 2 times a year in the lower reaches. This difference in frequency of flooding is principally due to the size of channels in the upper and lower portion of the watershed. During the 20-year period 1923 to 1942, inclusive, there were 14 floods that covered more than one-half of the flood plain and 58 smaller floods. Thirty-eight of the floods occurred in the months of April, May and June. Eleven floods occurred in October and the remaining floods occurred in the other eight months of the year. The spring floods caused extensive damages to growing crops and severe damage was caused to mature, unharvested crops by summer floods.

The types of flood damage encountered in the watershed were: (1) damage to crops and pasture; (2) deposition of sediment in reservoirs, channels and on valley lands; (3) flood plain scour; (4) damage to roads, bridges and fences and loss of livestock. Other damages include late planting of crops, increased cost of cultivation caused by noxious weeds, and the planting of lower income crops of shorter growing season due to spring floods. An estimated 417 acre-foot of sediment is reaching the lower end of the watershed annually and being deposited in the Benbrook Reservoir.

LAND TREATMENT ACTIVITIES

The Clear Fork watershed is served by three Soil Conservation Service Work Units which are assisting the Hood-Parker and Dalworth Soil Conservation Districts. The work units have assisted farmers in preparing

297 conservation plans on 102,145 acres. Approximately 25 percent of the planned practices have been applied.

FLOOD PREVENTION ACTIVITIES

The upper portions of all stream channels are badly clogged with sediment and have very little capacity for storm runoff. These blocks cause flood water to break out of the channel and inundate portions of the bottomlands before the normal channel capacity is reached. Land owners have made attempts to protect their bottomland fields from floods by constructing levees, dikes and diversions but since these individual efforts were not coordinated much of the effort was wasted. However, inundation of bottomlands by some of the smaller floods has been prevented by these structures.

HYDRAULIC AND HYDROLOGIC INVESTIGATIONS

From a graph showing cumulative departures from normal precipitation, the rainfall series for the period 1923 to 1942 was selected as most representative for the watershed area.

The design storm, under maximum runoff producing conditions, would produce 4.30 inches of runoff from the watershed. Runoff of this magnitude is not expected to occur more frequently than once in 25 years, and this value was used in determining minimum detention storage requirement. From a study of the rainfall-runoff relationships for this watershed and the hydraulic characteristics of the stream channel it was found that a rain of 1.58 inches, occuring within a one-day period and producing 0.1 inches of runoff was the minimum which would cause flooding at the smallest channel section. Such a rain would produce 1,050 c.f.s. at the reference cross-section. Therefore, no rains of less than this amount were considered for flood routing purposes. The largest rain considered, which occurred during the 20-year period, was one of 5.92 inches, which produced 1.95 inches of runoff. Under present conditions 8,408 acres of the flood plain above elevation 730, the flood pool limit of Benbrook Reservoir, would be flooded by the runoff from this storm. No flood plain acreage would lie within or above the pools of the proposed floodwater retarding structures. With land treatment practices and measures applied to the land, 7,942 acres would be flooded. With land treatment practices and measures applied to the land, 7,942 acres would be flooded. With land treatment measures applied and the proposed floodwater retarding structures in operation, only 4,056 acres would be flooded as a result of such a storm.

The channel capacity of Clear Fork at Cross-Section No. 3 (the reference cross-section) is 3,589 cubic feet per second. This section is located about 4 miles southeast of Alede and is at the location of the USGS Stage Recorder. The peak discharge at this point for a 5.92-inch rain under present conditions is 16,500 cubic feet per second. This discharge would be reduced to 8,609 cubic feet per second by the installation of the land treatment measures and proposed system of floodwater retarding structures, a reduction of 48 percent.

SEDIMENTATION DAMAGES

Sheet and gully erosion are severe over much of the West Cross Timbers area. These areas of severe erosion are directly related to the type of farming practiced, cultivation of steep slopes and improper land treatment. Overgrazing of range lands in some of the Grand Prairie area also has caused accelerated runoff and erosion. Erosion on the cultivated land in the Grand Prairie is moderate since farmers grow small grain and other close growing crops which tend to reduce erosion. In the Cross Timbers area row crop farming has predominated and the agricultural value of much of the once productive land has been destroyed. Erosion has decreased in the past ten years in parts of the West Cross Timbers area due to abandonment of some of the steeper and more severely eroded cultivated land. Natural revegetation has aided in retarding erosion on much of the idle and abandoned lands. A few of the extensive gully systems have become partially stabilized in recent years.

The principal sedimentation damages in the watershed are: (1) overbank deposition on valley lands; (2) damage to reservoirs; (3) accessory damages; and (4) channel filling. Other related damages are (1) flood plain scour; (2) channel enlargement; and (3) impaired drainage on valley lands.

Overbank Deposition

The deposition of sandy sediment on the flood plains of Clear Fork and its tributary valleys has caused an estimated average damage of 10 to 30 percent to 122.2 acres annually. These average annual damages are estimated in terms of decreased field crop and pasture grass yields, based on a reconnaissance valley sedimentation survey which shows that 6,110 acres of valley land in Clear Fork and its tributaries have been damaged by modern sediment deposits over a period of 50 years (estimated period of accelerated erosion). These deposits range in thickness from a few inches to about 6 feet, averaging about two feet. Deposition on the main stem of Clear Fork and the upper tributaries is valley-wide down to about Dicey school and terminates close to Aledo. Deposits are valley-wide along the upper reaches of Willow Creek, then narrowing down somewhat on South Fork and extending in a decreasing width below U. S. Highway 377.

Reservoir Damages

Under present watershed conditions it is estimated that Benbrook Reservoir will receive sediment accumulations at an average annual rate of 1.0 acre-foot per square mile of the Clear Fork drainage area, or 417 acre-feet. The West Cross Timbers area (117 square miles) is expected to contribute approximately 1.5 acre-feet annually per square mile of drainage area, and the Grand Prairie (300 square miles) approximately 0.8 acre-foot annually per square mile of drainage area. Those estimates are based on the detailed sedimentation surveys of Lake Dallas and T & P Reservoir (Weatherford) made in 1938, with adjustments for land use, erosion conditions, and size of watershed. For calculating benefits from the

floodwater retarding structures, it was estimated that land treatment measures would reduce the present sediment production rates an average of 36 percent, or an annual reduction of 149 acre-feet. The 33 proposed floodwater retarding structures would reduce the annual sediment contribution to Benbrook Reservoir an additional 60 acre-feet. Thus the land treatment measures plus the proposed floodwater retention structures would reduce the annual sediment accumulation in Benbrook Reservoir by 208 acre-feet, or an average reduction of 50 percent.

The present annual sedimentation damages to Benbrook Reservoir are estimated to be $19,753. Annual benefits due to reduced sedimentation are estimated to be $7,058 from land treatment and $2,842 from floodwater retarding structures, or a combined annual benefit of $9,900. These estimates are based on a replacement cost of $47.37 per acre-foot of storage capacity, which is equivalent to the cost of $12,250,500 for Benbrook Reservoir as estimated by the Corps of Engineers in 1951.

The only other reservoir of consequence in the watershed is the T & P Reservoir. It is estimated that under present conditions the average annual sedimentation damage to the reservoir is $3,390. The application of land treatment measures to the watershed lands is expected to reduce the present sedimentation rate approximately 40 percent. This would result in an average annual benefit of $1,356 to the reservoir. These estimates are based on the detailed sedimentation survey of the T & P Reservoir made by the Soil Conservation Service in 1938. The measured average annual sediment accumulation in the reservoir is 0.8 acre-feet per square mile. No floodwater retarding structures are planned in the T & P Reservoir watershed, therefore, no benefits from structures would be obtained.

Accessory Damages

The deposition of sediment on field crops and pasture grasses is causing some damage in the upper reaches of the Clear Fork drainage system. The damages range from moderate, caused by the deposition of coarse sandy sediment which not only affects growing plants but has some effect on succeeding crops, to minor damage caused by the deposition of fine sediment (silt and clay). The moderate damages are included with overbank deposition and the minor damages are included with floodwater damages.

Channel Filling

The deposition of sediment in the stream channel is causing considerable damage in the Clear Fork drainage system. Channel filling is occurring at a rather rapid rate in the upper part of the flood plain where reductions up to 75 percent of the original channel capacity were observed. The rate of filling decreases downstream, and practically no channel filling is occurring in the lower reaches of the main stem of the Clear Fork. Bedloads of sandy sediment, however, are carried the full length of the channel downstream to the head of Benbrook Reservoir.

Channel deposits comprise only a small volume of the total modern deposits, but they have been of major importance in causing increased overbank flooding.

Sediment Output Rates

The present sediment output rates for the watershed range from 0.3 to 1.0 acre-feet annually per square mile of drainage area in the Grand Prairie area, and 0.8 to 2.0 acre-feet annually per square mile of drainage area in the West Cross Timbers. These estimated rates are for watersheds with drainage areas of 1.0 to 7.0 square miles. Some of the small tributary watersheds (50 to 200 acres) have average annual output rates up to 5.0 acre-feet per square mile of drainage area in the West Cross Timbers area. These rates are based on the detailed sedimentation surveys of Lake Dallas and the T & P Reservoir, made in 1938 by the Soil Conservation Service. The measured sediment output rates for these surveys were 1.1 acre-feet annually per square mile for Lake Dallas and 0.8 for the T & P Reservoir.

In addition to the above data 11 detailed upland site studies were made to estimate the sediment output rates for individual floodwater retention structures.

The predicted sedimentation rate for each of the floodwater retarding structures was adjusted for: (1) present erosion rates, land use and vegetative cover of the watershed lands; (2) size and shape of the watershed, and (3) the location of high sediment production areas, especially in the West Cross Timbers, with reference to the structure sites. The sources of the sediment carried by the streams of Clear Fork drainage system, or measured as deposited material in reservoirs, are as varied as the types of erosion in the watershed. However, the relative amount of sediment derived from the various sources becomes extremely important in the evaluation of the effects of land treatment upon sediment production of the watershed. Based on the 11 detailed upland watershed studies and reconnaissance investigations in the remainder of the watershed, it is estimated that the relative sediment sources of the watershed are as follows:

Problem Area	Area Sq. Mi.	Estimated Sources of Sediment (Percent)			
		Sheet Erosion	Gully Erosion	Streambank Erosion	Flood Plain Scour
Grand Prairie	300	80	13	5	2
West Cross Timbers	117	55	35	7	3
Weighted Average for Watershed	417	73	19	6	2

Sediment deposition in floodwater retarding structure pools with drainage areas of less than 1.0 square mile is estimated to be about two-thirds of the gross erosion. For drainage areas of 1.0 to 5.0 square miles the quantity is estimated to be one-half of the gross erosion, and for drainage

areas of 5.0 to 10.0 square miles the amount of sediment deposited in the structure pools is estimated to be one-third of the gross erosion.

Land treatment measures applied to the watershed lands are expected to reduce the sediment output rate 40 to 70 percent for drainage areas of 1.0 to 5.0 square miles. The reduction in sediment output rates for the larger drainage areas (5.0 to 20.0 square miles) will range from 20 to 50 percent.

OTHER RELATED FLOOD PLAIN DAMAGES

Flood Plain Scour

Damage from flood plain scour is moderate in the Clear Fork watershed. Scour channels occupy approximately 310 acres of the flood plain area but most of them are wide, flat-bottomed channels that can be crossed by farm implements. During overbank floods areas are scoured to plow depth, resulting in a loss of production capacity of 25 to 75 percent. Flood plain scour has caused estimated damage of 25 percent to 2.2 acres of cropland and 1.9 acres of pasture; 50 percent damage to 4.5 acres of cropland and 3.8 acres of pasture; and 75 percent damage to 4.6 acres of cultivated land and 3.8 acres of pasture annually.

The scour channels are rather uniformly distributed throughout the flood plain area. In the lower portion of the watershed flood plain scour damages are typical of those found in valleys of the Grand Prairie. In valleys of the West Cross Timbers, however, many of the scour channels are in areas of deposition behind natural levees.

Channel Enlargement

Stream bank erosion and channel entrenchment are of minor importance in the Clear Fork watershed. Throughout the flood plain area bank erosion occurs for short sections (50-100 feet), with only slight shifting in the sharp bends of the channel. There is an average annual loss of only 0.51 acres due to channel enlargement. Stable channels with bank outcrops partly of limestones and shales are typical in the Grand Prairie, while sediment deposition in the channels of the West Cross Timbers causes decreases in channel capacity and considerable instability of the channels.

Impaired Drainage on Valley Lands

Poor drainage conditions, as a result of excessive sedimentation and scour channels, has affected approximately 12 acres annually in the Clear Fork watershed. The annual damage is about 50 percent in terms of reduced pasture grass yields. The ponding or swamping is due mostly to (1) the formation of natural levees which obstruct the free flow of side slope runoff and floodwater into the main channels, and (2) the deposition of sediment plugs in the scour channels.

FLOOD DAMAGES

Flood damage information on 70 percent of the flood plain area of Clear Fork and its major tributaries was obtained from landowners or operators. Information obtained included flood plain land use, yields of major crops, property damage which would result from a major flood, and general flood problems. The monetary value of the damage to flood plain lands by sediment deposition and scour was determined on the basis of present prices and costs.

The schedules obtained were analyzed to determine the land use in the flood plain, crop yields, other agricultural damage and crop and pasture damage.

Information concerning flood damages to roads and bridges was obtained from the county commissioners. No damage to railroads was reported during the 20-year period investigated.

Damage rates, as determined from the damage survey were adjusted on the basis of relationships found from surveys of other watersheds of similar characteristics to indicate damage rates to be expected from floods of various sizes and seasons. These rates were multiplied by acreages flooded by each flood, by size and season, in the evaluation series and damages adjusted for recurrence of flooding.

For the purpose of this study the flood plain on the main stem of Clear Fork of the Trinity was divided into four reaches and one major tributary (South Fork) was divided into two reaches. Differences in land use, yields, channel characteristics and frequency of flooding made separate evaluations of the several reaches advisable.

The total direct floodwater and sediment damages are estimated to average $181,764 under present conditions of which $84,728 (47 percent) is crop and pasture damage. In addition, there are numerous indirect damages such as the interruption of travel, losses sustained by the dealers and industries dependent upon agricultural products, loss of perishable farm products, depreciation in property values in the flooded areas, and similar items. Ten percent of the total annual value of the direct damages or $18,176, was taken as a conservative evaluation of the annual indirect flood damage. The average annual monetary flood damages are summarized in Table 1.

THE REMEDIAL PROGRAM AND ITS EVALUATION

Land Treatment Measures Needed

The major land treatment measures needed are: (1) seeding or sodding 20,917 acres of retired land; (2) seeding critical erosion areas totaling 455 acres; (3) sodding 319 acres of farm waterways and (4) constructing 671 miles of field terraces.

Other land treatment measures needed include 83 miles of diversion terraces, 205 farm ponds, 57 miles of fencing to enclose newly reseeded and retired areas, conservation rotations on 75,660 acres of cultivated land, and improved management practices on 128,792 acres of pasture.

The estimated cost of installing these measures is $1,014,590 and the annual cost, including installation and maintenance, is $48,169.

Structures and Measures for Runoff and Waterflow Retardation

The runoff and waterflow retardation structures and measures needed to provide protection for flood plain lands, highways, and roads are listed in Table 2, items 1 - 4, inclusive.

A system of 33 floodwater retarding structures and one drop inlet is needed to protect the flood plains along Clear Fork and its tributaries above Elev. 730, the flood pool elevation of Benbrook Reservoir.

The proposed structures and their drainage areas are shown on the work plan map. Descriptive information concerning the structures is summarized in Table 5. This system of flood water retarding structures will detain runoff from 31.9 percent of the watershed area above the Aledo gage.

Sufficient detention storage can be provided at all sites to make possible the use of vegetated emergency spillways.

The one drop inlet listed in Table 2 is needed to control a critical erosion area, and thereby protect the flood water retarding structure No. 30 from excessive sedimentation.

As indicated in Table 2, it will be necessary to relocate or raise short portions of several county roads which cross the pool areas of several floodwater retarding structures.

The estimated cost of installing these measures is $1,165,675 and the annual cost, including installation and maintenance, is $44,674.

Foundation and Borrow Investigations

In order to have data on foundation conditions and suitability of construction materials at the proposed 33 floodwater retarding structure sites in advance of detailed design and the procuring of easements, semi-detailed investigations were made on 11 of the structure sites.

Effect of These Measures on Damages and Benefits

The combined program of land treatment and run-off and waterflow retardation measures described above would prevent damage on the flood plain area above elevation 730, from 34 of the 72 floods in the 20-year period of study. Elevation 730 is the maximum expected high water level of Benbrook Reservoir. The remaining 38 floods would inundate an average of 2,139 acres annually, compared to present average annual flooding of 8,867 acres. Because the Texas and Pacific Railroad and the town of Weatherford lies along the major Town Creek tributary, further reduction of flooding on South Fork of the Clear Fork would be impractical. Further reduction of the main stem would necessitate much greater control, obtained only by constructing large reservoirs which would inundate extensive areas of valuable flood plain.

Most of the expected reduction in annual flood damages would be effected by the proposed system of floodwater retarding structures. The annual value of the reduction in flood damages attributable to these structures is estimated to be $98,873 out of a total of $149,780 from all measures, as shown in Table 1.

Owners and operators of flood plain lands in the watershed above elevation 730 say that if flood protection is provided they will intensify their use of these lands by growing high value crops such as truck crops, oats and castor beans on areas that are now idle or used for pasture because of the frequency of flooding. It is estimated that this more intensive use would increase the net income of the land by $4,571 annually after all expenses are deducted.

The total waterflow retardation benefits, including both the reductions in flood damages and the benefits from more intensive use of flood plain lands are estimated to be $154,351. In addition it is estimated that the conservation benefits to land owners and operators in the upland areas of the watershed from the application of land treatment measures would be $360,528 annually. The total expected benefits from the combined program would amount to $514,879 annually.

The expected land treatment benefits were determined by estimating the increased net income to the land which would result from the application of the needed land treatment practices and measures. It was assumed that the proportion of the cropland used for each crop would change very little although the total area used for cropland would be decreased by the retirement of idle cropland and steep, severely eroded areas to pasture or meadow. Likewise, it was assumed that there would be no change in the percentages of cattle used for dairying and beef production, although the total number of cattle would increase materially because of the increased acreage of meadow and pasture and the greater per-acre hay production and pasture carrying capacity to the expected from the application of land treatment measures.

The loss in value of production in the proposed structure sites is estimated at $3,139 annually. This is less than the estimated $3,216 annual cost for site acquisition in Table 3.

The estimated increase in annual net income is $318,430 from crops and $42,098 from pasture, or a total of $360,528 annually.

Comparison of Costs and Benefits

The ratio of the average annual benefit from the floodwater retarding structures, $103,444, to the average annual cost of these structures and appurtenant structures for their protection, $44,674, is 2.32:1. The ratio of the average annual benefit, $411,435, from the land treatment measures and practices to their average annual cost, $48,169, is 8.54:1. The ratio of the total average annual benefit, $514,879, to total average annual cost, $92,843, is 5.55:1.

ANNUAL MAINTENANCE

The estimated total annual maintenance cost of the land treatment practices and special flood prevention measures is $16,805. Distribution of this cost is shown in Table 3.

It is expected that the run-off and waterflow retardation structures will be maintained by the benefited farmers under an agreement with the soil conservation districts which carry the responsibility of maintenance. Group organizations of farmers will be developed for this purpose. The land treatment measures on privately owned lands will be maintained by the landowners or operators of the farms on which the measures are installed.

Table 1

Summary of Average Annual Monetary Floodwater and Sediment Damage and Waterflow Retardation Benefit from Recommended Program (1952 Prices)

CLEAR FORK OF THE TRINITY RIVER WATERSHED

Damages	Average Annual Damage			Average Annual Benefits		
	Under Present Conditions (dollars)	With Land Treatment Only (dollars)	With Land Treatment & Detention Storage (dollars)	From Land Treatment Only (dollars)	From Detention Storage Only (dollars)	Total Waterflow Retardation Benefits (dollars)
Floodwater Damage						
Crop and Pasture	84,728	68,388	23,218	16,340	45,170	61,510
Flood Plain Scour	630	495	181	135	314	449
Other Agricultural	36,218	28,320	5,832	7,898	22,488	30,386
Roads and Bridges	22,826	12,303	617	10,523	11,686	22,209
Sub-Total	144,402	109,506	29,848	34,896	79,658	114,554
Sediment Damage						
Overbank Deposition	14,090	11,148	3,827	2,942	7,321	10,263
Reservoirs	23,143	14,729	11,887	8,414	2,842	11,256
Swamping	129	102	38	27	64	91
Sub-Total	37,362	25,979	15,752	11,383	10,227	21,610
Indirect Damage and Benefits	18,176	13,548	4,560	4,628	8,988	13,616
Total Damage	199,940	149,033	50,160	xxxx	xxxx	xxxx
Benefit from Reduction of Damage	xxxx	xxxx	xxxx	50,907	98,873	149,780
Benefit from More Intensive Use of Flood Plain	xxxx	xxxx	xxxx	xxxx	4,571	4,571
Total Waterflow Retardation Benefit	xxxx	xxxx	xxxx	50,907	103,444	154,351

Table 2
Cost Estimate Table
CLEAR FORK WATERSHED

Structure or Measure	Unit	No.	Cost: To Farmer	Cost: To Federal Funds	Cost: To State County or Other	Cost: Total
Flood Retarding Structures	Each	33	$ 370	$1,069,427	$ 2,300	$1,072,097
Site Acquisition	Total		80,405			80,405
Drop Inlets	Each	1		4,715		4,715
Relocating Roads	Mile	.9			8,458	8,458
Sub-Total			$80,775	$1,074,142	$10,758	$1,165,675
Seeding Retired Areas	Acre	20,917	$355,589			$355,589
Seeding Critical Areas	Acre	455	22,750			22,750
Farm Waterways	Acre	319	31,900			31,900
Terracing	Mile	671	83,875			83,875
Farm Diversions	Mile	83	12,450			12,450
Farm Ponds	Each	205	92,250			92,250
Farm Fencing	Mile	57	22,800			22,800
Farm & Ranch Planning & Application	Acre	261,984		$392,976		392,976
Sub-Total			$621,614	$392,976		$1,014,590
Totals			$702,389	$1,467,118	$10,758	$2,180,265

Table 3
Annual Costs
CLEAR FORK WATERSHED

Structure or Measure	Unit	No.	Annual Cost Installation	Maintenance	Total
Floodwater Retarding Structures	Each	33	$37,804	$3,300	$41,104
Site Acquisition	Total		3,216		3,216
Drop Inlets	Each	1	118	25	143
Relocating Roads	Mile	.9	211		211
Sub-Total			$41,349	$3,325	$44,674
Seeding Retired Areas	Acre	20,917	14,224		14,224
Seeding Critical Areas	Acre	455	910		910
Farm Waterways	Acre	319	1,276	1,276	2,552
Terracing	Mile	671	3,355	6,710	10,065
Farm Diversions	Mile	83	498	664	1,162
Farm Ponds	Each	205	3,690	3,690	7,380
Farm Fencing	Mile	57	912	1,140	2,052
Farm and Ranch Planning and Application	Acre	261,984	9,824		9,824
Sub-Total			$34,689	$13,480	$48,169
Total			$76,038	$16,805	$92,843
Annual Maintenance - Farmer				$16,805	
Annual Maintenance - Government				0	

Table 4
Comparison of Average Annual Benefit and Cost
of the Recommended Program
CLEAR FORK WATERSHED
(1952 Prices)

Source of Benefit	Annual Cost	Annual Benefit	Benefit per Dollar of Cost
	(Dollars)	(Dollars)	(Dollars)
Detention Storage Program	44,674	103,444	2.32
Land Treatment Program:			
Reduction of Flood Damages	xxxx	50,907	xxxx
Land Treatment	xxxx	360,528	xxxx
TOTAL	48,169	411,435	8.54
All Sources	92,843	514,879	5.55

Table 5
Floodwater Retarding Structure Data
CLEAR FORK WATERSHED OF TRINITY RIVER

Site No.	Drainage Area Sq. mi.	Storage Volume: Det. Pool In.	Storage Volume: Det. Pool Ac.Ft.	Storage Volume: Sed. Pool Ac. Ft.	Storage Volume: Total Ac. Ft.	Surface Area Acres: Top Sed. Pool	Surface Area Acres: Top Det. Pool	Flood Plain Inundated: Sed. Pool Ac.	Flood Plain Inundated: Spill-way Crest Ac.	Max. Ht. of Fill Ft.	Volume of Fill Cu. Yd.	Draw down Rate cfs	Type of Spill-way	Estimated Total Cost
1	1.83	4.3	491	76	567	16	55	0	0	26	47,090	9	Veg	$23,545
2	6.00	4.7	1773	384	2157	68	205	0	0	30	86,307	35	"	43,154
3	1.91	4.3	440	173	613	23	65	0	0	32	46,500	10	"	23,250
4	2.14	4.3	497	120	617	22	64	0	0	27	54,639	11	"	27,320
5	1.32	4.3	303	71	374	11	32	0	0	31	43,079	7	"	21,540
6	1.16	4.3	270	64	334	12	31	0	0	29	37,295	6	"	18,648
7	2.69	4.3	626	184	810	21	66	0	0	36	101,624	13	"	50,812
8	2.50	4.3	577	131	708	19	52	0	0	32	58,465	13	"	29,232
9	1.62	4.3	411	124	535	26	43	0	0	23	54,608	8	"	27,304
10	4.30	4.3	1023	268	1291	38	104	0	0	33	67,306	22	"	33,653
11	.95	4.3	215	81	296	11	22	0	0	24	22,901	5	"	11,450
12	1.03	4.3	232	84	316	16	25	0	0	23	24,986	5	"	12,493
13	1.09	4.3	252	90	342	10	33	0	0	37	47,143	5	"	23,572
14	1.30	4.3	293	79	372	19	41	0	0	23	27,320	7	"	13,660
15	1.02	4.3	396	129	525	20	56	0	0	32	66,124	8	"	33,062
16	1.65	4.3	371	81	452	12	41	0	0	28	66,287	8	"	33,144
17	1.71	4.3	399	110	509	15	41	0	0	29	59,539	9	"	29,770
18	1.42	4.3	330	60	390	10	36	0	0	29	40,801	7	"	20,400
19	2.17	4.3	496	119	615	20	39	0	0	34	97,536	11	"	48,768
20	2.16	4.3	479	128	607	18	67	0	0	26	52,908	11	"	26,454
21	2.75	4.3	645	148	793	15	60	0	0	38	79,580	14	"	39,790
22	1.16	4.3	273	69	342	11	35	0	0	29	58,250	6	"	29,125
23	6.99	4.7	1765	270	2035	32	132	0	0	39	144,958	35	"	72,479
24	5.66	4.3	1262	331	1593	38	114	0	0	32	100,966	28	"	50,483
25	1.96	4.3	461	106	567	14	47	0	0	33	72,407	10	"	36,203

(Table 5 Continued on Page 19)

Table 5 (Continued)
Floodwater Retarding Structure Data
CLEAR FORK WATERSHED OF TRINITY RIVER

Site No.	Drainage Area Sq. Mi.	Storage Volume: Det. Pool In.	Storage Volume: Det. Pool Ac.Ft.	Storage Volume: Sed. Pool Ac. Ft.	Storage Volume: Total Ac. Ft.	Surface Area Acres: Top Sed. Pool	Surface Area Acres: Top Det. Pool	Flood Plain Inundated: Sed. Pool Ac.	Flood Plain Inundated: Spill-way Crest Ac.	Max. Ht. of Fill Ft.	Volume of Fill Cu. Yd.	Draw down Rate cfs	Type of Spill-way	Estimated Total Cost
26	3.07	4.3	718	127	845	19	61	0	0	31	70,487	15	Veg.	$ 35,244
27	1.80	4.3	294	81	375	14	35	0	0	30	50,204	7	"	25,102
28	1.45	4.3	352	106	458	13	40	0	0	32	47,881	8	"	23,940
29	1.51	4.3	349	115	464	16	39	0	0	27	55,836	8	"	27,918
30	1.33	4.3	292	78	370	9	28	0	0	36	67,067	7	"	33,534
31	7.35	4.8	1910	160	2070	21	130	0	0	42	200,477	37	"	100,238
32	1.68	4.3	400	33	433	7	36	0	0	27	45,207	8	"	22,603
33	1.81	4.3	417	43	460	9	38	0	0	24	43,075	9	"	21,537
Total	78.49		19012	4223	23235	625	1913	0	0		2,138,853			$1,069,427

1/ Estimated construction cost - $929,937
Technical services 139,490

APPENDIX

Foundation and Borrow Investigations

In order to have data on foundation conditions and suitability of construction materials at the proposed 33 floodwater retarding structures well in advance of detailed design and the procuring of easements, semi-detailed investigations were made on 11 typical structure sites.

Most of the sites are located within two specific physiographic areas; (1) The West Cross Timbers and (2) the Grand Prairie. Several, however, are located in areas which are a combination of the above areas. For example, at some sites, the surface formations are of the Grand Prairie, but the valley deposits are derived from West Cross Timbers formations which occupy the greater part of the watershed. At other sites the stream channels have cut down through the Grand Prairie into the sandy Trinity formations of the West Cross Timbers.

In general, construction in the West Cross Timbers area will be more difficult because of the high proportion of sand in both alluvium and underlying bedrock. In areas predominantly within the Grand Prairie the limestone and shale outcrops should be favorable for installing the structure abutments and the alluvium, containing good proportions of sand, silt and clay, should be favorable for construction of both cores and fills.

A sufficient number of sites in each of the three areas were investigated to show the representative conditions.

Borings were made along the center line of the proposed site, in the borrow area, and in the spillway section. Tentative recommendations as to selection of materials, excavation for foundation, etc. were made in a short report for each site investigated. Samples, both disturbed and undisturbed, were taken at each site and sent to the SCS soil testing laboratory at Albuquerque, New Mexico, for analysis. Final conclusions and recommendations regarding construction will be made when these analyses are received.

The following table summarizes information gathered during the foundation investigation of the 11 representative sites in the watershed. A brief reconnaissance was made of the other 22 sites to determine their characteristics in relation to those investigated.

APPENDIX

Summary Table of Geological Characteristics at Dam Sites - Clear Fork of Trinity River

Site No.	Formation	Alluvium	Abutments	Construction Materials	Foundation Conditions
1	Paluxy sand of Trinity Fm.(West Cross Timbers)	Fine sand 11' + deep;water at ave. Depth of 9'	Thin sandy soil over sandy clay 2.5'-3.0' thick	Sandy clay suitable. Sandy alluvium is of doubtful quality	Deeper borings necessary to determine.
2	"	"	"	"	"
3	"	Fine sand underlain by sandstone at 16'; water table at 8'.	2'-3' of sandy clay over poorly consolidated SS.	Sandy silt in alluvial valley. Clayey silts on slopes.	Doubtful in sandy alluvium-may be necessary to excavate to bedrock.
11	"	Fine sand 9' + deep-water table at 8.0'	Thin sandy soil over sandy clay 2.0'-3.0' thick.	Sandy clay suitable. Sandy alluvium is of doubtful quality	Deeper borings necessary to determine.
15	"	Silty & sandy clays; water bearing sand at 18'-Shale at 22'.	Clayey sand overlying sandy clay	Sandy and gravelly clays	Suitable in sandy clay above water bearing-sand-relief well possibility
28	"	Irregularly stratified sands, silts, clayey sands & sandy clays; limestone at 15'	Sandy clays and sandy silts overlying silty sands	Silty sands in alluvial portion mixed with sandy silts & silty clays on slopes.	Doubtful because of poor grading-may be necessary to excavate to l.s. & backfill with sandy clay
23	Walnut clays & limestones of Fredericksburg group; Grand Prairie	Silty clay & clay overlying gravelly sand-over l.s. in places.	Fine sandy silts & silty clays overlying gravelly clay or limestone	Soil material both in alluvial portion & on slopes appears to be suitable.	Suitable in clay horizon above gravelly sand
29	"	Silty clays and clays-some gravelly clay	Silty sand and silty clay over ss. or limestone	"	Suitable at minimum depth

Summary Table (Continued)

Site No.	Formation	Alluvium	Abutments	Construction Materials	Foundation Conditions
17	Walnut at site; Paluxy in watershed. West Cross Timbers & Grand Prairie	Clayey sands over sandy clays & clays. Water sand at 8'-impervious clay at 25'-30'	Fine sand over sandy clay	All material above water table appears to be suitable	May be necessary to excavate below water bearing formations
22	Walnut & Paluxy fms. at site and in watershed-GRPR and W. Cross Timbers	Clay or gravelly clay over water bearing gravelly sand at 9-10'	Clays & silty clays containing l.s. gravel	"	May be possible to set foundation in heavy clays above water zone.
30	"	Fine sand & Clayey sands over saturated sandy clay at 12'-15'.	Sandy clays over sandy silts over sandstone	Clayey sand in alvial portion; sandy clays on slopes	Doubtful in clayey sands overlying water zone-may be necessary to excavate to bedrock

Sites similar to 1, 2, 3, 11, 15 and 28 are sites 4, 5, 6, 7, 10, 12, 13, and 24 - West Cross Timbers Area.

Sites similar to 23 and 29 are 16, 18, 21 and 33 - Grand Prairie Area.

Sites similar to 17, 22 and 30 are 8, 9, 14, 19, 20, 25, 26, 27, 31 and 32 - Intermixed West Cross Timbers and Grand Prairie Areas.

APPENDIX

Table 1A

Summary of Average Annual Monetary Floodwater and Sediment Damage and Waterflow Retardation Benefit from Recommended Program (1952 Prices)

CLEAR FORK TRINITY RIVER WATERSHED (Mainstem Sec. 3-6)

Damages	Average Annual Damage			Average Annual Benefits		
	Present Conditions	With Land Treatment Only	With Land Treatment & Detention Storage	From Land Treatment Only	From Detention Storage Only	Total Waterflow Retardation Benefits
	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)
Floodwater Damages						
Crop and Pasture damage	9,463	7,515	1,581	1,948	5,934	7,882
Flood Plain Scour damage	112	87	18	25	69	94
Other Agricultural damage	3,196	2,456	376	740	2,080	2,820
Road and Bridge Damage	2,892	1,389	18	1,503	1,371	2,874
Sub-Total	15,663	11,447	1,993	4,216	9,454	13,670
Sediment Damage						
Overbank Deposition	1,171	914	190	257	724	981
Reservoirs	1,139	731	731	408	0	408
Swamping	0	0	0	0	0	0
Sub-Total	2,310	1,645	921	665	724	1,389
Indirect Damage and Benefit	1,797	1,309	291	488	1,018	1,506
Total Damage:	19,770	14,401	3,205	xxxx	xxxx	xxxx
Benefit from Reduction of Damage	xxxx	xxxx	xxxx	5,369	11,196	16,565
Benefit from more Intensive Use of Flood Plain	xxxx	xxxx	xxxx	xxxx	0	0
Total Waterflow Retardation Benefit	xxxx	xxxx	xxxx	5,369	11,196	16,565

APPENDIX
Table 1B
Summary of Average Annual Monetary Floodwater and Sediment Damage and Waterflow Retardation Benefit from Recommended Program (1952 Prices)
CLEAR FORK TRINITY RIVER WATERSHED (Mainstem Sec. 6-16)

Damages	Average Annual Damage			Average Annual Benefits		
	Under Present Conditions (dollars)	With Land Treatment Only (dollars)	With Land Treatment & Detention Storage (dollars)	From Land Treatment Only (dollars)	From Detention Storage Only (dollars)	Total Waterflow Retardation Benefits (dollars)
Floodwater Damages						
Crop and Pasture Damage	19,629	15,438	2,102	4,191	13,336	17,527
Flood Plain Scour Damage	189	148	21	41	127	168
Other Agricultural Damage	9,771	7,648	637	2,123	7,011	9,134
Road and Bridge Damage	6,877	3,345	11	3,532	3,334	6,866
Sub-Total	36,466	26,579	2,771	9,887	23,808	33,695
Sediment Damage						
Overbank deposition	2,518	1,966	277	552	1,689	2,241
Reservoirs	2,202	1,413	807	789	606	1,395
Swamping	0	0	0	0	0	0
Sub-Total	4,720	3,379	1,084	1,341	2,295	3,636
Indirect Damage and Benefit	4,119	2,996	386	1,123	2,610	3,733
Total Damages	45,305	32,954	4,241	xxxx	xxxx	xxxx
Benefit from Reduction of Damage	xxxx	xxxx	xxxx	12,351	28,713	41,064
Benefit from more Intensive Use of Flood Plain	xxxx	xxxx	xxxx	xxxx	0	0
Total waterflow Retardation Benefits	xxxx	xxxx	xxxx	12,351	28,713	41,064

APPENDIX

Table 10

Summary of Average Annual Monetary Floodwater and Sediment Damage and Waterflow Retardation Benefit from Recommended Program (1952 Prices)

CLEAR FORK TRINITY RIVER WATERSHED (Mainstem Sec. 16-19)

Damages	Average Annual Damage			Average Annual Benefits		
	Under Present Conditions	With Land Treatment Only	With Land Treatment & Detention Storage	From Land Treatment Only	From Detention Storage Only	Total Waterflow Retardation Benefits
	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)
Floodwater Damage						
Crop and pasture damage	5,779	4,741	1,752	1,038	2,989	4,027
Flood Plain Scour Damage	26	21	8	5	13	18
Other Agricultural Damage	2,161	1,747	736	414	1,011	1,425
Road and Bridge Damage	2,069	1,080	91	989	989	1,978
Sub-Total	10,035	7,589	2,587	2,446	5,002	7,448
Sediment Damage						
Overbank Deposition	1,315	1,041	389	274	652	926
Reservoirs	971	623	392	348	231	579
Swamping	129	102	38	27	64	91
Sub-Total	2,415	1,766	819	649	947	1,596
Indirect Damage and Benefit	1,245	936	340	309	596	905
Total Damages	13,695	10,291	3,746	xxxx	xxxx	xxxx
Benefit from Reduction of Damage	xxxx	xxxx	xxxx	3,404	6,545	9,949
Benefit from More Intensive Use of Flood Plain	xxxx	xxxx	xxxx	xxxx	0	0
Total Waterflow Retardation Benefit	xxxx	xxxx	xxxx	3,404	6,545	9,949

APPENDIX

Table 1D

Summary of Average Annual Monetary Floodwater and Sediment Damage and Waterflow Retardation Benefit from Recommended Program (1952 Prices)

CLEAR FORK TRINITY RIVER WATERSHED (mainstem Sec. 19-24)

Damages	Average Annual Damage			Average Annual Benefits		
	Under Present Conditions	With Land Treatment Only	With Land Treatment & Detention Storage	From Land Treatment Only	From Detention Storage Only	Total Waterflow Retardation Benefits
	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)
Floodwater Damages						
Crop and Pasture Damage	9,312	7,704	1,767	1,608	5,937	7,545
Flood Plain Scour Damage	58	47	10	11	37	48
Other Agricultural Damage	6,647	5,220	853	1,427	4,367	5,794
Road and Bridges	3,014	1,367	24	1,647	1,343	2,990
Sub-Total	19,031	14,338	2,654	4,693	11,684	16,377
Sediment Damage						
Overbank Deposition	2,694	2,185	482	509	1,703	2,212
Reservoirs	1,984	1,273	521	711	752	1,463
Swamping	0	0	0	0	0	0
Sub-Total	4,678	3,458	1,003	1,220	2,455	3,675
Indirect Damage and Benefits	2,371	1,780	366	591	1,414	2,005
TOTAL DAMAGES	26,080	19,576	4,023	xxxxx	xxxxx	xxxxx
Benefit from Reduction of Damage	xxxxx	xxxxx	xxxxx	6,504	15,553	22,057
Benefit from More Intensive Use of Flood Plain	xxxxx	xxxxx	xxxxx	xxxxx	1,782	1,782
Total Waterflow Retardation Benefit	xxxxx	xxxxx	xxxxx	6,504	17,335	23,839

APPENDIX

Table 1E

Summary of Average Annual Monetary Floodwater and Sediment Damage and Waterflow Retardation Benefit from Recommended Program (1952 Prices)

CLEAR FORK OF THE TRINITY RIVER WATERSHED (Gourdneck Tributary)

Damages	Average Annual Damage			Average Annual Benefits		
	Under Present Conditions (dollars)	With Land Treatment Only (dollars)	Sith Land Treatment & Detention Storage (dollars)	From Land Treatment Only (dollars)	From Detention Storage Only (dollars)	Total Waterflow Retardation Benefits (dollars)
Floodwater Damage						
Crop and pasture damage	4,905	4,079	1,160	826	2,919	3,745
Flood Plain Scour Damage	2	2	0	0	2	2
Other Agricultural Damage	2,928	2,275	219	653	2,056	2,709
Road and Bridges	1,495	1,102	179	393	923	1,316
Sub-Total	9,330	7,458	1,558	1,872	5,900	7,772
Sediment Damage						
Overbank Deposition	1,161	910	244	251	666	917
Reservoirs	861	552	225	309	327	636
Swamping	0	0	0	0	0	0
Sub-Total	2,022	1,462	469	560	993	1,553
Indirect Damage and Benefits	1,135	892	203	243	689	932
TOTAL DAMAGES	12,487	9,812	2,230	xxxxx	xxxxx	xxxxx
Benefit from Reduction of Damage	xxxxx	xxxxx	xxxxx	2,675	7,582	10,257
Benefit from More Intensive Use of Flood Plain	xxxxx	xxxxx	xxxxx	xxxxx	643	643
Total Waterflow Retardation Benefit	xxxxx	xxxxx	xxxxx	2,675	8,225	10,900

APPENDIX

Table 1F

Summary of Average Annual Monetary Floodwater and Sediment Damage and Waterflow Retardation Benefit from Recommended Program (1952 Prices)

CLEAR FORK OF THE TRINITY RIVER WATERSHED

(South Fork Confluence of Mainstem to Sec. N2)

Damages	Average Annual Damage			Average Annual Benefits		
	Under Present Conditions	With Land Treatment Only	With Land Treatment & Detention Storage	From Land Treatment Only	From Detention Storage Only	Total Waterflow Retardation Benefits
	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)
Floodwater Damages						
Crop and Pasture	10,014	8,038	4,523	1,976	3,515	5,491
Flood Plain Scour	243	190	124	53	66	119
Other Agricultural	1,963	1,544	834	419	710	1,129
Roads and Bridges	0	0	0	0	0	0
Sub-Total	12,220	9,772	5,481	2,448	4,291	6,739
Sediment Damage						
Overbank Deposition	2,486	1,946	1,156	540	790	1,330
Reservoirs	385	247	247	138	0	138
Swamping	0	0	0	0	0	0
Sub-Total	2,871	2,193	1,403	678	790	1,468
Indirect Damage and Benefits	1,509	1,196	688	313	508	821
TOTAL DAMAGES	16,600	13,161	7,572	xxxxx	xxxxx	xxxxx
Benefit from Reduction of Damage	xxxxx	xxxxx	xxxxx	3,439	5,589	9,028
Benefit from More Intensive Use of Flood Plain	xxxxx	xxxxx	xxxxx	xxxxx	0	0
Total Waterflow Retardation Benefit	xxxxx	xxxxx	xxxxx	3,439	5,589	9,028

APPENDIX
Table 1G
Summary of Average Annual Monetary Floodwater and Sediment Damage and Waterflow Retardation Benefit from Recommended Program (1952 Prices)
CLEAR FORK OF THE TRINITY RIVER WATERSHED
(South Fork Sec. W2-W4)

Damages	Average Annual Damage: Under Present Conditions (dollars)	Average Annual Damage: With Land Treatment Only (dollars)	Average Annual Damage: With Land Treatment & Detention Storage (dollars)	Average Annual Benefits: From Land Treatment Only (dollars)	Average Annual Benefits: From Detention Storage Only (dollars)	Average Annual Benefits: Total Waterflow Retardation Benefits (dollars)
Floodwater Damage						
Crop and pasture damage	15,076	11,909	7,819	3,167	4,090	7,257
Flood plain scour damage	0	0	0	0	0	0
Other Agricultural Damage	3,745	2,905	1,578	840	1,327	2,167
Road and Bridges	2,619	1,641	260	978	1,381	2,359
Sub-Total	21,440	16,455	9,657	4,985	6,798	11,783
Sediment Damage						
Overbank deposition	1,268	987	649	281	338	619
Reservoirs	440	282	282	158	0	158
Swamping	0	0	0	0	0	0
Sub-Total	1,708	1,269	931	439	338	777
Indirect Damage and Benefits	2,315	1,772	1,059	543	713	1,256
TOTAL DAMAGES	25,463	19,496	11,647	xxxxx	xxxxx	xxxxx
Benefit from Reduction of Damage	xxxxx	xxxxx	xxxxx	5,967	7,849	13,816
Benefit from More Intensive Use of Flood Plain	xxxxx	xxxxx	xxxxx	xxxxx	0	0
Total Waterflow Retardation Benefit	xxxxx	xxxxx	xxxxx	5,967	7,849	13,816

APPENDIX

Table 1H

Summary of Average Annual Monetary Floodwater and Sediment Damage and Waterflow Retardation Benefit from Recommended Program (1952 Prices)

CLEAR FORK OF THE TRINITY RIVER WATERSHED

(Willow Creek Sec. W4-Res.24)

Damages	Average Annual Damage			Average Annual Benefits		
	Under Present Conditions	With Land Treatment Only	With Land Treatment & Detention Storage	From Land Treatment Only	From Detention Storage Only	Total Waterflow Retardation Benefits
	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)
Floodwater Damage						
Crop and pasture	8,156	6,893	2,401	1,263	4,492	5,755
Flood plain scour	0	0	0	0	0	0
Other agricultural	3,693	2,848	585	845	2,263	3,108
Roads and Bridges	2,670	1,517	34	1,153	1,483	2,636
Sub-Total	14,519	11,258	3,020	3,261	8,238	11,499
Sediment Damage						
Overbank Deposition	1,477	1,199	440	278	759	1,037
Reservoirs	6,464	4,007	3,410	2,457	597	3,054
Swamping	0	0	0	0	0	0
Sub-Total	7,941	5,206	3,850	2,735	1,356	4,091
Indirect Damage and Benefits	2,246	1,646	687	600	959	1,559
TOTAL DAMAGES	24,706	18,110	7,557	xxxxx	xxxxx	xxxxx
Benefit from Reduction of Damage	xxxxx	xxxxx	xxxxx	6,596	10,553	17,149
Benefit from More Intensive Use of Flood Plain	xxxxx	xxxxx	xxxxx	xxxxx	2,146	2,146
Total Waterflow Retardation Benefit	xxxxx	xxxxx	xxxxx	6,596	12,699	19,295

APPENDIX

Table II

Summary of Average Annual Monetary Floodwater and Sediment Damage and Waterflow Retardation Benefit from Recommended Program (1952 Prices)

CLEAR FORK OF THE TRINITY RIVER WATERSHED

(Burgess Creek)

Damages	Average Annual Damage			Average Annual Benefits		
	Under Present Conditions	With Land Treatment Only	With Land Treatment & Detention Storage	From Land Treatment Only	From Detention Storage Only	Total Waterflow Retardation Benefits
	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)
Floodwater Damages						
Crop and pasture damage	2,394	2,071	113	323	1,958	2,281
Flood Plain Scour Damage	0	0	0	0	0	0
Other Agricultural Damage	2,114	1,677	14	437	1,663	2,100
Road and Bridges	1,190	862	0	328	862	1,190
Sub-Total	5,698	4,610	127	1,088	4,483	5,571
Sediment Damage						
Overbank Deposition	0	0	0	0	0	0
Reservoirs	596	383	54	213	329	542
Swamping	0	0	0	0	0	0
Sub-Total	596	383	54	213	329	542
Indirect Damage and Benefits	629	499	18	130	481	611
TOTAL DAMAGES	6,923	5,492	199	xxxxx	xxxxx	xxxxx
Benefit from Reduction of Damage	xxxxx	xxxxx	xxxxx	1,431	5,293	6,724
Benefit from More Intensive Use of Flood Plain	xxxxx	xxxxx	xxxxx	xxxxx	0	0
Total Waterflow Retardation Benefit	xxxxx	xxxxx	xxxxx	1,431	5,293	6,724

APPENDIX

Table 1J

Summary of Average Annual Monetary Floodwater and Sediment Damage and Waterflow Retardation Benefit from Recommended Program (1952 Prices)

CLEAR FORK TRINITY RIVER WATERSHED

(Area Below Aledo Gauge)

Damages	Average Annual Damage			Average Annual Benefits		
	Under Present Conditions	With Land Treatment Only	With Land Treatment & Detention Storage	From Land Treatment Only	From Detention Storage Only	Total Waterflow Retardation Benefits
	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)
Floodwater Damage						
Crop and pasture damage	0	0	0	0	0	0
Flood Plain Scour Damage	0	0	0	0	0	0
Other agricultural damage	0	0	0	0	0	0
Road and Bridges	0	0	0	0	0	0
Sub-Total	0	0	0	0	0	0
Sediment Damage						
Overbank Deposition	0	0	0	0	0	0
Reservoirs	8,101	5,218	5,218	2,883	0	2,883
Swamping	0	0	0	0	0	0
Sub-Total	8,101	5,218	5,218	2,883	0	2,883
Indirect Damages and Benefits	810	522	522	288	0	288
TOTAL DAMAGES	8,911	5,740	5,740	xxxxx	xxxxx	xxxxx
Benefit from Reduction of Damage	xxxxx	xxxxx	xxxxx	3,171	0	3,171
Benefit from More Intensive Use of Flood Plain	xxxxx	xxxxx	xxxxx	xxxxx	0	0
Total Waterflow Retardation Benefit	xxxxx	xxxxx	xxxxx	3,171	0	3,171

APPENDIX
Table 2A
Cost Estimate Table
CLEAR FORK WATERSHED
(Main Stem & Tributaries above Aledo Gauge)

Structure or Measure	Unit	No.	COST: To Farmer	To Federal Funds	To State County or Other	Total
Floodwater Retarding Structures	Each	33	$ 370	$1,069,427	$ 2,300	$1,072,097
Site Acquisition	Total		80,405			80,405
Drop Inlets	Each	1		4,715		4,715
Relocating Roads	Mile	.9			8,458	8,458
Sub-Total:			$80,775	$1,074,142	$10,758	$1,165,675
Seeding Retired Areas	Acre	13,529	229,993			229,993
Seeding Critical Areas	Acre	455	22,750			22,750
Farm Waterways	Acre	171	17,100			17,100
Terracing	Mile	187	23,375			23,375
Farm Diversions	Mile	62	9,300			9,300
Farm Ponds	Each	104	46,800			46,800
Farm Fencing	Mile	12	4,800			4,800
Farm & Ranch Planning & Application	Acre	153,643		230,465		230,465
Sub-Total			$354,118	$230,465		$584,583
TOTAL			$434,893	$1,304,607	$10,758	$1,750,258

APPENDIX
Table 2B
Cost Estimate Table
CLEAR FORK WATERSHED
(Main Stem & Tributaries Below Aledo Gauge)

Structure or Measure	Unit	No.	COST: To Farmer	COST: To Federal Funds	COST: To State County Or Other	COST: Total
Seeding Retired Areas	Acre	7,388	$125,596			$125,596
Seeding Critical Areas	Acre	0	0			0
Farm Waterways	Acre	148	14,800			14,800
Terracing	Mile	484	60,500			60,500
Farm Diversions	Mile	21	3,150			3,150
Farm Ponds	Each	101	45,450			45,450
Farm Fencing	Mile	45	18,000			18,000
Farm & Ranch Planning & Application	Acre	108,341		$162,511		162,511
TOTALS			$267,496	$162,511		$430,007

APPENDIX
Table 3A
Annual Costs
CLEAR FORK WATERSHED
(Main Stem and Tributaries above Aledo Gauge)

Structure or Measure	Unit	No	Annual Cost: Installation	Annual Cost: Maintenance	Annual Cost: Total
Floodwater Retarding Structures	Each	33	$37,804	$3,300	$41,104
Site Acquisition	Total		3,216		3,216
Drop Inlets	Each	1	118	25	143
Relocating Roads	Mile	.9	211		211
Sub-Total			$41,349	$3,325	$44,674
Seeding Retired Areas	Acre	13,529	9,200		9,200
Seeding Critical Areas	Acre	455	910		910
Farm Waterways	Acre	171	684	684	1,368
Terracing	Mile	187	935	1,870	2,805
Farm Diversions	Mile	62	372	496	868
Farm Ponds	Each	104	1,872	1,872	3,744
Farm Fencing	Mile	12	192	240	432
Farm & Ranch Planning & Application	Acre	153,643	5,762		5,762
Sub-Total			$19,927	$5,162	$25,089
Totals			$61,276	$8,487	$69,763

APPENDIX
Table 3B
Annual Costs
CLEAR FORK WATERSHED
(Main Stem and Tributaries below Aledo Gauge)

Structure or Measure	Unit	No	Annual Cost Installation	Annual Cost Maintenance	Annual Cost Total
Seeding Retired Areas	Acre	7,388	$ 5,024		$ 5,024
Seeding Critical Areas	Acre	0	0		0
Farm Waterways	Acre	148	592	$ 592	1,184
Terracing	Mile	484	2,420	4,840	7,260
Farm Diversions	Mile	21	126	168	294
Farm Ponds	Each	101	1,818	1,818	3,636
Farm Fencing	Mile	45	720	900	1,620
Farm and Ranch Planning and Application	Acres	108,341	4,062		4,062
	Totals		$14,762	$8,318	$23,080

APPENDIX
Table 6A
Increased Income Through More Intensive Use of Flood Plain Land
(Main Stem - Section 3 to Section 6)
CLEAR FORK OF TRINITY WATERSHED (1952 Prices)

Land Use	Acres	Yield	Production	Gross Income	Total Cost	Net Income
Present Conditions						
Alfalfa	504	3T	1,512	$68,539	$13,104	$55,435
Johnson Grass	123	2T	246	6,908	1,164	5,744
Corn	32	50 Bu.	1,600	2,928	906	2,022
Oats and Vetch	97	5 A.U.M.	485	2,600	1,002	1,598
Oats for hay	65	1.5T	97.5	2,738	950	1,788
Oats for grain	45	53 Bu.	2,385	2,409	632	1,777
Temporary Pasture (sudan)	61	5 A.U.M.	305	1,635	684	951
Pasture	319	4 A.U.M.	1,276	6,839	-	6,839
Woods and Miscellaneous	274					
TOTAL	1,520			$94,596	$18,442	$76,154

APPENDIX
Table 6B
Increased Income Through More Intensive Use of Flood Plain Land
(Main Stem - Section 6 to Section 16)
CLEAR FORK OF TRINITY WATERSHED (1952 Prices)

Land Use	Acres	Field	Production	Gross Income	Total Cost	Net Income
Present Conditions						
Clover and Vetch	44	300/2T	13,200/88	$5,870	$ 1,493	$ 4,377
Alfalfa	471	3.5T	1,648.5	74,726	15,355	59,371
Oats for hay	62	1.5T	93	2,611	906	1,705
Temporary pasture (sudan)	185	5 A.U.M.	925	4,958	2,076	2,882
Corn	257	50 bu.	12,850	23,516	7,276	16,240
Oats for grain	535	53 bu.	28,355	28,639	7,511	21,128
Oats for vetch	59	5 A.U.M.	295	1,581	609	972
Johnson grass for hay	16	2T	32	899	151	748
Temporary pasture (barley)	71	5 A.U.M.	355	1,903	662	1,241
Hegari	44	3T	132	3,707	1,332	2,375
Cotton	26	167 lbs.	4,342/312	1,548	1,189	359
Sudan for hay	26	3T	78	2,190	635	1,555
Rye and Vetch	35	300/1T	10,500/35	3,083	909	2,174
Truck	15	$150	2,250	2,250	799	1,451
Pasture	172	4 A.U.M.	688	3,688	-	3,688
Woodland and Miscellaneous	443					
TOTAL	2,461			161,169	$40.903	$120,266

APPENDIX
Table 6C
Increased Income Through More Instensive Use of Flood Plain Land
(Main Stem - Section 16 to Section 19)
CLEAR FORK OF TRINITY WATERSHED (1952 Prices)

Land Use	Acres	Yield	Production	Gross Income	Total Cost	Net Income
Present Conditions						
Sudan for hay	29	3 tons	87	$2,443	$ 708	$1,735
Hegari	35	2.5 tons	87.5	2,457	983	1,474
Oats for grain	89	45 bu.	4,005	4,045	1,218	2,827
Oats for hay	35	1 ton	35	983	434	549
Corn	38	40 bu.	1,520	2,782	977	1,805
Alfalfa	15	3 tons	45	2,040	456	1,584
Pasture	395	4 A.U.M.	1,580	8,469	-	8,469
Woodland and Miscellaneous	55					
TOTAL	692			$23,219	$4,776	$18,443

APPENDIX

Table 6D

Increased Income through more intensive use of Flood plain lands

(Main Stem - Section 19 to Section 24)

CLEAR FORK OF TRINITY WATERSHED (1952 prices)

Land Use	Acres	Yield	Production	Gross Income	Total Cost	Net Income
PRESENT CONDITIONS						
Corn	75	40 bu.	3,000	$5,490	$1,928	$3,562
Oats (grain)	4	45 bu.	180	182	55	127
Castor Beans	9	750 lbs.	6,750	675	373	302
Truck	12	$150	1,800	1,800	639	1,161
Hegari	21	2 tons	42	1,179	544	635
Alfalfa	50	3 tons	150	6,800	1,520	5,280
Rye and Vetch	24	1 ton hay	24	674	106	568
		300 lbs. seed	7,200	1,296	518	778
Oats and Vetch	24	5 A.U. Months	120	643	248	395
Sudan (hay)	12	2.5 tons	30	842	267	575
Oats (hay)	4	1 ton	4	112	50	62
Pasture	480	4 A.U. months	1,920	10,291	0	10,291
Woods and Miscellaneous	71					0
TOTALS	786			$29,984	$6,248	$23,736
AFTER LAND TREATMENT AND DETENTION STORAGE						
Corn	75	40 bu.	3,000	5,490	1,928	3,562
Oats (grain)	24	45 bu.	1,080	1,091	329	762
Castor Beans	19	750 lbs.	14,250	1,425	787	638
Truck	26	$150	3,900	3,900	1,385	2,515
Hegari	21	2 tons	42	1,179	544	635
Alfalfa	50	3 tons	150	6,800	1,520	5,280
Rye and Vetch	34	1 ton hay	34	955	150	805
		300 lbs seed	10,200	1,836	734	1,102
Sudan and Vetch	24	7 A.U. months	168	900	296	604
Sudan (hay)	16	2.5 tons	40	1,123	356	767
Pasture	426	4 A.U. months	1,704	9,133	0	9,133
Woods and Miscellaneous	71					0
TOTALS	786			$33,832	$8,029	$25,803
Flooded too often to intensify	285					
Total Flood Plain	1,071					

Net Increase	$2,067	=	$1,924
Less added damage	18	Discount Factor	.926
Less increased overhead - 50 acs.x $2.50	125	Annual Net Benefit	$1,782

APPENDIX

Table 6E

Increased Income through more intensive use of Flood Plain Lands

(Gourdneck Creek)

CLEAR FORK OF TRINITY WATERSHED (1952 Prices)

Land Use	Acres	Yield	Production	Gross Income	Total Cost	Net Income
PRESENT CONDITIONS						
Corn	6	35 bu.	210	$ 384	$ 147	$ 237
Oats (grain)	8	45 bu.	360	364	109	255
Castor Beans	8	750 lbs.	6,000	600	331	269
Peanuts	4	700 lbs.	2,800	283	168	115
Truck	9	$150	1,350	1,350	480	870
Hegari	21	2 tons	42	1,179	544	635
Clover and Vetch	11	2 tons hay	22	807	276	531
		300 lbs. seed	3,300	660	97	563
Pasture	197	4 A.U. months	788	4,223	0	4,223
Woods and Miscellaneous	39					0
TOTALS	303			$9,850	$2,152	$7,698
AFTER LAND TREATMENT AND DETENTION STORAGE						
Corn	20	35 bu.	700	$1,281	488	793
Oats (grain)	20	45 bu.	900	909	273	636
Castor Beans	13	750 lbs.	9,750	975	539	436
Peanuts	4	700 lbs.	2,800	283	168	115
Truck	14	$150	2,100	2,100	746	1,354
Hegari	21	2 tons	42	1,179	544	635
Clover and Vetch	11	2 tons hay	22	807	276	531
		300 lbs. seed	3,300	660	97	563
Pasture	161	4 A.U. months	644	3,452	0	3,452
Woods and Miscellaneous	39					0
TOTALS	303			$11,646	$3,131	$8,515
Flooded too often to intensify	175					
Total Flood Plain	478					

Net increase	$817
Less added damage	33
Less increased overhead - 36 acs x $2.50	90
	$694
Discount Factor	.926
Annual net benefit	$643

APPENDIX

Table 6F

Increased Income Through More Intensive Use of Flood Plain Land
(South Fork Confluence of Main Stem to Section W2)
CLEAR FORK OF TRINITY WATERSHED (1952 Prices)

Land Use	Acres	Yield	Production	Gross Income	Total Cost	Net Income
Present Conditions						
Corn	112	50 Bu.	5,600	$10,248	$3,171	$7,077
Alfalfa	225	3.5T	787.5	35,697	7,335	28,362
Oats for grain	84	53 Bu.	4,452	4,497	1,179	3,318
Truck	15	$100	1,500	1,500	799	701
Clover and Johnsongrass	41	2T	82	2,303	531	1,772
Pasture	38	4 A.U.M.	224	1,201	-	1,201
Woods and Miscellaneous	27					
TOTAL	542			$55,446	$13,015	$42,431

APPENDIX
Table 6G
Increased Income Through More Intensive Use of Flood Plain Land
(South Fork, Section W2 to Section W4)
CLEAR FORK OF TRINITY RIVER WATERSHED (1952 Prices)

Land Use	Acres	Yield	Production	Gross Income	Total Cost	Net Income
Present Conditions						
Corn	110	50 bu.	5,500	$10,065	$3,114	$6,951
Alfalfa	146	3.5T	511	23,164	4,760	18,404
Oats for hay	30	1.5T	45	1,264	438	826
Sudan for hay	28	3T	84	2,359	684	1,675
Hegari	63	3T	189	5,307	1,908	3,399
Clover (hay)	83	2T	166	6,376	1,075	5,301
Cotton	13	167/12	2,171/156	775	594	181
Oats for grain	101	53 bu.	5,353	5,407	1,418	3,989
Temporary pasture (sudan)	20	5 A.U.M.	100	536	224	312
Pasture	26	4 A.U.M.	104	557	-	557
Woods and Miscellaneous	40					
TOTAL	660			$55,810	$14,215	$41,595

APPENDIX

Table 6H

Increased Income through more intensive use of Flood Plain Lands
(Willow Creek - Section 4 to Reservoir 24)
CLEAR FORK OF TRINITY WATERSHED (1952 Prices)

Land Use	Acres	Yield	Production	Gross Income	Total Cost	Net Income
PRESENT CONDITIONS						
Corn	16	40 bu.	640	$1,171	$ 411	$ 760
Temporary pasture	66	5 A.U. months	330	1,769	615	1,154
Sudan hay	19	2.5 tons	47.5	1,334	422	912
Oats (hay)	21	1 ton	21	590	260	330
Truck	29	$150	4,350	4,350	1,545	2,805
Oats (grain)	63	45 bu.	2,835	2,863	863	2,000
Hegari	4	2 tons	8	225	103	122
Pasture	300	4 A.U. months	1,200	6,432	0	6,432
Woods and Miscellaneous	58					0
TOTALS	576			$18,734	$4,219	$14,515
AFTER LAND TREATMENT AND DETENTION STORAGE						
Corn	36	40 bu.	1,440	2,635	925	1,710
Temporary pasture	26	5 A.U. months	130	697	242	455
Sudan hay	40	2.5 tons	100	2,808	889	1,919
Sudan and vetch	40	7 A.U. months	280	1,501	493	1,008
Truck	39	$150	5,850	5,850	2,078	3,772
Oats (grain)	83	45 bu.	3.735	3,772	1,131	2,641
Hegari	4	2 tons	8	225	103	122
Pasture	250	4 A.U. months	1,000	5,360	0	5,360
Woods and Miscellaneous	58					0
TOTALS	576			$22,848	$5,861	$16,987
Flooded too often to intensify	232					
Total Flood Plain	808					

Net increase	$2,472
Less added damage	30
Less increased overhead - 50 x $2.50	125
	$2,317
Discount Factor	.926
Annual Net Benefit	$2,146

APPENDIX

Table 6I

Increased Income Through More Intensive Use of Flood Plain Land

(Burgess Creek)

CLEAR FORK OF TRINITY RIVER WATERSHED (1952 Prices)

Land Use	Acres	Yield	Production	Gross Income	Total Cost	Net Income
Present Conditions						
Oats	28	45 bu.	1,260	$1,273	$ 383	$ 890
Alfalfa	26	3T	78	3,536	790	2,746
Sudan for hay	21	2.5T	52.5	1,474	467	1,007
Corn	12	45 bu.	540	988	324	664
Clover (pasture)	6	5 A.U.M.	30	161	62	99
Pasture	76	4 A.U.M.	304	1,629	-	1,629
Woods and Miscellaneous	28					
TOTAL	197			$9,061	$2,026	$7,035

APPENDIX

Table 7A

Net Value of Agricultural Production in Area Involved in Floodwater Retarding Structure Sites
(33 Structures) Existing Conditions Clear Fork of Trinity

Land Use	Acres	Yield	Price	Gross Value	Cost of Production	Net Income
CROSS TIMBERS						
Bottomland						
Corn	14	40 Bu.	$ 1.83	$1,025	$ 360	
Oats for grain	14	45 bu.	1.01	636	192	
Sudan for hay	21	2.5 tons	28.08	1,474	467	
Hegari	21	2 tons	28.08	1,179	543	
Pasture	17	4 A.U.M.	5.36	364	-	
Woods	133	1 A.U.M.	5.36	713	-	
Upland						
Corn	51	18 bu.	1.83	1,680	1,019	
Oats for grain	69	25 bu.	1.01	1,742	882	
Sudan for hay	69	1.3 tons	28.08	2,527	1,169	
Hegari	154	1.3 tons	28.08	5,616	3,511	
Pasture	158	0.6 A.U.M.	5.36	509	-	
Woods	644	0.4 A.U.M.	5.36	1,383	-	
Channel	212					
GRAND PRAIRIE						
Bottomland						
Corn	16	45 bu.	1.83	1,318	482	
Oats for grain	23	45 bu.	1.01	1,045	315	
Sudan for hay	10	2.5 tons	28.08	702	193	
Hegari	17	2.5 tons	28.08	1,193	477	
Pasture	20	4 A.U.M.	5.36	429	-	
Woods	44	1 A.U.M.	5.36	236	-	
Upland						
Oats for grain	5	40 bu.	1.01	202	67	
Hegari	5	1.5 tons	28.08	211	118	
Pasture	63	0.7 A.U.M.	5.36	236	-	
Woods	75	0.5 A.U.M.	5.36	204	-	
Channel	58					
TOTAL	1,913			$24,624	$9,795	$14,829

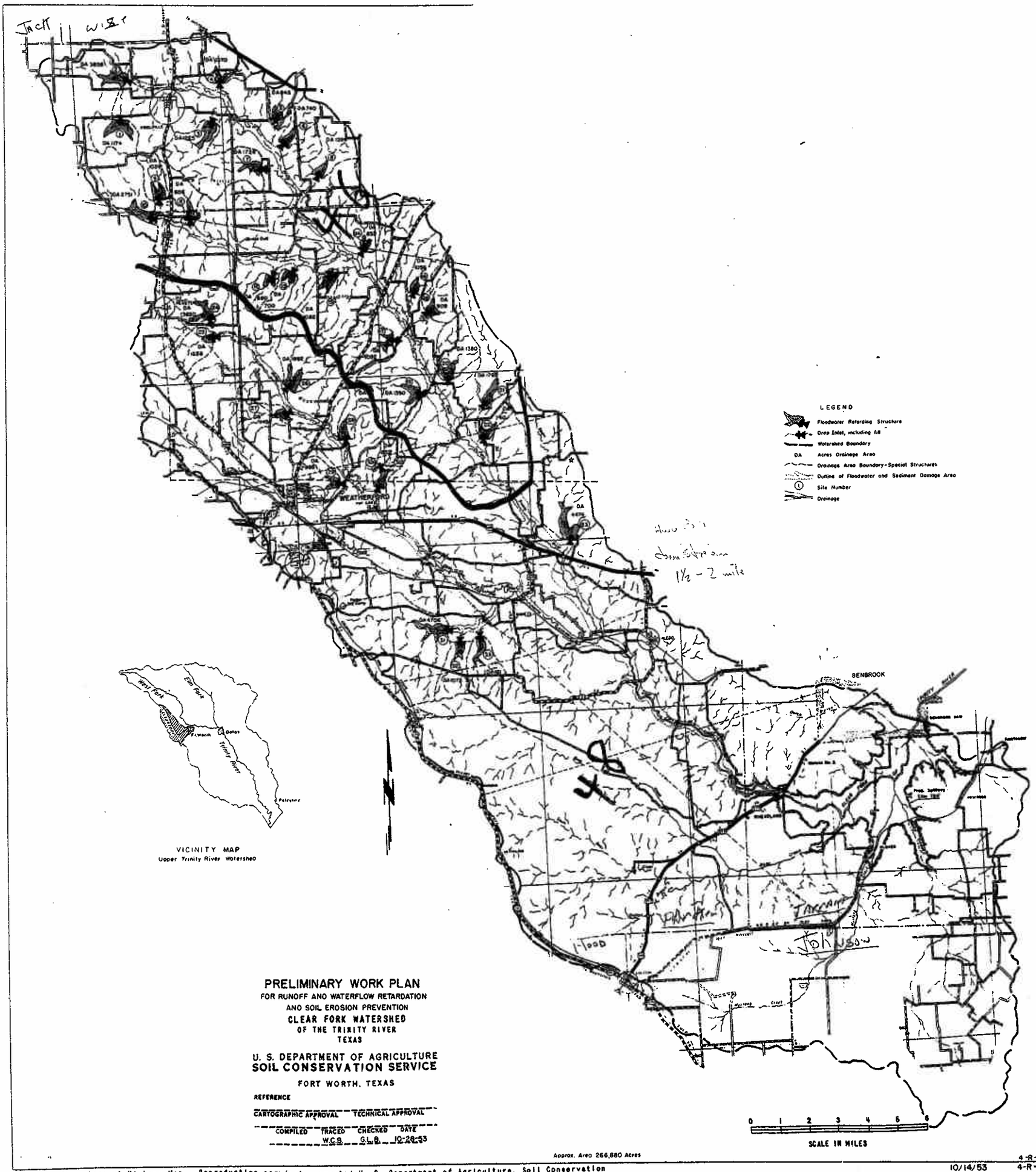
APPENDIX

Table 7B

Net Value of Agricultural Production in Area Involved in Floodwater Retarding Structure Sites
(33 Structures After Construction-Clear Fork of Trinity

Land Use	Acres	Yield	Price	Gross Value	Cost of Production	Net Income
CROSS TIMBERS						
Bottomland						
Pasture	35	4 A.U.M.	$ 5.36	$ 750		
Woods	47	1 A.U.M.	5.36	252		
Water	138					
Upland						
Pasture	344	0.6 A.U.M.	5.36	1,104		
Woods	500	0.4 A.U.M.	5.36	1,072		
Water	418					
Channel	95					
GRAND PRAIRIE						
Bottomland						
Pasture	65	4 A.U.M.	5.36	1,394		
Woods	20	1 A.U.M.	5.36	107		
Water	45					
Upland						
Pasture	73	0.7 A.U.M.	5.36	273		
Woods	70	0.5 A.U.M.	5.36	188		
Water	24					
Channel	39					
TOTAL	1,913			$5,140	-	$5,140

Reduction in net income in pool areas	
Acreage in crops reduced by 489 acres. Deduction for taxes and overhead	$ 9,689
Deduction for annual interest charge to avoid duplication	1,222
Value of half of the water stored in sediment reserve pool @ $9.00 per ac. ft.	3,216
	2,112
Net loss in income (negative project benefit)	$3,139



PRELIMINARY WORK PLAN

FOR RUNOFF AND WATERFLOW RETARDATION
AND SOIL EROSION PREVENTION

CLEAR FORK WATERSHED
OF THE TRINITY RIVER
TEXAS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FORT WORTH, TEXAS

REFERENCE

CARTOGRAPHIC APPROVAL		TECHNICAL APPROVAL	
COMPILED	TRACED	CHECKED	DATE
	W.C.B.	G.L.B.	10-28-53

4-R-884
10/14/53 4-R-882

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