Plan - 1951

RIVER BASIN

PRELIMINARY
Flood Control Work Plan
ROWLETT CREEK WATERSHED
A Subwatershed of the Trinity River
TX-SCD-29-117 Tr. No. 23

DESCRIPTION OF THE WATERSHED

Rowlett Creek rises near the town of Frisco in Collin County, Texas, and flows in a southerly direction for 30 miles, emptying into the East Fork of the Trinity River at the southwest corner of Rockwall County. The watershed varies from 2 to 12 miles in width, averaging 8 miles. Cottonwood, Spring and Muddy Creeks are the major tributaries.

The incorporated towns of Garland, Plano, and Wylie, as well as several small villages, are located within the boundaries of the watershed.

The watershed has an area of 150,000 acres (234 square miles), of which 8,658 acres drains directly into the East Fork of the Trinity River. Of the total area, 145,135 acres are in farms. The remaining 4,865 acres, about 3 percent, are in urban areas, roads and miscellaneous uses. The bottomland area includes 3,658 acres of flood plain on the East Fork of the Trinity River, 7,674 acres of flood plain on Rowlett Creek and tributary streams, and 410 acres of stream channels.

There are 420 miles of roads, of which 204 miles are hard-surfaced. Of the 184 bridges, 46 are major bridges spanning the larger streams.

Soils and Land Use

The Rowlett Creek watershed lies entirely within the Blackland Prairies Problem Area in Soil Conservation. These prairies constitute belts of dark colored, fine textured soils that are developing from chalk, marl, or limy clay formations. These soils represent several stages of development. Those on the steeper slopes and flood plain are very young and immature. Erosion on the steeper slopes has progressed almost as fast as soil development has taken place, and the true soil is usually less than 2 feet deep. On the smooth, gently sloping areas the soils are granular and dark colored, and the depth of the soil and subsoil is usually 3 to 4 feet.

Approximately 28 percent of the flood plain area is cultivated, 63 percent is pasture, Johnsongrass or idle land, 8 percent is woodland, and 1 percent is in roads and other miscellaneous uses. Sixty-two percent of the upland farm area is cultivated. The remaining 38 percent is either pasture or idle. Of the cropland, approximately 45 percent has been affected by slight erosion, 50 percent by moderate erosion and 5 percent by severe and very severe erosion.

Geology and Topography

The watershed is underlain by two principal geologic formations: (1) Austin chalk in the central and western sections, and (2) a narrow band of Taylor marl, about five miles wide, along the eastern side.

The Austin formation is an alternation of white chalky limestones and limy marl strata with some layers of shelly marl, especially near the top. The Taylor formation is mostly chalks, clays, marls and sands, and these types of sediment are interbedded and vary widely in composition. The relatively resistant Austin formation is an important factor in limiting the depth of gullies.

The watershed lies wholly within the Blackland Prairies belt of the West Gulf Coastal Plain. Physiographically the watershed consists of a plain dissected by numerous streams that have cut shallow valleys. The topography of the drainage area is, for the most part, undulating to gently rolling. Adjacent to the larger streams are areas of short, steep slopes of 10 percent or more which are generally seriously eroded. A considerable area in the upper end of the watershed consists of gentle slopes of one mile or more in length. The bottomlands, which occur along Rowlett Creek and its tributaries, are level to gently sloping. The local relief ranges from 40 to 80 feet.

Climate

The climate of the area is characterized by long summers and short winters. The winters are usually mild but occasional northers cause sudden drops in temperature. As a rule, these cold spells last only a few days. Few winters pass without a light fall of snow which generally melts as it falls.

Mean temperatures range from 83.8 degrees Fahrenheit in summer to 44.7 degrees in winter. The average temperature for the area is 65.7 degrees. The extreme recorded temperatures are 7 degrees below zero and 118 degrees above zero. The average date of the last killing frost is March 28, and that of the first killing frost is November 11, or a normal frost-free period of 228 days.

The mean annual precipitation of 39.95 inches is fairly evenly distributed, with the greatest amounts of rainfall occurring in April and May. Individual rains of excessive amounts which fall at irregular intervals during the year cause serious erosion and flood damage. The minimum recorded annual rainfall of 20.76 inches occurred in 1925 and the maximum annual rainfall of 54.79 inches fell in 1926.

Water Resources

There are no large bodies of surface water within the watershed. The principal source of water is deep wells extending into the Trinity or Woodbine sands. Most of this water contains considerable minerals. The present use of water is principally for municipalities, livestock, and domestic purposes.

None is used for irrigation. It is anticipated that industrial expansion will create a need for further water development. Also, additional surface storage will be needed in the near future because of the rapid lowering of the underground water table.

ECONOMY OF THE WATERSHED

Agricultural Economy

There are estimated to be 1,070 farms in the Rowlett Creek watershed with an average size of 140 acres. The better uplands are devoted largely to the production of cultivated crops. The more broken lands adjacent to the bottoms are used for livestock production. Of the cattle in the watershed, 70 percent are used for beef production.

The principal crops grown in the watershed are cotton, corn, and small grain, with 74 percent of the cropland being devoted to the production of these crops. The approximate yields per acre are: lint cotton, 225 pounds; corn, 20 bushels; wheat, 15 bushels; and oats, 30 bushels. Other crops grown are sweet clover, grain sorghums, and hay. Production is still good on the level areas and gentle slopes, but the need for land treatment on all cropland to increase the organic matter and productivity of the soil is apparent. Large areas of steeper slopes are badly eroded and should be planted to permanent grasses.

Because of the frequency of flooding, 40 percent of the flood plain formerly used for the production of high-income crops such as cotton, corn, and small grains, is now Johnsongrass meadow, pasture, or idle land.

The Rowlett Creek watershed is served by three Soil Conservation Service work units, which are assisting the Dalworth and Collin County Soil Conservation Districts. These work units have assisted farmers in preparing 204 conservation plans on 28,665 acres within the watershed boundaries.

It is expected that when land treatment practices have been applied and maintained for as long as two or three years production in the watershed will be increased approximately 20 percent.

Urban and Other Influences

Scattered throughout the watershed are 3 incorporated towns and several small unincorporated villages and residential areas occupied by people who commute to and from their work in Dallas, Garland, Plano or McKinney. Also, some people live on small acreages which are not adequate for subsistence and supplement their living by working in nearby industries.

Industrial developments include garment, valve, crate, and stove manufacturing plants in Plano; and the manufacture of tires and tubes, seismic instruments, aircraft, school bus bodies, and gas space heaters at Garland.

The 420 miles of roads are adequate to provide access to all parts of the watershed. However, frequent floods make many roads impassable by inundating road-beds and washing out bridges. The detours thus occasioned cause delay and extra travel distance to and from places of employment and markets.

Four railroads traverse the watershed and provide ample loading facilities for carload lot shipments.

FLOOD PROBLEMS AND DAMAGES

Rowlett Creek and its tributaries flood frequently and cause high annual damages. Approximately 5,658 acres of flood plain lie in the East Fork of the Trinity River bottoms above the confluence of Rowlett Creek and the river. Since Rowlett Creek flood control measures would have no effect on this area, it is excluded from all damage calculations. During the 20-year period 1923 to 1942 inclusive, 15 floods covered more than one-half of the Rowlett Creek flood plain and 102 smaller floods occurred. One-half of the larger floods occurred in April, May, and June, causing extensive damages to growing crops; however, summer and fall floods of less frequent occurrence caused the greatest direct crop damage.

The types of flood damage encountered in the watershed were: (1) Damage to crop and pasture, (2) flood plain scour, (3) deposition of sediment on valley lands, (4) damage to roads and railroads, and (5) other agricultural damages such as damage to levees and fences and loss of livestock.

LAND TREATMENT ACTIVITIES

During the past four years, 20 small neighbor groups of landowners, with membership wholly or partly within the Rowlett Creek watershed, have been cooperating with their local Soil Conservation Districts to accelerate the application of land treatment practices on their lands.

FLOOD CONTROL ACTIVITIES

Approximately 30 years ago a levee improvement district was organized and Rowlett Creek was leveed into the river. This levee has been maintained in good condition. The lands protected by this levee lie in the river bottom. At about the same time the landowners on Rowlett Creek downstream from State Highway 78 formed an organization and straightened the creek channel down to the Trinity River bottom. This channel improvement has reduced the frequency of flooding on this area. Other efforts at flood control have been minor.

HYDRAULIC AND HYDROLOGIC INVESTIGATIONS

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

The design storm would produce 5.2 inches of runoff from the watershed under present conditions. 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 requirements. From a study of the rainfall-runoff relationships for this watershed, it was found that a rain of 0.80 inch, occurring within a one-day period, was the minimum which would cause flooding at the smallest channel 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 7.50 inches which produced 5.87 inches of runoff. Under present conditions 7,467 acres of flood plain would be flooded by the runoff from this storm. If such a rain were to occur after land treatment practices and measures have been applied, it is estimated that the area inundated would be reduced to 7,140 acres. With land treatment measures applied and the proposed detention structures and floodway in operation only 1,264 acres would be flooded as a result of such a storm. Approximately 140 acres of flood plain would lie within the permanent pools of the proposed detention structures, and 67 acres within the detention pools. An additional 126 acres would lie within the floodway on Muddy Creek.

The channel capacity of Rowlett Creek at hydrologic section 1 is 1,403 cubic feet per second. This is the bottom section across the main stem. The peak discharge at this point for a 7.50 inch rain under present conditions was 20,200 cubic feet per second. The discharge would be reduced to 4,957 cubic feet per second by the proposed system of detention structures.

SEDIMENTATION AND OTHER RELATED FLOOD PLAIN DAMAGES

Soil erosion in the Rowlett Creek watershed has caused widespread damage since the land was first plowed about 1865. Sheet erosion on the normal upland with slopes of 1 to 2 percent, and sheet and gully erosion on the more sloping lands have progressed at an accelerated rate. Sheet erosion has been slight on slopes of less than 1 percent, but soil depletion has lowered the water intake rate and increased the problem of water disposal. In some fields the black, fertile topsoil is only one-half to three-fourths as deep as it was in its virgin state.

Gully erosion occurs mainly on the steeper slopes of 3 to 8 percent. In general the gullies are of shallow to moderate depth (2 to 5 feet) depending upon the concentration of water on unprotected slopes or upon the steepness of slope and type of vegetative cover. Serious erosion began about 1900, but did not attract much attention until 1920 when gullying began to be evident on cultivated fields. Since 1935 some of the severely eroded land has been abandoned from cultivation or retired to pasture. Erosion is still active on the idle lands, although it has diminished in severity.

The sediment output rates under present conditions range from 2.0 to 3.7 acre-feet per square mile of drainage area. These estimated rates are based on the detailed sedimentation survey of White Rock Lake made in 1935 by the Soil Conservation Service, Division of Research, and data from other similar reservoir watersheds in the Blackland Prairies. In estimating the present rates for the proposed floodwater detention structures, adjustments were made for: (1) Size and shape of the watershed, (2) present erosion rates on cultivated land and the condition of the vegetative cover on pasture lands in the watershed, and (3) the location of the areas of high sediment output rates with reference to the structure sites.

The principal sedimentation damages in Rowlett Creek and tributary valleys are: (1) Channel filling, (2) overbank deposition, and (3) accessory damages. Other related damages encountered within the flood plain are: (1) Flood plain scour and (2) slight channel enlargement in the upper reaches of the watershed.

SEDIMENTATION DAMAGES

Channel Filling

Of the sedimentation damages found in the Rowlett Creek watershed, channel filling is the most serious. The deposition of fine textured sediment (silt and clay) in the stream bed and on the stream banks has been severe in the lower reaches of Muddy Creek and moderately severe in the lower reaches of Rowlett Creek. Channel filling has reduced channel capacities from 30 to 60 percent in the lower reaches of Muddy Creek and 10 to 30 percent in the lower reaches of Rowlett Creek. Channel filling is not a problem on Spring Creek.

Overbank Deposition

Overbank deposition has occurred on approximately 1,100 acres in the lower reaches of Rowlett and Muddy Creeks. The deposits range from 1 to 2 feet in thickness and are in the form of thin natural levees and uniform valley-wide accumulations. A reconnaissance investigation of Rowlett Creek valley in 1950 revealed only minor damages resulting from valley deposition. This is due mainly to the high fertility and fine texture of the modern deposition. The modern deposition has occurred over an estimated period of 50 years.

Accessory Damage

Damages caused by the deposition of fine sediment (silt and clay) on field crops and pasture grasses and on State Highways have been of considerable magnitude. These damages were measured in terms of crop damage and the cost of sediment removal, and are included under floodwater damages.

Reservoir Sedimentation

There are no existing reservoirs in this watershed other than small privately owned stock water ponds.

OTHER RELATED FLOOD PLAIN DAMAGE

Flood Plain Scour

Scour damage has been slight on the flood plain of Rowlett Creek watershed. The majority of scour channels are short in length (500 to 1000 feet) and usually have sloping sides. A total of 60 acres of cropland has been damaged from 10 to 50 percent. Fifteen acres of pasture land has been damaged 10 to 25 percent.

Channel Enlargement

Lateral bank cutting on the channels within the flood plain of the Rowlett Creek drainage system is very slight. However, some local bank erosion is occurring in the headwater tributaries. Slightly less than 3.0 acre-feet is removed annually.

FLOOD DAMAGES

Flood damage information on 90 percent of the flood plain area of Rowlett Creek and its major tributaries was obtained from landowners or operators. Other information obtained included flood plain use, yields of major crops, property damages which would result from a major flood, and general flood problems. The monetary value of the percentage of damage to flood plain lands by sediment deposition and scour was determined on the basis of present values.

Estimates of road and bridge damages were obtained from the Dallas County Engineer's office. These damages were estimated for individual roads over the preceeding 20-year period. Roads which are now closed were not included. Much of this damage resulted from brush and debris lodging against the bridges. Estimates of railroad damages were obtained from the companies concerned.

Damage rates, as determined from damage schedules, 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. The rates were multiplied by acreages flooded by each flood by size and season in the evaluation series and adjustments made for recurrence of flooding. Flood plain areas lying within the pool limits of proposed detention structures were excluded from all damage calculations.

The total direct floodwater and sedimentation damages, based on information obtained as outlined above, averages $156,633 annually under present conditions, of which $57,756 is crop and pasture damage. These figures are based on the entire flood plain area. After excluding the area of flood plain inundated by the proposed detention structures and floodway, the average annual direct damage would be $152,071, of which $56,074 is crop and pasture damage. In addition there are numerous indirect damages such as interruption of travel, losses sustained by dealers and industries dependent on agricultural products, depreciation in property values in flooded areas, and similar items. Ten percent of the total annual value of direct damages, or $15,207, was taken as a conservative evaluation of the annual indirect flood damages. 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: the seeding or sodding of 19,600 acres of retired land; the installation of 4 drop inlets and

20 drop structures; the sodding of 4,500 acres of farm waterways; and construction of 2,480 miles of terraces. The drop inlets and drop structures are needed for grade stabilization in order to facilitate the establishment of land treatment measures.

Other land treatment measures needed include 40 miles of diversion terraces, 160 farm ponds, 244 miles of fencing to inclose newly retired and reseeded areas, improved crop rotations on 60,000 acres of cropland, and 30,000 acres of improved range and pasture management. The estimated cost of installing these measures is $1,525,405 and the annual cost, including installation and maintenance, is $99,504.

Flood Control Structures and Measures

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

A system of 17 detention structures is needed to protect the flood plain lands along Rowlett Creek and its tributaries. In addition to the detention structures, Muddy Creek will need 7.4 miles of floodway to further reduce flooding along this stream. The proposed detention structures and their drainage areas and the location of the floodway on Muddy Creek are shown on the Work Plan Map. Descriptive information concerning the structures is summarized in Table 5. The system of detention structures will detain the runoff from 65 percent of the Rowlett Creek drainage area. Sufficient detention storage capacity can be developed at all proposed sites to permit the use of vegetative emergency spillways.

As indicated, it will be necessary to raise or relocate portions of several county roads which cross the pool areas of proposed detention structures. In some instances flooded sections of roads will be abandoned or closed during periods of high stages in the detention pools.

The estimated cost of installing these measures is $1,262,383 and the annual cost, including installation and maintenance, is $45,255.

Effects of These Measures on Damages and Benefits

The combined program of land treatment and flood control measures described above would prevent damage from all but 26 of the 117 floods which occurred in the 20-year period, 1923 to 1942 inclusive. These remaining floods would be reduced to minor floods covering an average of 402 acres annually and causing an estimated average annual damage of only $10,411.

Most of the expected reduction in annual flood damages would be effected by the system of detention structures. The annual value of the reduction in flood damages attributable to the detention structures is estimated to be $96,432, and that attributable to the floodway is $5,729, out of a total of $156,867 from all measures as shown in Table 1.

Owners and operators of flood plain lands say that if flood protection is provided, they will intensify their use of these lands by growing high-value crops on areas that are now idle or used for Johnsongrass meadows because of the frequency of flooding. It is estimated that this more intensive use would increase the net income to the land, after all expenses are deducted, by $27,995 annually.

The total flood control benefit, including both the reduction in flood damages and the benefit from more intensive use of flood plain lands, is estimated to be $184,862 annually. In addition it is estimated that the benefits to landowners and operators in the upland areas of the watershed from the application of land treatment measures would be $307,074 annually. The total expected benefit from the combined program would amount to $491,936 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 practices and measures. It was assumed that the proportion of the cropland used for each crop would not change, although the total area used for cropland would be decreased by the retirement of steep and severely eroded areas to pasture or meadow, along with idle cropland. 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 acreages of meadow and pasture and the greater per-acre hay production and pasture carrying capacity to be expected from the application of land treatment measures.

The estimated increase in annual net income is $273,665 from crop and $33,409 from pasture, or a total of $307,074 annually.

Comparison of Cost and Benefit

The ratio of the average annual benefit from the detention structures, $118,186, to the average annual cost, $41,052, is 2.88:1.

The ratio of the average annual benefit from floodway, $11,970, to the average annual cost, $4,223, is 2.83:1.

The ratio of the average annual benefit from detention structures and floodway, $130,156, to the average annual cost of these measures and their appurtenant structures, $45,255, is 2.88:1.

The ratio of the average annual benefit, $361,780, from land treatment measures and practices to their average annual cost, $99,504, is 3.64:1.

The ratio of the total average annual benefit, $491,936, to total average annual cost, $144,759, is 3.40:1. See Table 4.

ANNUAL MAINTENANCE

Estimated annual maintenance costs after the land treatment measures and flood control structures have been installed are shown in Table 5.

It is expected that the flood control structures will be maintained by the benefited farmers under an agreement with the Soil Conservation District which carries the responsibility for maintenance. Group organizations of farmers will be developed for this purpose. The land treatment measures will be maintained by the landowners or operators of the farms on which the measures are installed.

Use this one Bridge for Table 4.

Table 1
Summary of Average Annual Monetary Floodwater and Sediment Damage and Flood Control Benefit from the Recommended Program
ROWLETT CREEK WATERSHED
(1949 Prices)

Damages	Average Annual Damage				Average Annual Benefit			
	Under Present Conditions	With Land Treatment Only	With Land Treatment and Detention Storage	With Land Treatment, Detention Storage and Floodway	From Land Treatment Only	From Detention Storage Only	From Floodway Only	Total Flood Control Benefits
	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)
Floodwater Damage								
Crop and Pasture	56,074	37,832	5,468 9.8%	3,451	18,242	32,364	2,017	52,623
Flood Plain Scour	204	143	23	12	61	120	11	192
Other Agricultural	16,593	10,843	1,408 9.5%	1,091	5,750	9,435	317	15,502
Roads and Bridges	44,500	29,650	4,099 9.7%	2,824	14,850	25,551	1,275	41,676
Railroads	34,500	23,730	3,651 10.4	2,076	10,770	20,079	1,575	32,424
Sub-Total	151,871	102,198	14,649	9,454	49,673	87,549	5,195	142,417
Sediment Damage								
Overbank Deposition	200	141	24	11	59	117	13	189
Sub-Total	200	141	24	11	59	117	13	189
Indirect Damage	15,207	10,233	1,467	946	4,974	8,766	521	14,261
Total Damage	167,278	112,572	16,140	10,411	xxx	xxx	xxx	xxx
Benefit from Reduction of Damage	xxx	xxx	xxx	xxx	54,706	96,432	5,729	156,867
Benefit from More Intensive Use of Flood Plain	xxx	xxx	xxx	xxx	xxx	21,754	6,241	27,995
Total Flood Control Benefit	xxx	xxx	xxx	xxx	54,706	118,186	11,970	184,862

Table 2
Cost Estimate Table
ROWLETT CREEK WATERSHED
(1949 Prices)

Structure or Measure	Unit	No.	Cost			
			To Farmer	To Federal Funds	To State, County or Other	Total
			(dollars)	(dollars)	(dollars)	(dollars)
Detention Structures	Each	17		894,764		894,764
Site Acquisition	Total			302,560		302,560
Floodway	Mile	7.4		56,309		56,309
Relocating Roads	Mile	3.5			8,750	8,750
Farm Waterways	Acre	4,500	337,500	112,500		450,000
Seeding Retired Areas	Acre	19,500	198,900	132,600		331,500
Group Collective Outlets	Acre	75		7,500		7,500
Terracing	Mile	2,480	310,000			310,000
Farm Diversions	Mile	40	6,000			6,000
Farm Ponds	Each	160	72,000			72,000
Farm Fencing	Mile	244	97,600			97,600
Drop Inlets	Each	4		8,100		8,100
Drop Structures	Each	20		25,000		25,000
Farm and Ranch Planning and Application	Acre	145,135		217,703		217,703
Total			1,022,000	1,757,036	8,750	2,787,786
Estimated Amount to be Expended During 1951 Fiscal Year			250,900	167,268		418,168

Table 3
Annual Costs
ROWLETT CREEK WATERSHED
(1949 Prices)

Structure or Measure	Unit	No.	Annual Cost		
			Installation	Maintenance	Total
Detention Structures	Each	17	$31,549	$ 1,700	$ 33,249
Site Acquisition	Total		7,564		7,564
Floodway	Mile	7.4	1,408	2,815	4,223
Relocating Roads	Mile	3.5	219		219
Farm Waterways	Acre	4,500	16,313	18,000	34,313
Seeding Retired Areas	Acre	19,500	11,271		11,271
Group Collective Outlets	Acre	75	188	300	488
Terracing	Mile	2,480	12,400	24,800	37,200
Farm Diversions	Mile	40	240	320	560
Farm Ponds	Each	160	2,880	2,880	5,760
Farm Fencing	Mile	244	3,904	4,880	8,784
Drop Inlets	Each	4	203	100	303
Drop Structures	Each	20	625	200	825
Total			$88,764	$55,995	$144,759

Flood Control Structures and Measures		$ 45,255
Land Treatment Measures		99,504
Annual Maintenance - Farmer	$55,995	

Table 4
Comparison of Average Annual Benefit and Cost of the Recommended Program
ROWLETT CREEK WATERSHED
(1949 Prices)

Source of Benefit	Annual Cost	Annual Benefit	Benefit per Dollar of Cost
	(dollars)	(dollars)	(dollars)
Detention Storage	41,032	118,186	2.88
Floodway	4,223	11,970	2.83
Total	45,255	130,156	2.88
Land Treatment			
Flood Control	xxx	54,706	xxx
Land Treatment	xxx	307,074	xxx
Total	99,504	361,780	3.64
All Sources	144,759	491,936	3.40

Deleted

Table 5
Detention Structure Data
ROWLETT CREEK WATERSHED

Site No.	Drainage Area Sq. Mi.	Storage Capacity Acre Feet Perm. Pool	Det. Pool	Total	Inches of Runoff Perm. Pool	Det. Pool	Total	Surface Area Acres Top of Perm. Pool	Top of Det. Pool	Max. Ht. of Dam Ft.	Flood Plain Inundated Perm. Pool Ac.	Det. Pool Ac.	Total Acres	Volume of Fill Cu. Yds.	Draw-down Rate cfs	Type of Spillway	Estimated Total Cost
1	24.1	1526	9405	10931	1.2	7.3	8.5	173	685	48	35	18	53	307,100	121	Veg.	$138,195.154
2	5.6	353	1602	1955	1.2	5.3	6.5	42	150	41	6	2	8	111,337	28	"	50,102.058
3	18.6	1299	7308	8607	1.3	7.0	8.3	156	523	50	29	15	44	250,024	93	"	112,511.126
4	12.3	787	4108	4895	1.2	6.3	7.5	112	413	36	20	10	30	156,672	62	"	70,502.079
5	1.7	125	498	623	1.4	5.4	6.8	25	83	28	5	2	7	44,090	9	"	19,841.022
6	6.0	402	1843	2245	1.3	5.7	7.0	51	158	44	4	2	6	125,676	30	"	56,554.063
7	10.2	658	3100	3758	1.2	5.7	6.9	106	266	36	12	6	18	141,162	51	"	63,523.071
8	8.1	575	2393	2968	1.3	5.6	6.9	70	188	40	0	0	0	130,038	41	"	58,517.065
9	3.3	214	944	1158	1.2	5.5	6.7	28	96	40	0	0	0	69,600	17	"	31,320.035
10	4.3	267	1235	1502	1.2	5.3	6.5	69	171	20	8	3	11	45,040	22	"	20,268.023
11	1.3	94	343	437	1.4	5.2	6.6	19	48	25	2	1	3	29,801	7	"	13,410.015
12	1.7	128	513	641	1.4	5.6	7.0	28	71	25	5	2	7	31,000	9	"	13,950.016
13 1/	22.7	1601	8399	10000	1.3	7.0	8.3	220	590	52	9	4	13	231,469	181	"	104,161.116
14	1.8	125	511	636	1.2	5.3	6.5	19	55	33	0	0	0	38,196	9	"	17,188.019
15	2.5	163	766	929	1.2	6.0	7.2	32	78	28	2	0	2	43,575	13	"	19,609.022
16	5.3	325	1544	1869	1.2	5.4	6.6	39	142	47	0	0	0	179,085	27	"	80,588.090
17	1.9	149	521	670	1.4	5.1	6.5	26	65	29	3	2	5	54,501	10	"	24,525.027
Total	131.4	8791	45033	53824				1215	3782		140	67	207	1,988,366			$894,764 2/

1/ Excluding the areas from which runoff is controlled by detention structures.

2/ Construction Cost - $778,445
Technical Services - 116,319

APPENDIX

Table 1

Increase in Income Through More Intensive Use of Flood Plain Lands

ROWLETT CREEK WATERSHED

ROWLETT CREEK

(1949 Prices)

Land Use	Acres	Yield	Production	Gross Income	Total Cost	Net Income
Present Conditions						
Cotton	472	408 lbs.	192,576	$ 63,743	$29,906	$ 33,837
Corn	535	55 bu.	29,425	37,664	11,530	26,134
Grain Sorghum	134	18 CWT	2,412	4,679	2,894	1,785
Forage Sorghum	323	4 ton	1,292	33,166	9,544	23,622
Oats	30	35 bu.	1,050	809	574	235
Wheat	15	30 bu.	450	860	306	554
Johnsongrass Meadow	816	2 ton	1,632	28,735	11,587	17,148
Clover Meadow	82	2 ton	164	4,210	1,410	2,800
Alfalfa	164	4 ton	656	16,840	5,150	11,690
Rye Grass Meadow	14	2 ton	28	490	241	249
Pasture	1,264	4 AUM	5,056	13,651	1,264	12,387
Woods	360					
Idle	535					
Waste	16					
Miscellaneous	107					
Total	4,867			$204,847	$74,406	$130,441
After Land Treatment and Detention Storage						
Cotton	572	408 lbs.	233,376	$ 77,247	$36,242	$ 41,005
Corn	535	55 bu.	29,425	37,664	11,530	26,134
Grain Sorghum	134	18 CWT	2,412	4,679	2,894	1,785
Forage Sorghum	323	4 ton	1,292	33,166	9,544	23,622
Oats	30	35 bu.	1,050	809	574	235
Wheat	65	30 bu.	1,950	3,725	1,326	2,399
Johnsongrass Meadow	400	2 ton	800	14,000	5,680	8,320
Clover	182	250 lbs.	45,500	6,825	5,824	1,001
Vetch	150	250 lbs.	37,500	5,625	4,800	825
Alfalfa	380	4 ton	1,520	39,045	11,932	27,113
Pasture	1,689	4 AUM	6,756	18,241	1,689	16,552
Woods	300					
Miscellaneous	107					
Total	4,867			$241,026	$92,035	$148,991
Areas in Detention Structures	131					
Flooded too often to intensify	478					
Total Acres	5,476					

Net Increase	$ 18,550
Less Added Damage	34
Less Clearing Cost	120
Less cost of increased overhead 602 ac. @ $2.95	1,776
Nst Benefit	$ 16,620

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APPENDIX
Table 1A
Increase in Income Through More Intensive Use of Flood Plain Lands
ROWLETT CREEK WATERSHED
MUDDY CREEK
(1949 Prices)

Land Use	Acres	Yield	Production	Gross Income	Total Cost	Net Income
Present Conditions						
Cotton	101	462 lbs.	46,662	$15,445	$ 7,053	$ 8,392
Corn	17	45 bu.	765	979	327	652
Grain Sorghum	16	12 CWT	192	372	173	199
Wheat	8	30 bu.	240	458	82	376
Meadow	187	2 ton	374	6,545	2,655	3,890
Oats	6	35 bu.	210	162	57	105
Pasture	1,332	4 AUM	5,328	14,386	1,332	13,054
Woods	81					
Idle	330					
Miscellaneous	44					
Total	2,122			$38,347	$11,679	$26,668
After Land Treatment and Detention Storage						
Cotton	101	462 lbs.	46,662	$15,445	$ 7,053	$ 8,392
Corn	17	45 bu.	765	979	327	652
Grain Sorghum	16	12 CWT	192	372	173	199
Meadow	37	2 ton	74	1,295	525	770
Alfalfa	100	3 ton	300	7,701	3,480	4,221
Vetoh	57	2 CWT	114	1,710	912	798
Oats	14	35 bu.	350	270	134	136
Pasture	1,710	4 AUM	6,840	18,468	1,710	16,758
Woods	26					
Miscellaneous	44					
Total	2,122			$46,240	$14,314	$31,926
				Net Increase		$ 5,258
				Less Added Damage		40
				Less Clearing Cost		84
				Net Benefit		$ 5,134

(Continued on next page)

Increase in Income Through More Intensive Use of Flood Plain Lands (Cont'd)
MUDDY CREEK

Land Use	Acres	Yield	Production	Gross Income	Total Cost	Net Income
After Land Treatment, Detention Storage and Floodway						
Cotton	150	462 lbs.	69,300	$22,938	$10,476	$12,462
Corn	17	45 bu.	765	979	327	652
Grain Sorghum	16	12 CWT	192	372	173	199
Meadow	37	2 ton	74	1,295	525	770
Alfalfa	150	3 ton	450	11,552	3,720	7,832
Oats	14	35 bu.	490	377	134	243
Vetch	200	2 CWT	400	6,000	3,200	2,800
Pasture & Floodway	1,468	4 AUM	5,872	15,854	1,468	14,386
Woods	26					
Miscellaneous	44					
Total	2,122			$59,367	$20,023	$39,344

Acres in Detention Structures	76	Net Increase	$ 7,418
Total Acres	2,198	Less Added Damage	0
		Less Cost of Increased Overhead 399 ac. @ $2.95	1,177
		Net Benefit	$ 6,241

APPENDIX
Table 2
Summary of Average Annual Monetary Floodwater and Sediment Damage and Flood Control Benefit from the Recommended Program
ROWLETT CREEK WATERSHED
ROWLETT CREEK

Damages	Average Annual Damage: Under Present Conditions (dollars)	With Land Treatment Only (dollars)	With Land Treatment and Detention Storage (dollars)	Average Annual Benefit: From Land Treatment Only (dollars)	From Detention Storage Only (dollars)	Total Flood Control Benefits (dollars)
Floodwater Damage						
Crop and Pasture	43,185	27,270	2,990 17726	15,915	24,280	40,195
Flood Plain Scour	130	82	9	48	73	121
Other Agricultural	14,540	9,160	1,018	5,380	8,142	13,522
Roads and Bridges	36,000	22,680	2,484	13,320	20,196	33,516
Railroads	24,000	15,120	1,656	8,880	13,464	22,344
Sub-Total	117,855	74,312	8,157	43,543	66,155	109,698
Sediment Damage						
Overbank Deposition	118	74	8	44	66	110
Sub-Total	118	74	8	44	66	110
Indirect Damage	11,797	7,438	816	4,359	6,622	10,981
Total Damage	129,770	81,824	8,981	xxx	xxx	xxx
Benefit from Reduction of Damage	xxx	xxx	xxx	47,946	72,843	120,789
Benefit from More Intensive Use of Flood Plain	xxx	xxx	xxx	xxx	16,620	16,620
Total Flood Control Benefit	xxx	xxx	xxx	47,946	89,463	137,409

APPENDIX

Table 2A

Summary of Average Annual Monetary Floodwater and Sediment Damage and Flood Control Benefit from the Recommended Program

ROWLETT CREEK WATERSHED

MUDDY CREEK

Damages	Average Annual Damage				Average Annual Benefit			
	Under Present Conditions	With Land Treatment Only	With Land Treatment, Detention and Storage	With Land Treatment, Detention Storage and Floodway	From Land Treatment Only	From Detention Storage Only	From Floodway Only	Total Flood Control Benefits
	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)
Floodwater Damage								
Crop and Pasture	12,889	10,562	2,478	461	2,327	8,084	2,017	12,428
Flood Plain Scour	74	61	14	3	13	47	11	71
Other Agricultural	2,053	1,683	390	73	370	1,293	317	1,980
Roads and Bridges	8,500	6,970	1,615	340	1,530	5,355	1,275	8,160
Railroads	10,500	8,610	1,995	420	1,890	6,615	1,575	10,080
Sub-Total	34,016	27,886	6,492	1,297	6,130	21,394	5,195	32,719
Sediment Damage								
Overbank Deposition	82	67	16	3	15	51	13	79
Sub-Total	82	67	16	3	15	51	13	79
Indirect Damage	3,410	2,795	651	130	615	2,144	521	3,280
Total Damage	37,508	30,748	7,159	1,430	xxx	xxx	xxx	xxx
Benefit from Reduction of Damage	xxx	xxx	xxx	xxx	6,760	23,589	5,729	36,078
Benefit from More Intensive Use of Flood Plain	xxx	xxx	xxx	xxx	xxx	5,134	6,241	11,375
Total Flood Control Benefit	xxx	xxx	xxx	xxx	6,760	28,723	11,970	47,453

APPENDIX
Table 3
Cost Estimate Table
ROWLETT CREEK WATERSHED
ROWLETT CREEK 1/
(1949 Prices)

Structure or Measure	Unit	No.	Cost			
			To Farmer	To Federal Funds	To State, County or Other	Total
Detention Structures	Each	11	$	$ 693,270	$	$ 693,270
Site Acquisition	Total			218,400		218,400
Relocating Roads	Mile	2.0			5,000	5,000
Farm Waterways	Acre	3,315	198,900	132,600		331,500
Seeding Retired Areas	Acre	14,365	183,154	61,051		244,205
Group Collective Outlets	Acre	55		5,500		5,500
Terracing	Mile	1,828	228,500			228,500
Farm Diversions	Mile	30	4,500			4,500
Farm Ponds	Each	118	53,100			53,100
Farm Fencing	Mile	182	72,800			72,800
Drop Inlets	Each	3		6,075		6,075
Drop Structures	Each	15		19,250		19,250
Farm and Ranch Planning and Application	Acre	102,686		154,029		154,029
Total			$740,954	$1,290,175	$5,000	$2,036,129
Estimated Amount to be Expended During 1951 Fiscal Year			$183,251	$ 122,168		$ 305,419

1/ The land treatment measures in Rowlett Creek plus those in Muddy Creek will not check with watershed totals shown in Table 2, Work Plan, because an area of direct drainage into East Fork is not included in either subwatershed.

APPENDIX
Table 3A
Cost Estimate Table
ROWLETT CREEK WATERSHED
MUDDY CREEK 1/
(1949 Prices)

Structure or Measure	Unit	No.	Cost			
			To Farmer	To Federal Funds	To State, County or Other	Total
Detention Structures	Each	6	$	$201,494	$	$201,494
Site Acquisition	Total			84,160		84,160
Floodway	Mile	7¼		56,309		56,309
Relocating Roads	Mile	1.5			3,750	3,750
Farm Waterways	Acre	1,035	62,100	41,400		103,500
Seading Retired Areas	Acre	4,485	57,184	19,061		76,245
Group Collective Outlets	Acre	17		1,700		1,700
Terracing	Mile	570	71,250			71,250
Farm Diversions	Mile	9	1,350			1,350
Farm Pond	Each	37	16,650			16,650
Farm Fencing	Mile	56	22,400			22,400
Drop Inlets	Each	1		2,025		2,025
Drop Structures	Each	5		5,750		5,750
Farm and Ranch Planning and Application	Acre	33,381		50,072		50,072
Total			$230,934	$461,971	$3,750	$696,655
Estimated Amount to be Expended During 1951 Fiscal Year			$ 66,879	$ 44,586		$111,465

1/ See footnote, Table 3.

APPENDIX
Table 4
Annual Costs
ROWLETT CREEK WATERSHED
ROWLETT CREEK 1/
(1949 Prices)

Structure or Measure	Unit	No.	Annual Cost		
			Installation	Maintenance	Total
Detention Structures	Each	11	$24,445	$ 1,100	$ 25,545
Site Acquisition	Total		5,460		5,460
Relocating Roads	Mile	2	125		125
Farm Waterways	Acre	3,315	11,271	13,260	24,531
Seeding Retired Areas	Acre	14,365	8,852		8,852
Group Collective Outlets	Acra	55	138	220	358
Terracing	Mile	1,828	9,140	18,280	27,420
Farm Diversions	Mile	30	180	240	420
Farm Ponds	Each	118	2,124	2,124	4,248
Farm Fencing	Mile	182	2,912	3,640	6,552
Drop Inlets	Each	3	152	75	227
Drop Structures	Each	15	481	150	631
Total			$65,280	$39,089	$104,369

Flood Control Structures and Measures		$ 31,130
Land Treatment Measures		73,239
Annual Maintenance - Farmer	$39,089	

1/ See footnote, Table 3.

APPENDIX
Table 4A
Annual Costs
ROWLETT CREEK WATERSHED
MUDDY CREEK 1/
(1949 Prices)

Structure or Measure	Unit	No.	Annual Cost		
			Installation	Maintenance	Total
Detention Structures	Each	6	$ 7,104	$ 600	$ 7,704
Site Acquisition	Total		2,104		2,104
Floodway	Mile	7.4	1,408	2,815	4,223
Relocating Roads	Mile	1.5	94		94
Farm Waterways	Acre	1,035	3,519	4,140	7,659
Seeding Retired Areas	Acre	4,485	2,764		2,764
Group Collective Outlets	Acre	17	43	68	111
Terracing	Mile	570	2,850	5,700	8,550
Farm Diversions	Mile	9	54	72	126
Farm Pond	Each	37	666	666	1,332
Farm Fencing	Mile	56	896	1,120	2,016
Drop Inlets	Each	1	51	25	76
Drop Structures	Each	5	144	50	194
Total			$21,697	$15,256	$36,953

Flood Control Structures and Measures		$14,125
Land Treatment Measures		22,828
Annual Maintenance - Farmer	$15,256	

1/ See footnote, Table 3.

APPENDIX
Table 5
Comparison of Average Annual Benefit and Cost of the Recommended Program
ROWLETT CREEK WATERSHED
ROWLETT CREEK

Source of Benefit	Annual Cost	Annual Benefit	Benefit per Dollar of Cost
	(dollars)	(dollars)	(dollars)
Detention Storage	31,130	89,463	2.87
Land Treatment			
Flood Control	xxx	47,946	xxx
Land Treatment	xxx	227,044	xxx
Total	73,239	274,990	3.75
All Sources	104,369	364,453	3.49

PRELIMINARY WORK PLAN

FOR FLOOD AND WATERFLOW RETARDATION AND SOIL EROSION PREVENTION

ROWLETT CREEK WATERSHED

OF THE TRINITY RIVER WATERSHED

TEXAS

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

VICINITY MAP

LEGEND

- Floodwater Retarding Structure
- Flood Plain Boundary
- Drainage Area Boundary, Spread Structures
- Floodway
- Watershed Boundary
- Paved Road
- Improved Road
- Dirt Road
- Railroad
- County Line
- Streams
- Towns and Cities
- Small Communities

COLLIN COUNTY
DALLAS COUNTY

APPENDIX
Table 5A
Comparison of Average Annual Benefit and Cost of the Recommended Program
ROWLETT CREEK WATERSHED
MUDDY CREEK

Source of Benefit	Annual Cost	Annual Benefit	Benefit per Dollar of Cost
	(dollars)	(dollars)	(dollars)
Detention Storage	9,902	28,723	2.90
Floodway	4,223	11,970	2.83
Total	14,125	40,693	2.88
Land Treatment			
Flood Control	xxx	6,760	xxx
Land Treatment	xxx	70,500	xxx
Total	22,828	77,260	3.38
All Sources	36,953	117,953	3.19