

WATERSHED WORK PLAN

TURKEY CREEK WATERSHED

Fort Bend County, Texas

Prepared Under The Authority Of The
Watershed Protection And Flood Prevention Act
(Public Law 566, 83rd Congress, 68 Stat. 666)

September 1955

Form TX-914
App'd 7/55

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
WATERSHED WORK PLAN

AGREEMENT

between the

Coastal Plains Soil Conservation District

(name of local organization)

Fort Bend County Commissioners Court

(name of local organization)

Fort Bend County Drainage District

(name of local organization)

STATE OF Texas

and the

SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE

Whereas, application has heretofore been made to the Secretary of Agriculture by
Coastal Plains Soil Conservation District

(name of local organization)

Fort Bend County Commissioners Court and

(name of local organization)

Fort Bend County Drainage District

(name of local organization)

State of Texas, hereinafter referred to as the local organization, for assistance in preparing a plan for works of improvement for the Turkey
Creek Watershed, State of Texas, under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, 68 Stat, 666); and

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

Whereas, there has been developed through the cooperative efforts of the local organization and the Service a mutually satisfactory plan for works of improvement for said watershed, designated as the watershed work plan for Turkey
Creek Watershed, State of Texas, which watershed work plan is annexed to and made a part of this agreement; and

Whereas, the watershed work plan describes the watershed and its problems, and sets forth a plan for works of improvement including a schedule of operations, the kinds and quantities of measures to be installed, the estimated cost, cost-sharing arrangements, maintenance and other responsibilities of those participating in the project, and economic justification for installing, operating and maintaining the works of improvement; and

Whereas, the Watershed Protection and Flood Prevention Act provides (a) that the local organization and the Secretary of Agriculture shall agree on the watershed work plan prior to participation by the Secretary of Agriculture in the installation of the works of improvement as set forth in said plan, and (b) that, at least forty-five days (while Congress is in session) before such installation involving Federal assistance is commenced, the watershed work plan and the justification therefor shall be transmitted by the Secretary of Agriculture to the Congress through the President;

Now, therefore, in view of the foregoing considerations, the local organization and the Secretary of Agriculture, through the Service, hereby agree on the watershed work plan, and further agree that the works of improvement as set forth in said plan will be installed, operated, and maintained substantially in accordance with the terms, conditions, and stipulations provided for therein.

It is further understood that this agreement does not constitute a financial document to serve as a basis for the obligation of Federal funds, and that financial and other assistance to be furnished by the Service in carrying out the watershed work plan is contingent on the appropriation of funds for this purpose and on the execution of supplemental agreements setting forth the cost-sharing arrangements and other conditions that are applicable to specific works of improvement.

It is further agreed that the watershed work plan may be amended or revised, and that this agreement may be modified or terminated, only by mutual agreement of the parties hereto.

No member of or Delegate to Congress shall be admitted to any share or part of this agreement, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

Ft. Bend Co. Commissioners Court
(name of local organization)

By G. G. Roane
Title County Judge

Date September 19, 1955

The signing of this agreement was authorized by a resolution of the governing body of the Ft. Bend Co. Commissioners Court
(name of local organization)

adopted at a meeting held on September 19, 1955.

Ellen Maack
County Clerk (Secretary, local organization)
and Ex-Officio Clerk of Commissioners Court
Date September 19, 1955

Fort Bend County Drainage District
(name of local organization)

By [Signature]

County Judge and Chairman, Board of
Title Directors, Fort Bend County
Drainage District

Date September 19, 1955

The signing of this agreement was authorized by a resolution of the governing
body of the Fort Bend County Drainage District
(name of local organization)

adopted at a meeting held on September 19, 1955.

Ella Maack
County Clerk (Secretary, local organization)

Date September 19, 1955

Coastal Plains Soil Conservation District
(name of local organization)

By [Signature]

Title Chairman

Date 9-21-, 1955

The signing of this agreement was authorized by a resolution of the governing
body of the Coastal Plains Soil Conservation District
(name of local organization)

adopted at a meeting held on September 21, 1955.

[Signature]
(Secretary, local organization)

Date Sept 21, 1955

Soil Conservation Service
United States Department of Agriculture

By _____
Administrator

Date _____, 1955

WATERSHED WORK PLAN
TURKEY CREEK WATERSHED
Fort Bend County, Texas

**Prepared Under the Authority of the
Watershed Protection and Flood Prevention Act**

Prepared by
Coastal Plains Soil Conservation District
Fort Bend County Drainage District

With Assistance by
U. S. Department of Agriculture
Soil Conservation Service

September 1955

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WATERSHED WORK PLAN
TURKEY CREEK WATERSHED
Fort Bend County, Texas
September 1955

INTRODUCTION

Authority

The Watershed Work Plan for the Turkey Creek watershed in Fort Bend County, Texas, hereinafter referred to as the Plan, will be carried out under authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, 68 Stat. 666).

Purpose and Scope of Plan

The Coastal Plains Soil Conservation District provides through its Program and Work Plan for the application of a complete program of soil and water conservation and improved plant management within this watershed. Its objective is to use each acre of agricultural land in accordance with its capabilities for sustained agricultural production and to treat each acre in accordance with its needs for protection and improvement. Such a program, when applied and maintained within the watershed will have a major effect in improving drainage conditions. However, additional structural measures for improvement of drainage are needed to complete the soil, plant, and water conservation program in the watershed.

The Fort Bend County Drainage District has for its primary purpose the drainage of lands in Fort Bend County. It coordinates its activities with those of the Coastal Plains Soil Conservation District. The Coastal Plains Soil Conservation District and the Fort Bend County Drainage District have executed a memorandum of understanding and developed a plan of operations for improvement of drainage facilities in Fort Bend County.

The purpose of this plan is (1) to state specifically the land treatment and structural measures which are designed primarily for, or contribute directly to improved drainage and (2) to specify how, when, and by whom they will be carried out to achieve the maximum practicable improvement of drainage conditions. The measures and practices planned herein constitute an integral part of the complete soil, plant, and water conservation program in this watershed and have been incorporated in the work plan of the Coastal Plains Soil Conservation District.

Application of this mutually developed plan will provide the improvement of land resources which can be undertaken at this time with the combined facilities of local interests and of State and Federal agencies. Upon

completion and continued maintenance of the measures set forth in this plan, a material contribution will be made toward increasing agricultural production to a level consistent with the capabilities of the land, thereby promoting the welfare of the landowners and operators, the community, the State and the Nation. The watershed is located entirely in Fort Bend County, Texas and contains 18,880 acres.

SUMMARY OF PLAN

This plan is a combination of land treatment practices and structural measures which contribute directly to soil, plant and water conservation and the drainage phase of agricultural water management. The works of improvement as listed in Table 1, are planned to be installed during a 5-year period at an estimated cost of \$352,284, of which \$285,036 is to be borne by non-Federal interests and \$67,248 by the Federal Government. These estimates are inclusive of the current costs of private interests under the going National programs pertaining to the objectives of this plan. It is estimated that the Federal contribution for accelerating the going agricultural program will be \$7,000 for technical assistance which will be provided through the Coastal Plains Soil Conservation District.

The Fort Bend County Drainage District and the Coastal Plains Soil Conservation District, under provisions of state enabling legislation, have agreed to assume responsibility for overall periodic inspection and maintenance of the 14.6 miles of main ditches at an estimated annual cost of \$3,906 and 20 miles of group laterals at an estimated cost of \$1,580. Local landowners and operators will assume responsibility for maintenance of land treatment measures and farm drainage systems at an estimated annual cost of \$3,540, in accordance with provisions of the farmer-district cooperative agreements.

Comparisons of Benefit and Cost

When the planned structural measures for agricultural water management are applied and the needed farm drainage measures are applied and operating at full effectiveness on 80 percent of the area, the ratio of the average annual benefits, \$63,695, to the estimated average annual equivalent cost, \$17,417, is 3.66 to 1 based on 1954 price levels for installation costs and long-term prices for benefits and costs of operation and maintenance.

DESCRIPTION OF WATERSHED

Physical Data

Turkey Creek rises 3 miles northwest of Tavener, Texas approximately 1.25 miles upstream from U. S. Highway 90-A, and flows into the East Bernard River approximately 2 miles above its junction with the West Bernard River. The watershed is approximately 12 miles in length and

averages about 2.5 miles in width (Figure 2).

The watershed has an area of 18,880 acres (29.5 square miles). The entire area is in farms except the small portion occupied by roads. There are 314 acres of bottom land in this watershed, all of which is in woods. The entire bottom land area is located below Highway 59.

The entire watershed lies in the Coastal Prairie Problem Area in Soil Conservation. Approximately 20 percent of the soils are deep, fine textured, very slowly permeable; 53 percent deep, fine textured slowly permeable; 25 percent deep, medium textured, very slowly permeable; and 2 percent other types. The soils are in fair physical condition.

The topography of the watershed is nearly level to undulating, with a gentle slope toward the south and southeast. Steeper slopes which are quite short occur only along the lower reaches of the stream. The watershed is open prairie except for trees and brush near parts of the main stream. Elevations range from 120 feet above sea level in the headwaters to 70 feet at the confluence of Turkey Creek and the East Bernard River.

Approximately 72.6 percent of the watershed is in cultivation, 23.8 percent is in pasture, 1.7 percent in woods and 1.9 percent in roads and railroads.

The watershed is located entirely within the outcrop of the Beaumont clay formation of the Pliocene system. The Beaumont formation averages 700 feet in thickness, with a dip southeastward extending beneath beach sands and waters of the Gulf as far as the continental shelf. The formation throughout its extent consists generally of a unit of plastic, poorly bedded clay, interbedded with lentils and more or less continuous layers of sand. In some sections the clay content ranges up to 80 and 90 percent. The clay in most places is calcareous and contains calcareous nodules and fragments of partly decomposed wood. The Beaumont formation consists mainly of deltaic sediments deposited by rivers as natural levees and deltas.

The cover condition of the pastureland generally is good from a hydrologic standpoint. The cropland is used predominately for clean tilled crops. Winter cover crops are being used on only a relatively small part of this area.

The average annual temperature is 69 degrees Fahrenheit. Mean temperatures range from 83.3 degrees in summer to 53.6 degrees in winter. The extreme recorded temperatures are 7 degrees above zero and 108 degrees above zero. The average date of the last killing frost is February 22 and that of the first killing frost is December 1, a normal frost-free period of 275 days.

United States Weather Bureau records show an average annual rainfall

of 42.77 inches and a maximum annual rainfall of 69.83 inches. The average monthly rainfall ranges from 2.73 inches in February to 4.30 inches in each of the months of May, July, and December. On the average, rainfall occurs on 100 days annually.

The annual evaporation at the Texas Agricultural Experiment Station at Angleton, Texas about 15 miles south of the watershed, is 44.84 inches. The average monthly evaporation is approximately 1.60 inches during the winter and 5.80 inches in July.

Economic Data

The economy of the watershed is almost entirely agricultural. The principal crops are cotton, corn, rice and grain sorghums. Minor crops are hubam clover, Alyce clover, and cowpeas which are planted for soil improvement. There are some livestock farms in the watershed with both beef and dairy cattle enterprises represented.

There is a relatively wide range in size of farms in the watershed. A number of farms are 700 or more acres in size; however, most farms contain from 80 to 150 acres.

The population of Fort Bend County, in which the watershed is located, was 30,410 in 1950. In the decade 1940 to 1950 the population of the county decreased 7.7 percent. The principal towns in the county and their 1950 populations are Rosenberg, 5,758; Richmond, 2,045; and Sugarland, 2,278. The villages of Kendleton and Beasley, with populations in 1950 of 100 and 300 respectively, are located near the watershed.

The principal local markets for crops are Rosenberg and Richmond. Most of the livestock is marketed in Houston. Access to all parts of the watershed is furnished by 6 miles of paved roads and 30 miles of gravelled roads. The T. & N.O. (MP) Railroad provides adequate rail transportation and carlot shipping facilities.

There is no mineral production in the watershed. Both oil and sulphur are produced, however, in nearby areas.

WATERSHED PROBLEMS

Floodwater Damages

The Corps of Engineers, Galveston District, in its "Report on Survey of the Streams Flowing Through Coastal Plains Soil Conservation District, Texas," states that approximately 2,493 acres on Turkey Creek are subject to rather infrequent flooding, with an average annual flood damage of approximately \$3,912 (long-term prices). The topography of the watershed does not permit the use of floodwater retarding structures.

Sediment Damage

No reservoirs or farm ponds exist in the watershed. The damage from sediment on the 314 acres of bottom land is negligible. From studies made in neighboring watersheds which have improved drainage systems, it is anticipated that the only appreciable sediment damage will be due to deposition in the laterals and main ditches of the drainage system. Sediment will be derived from sheet erosion and some erosion of the side slopes of the ditches. In this plan the allowance for maintenance is sufficient to permit removal of this deposition.

Erosion Damage

Erosion rates in the Turkey Creek watershed are very low due to the nearly level topography. Sheet erosion is the major source of sediment. The annual gross sheet erosion is estimated to be approximately 40 acre-feet. The amount of sediment that reaches the mouth of the watershed is estimated to be only 10 acre-feet annually, with the major portion of the remaining sediment being deposited before reaching the stream channels.

Problems Relating to Methods Now Used in the Disposal of Water

The main problem in the Turkey Creek watershed is the lack of suitable outlets for farm drainage systems. The inadequacy of the Turkey Creek channel has hindered the installation of drainage systems by individual landowners or groups of landowners.

The land in the Turkey Creek watershed has been more intensively used than in the Coastal Plains Soil Conservation District as a whole. It is estimated that the amount of new land placed in cultivation as a result of these works of improvement will not exceed 14 percent of the entire watershed area (Table 7). The clean-tilled crops, predominately cotton and corn, have been grown generally with the simple alternation of corn with cotton. This plan of cropping has intensified the drainage problem. The depletion of organic matter from the topsoil has caused its structure to become less granular and less absorptive, thereby reducing the infiltration rate. Until adequate surface drainage is provided it is not feasible to attempt soil improvement through the use of deep rooted legumes, since they will not grow well where the land is poorly drained.

The pasturelands are poorly drained and the more desirable forage plants have not thrived. This has resulted in low grade pastures with low carrying capacities, which produce poor quality beef. Poorly drained areas are conducive to the propagation and spread of diseases, parasites and insects detrimental to livestock.

INVESTIGATIONS AND ANALYSES

Previous Drainage Investigations

On January 16, 1946, the Supervisors of the Coastal Plains Soil Conservation District requested the Soil Conservation Service to make a drainage survey of the District to determine the; (1) condition of natural and artificial drainageways and their capacities; (2) needed improvements on the existing drainage systems; (3) additional facilities needed to provide adequate drainage; and (4) estimated costs and benefits of the needed drainage improvements. The request was approved and field work was started on February 13, 1946. This survey was completed and a report prepared in June, 1947.

Drainage investigations were made by the Bureau of Reclamation in the Big Creek watershed which is located adjacent to Turkey Creek in the Coastal Plains Soil Conservation District. A report of these investigations designated "Project Planning Report No. 5-14.8-1, Plan for Development, Big Creek Project, Gulf Coast, Texas," was issued in December 1948 and covered an area of 175,000 acres.

A survey of drainage needs in the Coastal Plains Soil Conservation District was made by the Corps of Engineers pursuant to authority contained in Section 204 of the Flood Control Act approved June 30, 1948, and the "Report on Survey of the Streams Flowing Through Coastal Plains Soil Conservation District, Texas", dated May 22, 1953, was prepared. Incorporated in this report was an engineering report prepared by S. A. Russel and Freese, Nichols and Turner, associated engineers, for the Fort Bend County Drainage District.

Use has been made of the basic information contained in these reports in the preparation of this Plan.

Program Determination

An investigation of the watershed problems showed that the flood problem was insignificant. It was determined that the major need is agricultural water management in the form of improved drainage. Determination was made of the remaining needed land treatment measures which contribute directly to improved drainage. Although some benefits in improved infiltration rates would result from land treatment measures, it was apparent that additional structural measures would be required to obtain the desired degree of improvement in surface drainage. Therefore, determination was made of feasible structural measures needed to achieve this objective.

The study made and the procedures used in that determination were as follows: The existing base map of the watershed prepared by S. A. Russell and associates, showing the watershed boundary, principal

streams and systems of roads and railroads, was used with some needed modification of the watershed boundaries. Representative cross sections were selected and surveyed. The surveyed cross sections were supplemented by use of cross sections from the Corps of Engineers and other previous studies after checking to make certain that these sections were still representative of existing conditions.

After field examinations and the aforementioned surveys had been made, a structure location map of the watershed, showing main drainage ditches and other pertinent information was prepared. Criteria established by the Fort Bend County Drainage District were used in establishing the portion of the system on which Federal assistance is requested. These criteria were that no Federal assistance would be requested in the construction of group laterals which served less than 320 acres of cropland or 640 acres of pastureland, or which would benefit fewer than two farms.

When the land treatment measures and those structural measures for improved drainage had been determined, a table was developed which gave the total cost of each type of measure and the portion to be borne by the participants, based on the classification of expected benefits. The summation of the total costs for all the needed measures represented the estimated cost of the improved drainage and soil, plant, and water conservation program for the watershed. A second cost table was developed to show the annual installation cost, annual maintenance cost, and total annual cost of the drainage installations.

Hydraulic and Hydrologic Investigations

Drainage engineers of the Soil Conservation Service have developed drainage coefficients to provide a specified kind and degree of drainage for use under variable conditions of climate, topography, land use and soils. The drainage coefficient C is used in the general formula $Q = CM^{5/6}$ where Q is the quantity in cubic feet per second for which the ditch is to be designed, and M is the drainage area of the watershed in square miles. The values of C in this particular area are as follows: range land 15, rice land 22.5 and cultivated land 45. In order to make allowance for initial silting of the ditches these values are increased 20 percent to 18, 27, and 54, respectively. The curves used are shown in Figure 1. These coefficients are in current use by the Coastal Plains Soil Conservation District and the Fort Bend County Drainage District. The required capacities of all the ditches in this work plan were determined by the formula $Q = 54M^{5/6}$ in order to make ample allowance for future changes in land use.

Geologic Investigations

Reconnaissance geological inspections were made at intervals along the stream channel at or near the engineering cross sections. These were in addition to brief lithologic, stratigraphic, and structural studies

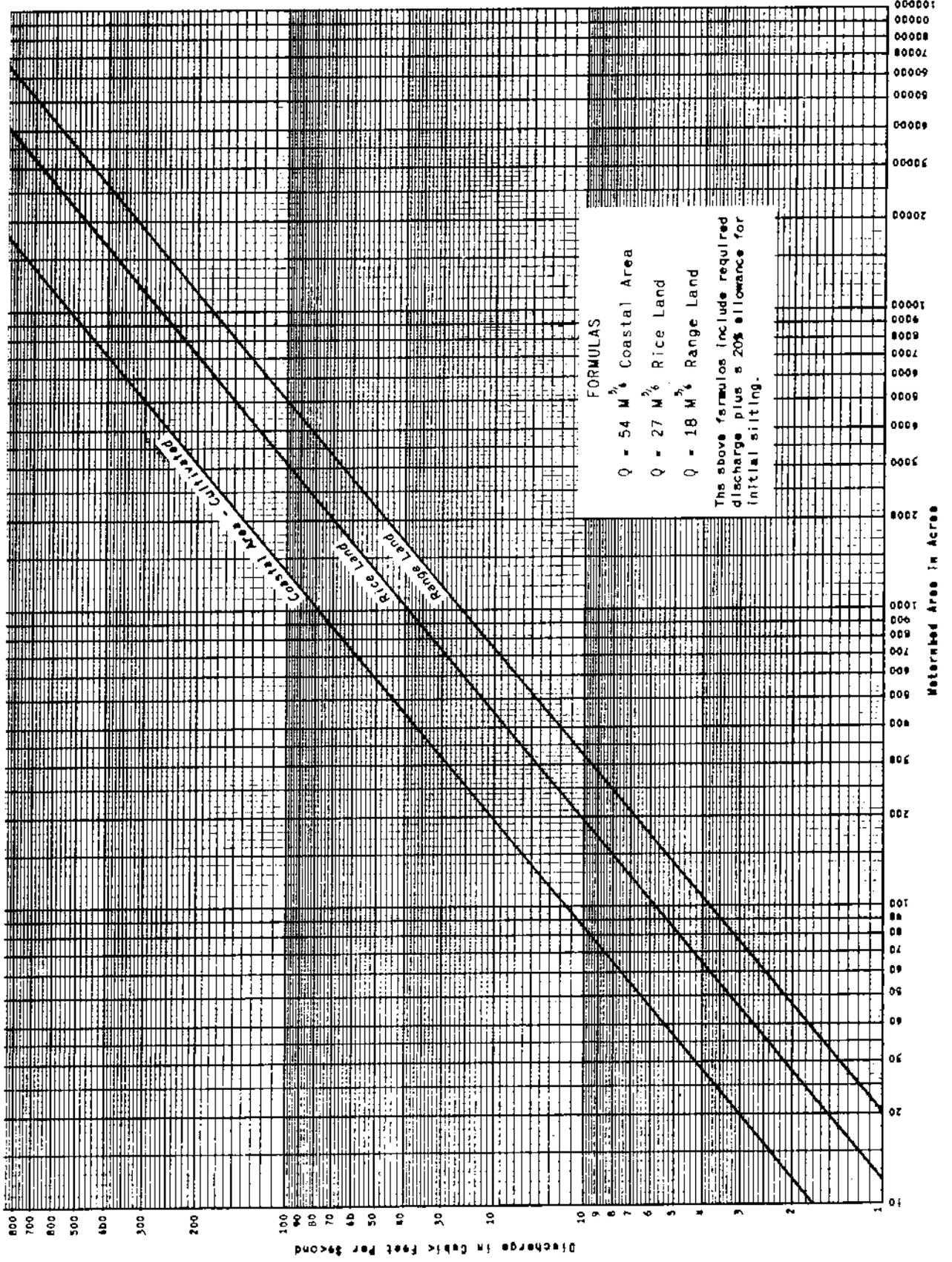


FIGURE 1
DRAINAGE RUNOFF CURVES FOR TEXAS GULF COAST

of the watershed as a whole. Borings were made at or near some of the cross sections to obtain a representative sample of the soils and geology of the watershed, and to determine the best side slopes for the proposed drainage ditches.

This reconnaissance of geologic problems in the watershed indicates little or no need for exploration with core drilling equipment. The installation of a drainage program should have few or no construction problems. No hard rock is present in the watershed.

Sedimentation Investigations

The field surveys of the sedimentation problems in the Turkey Creek watershed were made according to methods described in the revised "Sedimentation Section of Procedures for Developing Flood Prevention Work Plans" Water Conservation 6, Soil Conservation Service, Region 4, February 24, 1954. Field studies included reconnaissance surveys of geology and physiography, and the occurrence of overbank sediment deposits, flood plain scour and streambank erosion. The nature of the channels and valley on or near all engineering cross sections was also studied, making soil borings where necessary. In the preparation of the report tabular summaries of all the above findings, with explanatory texts, were prepared. Investigations of sediment sources in the entire watershed were made according to standard procedures.

The sediment derived from sheet erosion was estimated by use of a formula shown in "Suggested Criteria for Estimating Gross Sheet Erosion and Sediment Delivery Rates for the Blackland Prairie Problem Area in Soil Conservation", Soil Conservation Service, Region 4, February, 1953. The formula is based on data obtained by a watershed survey and includes the following:

1. Soil unit in acres, by slope in percent, slope length in feet, and present land use (cultivated, pasture and woodland).
2. Average farming practices (such as percent row crop and/or percent small grain).
3. Cover condition classes on pasture and woodland.
4. Past history of land use.
5. Maximum 30-minute rainfall intensity to be expected once in two years.

There was little or no evidence of gully or streambank erosion. From the above studies the total annual sediment yields were calculated as 41.6 acre-feet from sheet erosion and none from the other possible sources. There was no evidence of overbank deposition of sediment or

flood plain scour. Estimates were also made of the probable rate of sedimentation of proposed drainage ditches.

The pastureland in the watershed has a good grass cover and a very low rate of erosion. No appreciable reduction in the rate of sediment production from pastureland is expected in the future. It is estimated that the application of needed land treatment measures will reduce the annual rate of sediment yield from sheet erosion of cultivated land by about 18 percent.

Economic Investigations

Information was obtained from landowners and operators, agricultural workers, and processors relative to average yields, crop losses and production losses, by soil units, resulting from poor drainage. A sampling of the landowners and operators was made to determine the extent and rate at which changes in land use and crop distribution would take place after improved drainage facilities were installed. Landowners and operators of lands in the same soil unit in adjoining watersheds where improved drainage facilities have been installed were interviewed also. This made it possible to base estimates of probable changes in cropping patterns and yields in the Turkey Creek watershed on changes that had already occurred on identical soil units on neighboring farms.

Economic data included in previous investigations were reviewed and correlated with the information currently obtained after the necessary adjustments to long-term prices had been made. Benefits and farm operating costs determined in this investigation were based on 1954 prices and converted to long-term levels by use of the appropriate conversion factors.

Although installation on the basis of 80 percent participation is planned over a 5-year period, it was believed desirable for economic evaluation to assume some additional lag resulting from unforeseen circumstances. Therefore, for the purpose of evaluation benefits, it was assumed that about 10 percent of the farm drainage would be effective each year for the first 5 years after completion of the group outlet system, and that an additional 30 percent would become effective during the next 5 years. Drainage benefits have been discounted accordingly to 67.05 percent of the undiscounted benefit that would result from 100 percent immediate installation of farm drainage.

Consideration was given to the problem of separating benefits accruing to the on-farm drainage systems from those accruing to the open drains of the disposal system. It was determined that no means was available for making this separation. Therefore, benefits were divided in proportion to costs for each phase of the drainage system for benefit-cost determination, thus resulting in the same benefit-cost ratio as

though total benefits had been compared with total costs.

Benefits claimed for improved drainage are net benefits after all production and other associated costs have been deducted. Investigations showed that an amortization period of 25 years would be appropriate for the conditions in this watershed. This amortization period is comparable to that used for similar drainage projects in this area.

Land use and treatment needs were determined after consultation with local work unit personnel and soil conservation district supervisors. Due consideration was given to land capability, soils, type of farming, amounts of farm planning and practices established, and the ability of local leaders to carry out the projected program. As a result of this analysis, the quantity of each land treatment measure included in the plan represent about 80 percent of the total needs and is believed to approximate the amount of application that can be achieved under the program.

EXISTING OR PROPOSED WORKS OF IMPROVEMENT

The Fort Bend County Drainage District was created by H. B. 859, 51st Legislature, State of Texas, 1949. It has an area of 554,000 acres including the Turkey Creek watershed which is only 3.4 percent of the total area. Due to the large area which it serves, this drainage district has not been able to assist all watersheds within its boundaries with their drainage problems. The Turkey Creek watershed is one of those areas which have received little or no assistance prior to this time.

During the past several years small neighborhood groups of farmers, cooperating with the Coastal Plains Soil Conservation District, have prepared soil and water conservation plans on a community basis. The application of adequate drainage measures has been hampered by lack of suitable outlets. Adequate drainage systems have been installed on 2,130 acres where suitable outlets were available. The proposed works of improvement will provide adequate outlets for an additional 14,000 acres which are in need of drainage.

WORKS OF IMPROVEMENT TO BE INSTALLED

Land Treatment Measures

An effective conservation program based upon the use of each acre of agricultural land within its capabilities and its treatment in accordance with its needs, such as is now being carried out by the Coastal Plains Soil Conservation District, is essential to a sound and adequate drainage program in the watershed. Basic to the attainment of this objective is the establishment and maintenance of all applicable soil, plant and water management practices essential to proper land use. Emphasis will be placed on accelerating the establishment of land

treatment practices which have a measurable effect on the establishment of a good water management program.

An important phase of the work is the installation of adequate drainage systems on 11,720 acres of land. Soil improving crops will be planted on 4,775 acres and 1,304 acres of rotation hay and pasture will be established on cropland to improve water-holding capacity of the soils, increase infiltration rates and reduce erosion. Other measures which will be applied include 4,339 acres of crop residue utilization, 1,800 acres of proper use of pastureland to improve and maintain effective vegetative cover and 841 acres of land smoothing to facilitate surface drainage.

The estimated total cost of planning and installing these measures is \$138,142, as shown in Table 1.

Under the guidance and with the assistance of the Coastal Plains Soil Conservation District, landowners and operators will apply other land treatment measures such as rotation grazing, crop rotations, fertilizing, and brush control. These practices are a part of a complete soil, plant and water conservation program, but since they either do not contribute directly to a water management program, or contribute in a less positive manner due to characteristics of the practice or small areas affected, their costs have not been included in Table 1.

Structural Measures for Drainage

A system of drainage ditches and appurtenances will be installed to provide adequate agricultural drainage. There will be 14.6 miles of main ditches constructed at or near the location shown on the Structure Location Map, Figure 2. An estimated additional 20 miles of group laterals will be constructed as the on-farm drainage systems are developed. Data concerning these structures are summarized in Table 6 and 6A and costs listed in Table 1.

Easements for the drainage improvements will be provided by local interests. The land value of these easements is estimated to be \$10,350 based on market value as determined by the Fort Bend County Drainage District. The average annual loss in production on the areas effected is insignificant because most of the area is now in channels. The amortized cost of the easements is \$663. Therefore, in accordance with sound economic principles, this amount was used in determining the economic evaluation of the program. The total estimated cost of the drainage structural measures is \$214,142. The annual cost including the annual equivalent of installation, operation, and maintenance is \$17,417.

Effect on Damages and Benefits

The combined program of land treatment and farm drainage described

above will materially increase yields. The drainage system will permit normal farming operations and crop growth during periods when, because of excess runoff, they would otherwise be restricted.

Floodwater damages which are estimated to be approximately \$3,912 annually, based on long-term prices, are not expected to be materially changed by the program although it is probable that they may be reduced slightly.

Farm operators in the watershed expressed their intent to shift to higher income crops and to increase lands in cultivation after improved drainage measures are installed. It is expected that the acres in cropland will increase from 13,714 to 16,401. However, it is expected that 1,304 acres of the poorer cropland will be devoted to rotation hay and pasture. The increase in acres of higher income crops together with the increased and more uniform yields as a result of drainage are expected to produce benefits estimated to be \$94,600 annually, based on long-term prices. Based on the costs involved, \$63,695 of these benefits have been allocated to structural measures.

The installation of the proposed drainage project on the Turkey Creek watershed will have no known detrimental effect on any existing or proposed downstream projects which might be considered in the future and will be compatible with any works of improvement which might be planned in the development of the San Bernard River basin.

The Fish and Wildlife Service, in a report issued in April 1952, concluded that drainage in the Coastal Plains Soil Conservation District might have some adverse effect on the habitat of woodcock and the mottled duck. No significant effect was expected on quail, doves, rabbits and squirrel. There is a possible benefit to fishing and prairie chicken resources. Therefore, it appears that the proposed drainage improvements will have little overall effect on wildlife resources.

COMPARISON OF BENEFITS AND COSTS

It is estimated that the total benefits in the form of increased farm income from the drainage measures included in the Plan will approximate \$94,600 annually after discounting for the probable lag in installation. The structural measures and the on-farm drainage improvements are wholly interdependent phases of the plan because no benefits can be obtained from one without the other. It is believed, therefore, that the only sound procedure for allocating benefits between the structural measures and on-farm improvements is in proportion to the costs of the two components. The total annual installation, operation and maintenance cost of drainage improvements is \$25,870 of which \$17,417, or 67.33 percent, is for the structural measures and \$8,453, or 32.67 percent, is for the on-farm improvements. Allocation of the average annual benefits in this proportion .

credits the structural measures with 67.33 percent of the benefits, \$63,695 annually, and the on-farm system with an average annual benefit of \$30,905 annually.

Community benefits will be created through opportunities for more complete utilization of existing resources, greater employment and the like. Although these benefits are estimated to equal at least \$4,735 annually, they have not been included in the economic justification of the program. Certain intangible benefits such as increased security of the landowners through more certain crop yields and improved opportunities for economic planning will accrue. These benefits are not measurable in monetary terms.

ACCOMPLISHING THE PLAN

The Extension Service will cooperate with the Coastal Plains Soil Conservation District and the Fort Bend County Drainage District to achieve the application of the needed soil and water conservation practices in the Turkey Creek watershed within the five year installation period provided for in the plan. Assistance will fall within the scope of their basic assignment.

1. The dissemination of useful and practical information relating to agriculture and home economics.
2. The practical application of such knowledge to farm and home situations. Assistance will be given in necessary program educational activities through news releases, radio, circular letters, bulletins and other similar means, and by conducting general information and local farm meetings to reach individuals and groups of people.

Land Treatment Measures

Land treatment measures itemized in Table 1 will be established on the land by farmers in cooperation with the Coastal Plains Soil Conservation District. The cost of applying these measures will be borne by the owners and operators of the land. It is expected that the owners and operators will be reimbursed for a portion of this cost through the existing Agricultural Conservation Service Program. The amount of reimbursement to be expected was estimated, based on the current program, and was not included in the total estimated non-Federal cost of the land treatment measures listed in Table 1. The soil conservation district is giving assistance in the planning and application of these measures under its going program. This assistance will be increased so as to assure accelerated application of the planned measures within the 5-year installation period.

The governing body of the Coastal Plains Soil Conservation District will arrange for meetings according to a definite schedule and, by

individual contacts, encourage the landowners and operators within the Turkey Creek watershed to adopt and carry out soil and water conservation plans on their farms. District-owned equipment will be made available to the landowners in accordance with the existing arrangements for equipment usage in the district. The district governing body will make periodic inspections of the completed land treatment measures and follow through to see that maintenance is performed.

The Soil Conservation Service will assign additional technicians and aids to the Coastal Plains Soil Conservation District to assist landowners and operators cooperating with the district in accelerating the preparation and application of soil and water conservation plans.

The Farmers Home Administration soil and water conservation loan program, is available to all eligible individual farmers and ranchers in the area. Educational meetings will be held in cooperation with other agencies outlining the services available and eligibility requirements. Present FHA clients will be encouraged to cooperate in the program.

The County ASC Committees will cooperate with the governing body of the soil conservation district by selecting and providing financial assistance for those ACPS practices which will accomplish the conservation objectives in the shortest possible time.

Structural Measures for Drainage

The Fort Bend County Drainage District was created by House Bill No. 859, 51st Legislature, State of Texas during the regular session of 1949. The bill was approved and became effective June 2, 1949. On June 25, 1949, the voters of Fort Bend County approved a bond issue of \$2,170,000 and authorized the Commissioners Court to levy and collect a continuing ad valorem tax to provide for the payment of interest and redemption of bonds within a thirty-year period after date of issue. At the same time the voters authorized the collection of a continuing ad valorem tax for the purpose of operating the district and maintaining its property.

The Fort Bend County Drainage District will contract for the construction of the 14.6 miles of main ditches listed in the plan. It will also furnish necessary engineering and other installation services to make detail surveys and designs, to prepare specifications for bids, and to supervise construction by making the necessary inspections. All of these services will be governed by standards approved by the Soil Conservation Service.

Funds for the local share of the construction, engineering services and other installation services will be made available by the Fort Bend County Drainage District at the time of final approval of the project. Rights-of-way and easements for the project will be obtained insofar as possible by private donation. In those instances where such

donations would create excessive hardship, easements will be purchased. Construction will be started as soon as Federal funds are available.

The 14.6 miles of main ditches will be constructed during the first year. The remaining 20 miles of group laterals will be constructed over a five year period by local interests as the on-farm drainage systems are installed.

Technical specialists will be provided by the Soil Conservation Service to assist in the planning, design, preparation of specifications, supervision of construction, preparation of contract payment estimates, final inspection, execution of certificates of completion, and related duties for the establishment of the planned structural measures for improved drainage.

Table 1 indicates the schedule of operations for each phase of the program which the cooperating parties have agreed should be followed to achieve the most efficient prosecution of the work. This schedule will be adjusted year by year on the basis of any significant changes in the Plan found to be mutually desired and in light of appropriations and accomplishments actually made.

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

PROVISIONS FOR OPERATION AND MAINTENANCE

Land Treatment Measures

Land treatment measures will be operated and maintained by the landowners or operators of the farms on which the measures are installed under agreements with the Coastal Plains Soil Conservation District. Representatives of the soil conservation district will make periodic inspections of the land treatment measures to determine maintenance needs; will encourage landowners and operators to perform maintenance; and will make district-owned equipment available for this purpose.

Structural Measures for Drainage

The 14.6 miles of main ditches will be operated and maintained by the Fort Bend County Drainage District. The 20 miles of group laterals will be operated and maintained by the Coastal Plains Soil Conservation District and individual landowners with assistance from the Fort Bend County Drainage District and the Fort Bend County Commissioners Court.

All open drains will be inspected at least annually and after each heavy rain or stream flow. Items of inspection will include but not be limited to the degree of scour and silting, the degree of obstruction to flow caused by excessive vegetative growth within the open

drains, and the condition of all grade control structures, watergates, crossings and fences installed as a part of the structural measures. Technical assistance for making the inspections and determining the kinds and amount of maintenance work required will be furnished by the Coastal Plains Soil Conservation District.

The estimated annual operation and maintenance cost of the 14.6 miles of main ditches is \$3,906 and for the 20 miles of group laterals is \$1,580, based on long-term price levels. The necessary maintenance work will be accomplished by contract or by force account; by the use of equipment owned by the Fort Bend County Drainage District, the Fort Bend County Commissioners Court and the Coastal Plains Soil Conservation District; by contributed labor and equipment; or a combination of these methods. Necessary funds for accomplishing the maintenance work will be obtained from the Commissioners Court which has been authorized to levy an ad valorem tax for operation and maintenance purposes.

Provisions will be made for free access of District and Federal representatives to inspect the structural measures at any time.

COST-SHARING

Non-Federal interests will be responsible for the installation and maintenance of the land treatment measures shown in Table 1 at an estimated installation cost of \$131,142. The Federal government will provide necessary technical assistance to assure completion of the installation of land treatment measures within the 5-year installation period at an estimated cost of \$7,000, in addition to funds provided under the going program. Non-Federal interests thus will provide approximately 95 percent of the cost of installing land treatment measures, Table A.

The required non-Federal cost of structural measures for 14.6 miles of open drains, including all lands, easements and rights-of-way, the capitalized value of operation and maintenance of the structural measures for water disposal during the expected life, and the costs of administering contracts, will be paid by non-Federal interests. This cost is estimated to be \$176,497, Table D. Furthermore, non-Federal interests will pay the cost of installing an additional 20 miles of group laterals at a cost of \$31,600 as shown in Table 1. The only Federal assistance requested in the installation of these group laterals is \$4,000 for installation services.

The Federal Government will pay the cost of installation services for structural measures for drainage improvement in an estimated amount of \$28,999, Table E.

Construction costs of the structural measures for improved drainage, including an allowance for contingencies, were allocated between Federal and non-Federal interests in proportion to the benefits

received, Table C.

For the purpose of cost allocation, benefits were divided into classes 1 and 2. Class 1 benefits were those derived from reduction of damage. Inasmuch as no flood prevention benefits will accrue in Turkey Creek watershed, there will be no class 1 benefits. Class 2 benefits were those derived from the increased income attendant upon the enhanced productivity of land and constituted the benefits to be obtained from drainage improvements in the Turkey Creek watershed. Benefits were further subdivided into subclasses A and B, based upon the identifiability of beneficiaries and the significance of the benefits. Benefits accruing to beneficiaries within the watershed area who receive significant, identifiable benefits were placed in subclass A. Those benefits accruing to beneficiaries outside the watershed or those within the watershed who may be unidentifiable or who receive relatively insignificant benefits were placed in subclass B.

Based on these definitions all benefits were allocated to class 2 and divided between classes 2A and 2B in the amounts of \$63,695 and \$4,735, respectively. Therefore, all construction costs of the disposal system, \$109,722 were allocated to non-Federal interests, Table G. The cost of the project, including land treatment measures, is estimated to be \$352,284, of which the Federal share will be \$35,999, or 10.21 percent, and the non-Federal share will be \$316,285, or 89.79 percent.

Proposed Cost-Sharing Adjustment

Because of high maintenance costs, rights-of-way costs, land treatment costs and other factors, a sum of \$9,098, which includes \$31,600 for installing the 20 miles of group laterals for which no Federal assistance other than installation services is requested, is the maximum amount of construction costs above the required non-Federal costs listed in Table D which the local sponsors believe can be furnished by them and still insure their ability to participate in the project. The Fort Bend County Drainage District has competent engineering services available which can perform a portion of the installation services normally provided as a Federal cost. It is therefore proposed that the responsibility for installation services equivalent to a cost of \$9,375 be assumed by the Fort Bend County Drainage District and that \$40,624 of the allocated non-Federal construction cost be borne by the Federal Government. The share of the total project cost to be borne by the local people after this proposed adjustment would be \$386,112 or 85.17 percent. Several of the factors which prompted this proposal were:

1. Since the Fort Bend County Drainage District will furnish installation services in the amount of \$9,375 which would otherwise be furnished by the Federal Government it is proposed that the Federal Government assume an equal additional amount of the construction cost.

2. In addition to the 14.6 miles of main ditches on which Federal assistance is requested, local interests will construct an additional 20 miles of group laterals at an estimated cost of \$31,600.
3. Local land treatment costs will be high, amounting to an estimated \$131,142. For example the cost of installing drainage systems, including land smoothing on the individual farms will be \$70,808.
4. The cost of rights-of-way and accompanying structural changes will be very high. This will be brought about primarily by the necessity of replacing inadequate County and private road bridges at an estimated cost of \$58,050.
5. In addition to the first costs of construction the local interests are responsible for operation and maintenance of the entire project consisting of 34.6 miles of open ditches. The capitalized value of the annual operation and maintenance costs is \$101,076, which is almost as much as the construction cost of the project.

Table A - Land Treatment Costs

Type of Cost	Federal Cost (dollars)	Non-Federal Cost (dollars)	Total Cost (dollars)
<u>Non-Federal Lands</u>			
1. Technical Assistance	7,000	-	7,000
2. Installation Cost <u>1/</u>	-	131,142	131,142
3. Total	7,000	131,142	138,142
4. Grand Total	7,000	131,142	138,142

1/ This cost is exclusive of any reimbursement from ACP or other Federal funds.

**Table B - Distribution of Average Annual Benefits and
Allocation of Construction Costs by Purposes
and by Class of Benefits**

Step A Distribution of Average Annual Benefits			
Class of Benefits	: <u>Purpose</u> :		Total
	: <u>Drainage</u> :		
	(dollars)	(percent)	(dollars)
Class 1A Benefits	-	-	-
Class 1B Benefits	-	-	-
Class 2A Benefits	63,695	93.1	63,695
Class 2B Benefits	4,735	6.9	4,735
Total	68,430	100.0	68,430

Step B Allocation of Construction Costs			
Class of Benefits	: <u>Purpose</u> :		Total
	: <u>Drainage</u> :		
	(dollars)	(percent)	(dollars)
Class 1A Benefits	-	-	-
Class 1B Benefits	-	-	-
Class 2A Benefits	102,151	93.1	102,151
Class 2B Benefits	7,571	6.9	7,571
Total	109,722	100.0	109,722

Table C - Benefits and Allocated Construction Costs

Class of Benefits	Benefits		Allocated Construction Costs	
	(dollars)	(percent)	(dollars)	(percent)
1. Class 1A	-	-	-	-
2. Class 1B	-	-	-	-
3. Subtotal Class 1	-	-	-	-
4. Class 2A	63,695	93.1	102,151	93.1
5. Class 2B	4,735	6.9	7,571	6.9
6. Subtotal Class 2	68,430	100.0	109,722	100.0
7. Total	68,430	100.0	109,722	100.0

Table D - Required Non-Federal Costs

Type of Cost	: Cost or Appraised Value (dollars)
1. Land, easements, rights-of-way and etc.	
a. Land value	10,350
b. County road bridges and culverts	41,550
c. Private road bridges	16,500
d. Fence Construction	2,000
e. Power line relocation	280
f. Legal fees, services	4,241
2. Water rights	-
3. Capacity and facilities for its use on or at the structure for purposes other than flood prevention and features related thereto	-
4. Capitalized value of operation and maintenance during expected life of improvements	101,076
5. Cost of administering contracts	500
6. Total	176,497

Table E - Installation Services

Agency	:	Cost	:	Total
		(dollars)		(dollars)
Soil Conservation Service		28,999		28,999
Total		28,999		28,999

Table F - Proposed Adjustment in Federal and Non-Federal Costs

Reason for Adjustment	:	:	Transfer from Non-
			Federal to Federal
		to Non-Federal	Construction Costs
		(dollars)	(dollars)
1. Reason a		9,375	9,375
2. Reason b,c,d,and e		-	31,249
Total		9,375	40,624

Table G - Proposed Cost-Sharing

Type of Costs	: Federal : Cost (dollars)	: Non-Federal: : Cost (dollars)	: Total : Cost (dollars)
<u>COSTS FOR STRUCTURAL MEASURES</u>			
1. Required Non-Federal Costs (Item 6, Table D)	-	176,497	176,497
2. Installation Services (Table E)	28,999	-	28,999
3. Subtotal (Item 1 plus 2)	28,999	176,497	205,496
Allocation of Construction Costs			
4. Costs allocated to Class 1A benefits	-	-	-
5. Costs allocated to Class 1B benefits	-	-	-
6. Costs allocated Class 2 benefits (Item 6, Table C)	-	109,722	109,722
7. Subtotal (Item 4 plus 5 plus 6)	-	109,722	109,722
Recommended Adjustments of Construction Costs			
8. Increase of Federal Cost (Table F)	40,624	-	-
9. Decrease of Non-Federal Cost (Table F)	-	40,624	-
0. Subtotal (Items 8 plus 9)	/ 40,624	- 40,624	-
Recommended Adjustments of Installation Costs			
1. Decrease of Federal Cost (Table F)	9,375	-	-
2. Increase of Non-Federal Cost (Table F)	-	9,375	-
3. Subtotal (Items 8 plus 9)	- 9,375	/ 9,375	-
4. Total cost-sharing for structural measures (Items 3 plus 7 plus or minus 10 and 13)	60,248	254,970	315,218
<u>COSTS FOR LAND TREATMENT MEASURES</u>			
5. Non-Federal Lands (Item 3, Table A)	7,000	131,142	138,142
6. Federal Lands (Item 6, Table A)	-	-	-
7. Subtotal (Items 12 plus 13)	7,000	131,142	138,142
3. Grand Total Project Cost-Sharing (Items 11 plus 14)	67,248	386,112	453,360

TABLE 1 - ESTIMATED INSTALLATION COSTS
(Based on 1954 Price Levels)

Turkey Creek Watershed, Texas

For: First Fiscal Year

Items	Unit	No. to be Applied		Estimated Cost		Total
		Non-Federal Land	Federal Land	Non-Federal Land	Federal Land	
				(dollars)	(dollars)	(dollars)
LAND TREATMENT						
<u>LAND TREATMENT MEASURES</u>						
Soil Conservation Service						
Land Treatment Measures						
Cover Cropping	Acre	1,194	-	10,746	-	10,746
Rotation Hay and Pasture	Acre	326	-	3,586	-	3,586
Crop Residue Utilization	Acre	1,085	-	416	-	416
Proper Use	Acre	450	-	338	-	338
Drainage	Acre	2,930	-	13,918	-	13,918
Land Smoothing	Acre	210	-	3,780	-	3,780
Technical Assistance (Accl.)	Dollars	-	1,750	-	1,750	1,750
SCS Subtotal				1,750	32,784	34,534
TOTAL LAND TREATMENT				1,750	32,784	34,534
<u>STRUCTURAL MEASURES</u>						
AGRICULTURAL WATER MANAGEMENT						
<u>Drainage</u>						
Soil Conservation Service						
Open Drains (Main ditches)	Miles	14.6	40,624	37,498	-	78,122
Open Drains (Group Laterals)	Miles	5.0	-	7,900	-	7,900
Total Drainage	Miles	19.6	40,624	45,398	-	86,022
TOTAL AGRICULTURAL WATER MANAGEMENT				40,624	45,398	86,022
TOTAL CONSTRUCTION COSTS				40,624	45,398	86,022
<u>INSTALLATION SERVICES</u>						
Total SCS				16,624	9,375	25,999
TOTAL INSTALLATION SERVICES				16,624	9,375	25,999
OTHER COSTS				-	75,421	75,421
TOTAL STRUCTURAL MEASURES				57,248	130,194	187,442
GRAND TOTAL				58,998	162,978	221,976
<u>PROPERTY</u>						
Total SCS				58,998	162,978	221,976
TOTAL				58,998	162,978	221,976

Date: September, 1955

TABLE 1 - ESTIMATED INSTALLATION COSTS
(Based on 1954 Price Levels)

Turkey Creek Watershed, Texas

For: Second Fiscal Year

Items	Unit	No. to be Applied		Estimated Cost		Total
		Non-Federal Land	Federal Land	Non-Federal Land	Federal Land	
				(dollars)	(dollars)	(dollars)
LAND TREATMENT						
Soil Conservation Service						
Land Treatment Measures						
Cover Cropping	Acre	1,194	-	10,746	-	10,746
Rotation Hay and Pasture	Acre	326	-	3,586	-	3,586
Crop Residue Utilization	Acre	1,085	-	416	-	416
Proper Use	Acre	450	-	337	-	337
Drainage	Acre	2,930	-	13,917	-	13,917
Land Smoothing	Acre	210	-	3,780	-	3,780
Technical Assistance (Accl.)	dollars			1,750	-	1,750
SCS Subtotal				1,750	32,782	34,532
TOTAL LAND TREATMENT				1,750	32,782	34,532
STRUCTURAL MEASURES						
AGRICULTURAL WATER MANAGEMENT						
Drainage						
Soil Conservation Service						
Open Drains (Main ditches)	Miles	-	-	-	-	-
Open Drains (Group Laterals)	Miles	5.0	-	7,900	-	7,900
Total Drainage	Miles	5.0	-	7,900	-	7,900
TOTAL AGRICULTURAL WATER MANAGEMENT					7,900	7,900
TOTAL CONSTRUCTION COSTS					7,900	7,900
INSTALLATION SERVICES						
Total SCS				1,000	0	1,000
TOTAL INSTALLATION SERVICES					1,000	1,000
OTHER COSTS					0	0
TOTAL STRUCTURAL MEASURES				1,000	7,900	8,900
GRAND TOTAL				2,750	40,682	43,432
Summary						
Total SCS				2,750	40,682	43,432
TOTAL				2,750	40,682	43,432

Date: September, 1955

TABLE 1 - ESTIMATED INSTALLATION COSTS
(Based on 1954 Price Levels)

Turkey Creek Watershed, Texas

For: Third Fiscal Year

Items	Unit	No. to be Applied		Estimated Cost		Total
		Non-Federal Land	Federal Land	Non-Federal Land	Federal Land	
				(dollars)	(dollars)	(dollars)
LAND TREATMENT						
Soil Conservation Service						
Land Treatment Measures						
Cover Cropping	Acre	955	-	8,595	-	8,595
Rotation Hay and Pasture	Acre	260	-	2,860	-	2,860
Crop Residue Utilization	Acre	867	-	333	-	333
Proper Use	Acre	360	-	270	-	270
Drainage	Acre	2,344	-	11,134	-	11,134
Land Smoothing	Acre	169	-	3,042	-	3,042
Technical Assistance (Accl.)	Dollars		1,400	-	1,400	1,400
SCS Subtotal			1,400	26,234		27,634
TOTAL LAND TREATMENT				1,400	26,234	27,634
STRUCTURAL MEASURES						
AGRICULTURAL WATER MANAGEMENT						
Drainage						
Soil Conservation Service						
Open Drains (Main ditches)	Miles		-	-	-	-
Open Drains (Group Laterals)	Miles	4.0	-	6,320	-	6,320
Total Drainage	Miles	4.0	-	6,320	-	6,320
TOTAL AGRICULTURAL WATER MANAGEMENT					6,320	6,320
TOTAL CONSTRUCTION COSTS					6,320	6,320
INSTALLATION SERVICES						
Total SCS				800	0	800
TOTAL INSTALLATION SERVICES				800	0	800
OTHER COSTS						
					0	0
TOTAL STRUCTURAL MEASURES				800	6,320	7,120
GRAND TOTAL				2,200	32,554	34,754
ADDITIONAL						
Total SCS				2,200	32,554	34,754
TOTAL				2,200	32,554	34,754

Date: September, 1955

TABLE 1 - ESTIMATED INSTALLATION COSTS
(Based on 1954 Price Levels)

Turkey Creek Watershed, Texas

Por: Fourth Fiscal Year

Items	Unit	No. to be Applied		Estimated Cost		Total
		Non-Federal Land	Federal Land	Non-Federal Land	Federal Land	
				(dollars)	(dollars)	(dollars)
LAND TREATMENT						
Soil Conservation Service						
Land Treatment Measures						
Cover Cropping	Acre	716	-	6,444	-	6,444
Rotation Hay and Pasture	Acre	196	-	2,156	-	2,156
Crop Residue Utilization	Acre	651	-	250	-	250
Proper Use	Acre	270	-	203	-	203
Drainage	Acre	1,758	-	8,351	-	8,351
Land Smoothing	Acre	126	-	2,268	-	2,268
Technical Assistance (Accl.)	Dollars		1,050	-	-	1,050
SCS Subtotal			1,050	19,672	-	20,722
TOTAL LAND TREATMENT				1,050	19,672	20,722
STRUCTURAL MEASURES						
AGRICULTURAL WATER MANAGEMENT						
Drainage						
Soil Conservation Service						
Open Drains (Main ditches)	Miles		-	-	-	-
Open Drains (Group Laterals)	Miles	3.0	-	4,740	-	4,740
Total Drainage	Miles	3.0	-	4,740	-	4,740
TOTAL AGRICULTURAL WATER MANAGEMENT					4,740	4,740
TOTAL CONSTRUCTION COSTS					4,740	4,740
INSTALLATION SERVICES						
Total SCS			600	0	-	600
TOTAL INSTALLATION SERVICES				600	0	600
OTHER COSTS						
					0	0
TOTAL STRUCTURAL MEASURES				600	4,740	5,340
GRAND TOTAL				1,650	24,412	26,062
APPROPRIATION						
Total SCS			1,650	24,412	-	26,062
TOTAL				1,650	24,412	26,062

Date: September, 1955

TABLE 1 - ESTIMATED INSTALLATION COSTS
(Based on 1954 Price Levels)

Turkey Creek Watershed, Texas

For: Fifth Fiscal Year

Items	Unit	No. to be Applied	Estimated Cost		Total
			Non-Federal Land	Federal Land	
			(dollars)	(dollars)	(dollars)
LAND TREATMENT					
Soil Conservation Service					
Land Treatment Measures					
Cover Cropping	Acre	716	-	6,444	6,444
Rotation Hay and Pasture	Acre	196	-	2,156	2,156
Crop Residue Utilization	Acre	651	-	250	250
Proper Use	Acre	270	-	202	202
Drainage	Acre	1,758	-	8,350	8,350
Land Smoothing	Acre	126	-	2,268	2,268
Technical Assistance (Accl.)	Dollars		1,050	-	1,050
SCS Subtotal			1,050	19,670	20,720
TOTAL LAND TREATMENT			1,050	19,670	20,720
STRUCTURAL MEASURES					
AGRICULTURAL WATER MANAGEMENT					
Drainage					
Soil Conservation Service					
Open Drains (Main ditches)	Miles		-	-	-
Open Drains (Group Laterals)	Miles	3.0	-	4,740	4,740
Total Drainage	Miles	3.0	-	4,740	4,740
TOTAL AGRICULTURAL WATER MANAGEMENT			-	4,740	4,740
TOTAL CONSTRUCTION COSTS			-	4,740	4,740
INSTALLATION SERVICES					
Total SCS			600	0	600
TOTAL INSTALLATION SERVICES			600	0	600
OTHER COSTS			0	0	0
TOTAL STRUCTURAL MEASURES			600	4,740	5,340
GRAND TOTAL			1,650	24,410	26,060
SCS SUMMARY					
Total SCS			1,650	24,410	26,060
TOTAL			1,650	24,410	26,060

Date: September, 1955

TABLE 1 - ESTIMATED INSTALLATION COSTS
(Based on 1954 Price Levels)

Turkey Creek Watershed, Texas

For: Total Project

Items	Unit	No. to be Applied		Estimated Cost		Total
		Non-Federal Land	Federal Land	Non-Federal Land	Federal Land	
				(dollars)	(dollars)	(dollars)
D TREATMENT						
Soil Conservation Service						
Land Treatment Measures						
Cover Cropping	Acre	4,775	-	42,975	-	42,975
Rotation Hay and Pasture	Acre	1,304	-	14,344	-	14,344
Crop Residue Utilization	Acre	4,339	-	1,665	-	1,665
Proper Use	Acre	1,800	-	1,350	-	1,350
Drainage	Acre	11,720	-	55,670	-	55,670
Land Smoothing	Acre	841	-	15,138	-	15,138
Technical Assistance (Accl.)	Dollars			7,000	-	7,000
SCS Subtotal				7,000	131,142	138,142
ALL LAND TREATMENT				7,000	131,142	138,142
STRUCTURAL MEASURES						
AGRICULTURAL WATER MANAGEMENT						
<u>Drainage</u>						
Soil Conservation Service						
Open Drains (Main ditches)	Miles	14.6		40,624	37,498	78,122
Open Drains (Group Laterals)	Miles	20.0		-	31,600	31,600
Total Drainage	Miles	34.6		40,624	69,098	109,722
ALL AGRICULTURAL WATER MANAGEMENT				40,624	69,098	109,722
ALL CONSTRUCTION COSTS				40,624	69,098	109,722
INSTALLATION SERVICES						
Total SCS				19,624	9,375	28,999
ALL INSTALLATION SERVICES				19,624	9,375	28,999
OTHER COSTS				-	75,421	75,421
ALL STRUCTURAL MEASURES				60,248	153,894	214,142
D TOTAL				67,248	285,036	352,284
GRAND TOTAL						
Total SCS				67,248	285,036	352,284
ALL				67,248	285,036	352,284

Date: September, 1955

TABLE 2 - STATUS OF WATERSHED WORKS OF IMPROVEMENT
 (Based on 1954 Price Levels)
 June 30, 1955

Turkey Creek Watershed, Texas

Measures	Unit	Applied to Date	Total Non-Federal Cost
			(dollars)
<u>LAND TREATMENT</u>			
Cover Cropping	Acre	4,502	33,315
Rotation Hay and Pasture	Acre	0	0
Crop Residue Utilization	Acre	4,938	0
Proper Use	Acre	223	167
Drainage	Acre	2,130	11,990
Land Smoothing	Acre	460	5,750
Subtotal		-	51,222
<u>AGRICULTURAL WATER MANAGEMENT</u>			
<u>Drainage</u>			
Open Drains	Miles	0	0
Subtotal		0	0
Total	xxx	xxx	51,222

Date: September, 1955

TABLE 3 - ANNUAL COSTS
(Based on Long-Term Price Levels)

Turkey Creek Watershed, Texas

Measures	: AMORTIZATION OF INSTALLATION : OPERATION AND MAINTENANCE		: COSTS		: Total
	: Federal : Non-	: Total : Federal : Non-	: Federal : Non-	: Federal : Non-	
	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)
<u>AGRICULTURAL WATER MANAGEMENT</u>					
Drainage					
Open Drains	3,270	8,661	11,931	-	5,486
Subtotal	3,270	8,661	11,931	-	5,486
<u>TOTAL AGRICULTURAL WATER MANAGEMENT</u>					
	3,270	8,661	11,931	-	5,486
<u>GRAND TOTAL</u>					
	3,270	8,661	11,931	-	5,486
					17,417

Date: September, 1955

TABLE 4 - SUMMARY OF BENEFITS
(Based on Long-Term Price Levels)

Turkey Creek Watershed, Texas

Item	Estimated		Estimated		Classes of Benefits			
	Average	Annual	Average	Annual	1	2	A	B
	: Estimated : Average :		: Estimated : Average :		: : : : : : :			
	: Annual : Damage :		: Annual : Damage :		: : : : : : :			
	: Without : Project :		: With : Project :		: : : : : : :			
	: Structural : Measures :		: Structural : Measures :		: : : : : : :			
	: (dollars) (dollars) :		: (dollars) (dollars) :		: : : : : : :			
Drainage	xxx	xxx	xxx	xxx	-	-	63,695	-
TOTAL AGRICULTURAL WATER MANAGEMENT BENEFITS	xxx	xxx	xxx	xxx	-	-	63,695	-
GRAND TOTAL ALL BENEFITS	\$63,695							

Date: September, 1955

Table 5 - BENEFIT COST ANALYSIS
(Based on Long-Term Price Levels)

Turkey Creek Watershed, Texas

Measures	: AVERAGE ANNUAL BENEFITS:			: Average : Benefit-
	: Drainage	: Total	: Annual	
	: (dollars)	: (dollars)	: (dollars)	: Ratio
<u>AGRICULTURAL WATER MANAGEMENT</u>				
<u>Drainage</u>				
Open drains	63,695 ^{1/}	63,695	17,417	3.66:1
Subtotal	63,695	63,695	17,417	3.66:1
<hr/>				
TOTAL AGRICULTURAL WATER MANAGEMENT	63,695	63,695	17,417	3.66:1
<hr/>				
GRAND TOTAL	63,695	63,695	17,417	3.66:1

^{1/} The total benefits from the proposed drainage system are estimated to be \$94,600 annually. This includes the benefits allocated to on-farm drainage and land smoothing. However, no benefits can be obtained until the farm drainage systems have been installed.

Date: September, 1955

TABLE 6 - STRUCTURE DATA
Preliminary Estimates for Structural Measures
for Improved Drainage

Turkey Creek Watershed, Texas

Type Structure	: Length (miles)	: Excava- tion (cu. yds)	: Grade Control Structures (number)	: Water Gates (number)
Main Ditches	14.6	305,200	4	54
Group Laterals	20.0	80,000	45	40
Total	34.6	385,200	49	94

Date: September, 1955

TABLE 6A - STRUCTURE DATA
 Estimated Structure Cost Distribution
 (Based on 1954 Price Levels)

Turkey Creek Watershed, Texas

Name of Structure	FEDERAL INSTALLATION COST					NON-FEDERAL INSTALLATION COST					Estimated Total Non-Federal Cost (dollars)	
	Contract Services	Installation	Administration	Total	Contract Services	Installation	Administration	Total	Estimated Total			
Open Drains (Main Ditches)	36,930	6,249	3,693	9,375	56,247	34,090	9,375	500	74,921	3,409	122,295	178,542
Open Drains (Group Laterals)	-	4,000	-	-	4,000	29,000	-	-	-	2,600	31,600	35,600
TOTAL	36,930	10,249	3,693	9,375	60,247	63,090	9,375	500	74,921	6,009	153,895	214,142
GRAND TOTAL	36,930	10,249	3,693	9,375	60,247	63,090	9,375	500	74,921	6,009	153,895	214,142

Date: September, 1955

TABLE 7 - SUMMARY OF PHYSICAL DATA

Turkey Creek Watershed, Texas

Item	Unit	Quantity Without Program	Quantity With Program
Watershed Area	Sq. Mi.	29.5	29.5
Watershed Area	Acres	18,880	18,880
Area of Cropland	Acres	13,714	16,401
Area of Pasture	Acres	4,487	1,800
Area of Woodland	Acres	329	329
Area of Roads	Acres	350	350
Annual Rate of Erosion			
Sheet	Tons/Yr.	72,467	59,423
Gully	Tons/Yr.	0	0
Streambank	Tons/Yr.	0	0
Scour	Tons/Yr.	0	0
Area Damaged Annually by			
Sediment	Acres	0	0
Flood Plain Scour	Acres	0	0
Swamping	Acres	0	0
Streambank Erosion	Acres	0	0
Sheet Erosion	Acres	13,714	3,280
Sediment Production	Tons/Ac/Yr.	.92	0.75
Average Annual Rainfall	Inches	44.84	44.84

Date: September, 1955

TABLE 8 - SUMMARY OF PLAN DATA

Turkey Creek Watershed, Texas

Item	Unit	Quantity
Years to complete program	Year	5
Total installation cost		
Federal	Dollars	67,248
Non-Federal	Dollars	285,036
Annual O and M cost		
Federal	Dollars	0
Non-Federal	Dollars	9,026
Drainage Benefits	Dollars	63,695

Date: September, 1955

