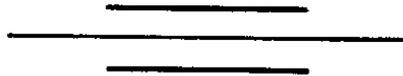


WATERSHED WORK PLAN
for the
TOWN BANK WATERSHED

Salem County,
New Jersey



WATERSHED WORK PLAN

TOWN BANK WATERSHED

Salem County
New Jersey

Prepared under the authority of the
Watershed Protection and Flood Prevention Act

(P.L. 566, 83rd Cong., 68 Stat. 666)
as amended by the Act of August 7, 1956
(P.L. 1018, 84th Cong., 70 Stat. 1088.)

Prepared by:

Salem-Cumberland Soil Conservation District
Town Bank Meadow Company
City of Salem
County of Salem

Assisted by:

United States Department of Agriculture
Soil Conservation Service

TABLE OF CONTENTS - continued

	<u>PAGE</u>
Table 3A - Structure Data - Pumping Plant	17
Table 4 - Summary of Physical Data	18
Table 5 - Summary of Plan Data	19
Table 6 - Annual Costs	20
Table 7 - Monetary Benefits From Structural Measures and Land Treatment Measures For Flood Prevention	21
Table 8 - Benefit Cost Analysis	22
Table 9 - Allocation of Installation Costs of Structural Measures	23
Table 9A - Classification of Agricultural Water Management Benefits	24
Figure I - Planned Structural Measures Map	
Figure II - Problem Area Map	
Typical Cross-Sections of Existing and Proposed Channel First Oak Ditch	
Typical Cross-Sections of Existing and Proposed Channel Second Oak Ditch	

SECTION I - THE WATERSHED WORK PLAN

TOWN BANK WATERSHED

Salem County, New Jersey

SUMMARY OF PLAN

The Town Bank Watershed is located in Salem County, New Jersey, taking in part of the City of Salem. It has a drainage area of approximately 2,400 acres, draining into the Salem River, which is a tributary of the Delaware River.

The sponsoring organizations are the Salem-Cumberland Soil Conservation District, the Town Bank Meadow Company, the City of Salem, and the County of Salem.

The major problems are flooding and poor drainage of 1,073 acres of agricultural land. The watershed has been protected for many years from tidal inundation by a dike and tide gates. Flooding occurs annually, caused by runoff from heavy rainfall. Much land formerly used for crops is now used for pasture or left idle because of flooding and poor drainage.

Planned structural measures consist of 24,900 feet of channel improvement and a pumping plant. These will provide for drainage and flood prevention from at least a 5 year frequency storm. Pumping will remove the water for this frequency storm. Deepening of the channels will require reinforcing the abutments of one bridge.

The estimated total project cost is \$216,026, of which \$110,144 will be from P.L. 566 funds and \$105,882 from other funds.

The estimated installation cost of structural measures is \$145,026, of which \$103,144 will be P.L. 566 funds and \$41,882 from other funds.

The estimated installation cost of land treatment measures for watershed protection is \$71,000. This includes \$11,000 for technical assistance, of which \$7,000 is from P.L. 566 funds and \$4,000 from the Soil Conservation District program of assistance to operators

and landowners. The cost of applying land treatment measures will be borne by landowners and operators. These measures, which are designed to control erosion and reduce runoff, are necessary in maintaining productive capacity of the land. They consist of contour farming, cover cropping, diversions, pasture planting, conservation crop rotations, waterway development, crop residue management, and farm drainage.

The City of Salem, the Town Bank Meadow Company, and the Salem-Cumberland Soil Conservation District will assume responsibility for operation and maintenance, estimated at \$5,700 annually. The Town Bank Meadow Company, the Salem-Cumberland Soil Conservation District, and the City of Salem will be responsible for acquiring all land, easements and rights-of-way, estimated at \$3,000. The Salem-Cumberland Soil Conservation District will contract for the channel works of improvement, and the City of Salem for the pumping plant. Landowners, through agreements with the Salem-Cumberland Soil Conservation District, will provide for maintenance of land treatment measures.

The average annual benefits from the proposed structural measures are \$13,466, and the average annual costs \$10,813, giving a benefit-cost ratio of 1.2 to 1.

The plan provides for installation of the structural measures during fiscal year 1960 and the installation of land treatment measures over a period of 5 years.

DESCRIPTION OF THE WATERSHED

The Town Bank Watershed is located in the west central part of Salem County. It drains into the Salem River, a tributary of the Delaware River. The watershed area is approximately 2,400 acres. Of this, 950 acres lies within the City of Salem. This 950 acres represents 56 percent of the incorporated area of the City, which has a population of 9,000.

The topography is level to gently rolling, with the highest elevation 13 feet above mean sea level. The bulk of the watershed lies between mean sea level and 10 feet above mean sea level.

The two streams in the watershed, First Oak Ditch

and Second Oak Ditch, were formerly tidal streams. They were diked over a hundred years ago, when the Town Bank Meadow Company was organized.

The underlying geologic formations of the Town Bank Watershed are the Hornerstown Marl, Navasink Marl, and the Mount Laurel - Wenonah sands, which are unconsolidated strata of Tertiary and Cretaceous Ages. These formations dip very gently to the southeast. They are nearly everywhere mantled by 5 to 20 feet of Cape May sands and gravels. Some of the deep erosion channels in the old topography have been filled, first with well washed coarse sand and gravel, then with silty alluvium. This succession is now found in marshy areas.

The following table shows the breakdown of land use of the 2,400 acres in the watershed.

<u>Land Use</u>	<u>Acres</u>
Cropland	917
Pasture-Hay	671
Woods	200
Idle	403
Urban Development	209
	<u>2,400</u>

Row crops, including sweet corn, soybeans, tomatoes, asparagus and peppers occupy the bulk of the cropland. They are usually followed by cover crops of winter grain. The 200 acres of woods are in about 15 scattered farm woodlots.

The average annual precipitation is 44 inches, the greatest amounts occurring during July and August. During the remainder of the year, the monthly distribution is fairly uniform. The average annual temperature is 53 degrees, with the monthly average ranging from 31 degrees in February to 75 degrees in July. The frost free period is generally from May 1st to September 15th.

WATERSHED PROBLEMS

Due to inadequate capacity of channels and tidegates, 1,073 acres of cropland are affected by a combined and inseparable floodwater and drainage problem.

About 80 acres of low lying marsh land within the City of Salem has been zoned for industrial and urban use. This will be developed slowly, by filling as better land becomes unavailable. Filling will be necessary wheteer or not there is a project. However, without the installation of the works of improvement, approximately one additional foot of filling will be necessary, due to present water level.

Flooding occurs annually, the most severe storms coming between July and November, often associated with hurricanes. Severe floods occurred in August 1933, September 1940, September 1944, September and November 1950, August 1954, and August 1955.

The principal crops grown are sweet corn, tomatoes, asparagus, soybeans and peppers. Due to the prevalence of flood hazards coupled with poor drainage, the potential yields of these crops have been materially limited. There are 671 acres of hay and pasture on 3 dairy farms. Protective measures will increase yields of these crops and reduce hazards of crop failure.

Erosion and sedimentation are not serious problems. What sediment originated from sheet erosion is mostly trapped in natural depressions and little reaches the channels.

The United States Fish and Wildlife Service Report concludes that although installation of the proposed project will alter the fish and wildlife habitat on the area, the ditches planned will provide habitat roughly equivalent to that now being provided by the marsh.

The 200 acres of forest land is located on low flat terrain, consequently it does not appear that substantial woodland hydrological benefits would accrue from an intensified program. There is no indication of conversion of this land to other use.

EXISTING OR PROPOSED WORKS OF IMPROVEMENT

The Town Bank dike was breached and destroyed during

a hurricane storm on August 22, 1933. The County of Salem rebuilt the dike to adequate height and cross section. Nine 24-inch tide gates were installed and a road was built on top of the dike. There has been no damage to the dike since it was rebuilt in 1933. The maintenance and continued functioning of this dike is necessary for the realization of the benefits from this project.

WORKS OF IMPROVEMENT TO BE INSTALLED

Land Treatment Measures for Watershed Protection

Land treatment measures for watershed protection will be carried out under the existing District program, along with accelerated technical assistance with P.L. 566 funds. These measures will assure efficient use of land benefited by the structural measures. The measures included in this plan are those planned for installation during the 5-year installation period. No flood prevention benefits are claimed from land treatment measures, other than drainage measures, although it is recognized that some will accrue. It is necessary that drainage measures be installed to realize project benefits.

The measures to be installed are contour farming, cover cropping, pasture planting, conservation crop rotations, waterway development, crop residue management, and farm drainage.

Structural Measures

The structural measures provided for in this plan are multiple purpose, in that they provide flood prevention and drainage benefits. They consist of a pumping plant and channel improvement.

The pumping plant will consist of low lift pumps having a combined capacity of 88,000 gallons per minute and will be suitable housed. The pumps will take care of the entire design storm.

Channel improvements will consist of enlarging 8,100 feet of First Oak Ditch and 16,800 feet of Second Oak Ditch to provide the necessary capacity to carry excess water to the pumping plant. The deepening of the channel will necessitate reinforcing the abutments of one bridge.

Under normal conditions the tide gates will operate

and keep the water level between elevations -0.5 and -1.0 mean sea level. The pumps will serve to maintain the water level between -1.5 and -2.0 elevations and at or below 0.0 elevation for storms up to at least the 5-year frequency event. A water elevation of -2.0 at the pumps will provide a minimum of 2 feet of water in the channels which is desirable for fish and wildlife.

All ditch banks will be vegetated. Establishment of vegetation on the ditch banks will be worked out with the New Jersey Division of Fish and Game with regard to a type that will be desirable for wildlife.

BENEFITS FROM WORKS OF IMPROVEMENT

The structural measures included in this plan will provide for flood prevention and agricultural drainage benefits to 1,073 acres of cropland. Channel and pump capacities are based on adequate agricultural drainage and flood protection against at least a 5-year frequency storm. Benefits to agricultural land are the results of increased yields and reduction of hazards of crop failure. This is based on an anticipated change of 260 acres of pasture to market garden crops and average yield increases of field corn and tomatoes from 40 to 78 bushels per acre and 9 to 13 tons per acre respectively. Acreage increase in field corn is for on farm consumption. It is recognized that certain benefits will accrue to non-agricultural land. These benefits were not evaluated because of the 30-40 year expected delay in accrual.

The average annual flood prevention and agricultural drainage benefits are \$13,466. Since they are inseparable, the benefits are allocated on a 50-50 basis.

Primary average annual benefits allocated to agricultural drainage are estimated at \$6,733. Secondary benefits are estimated at \$12,027. Secondary benefits were not used for project justification.

Additional benefits not measureable in monetary terms will result from the project. These include such things as safety of travel on the roads within the flood plain, improvement in sanitary conditions and elimination of some mosquito breeding areas.

COMPARISON OF BENEFITS AND COSTS

The average annual benefits from structural measures are estimated at \$13,466, the average annual costs \$10,813, a benefit-cost ratio of 1.2 to 1. Average annual benefits attributed to flood prevention and agricultural water management are shown in Table 8.

ACCOMPLISHING THE PLAN

An informational and educational program will be carried out by the sponsors with the assistance of the Soil Conservation Service and the Extension Service. This program will be aimed at helping to achieve an understanding and appreciation of the plan and participation in the program by landowners and operators in the watershed and other interested people and groups in order to facilitate the full accomplishment of the project.

Land treatment measures will be established on the land by the farm owners and operators in cooperation with the Salem-Cumberland Soil Conservation District. The cost of applying these measures will be borne by the landowners and operators. The Soil Conservation District with the assistance of the Soil Conservation Service is now giving assistance in the planning and application of these measures under its going program. Technical assistance will be accelerated with P.L. 566 funds so as to assure planning and application of the planned measures within the installation period of the project.

The sponsoring organization will utilize any assistance that may be needed and is available from other agencies and organizations. These agencies and organizations and their functions are described as follows:

The Farmers Home Administration provides soil and water conservation loan facilities to all eligible farmers in the watershed. Watershed loans can also be made to the sponsors.

The Salem County Agricultural Stabilization and Conservation Committee cooperates with the Soil Conservation District governing body in providing financial assistance in line with needs and funds available for those practices which will help accomplish the conservation objectives as desired by the landowners.

The Forest Management Section of the New Jersey Department of Conservation and Economic Development, in cooperation with the United States Forest Service, provides technical assistance needed to assist landowners with their forest problems.

The Salem-Cumberland Soil Conservation District and the City of Salem have been ruled by the New Jersey Attorney General as legally authorized to sponsor watershed projects under Public Law 566 as amended.

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

Federal assistance for carrying out the works of improvement on non-Federal land as described in this work plan will be provided under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress; 68 Stat. 666, as amended by Public Law 1018, 84th Congress; 70 Stat., 1088.)

All land, easements, and rights-of-way will be secured by the City of Salem, the Town Bank Meadow Company, and the Salem-Cumberland Soil Conservation District before any Federal funds for construction are expended. The construction of the channel and installation of the pumping plant will be handled as two construction units. The City of Salem owns the land on which the pumping plant will be installed. The Town Bank Meadow Company has authority vested within the organization to install channel works of improvement in all of drainage ways exclusive of approximately 1/2 mile of both First Oak and Second Oak Ditch. The Salem-Cumberland Soil Conservation District has authority to provide assistance in additional channels above the authorized area of the Town Bank Meadow Company. All sponsors will acquire necessary easements in their area of responsibility.

The Salem-Cumberland Soil Conservation District will act as the local contracting organization for stream channel improvements. The City of Salem will act as the

local contracting organization for the pumping plant.

Funds for the share of the construction cost to be paid by the local organization will be provided by the City of Salem and the County of Salem.

The New Jersey Division of Water Policy and Supply will review designs and plans for approval and issue permits for construction as required by state law.

The structural measures will be installed during fiscal year 1960. Land treatment measures for watershed protection will be completed in fiscal year 1964.

SCHEDULE OF EXPENDITURES

<u>Fiscal Year</u>	<u>P.L. 566</u>	<u>Other</u>	<u>Total</u>
1959	2,000	0	2,000
1960	102,144	50,882	153,026
1961	1,500	14,000	15,500
1962	1,500	14,000	15,500
1963	1,500	14,000	15,500
1964	1,500	13,000	14,500

PROVISIONS FOR OPERATION AND MAINTENANCE

Land treatment measures will be operated and maintained by landowners or operators under cooperative agreement with the Salem-Cumberland Soil Conservation District.

Maintenance of the channel improvements will be the responsibility of the Salem-Cumberland Soil Conservation District.

The pumping plant will be operated and maintained by the City of Salem.

The Town Bank Meadow Company will actually perform the works of maintenance on that portion of the channel improvements which lie outside of the city limits and the City of Salem for that portion which lies within the city. Agreements will be entered into to this effect.

Funds for operation and maintenance will be raised by the City of Salem through taxation, and by the Town Bank Meadow Company through assessment of its members. Money will be budgeted for this purpose.

The annual cost of operations and maintenance is estimated at \$5,700. See Table 6.

The City of Salem and the Salem-Cumberland Soil Conservation District will appoint officials who will make continuous inspections of the pumping plant.

The City of Salem, the Town Bank Meadow Company, and the Salem-Cumberland Soil Conservation District will appoint officials who will make inspections of the stream channel improvements at least once a year and more often with unusual flood conditions. Joint inspections will be made by the local officials with the Soil Conservation Service representative at least once a year.

Written inspection reports will be prepared by the local officials at least once a year and will be made available at any time to the Soil Conservation Service.

The State Conservationist will determine what maintenance measures are needed and he will so notify the sponsoring local organizations responsible for the maintenance. He will provide design information and technical assistance that may be available and needed to the sponsoring local organizations in performing works of maintenance.

The City of Salem, the Town Bank Meadow Company, and the Salem-Cumberland Soil Conservation District will execute an operation and maintenance agreement prior to issuance of invitations to bid.

COST SHARING

The total project cost is estimated at \$216,026, of which \$110,144, or 51 percent will come from P.L. 566 funds and \$105,882, or 49 percent from other funds.

The estimated cost for installation of land treatment measures, including technical assistance, is \$71,000, of which \$7,000 will be from P.L. 566 funds and \$64,000 from other funds.

The estimated cost for installation of structural measures, excluding operation and maintenance costs, is \$145,026, which was allocated to drainage and flood pre-

vention on a fifty-fifty basis, the benefits being inseparable. Of this \$145,026, \$103,144, or 71.1 percent will be borne by P.L. 566 funds and \$41,882, or 28.9 percent from other funds. The share from other than P.L. 566 funds includes \$3,000 for land easements and rights-of-way, and \$1,000 for administration of contracts.

Total agricultural water management benefits include secondary as well as direct identifiable benefits. Secondary benefits result from increased processing, hauling and related activities. The ratio of direct identifiable to total benefits is \$6,733 to \$18,760, or 36 percent. It is required, however, that at least 55 percent of the total installation cost allocated to agricultural water management purposes be paid for from other than P.L. 566 funds. See Table 9 for cost allocation.

CONFORMANCE OF PLAN TO FEDERAL LAWS AND REGULATIONS

This project will have no effect on any proposed plan for the comprehensive development of the Delaware River Basin.

This plan does not provide for bringing any new land into agricultural production.

SECTION 2 - INVESTIGATIONS, ANALYSES, SUPPORTING TABLES AND MAPS

INVESTIGATIONS AND ANALYSES

Hydrology and Hydraulics

The hydrology and hydraulic design was based on providing flood protection and adequate agricultural drainage. The "B" curve drainage criteria was used. This design would require a channel capable of handling a 24-hour, 5-year frequency storm at the outlet. To provide this protection, it was necessary to deliver the runoff to a sump area in the City of Salem and then pass it through the dike by means of pumps, maintaining a maximum elevation at the sump area of 0.0 ft. MSL.

The inflow hydrograph from the design storm was routed through the existing nine 24-inch sluice gates to determine the required pumping capacity. Due to the characteristics of the tide cycles and the required stage at which design water elevation must be maintained, there are times when the tide gates cannot operate or will operate to a limited extent. Therefore, the pumping plant was designed to take the entire storm runoff and will have a capacity of 88,000 gallons per minute.

The study shows that the present stream channels will have to be enlarged to convey the flood runoff to the outlet.

In making the above analyses tide elevations at Deepwater, New Jersey were related and converted to Salem, New Jersey. Two years of continuous tide records were studied.

It was determined that land treatment measures will have very little hydrologic effect in reducing runoff due to the short gentle slopes involved and the high permeability of the upland soils. For these reasons, no claims are made for flood prevention benefits from land treatment measures.

Economics

This project is justified by the restoration and more intensive use of agricultural cropland. Protection

will be afforded the land by stream channel improvements and a pumping plant which can be operated to provide adequate drainage outlets for the present cropland. Investigations of the present cropland showed that there is a flooding problem and a drainage problem due to inadequate outlets. It was determined that it would be difficult to separate flood damages from drainage damages. The area was examined from the standpoint of its land use capability. There are approximately 488 acres of class IIw and 848 acres of class IIIw land. These soils in other nearby areas when drained have proved to be very productive.

Direct benefits were considered joint flood prevention and drainage benefits that are not separable.

Benefits were obtained from estimated yield increases on land in capability classes IIw and IIIw. These wet lands were measured from the land use capability map, totaling 1,073 acres. Areas in woodland and idle use were not included in the benefit area. It was assumed that 65 percent of the total land treatment needs would be accomplished, hence benefits and associated costs were evaluated on that basis.

Yield data, under present conditions was obtained for the area. Percentages of various crops grown in the area and future prospects were evaluated with the Work Unit Conservationist and Extension Service personnel. Crop yield increases are expected to range as follows, reaching the top as an average in 5 years:

Corn	40	-	78 bushels
Tomatoes	9	-	13 tons
Hay-Pasture	.5	-	3.5 tons

Associated costs of farm drainage and group outlets, including operation and maintenance, plus increased costs of production were deducted from total benefits. The remaining benefits were used for project justification.

Long term prices were used in determining benefits. The benefits were discounted for a lag period of five years, using a factor of 0.914.

There are 397 acres of class VIII land that will be partially drained; no benefits have been taken for this area. It is not expected that any new land will be brought into agricultural production.

Table 1

ESTIMATED PROJECT INSTALLATION COSTS

Town Bank Watershed, New Jersey

Price Base 1958
(Dollars)

Installation Cost Item	Unit	No. to be Applied	Estimated Cost		Total
			PL 566	Other	
LAND TREATMENT FOR WATERSHED PROTECTION					
Soil Conservation Service					
Contour Farming	Acre	30		500	500
Cover Cropping	Acre	100		400	400
Pasture Planting	Acre	100		4,500	4,500
Conservation Crop Rotations	Acre	100		4,000	4,000
Waterway Development	Acre	3		600	600
Open Drains	Mile	14		28,000	28,000
Closed Drains	Mile	11		22,000	22,000
Technical Assistance	\$		7,000	4,000	11,000
TOTAL LAND TREATMENT			7,000	64,000	71,000
STRUCTURAL MEASURES					
Soil Conservation Service					
Pumping Plant	No.	1	38,916	21,564	60,480
Stream Channel Improvements	Mile	4.7	30,722	16,318	47,040
Sub-Total Construction			69,638	37,882	107,520
INSTALLATION SERVICES					
Soil Conservation Service					
Engineering Services			21,504		21,504
Other			12,002		12,002
Sub-Total Installation Services			33,506		33,506
OTHER COSTS					
Land Easements and Rights-of-way				3,000	3,000
Administration of Contracts				1,000	1,000
Sub-Total Other Costs				4,000	4,000
TOTAL STRUCTURAL MEASURES			103,144	41,882	145,026
TOTAL PROJECT			110,144	105,882	216,026

April, 1959

Table 2

ESTIMATED STRUCTURE COST DISTRIBUTION

Town Bank Watershed, New Jersey

Price Base 1958
(Dollars)

Structure	Installation Cost P.L. 566 Funds				Installation Cost--Other Funds				Total Installation Costs		
	Construction Eng. Est.	Construction Contingencies	Installation Engineering	Other Serv. P.L. 566	Construction Eng. Est.	Construction Contingencies	Other Admin. of Contracts & Easements & R/W	Total Other			
Stream Channel Improvements	27,430	3,292	9,408	5,262	45,392	14,570	1,748	400	2,500	19,218	64,610
Pumping Plant	34,746	4,170	12,096	6,740	57,752	19,254	2,310	600	500	22,664	80,416
GRAND TOTAL	62,177	7,462	21,504	12,002	103,144	33,823	4,058	1,000	3,000	41,882	145,026

Table 3
STRUCTURE DATA

STREAM CHANNEL IMPROVEMENTS

Town Bank Watershed, New Jersey

Channel Designation	Sta. Numbering For Reach Station (100 ft.)	Water-shed Area (sq. mi.)	Required Drainage Curve	Required Drainage Capacity (cfs)	Planned Channel Capacity (cfs)	Ave. Bottom Width (feet)	Ave. Side Slope	Ave. Depth (ft.)	Ave. Fall (ft./mile)	Ave. Vel. in Channel (ft./sec)	Vol. of Excav. (1000 c.y.)
Second Oak Ditch	0	35.5	B	87	87	13	1:1	4.0	1.21	1.27	4.8
	35.5	70.2	B	113	113	13	1:1	5.3	0.74	1.16	5.1
	70.2	100.3	B	133	137	14	1:1	5.3	1.00	1.34	5.3
Second Oak Spur	100.3	143	B	149	156	20	1:1	5.5	0.58	1.11	14.6
	143	148	B	196	199	26	1:1	5.5	0.58	1.15	1.6
	0	20	B	41	39	4	1:1	3.6	2.64	1.42	1.5
First Oak Ditch	0	14.5	B	22	33	3	1:1	3.0	5.28	1.83	1.9
	14.5	28.4	B	43	68	3	1:1	4.6	10.03	2.71	0.6
	28.4	50.1	B	65	69	6	1:1	4.6	1.69	1.41	2.3
	50.1	81.0	B	78	82	13	1:1	4.9	0.53	0.93	5.5

April, 1959

Table 3A
 STRUCTURE DATA
 PUMPING PLANT
 Town Bank Watershed, New Jersey

Item	Unit	Quantity
Drainage Area	sq.mi.	3.75
Designed Capacity of Pumps	g.p.m.	88,000
Static head	feet	6

April, 1959

Table 4

SUMMARY OF PHYSICAL DATA

Town Bank Watershed, New Jersey

Item	Unit	Quantity Without Project	Quantity With Project
Watershed Area	sq.mi.	3.75	3.75
Watershed Area	acre	2,400	2,400
Urban	acre	209	209
Area of Cropland	acre	917	1,177
Area of Pasture & Hay	acre	671	411
Area of Woodland	acre	200	200
Idle	acre	403	403
Area Subject to Flood Damage	acre	932	396
Area Needing Drainage	acre	1,073	376
Average Annual Rainfall	inch	44	44

April, 1959

Table 5
SUMMARY OF PLAN DATA
Town Bank Watershed, New Jersey
Price Base 1958

Item	Unit	Quantity
Years to complete project	Year	5
Total installation cost		
Public Law 566 funds	Dollar	103,144
Other	Dollar	41,882
Annual O&M cost Non-Federal	Dollar	5,700
Average annual monetary benefits <u>1/</u>	Dollar	13,466
Agricultural	Percent	100.0
Flood Prevention Benefit from changed land use and enhancement	Dollar	6,733
Drainage benefits	Dollar	6,733

1/ From Structural Measures and Land Treatment Measures for Flood Prevention and Agricultural Water Management (Drainage)

April, 1959

Table 6
ANNUAL COSTS

Town Bank Watershed, New Jersey

Price Base 1958
(Dollars)

Measures	Amortization of <u>1/</u> Installation Cost	Operation and Maintenance Costs <u>2/</u>	Total
Pumping Plant	2,835	4,750	7,585
Stream Channel Improvements	2,278	950	3,228
TOTAL	5,113	5,700	10,813

- 20 -

- 1/ Installation Cost of Pumping Plant 50 years @ 2½% interest
Stream Channel Improvements 50 years @ 2½% interest
- 2/ Long term projected prices
U. S. 1957 - 723.8 -- Long Term 685

April 11, 1959

Table 7

MONETARY BENEFITS FROM STRUCTURAL MEASURES and
LAND TREATMENT MEASURES FOR FLOOD PREVENTION

Town Bank Watershed, New Jersey

Long Term Project Prices 2/
(Dollars)

	Estimated Average Annual Damage			Average Annual Monetary Benefits
	Without Project	After Land Treatment For Water- shed Pro- tection	With Project	
Crop & Pasture	6,733	6,733	0	6,733
TOTAL FLOOD PREVENTION BENEFITS				6,733
Drainage				6,733
Secondary <u>1/</u>				12,027
TOTAL AGRICULTURAL WATER MANAGEMENT BENEFITS				18,760
TOTAL PRIMARY BENEFITS				13,466
TOTAL MONETARY BENEFITS				25,493

1/ Not used in project justification

2/ A.R.S. Price Projection Sept., 1957

April, 1959

Table 8

BENEFIT COST ANALYSIS

Town Bank Watershed, New Jersey

Price Base Long-Term
(Dollars)

AVERAGE ANNUAL BENEFITS

Measures	Flood Prevention	Agricultural Water Management Drainage	Total	Average Annual Cost	Benefit Cost Ratio
Pumping Plant and Stream Channel Improvements	6,733	6,733	13,466	10,813	1.2

April, 1959

Table 9

ALLOCATION OF INSTALLATION COSTS OF STRUCTURAL MEASURES

Town Bank Watershed, New Jersey

Price Base 1958
(Dollars)

Item	Purpose		Total
	Flood Prevention	Agricultural Water Management	
P.L. 566	70,513	32,631	103,144
Other	2,000	39,882	41,882
Total	72,513	72,513	145,026

April, 1959

Table 9A
 CLASSIFICATION OF AGRICULTURAL WATER MANAGEMENT BENEFITS
 Town Bank Watershed, New Jersey
 Long Term
 (Dollars)

Purpose	Direct Identifiable		Secondary 1/	Total
	Dollars	Percent		
Drainage	6,733	36	12,027	18,760

1/ Not used for project justification

April, 1959

TOWN BANK
WATERSHED

Salem County
New Jersey

PROBLEM
LOCATION

0 1/4 1/2 Mile

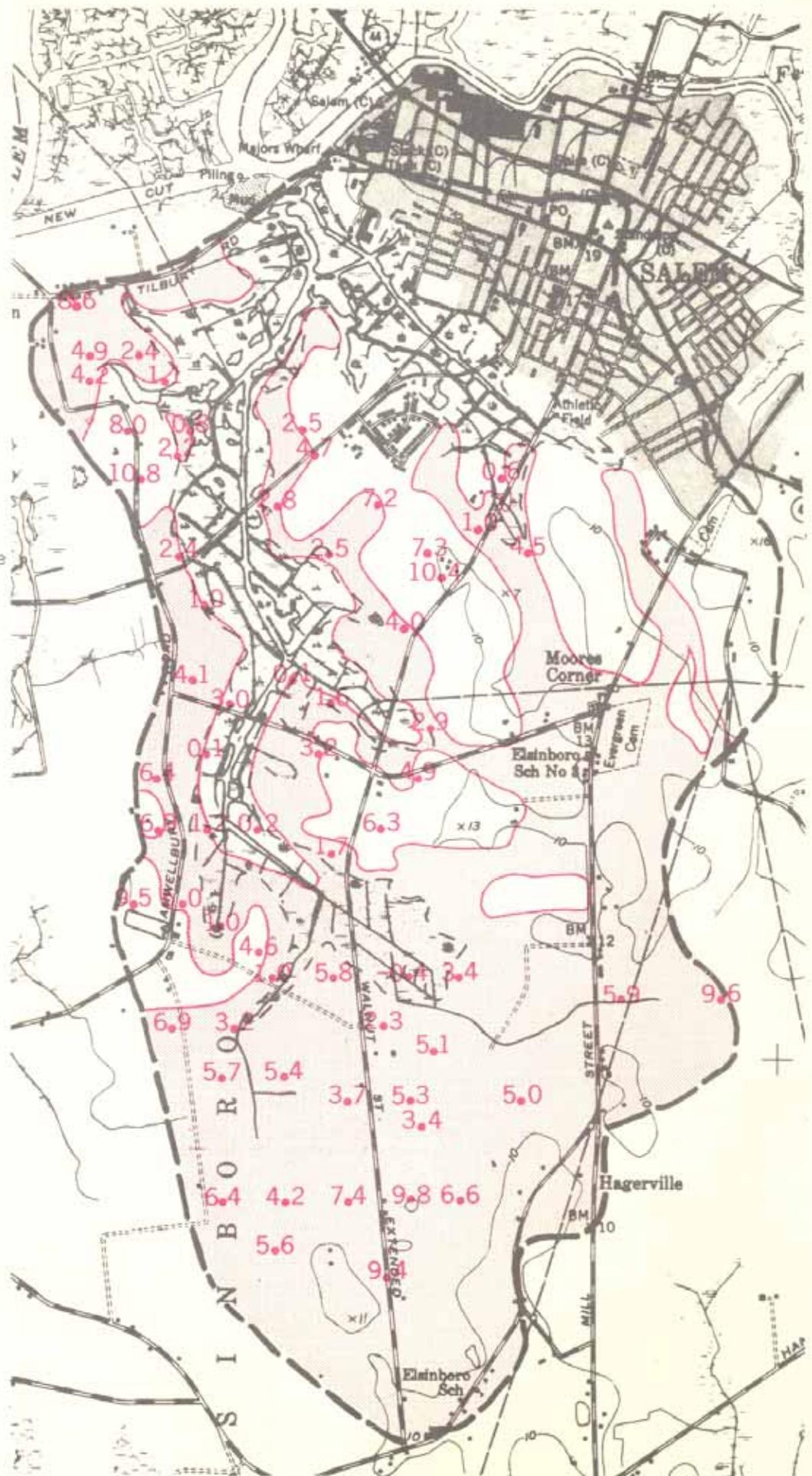


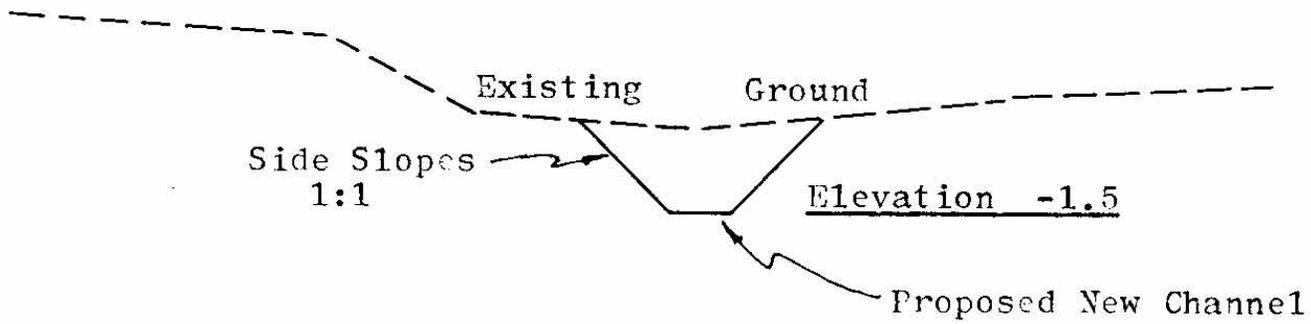
Figure 2.

TYPICAL CROSS-SECTIONS OF EXISTING AND PROPOSED CHANNEL

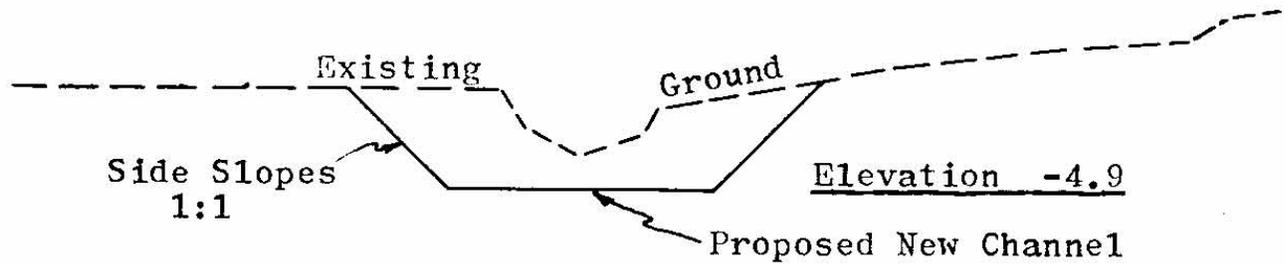
FIRST OAK DITCH

Town Bank Watershed, New Jersey

Station 11+30



Station 57+25



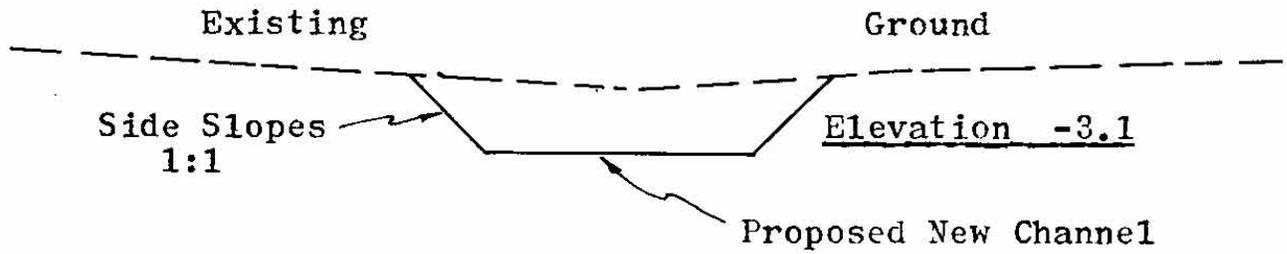
Scale - 1"=10'

TYPICAL CROSS-SECTIONS OF EXISTING AND PROPOSED CHANNEL

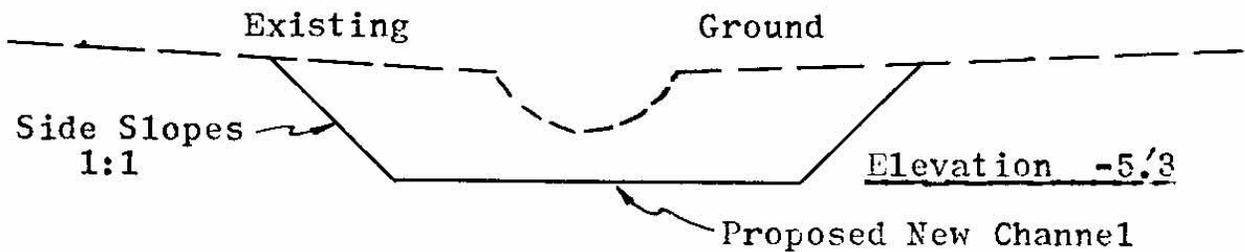
SECOND OAK DITCH

Town Bank Watershed, New Jersey

Station 25+50



Station 112+80



Scale - 1"=10'