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REPORT ON PROPOSED
REHABILITATION AND BETTERMENT
OF
ROOSEVELT WATER CONSERVATION DISTRICT
ARIZONA

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BOARD OF DIRECTORS

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WILLIAM S. BODINE
Superintendent & Secretary

ROOSEVELT WATER CONSERVATION DISTRICT

YOrktown 3-3137

HIGLEY, ARIZONA

YUkon 8-2555

April 3, 1958

The Honorable Fred A. Seaton
Secretary of the Interior
Department of the Interior
Washington, D. C.

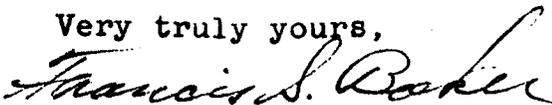
My dear Mr. Secretary:

Transmitted herewith is the Application for Loan, in the amount of \$2,780,000. for the Roosevelt Water Conservation District.

This Application, and engineering evaluation and feasibility report, is submitted pursuant to the provisions of the Small Reclamation Projects Act of 1956. This Application is for the rehabilitation of the existing project and for the betterment of its facilities.

Accompanying this Application is a check in the amount of \$1,000. as required by the Act.

Very truly yours,


Francis S. Baker
President

RESOLUTION NO. 3-58

RESOLUTION OF BOARD OF DIRECTORS OF
ROOSEVELT WATER CONSERVATION DISTRICT
EXPRESSING A WILLINGNESS TO ENTER INTO
A CONTRACT UNDER THE SMALL RECLAMATION
PROJECTS ACT OF 1956.

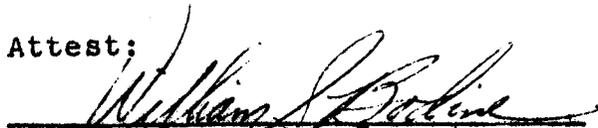
WHEREAS, Roosevelt Water Conservation District is filing with the Secretary of the Interior a proposal pursuant to the Small Reclamation Projects Act of 1956 (70 Stat. 1047, 71 Stat. 48), and it is necessary that the District express its willingness to enter into an appropriate contract for the repayment of any loan under such proposal,

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of Roosevelt Water Conservation District, an irrigation district organized under the laws of the State of Arizona, that said District is willing to enter into a contract with the United States of America, Department of Interior, for the return and repayment within twenty-two (22) years of the amount of the proposed loan in the sum of Two Million Seven Hundred Eighty Thousand Dollars (\$2,780,000) pursuant to the provisions of said Small Reclamation Projects Act of 1956, as amended.

PASSED and ADOPTED this 1st day of April, 1958.


President

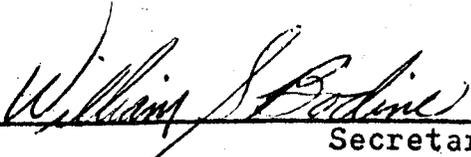
Attest:


Secretary

C E R T I F I C A T E

I, WILLIAM S. BODINE, the duly appointed, qualified and acting Secretary of the ROOSEVELT WATER CONSERVATION DISTRICT, hereby certify that the attached is a true, correct and complete copy of RESOLUTION NO. 3-58, unanimously adopted by the Board of Directors of said District at a regular meeting thereof held on the 1st day of APRIL, 1958, at which said meeting a quorum was present and voted.

WITNESS my hand and the seal of the ROOSEVELT WATER CONSERVATION DISTRICT, this 1st day of APRIL, 1958.


Secretary



OBED M. LASSEN
STATE LAND COMMISSIONER

OFFICE OF
State Land Department
STATE OF ARIZONA
Phoenix, Arizona

March 31, 1958

Roosevelt Water Conservation Dist.
Post Office Box 268
Higley, Arizona

Attention: Mr. William S. Bodine
Superintendent & Secretary

Dear Mr. Bodine:

Your letter of March 24, 1958, and report on Proposed Rehabilitation and Betterment of Roosevelt Water Conservation District of Arizona, was received by this office. The report included application for \$2,780,000 rehabilitation loan under the provisions of the Small Projects Act.

I have reviewed the report as submitted for Collar, Williams, and White Engineering, Inc. by Donald H. Collar, Civil Engineer. The project is not new to me, as I have been very closely acquainted with it for many years. It is felt that the project will be able to repay the requested rehabilitation loan by the savings in the cost of O/M and water. I therefore feel that this project is economically and physically sound.

It is for this reason that I present herewith, approval to this project as State Land Commissioner.

Very truly yours,

Obed M. Lassen
Obed M. Lassen
State Land Commissioner

OML:dt
cc: Governor McFarland

ERNEST W. MCFARLAND
GOVERNOR



Executive Office

State House
Phoenix, Arizona

January twenty-first, 1957

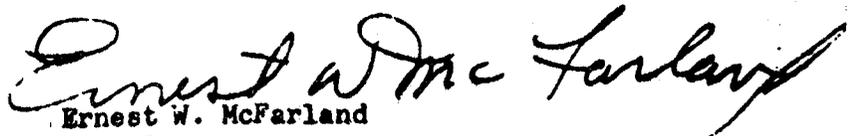
Dear Obie:

In compliance with the directive in Section (c), Chapter 972, Public Law 984, titled the "Small Reclamation Projects Act of 1956," I am designating the State Land Department, and you, by virtue of your office as State Land Commissioner, to act as the proper State agency for the purpose of participation in the development of projects under Federal reclamation laws.

The purpose of the Small Reclamation Projects Act of 1956 is to encourage State and local participation in the development of projects under the Federal reclamation laws and to provide for Federal assistance in the development of similar projects in the seventeen western reclamation States by non-Federal organizations.

Kindest personal regards.

Sincerely,



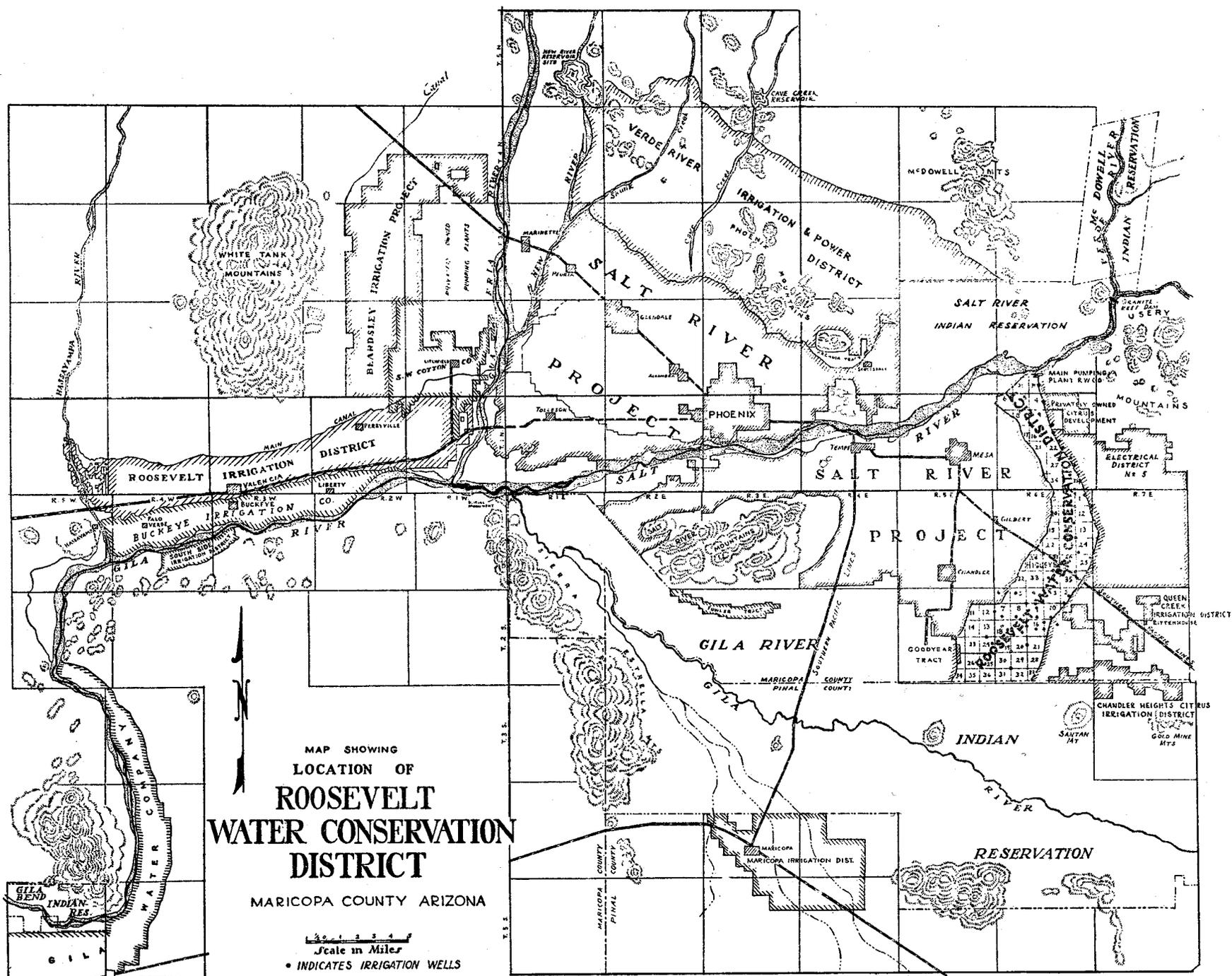
Ernest W. McFarland
Governor

Honorable O. M. Lassen
State Land Commissioner
State Office Building
Phoenix

REPORT ON PROPOSED
REHABILITATION AND BETTERMENT
OF
ROOSEVELT WATER CONSERVATION DISTRICT
ARIZONA

A P R I L
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PREPARED BY:
COLLAR, WILLIAMS & WHITE ENGINEERING INC.
DONALD H. COLLAR, CIVIL ENGINEER



MAP SHOWING
 LOCATION OF
ROOSEVELT
WATER CONSERVATION
DISTRICT

MARICOPA COUNTY ARIZONA

Scale in Miles

• INDICATES IRRIGATION WELLS

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DISTRICT AUDIT REPORT June 30, 1957

SUPPLEMENTAL INFORMATION

SYNOPSIS

This report has been prepared for the Roosevelt Water Conservation District and presents a description and analysis of the District's proposed \$2,730,000 program for rehabilitation and betterment of irrigation facilities.

Roosevelt Water Conservation District was formed October 9, 1924. It has operated as an independent irrigation district since that time and has proven to be a very successful project. The district includes approximately 37,500 irrigable acres which includes farms which are extremely variable both as to size and type. Gross income of project lands was over \$9,816,042.00, in 1955, and average gross income per irrigated acre is among the highest in the nation.

Most of the project irrigation facilities have been in service for over 30 years and are in need of physical improvement to adapt the system to present day conditions. Present problems are the result of physical and economic changes which have taken place since original construction was completed. These include changed land and water use problems, increasing operation and maintenance costs, short surface water supply, and the lowering of the ground water table. The district proposes to meet these problems by undertaking a three year plan for the betterment of irrigation facilities on a project-wide basis.

The three year plan with an estimated total cost of \$2,730,000, contemplates completion of repair to the district canal system and installation of approximately 61 miles of lateral lining and pipe lines. Lateral structures would be rehabilitated or modernized concurrently with the lining and pipe line work.

District estimates of anticipated future revenues indicate that without borrowing R&B funds, accomplishment of the required work would require 25 years to complete. Such an extended program would do little better than keep pace with obsolescence. The District has proposed completion of rehabilitation and betterment pursuant to the small Reclamation Projects Act of 1956 (70 Stat. 1044), as a practical means of expediting the work to provide for the realization of benefits in a reasonable period of time.

The proposed program presented herein would provide for a \$2,780,000 loan for rehabilitation and betterment work by Roosevelt Water Conservation District over a 3-year period.

The analysis of payment capacity for Roosevelt Water Conservation District lands has been based on the production of general field crops which are grown on about 85% of the area, returns from the production of vegetables, tree and vine crops, and other crop and livestock enterprises. Average water supply conditions of the project, and crop values for the years 1948 through 1957 were used in the calculations.

Under the foregoing conditions, the average annual farm income was approximately \$9,758,849 or approximately \$264 per acre. The average cost of irrigation water to land owners was \$600,248 or \$16.03 per acre. The average irrigation tax levy was \$203,500 or \$5.50 per acre.

The District has at present two major sources of irrigation water. (1) Surface water, diverted at Granite Reef Dam, by contract with the Salt River Valley Water Users' Association. (2) Water pumped from the underground basin. The total average annual water production for the period 1930-1958 is 111,643 acre feet. The computed average annual water loss is 20.1% of total production. The proposed program is designed to reduce this loss by 50%. At the rate charged for irrigation water in 1957, this saving represents \$92,183.00 annually. The money saved in reducing this loss will be applied toward the repayment of the loan and upon completion of repayment be directed back to the land owners in the form of a lower water rate.

The total acreage in the District in ownerships in excess of 160 acres is 8,180.31. Based on the current rate of interest of 3-3/8%, the total interest to be paid during the District proposed 22 year repayment period is \$247,925.83 or \$30.31 per "Excess" acre.

The plan of rehabilitation, which involves repair and improvement of the District's irrigation and drainage system is designed to permit more economical operation and maintenance of the District works, provide more efficient water deliveries, and reduce distribution system losses. The plan provides for repair or replacement of deteriorated existing canal lining, installation of concrete lining or pipes in the presently unlined laterals having the heaviest seepage loss and highest maintenance costs. The total estimated construction cost for the proposed plan of rehabilitation, on the basis of present prices plus a general escalator of 12% of labor & materials is \$2,730,000 as summarized below:

Repair Main Canal Lining	-	539,193
Lateral Lining & Pipe Lines	-	1,300,368
Lateral Structures	-	225,000
Engineering	-	168,798
Contingencies & Incidentals	-	248,894
Escalator	-	247,747
		<hr/>
		\$2,730,000

The total estimated construction cost is allocable to rehabilitation and betterment of the District Main Canal and Lateral distribution system. No funds from the proposed loan would be used to rehabilitate or modernize the Main Pumping Plant and Deep Well System.

Under the plan, the laterals located along County Roadways and State Highways would be relocated outside the road right-of-way. This will require the aquisition of approximately 200 acres of new right-of-way. Developed farm land in the District is presently valued at approximately \$1000 per acre: 200 Ac. @ \$1000/Ac. = \$200,000 which will be provided by the District as a portion of it's participation in the program.

Under the plan, the District operation, maintenance and replacement costs of Canal, Lateral and Flood Control System on the basis of projected prices and conditions, would be reduced from \$67,979 to \$36,465 annually, thus resulting in annual savings of \$31,514.

The amortization capacity of the District lands creditable to the plan on the basis of the above conservative estimated savings totals \$123,697 annually, including \$92,183 in water conservation and \$31,514 in O. & M. & replacement costs. The monies realized from these savings projected into the overall District financial program for the 22 year loan retirement period indicated that the proposed rehabilitation and betterment program provides a practical plan for accomplishing needed work at a rate consistent with Roosevelt Water Conservation District's operational requirements and financial resources.

It is requested that funds advanced under the proposed two million, seven hundred and thirty thousand dollar rehabilitation and betterment program be scheduled for repayment over a period of 22 years from the time the program is completed.

REPORT ON PROPOSED
REHABILITATION AND BETTERMENT
ROOSEVELT WATER CONSERVATION DISTRICT
ARIZONA

I. INTRODUCTION

A. Description and legal status and powers of Roosevelt
Water Conservation District.

The Roosevelt Water Conservation District is located wholly in Maricopa County in the south central portion of Arizona, approximately fourteen miles east of Phoenix, the capitol of the State. It was organized under the provisions of Arizona Revised Statutes, Article 1, Chapter 6, Title 45, and is a political subdivision of the state, vested with all the rights, privileges and benefits and entitled to the immunities and exemptions granted municipalities and political subdivisions under the laws and constitution of Arizona and of the United States (Sec. 7, Article XIII, Arizona Constitution). The affairs of the District are administered by a board of nine directors, three of whom are elected by the District landowners from each of the three divisions of the District by classes. Each director holds office for three years, and one director is elected from each division each year so that the terms of the members of the board at any time are staggered (A.R.S. 45-1514). Electors must be holders of title or evidence of title to lands within the District, be over the age of twenty-one years, have been a resident continuously for six months prior to any election in the county in which the District is located and be registered as required by law (A.R.S. 45-1517). Each landowner qualifying is entitled to only one vote as the District has not elected the acreage system of voting (A.R.S. 45-1641).

The District has the power of taxation for District purposes and all district taxes are levied annually upon the lands within the District at a uniform rate per acre. The taxes are collected through the office of the County Treasurer of Maricopa County, who is ex-officio treasurer of the District, and are payable at the same time as state, county and local district taxes. Such taxes are a lien upon the lands against which they are assessed and levied, and such lien may be enforced and foreclosed by notice and sale in the same manner as state, county and local district taxes. All provisions of the general revenue laws of the state for the assessment, levying and collection of taxes on real estate for state and county purposes are applicable to the assessment, levying and collection of taxes for District purposes. The Board of Directors of the District are required to adopt annually a budget for District purposes prior to the assessment and levy of taxes and all moneys raised by taxation may be applied only to the objects

for which they are levied and for no other purpose (A.R.S., Article 8, Chapter 6, Title 45).

The District has the power to exercise the right of eminent domain for District purposes (A.R.S., Sections 12-1111 and 45-1581).

Subject to the approval of the landowners of the District, it has the power to enter into a contract with the federal government or any department or agency thereof for the purpose of securing a loan or advance of money to be used to acquire or construct works or properties or make or procure extensions, improvements, reconstruction or repair of any of its works or properties (A.R.S., Article 5, Chapter 9, Title 45).

The lands embraced lie immediately east of and adjacent to the eastern boundary line of the Salt River Valley Project, operated by the Salt River Valley Water Users' Association.

R.W.C.D. includes approximately 37,500 irrigable acres which receive a surface water supply which is supplemented by water pumped from the underground basin by 60 district-owned deep wells and pumps. Irrigated lands in the project area are served by over 150 miles of canals and laterals.

A wide variety of crops are grown on the project including cotton, grains, alfalfa, citrus, cantaloupes and various winter vegetables. The gross crop income in 1955 amounted to over \$9,500,000 and the average crop income for the same year was \$253.63 per cultivated acre. The tree and vine crops are grown in small farm units, however the net income per acre is approximately two times that of the general field crops. During the same period there were 375 water accounts with farm sizes ranging from one acre to 1600 acres.

B. Electrical Power Source and Cost.

The District has an agreement dated July 1, 1950 with Salt River Project Agricultural Improvement and Power District (hereinafter called "Seller"), for the purchase by the District of all of the electrical power and energy required by it. Such agreement is to endure until December 2, 2023, provided either party may terminate the same on December 31, 1962 or at any 10-year interval thereafter, by notice in writing given not less than three years prior to the termination date specified in the notice. However, cancellation by the District will not be effective unless the District has received a bona fide offer for the furnishing of all of the District's electrical power and energy requirements during the succeeding 10-year period at more favorable rates and the Seller has refused to equal such rates. The agreement provides for the delivery of firm power from all sources available to the Seller, including any of its hydroelectric plants on the

Salt and Verde Rivers up to the amount of energy that can be generated by such plants by water that can be put to beneficial use on the lands in the Salt River Project.

The energy is to be delivered at a nominal frequency of 60 cycles at the point of attachment of the Seller's 12,500 volt line to District's structure and is measured at the low tension side of the District's transformers. The present rate of delivery is up to 12,000 kilowatts and a consumption up to 56,134,080 kilowatt hours annually. The annual load factor is not to be in excess of 53.4%.

The average cost of power is 7.51 mills per kilowatt hour, computed on a rate schedule for monthly periods as follows:

"Monthly Rate:

Demand Charge - \$.8523 per kilowatt
of billing demand.

Energy Charge - First 250 kilowatt-
hours per kilowatt of
billing demand at 3.977
mills per kilowatt-hour.
All over 250 kilowatt-
hours per kilowatt of
billing demand at 3.409
mills per kilowatt-hours

Wheeling Charge \$.0015 per kilowatt-hour.

Minimum Monthly
Bill - \$1.136 per month per kilo-
watt of contract rate of
delivery.

(c) The total payments made by the District to the Seller for each fiscal year as computed above, shall not be less than one of the following amounts, whichever is applicable:

- (1) If the Purchaser's use of energy for the year does not exceed the contract amount of energy for such year:
- (2) If the Purchaser's use exceeds the contract amount for the year:

The amount of the monthly bills as computed for the twelve-month period plus 2.591 mills per kilowatt-hour for all use during the year in excess of the contract amount."

"If, at any time during the term of the agreement, the Arizona Power Authority amends said contract by changing the amount of any of these designated items either upward or downward, the same amount of change, when multiplied by 1.136363, shall be made in the respective items of the agreement. If, at any time during the term of the agreement, the Arizona Power Authority amends said contract, by changing the kilowatt-hour blocks, the same amount of change shall be made in the respective items of the agreement."

There is a ceiling on the per kilowatt hour charge computed on an annual consumption basis of 8.5 mills per kilowatt hour of total consumption during the year.

C. History of Project

In the year 1917 a landowner's organization known as the Auxiliary Eastern Landowners' Association was perfected with a view to the building of a dam upon the Salt River, and the making of arrangements with the Salt River Valley Water Users' Association for the watering of lands. This was followed by the organization on September 13, 1920, of an irrigation district under the Irrigation District Law of the State of Arizona, which was originally known as the "Auxiliary Eastern Irrigation District." Later, the present name, "Roosevelt Water Conservation District," was adopted.

The District transferred to the Salt River Valley Water Users' Association whatever filings it had upon dam sites on the Salt River and entered into a contract with the Association, whereby in consideration of the concrete lining of the Association's canals, the District should have water thereby saved. Later, a controversy developed as to the amount of water savings credited to the District, and following a suit in the Superior Court of the State of Arizona, the matter was settled by Stipulation, Cause No. 32031-C, on September 19, 1940, under which the Association agreed to credit to the District, 5.6% of all water diverted at Granite Reef Dam for Association use. This Stipulation also provided for storage rights in Bartlett Reservoir, and included all amounts of water due the District under the Agreement of October 24, 1924, and under its appropriative right as construed and established by the Court, and also included all unregulated flood water to which the District is entitled.

The irrigation system of the District was constructed during the years 1925 and 1926, and consists of the main pumping plant from which water is pumped from the Consolidated

Canal of the Salt River Valley Water Users' Association into the main canal of the District, the canal and lateral system with their appurtenant structures, and individual wells located throughout the District. The canal system consists of the Main Canal, about 21 miles in length, and the Eastern Canal Extension, about 6 miles in length, and which is an extension of the Eastern Canal of the Salt River Valley Water Users' Association, through which the District has a carrying right for water. The Main Canal and the Eastern Canal Extension were both lined with pneumatically applied mortar by the District in the fall and winter of 1927.

Previous to the legal organization of the Roosevelt Water Conservation District as an entity it was preceded by a voluntary association of the landowners known as the "Auxiliary Eastern Canal Landowners Association." On August 28, 1920, this association filed with the State Water Commissioner its application #A-85 together with its construction plan for the appropriation and application of 522 second feet of the waters of the Salt and Verde Rivers and received of the State Water Commissioner, permit #A-402 for such appropriation and construction of its works.

All rights of the Association in and to the appropriation and application and permit were assigned, with the approval of the Water Commissioner, to the Roosevelt Water Conservation District on April 28, 1925. Notice of completion of works and application of water to beneficial use was filed on June 25, 1928, establishing the right of the District to the appropriation in question.

The Association in question was the owner of a right-of-way filing on the site now occupied by the Mormon Flat Dam, built by the Salt River Valley Water Users' Association.

By virtue of a contract made on the 24th of October, 1924, between the Roosevelt Water Conservation District and the Salt River Valley Water Users' Association, approved by the United States Secretary of the Interior, and in consideration of the transfer by the Auxiliary Eastern Landowners Association of the Salt River Valley Water Users' Association of its right-of-way and dam sites, it was agreed that the construction of the works of the District necessary for the application of its water appropriation to beneficial use, should be done by the Salt River Water Users' Association at the cost and expense of the District, and that the District, should have the right to store its water in the reservoirs of the Association. This storage privilege enables the District to conserve the water obtained through savings from canal lining, to be drawn upon as required. The work consisted of the enlargement, extension, and concrete lining of certain canals of the Salt River Valley Water Users' Association, and the construction of a main and an extension canal for the District by other contractors employed by the District. The District work was completed in 1926,

and the Salt River Valley Water Users' Association work in 1928. The cost of the work done for the Salt River Valley Water Users' Association by the District was \$889,000.00.

On April 12, 1927, the Roosevelt Water Conservation District filed application #A-713 with the State Water Commissioner and received permit #A-496 for the appropriation of 40,000 acre-feet of water per year from the flow of the Queen Creek. The works for the application of this water were completed and proof established on the first day of November, 1928.

On April 22, 1950, certificate # 1658, Docket 539, Page 262, State of Arizona was issued to R.W.C.D. by the State Land Commissioner of Arizona.

Certificate No. 1658 is as follows: "This is to certify that Roosevelt Water Conservation District, of Higley, State of Arizona, has made proof to the satisfaction of the State Land Commissioner of Arizona of a right to the use of the waters of Queen Creek, tributary of Gila River, for irrigation purposes, under amended application No. A-713, permit No. A-496, of the State Water Commissioner and that said right to the use of said waters has been perfected in accordance with the laws of Arizona, and made and entered of record in the records of the State Land Commissioner at Phoenix, Arizona in Volume 5, at Page 1658 on the 31st day of March, 1950; that the priority of the right hereby confirms dates from April 12, 1927; that the amount of water to which such right is entitled and hereby confirmed for the purposes aforesaid is limited to an amount actually beneficially used for said purposes, and shall not exceed one and one-half (1 1/2) acre feet per acre per annum, for a total of 15,859.33 acres more or less.

A description of the lands under such right, and to which the water hereby confirmed is appurtenant, or if for other purposes the place where such water is put to beneficial use, is as follows:

<u>TWP</u>	<u>Range</u>	<u>Sections</u>	<u>No. Acres</u>
2S	5E	11,12,13,14 15,22,23,24, 25,26,27,34, 35,&36	6,333.59
2S	6E	7,8,9,10,11, 15,16,17,18, 19,20,21,22, 28,29,30,31, 32,&33	9,525.74

The subdivisions being of record in the office of the State Land Department.

The point of diversion under this appropriation and right to the use of water is within the Northwest quarter of the Southeast quarter (NW 1/4 SE 1/4) of section twelve (12), Township two (2) South, Range Six (6) East, Gila and Salt River Meridian, Maricopa County, Arizona. Being 1100 feet east of the center of said section twelve."

Almost the entire area of the District is underlaid by water bearing gravels, making possible the extensive pumping of underground water. The District purchased a group of operating pumps and wells within the District in 1924 and subsequently installed an additional number, and now has a total of 60 wells installed and operating at various points throughout the District. The individual outputs of these 60 wells vary from a minimum of 50 to a maximum of 350 miners inches, an average of about 8.9 acre-feet per day of 24 hours. Therefore, the maximum available water supply from this source amounts to about 480 acre-feet per day, or about 144,000 acre-feet per year.

D. PRESENT BOND DEBT.

BOND & INTEREST PAYMENT SCHEDULE	6th Series "Refunding"		7th Series "Improvement"		Sub-Total	TOTAL
	Principal	Interest	Principal	Interest		
1/1/58		16,830.00		1,380.00	18,210.00	
7/1/58	56,000.00	16,830.00	5,000.00	1,380.00	<u>79,210.00</u>	97,420.00
1/1/59		15,710.00		1,280.00	16,990.00	
7/1/59	58,000.00	15,710.00	5,000.00	1,280.00	<u>79,990.00</u>	96,980.00
1/1/60		14,550.00		1,180.00	15,730.00	
7/1/60	60,500.00	14,550.00	5,000.00	1,180.00	<u>81,230.00</u>	96,960.00
1/1/61		13,340.00		1,080.00	14,420.00	
7/1/61	63,000.00	13,340.00	5,000.00	1,080.00	<u>82,420.00</u>	96,840.00
1/1/62		12,080.00		980.00	13,060.00	
7/1/62	65,500.00	12,080.00	5,000.00	980.00	<u>83,560.00</u>	96,620.00
1/1/63		10,770.00		880.00	11,650.00	
7/1/63	68,000.00	10,770.00	6,000.00	880.00	<u>85,650.00</u>	97,300.00
1/1/64		9,410.00		760.00	10,170.00	
7/1/64	71,000.00	9,410.00	6,000.00	760.00	<u>87,170.00</u>	97,340.00
1/1/65		7,990.00		640.00	8,630.00	
7/1/65	73,500.00	7,990.00	6,000.00	640.00	<u>88,130.00</u>	96,760.00
1/1/66		6,520.00		520.00	7,040.00	
7/1/66	76,500.00	6,520.00	6,000.00	520.00	<u>89,540.00</u>	96,580.00
1/1/67		4,990.00		400.00	4,990.00	
7/1/67	80,000.00	4,990.00	6,000.00	400.00	<u>91,390.00</u>	96,380.00
1/1/68		3,390.00		280.00	3,670.00	
7/1/68	83,000.00	3,390.00	7,000.00	280.00	<u>93,670.00</u>	97,340.00
1/1/69		1,730.00		140.00	1,870.00	
7/1/69	86,500.00	1,730.00	7,000.00	140.00	<u>95,370.00</u>	97,240.00

Total Principal 841,500.00 69,000.00 910,500.00
 Total Interest 234,620.00 19,040.00 253,660.00

Total Principal & Interest. \$1,164,160.00

Tabulation of Total District Revenues and Expenditures

For Period 1948 - 1958

REVENUES					EXPENDITURES			
PERIOD	Irrigation Water Sales	Taxation & Assessments	Misc. *	TOTAL	Operation & Maintenance	Funded * Debt	Capital Investment	TOTAL
1/1/48 - 12/31/48	\$554,601.30	\$122,552.60	\$7,160.20	\$684,314.10	\$477,506.08	\$95,514.00	\$114,978.70	\$687,998.78
1/1/49 - 12/31/49	552,141.24	128,592.87	7,464.21	688,198.32	433,590.57	120,238.89	59,245.55	613,075.01
1/1/50 - 12/31/50	571,867.95	98,515.01	14,178.98	684,561.94	488,124.21	93,331.72	28,993.14	610,431.07
1/1/51 - 6/30/51	259,801.08	25,407.61	3,613.82	288,822.51	227,577.68	60,330.00	34,274.30	322,181.98
7/1/51 - 6/30/52	540,239.03	126,337.81	9,012.41	675,589.25	438,845.84	117,660.00	50,671.01	607,176.85
7/1/52 - 6/30/53	675,734.16	129,443.43	13,473.85	818,651.44	578,262.53	92,900.00	33,554.61	704,717.14
7/1/53 - 6/30/54	651,781.92	103,855.03	13,785.49	769,422.44	621,377.77	93,060.00	73,656.59	788,094.36
7/1/54 - 6/30/55	655,446.74	103,781.05	14,889.86	774,117.65	596,157.38	97,140.00	113,142.64	806,440.02
7/1/55 - 6/30/56	650,600.76	114,021.84	11,128.31	775,750.91	581,126.61	126,980.00	198,118.48	906,225.09
7/1/56 - 6/30/57	729,078.52	129,099.53	16,435.84	874,613.89	678,303.13	100,040.00	143,828.88	922,128.01
				\$7,034,353.89				\$6,968,468.31

* Misc. Income includes:
 Stock water sales
 Equipment & Property Rental
 Cash Discounts
 Sale of Scrap Equipment & Materials
 U. S. Government Bond Revenues

Note: Included in Total Disbursements is \$116,000.00 for Reserves.

* Funded Debt Includes:
 6th Series Refunding Bonds, Principal & Interest and
 7th Series Improvement Bonds, Principal & Interest.
 Both Bond Series to be paid out in 1969.

F.

(1) Summary of Operation & Maintenance Costs of
Individual Well System for Period 1948 - 1958.

PERIOD	INDIVIDUAL WELL SYSTEM
1/1/48 - 12/31/48	\$67,603.35
1/1/49 - 12/31/49	54,191.01
1/1/50 - 12/31/50	39,441.03
1/1/51 - 6/30/51	23,495.02
7/1/51 - 6/30/52	64,519.95
7/1/52 - 6/30/53	118,610.75
7/1/53 - 6/30/54	95,857.22
7/1/54 - 6/30/55	67,289.89
7/1/55 - 6/30/56	73,848.35
7/1/56 - 6/30/57	100,036.85
TOTAL	<hr/> \$704,893.42
Average Cost Per Year	\$74,199.31

(2) Summary of Power Use and Cost for Period 1948 - 1958.

PERIOD	KWH USE Main Pump- ing Plant	KWH USE Individual Well System	TOTAL KWH USED	COST
1/1/48-12/31/48	2,002,000	36,178,045	38,180,045	\$342,144.26
1/1/49-12/31/49	3,270,000	31,260,197	34,530,197	322,166.23
1/1/50-12/31/50	2,827,000	42,020,258	44,847,258	365,704.94
1/1/51- 6/30/51	900,000	22,609,238	23,509,238	177,804.76
7/1/51- 6/30/52	2,795,000	39,616,068	42,411,068	313,457.47
7/1/52- 6/30/53	2,904,000	45,798,782	48,702,782	360,414.43
7/1/53- 6/30/54	2,773,000	60,658,368	63,431,368	407,182.21
7/1/54- 6/30/55	2,929,000	61,654,127	64,583,127	412,213.68
7/1/55- 6/30/56	2,986,000	56,428,991	59,414,991	403,324.47
7/1/56- 6/30/57	3,003,200	69,297,665	72,300,865	454,927.70
	26,389,200	465,521,739	491,910,939	
Total Costs - - - - -	- - - - -	- - - - -	- - - - -	\$3,559,340.15
Average Cost Per Year - - - - -	- - - - -	- - - - -	- - - - -	\$374,667.38
Average Cost Per K.W.H. - - - - -	- - - - -	- - - - -	- - - - -	\$.0072357

F.

(3) Summary of Operation & Maintenance Costs of Main Canal, Lateral System, Drainage & Flood Control System for Period 1948 - 1958.

PERIOD	Main Canal	Lateral System	Drainage System	Flood Control
1/1/48-12/31/48	\$8,507.03	\$41,642.13	\$56.16	\$193.84
1/1/49-12/31/49	16,961.10	45,274.11	678.11	546.81
1/1/50-12/31/50	10,889.92	47,036.60	812.71	846.35
1/1/51- 6/30/51	5,757.35	21,171.09	1,370.03	186.15
7/1/51- 6/30/52	10,763.40	41,770.11	1,273.19	548.80
7/1/52- 6/30/53	12,227.88	49,503.69	1,336.07	201.79
7/1/53- 6/30/54	12,493.68	50,124.18	2,436.64	1,100.64
7/1/54- 6/30/55	15,289.31	45,359.62	3,691.37	1,594.22
7/1/55- 6/30/56	20,189.36	45,291.01	3,548.61	1,778.15
7/1/56- 6/30/57	16,204.59	40,365.95	2,062.48	442.01
Totals	\$129,283.62	\$427,538.49	\$17,265.37	\$7,438.76
Average Cost per Year	\$ 13,608.80	\$ 45,004.05	\$ 1,817.41	\$ 783.03
Average Total Per Year - - - \$61,200				

F.

(4) Summary of Total Operation & Maintenance Costs

for Period 1948 - 1958.

O & M COSTS	Individual Well System	Main Pumping Plant	Other Costs	Depreciat. Costs	* TOTAL	TOTAL COSTS LESS DEPRECIATION
1/1/48 - 12/31/48	67,603.35	10,930.26	483,909.50	10,576.97	573,020.08	562,443.11
1/1/49 - 12/31/49	54,191.01	11,984.98	475,719.12	11,934.35	553,829.46	541,895.11
1/1/50 - 12/31/50	39,441.03	10,274.99	517,870.86	13,851.05	581,437.93	567,586.88
1/1/51 - 6/30/51	23,495.02	5,670.90	252,049.72	6,692.04	287,907.68	281,215.64
7/1/51 - 6/30/52	64,519.95	12,921.73	469,956.83	9,107.33	556,505.84	547,398.51
7/1/52 - 6/30/53	118,610.75	12,140.96	530,364.45	10,046.37	671,162.53	661,116.16
7/1/53 - 6/30/54	95,857.22	12,455.10	589,317.17	16,808.28	714,437.77	697,629.49
7/1/54 - 6/30/55	67,289.89	13,124.87	595,875.65	17,006.97	693,297.38	676,290.41
7/1/55 - 6/30/56	73,848.35	14,779.64	598,914.04	20,564.58	708,106.61	687,542.03
7/1/56 - 6/30/57	100,036.85	12,881.55	643,556.60	21,828.13	778,303.13	756,475.00
	704,893.42	117,164.98	5,157,533.94	138,416.07	6,118,008.41	5,979,592.23
Average Cost Per Year - - - - -					\$629,430.76	
* Includes Funded Debt						

II. DISTRICT LANDS.

A. History in Brief of District Agricultural Development and Production.

During the period of 1917-1927 the District was undergoing the process of formation and construction. Records of cultivation in the area during this period are not at all complete, but it is established that some farming operations were carried on, utilizing private wells for irrigation purposes. Beginning with the year 1927, crop summaries of the District are a matter of record. As early as 1927 the total planted acreage was 31,702 acres. This acreage increased until 1930, and of course was reduced during the period that the entire country was suffering a major depression. By 1934 the cotton quarantine had been lifted, federal loan funds became available and cultivated acreage began to increase. From that time on, the economy of the District has been very stable, cultivated acreage 30,000 and upward. The heaviest production years in the District history, of course, occurring during the years of War and National Emergency.

The soil of the District has been so developed, that some of the highest yields per acre in central Arizona are obtained.

The soil is the usual valley fill underlaid at depths varying from 80 to 150 feet with gravel and boulders. An extensive soil survey was made by the Bureau of Chemistry and Soils, United States Department of Agriculture, and appears as Bulletin No. 32, Series of 1926, obtainable from the Superintendent of Documents, Washington, D.C.

The lower portion of the District shows a very mixed type of soils with very little consistency. The central and northern portions are fairly consistent although the latter is to a considerable extent also mixed. In general, the soil may be said to consist largely of loams and clays with small amount of sand. The Cajon clay and loam types predominate.

Based upon this past history of continuous farm operation, it is reasonable to assume that the land production will not decrease during the proposed rehabilitation and repayment program.

TABLE I

ROOSEVELT WATER CONSERVATION DISTRICT

JOB NO. 570103

CROP RECORD (EXCERPT FROM NUVEEN REPORT) FALL CENSUS

1957

PERIOD: 1935 TO 1956 - ACRES

CROP	PERIOD: 1935 TO 1956 - ACRES																						
	1935	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	1956	
Alfalfa & Alfalfa Grain	3,624	2,820	2,106	2,815	4,110	7,640	10,098	10,652	14,215	17,501	20,001	19,822	14,230	10,765	11,331	10,029	8,223	7,963	7,769	9,585	8,795	6,720	
Barley	633	69	348	70	358	1,131	983	2,106	1,615	3,864	3,125	5,155	3,356	1,552	3,479	708	976	918	761	256	1,018	438	
Corn	55	188		27		10	8		13	43	6	10	66	59	78	7		26	16	286	485	643	
Cotton	10,981	19,930	24,611	17,679	12,574	14,396	14,180	14,984	8,955	1,467	890	158	1,185	1,972	7,801	8,660	17,561	18,839	19,363	12,505	9,921	11,302	
Dates	45	51	72	73	83	78	73	81	81	81	81	81	61	77	92	89	73	73	73	73	73	73	
Citrus	3,334	3,531	3,552	3,566	3,500	3,488	3,392	3,384	3,315	3,287	3,293	3,278	3,271	3,278	3,282	3,303	3,303	3,303	3,288	3,264	3,252	3,296	
Deciduous Fruits	5	8	8	8	8	8							581	9	9	9							
Hegari - Maize	20	86	25	202	15	38	588	280	978	170	1,441	3,430	4,697	7,231	3,863	7,297	1,225	1,909	1,692	4,953	4,836	2,561	
Lettuce			19							3			186	234	472	545	628	902		628			
Nursery Stock	19	11	7	7	7	7	7	5				1	2	1	2					56	104	31	
Oats	10		81	38	69	209	394	479	356	345	716	77	154	75	3					89	215	17	
Peanuts	19										2												
Peas			38							3		3	4				48	61		156		45	
Pasture	87	84	55	211	192	328	172	74	138	750	271	189	317	365	120	194	226	53	57	169	317	280	
Irish Potatoes	15		87	63	39			3	1													59	
Sweet Potatoes	90		7	32	74	91	148	90	176	114	69	71	38	24	16	31				4			
Psylla Seed																							
Watermelons	82	12		67	50	23	50		27	192	164												
Wheat	590	398	621	730	648	456	270	260	10	60	347	422	76		151		74			74	75	61	
Gardens	1	14	4		10		24	57	43	67	28	194	162	119	98	64	89	29	24	41	31	13	
Sudan	10	32	54	44	22	64	50	126	263	170	109		38	19		59	39	9	83	85	307	46	
Vineyard																				22	47	58	58
Truck																							
Olives																							
Tomatoes	7			10		2																	
Broom Corn	8																						
Clover		18				20																	
Onions		18								10										50	100	61	
Flax												363	1,099	1,225	52								
Carrots														187	216	48	48						
Cauliflower																60	39	70	47				
Beets																	38						
Castor Beans																				14		20	
Millet																					121	191	
Soya Beans																						560	741
TOTALS	19,635	27,270	31,695	25,647	21,759	27,989	30,437	32,581	30,186	28,127	30,543	33,254	29,523	27,192	31,099	31,100	32,590	34,155	33,263	32,488	30,167	26,536	

B. Crop Report Recapitulation for Period 1947 - 1956

		1956	1955	1954	1953	1952	1951	1950	1949	1948	1947
GRAINS:	Barley	4,937	6,076	9,971	3,504	3,482	6,288	9,380	9,977	12,992	3,356
	Grain Sorghum	2,561	4,836	4,952	1,691	1,908	1,223	7,296		7,290	5,277
	Other	974	555	232	14	120	321	754	875	452	230
SEED CROPS:	Flax						106	347	2,996	2,384	1,099
	Sugar Beets					38	38				
	Other	20							3,863		
HAY & FORAGE:	Alfalfa Hay	5,809	10,689	10,223	7,015	6,715	9,060	9,350	10,978	9,225	14,228
	Other Hay	911			82	2,702		56			
	Pasture	334	316	169	57	71	225	266	345	374	316
	Silage	214	485	492							103
VEGETABLES:	Lettuce	1,415	772	954	1,602	2,074	882	544			
	Cantaloupe, etc.	151	839		592	252	726	761			
	Carrots					48	77	117			
	Potatoes - white		60		4			93	148		
	Onions	109									
	Soy Beans	741									
	Watermelons	235					115				
	Other	38	825	545		221		522	1,339	616	500
FRUITS:	Oranges	1,957	1,800	1,800	1,780	1,780	1,780	1,780	1,780	1,780	1,646
	Grapefruit	1,419	1,419	1,473	1,498	1,498	1,498	1,498	1,498	1,498	1,646
	Dates & Vineyard	131	130	119	72	72	72	88	89		
MISCELLANEOUS:	Cotton-short staple	11,190	9,738	12,456	18,623	18,169	17,419	8,141	7,801	2,008	1,184
	Cotton-long staple	129	288	48	740	970	140	517			
	Cotton Seed	11,319	10,026	12,504	19,363	19,139	17,559	8,658	7,801	2,008	1,184
	TOTAL	44,594	48,854	55,938	56,637	59,259	57,529	50,168	49,490	40,627	30,769
	DUPLICATED ACREAGE*	14,969	15,168	21,173	21,468	24,956	22,692	15,865	18,200	6,241	1,184
	NET AREA	29,625	33,686	34,765	35,169	34,303	34,837	34,303	31,290	34,386	29,585

* Includes cotton seed acreage

C. LAND OWNERSHIPS IN EXCESS OF 160 ACRES PER PERSON

Owner	No. of Owners	Excess Acres
Brown, A. B., & Son Ranches	1	416.20
Curtis, Melvin J. & Carmen	2	67.00
Dougherty Ranch	1	1,390.66
Ellsworth, Wm. Vaughn, Julia P., Grant R., & Fern S. (Deeded ownership)	4	93.91
" " " " (Incl. Leases & Cont.)	4	301.76
Enloe, Carl L., & Zelma G.	2	33.58
Enloe, Norris L. & Velva S.	2	258.85
Enloe, W. A. & Helen G.	2	24.64
Fincher, J. W.	1	108.60
Hadley, D. L. & Bethany	2	295.74
Herman, Ruby & Carlyn Diane	2	143.94
Holliday, Ralph	1	64.80
Johnson, J. Denver	1	719.15
Killian, Ray & Jessie E.	2	207.90
Morrison, H. C., Leatha, Kenneth, Marvin & Eunice Inez (Deeded ownership)	5	78.78
(Incl. leases & Cont.)	5	663.59
Nichols, Hugh & Lena E.	2	412.54
Passey, Wm. H.	1	412.26
Rancho El Desierto	1	197.62
Recker, Earl C. & Helen E.	2	974.78
Rice, W. L.	1	74.10
Riggs, Ben & Myrtle (Deeded ownership)	2	176.80
Riggs, Ben, Myrtle, Reid E. & Lilly (Incl. Leases & Cont.)	4	401.60
Sanders, F. G. & Ada M.	2	88.58
Valley Citrus Packing Co.	1	10.31
Versluis, Ellen H.	1	147.84
Whitten, Guy R. & Ardella D.	2	153.53
Wood, Geo. E. & Helen R., Rabb, W. P. & Marie R., Stock, Louis T. & Mary B.	6	261.25
	Total	8,180.31

D. SIZE OF FARM OPERATIONS BY 80 ACRE GROUPS

0 to 80 Acres

Ackerman, Rosemary	27.94 Acres
Angeny, F. Granville	47.33
Armistead, Anola	9.15
Barney, Talmage (See "A" 80/160 group)	78.00
Barr, Donald H.	56.66
" " " (Incl. leases & contracts*)	65.66
Beck - Black	12.05
Becker, Francis	1.92
Belden - Mayfield	78.40
Berkenkamp, Louisa	9.04
Bernard, Ray A.	58.50
Betts & Montgomery	45.02
Bias, Arvel	3.80
Black, H. J. (See 'A' 320/400)	21.35
Black, P. N.	2.00
Blair - Montierth	38.42
Bloomer, John	75.88
Bolton, Gerald E.	15.59
Boyster, Harrel	22.24
Brammer, James W.	76.13
Branham, W. K.	14.47
Bratcher - Van Zandt	10.21
Brimhall - Dart	.90
Brown,- Florence	39.00
Brown, Lorena Mae	44.80

0 to 80 Acres Cont'd

Brown - Gray	1.50 Acres
Chesser, Ada	29.10
Cluff & Jones (See 'A' 160/240)	75.80
Clyde - Hogan	36.57
Coombs, Afton	6.19
Cranney & Bickmore	62.23
Crismon, John S.	19.98
Dailey - Mortensen	38.30
Darragh - Dutton	41.16
Davis, Tom C., Jr.	39.00
Desert Citrus Growers Co.	36.82
Deverman & Barr	4.81
Dhuyvetter, Achel	67.40
Elsberry - Nichols (See Malin - Nichols)	78.42
England, W. B. (See R. W. C. D. * England)	18.50
Farrar, J. Elden	9.58
Finch, Willie C., et al	1.53
Florida, Harry M.	19.50
Funk,- Thayer	19.24
Geare - Freestone	78.40
Germann, Walter	.76
Gibson - Arnold (See Passey - Arnold)	38.00
Gifford, Austin	4.71
Gifford, John	1.73
Gottschalk, Lydia	12.50
Hall, W. J.	9.50
Hamilton, James Mace	79.00
Hamlett, W. A.	79.00
Hamm, Orville	28.69
Harding, Leo W.	35.33
Haws, D. M.	9.75
Heimsoth, Edwin	79.90

* Hereafter called L. & C.

0 to 80 Acres (Cont'd)

Helmcke, Grace Rebecca	9.29 Acres
Helmhout - Murphy	78.40
Henderson, Roy A.	37.54
Hendrix, Ross Harter	27.59
Hendrix, Ruth Gelke	14.43
Herman, E. G.	50.00
Hikida, Zetsuo	57.10
Hinchliffe, Vincent J.	19.50
Hobart, Charles	13.03
Hoelke (Rogers), Harriet M.	17.68
Hogue, Clifton A.	11.98
Holcomb, L. E.	10.00
Holland - Ethington	38.25
Hooten, Barney	9.40
Hover, Carl	70.09
Hover - Sharp (See Riggins - Sharp)	19.50
Jankos, Albert C.	33.50
" " " (Incl. L. & C.)	71.50
Jennings - Sherwood	9.70
Jeter, D. R.	76.34
Jones - Allred	65.00
Judd, Rulon	78.17
Justis - Brown (See Westbrook - Brown)	18.90
Kegg - Study	2.50
Kempton, C. I.	8.24
Kenson, A. H.	9.24
Kent, Dr. Melvin L.	18.50
Larsen Bros.	17.51
Lee - Harmon	48.15
Lincoln, - Pruett	74.16
Linke & Resley - Johnston	76.40
Lintz, Minnie	14.63

O to 80 Acres (Cont'd)

Little, W. R. & Denton	(See 'B' 160/240)	79.00 Acres
Lloyd & Rollins		18.96
Lopez, Antonio, Sr		19.70
Lopez, Fernanda		18.70
Lorenz & Page		5.63
Lund - Pew		19.39
Macchiaroli, Cono		56.49
Marler & Schwalbe		19.50
Martin, George Marion		1.67
Martindale, Mildred		66.23
Masse, Pete		70.68
Massey, Hubert		73.70
Masterson - Metcalf		.72
Matthews, Kate B.		61.93
Mattison, H. A.		41.00
Maxwell, Lora		4.88
Mearns, Hughes		14.31
Merrill, Virgil		45.30
Mitchell, W. W., Jr.		28.79
Nakatsu, Giichi		8.95
Nakatsu - Matsuyoshi		8.96
Newman & Ergenbright		18.50
Norton, Clifford		72.00
Norton - Pogue		3.12
Osborn, Roy		29.80
Palmer, Harry		9.66
Patrick - Lemley		19.25
Phillips - Lamoreaux		45.40
Rambo - Hudson		18.25
Rankin, H. J.		24.09
Richardson - Ray		11.10
Russell, George S.		4.20

0 to 80 Acres (Cont'd)

R. W. C. D. - England	(See England)	15.80 Acres
Schweikart, Earl		38.85
Scott - Anderson		19.50
Scott - Sutherland	(See Sutherland)	38.00
Sheldon, Alice Mildred		31.56
Sherrill, George		4.21
Skolnick, Max		26.88
Smith, Opal R.		38.00
Southerland, U. O.		9.70
Speer, George		10.00
Sposito, Frank		38.80
Standage, Gerald E.		19.50
Stevenson, J. R.		19.42
Stewart & Mangum		19.50
Stewart - Aguilar		4.85
Stewart - Boydston		9.70
Stewart - Masterson		5.48
Stigler (Koch) - Arizona Dawn Gardens		65.30
Sutherland & Jackson	(See Scott - Sutherland)	32.97
Sutton - Meyers		19.50
Tappan, James M.		9.12
Taylor - Macias		39.78
Thelander - Araki		12.00
Thelander, Wallace & Ivan		6.50
Timmer, Herman C.		7.17
Tryon, M. P.		4.41
Turner, C. H.		23.80
Uhly, William A.		19.24
Vasumpaur, John A.		10.43
Vaughn, Edward		8.66
Vaughn, William B.		6.10
Walker, W. O.		18.50
Werner, L. B.		28.50

0 to 80 Acres (Cont'd)

Westbrook, Frank B.	18.90 Acres
White, Walter D.	64.75
Williams, Katie C.	2.80
Wood - Farr	3.38
Woodard, Hadley, et al	34.94

80 to 160 Acres

Andersen - Chitwood	153.54 Acres
Armistead & Otto	83.62
Baker, Francis	134.32
Beebe, Sr., R. D., et al (See 'A' 560/640)	154.25
Brown - Neely (See Sawyer - Neely)	157.40
Burgher, Arthur	148.82
Cain, Almon C.	97.33
Carpenter, Jerald	95.39
Clem, Jack	129.03
Cluff, O. L.	151.80
Cobb, Lloyd	115.74
Compton, Joy (See 'A' Over 800)	117.60
Cooley, Eldon W.	156.00
Evans - Kerby (See Tarwater - Kerby)	135.24
Farr & Farr	84.66
Fincher, Clyde (Incl. L. & C.)	155.38
Fulton - Faltis	154.80
Hawes, T. Woodson	154.50
A Barney, Talmage (Incl. L. & C.)	104.50
Knappenberger, Henry Moulton	154.80
Laney - Cheyenne Cattle Co.	98.54
Lockhart, James LeRoy (See 'A' 240/320)	154.80
Malin, J. T.	88.18
Malin - Nichols (See Elsberry - Nichols)	116.80
Maloy - Crandall	153.24

80 to 160 Acres

Mesa Heights Farms		131.09 Acres
Millett - Miller & Huber		146.25
Millett - Peterson		125.96
Neely, C. W.		153.01
Nichols, A. T. (Buck)	(See 'B' 240/320)	166.51
Palmer - Rowland		117.40
Parsons, Lawrence, et al		96.83
Passey - Arnold		192.67
Peterson, Verl		154.44
Peterson, J. Grant		149.26
Reber, Ellare, et al		154.10
Redding - Mumford		156.00
Riggins - Sharp	(See Hover - Sharp)	156.00
Schnauffer, Wm. J.		154.80
Scott, Jesse		156.00
Shapell, Edward	(See 'C' 160/240)	101.77
Spitler, Elvin N.	(See 'D' 160/240)	116.24
Tone, Klove		112.98
Tone, Kent		117.48
Williams, A. A., et al		114.42
Wood, C. J. & R. C.		80.17

160 to 240 Acres

	Babcock - Barney		229.77
A	Cluff & Jones	(Incl. L. & C.)	231.80
	Cook - Gieszl		167.57
	Escobedo Bros.	(See 'B' 320/400)	233.00
	Fincher, Bruce		228.80
	Fincher, Luveda		233.80
	Flaherty & Udall		230.20
	Gylling - Knight		213.70
B	Little, W. R. & Denton	(Incl. L. & C.)	231.20
	Mc Creary - Mc Creary		222.50

160 to 240 Acres (Cont'd)

Rice - Bolt		233.80 Acres
Sawyer, J. H.		219.23
C Shapell, Edward	(Incl. L. & C.)	197.11
D Spitler, Elvin N.	(Incl. L. & C.)	223.39
Tarwater - Kerby	(See Evans - Kerby)	200.85
Thayer, Dean H., et al		228.34
Valley Citrus Packing Co.,		219.06

240 to 320 Acres

Coleman, Merrill, DeClusin dba Consolidated Citrus		260.90
Holliday, Ralph & Clyde		288.87
Jones, Leland		271.87
A Lockhart, James LeRoy	(Incl. L. & C.)	294.20
Macchiaroli Fruit Co.		268.64
Malin - Boggs		257.36
B Nichols, A. T. (Buck)	(Incl. L. & C.)	267.32
Nichols, Gilbert		309.54
Oasis Citrus Groves		230.04
Passey, W. H.	(See 'A' 400/480)	288.50
Riggs, Lyle		311.00
Versluis, Ellen H.		307.84

320 to 400 Acres

Backer, H. O., et al		388.60
A Black, H. J.	(Incl. L. & C.)	340.38
B Escobedo Bros.	(Incl. L. & C.)	389.19
Willis, C. H.		320.96

400 to 480 Acres

Arnett, Marvin		426.52
Fincher, J. W.		427.00
A Passey, W. H.	(Incl. L. & C.)	467.92
Whitten, Guy		473.53

480 to 560 Acres

Herman - Baker 540.64 Acres

560 to 640 Acres

A	Beebe, Sr., R. D., et al (Incl. L. & C.)	578.59
	Curtis, Melvin J. (See 'A' 720/800)	604.10
	Ellsworth, Grant, et al (See 'AA' Over 800)	579.11
	Enloe, Norris	578.85
	Hadley, D. L.	615.74
	Nichols, Hugh	577.74
	Riggs, Ben & Son (See 'B' Over 800)	575.20
	Sanders, F. G., et al	585.74
	Sawyer & St. of Ariz. - Neely (See Brown - Neely)	618.00
	Shipp, Earl, et al	614.02
	Wood, et al - Freestone	599.65

640 to 720 Acres

	Enloe, Wayne & Carl	712.47
	Killian, Ray, et al	640.62

720 to 800 Acres

A	Curtis, Melvin J. (Incl. L. & C.)	773.60
	Merrill Farms, et al	796.47

OVER 800 Acres

A	Compton, Joy (Incl. L. & C.)	1,086.95
	Dougherty Ranch	1,550.66
AA	Ellsworth, Grant, et al (Incl. L. & C.)	941.76
	Johnson, J. D.	1,038.58
	Morrison Bros.	1,153.58
	" " " (Incl. L. & C.)	1,464.38
	Recker, Earl C., et al	1,652.40
B	Riggs, Ben & Son (Incl. L. & C.)	1,459.80

E. ESTIMATED FUTURE SUBURBAN DEVELOPMENT.

The northern portion of the District is located just two and one half miles east of the City of Mesa, Arizona which is the third largest city in the state. The City of Mesa is growing rapidly in area and population and at the present time some 6000 acres of the district citrus lands north and east of the city have a potential of urban development in the next ten years. The development of the Valley is in this direction and as farm land is purchased for new sub-divisions for residential development, it is apparent that the drain on the available water resources will be reduced.

The District is in an advantageous position in regards to water supply, as it has a contract with the Salt River Valley Water Users' Association for surface water from the Salt and Verde Rivers and Rights to the use of ground water. The District also has the control of the distribution and delivery of all its water, so that any reduction in water use, caused by urban development in the District, could be utilized to maintain a full agricultural economy on the remaining land.

The City of Mesa is expanding its domestic water system at present, which includes extending mains into and across the District lands. With this development, it is probable that the domestic water in this area would be furnished by the Municipal System, and the city water source is entirely outside of the District. Should the entire 6000 acres be served by the Municipal System, then the district would only be called on to supply water to the remaining 31,000 acres for agricultural use: (31,000 acre X 4.0 acre feet = 124,000 acre feet of water at the source.)

In conclusion, it is reasonable to assume that the anticipated urban development of all or part of the aforementioned 6,000 acres in the District will reduce the drain on the District water resources substantially. This forecast of domestic water use for the District depends on anticipated growth of population in the Valley. In preparing this forecast, these conditions have been kept in mind, and it is believed that the estimates herein are conservative.

III. WATER SUPPLY.

The District has at present two major sources of irrigation water, they are: (1) Surface water, diverted at Granite Reef Dam. (2) Water pumped from the underground basin.

A. Total Water Production 1930 - 1958.

WATER PRODUCTION RECORD			
CALENDAR YEAR	RIVER AC. FT.	WELLS AC. FT.	TOTAL AC. FT.
1930	18,613	28,724	47,337
31	35,994	21,270	57,264
32	38,410	748	39,158
33	46,359	3,641	50,000
34	42,878	33,777	76,655
35	35,289	34,303	69,592
36	52,039	42,010	94,049
37	65,472	56,789	122,261
38	40,842	69,496	110,338
39	35,446	64,050	99,496
40	33,854	67,493	101,347
41	54,703	41,069	95,772
42	55,048	89,878	144,926
43	54,070	100,822	154,892
44	44,514	99,047	143,561
45	54,330	96,147	150,477
46	45,186	89,102	134,288
47	36,523	87,103	123,626
48	19,911	102,793	122,694
49	42,519	85,060	127,579
50	41,379	105,649	147,028
51	22,631	96,290	118,921
52	48,651	85,607	134,258
53	26,797	100,581	127,378
54	27,364	104,150	131,514
55	37,154	94,420	131,574
56	46,154	100,045	146,199
57	21,557	102,276	123,835
Average 1930 to 1946 Incl.	44,269	55,198	99,468
Average 1947 to 1958 Incl.	33,694	96,724	130,418
Average 1930 to 1958 Incl.	40,132	71,512	111,643

B. Surface Water Supply.

Source: 5.6% of all water diverted at Granite Reef Dam by the Salt River Valley Water Users' Association, for Association use.

GRANITE REEF DAM DIVERSIONS			
YEAR	NET PROJECT Diversions (Ac/Ft)	R.W.C.D. Allotment (5.6)% (Ac/Ft)	R.W.C.D. Actual Diversions (Ac/Ft)
1926	848,528	47,518	21,795
27	989,353	55,404	44,602
28	974,682	54,582	80,896
29	821,016	45,977	16,976
30	729,440	40,849	18,940
31	786,794	44,060	36,019
32	1,055,474	59,107	38,451
33	849,320	47,562	46,337
34	761,839	42,663	43,099
35	963,972	53,982	35,290
36	978,116	54,774	52,040
37	1,177,687	65,950	65,471
38	983,797	55,093	40,841
39	714,226	39,997	35,445
40	543,798	30,453	33,857
41	1,162,786	65,116	54,702
42	1,009,785	56,548	55,047
43	888,492	49,756	54,067
44	918,463	51,434	44,515
45	910,341	50,979	54,330
46	798,084	44,693	45,144
47	598,487	33,515	35,880
48	632,175	35,402	19,911
49	732,194	41,003	42,519
50	659,926	36,956	41,379
51	475,950	26,653	22,631
52	717,932	40,204	48,651
53	695,482	38,947	26,797
54	670,647	37,556	27,364
55	600,607	33,634	37,203
	24,649,393	1,380,367	1,220,199
	Ave. 746,950/yr	Ave.* 46,012/yr	Ave.* 40,673/yr.

* It is noted that the average figure for actual diversions is somewhat less than that for allotted diversions. This difference is explained by the fact that the district is subject to evaporation and operational losses on the quantity of water stored at Granite Reef Dam and in the Bartlett Reservoir.

C. Recap of Water Production and Costs 1948 - 1958

Year	River Water Produced (Ac. Ft.)	Pump Water Produced (Ac. Ft.)	Total Water Produced (Ac. Ft.)	Total Water Delivered (Ac. Ft.)	Per Cent of Loss
1948	19,912	102,779	122,691	95,552	22.12
1949	42,518	85,060	127,578	100,382	21.32
1950	41,379	105,648	147,027	114,374	22.21
1951	22,631	96,291	118,992	90,445	24.23
1952	48,582	85,608	134,190	107,829	19.64
1953	26,797	100,378	127,387	103,228	18.96
1954	27,295	104,150	131,445	107,167	18.52
1955	37,154	94,419	131,573	107,590	18.23
1956	46,154	100,045	146,199	119,687	18.13
1957	21,557	102,276	123,835	101,277	18.22

Year	River Water Power Cost	Pump Water Power Cost	O & M Cost	Total River Water Cost	Total Pump Water Cost	Average Cost
1948	\$1.12	\$4.08	\$2.64	\$3.76	\$6.72	\$5.79
1949	.89	4.38	2.18	3.07	6.56	5.39
1950	.74	4.47	1.73	2.47	6.20	5.13
1951	.84	4.30	2.37	3.21	6.67	5.97
1952	.63	4.23	2.24	2.87	6.47	5.16
1953	.72	4.47	3.20	3.92	7.67	6.88
1954	.67	4.46	2.43	3.10	6.89	6.09
1955	.71	4.62	2.53	3.24	7.15	6.04
1956	.62	4.76	2.41	3.03	8.17	6.55
1957	.77	5.00	2.97	3.74	7.97	7.23

Average yearly Produced 131,091 Ac. Ft.

Average Yearly Delivered 104,753 Ac. Ft.

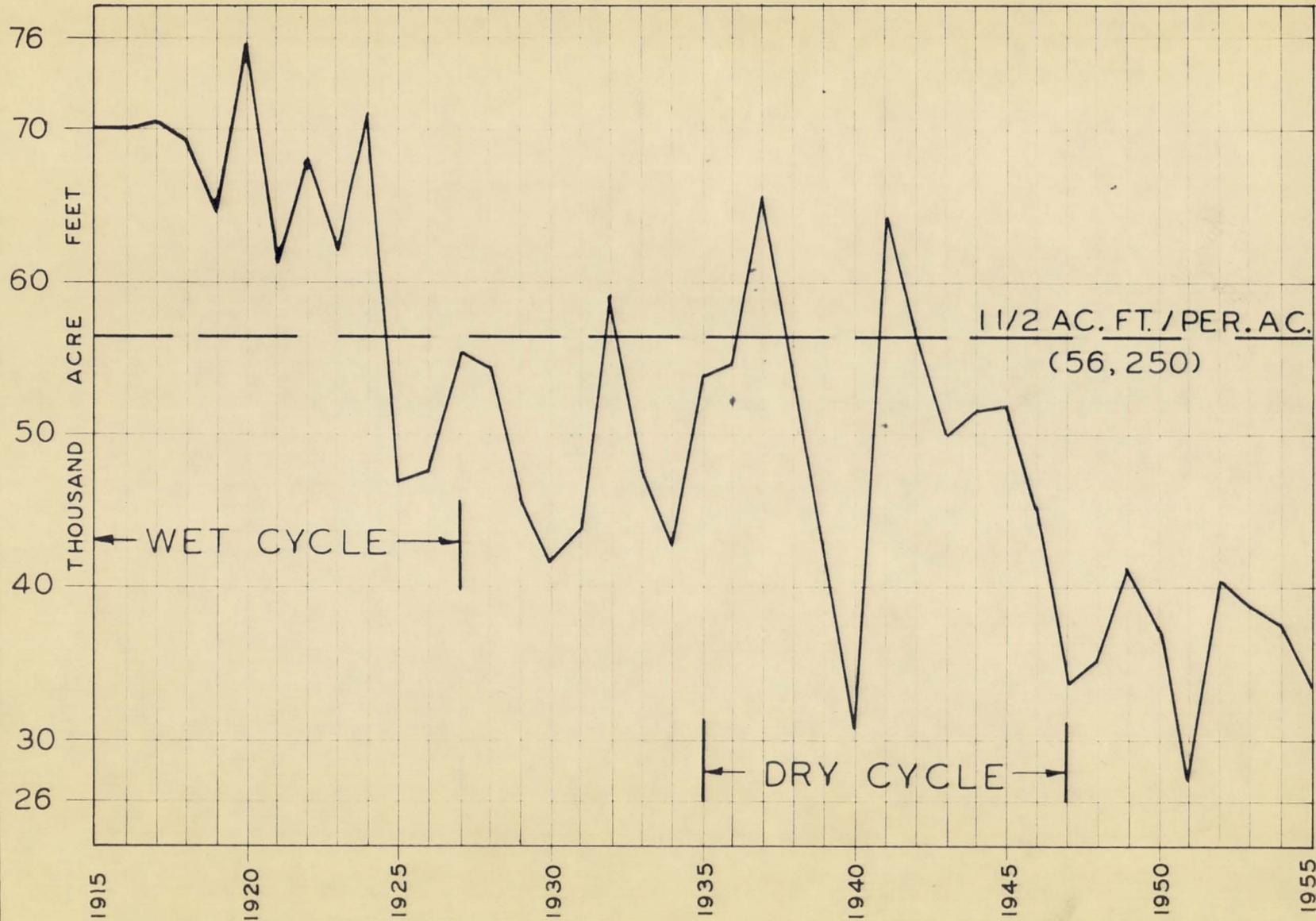
Average Yearly Loss 26,338 Ac. Ft.

Crop Values:

1948	\$ 4,042,905.00
1949	6,020,227.00
1950	11,339,414.00
1951	12,491,630.00
1952	11,794,033.00
1953	11,525,563.00
1954	9,994,471.00
1955	9,816,042.00
1956	10,406,314.00
1957	10,157,891.00

R.W.C.D. ALLOTMENT OF GRANITE REEF DAM DIVERSIONS 1915 - 1955

5.6% OF PROJECT DIVERSIONS AT GRANITE REEF DAM



FROM THE RECORDS OF THE S.R.V.W.U.A.

PLATE

D. Projection of Underground Water Table.

Table IV is a compilation of static water surface readings of District wells. It will be noted that the table includes readings made during the period of 1935-1957. During that period some wells were abandoned and some replacements drilled. This explains the fact that readings are recorded for 81 wells, while the District has never had more than 60 wells in operation at any one time. The recordings shown are compiled from the records of the Salt River Valley Water Users' Association and Roosevelt Water Conservation District.

The trend of the movement of the underground water table as indicated by these recordings is consistent with the trend of the entire basin from which this district withdraws it's pump water supply, as shown by Plate V. Taken from a report published by the United States Department of the Interior, Geological Survey, entitled: "Pumpage and Ground-water Levels in Arizona in 1952, By L. C. Halpenny and others." Prepared in cooperation with Arizona State Land Department, W. W. Lane, Commissioner, Tucson, Arizona.

From Plate V it will be noted that for the period 1946-1957 the average annual decline is approximately 8.4 feet. This ten year period represents the heaviest draft made upon the District underground water source in it's history. The factors effecting the decline of the water table during this period are both nation wide and local, and are as follows: (1) Farm prices far above average. (2) Cotton market good, and acreage controls not established until 1954. (3) National emergency existed in Korea. (4) Farming operations developed to enhance a double crop season. (5) Rainfall below normal on watershed area of surface supply. (6) Area surrounding District, within the same underground water basin, pumping at an excessive rate, i.e. S.R.V.W.V.A. and Queen Creek Irrigation District.

Assuming that the factors mentioned do not change enough during the repayment period of the proposed loan to decrease the average annual decline of the water table, the following projection is made:

Ave. Annual Decline	8.4 feet
Construction Period (3 years) + repayment period (22 years)	= 25 years

Total = 25 yrs X 8.4 Ft/yr. = 210.0 Ft. Average decline

Well Series (1-10) 35% of District Area

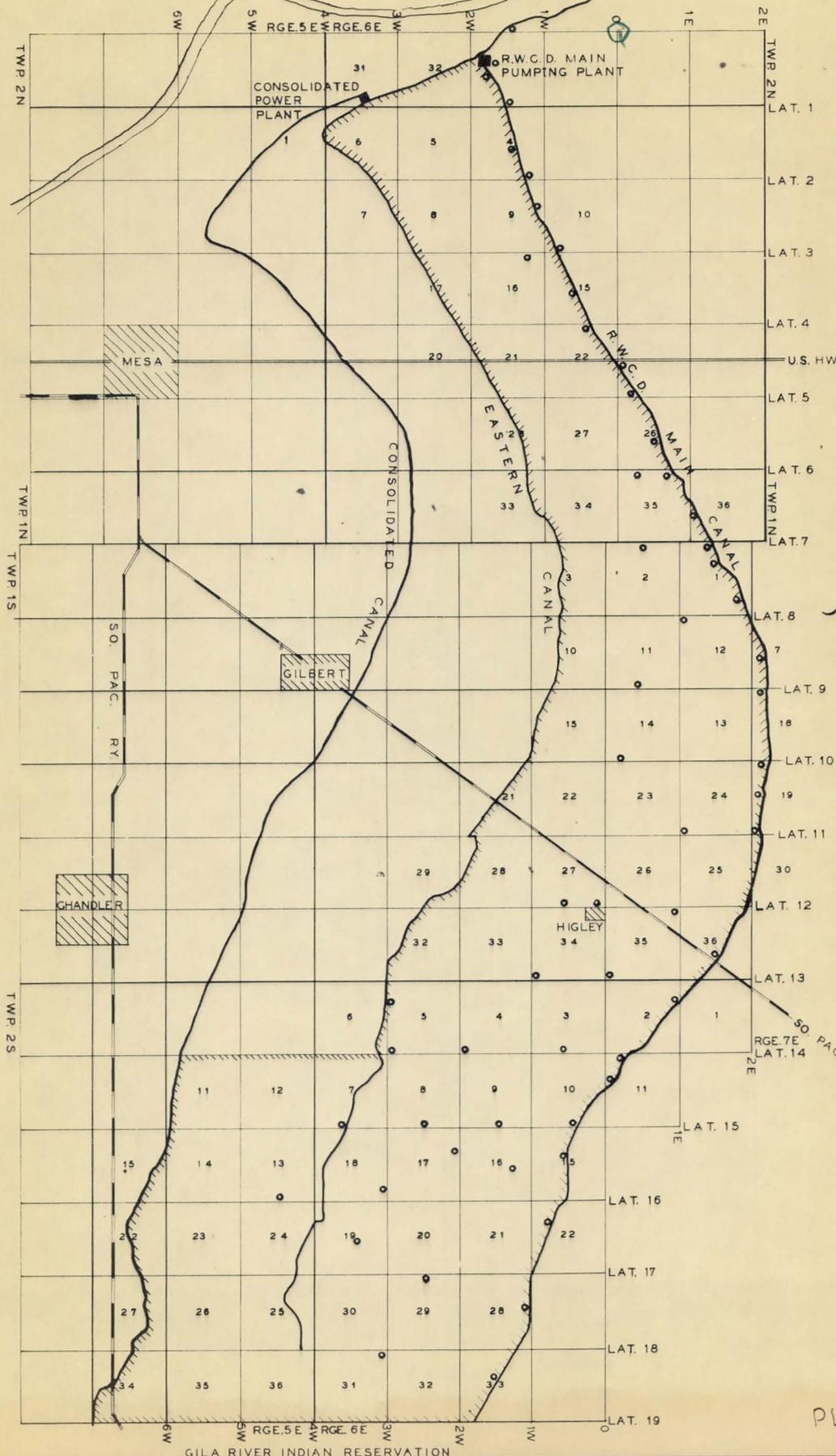
326.6 Ft. - Present average depth to water
+ 210.0 Ft. - Estimated decline for 25 yr. period
536.6 Ft. - Projected average depth to water

Well Series (10-18½) 65% of District Area

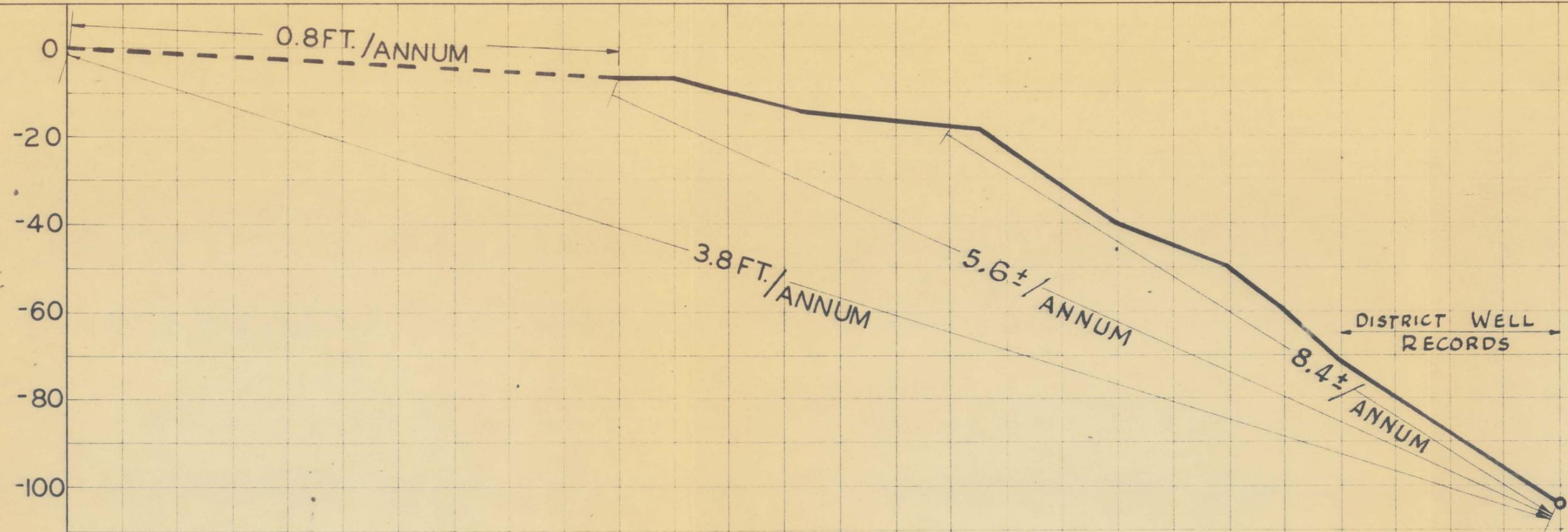
198.3 Ft. - Present average depth to water
+ 210.0 Ft. - Estimated decline for 25 yr. period
408.3 Ft. - Projected average depth to water

ROOSEVELT WATER CONSERVATION DISTRICT (DISTRICT WELLS)

GRANITE REEF
DIVERSION DAM



CUMULATIVE NET CHANGES OF AVERAGE GROUND WATER LEVEL, IN FEET 1930 - 1956



FROM RECORDS OF U.S. GEOLOGICAL SURVEY
&
ARIZONA STATE LAND DEPT.
(PUMPAGE AND GROUND-WATER LEVELS IN ARIZ. IN 1952)
(L. C. HALPENNY AND OTHERS)

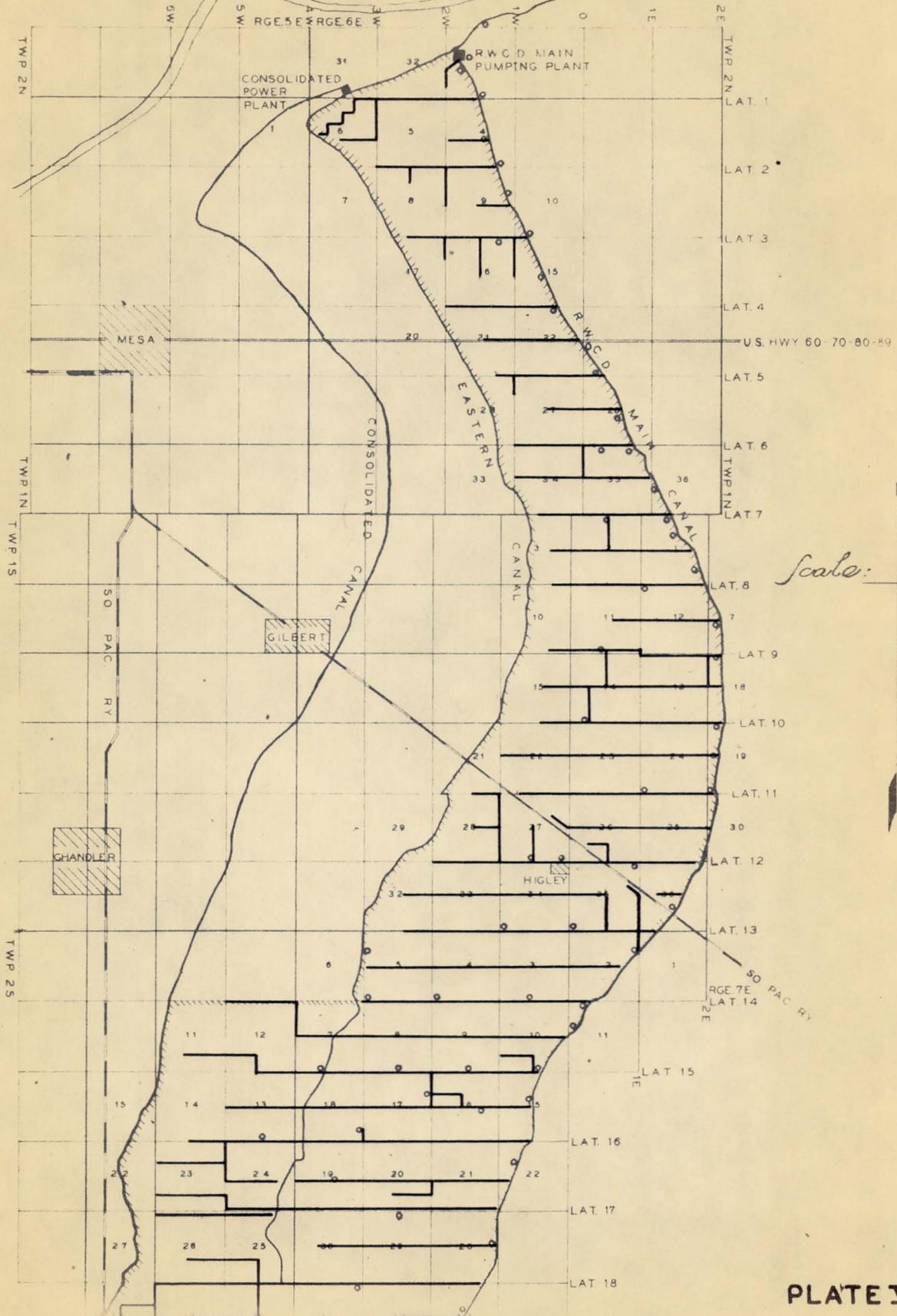
CUMULATIVE NET CHANGES OF AVERAGE WATER LEVEL
QUEEN CREEK - HIGLEY - GILBERT AREA

PLATE V

1930 31 32 33 34 35 36 37 38 39 1940 41 42 43 44 45 46 47 48 49 1950 51 52 53 54 55 56

ROOSEVELT WATER CONSERVATION DISTRICT DISTRIBUTION SYSTEM

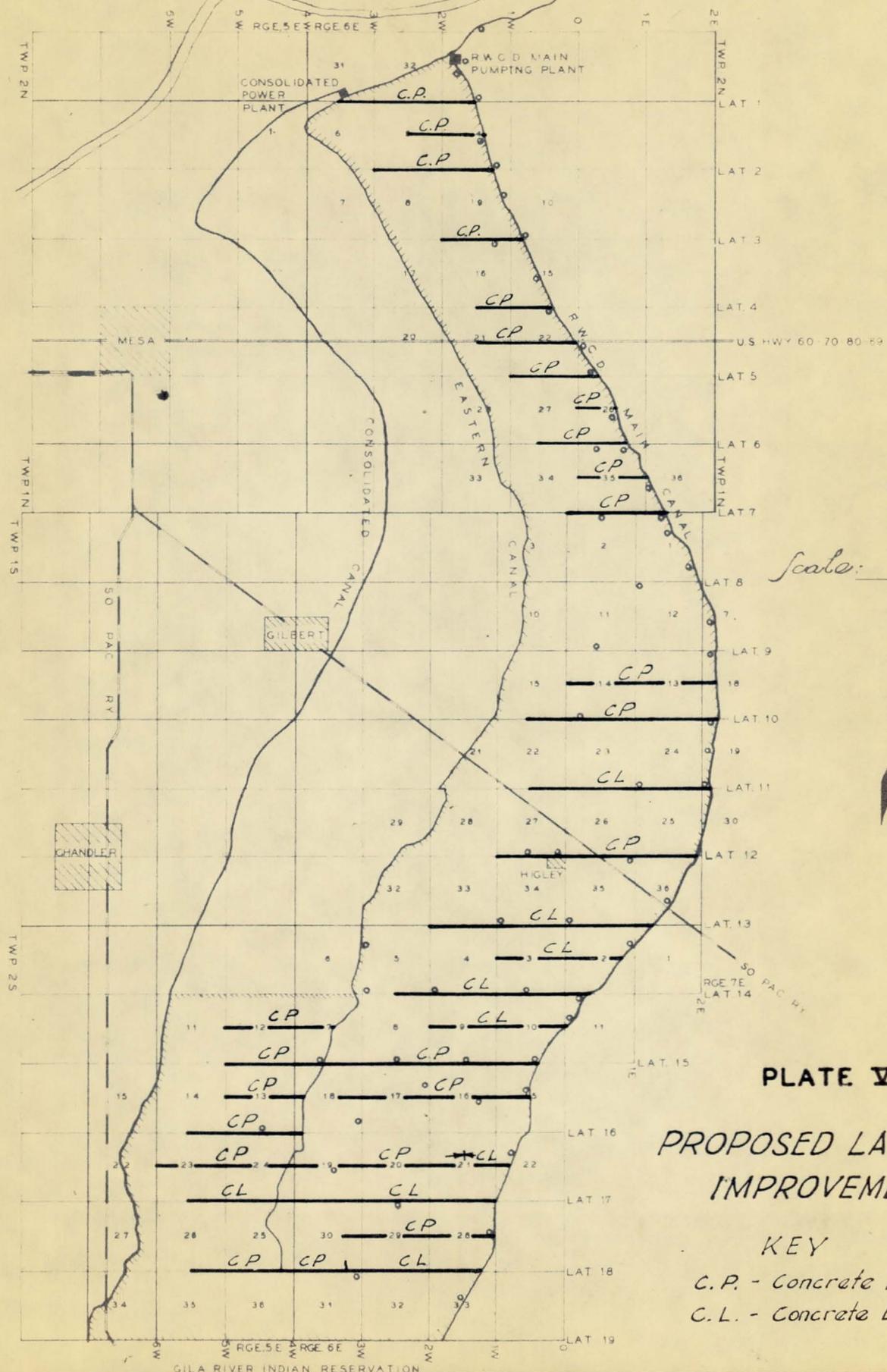
GRANITE REEF
DIVERSION DAM



Scale: 1" = 2mi.

ROOSEVELT WATER CONSERVATION DISTRICT

GRANITE REEF DIVERSION DAM



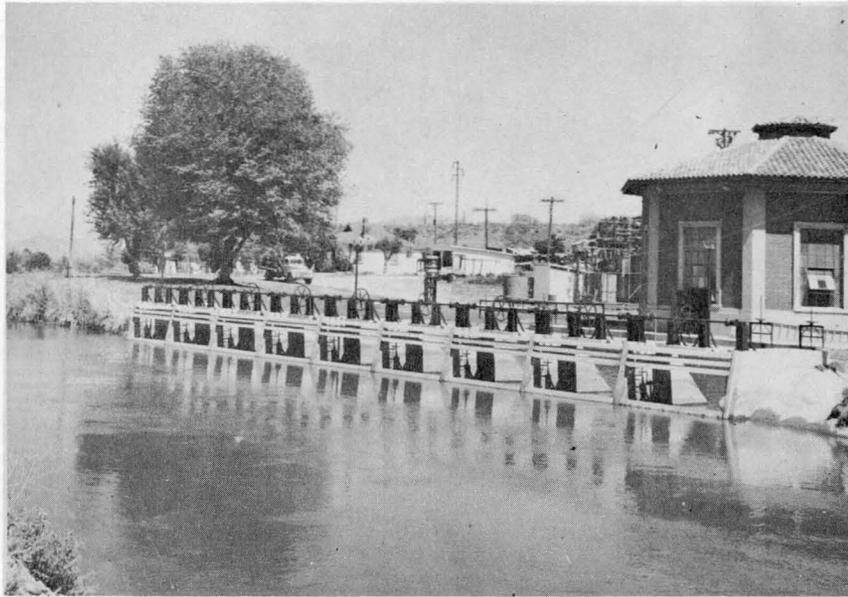
Scale: 1" = 2mi.

PLATE VII

PROPOSED LATERAL IMPROVEMENT

KEY

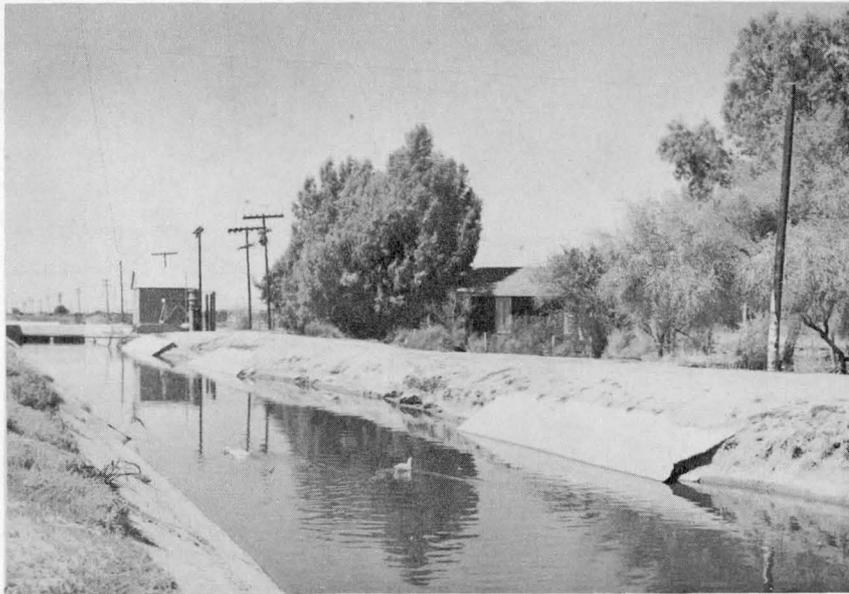
C.P. - Concrete Pipe
 C.L. - Concrete Lining



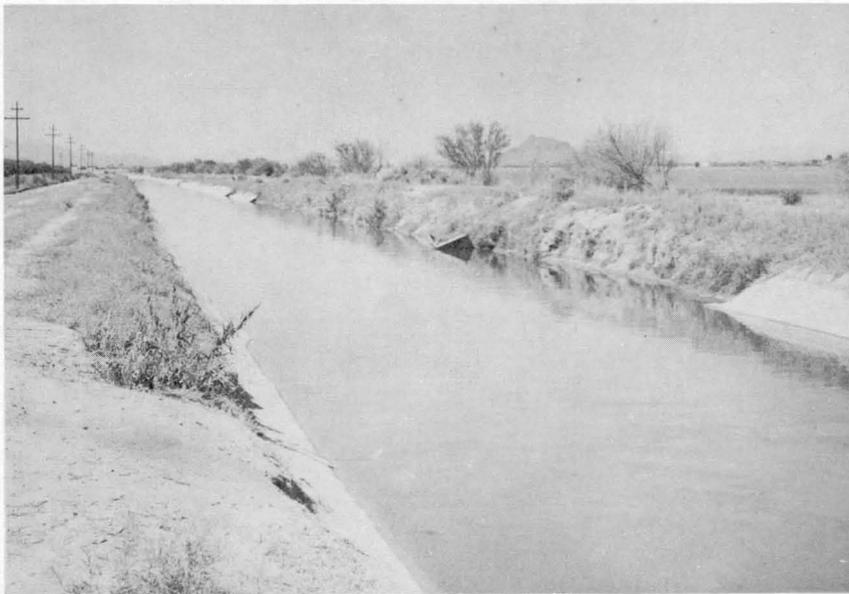
View of R. W. C. D. Main Pumping Plant on
S. R. V. W. U. A. Consolidated Canal



View of R. W. C. D. Main Canal
Section of Deteriorated Lining



View of R. W. C. D. Main Canal
Section of Deteriorated Lining



View of R. W. C. D. Main Canal
Lining Damaged by Flood



View of R. W. C. D. Main Canal Showing
Section With Top of Lining too Low for Proper Operation



View of R. W. C. D. Main Canal
Section of Deteriorated Lining



View of Lateral and Check Structure With
Heavy Water Loss Due to Seepage



View of Lateral With High Maintenance Cost
and Heavy Water Loss Due to Erosion



View of Lateral With High Maintenance Cost
and Heavy Water Loss Due to Seepage and Erosion



View of 1/4 Mile of Lined Test Section 2-inches of
Non Reinforced Concrete Lining on Compacted Embankment



View of Lateral With Heavy Maintenance
Cost Due to Erosion



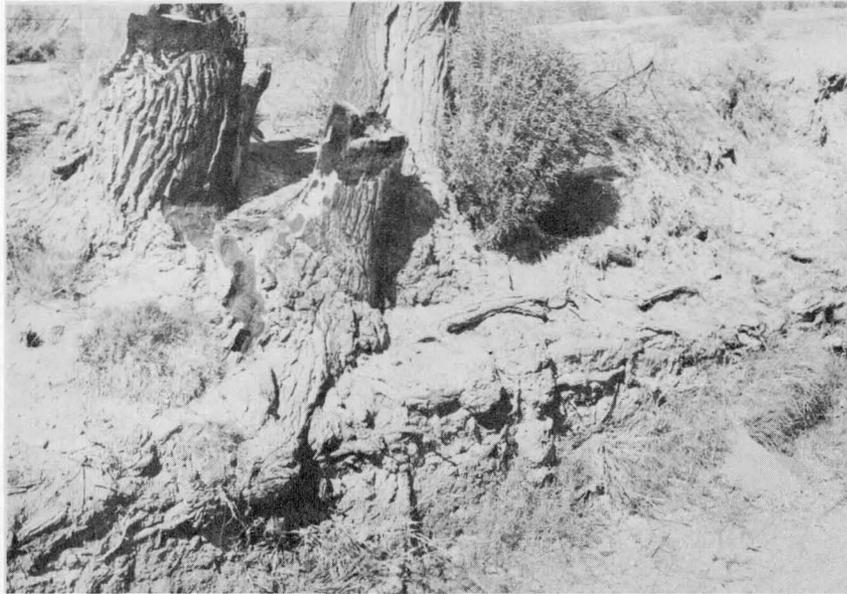
View of Lateral With Heavy Water
Loss Due to Seepage



View of Lateral and Check Structure With
High Maintenance Cost Due to Erosion



View of Lateral With High Maintenance Cost
and Heavy Water Loss Due to Plant Growth



View of Lateral Bank
High Maintenance Cost - Heavy Seepage Loss



View of Lateral and Check Structure
Heavy Seepage Loss

IV. PLAN.

A. Rehabilitation and Betterment Problems and Needs.

The original project facilities were constructed over 30 years ago. The main canal system was lined with pneumatically applied mortar, and due to constant use and some flood damages is in need of repair. In some places the elevation of the top of the lining is too low for proper operation. The laterals were not lined and facilities in general were adapted to the prevailing conditions representative of rural land use patterns, low cost labor and an abundant water supply.

Present problems are the result of many physical and economic changes that have taken place since construction was completed. These include changed land and water use patterns, increased operation and maintenance costs, continued short surface water supply and the lowering of the ground water table. Present needs are for general betterment and modernization of the irrigation facilities to adapt the system to present day conditions.

1. Operation and Maintenance

Operation and maintenance problems and costs have increased rapidly in recent years because of higher labor costs and more complex water service requirements. Improvement and modernization of physical works is now needed to insure efficient and economical over-all operations.

Maintenance problems have increased concurrently with labor costs and age of facilities. The pneumatically applied mortar lining of the main canal is broken and cracked in various places increasing the cost of cleaning, demossing, etc. The elevation of the top of the lining is below required grade in places, prohibiting proper lateral delivery. The lateral system, some 125 miles overall, consists practically entirely of unlined open ditches. Due to the gradient of the natural ground and the large quantity of water carried by the laterals, some have eroded and scoured to such an extent that they are now excessively deep and wide. This condition provides a large area for weed growth and thus provides a greatly increased cleaning cost, etc. The demands in the face of higher cost labor make the installation of concrete lining and pipe lines one of the most urgent project needs from a maintenance standpoint.

2. Water Conservation.

District records show that about 20.1% of the total project water supply is lost by evaporation, seepage and waste in transit through the canal and lateral system. These losses apply to both pumped and surface water, since both are transported through the distribution system for delivery. The total of these losses on the average are estimated at about 26,338 acre

feet per year, which at the price to be charged for water in 1958 represents \$197,530. According to the records of the Salt River Valley Water Users' Association: "Less than 25% of the canal and lateral losses on the project which are accounted for as percolation to the underground basin are recoverable by project pumps. It has often been assumed that these accretions to the underground basin could be stored there indefinitely and thus retained without evaporation for future use. Under the conditions that prevail in the Salt River Valley this assumption is not correct insofar as project use is concerned."

There are three basic reasons for making more efficient use of the available surface supply on the project and preventable seepage losses to a minimum. Water conserved at the surface is available for project use, whereas:

1. Only 25% of the total losses from canals and laterals are estimated to be recoverable.
2. There would be direct monetary saving in substituting these preventable losses for an equal amount of pumped water.
3. The quantity of water available per acre would be increased, thus increasing the potential yield of each acre.

It is estimated that a comprehensive program of canal lining replacement, lateral lining, pipe line construction and structure improvements would prevent approximately 50% of the total measured losses or about 13,000 acre-feet per year. Other important and tangible benefits are reduction of the overdraft on the underground basin and lowered pumping costs.

B. Proposed Rehabilitation and Betterment Program.

1. General Description.

The proposed program would provide a means for R.W.C.D. to undertake an extensive rehabilitation and betterment program. It would, in effect, provide an interest-free Federal loan totaling \$2,780,000 under the "Small Reclamation Project Act of 1956, to be used by R.W.C.D. to expedite a program for the betterment of irrigation works over a three year period. None of these funds would be used for other than rehabilitation purposes.

2. Work Proposed

A. Canals

The main canal system would be patched and repaired along its entirety in such places that

have been damaged due to overflowing and flood damage. It will be necessary to repair damaged sections by preparing the embankment, placing reinforcing steel, and lining with pneumatically applied mortar.

Under this phase of the program the work would be carried on during the mid-winter season when canals can be dried up for a period of time.

Physical work would be accomplished partly by contract and partly by District forces. The District is responsible for handling all irrigation water and in general would perform the earthwork, placement of reinforcement fabric and preparatory work with actual placement of lining being performed by contract.

B. Laterals

It is contemplated that approximately 61 miles of laterals would be reconstructed and lined with concrete or replaced with underground pipe lines. Lateral structure work would be performed principally by District forces.

The proposed program will proceed at such rate as available allocations of funds will allow. It is the opinion of the engineer that a schedule of 20 to 25 miles of lateral rehabilitation per year could be readily accomplished without interfering with the normal operation of the District.

Some of the laterals would be reconstructed along existing alignment while in other cases it would be more feasible to relocate within the District right-of-way.

Underground pipe lines would be constructed where it is determined to be engineering wise and economically feasible to do so. The general terrain and direction of the flow of the main portion of laterals in the District is such that pipe lines would operate very efficiently both in delivery service and low cost maintenance.

In June of 1955 the District rehabilitated a portion of one lateral to establish a test section. The section is 1/4 mile in length and was constructed in accordance with the specifications approved by the Bureau of Reclamation for the Salt River Valley Water Users' Association. The work consisted of relocation of alignment, preparation of compacted embankment,

and lining with 2" of nonreinforced concrete. The compacted embankment was constructed with District forces and equipment. The lining was placed by a private contracting firm using the subgrade guided slip form method.

C. Adjustments

The quantities of work outlined above represent the District's best current estimate of a practical 3 year program fitted to the over-all objectives of a betterment plan. However, allowance should be made for future adjustments since flexibility is necessary for successful completion of a program of this type.

It appears probable that during a 3 year period adjustments may be desirable to take advantage of new developments in low cost lining and pipe construction methods which are undergoing constant improvement.

3. Estimated Costs

Estimated costs for the various features in the proposed \$2,730,000 program are based on actual costs of similar work currently in progress by the Salt River Project, past experience of R.W.C.D., current labor and materials costs, and engineering estimates compiled by a private consulting engineering firm.

TABLE VI

CANAL LINING REPAIR
ESTIMATED COSTS

(1-1/4 inch reinforced pneumatically applied mortar)

Estimating Unit Costs

Labor	-----	\$0.065 square foot
Reinforcing	-----	\$0.035
Transportation and heavy equipment	-----	\$0.045
Misc.	-----	\$0.023
Pneumatically applied mortar (contract	-----	\$0.200 <u>\$0.368</u>

Estimated Area of Repair
1,465,200 square feet

1,465,200 sq. ft. @ \$0.368 = \$539,193

TABLE V

LATERAL IMPROVEMENT
ESTIMATED COSTS

LATERAL	TYPE OF IMPROVEMENT	REQUIRED SIZE	QUANTITY (FT.)	UNIT COST (\$)	SUB TOTAL (\$)	TOTAL (\$)
1	N.J.C.P.	30"	5280	4.80	25,344	58,032
	" "	24"	6560	4.00	26,240	
	R.C.P.	24"	88	5.10	448	
	STR.		6 only	1000.0	6,000	
1 1/2	N.J.C.P.	24"	2600	4.00	10,400	16,188
	N.R.C.P.	18"	1320	2.70	3,564	
	R.C.P.	24"	44	5.10	224	
	STR.		2 only	1000.0	2,000	
2	N.J.C.P.	24"	8060	4.00	32,240	36,688
	R.C.P.	24"	88	5.10	448	
	STR.		4 only	1000.0		
3	N.J.C.P.	30"	859	4.80	4,123	29,815
	N.J.C.P.	24"	5280	4.00	21,120	
	R.C.P.	30"	88	6.50	572	
	STR.		4 only	1000.0	4,000	
Note:	N.J.C.P.	-	No joint Conc. pipe (non reinforced cast in place)			
	R.C.P.	-	Reinforced conc. pipe			
	N.R.C.P.	-	Non reinforced conc. pipe			
	S.R.C.P.	-	Semi reinforced conc. pipe			
	C.D.	-	Concrete lined ditch			

TABLE V

LATERAL IMPROVEMENT
ESTIMATED COSTS

LATERAL	TYPE OF IMPROVEMENT	REQUIRED SIZE	QUANTITY (FT.)	UNIT COST (\$)	SUB TOTAL (\$)	TOTAL (\$)
4	N.J.C.P.	24"	4602	4.00	18,408	26,420
	N.R.C.P.	18"	1320	2.70	3,564	
	R.C.P.	24"	88	5.10	448	
	STR.		4 only	1000.0	4,000	
4 1/2	N.J.C.P.	24"	5000	4.00	20,000	32,352
	N.R.C.P.	18"	2640	2.70	7,128	
	R.C.P.	24"	44	5.10	224	
	STR.		5 only	1000.0	5,000	
5	N.J.C.P.	30"	4640	4.80	22,272	35,290
	N.J.C.P.	24"	1320	4.00	5,280	
	N.R.C.P.	21"	1320	3.25	4,290	
	R.C.P.	24"	88	5.10	448	
	STR.		3 only	1000.0	3000	
5 1/2	N.J.C.P.	24"	2700	4.00	10,800	14,024
	R.C.P.	24"	44	5.10	224	
	STR.		3 only	1000.0	3000	
6	N.J.C.P.	24"	6613	4.00	26,452	31,676
	R.C.P.	24"	44	5.10	224	
	STR.		5 only	1000.0	5000	

TABLE V

LATERAL IMPROVEMENT
ESTIMATED COSTS

LATERAL	TYPE OF IMPROVEMENT	REQUIRED SIZE	QUANTITY (FT.)	UNIT COST (\$)	SUB TOTAL (\$)	TOTAL (\$)
6 1/2	N.J.C.P.	24"	5380	4.00	21,520	25,968
	R.C.P.	24"	88	5.10	448	
	STR.		4 only	1000.0	4,000	
7	N.J.C.P.	36"	2436	5.88	14,324	39,806
	N.J.C.P.	30"	5280	3.75	19,800	
	R.C.P.	36"	88	7.75	682	
	STR.		5 only	1000.0	5000	
9 1/2	N.J.C.P.	30"	6780	4.80	32,544	63,522
	N.J.C.P.	24"	5280	4.00	21,120	
	R.C.P.	30"	132	6.50	858	
	STR.		9 only	1000.0	9,000	
10	C.D.	2x2.4	6780	0.30	19,689	51,252
	C.D.	2x2.0	5280		13,306	
	C.D.	1x2.5	2640		6,399	
	R.C.P.	30"	132	6.50	858	
	STR.		11 only	1000.0	11,000	
11	C.D.	2x2.7	5280	0.30	16,410	50,254
	C.D.	2x2.4	5280		15,333	
	C.D.	2x2.0	2640		6,653	
	R.C.P.	30"	132		858	
	STR.		11 only	1000.0	11,000	

TABLE V

LATERAL IMPROVEMENT
ESTIMATED COSTS

LATERAL	TYPE OF IMPROVEMENT	REQUIRED SIZE	QUANTITY (FT.)	UNIT COST (\$)	SUB TOTAL (\$)	TOTAL (\$)
12	N.J.C.P.	36"	13,200	5.88	77,616	93,639
	R.C.P.	36"	132	7.75	1,023	
	STR.		15 only	1000.0	15,000	
13	C.D.	2x2.7	1391	0.30	4,323	62,519
	C.D.	2x2.6	2640		8,078	
	C.D.	2x2.2	7920		21,527	
	C.D.	1x2.6	2640		6,621	
	C.D.	1x2.2	2640		5,726	
	R.C.P.	30"	176	6.50	1,144	
	STR.		15 only	1000.0	15,000	
13 1/2	C.D.	2x2.4	4400	0.30	12,778	33,706
	C.D.	2x2.0	5300		13,356	
	R.C.P.	30"	88	6.50	572	
	STR.		7 only	1000.0	7,000	
14	C.D.	2x2.2	4740		12,883	47,990
	C.D.	2x2.4	2640		7,667	
	C.D.	1x2.5	5280		12,799	
	C.D.	1x2.1	2640		5,497	
	R.C.P.	30"	176	6.50	1,144	
	STR.		8 only	1000.0	8,000	

TABLE V

LATERAL IMPROVEMENT
ESTIMATED COSTS

LATERAL	TYPE OF IMPROVEMENT	REQUIRED SIZE	QUANTITY (FT.)	UNIT COST (\$)	SUB TOTAL (\$)	TOTAL (\$)
14 1/2	C.D.	2x2.0	5400	0.30 sq.ft.	13,608	31,250
	C.D.	2x1.9	5300		12,784	
	R.C.P.	30"	132	6.50	858	
	STR.		4 only	1000.0	4,000	
14 1/2 W. of Extension Canal	N.J.C.P.	30"	8580	4.80	41,184	47,470
	R.C.P.	30"	44	6.50	286	
	STR.		6 only	1000.0	6,000	
15	N.J.C.P.	36"	14060	5.88	82,673	106,489
	N.J.C.P.	30"	2640	4.80	12,672	
	R.C.P.	36"	176	6.50	1,144	
	STR.		10 only	1000.0	10,000	
15 W. of Extension Canal	N.J.C.P.	30"	2640	4.80	12,672	38,078
	N.J.C.P.	24"	5280	4.00	21,120	
	R.C.P.	30"	44	6.50	286	
	STR.		4 only	1000.0	4,000	
15 1/2	N.J.C.P.	36"	5240	5.88	30,811	94,357
	N.J.C.P.	30"	10560	4.80	50,688	
	R.C.P.	36"	132	6.50	858	
	STR.		12 only	1000.0	12000	

TABLE V

LATERAL IMPROVEMENT
ESTIMATED COSTS

LATERAL	TYPE OF IMPROVEMENT	REQUIRED SIZE	QUANTITY (FT.)	UNIT COST (\$)	SUB TOTAL (\$)	TOTAL (\$)
15 1/2 W. of Extension Canal	N.J.C.P.	24"	5280	4.00	21,120	27,092
	N.J.C.P.	30"	500	4.80	2,400	
	R.C.P.	30"	500	4.80	2,400	
	STR.		3 only	1000.0	3,000	
16 W. of Extension Canal	N.J.C.P.	30"	9240	4.80	44,352	49,638
	R.C.P.	30"	44	6.50	286	
	STR.		5 only	1000.0	5,000	
16 1/2 W. of Extension Canal	N.J.C.P.	30"	5000	4.80	24,000	26,286
	R.C.P.	30"	44	6.50	286	
	STR.		2 only	1000.0	2,000	
16 1/2	C.D.	2x2.4	3730	0.30 sq.ft.	10,832. t.	77,394
	N.J.C.P.	36"	2640	5.88	15,523	
	N.J.C.P.	30"	7920	4.80	38,016	
	R.C.P.	36"	132	7.75	1,023	
	STR.		12 only	1000.0	12,000	
17	C.D.	2x2.5	5280	0.30 sq.ft.	15,840	60,067
	C.D.	2x2.2	5280		14,351	
	C.D.	1x2.3	2640		5,940	
	C.D.	1x2.0	3900		7,792	
	R.C.P.	30"	176	6.50	1,144	
	STR.		15 only	1000.0	15,000	

TABLE V

LATERAL IMPROVEMENT
ESTIMATED COSTS

LATERAL	TYPE OF IMPROVEMENT	REQUIRED SIZE	QUANTITY (FT.)	UNIT COST (\$)	SUB TOTAL (\$)	TOTAL (\$)
17 W. of Extension Canal	C.D.	1x2.7	3960	0.30 sq.ft.	34,214	58,368
	C.D.	1x2.0	2640		17,582	
	R.C.P.	30"	88		572	
	STR.		6 only	1000.0	6,000	
17 1/2	N.J.C.P.	30"	7920	4.80	38,016	62,428
	N.J.C.P.	24"	3960	4.00	15,840	
	R.C.P.	30"	88	6.50	572	
	STR.		8 only	1000.0	8,000	
18	C.D.	1x2.5	4382	0.30 sq.ft.	10,622	97,310
	N.J.C.P.	30"	5280	4.80	25,344	
	N.J.C.P.	24"	5930	4.00	23,720	
	C.D.	2x2.6	1800	0.30 sq.ft.	5,508	
	C.D.	1x2.7	5280		13,686	
	R.C.P.	30"	220	6.50	1,430	
	STR.		17 only	1000.0	17,000	

TABLE V SUMMARY OF ESTIMATED LATERAL IMPROVEMENT COSTS

LATERAL	CONDITION	TYPE OF IMPROVEMENT	STRUCTURES	LENGTH	ESTIMATED COSTS
NO. 1	CRITICAL LOSS	CONC. PIPE LINE	6	2.24 MI.	58,032
NO. 1 1/2	AVERAGE LOSS	CONC. PIPE LINE	2	0.74 MI.	16,188
NO. 2	HIGH MAINT.	CONC. PIPE LINE	4	1.53 MI.	36,688
NO. 3	CRITICAL LOSS HIGH MAINT.	CONC. PIPE LINE	4	1.16 MI.	29,815
NO. 4	CRITICAL LOSS HIGH MAINT.	CONC. PIPE LINE	4	1.12 MI.	26,420
NO. 4 1/2	LOCATED ON U.S. HWY. NO. 80 R/W	CONC. PIPE LINE	5	1.45 MI.	32,352
NO. 5	CRITICAL LOSS	CONC. PIPE LINE	3	1.40 MI.	35,290
NO. 5 1/2	HIGH MAINT.	CONC. PIPE LINE	3	0.51 MI.	14,024
NO. 6	SANDY SOIL CRITICAL LOSS	CONC. PIPE LINE	5	1.25 MI.	31,676
NO. 6 1/2	HEAVY EROSION HIGH MAINT.	CONC. PIPE LINE	4	1.02 MI.	25,968
NO. 7	AVERAGE LOSS	CONC. PIPE LINE	5	1.46 MI.	39,806
NO. 12	LOCATED ON MAIN HWY. R/W	CONC. PIPE LINE	15	2.53 MI.	93,639
NO. 13	SUBJECT TO FLOOD WATER	CONC. LINING	15	3.26 MI.	62,519
NO. 14	SUBJECT TO FLOOD WATER	CONC. LINING	8	2.90 MI.	47,990
NO. 15	SUBJECT TO FLOOD WATER	CONC. PIPE LINE	10	3.16 MI.	106,489
NO. 15 1/2	SUBJECT TO FLOOD WATER	CONC. PIPE LINE	12	2.99 MI.	94,357
NO. 16 1/2	HEAVY LOSS	CONC. LINING CONC. PIPE LINE	12	0.71 2.02 MI.	77,394
NO. 17	SUBJECT TO FLOOD WATER	CONC. LINING	15	3.24 MI.	60,067

TABLE V SUMMARY OF ESTIMATED LATERAL IMPROVEMENT COSTS

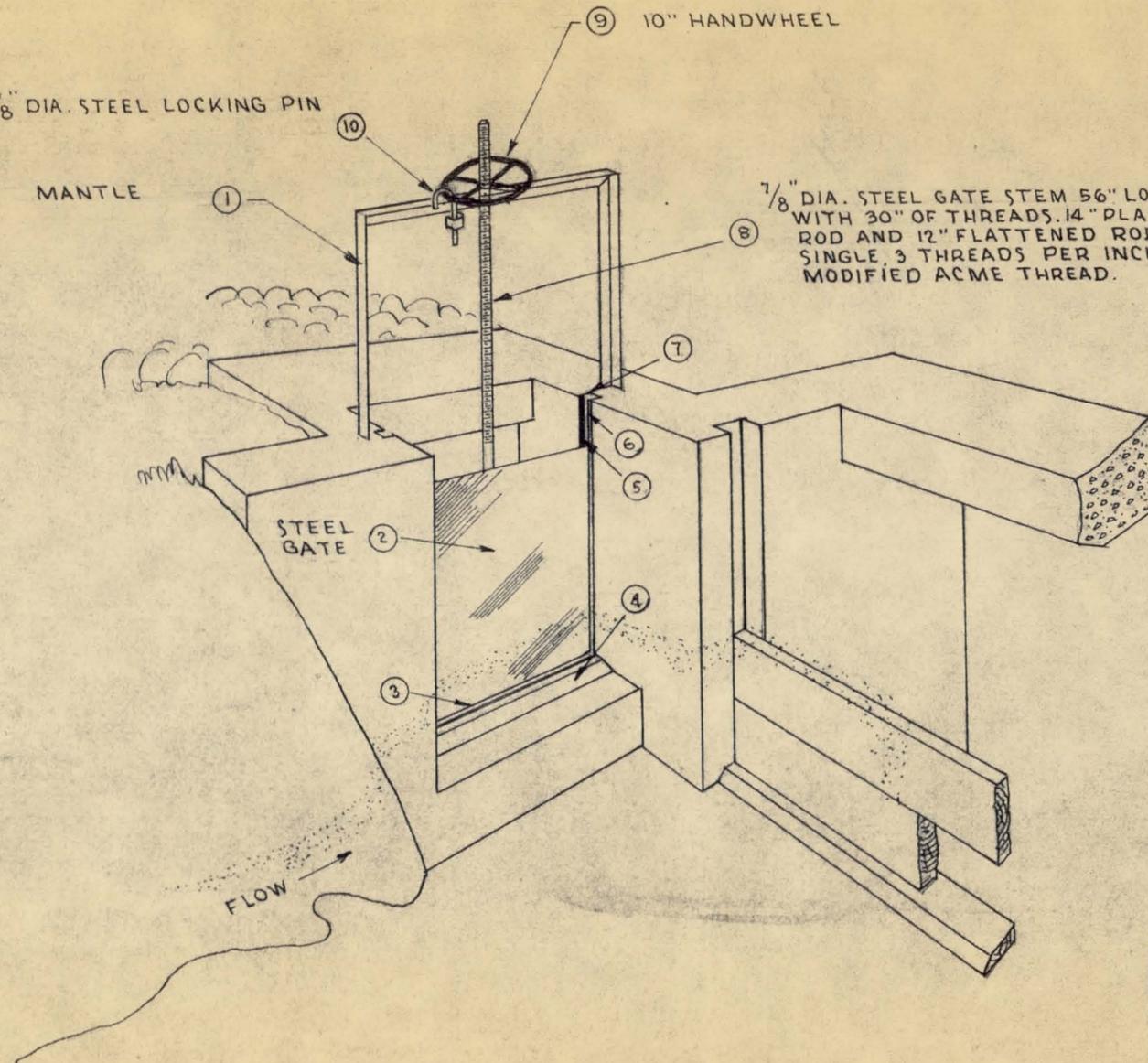
LATERAL	CONDITION	TYPE OF IMPROVEMENT	STRUCTURES	LENGTH	ESTIMATED COSTS
NO.17 1/2	HIGH MAINT.	CONC. PIPE LINE	8	2.25 MI.	62,428
NO.18	HIGH MAINT.	CONC. PIPE LINE CONC.LINING	17	2.12 MI. 2.17 MI.	97,310
NO.13 1/2	SUBJECT TO FLOODWATER	CONC. LINING	7	1.84 MI.	33,706
NO.14 1/2	SUBJECT TO FLOOD WATER	CONC. LINING	4	2.03 MI.	31,250
NO.9 1/2	AVERAGE LOSS	CONC. PIPE LINE	9	2.28 MI.	63,522
NO.11	SUBJECT TO FLOOD WATER	CONC. LINING	11	2.50 MI.	50,254
NO.17 W	AVERAGE LOSS	CONC. LINING	6	1.25 MI.	58,368
NO.16 1/2 W	AVERAGE LOSS	CONC. PIPE LINE	2	.96 MI.	26,286
NO.16 W	AVERAGE LOSS	CONC. PIPE LINE	5	1.75 MI.	49,638
NO.15 1/2 W	AVERAGE LOSS	CONC. PIPE LINE	3	1.19 MI.	27,092
NO.15 W	AVERAGE LOSS	CONC. PIPE LINE	4	1.50 MI.	38,078
NO.14 1/2 W	AVERAGE LOSS	CONC. PIPE LINE	6	1.63 MI.	47,470
NO.10	AVERAGE LOSS	CONC. LINING	11	2.81 MI.	51,252
	TOTALS		225	60.97 MI.	1,525,368

5/8" DIA. STEEL LOCKING PIN

MANTLE

⑨ 10" HANDWHEEL

7/8" DIA. STEEL GATE STEM 56" LONG WITH 30" OF THREADS. 14" PLAIN ROD AND 12" FLATTENED ROD. SINGLE, 3 THREADS PER INCH MODIFIED ACME THREAD.



~ LEGEND ~

- ① MANTLE
- ② STEEL GATE
- ③ RUBBER BOTTOM GASKET
- ④ 3/4" x 3" REDWOOD
- ⑤ 3/4" x 3/4" REDWOOD
- ⑥ WEDGE
- ⑦ RUBBER SIDE GASKET
- ⑧ GATE STEM
- ⑨ HANDWHEEL
- ⑩ LOCKING PIN

PLATE VIII

PERSPECTIVE
TURN OUT STRUCTURE
CEMENT LINED LATERAL

DESIGNED:

DRAWN:

TRACED:

SCALE: NONE

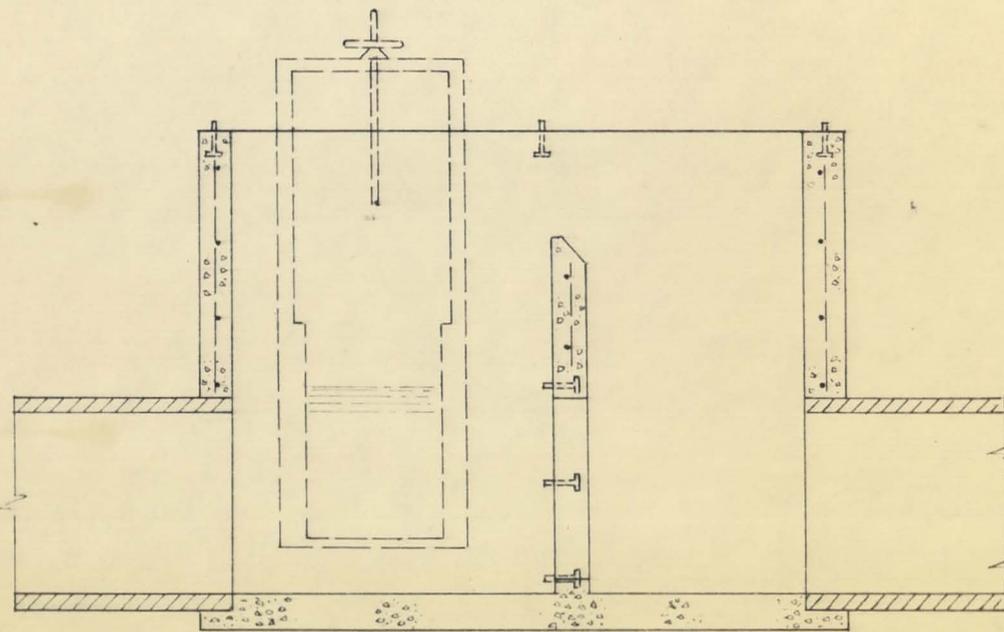
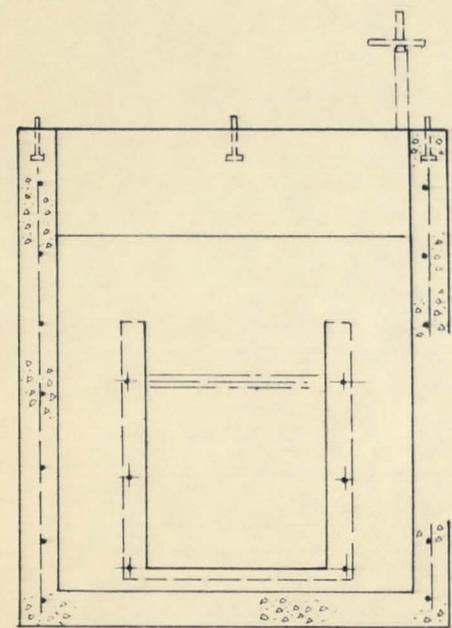
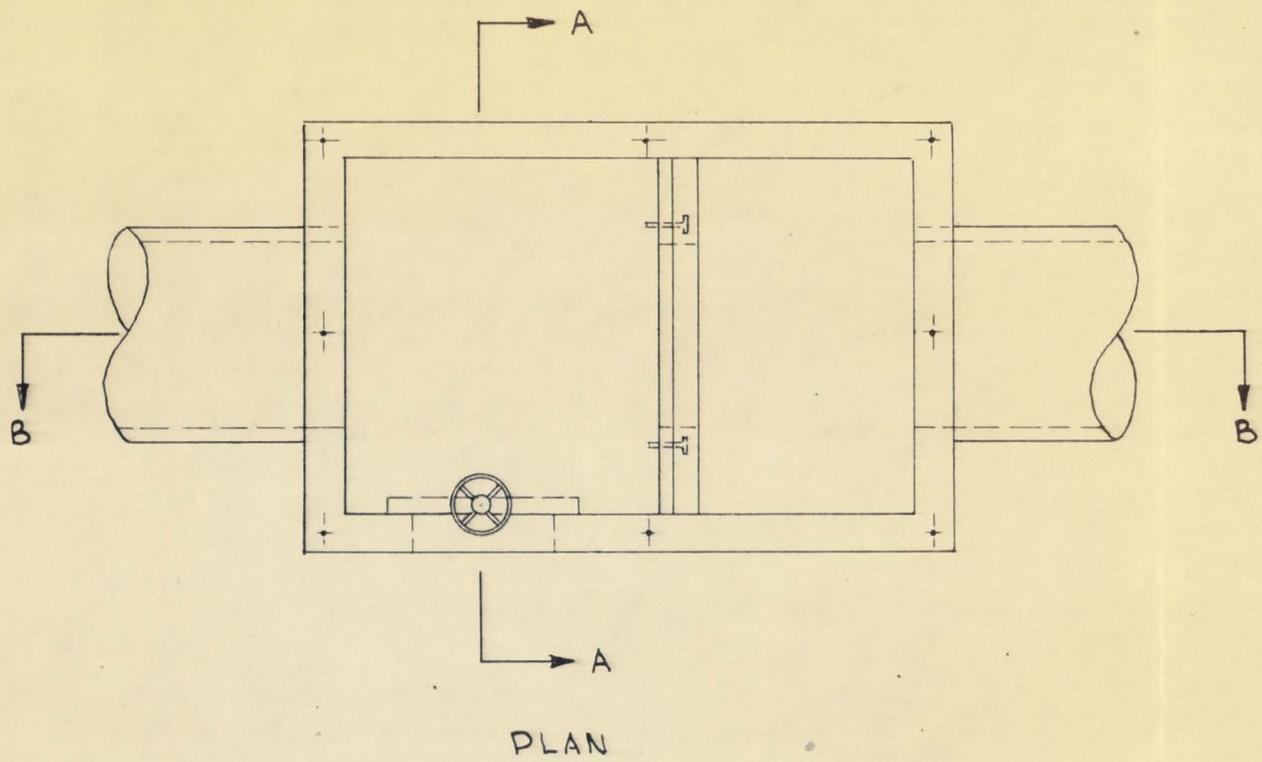


PLATE IX

TYPICAL PIPELINE
TURN OUT STRUCTURE

DESIGNED:
DRAWN:
TRACED:
SCALE: NONE

C. Estimated Rehabilitation Costs.

The total estimated construction cost for the proposed plan of rehabilitation is \$2,730,00 based on a three year construction period, allowing for an approximate over-all increase in labor and materials of twelve (12) percent, and approximately 10% for contingencies. The cost of major items of the plan, based on current prices is as follows:

SUMMARY OF CONSTRUCTION COST OF MAJOR ITEMS OF
THE PLAN OF REHABILITATION

<u>Feature</u>	<u>Estimated Cost</u>
Laterals (Lining, Pipe Lines & Structures)	\$1,525,368
Canal Lining Repair	<u>539,193</u>
TOTAL (less engineering, Contingencies & Incidentals)	\$2,064,561
Escalator of 12%	<u>247,747</u>
Projected Construction Costs	\$2,312,308
Engineering (surveys, design, supervision & inspection) @ 7.3%	<u>168,798</u>
	\$2,481,106
Contingencies & Incidentals	<u>248,894</u>
TOTAL PROJECT ESTIMATE	\$2,730,000

D. DISTRICT PARTICIPATION.

1) Preparation of Report and application (Fee paid to private consulting engineer)	\$6,500
2) Application processing fee (Paid to U.S. Dept. of Interior)	<u>1,000</u>
	\$7,500
3) District Water Rights	
a) Investment through the S.R.V.W.U.A. in connection with canal lining	\$889,000
b) Water appropriation rights from State of Arizona	<u>4,141</u>
	\$893,141

- 4) Acquisition of Right-of-way for laterals to be relocated (approx. 200 ac @ \$1000.00) \$200,000

Note: Value of land to be acquired is based on current real estate values as evidenced by recent transactions. Land owners have agreed to contribute necessary right-of-way for the project, which will enhance property values and district operation without creating additional financial burden upon the District

- 5) District administration and supervision (salaries, office & shop space, vehicles, etc.) \$50,000

5a) The District holds U. S. Government bonds in the amount of \$156,000 which is a Reserve For Present Funded Debt. This Reserve has been established in accordance with the requirements of the Reconstruction Finance Corporation and cannot be considered as a cash surplus, but will be available after year 1969, the Pay-out date for present outstanding bonds. It is anticipated that the District will wish to perform additional rehabilitation work not included in the herein described program. These funds could be used for this purpose.

The District is not allowed by Arizona Irrigation District Law to create or maintain a cash surplus, therefore there are no funds available which the District could pledge as participation.

Total District Participation \$1,150,641

E. Project Cost Summary.

Total Construction Cost	-	\$2,730,000
New Right-of-way	-	200,000
Report & Application	-	7,500
Water Rights	-	893,141
District Administration and supervision	-	<u>50,000</u>
Total Project Cost	-	\$3,880,641
District Participation	-	<u>1,150,641</u>
Amount of Loan Request (Less U.S.B.R. Expenses)	-	\$2,730,000
Estimated U.S.B.R. Costs	-	<u>50,000</u>
Total Amount of Loan Application	-	\$2,780,000

V. OPERATION & MAINTENANCE & REPLACEMENT
DURING REPAYMENT PERIOD. (CANAL &
LATERAL SYSTEM)

The construction of canal and lateral lining and pipe lines and the modernization of structures would increase the efficiency of over-all project operations by reducing the waste of water, improving the speed and accuracy of distribution, and greatly reducing the cost of operation and maintenance.

Included in the cost of operation and maintenance of the canal and lateral system are all such items as cleaning, demossing, weed control, and emergency repairs. During the period 1948-1958 the average annual cost of O. & M. was \$61,200.

A. Summary of O. & M. costs for Period 1948 - 1958

PERIOD	MAIN CANAL	LATERAL SYSTEM	DRAINAGE SYSTEM	FLOOD CONTROL
1/1/48-12/31/48	\$8,507.03	\$41,642.13	\$ 56.16	\$ 193.84
1/1/49-12/31/49	16,961.10	45,274.11	673.11	546.81
1/1/50-12/31/50	10,889.92	47,036.60	812.71	846.35
1/1/51- 6/30/51	5,757.35	21,171.09	1,370.03	186.15
7/1/51- 6/30/52	10,763.40	41,770.11	1,273.19	548.80
7/1/52- 6/30/53	12,227.88	49,503.69	1,336.07	201.79
7/1/53- 6/30/54	12,493.63	50,124.18	2,436.64	1,100.64
7/1/54- 6/30/55	15,289.31	45,359.62	3,691.37	1,594.22
7/1/55- 6/30/56	20,189.36	45,291.01	3,548.61	1,778.15
7/1/56- 6/30/57	16,204.59	40,365.95	2,062.48	442.01
Totals	\$129,283.62	\$427,538.49	\$17,265.37	\$7,438.76
Average cost per year	\$13,608.80	\$45,004.05	\$1,817.41	\$783.03
Average Total Per Year --		\$61,200.00		

B. Estimated Future Requirements "Without Rehabilitation":

O. & M. COST PER ANNUM				
PERIOD	MAIN CANAL	LATERAL SYSTEM	DRAINAGE SYSTEM	FLOOD CONTROL
1-3 yrs. (following Const.)	\$13,878	\$45,922	\$2,000	\$800
3-10 yrs.	14,528	48,069	2,200	850
10-22 yrs.	15,640	51,750	2,400	900
Average:	15,045	49,784	2,280	870
AVERAGE TOTAL PER YEAR -- \$67,979				

C. Estimated Future Requirements "With Rehabilitation":

O. & M. COST PER ANNUM				
PERIOD	MAIN CANAL	LATERAL SYSTEM	DRAINAGE SYSTEM	FLOOD CONTROL
1-3 yrs (following const.)	\$10,200	\$19,125	0	\$780
3-10 yrs.	11,000	21,000	400	780
10-22 yrs.	13,200	25,200	800	780
Average:	12,090	23,035	560	780
AVERAGE TOTAL PER YEAR -- \$36,465				

D. Summary of Estimated Savings in O. & M. Due to Rehabilitation & Betterment.

O. & M. SAVINGS PER ANNUM			
PERIOD	O. & M. COSTS "WITHOUT REHAB."	O. & M. COSTS "WITH REHAB."	SAVINGS
1st year (following const)	\$62,597	\$30,105	\$32,492
2	62,597	30,105	32,492
3	62,597	30,105	32,492
4	65,647	33,180	32,467
5	65,647	33,180	32,467
6	65,647	33,180	32,467
7	65,647	33,180	32,467
8	65,647	33,180	32,467
9	65,647	33,180	32,467
10	65,647	33,180	32,467
11	70,690	39,980	30,710
12	70,690	39,980	30,710
13	70,690	39,980	30,710
14	70,690	39,980	30,710
15	70,690	39,980	30,710
16	70,690	39,980	30,710
17	70,690	39,980	30,710
18	70,690	39,980	30,710
19	70,690	39,980	30,710
20	70,690	39,980	30,710
21	70,690	39,980	30,710
22	70,690	39,980	30,710
TOTAL ESTIMATED SAVINGS -- \$693,265 (Through Repayment Period)			

VI. PAYMENT ABILITY

A. Tabulation of Total District Revenues and Expenditures

For Period 1948 - 1958

REVENUES					EXPENDITURES			
PERIOD	Irrigation Water Sales	Taxation & Assessments	Misc. *	TOTAL	Operation & Maintenance	Funded * Debt	Capital Investment	TOTAL
1/1/48 - 12/31/48	\$554,601.30	\$122,552.60	\$7,160.20	\$684,314.10	\$477,506.08	\$95,514.00	\$114,978.70	\$687,998.78
1/1/49 - 12/31/49	552,141.24	128,592.87	7,464.21	668,198.32	433,590.57	120,238.89	59,245.55	613,075.01
1/1/50 - 12/31/50	571,867.95	98,515.01	14,178.98	684,561.94	488,124.21	93,331.72	28,993.14	610,431.07
1/1/51 - 6/30/51	259,801.08	25,407.61	3,613.82	288,822.51	227,577.68	60,330.00	34,274.30	322,181.98
7/1/51 - 6/30/52	540,239.03	126,337.81	9,012.41	675,589.25	438,845.84	117,660.00	50,671.01	607,176.85
7/1/52 - 6/30/53	675,734.16	129,443.43	13,473.85	818,651.44	578,262.53	92,900.00	33,554.61	704,717.14
7/1/53 - 6/30/54	651,781.92	103,855.03	13,785.49	769,422.44	621,377.77	93,060.00	73,656.59	788,094.36
7/1/54 - 6/30/55	655,446.74	103,781.05	14,889.86	774,117.65	596,157.38	97,140.00	113,142.64	806,440.02
7/1/55 - 6/30/56	650,600.76	114,021.84	11,128.31	775,750.91	581,126.61	126,980.00	198,118.48	906,225.09
7/1/56 - 6/30/57	729,078.52	129,099.53	16,435.84	874,613.89	678,303.13	100,040.00	143,828.88	922,128.01
				\$7,034,353.89				\$6,968,468.31

* Misc. Income includes:
 Stock water sales
 Equipment & Property Rental
 Cash Discounts
 Sale of Scrap Equipment & Materials
 U. S. Government Bond Revenues

Note: Included in Total Disbursements
 is \$116,000.00 for Reserves.

* Funded Debt Includes:
 6th Series Refunding Bonds, Principal
 & Interest and
 7th Series Improvement Bonds, Principal
 & Interest.
 Both Bond Series to be paid out in 1969.

B. Summary of Estimated Revenues for Payment Period (22 years)

The estimate of revenues is made on the following basis: District revenues are from three sources. (1) Irrigation Water Sales (2) Taxation and Assessments (3) Miscellaneous. The revenues from items 2 and 3 are based on the average for the period 1948-1958. It is assumed that these revenues will remain consistent for the repayment period, however, the District could vote a special assessment at any time for a particular purpose which would affect the amount of revenue. The revenue from item 1 is, of course, based on the rate charged for irrigation water, and this rate will be established on an annual basis to meet the budgeted financial requirements of the District. For the purpose of this estimate, the quantity of irrigation water available for sale the initial year of the repayment period is the average for the period 1948-1958 of 104,753 Ac. Ft. plus the anticipated savings of 50% of the annual losses of that period or approximately 13,000 Ac. Ft. Therefore, the anticipated quantity available for sale the initial year is approximately 117,000 Ac. Ft. It is anticipated that this quantity will remain available annually for the period of repayment. The rate to be charged for irrigation water will be computed annually upon preparation of the District Budget and will be regulated by the District financial requirements. The following Table is tabulated on the estimated required revenues as seen at the time this projection is being made.

PERIOD	Quantity of Irr. Water	Irr. Water Sales	Taxation & Assessments	Misc.	TOTAL
Rehab. Comple- tion +1 yr (1961 ⁺)	117,000	\$795,600	\$113,850	\$11,700	\$921,150
2		813,150			938,700
3		836,550			962,100
4		854,100			979,650
5		872,820			998,370
6		891,540			1,017,090
7		912,600			1,038,150
8		936,000			1,061,550
9		953,550			1,079,100
10		877,500			1,003,050
11		958,230			1,083,780
12		992,160			1,117,710
13		1,012,050			1,137,600
14		1,031,940			1,157,490
15		1,051,830			1,177,380
16		1,071,720			1,197,270
17		1,091,610			1,217,160
18		1,111,500			1,237,050
19		1,131,390			1,256,940
20		1,151,280			1,276,830
21		1,171,170			1,296,720
22	117,000	1,192,230	113,850	11,700	1,317,780

C. Summary of Estimated Expenditures for Payment Period (22 years)

The estimate of expenditures is made on the following basis: upon completion of rehabilitation, the O. & M. costs of the canal and lateral system will decrease approximately \$31,000 per annum. The O. & M. costs of the individual well system will continue to increase due to the estimated annual decline of the underground water table which is estimated to be 8.4 feet per annum. It is estimated that this decline will increase the cost of irrigation water \$0.17⁺ per acre foot per annum. Based upon the anticipated water delivery of 117,000 acre feet per annum, the O. & M. cost will increase approximately \$20,000 per annum. The other budget item of District Expenditure is Capital Investment. For the purpose of this projection, it is assumed that this item will remain consistent with the average amount expended for the period 1948-1958 which is approximately \$89,000 per annum. The following table is tabulated on the basis that upon the initial year of the repayment period the O. & M. cost will be approximately equal to the 1957 cost of \$678,000 minus the estimated savings of the program of \$31,000⁺, or \$647,000. The existing funded debt is being repaid on an established schedule.

PERIOD	Operation & Maintenance	Existing Funded Debt	Capital Investment	TOTAL
Rehab. completion + 1 (1961 ⁺)	\$647,000	\$96,840	\$89,000	\$832,840
2	667,000	96,620		852,620
3	687,000	97,300		873,300
4	707,000	97,340		893,340
5	727,000	96,760		912,760
6	747,000	96,580		932,580
7	767,000	96,380		952,380
8	787,000	97,340		973,340
9	807,000	97,240		993,240
10	827,000	0		916,000
11	847,000			936,000
12	867,000			956,000
13	887,000			976,000
14	907,000			996,000
15	927,000			1,016,000
16	947,000			1,036,000
17	967,000			1,056,000
18	987,000			1,076,000
19	1,007,000			1,096,000
20	1,027,000			1,116,000
21	1,047,000			1,136,000
22	1,067,000		89,000	1,156,000

VII. FINANCIAL PROGRAM

A. Loan Repayment Schedule.

YEAR	PAYMENT	UNPAID BALANCE
0	-----	\$2,780,000
1	\$85,000	2,695,000
2	85,000	2,610,000
3	85,000	2,525,000
4	85,000	2,440,000
5	85,000	2,355,000
6	85,000	2,270,000
7	85,000	2,185,000
8	85,000	2,100,000
9	85,000	2,015,000
10	85,000	1,930,000
11	160,800	1,769,200
12	160,800	1,608,400
13	160,800	1,447,600
14	160,800	1,286,800
15	160,800	1,126,000
16	160,800	965,200
17	160,800	804,400
18	160,800	643,600
19	160,800	482,800
20	160,800	322,000
21	160,800	161,200
22	161,200	0

B. Interest on Indebtedness of Land Ownerships in Excess of 160 Acres.

Total acreage in District in ownerships in excess of 160 acres = 8,180.31

Estimated interest based on rate of 3-3/8%:

$$\text{Interest (annual)} = \frac{\text{Unpaid Balance}}{37,000 \text{ ac.}} \times 3\text{-}3/8\% \times 8,180.31 \text{ ac.}$$

INTEREST PAYMENTS		
YEAR	UNPAID BALANCE	INTEREST
0	\$2,780,000	\$20,743.65
1	2,695,000	20,109.48
2	2,610,000	19,475.31
3	2,525,000	18,840.87
4	2,440,000	18,206.70
5	2,355,000	17,572.53
6	2,270,000	16,938.09
7	2,185,000	16,303.92
8	2,100,000	15,669.76
9	2,015,000	15,035.31
10	1,930,000	14,401.15
11	1,769,200	13,201.28
12	1,608,400	12,001.42
13	1,444,600	10,779.19
14	1,286,800	9,601.68
15	1,126,000	8,401.82
16	965,200	7,201.95
17	804,400	6,002.36
18	643,600	4,802.50
19	482,800	3,602.63
20	322,000	2,402.77
21	161,200	1,202.90
22	0	
		\$272,461.27

C. Tabulation of 22 Year Loan Retirement Period Financial Program.

YEAR OF PAYMENT	DISTRICT REVENUES				DISTRICT EXPENDITURES		NET REVENUE	EXISTING FUNDED DEBT		Small Projects Loan Retirement		RESERVE	
	Water Sales	Taxation & Assessments	Misc.	Total	Operation & Maintenance	Capital Investment		Principal	Interest	Principal	Interest	Annual	Accumulative
Rehab. Completion 1 year (1961 ⁺)	\$795,600	\$113,850	\$11,700	\$921,150	\$647,000	\$89,000	\$185,150	\$68,000	\$28,840	\$85,000	\$20,744	\$3,310	
2	813,150			938,700	667,000		182,700	70,000	26,120		20,109	1,580	\$4,890
3	836,550			962,100	687,000		186,100	74,000	23,300		19,475	3,800	8,690
4	854,100			979,650	707,000		183,650	77,000	20,340		18,841	1,310	10,000
5	872,820			998,370	727,000		182,370	79,000	17,260		18,207	1,110	11,110
6	891,540			1,017,090	747,000		181,090	82,000	14,080		17,573	10	11,120
7	912,600			1,038,150	767,000		182,150	86,000	10,780		16,938	370	11,490
8	936,000			1,061,550	787,000		185,550	90,000	7,340		16,304	3,210	14,700
9	953,550			1,079,100	807,000		183,100	93,500	3,740		15,670	860	15,560
10	877,500			1,003,050	827,000		87,050	0	0	85,000	15,035	158,050	173,610
11	958,230			1,083,780	847,000		147,780	(\$156,000 reserve available)		160,800	14,401	-13,020	160,590
12	992,160			1,117,710	867,000		161,710				13,201	910	161,500
13	1,012,050			1,137,600	887,000		161,600				12,001	800	162,300
14	1,031,940			1,157,490	907,000		161,490				10,779	690	162,990
15	1,051,830			1,177,380	927,000		161,380				9,602	580	163,570
16	1,071,720			1,197,270	947,000		161,270				8,402	470	164,040
17	1,091,610			1,217,160	967,000		161,160				7,202	360	164,400
18	1,111,500			1,237,050	987,000		161,050				6,002	250	164,650
19	1,131,390			1,256,940	1,007,000		160,940				4,802	140	164,790
20	1,151,280			1,276,830	1,027,000		160,830				3,603	30	164,820
21	1,171,170			1,296,720	1,047,000		160,720			160,800	2,403	-80	164,740
22	1,192,230	\$113,850	\$11,700	1,317,780	1,067,000	\$89,000	161,780			161,200	1,203	580	165,320

SUMMARY & CONCLUSIONS

There exists a need for rehabilitation of the existing District irrigation and drainage systems to effect savings in operation and maintenance costs to achieve optimum crop production with the water supplies available to the District.

Since the organization of the District in 1920, it has been in continuous operation as an irrigation District under the laws of the State of Arizona. The construction of the irrigation works was completed in 1927 and since that time the works have been maintained in an operative condition, but due to rising costs of labor, equipment, power and other factors affecting the cost of operation and maintenance the District has been able to do little more than keep ahead of the immediate needs of the system.

Should the District undertake a rehabilitation program such as is proposed in this report without the benefit of a Long Term Loan, it would be necessary to extend the construction over a period of approximately 25 years. This rate of improvement would hardly keep ahead of obsolescence.

The plan to complete the construction in three years would allow the District to take full advantage of the savings due to the rehabilitation program through the repayment period.

The proposed rehabilitation program would afford both tangible and intangible benefits.

TANGIBLE BENEFITS.

(1) Savings in Operation and Maintenance Costs.

The construction of canal and lateral lining and pipe lines and the modernization of structures would increase the efficiency of over-all project operations by reducing the waste of water and improving the speed and accuracy of distribution.

The total cost for maintenance of canals and laterals during the period 1948-1958 amounted to \$61,200 per year. It is anticipated that approximately \$31,514 per year could be saved by lining or pipe line construction.

(2) Savings from Water Conservation.

Water savings under the proposed program of canal lining replacement, lateral lining, pipe line construction and structure improvements would prevent approximately 50% of the total measured losses. At the rate charged for irrigation water in 1957, this saving represents \$91,000 annually. Additional water conservation benefits resulting from structure improvements are significant but cannot be evaluated.

INTANGIBLE BENEFITS.

There would be benefits to the District from the proposed program which could not be given a value in dollars and cents. These include such things as; improvement of sanitary conditions, reduction of traffic hazards, and improved appearance, which contribute to the public welfare and general enhancement of property values.

The estimated development of 6,000 Acres of District lands in urban growth within possibly 10 years, indicates a definite reduction in draft upon the District irrigation water supply, or larger quantity available for lands remaining in agriculture.

Operation and maintenance of the District works should remain the responsibility of the District, both during and after accomplishment of the proposed rehabilitation. The project is feasible.

CONCLUSIONS

The rehabilitation and betterment of Roosevelt Water Conservation District Irrigation Facilities is needed to remedy multiple problems resulting from rising costs of labor and materials; increasing population growth and urban development; continued short water supply and depletion of underground water resources.

The proposed rehabilitation and betterment program described herein provides a practical plan for accomplishing needed work at a rate consistent with Roosevelt Water Conservation District operational requirements and financial resources.

Tangible and intangible benefits adequately justify the program costs. Monetary savings accruing during the repayment period from reduced maintenance and water conservation alone would exceed total expenditures for the work.

The District's rehabilitation and betterment obligation under the proposed program would be within its payment capacity.

SUPPLEMENTAL INFORMATION

Item I - Refer to I. Introduction, A. Description and Legal Status and Powers of Roosevelt Water Conservation District:

Limitations on Bonded Indebtedness and Taxes. Section 7, Article XIII, of the Arizona Constitution exempts the District from the provisions of Section 8, Article IX, of that Constitution which places a limitation on the amount of indebtedness to which any county, city, town, school district, or other municipal corporation may subject itself. The limitation on an irrigation district is provided by Section 45-1804, Arizona Revised Statutes, providing that:

"No bonds shall be issued by a district which will cause the total aggregate outstanding bonded indebtedness of the district and other district obligations for the payment of money to exceed sixty per cent of the estimated market value of the lands within the district, after its system or irrigation works has been completed, and for the irrigation works owned or to be acquired by the district with the proceeds of the bonds."

The Board of Directors or other officers of the District may not incur any debt or liability, either by issuing bonds, or otherwise, in excess of express provisions of Chapter 6, Title 45, Arizona Revised statutes relating to irrigation districts, and any debt or liability incurred in excess of such limitation is void.

As of June 30, 1957, the principal amount of the District's outstanding bonded indebtedness was \$910,500.00, and the amount of all other district obligations was \$218,758.46, making an aggregate amount of \$1,129,258.46. The estimated market value of the lands within the District is \$55,500,000, and the District's irrigation works was \$2,602,264.88 as of June 30, 1957. There has been no substantial change since that date in any of the foregoing amounts.

There is no limitation on the amount of District taxes per acre which may be levied and collected, nor is there any limitation on the amount of the increase in District Taxes per acre in any year over that levied in the prior year or years. The District's Board of Directors is required by Section 45-1712 to levy annually taxes in a sufficient amount to meet the obligations of the District for the next fiscal year including maturing bonds and interest, maintenance and operating and current expenses, together with such additional amount necessary to meet any deficiency in the payment of items of expense incurred during any previous year, and to provide funds for purchases of land sold for delinquent taxes.

Provisions Relating To District Taxes. A landowner may pay district taxes without paying state and county taxes levied upon the same lands (A.R.S. 45-1718). District taxes are a lien upon the lands against which they are assessed and levied and such lien may be enforced and foreclosed by notice and sale in the same manner as state, county, and local district taxes (A.R.S. 45-1714).

The Board of Directors may withhold water service from any parcel of land under such rules and regulations as it promulgates, pending payment of the water tax assessed against such parcel of land. All charges for water service become a lien upon the land until paid in full (A.R.S. 45-1588).

Item II - Refer to III. Water Supply, D. Projection of Underground Water Table. In addition to the 60 operating irrigation wells owned by the District, there are 33 private wells (10 inch and larger Diam. casing) operating within the boundaries of the District. Of these 33, 18 are used for supplemental irrigation, and 15 for stock water and domestic purposes.

Item III - Refer to IV. Plan, A. Rehabilitation and Betterment Problems and Needs. The individual deep well pumps and the Main Pumping Plant are in much better condition than the canal and lateral system. During the period 1951-1957 the District completed a modernization program its' entire pumping equipment. The main feature of the program was the conversion of the system from 25 to 60 cycle power. This included the rewinding of motors, both individual pumps and the main plant, the purchase of some new motors, switching equipment, transformers, etc. The cost of the program was \$124,832.37. The average overall operating efficiency of the individual well system in 1957 was approximately 63%. The efficiency of the main plant was approximately 58%. It is anticipated that during the repayment period the pumping system will require no more than normal operating maintenance.

Item IV - Refer to I. Introduction, C. History of Project, Page 6. During certain periods, water from flow of Queen Creek has been available to the District, but the flows have not been consistent or reliable as a permanent source. The District has constructed diversion facilities, but since the flow of the stream is not regulated, water is available only when the rainfall is sufficient in the watershed area to create stream flow, but cannot be stored for systematic distribution. Whitlow Ranch Dam is under construction on Queen Creek by the U. S. Corps of Engineers, as a flood control project. At some future date it will be possible for the District to build storage facilities below the dam which will make it possible to utilize the flow of Queen Creek as a dependable water source.

Item V - Refer to II. District Lands, B. Crop Report Recapitulation for Period 1947-1956. The table which follows shows the average crop yield and gross income per acre.

AVERAGE CROP YIELD AND GROSS INCOME PER ACRE 1947 to 1956

	UNIT	1947		1948		1949		1950		1951	
		YIELD	INCOME	YIELD	INCOME	YIELD	INCOME	YIELD	INCOME	YIELD	INCOME
GRAINS											
Barley	Bu.	76	\$75.000	76	\$74.50	76	\$55.50	76	\$55.50	76	\$70.70
Grain Sorghum	Bu.	50	83.50	50	65.00	50	56.00	50	56.00	50	68.50
Other	Bu.	55	64.00	60	68.00	50	56.00	50	55.15	50	67.50
SEED CROPS											
Flax	Bu.	25	175.00	25	150.00	30	115.50	35	101.50	30	97.50
Sugar Beets	Cwt.									40	1120.00
Other											
HAY & FORAGE											
Alfalfa Hay	Ton	5	81.50	4	100.00	4	92.00	4	80.00	4	140.00
Other Hay	Ton	2	28.00					2.50	35.00		
Pasture	Acre	1	20.00	1	20.00	1	20.00	1	30.00	1	30.00
Silage	Ton										
VEGETABLES											
Lettuce	Crates							250	625.00	250	687.50
Cantaloupe, etc.	Crates							250	812.50	250	812.50
Carrots	Crates							400	1100.00	400	1200.00
Potatoes, White	Sacks					250	750.00	250	625.00		
Onions	Cwt.										
Soy Beans	Cwt.										
Watermelons	Ton									8	280.00
Other	Acre	500	350.00	616	350.00	1339	350.00	522	350.00		
FRUITS											
Oranges	Crates	450	416.50	500	240.00	250	320.00	600	1020.00	500	1204.00
Grapefruit	Crates	750	101.25	800	100.00	300	100.00	1000	850.00	1000	400.00
Dates & Vineyard	Acre									72	400.00
MISCELLANEOUS											
Cotton, Short St.	Bales	1.	170.00	1.25	211.75	2	280.00	2.25	495.00	2	395.00
Cotton, long st.	Bales							1	300.00	1	500.00
Cotton Seed	Ton	.50	32.50	.50	32.50	1	45.00	1	112.00	1	65.00

AVERAGE CROP YIELD AND GROSS INCOME PER ACRE 1947 to 1956 Cont'd.

	UNIT	1952		1953		1954		1955		1956	
		YIELD	INCOME								
GRAINS											
Barley	Bu.	74	\$50.00	75	\$83.20	80	\$70.50	75	\$78.25	79	\$82.95
Grain Sorghum	Bu.	48	92.50	60	90.75	65	84.00	70	73.50	58	65.00
Other	Bu.	26	57.20			35	70.00	40	65.00	48	72.00
SEED CROPS											
Flax	Bu.										
Sugar Beets	Cwt.	30	390.00								
HAY & FORAGE											
Alfalfa Hay	Ton	4	132.00	4	100.00	4	112.00	4	136.00	3.75	105.00
Other Hay	Ton	2	66.00	3	66.00					2.50	67.50
Pasture	Acre	1	15.00	1	20.00	1	25.00	1	30.00	1	48.00
Silage	Ton					16	80.00			16	64.00
VEGETABLES											
Lettuce	Crates	150	262.50	200	250.00	200	270.00	350	367.50	325	568.75
Cantaloupe, etc.	Crates	125	281.25	165	280.00	545	300.00	200	400.00	110	200.00
Carrots	Crates	425	1250.00								
Potatoes White	Sacks							240	760.00		
Onions	Cwt.									260	1300.00
Soy Beans	Cwt.									20	150.00
Watermelons	Ton							7	250.00	10	200.00
Other	Acre	221	500.00			545	600.00	755	550.00		
FRUITS											
Oranges	Crates	400	740.00	400	424.00	400	450.00	400	600.00	425	984.00
Grapefruit	Crates	700	560.00	800	680.00	800	700.00	800	520.00	750	455.00
Dates & Vineyard	Acre	72	425.00	72	450.00	119	600.00	130	550.00	130	370.00
MISCELLANEOUS											
Cotton, short st.	Bales	2	370.00	2.25	360.00	2.25	395.00	2.50	425.00	2.50	431.25
Cotton, long st.	Bales	1	515.00	1	385.00	1	345.00	1.50	405.00	1.33	422.50
Cotton Seed	Ton	1	68.00	1	52.00	1	60.00	1	45.00	.85	49.30

During the period 1946-1958 the cost of irrigation water and O. & M. of the District to the farmer has been as follows.

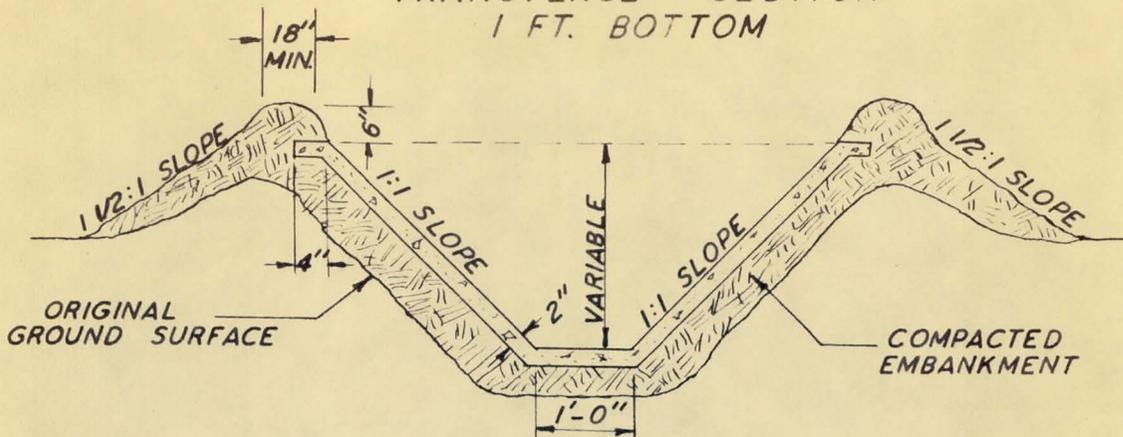
<u>Water Rate Per Acre Ft.</u>	<u>Tax Rate Per Acre</u>
1/1/47-12/31/47 - \$3.60	7/1/46-6/30/47 - \$4.70
1/1/48-12/31/48 - 5.80	7/1/47-6/30/48 - 5.20
1/1/49-12/31/49 - 5.50	7/1/48-6/30/49 - 5.20
1/1/50-12/31/50 - 5.00	7/1/49-6/30/50 - 5.00
1/1/51-12/31/51 - 5.35	7/1/50-6/30/51 - 4.50
1/1/52-12/31/52 - 6.33	7/1/51-6/30/52 - 5.50
1/1/53-12/31/53 - 6.00	7/1/52-6/30/53 - 5.50
1/1/54-12/31/54 - 6.00	7/1/53-6/30/54 - 5.50
1/1/55-12/31/55 - 6.00	7/1/54-6/30/55 - 5.50
1/1/56-12/31/56 - 6.00	7/1/55-6/30/56 - 5.50
1/1/57-12/31/57 - 7.00	7/1/56-6/30/57 - 5.50
1/1/58- - 7.50	7/1/57-6/30/58

Item VI - Refer to III. Water Supply, A. Total Water Production 1930-1958, pages 28, 29, and 30. It will be noted that there is a slight variance in the river water production totals of the three tables. This is explained by the fact that the data was compiled from three independent sources of records and each are affected by any adjustments made by the agency responsible for the records.

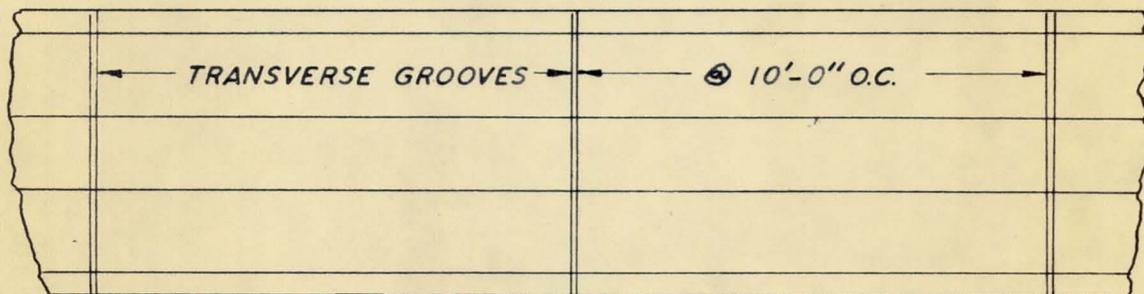
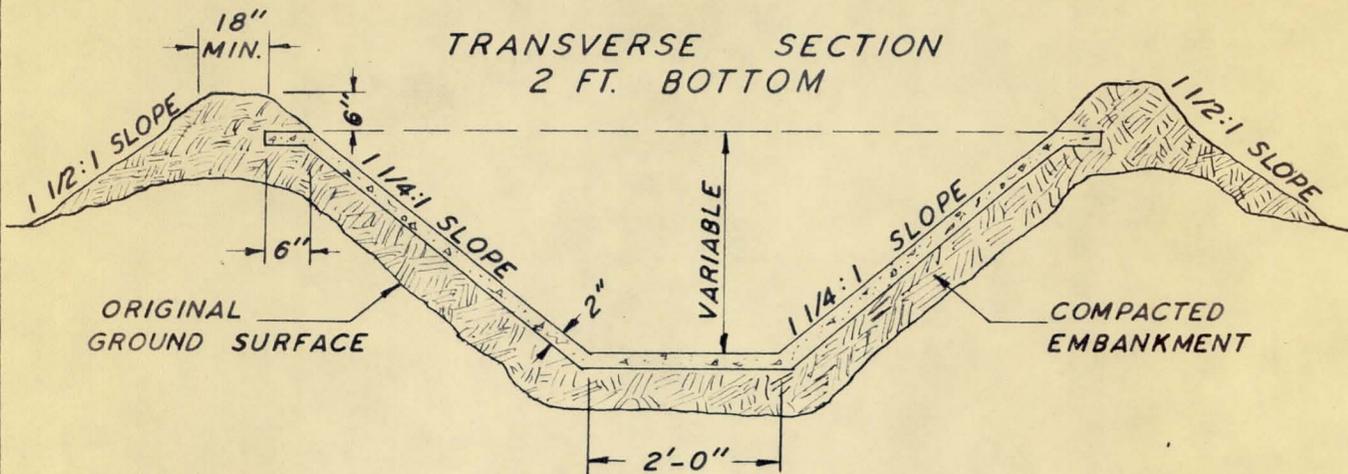
Item VII - Refer to IV. Plan, Table V Lateral Improvement Estimated Costs. The estimates in this report are based on the following information and data: Profiles of existing laterals and proposed new alignment. Records of District Water Department as to required capacities. Factors of slope in the following range ($S = .00167$ to $S = .00457$). Pipe sizes calculated with a "Fields Hydraulics Calculator For Gravity Flow in Pipes" based on the Manning Formula, using the following roughness coefficients; (cast in place concrete pipe - $N = .013$, precast concrete pipe - $N = .012$) concrete lined ditch sections calculated with the Manning Formula for the following conditions; $N = .015$, BTM. width = 2 ft., side slope = 1.25: 1. pneumatically applied concrete mortar lining - $N = .020$.

Item VIII - Refer to IV Plan. The proposed specifications and standards for construction are based upon the standards which have been approved by the Bureau of Reclamation for rehabilitation work in the Salt River Project by the S. R. V. W. V. A. all of the physical features of Roosevelt Water Conservation Dist and the Salt River Project are very similar: The water sources are the same, the terrain similar, method of water distribution the same, farming methods similar, and the rehabilitation needs the same. The proposed specifications for pre cast concrete pipe are based on ASTM Designation C 14-55 and ASTM designation C 76-55. The proposed specifications for

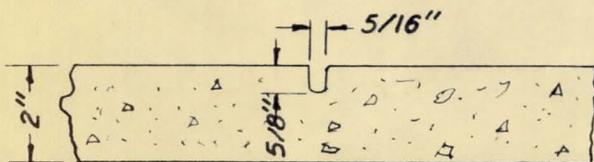
TRANSVERSE SECTION
1 FT. BOTTOM



TRANSVERSE SECTION
2 FT. BOTTOM



PLAN VIEW OF LAT. SHOWING TRANSVERSE GROOVES



TYPICAL LONGITUDINAL SECTION
SHOWING TRANSVERSE GROOVES
IN BOTTOM AND SIDES

TYPICAL LATERAL SECTIONS
NON REINFORCED CONC. LINING

FROM RECORDS OF
S.R.V.W.U.A.

NO SCALE

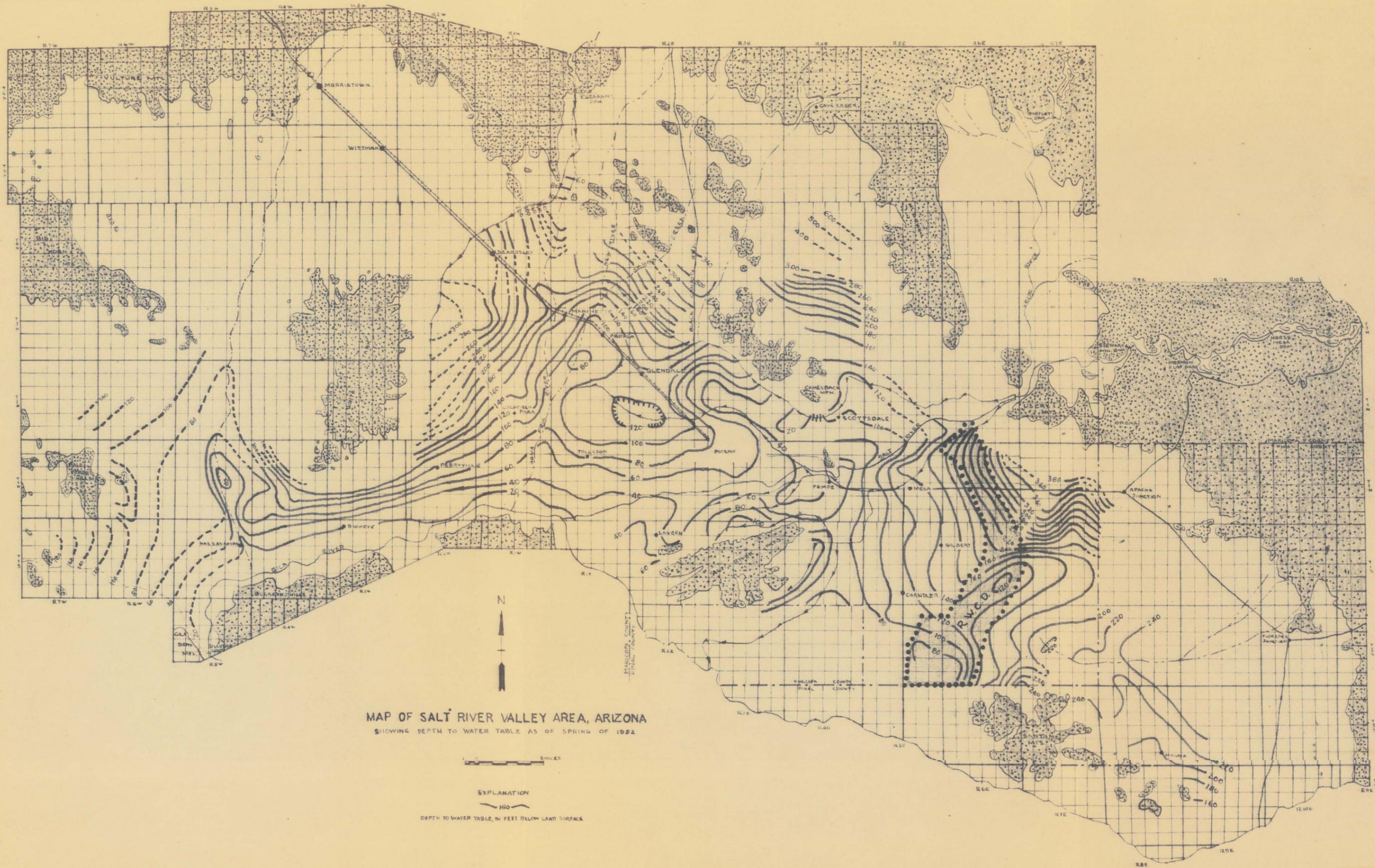
cast in place pipe are based on USBR "Tentative Instructions for Placing Cast-in-place Unreinforced Concrete Pipe." The proposed specifications for pneumatically applied mortar are based on the S.R.V.W.U.A. "Standard specifications for installation of pneumatically applied concrete mortar lining (Jan. 1953)

The costs used in the estimates are compiled from: The Records of the S.R.V.W.U.A. of work of a similar nature, both that done by contractors and force account work. Material obtained from contractors and suppliers.

Item IX - Refer to IV Plan., Page 34, 2. Water Conservation.

The assumption that a comprehensive program of canal lining replacement, lateral lining, pipe line construction and structure improvements would prevent approximately 50% of the total measured losses is based on the S.R.V.W.U.A. and U.S.B.R. Soil and Moisture Conservation Study, 1953-1954, copies of the report of which are on file with the U.S.B.R.

Item X - Refer to V Operation and Maintenance and Replacement During Repayment Period. (Canal and lateral system), Page 40. Section B. Estimated Future Requirements "Without Rehabilitation." The assumptions made for this projection are based on the following: The proposed program of lateral betterment includes approximately 50% of the lateral system in mileage, but includes over 80% of the laterals which carry more than two "heads" of water, or are high maintenance laterals because of soil conditions etc., or are laterals required to carry a large quantity of water for long distances. It will be noted that the location of some wells make for short run deliveries. The proposed program is concentrated on the laterals having the highest water loss and maintenance costs. The proposed canal betterment will decrease the water loss greatly, but will not reduce the maintenance costs by a large percentage because the need for silt and moss removal will remain, as the channel will remain an open one, however, some saving will be realized as these operations will be simplified. The savings in the maintenance of the drainage system will increase in relation to the savings of the lateral system, since practically all "tail" and drainage water is picked up by the lateral system. The proposed program affects the flood control system only in that the laterals which are used to spill flood water will be improved to the extent that the water can be carried off faster and in larger quantities. The initial estimated amount of savings of each of these phases of the program are based on the research and estimates made by the S.R.V.W.U.A. The increases in projected costs are based on the estimate that due to depreciation the O. & M. costs will increase approximately 30% during the repayment period and the annual increases will vary from no appreciable increase for the first three years to approximately 1% for the next seven years and approximately 2% for the last twelve years.



MAP OF SALT RIVER VALLEY AREA, ARIZONA
 SHOWING DEPTH TO WATER TABLE AS OF SPRING OF 1952

EXPLANATION
 ————
 DEPTH TO WATER TABLE, IN FEET BELOW LAND SURFACE