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HAROLD CONKLING
CONSULTING ENGINEER
108 WEST SIXTH STREET
LOS ANGELES 14, CALIFORNIA

September 8, 1948

Robert L. Ryan, Engineer
Ventura County Flood Control District,
Court Hpuse
Ventura, California

Dear Sir:

Herewith is report on feasibility and desirability of spreading water from Matilija Reservoir in Eastern Ojai Valley.

Information at hand is not sufficient to draw conclusions as definitely as is desirable, but the threat of a severe shortage in that part of the Valley makes it desirable to do all possible to alleviate the condition which would arise. There are other reasons persuasive to the desirability of spreading.

It is therefore recommended that plans be drawn for a pipe line from Matilija Reservoir to deliver 20 second feet of water for spreading in Senor Wash at elevation 1000 feet above sea level. The same pipe line would carry domestic water to the east also. The capacity for the dual purpose would be larger than 20 second feet.

Yours truly,

(Signed) HAROLD CONKLING

Feasibility of Spreading Water from Matilija Dam in Eastern Ojai Valley

Harold Conkling
Sept. 8, 1948

This is a report on the feasibility of spreading water to replenish the ground water basins of Ojai Valley east of the City of Ojai, as authorized by letter of Robert L. Ryan, Engineer, Ventura County Flood Control District, dated July 21. This was, in turn, authorized by the Board of Supervisors, on July 20th.

Situation in Eastern Ojai Valley

Eastern Ojai Valley is defined as the alluvial area east of approximately the west line of the City of Ojai.

Its water supply has been produced almost entirely from the recent alluviums deposited in the cones built up by Senor and Horn Canyons. This alluvium appears to be generally about 300-350 feet deep along the southern side of the valley but becomes shallower with distance to the north. Recent wells have penetrated the older alluviums underlying the recent cones and in some cases have secured good supplies. It also appears probable that there are deep, wide channels cut in the old alluvium by the ancient streams which have been filled by the recent material, thus giving a greater depth of recent alluvium. All

wells penetrating the older alluvium have not been successful. It is believed that the older formations are too slowly recharged to give a permanent supply

The slope of the valley floor and of the water table is steep to the southwest. Water moves rapidly through the gravels and leaks out into San Antonio Creek. Measurements of San Antonio Creek by Ventura County Water Survey indicate that when the water table is about 60 ft. below the surface south of Grand Ave. and east of Gorman Road, rising water ceases to appear in San Antonio Creek at a point near the southeast corner of Ojai city limits. While there is undoubtedly some leakage with the water table at lower elevations, it should decrease as it further recedes.

The small capacity of the ground water basins, and rapid recharge induce large surface fluctuations in elevation of water table except near San Antonio Creek below Ojai Ave. A rise of 40-60 ft. and an equal recession in the same year are not uncommon.

Most of the wells in this area are west of Carne Rd. and east of the center line of Ojai City. East of Carne Rd. they are, so far as the water maps show, mostly south of Grand Avenue.

The alluvial area west of Carne Rd. is almost all below elevation 900 and that east of the road is almost all above 900 feet.

The wash of San Antonio Creek traverses the area west of Carne Road. Elevation of the wash near the mountains is about 1000 feet.

The situation is a factor in considering the value of spreading water from Matilija Creek in this region for the purpose of replenishing the ground water. Obviously it would help the water supply very little to spread water when the water table is at high elevations, because it would leak out rapidly into San Antonio Creek. The water table is high only in years of good runoff and at such times Ventura River gravels are surcharged also. While the discharge of San Antonio Creek is available to the City of Ventura at its diversion in Ventura River, this additional water would come at a time when it would be of little use to the City.

Furthermore, when drought conditions prevail they are general over the county. Fortunately, however, the flow of Matilija Creek is better sustained than that of Senor and Horn Canyons so there are periods when water could be conveyed from Matilija Reservoir to eastern Ojai Valley and spread with benefit to the valley. The conditions which must exist to make this possible are:

1 - Matilija Reservoir must be full.

2 - All gravity rights below Matilija Reservoir must be receiving the water appurtenant to their rights.

3 - All the water that would percolate under natural conditions in Ventura River bottoms must be percolating.

4 - The water table in Eastern Ojai Valley must be so far below ground surface that water is not leaking out into San Antonio Creek.

In other words, only water which would escape into the ocean can be spread with benefit to the water supply and it can be done only during limited periods after the water table in Eastern Ojai Valley has receded.

To determine what could be accomplished, a careful study was made of the runoff of Matilija Creek since 1922, of the fluctuations of water table in Eastern Ojai Valley, and insofar as possible of the increase in demand for water in that area since 1932. It should be stated at once that while it is known that demand for water has increased considerably, data are not sufficient to evaluate it with any degree of accuracy.

Calculations were made for the period 1922-1948 of the amount of water which could be transported from Matilija Dam for spreading in Eastern Ojai Valley with conduits of 5, 10, and 20 second foot capacity. It was found that:

1 - With a 20 second foot conduit, 1740 acre feet could have been spread beneficially in March and April of 1923. This was the beginning of a critical period of shortage and would have been helpful.

2 - No water could have been spread beneficially again until June 1927, when 300 acre feet

would have been available and would have helped the situation by that small amount.

3 - From July 1927 to January 1932 no water could have been spread. This was the most critical period since records of runoff began. Parenthetically, more prolonged periods of drought have occurred in the past.

4 - In the period February 1932 - May 1936, inclusive, 13870 acre feet could have been spread beneficially. This was after the most critical period of the long 14-year drought of 1923-1936.

5 - In 1939 and 1940 a total of 3650 acre feet could have been spread beneficially. It would have helped to keep the water table up.

6 - During all years 1941-1945 the water table was so high that no benefit could result from spreading.

7 - In 1946 and 1947 4480 acre feet could have been spread with possible beneficial results. The water table would have been considerably higher than at present but the amount of benefit cannot be definitely estimated now because the runoff of this year or next year may raise it to a high elevation whether or not spreading is done.

Altogether in the 22 years 1923-1944 and ignoring the years 1946 and 1947 because of uncertainty as to benefits, the following average annual amounts could be spread at times when Eastern Ojai Valley would be materially aided.

Capacity of conduit from Matilija for spreading only	Avg. Annual amount beneficially spread. 22 yr. period. acre feet	Increase Acre Feet
0 sec.ft.	0	
5 "	340	340
10 "	620	280
15 "	790	170
20 "	910	120
25 "	1000	90

Probable Needs for Eastern Ojai Valley

As stated above, it is believed the water supply in much of Eastern Ojai Valley would be in a critical situation when and if droughts as severe as those of the past occur and that it will become more critical as time goes on because demand will increase.

This situation cannot be divorced from the situation in the whole of the irrigable portion of Zone 1. Development of the water supply and its utilization will require:

1 - Construction of a conduit of large capacity from Ventura River over the divide to the point where the water would reach Casitas Reservoir site. In this, all the water which would

otherwise flow into the ocean, up to the capacity of the conduit, would be diverted to Casitas Reservoir.

2 - Construction of a reservoir at Casitas of as large a capacity as can be justified by the water available from both its own watershed and Ventura River watershed.

3 - Satisfaction from Casitas Reservoir of as much of Ventura City's need for water as possible so that Matilija Reservoir can retain more of the water which comes to it. It would thus have a safe yield of greater than the 1800 acre feet it has under present conditions.

4 - A conduit from Matilija Dam to the east that will not only satisfy the near future prospective need of domestic users but also provide water for at least part of the agricultural area east and north of Ojai City, whether it is in subdivision or not.

It is difficult to estimate at this time what the need will be. The time when it occurs may be soon or late, depending on the weather, but it is probable that such a demand will occur. If it does and is not satisfied, considerable harm will result to the County's agricultural resources.

A way to partially satisfy it is to bring water from

Matilija Reservoir for spreading in the region. This would require a pipe line of such capacity that it would be more than ample to carry all the water needed for direct use.

Cost of Pipe Line to Eastern Ojai Valley for Spreading

This would be the cost additional to that which would be required for a pipe line to carry domestic water only. The same location can be used for both domestic use and spreading. The principal item of additional cost will be the additional tonnage of pipe required because of its larger diameter. Trenching, backfilling, and bridging would cost almost the same for the larger pipe as for the smaller from Matilija to Carne Road. Cost of handling and laying the pipe would be greater.

It therefore is not necessary to estimate the actual cost of the two capacities of conduit. The cost of the additional steel delivered at Ojai City can be readily obtained from pipe suppliers. A reasonable percentage can be added to this cost for the greater cost of laying. A question mark can be left for the cost of land on which to spread the water; this should not be a large item.

While it is not necessary to estimate the cost of the system for domestic use only, it is necessary to design such a system so that there will be a basis for calculating the additional cost of a conduit which will transport water for spreading.

There is no definite present basis for design of a

distribution system because little is known about the location of the water users who will use it and practically nothing in the way of firm commitments.

Therefore, in order to reach an answer the bull must be taken by the horns. In other words, the location of a market for the present 1800 acre feet of safe yield must be assumed. Furthermore, assumptions as to all other matters must be made and on these assumptions the system must be designed. If a definite market were awaited the delay might be interminable.

The following assumptions were made for the domestic system without spreading:

1 - Capacity of pipe line throughout would be at least 2-1/2 times the average discharge for the year at any point. Or, in other words, demand in acre feet during a peak month was assumed to be 20.8% of the annual capacity needed at any point. This value was increased to 25% for those portions of the system east of City of Ojai.

2 - The pipe line from Matilija would have an annual capacity of 1800 acre feet. It would split at Rice Road and El Roblar. Easterly from that point the annual delivery would be 1000 acre feet, and southerly from that point it would also be 1000 acre feet annually. The southerly line will not be discussed further herein.

3 - The pipe line would deliver 0.6 second foot at Elevation 910 just east of Carne Road on Grand Avenue.

For design of a system to serve the dual purpose of domestic service and spreading, it was assumed that:

1 - The pipe line would deliver 20 second feet for spreading at elevation 1000 in San Antonio Creek Wash just below the mouth of Senor Canyon and about on the northerly extension of Carne Road.

2 - Capacity at any point would equal 20 second feet plus the average annual capacity required for domestic service as outlined above.

3 - For spreading capacities of less than 20 second feet, design capacities were reduced by a corresponding amount.

The pipe would be welded steel, dipped and wrapped. Perhaps a better quality of pipe, such as coal-tar enamel or concrete-lined inside and out, would be found to be preferable on more mature consideration but at present it is felt that the dipped and wrapped pipe above noted is suitable. Furthermore, it appears to be difficult to get delivery.

Mile	Point	Design Capacity between points - Sec.Ft.		Diameter* of Pipe	
		Domestic	Domestic plus spread'g. 20 sec.ft.	Domestic	Domestic plus sprd'g.
0	Existing outlet from Matilija Reservoir	6.25	22.5	20"	32"
3.4	Split at Rice and El Roblar	3.6	21.4	16"	30"
5.2	Intersection of Sierra Road and Cuyama Road	2.9	21.2	14"	30"
6.3	Intersection of Lion St. and Grand Ave.	1.5	20.5	10"	30"
7.5	Grand Ave., just west of San Antonio Creek	0.6	20.2	8"	30"
8.7	Intersection of Grand Ave. and Carne Road	0	20	-	30"
9.5	Spreading Grounds				

* Nominal diameter.

Estimated Cost

	Amount to be Spread - Second Feet			
	0	5	10	20
Cost of pipe for line to carry domestic water only, f.o.b. Ojai	$170,000			
Additional cost of pipe for line to carry water to be spread in addition to domestic water, f.o.b. Ojai		$ 92,000	$171,000	$265,000
Additional cost of handling		15,000	21,000	35,000
Cost of trenching and backfilling from Grand Ave. northward to San Antonio Creek Wash (3/4 mile)		12,000	12,000	12,000
Cost of land for spreading		?	?	?
Total Add'l.Cost	-	$119,000	$204,000	$312,000

Note: Cost of pipe at the factory is from quotations by American Pipe and Steel Corporation and Consolidated Western Steel Corporation, on September 6, 1948. The cheaper quotation for any particular size was used.

ADDITIONAL COMMENT

1. There is great need for flexibility in a water supply system for Zone 1.

2. Flexibility requires a considerable excess capacity in the conduit to Eastern Ojai Valley from Matilija.

3. Spreading water from Matilija Creek would be beneficial to Eastern Ojai Basin. In a period like that from 1923 through 1944, and with present draft, about 900 acre feet per year could be spread beneficially in San Antonio Creek Wash through a conduit from Matilija Dam having a capacity of 20 second feet in excess of that required for domestic service.

4. Only water which would otherwise waste into the ocean would be spread.

5. Much additional water could have been carried over to the eastern end of the valley. This would serve no direct beneficial use but would serve to keep a running stream in San Antonio Creek.

6. A severe shortage of water in Eastern Ojai Valley seems probable when droughts similar to those at the turn of the century and in the 1920's and 1930's occur.

7. Eventually, Matilija Reservoir will fill with debris and the yield from it will be negligible. Spreading in eastern Ojai Valley will be necessary then and more water will be available to spread because it cannot be stored in Matilija.

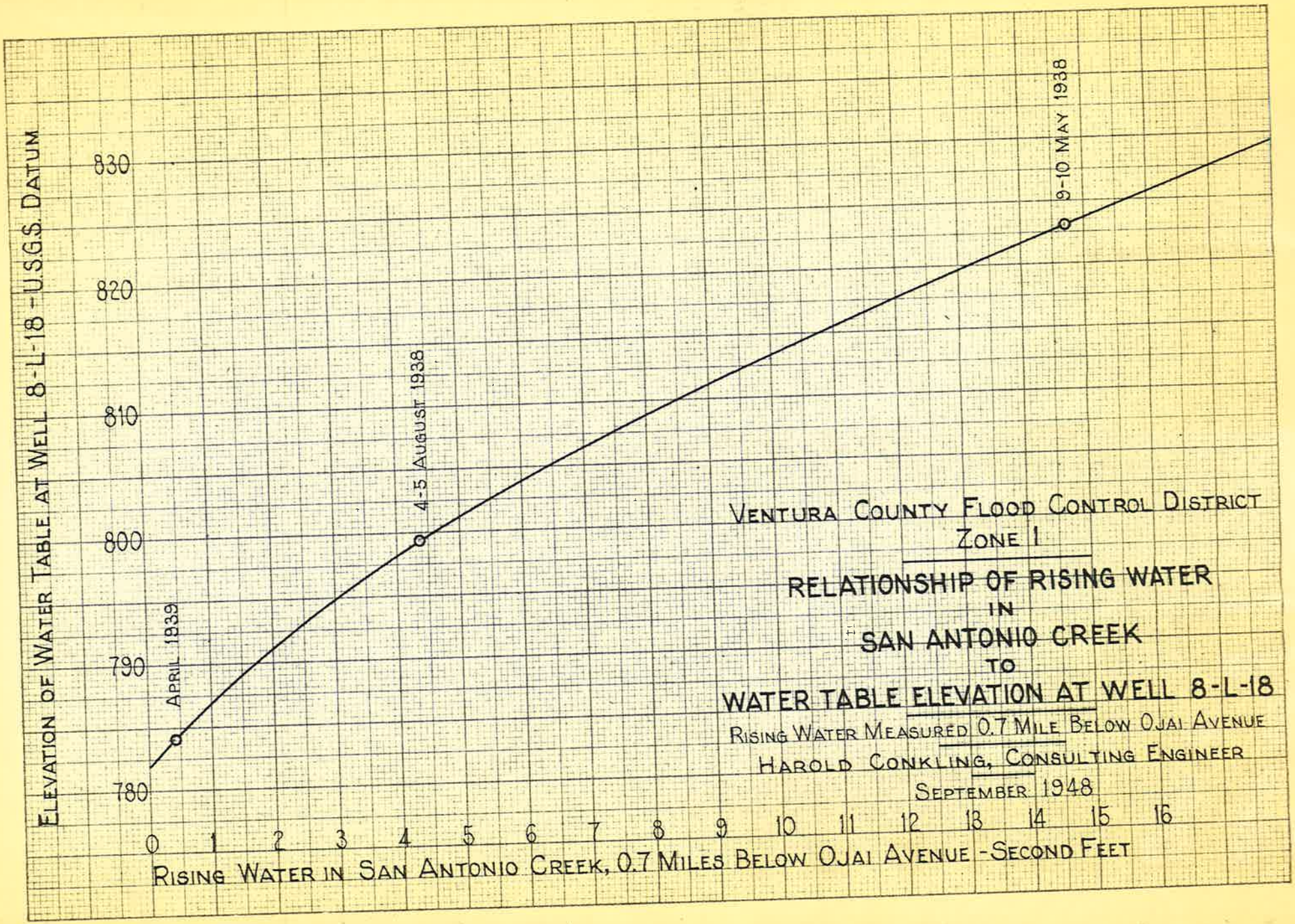
8. Installation now of a spreading conduit may anticipate the future to far. That depends on the weather. However, it is better to be on the safe side. The capacity to carry water can be installed more cheaply in combination with the domestic conduit than it can be installed later as a separate unit.

9. The conduit to carry 20 second feet seems as large as is justified.

RECOMMENDATION

It is recommended that detailed designs and estimates of cost of facilities to spread water from Matilija Reservoir spill in Eastern Ojai Valley be incorporated in the Engineer's report on the distribution system from Matilija Reservoir.

It is further recommended that the additional conduit capacity for transmission of water to be spread be 20 cubic feet per second and that the spreading grounds be located in San Antonio Creek Wash at mouth of Senor Canyon, just below elevation 1000.



VENTURA COUNTY FLOOD CONTROL DISTRICT
ZONE 1

RELATIONSHIP OF RISING WATER IN SAN ANTONIO CREEK TO WATER TABLE ELEVATION AT WELL 8-L-18

RISING WATER MEASURED 0.7 MILE BELOW OJAI AVENUE

HAROLD CONKLING, CONSULTING ENGINEER

SEPTEMBER 1948

JANUARY FEBRUARY MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER OCTOBER NOVEMBER DECEMBER

5 10 15 20 25

WATER TABLE ELEVATION - U.S.G.S. DATUM

830 820 810 800 790 780 770 760 750

RISING WATER OUTFLOW - SECOND FEET

16 14 12 10 8 6 4 2 0

WATER TABLE ELEVATION AT WELL 8-L-18

RISING WATER

RAIN MAY 16-19, INC.

RAIN DEC. 15-21, INC.

VENTURA COUNTY FLOOD CONTROL DISTRICT

ZONE 1

RISING WATER OUTFLOW FROM OJAI VALLEY IN SAN ANTONIO CREEK 1938

MEASURED 0.7 MILE BELOW OJAI AVENUE

HAROLD CONKLING, CONSULTING ENGINEER

SEPTEMBER 1948

8-L-18
Lawrence Shaw.
Location:- Ojai Valley, approximately 0.4 mile west of Carne Road and 900 feet south of Grand Avenue.

WELL Nº 8-L-
GROUND ELEV. 84
LOCAL Nº

1927 1928 1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950 19

ELEVATION ABOVE SEA LEVEL - U.S.G.S. DATUM.

840 830 820 810 800 790 780 770 760 750 740 730 720 710 700 690

GROUND SURFACE

P = PUMPING

Periods in which water could be spread and leakage from basin is at a minimu

Periods with water available for spreading but no benefit

WATER SURVE
VENTURA COU
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