

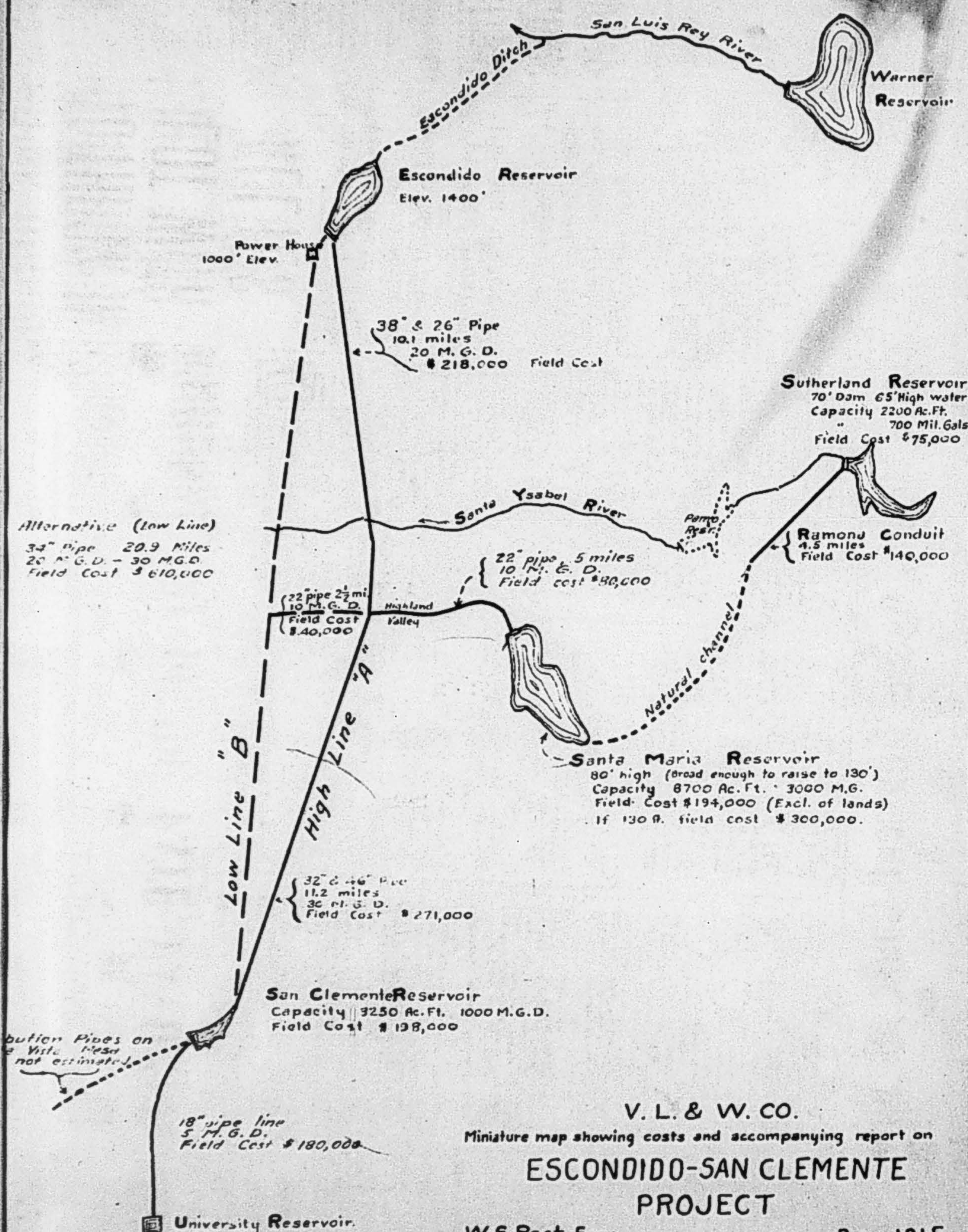


**REPORT ON ESCONDIDO-SAN CLEMENTE PROJECT OF**

**VOLCAN LAND & WATER CO.**

**By William S. Post**

**December 1, 1915.**



V. L. & W. CO.

Miniature map showing costs and accompanying report on  
**ESCONDIDO-SAN CLEMENTE PROJECT**

W.S. Post, Engr.

Dec. 1915

Drawing No. 555  
 File No. D-50

REPORT ON ESCONDIDO-SAN CLEMENTE PROJECT OF  
VOLCAN LAND & WATER CO.

By William S. Post

December 1-1915.  
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General Statement.

This plan proposes the building of Warner Reservoir, the utilization of the natural bed of the San Luis Rey as far as the intake of the Escondido Mutual Water Company's ditch, the joint use of this ditch to the Escondido Reservoir, the building of a pipe line from the Escondido Reservoir to San Clemente Reservoir. At the middle point of this pipe line a feeder will enter from the Santa Maria Reservoir.

The Warner Reservoir would be built as described in previous reports. The use of the Escondido Ditch would be according to an agreement to be entered into with the Escondido Mutual Water Company. This report deals especially with the pipe line from the Escondido Reservoir to San Clemente and gives the results of surveys just completed. There are several alternative solutions which are indicated below but the report confines itself in detail to the one which is recommended.

The first solution may be called the "High Line". This would begin at the level of the Escondido outlet 1380 feet in elevation and reach the San Clemente at an elevation of 757. The fall is rapid and this fall is utilized to decrease the diameter of the pipes. A variation of this plan would consist in a pipe line from the Escondido Reservoir to Highland Valley meeting the old survey of the Pamo Canal about midway.

The second general solution may be called the "Low Line". This would use the fall for power from the Escondido Reservoir at an elevation of 1380 feet to the present power house of the Escondido Mutual Water Company, elevation 980. It would use the Right of Way of the present distributing ditch of the Mutual Company for some five miles and then follow in the main the highway from Escondido to San Clemente Reservoir.

A variation would be not to place this "Low Line" upon the highway, but follow approximately the same route as shown in detail on the high line, uniting with Old Pamo Canal in Highland Valley or using pipe throughout.

#### High Line Conduit.

The plan recommended consists of the use of 38 inch cement pipe and 26 inch Lock Bar pipe from Escondido Reservoir to the junction with Santa Maria feeder, thence 46" and 32" pipe to San Clemente. The elevation of the outlet of the Escondido Reservoir is 1380 feet, and the end of the pipe line is 756 feet at the San Clemente Reservoir. The length is 21.3 miles and consists of the following structures:

38 inch cement pipe	15,060 lin.feet
46 " " "	20,260 " "
46 " " " reinforced	2,860 " "
26 " Lock bar steel pipe	39,200 " "
32 " " " " "	32,980 " "
Poway tunnel	<u>1,840 " "</u>
Total	112,200 " "

This provides for 1,500 miners inches, 30 second feet or 20 million gallons daily. This is the safe yield of Warner Reservoir and the plan provides only for a continuous flow through the conduit which perhaps is justified by the regulation afforded by the Escondido Reservoir. At the 10th mile the junction of the Santa Maria Feeder, where 15 more second feet is added, the pipe is increased to a delivery of 45 sec. feet, 2250 miners inches or 45 million Gallons daily.

The capacity of the Escondido Ditch at its intake and for several miles is 2,000 miners Inches, sufficient to supply both their own consumers and carry the Warner water. It is not certain, but the probable figure for the lower portion is 1,500 Miners Inches and some enlargement and reconstruction would be required to secure the total quantity. However, it must be remembered that this ditch is absolutely unused for six to eight months and this means that half of the above quantities of water can be transported annually to San Clemente without any reconstruction, With San Clemente Reservoir built sufficient to store and regulate the quantity, some 500 Miners Inches would be available for use without Touching the present facilities of the Escondido Ditch.

The general route of the High Line is so located as to take advantage of high ground where cement pipe can be used. About one third is cement pipe and the remainder steel pipe.

Rights of Way over 3 miles will be over government land;  $1\frac{1}{2}$  miles along the Mutual Company's Ditch; one mile on a road; some  $4\frac{1}{2}$  miles on rough grazing land; and about 13 miles over barley lands, generally along property lines.

About 60 acres is required.

The attached map shows the recommended High Line route and an alternative Low Line.

ESTIMATE OF COST.HIGH LINE - ESCONDIDO RESERVOIR to SAN CLEMENTE.

38" Cement Pipe in place-					
15,060 lin. Feet	@	3.25			\$49,000
46" Cement Pipe in place					
20,260 Lin. Feet	@	4.00			81,000
46" Re-inforced Cement Pipe					
2,860 Lin. Feet	@	6.00			17,200
26" Lock Bar Steel Pipe					
3/16" 27,810 Lin. Ft.	#73		2,030,130		
1/4" 3,380 " "	95		321,100		
5/16" 6,360 " "	123		782,280		
3/8" 1,650 " "	146		240,900		
			<u>3,374,410</u>		
@ \$.05 in place					168,800
32" Lock Bar Steel Pipe					
3/16" 30,510 Lin. Feet	#85		2,593,050		
1/4" 2,470 " "	110		271,700		
@ \$.05 in place			<u>2,864,750</u>		143,300
Tunnel (in cemented gravels) Concrete Lined					
1840 Lin. Feet @ \$16					<u>29,500</u>
					<u>\$488,800</u>



Santa Maria Feeder

This high line conduit is located so as to pass through Highland Valley. The distance from Santa Maria Reservoir is approximately 5 miles and requires a pipe of 22 inches diameter to convey 1,000 Miners Inches to the pipe line. It will be understood that this "High Line" plan proposes the abandonment of Pamo Reservoir and as already outlined in former reports, proposes a diverting dam at the Sutherland Damsite, the building of the Ramona Conduit 5 miles in length and the building of the Santa Maria Reservoir of a sufficient height to store all the water of Sutherland and the Black Canyon. This would be the entire development on the upper Santa Ysabel. The remainder being taken care of by the Carroll Reservoir.

The cost of the Santa Maria feeder is estimated to be \$80,000.00.

SUMMARY OF COST OF  
COMPLETE DEVELOPEMENT UNDER THIS PLAN.

(As given in my letter of September 26th revised)

Purchase Price	\$2,500,000
San Pasqual Rights	500,000
Warnor Dam, 100 ft. Dam, 90 ft. water level, capacity 117,000 Acre feet	302,000
Pipe, Escondido Reservoir to San Clemente Reservoir, as previously estimated Capacity 30 million gallons daily	489,000
Santa Maria Feeder, 22" Pipe from Santa Maria Dam to preceeding pipe 5 miles, Capacity 20 M. G. Daily	80,000
Sutherland Reservoir 70' high, 65' water line, Capacity 2200 acre feet	75,000
Ramona Conduit, Capacity 30 Million Gallons daily 5 miles	140,000
Santa Maria Reservoir, 130' high Capacity 34,000 Acre feet	300,000
San Clemente Reservoir 65' High 60' water level, Capacity 3250 Acre feet	198,000
City Pipe Line, Capacity 5 M.G. daily San Clemente to University Heights	<u>180,000</u>
	\$4,764,000
Add 15% overhead on \$1,764,000 Construction field cost given above	<u>267,000</u>
Total	\$5,031,000

ANNUAL OPERATING COST.

Maintenance and Operation	\$50,000
Rental allowance or equivalent to Escondido Mut. Water Co.-say	10,000
Interest 8% on \$5,031,000	403,000
Depreciation 3% on \$2,031,000	<u>61,000</u>
Total Annual "Production Cost"	\$524,000

COST per 1000 Gallons.

Cost per 1000 Gallons based on  
full delivery of 26 million 3  
gallons daily or 9500 million  
gallons annually, is

5½ cents.

Comparison with Former Estimates  
Of Various Engineers.

Engineer	Safe Yield found <i>Mil. Gals daily</i>	Cost of Physical Structures	Total Cost.	Price per 1000 Gals Physical cost <i>cents</i>	Total cost <i>cents</i>	Interest used
Haygood	46	3,570,000	6,070,000	1.2 $\frac{7}{8}$	3.4 ?	7%
Harroun	23	\$4,934,000	\$7,739,000	3.7	5.3	4 $\frac{1}{2}$ %
"	"	"	"	5.8	8.5	8%
O'Shaughnessy and Lippincott	19	\$6,500,000	\$9,000,000	6.8	8.8	?
Post	26	\$2,031,000	\$5,031,000	3.0	5.5	8%

CONCLUSION

The plan here present calls for only half of the construction expenditure than the previous estimates and the physical "production cost" per 1000 Gallons is half. <sup>I have</sup> ~~including~~ the value of the property at \$3,000,000 instead of \$2,500,000 as used by Harroun and Lippincott <sup>and</sup> the price per 1000 Gallons is 5  $\frac{1}{2}$  against 8  $\frac{1}{2}$  cents.

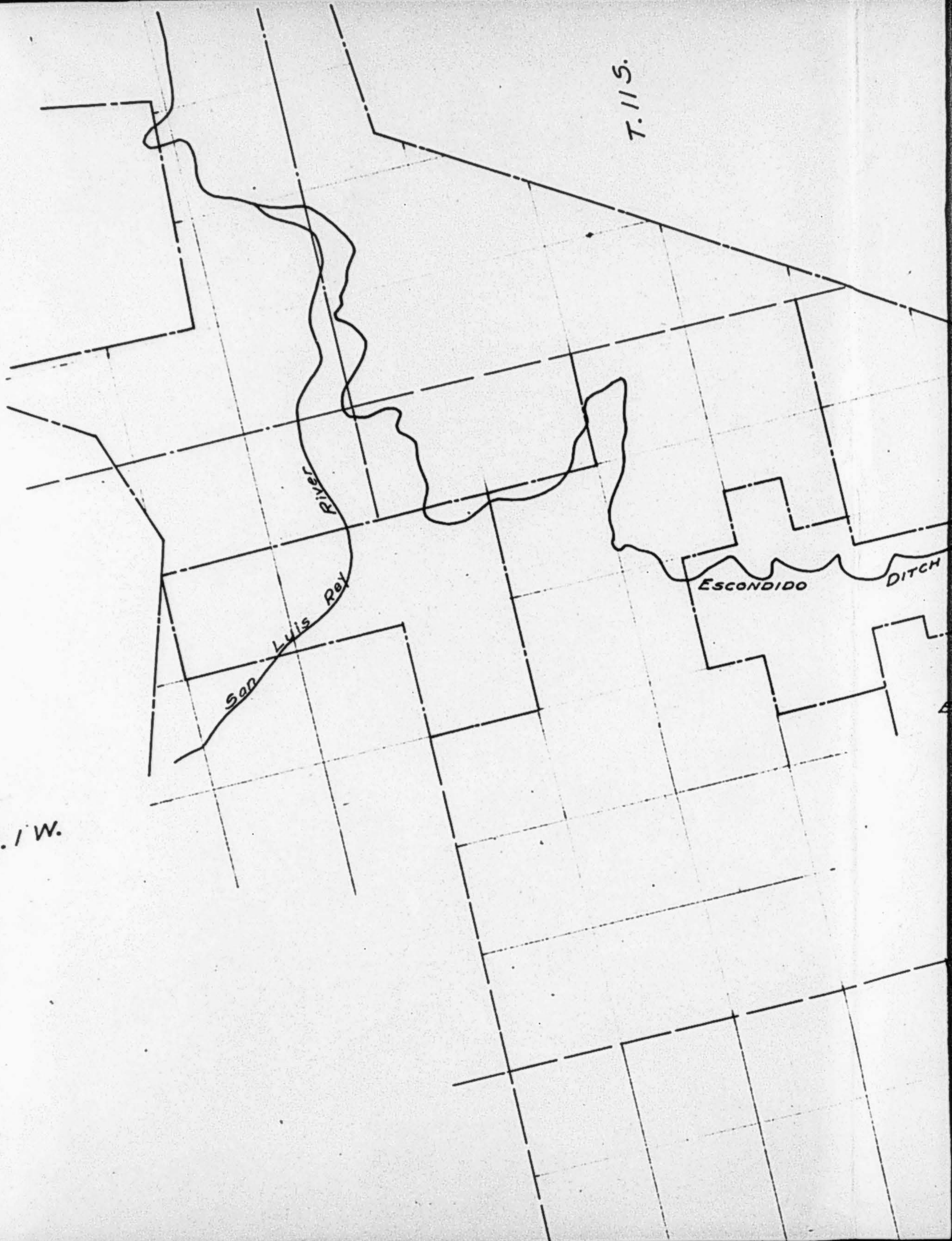
All of the high run off basins are connected by this plan, and in addition the pipe line passes over the San Pasqual Valley where the important pumping gravels are located; a safety factor.

The situation developed here permits the delivery into San Clemente Valley of the free flowing water of San Luis Rey River to the extent of at least 2 million gallons daily within a single construction year. The capital investment required is for the pipe line and San Clemente Reservoir or \$790,000 to serve the Linda Vista Mesa or \$980,000 to serve the City of San Diego.

Thereafter the addition of each unit previously listed will add its quota of water as the demand increases.

*William S. Post.*

T. 115.

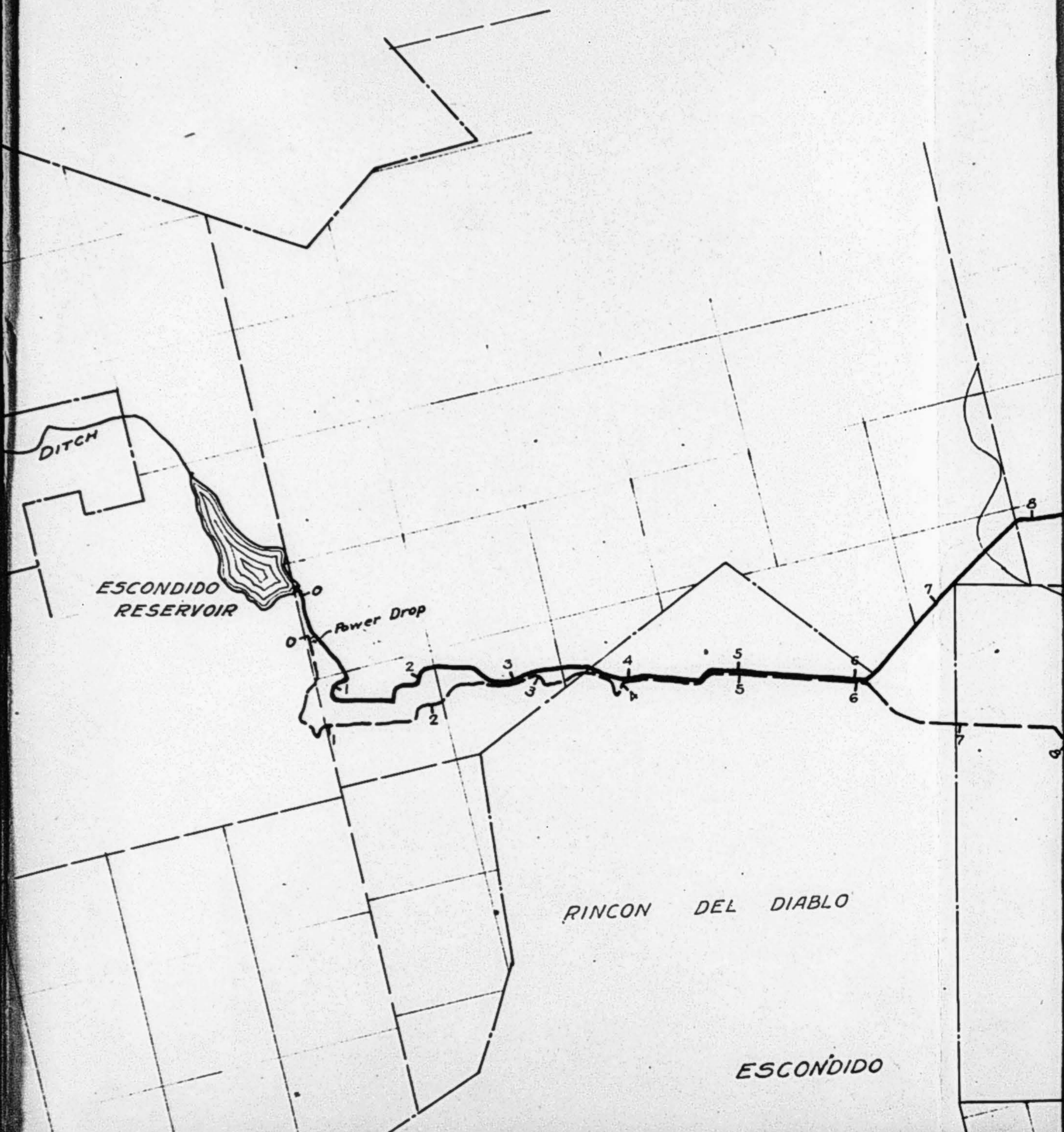


San Luis Rey River

Escondido Ditch

R. I. W.

T. 12 S.



ESCONDIDO  
RESERVOIR

Power Drop

DITCH

RINCON DEL DIABLO

ESCONDIDO

T. 13 S.

T. 14 S.

HIGH LINE CONDUIT - 21.3 MILES.

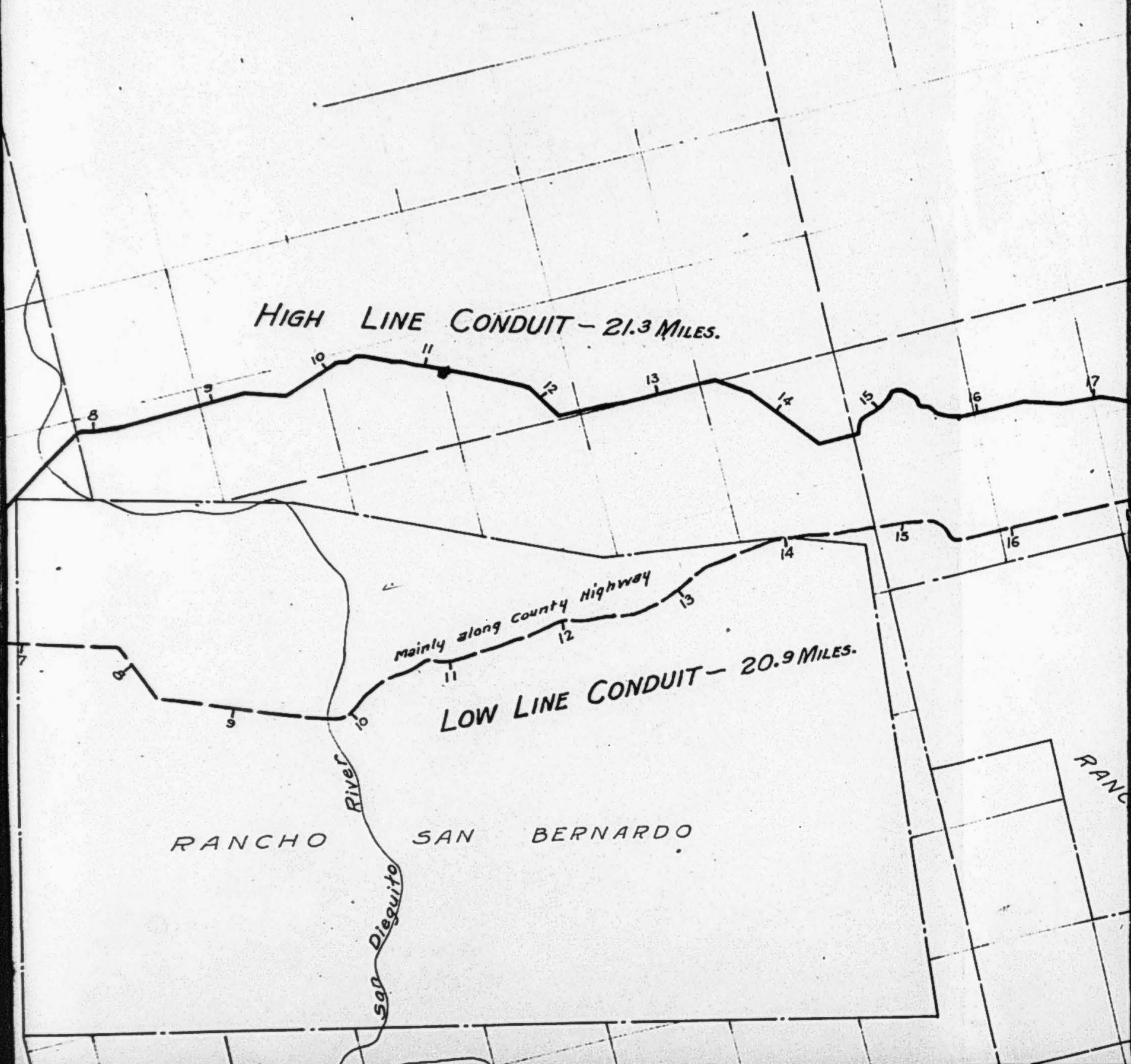
mainly along County Highway

LOW LINE CONDUIT - 20.9 MILES.

RANCHO

SAN BERNARDO

RANCHO



T. 14 S.

T. 15 S.



19.

20

21

Tunnel

SAN CLEMENTE RESERVOIR

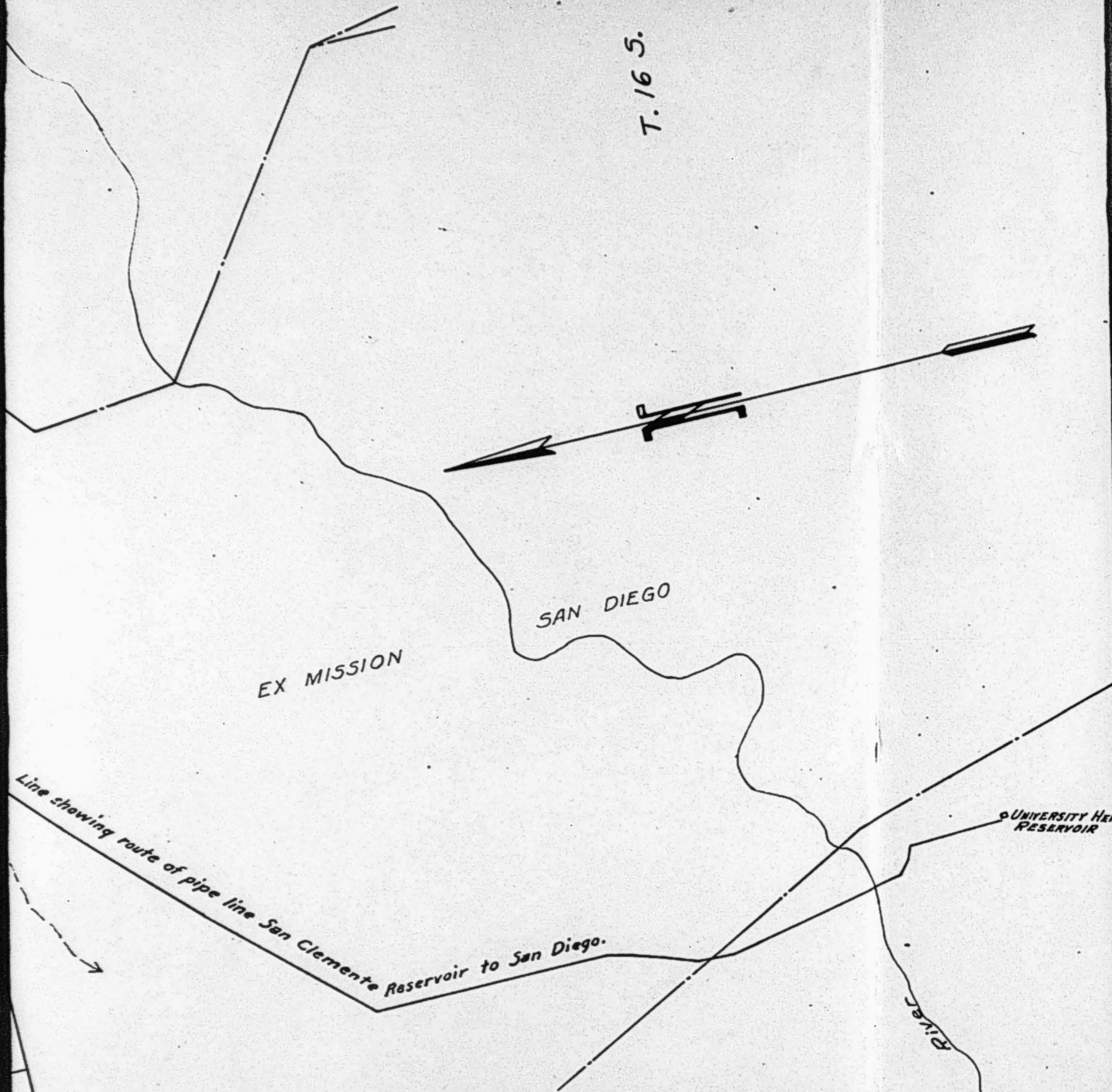
Line showing route

RANCHO

507



T. 16 S.



Line showing route of pipe line San Clemente Reservoir to San Diego.

VOLCAN LAND & WATER CO.  
MAP OF  
**PROPOSED PIPE LINES**  
FROM ESCONDIDO RESERVOIR

Drawing No. 4  
File No. B-

UNIVERSITY HEIGHTS  
RESERVOIR

River

San Diego

UNIVERSITY HEIGHTS  
RESERVOIR

CITY OF  
SAN DIEGO

San Diego

River

San Diego

Drawing No 534  
File No B-40

of

5

F E E T

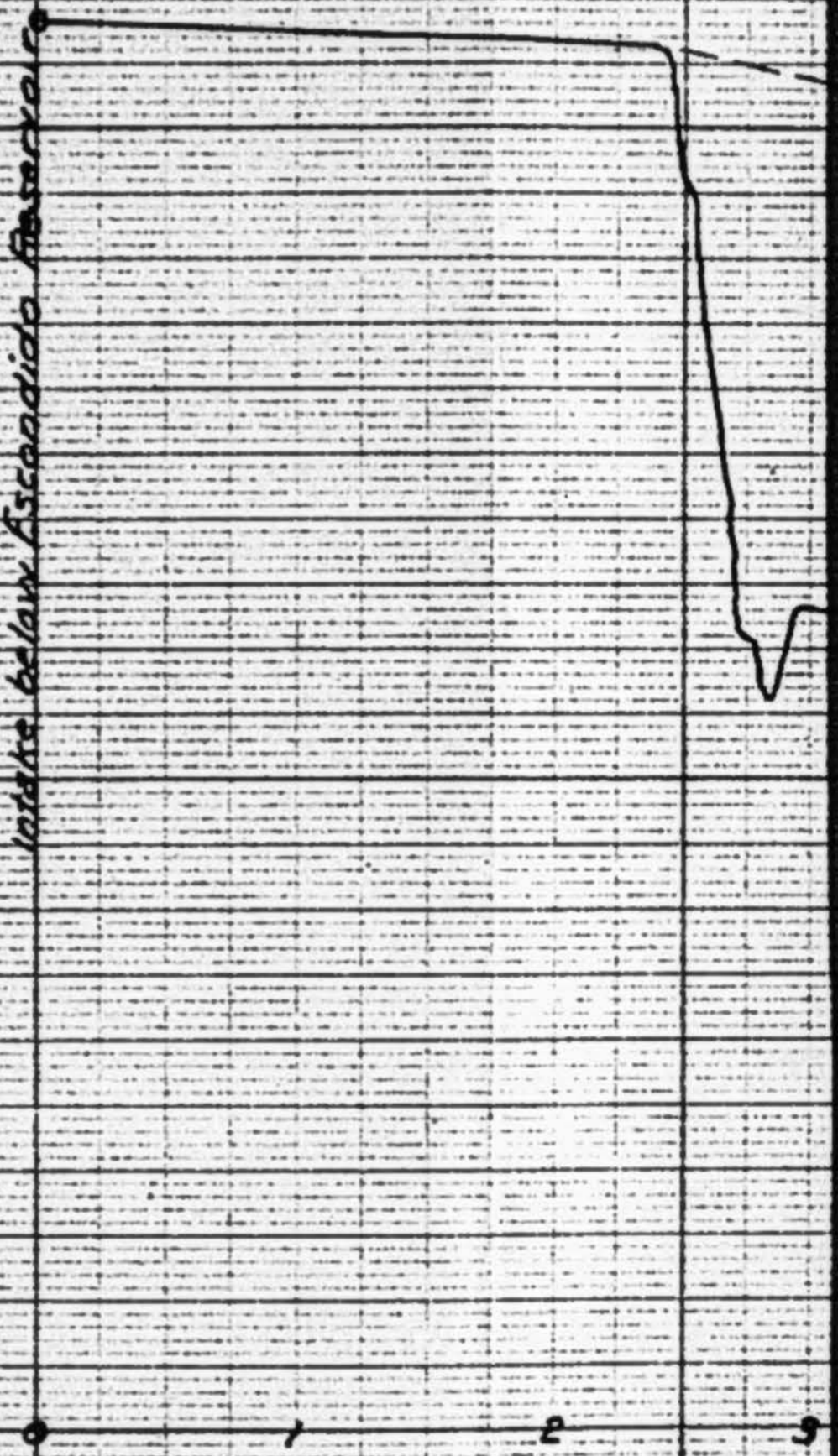
1400  
1300  
1200  
1100  
1000  
900  
800  
700  
600  
500  
400  
300

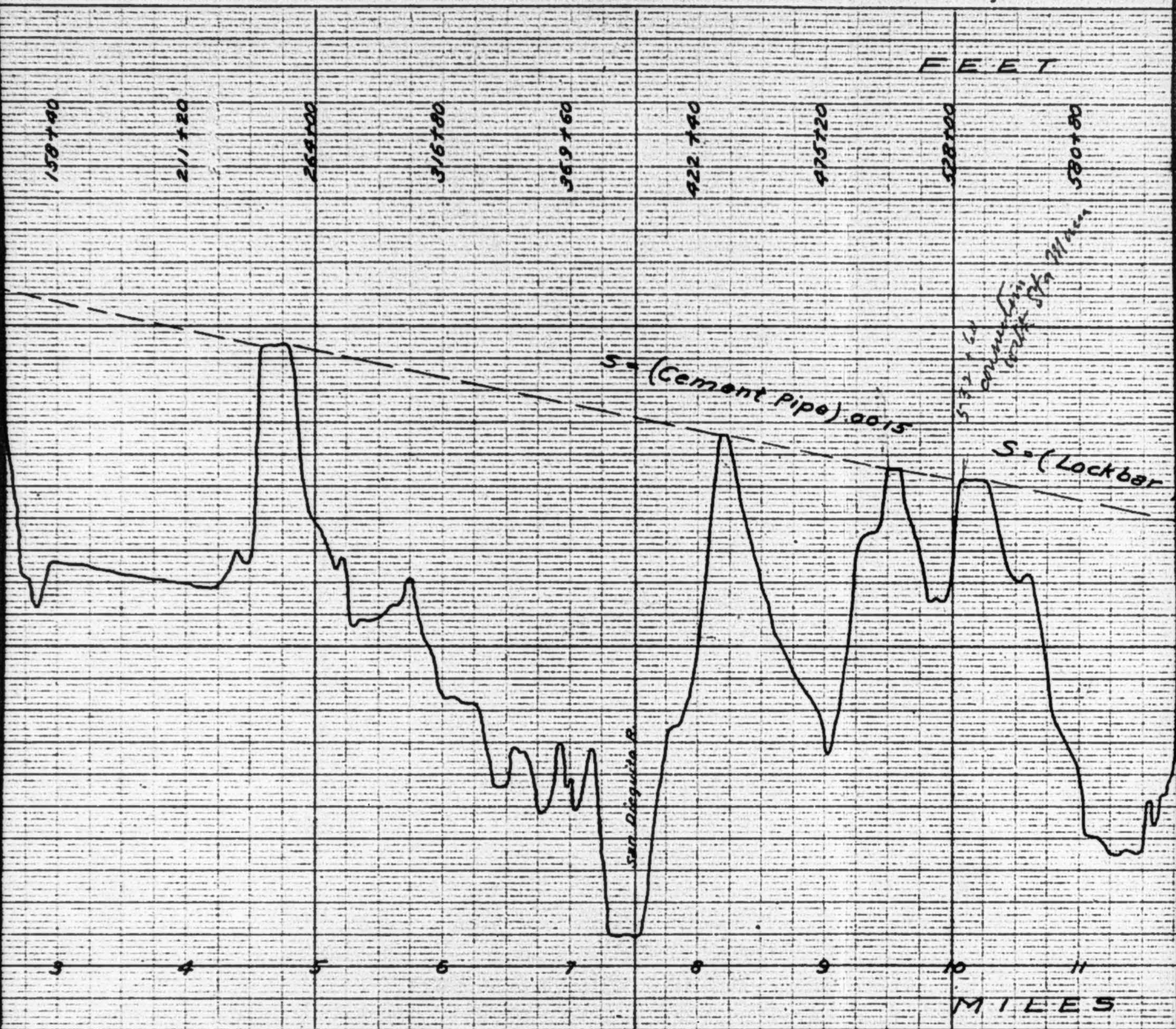
Intake below Ascendido Reservoir

52+80

105+60

158+80





699760

686740

739720

792700

847780

897760

950740

1003720

1056700

p. syphon) .0078

12

13

14

15

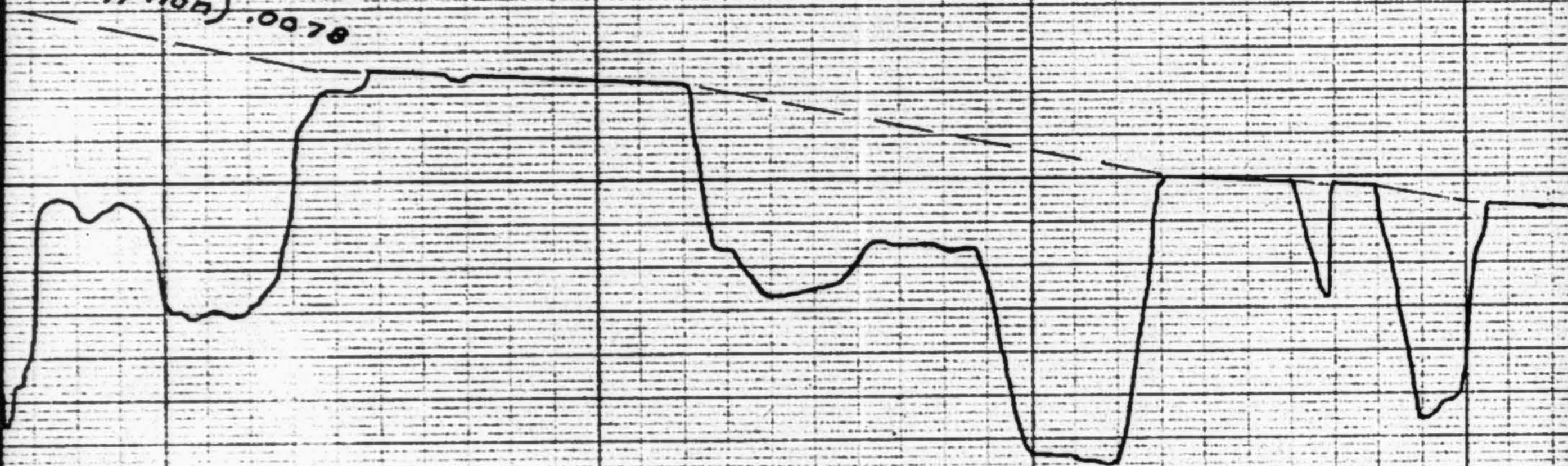
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17

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19

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1056400

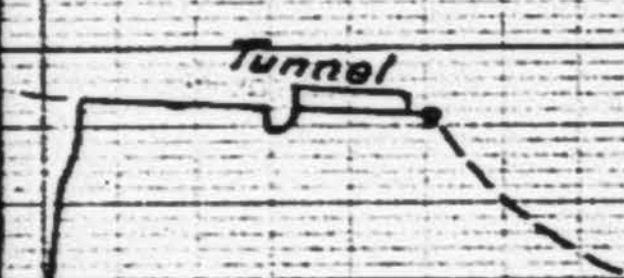
0818011

VOLCAN  
M.  
HIGH

ESCONDIDO & SA

Horizontal Scale: 1 in

Acc



Outlet at 21.3 miles into San Clemente Resr.

800

700

600

500

400

0

20

21

VOLCAN LAND & WATER CO.

Miniature Profile

HIGH LINE CONDUIT

Connecting

ESCONDIDO & SAN CLEMENTE RESERVOIRS

Horizontal Scale: 1 in. = 1 Mile, Vertical Scale: 1 in. = 200 Ft.

San Clemente Resr.

Accompanying Report of W.S. Post, Engr.

December 1915

Drawing No. 550 A

File No. D-50

F E E T

1000  
900  
800  
700  
600  
500  
400  
300  
200

Ditch intake immediately  
above Power House  
E. M. W. Co.

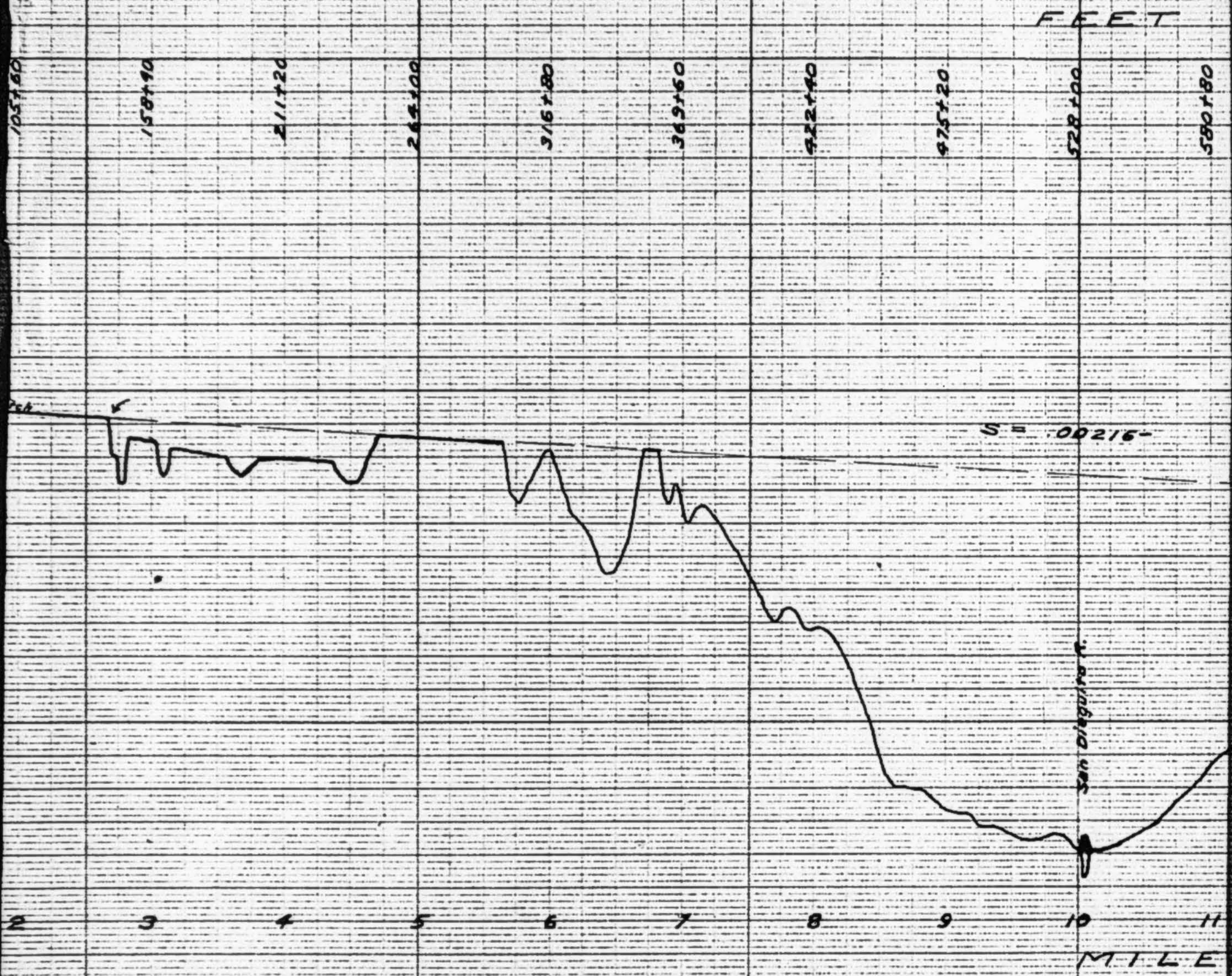
Esc. M. W. Co. Ditch

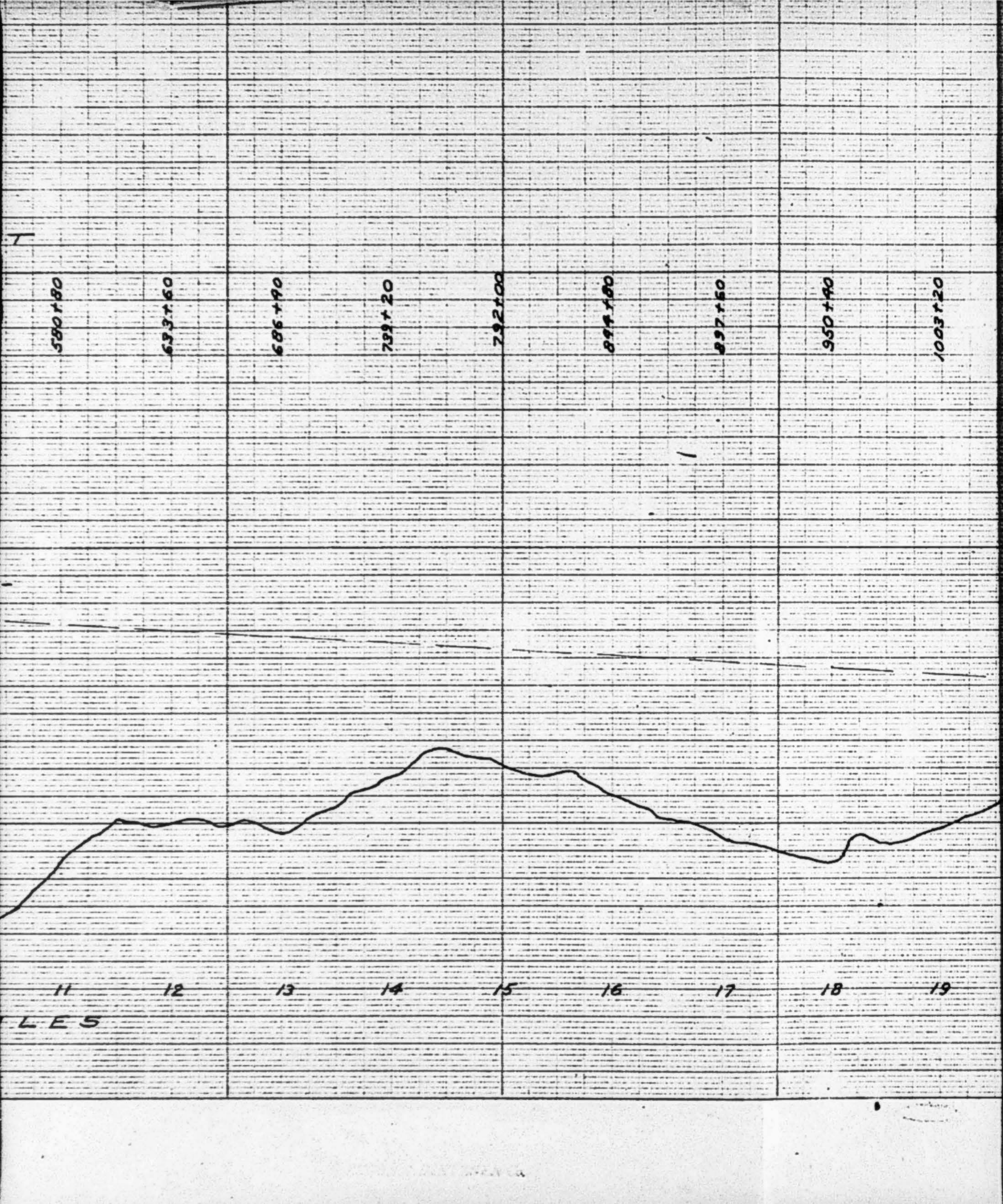
52+80

105+60

0 1 2

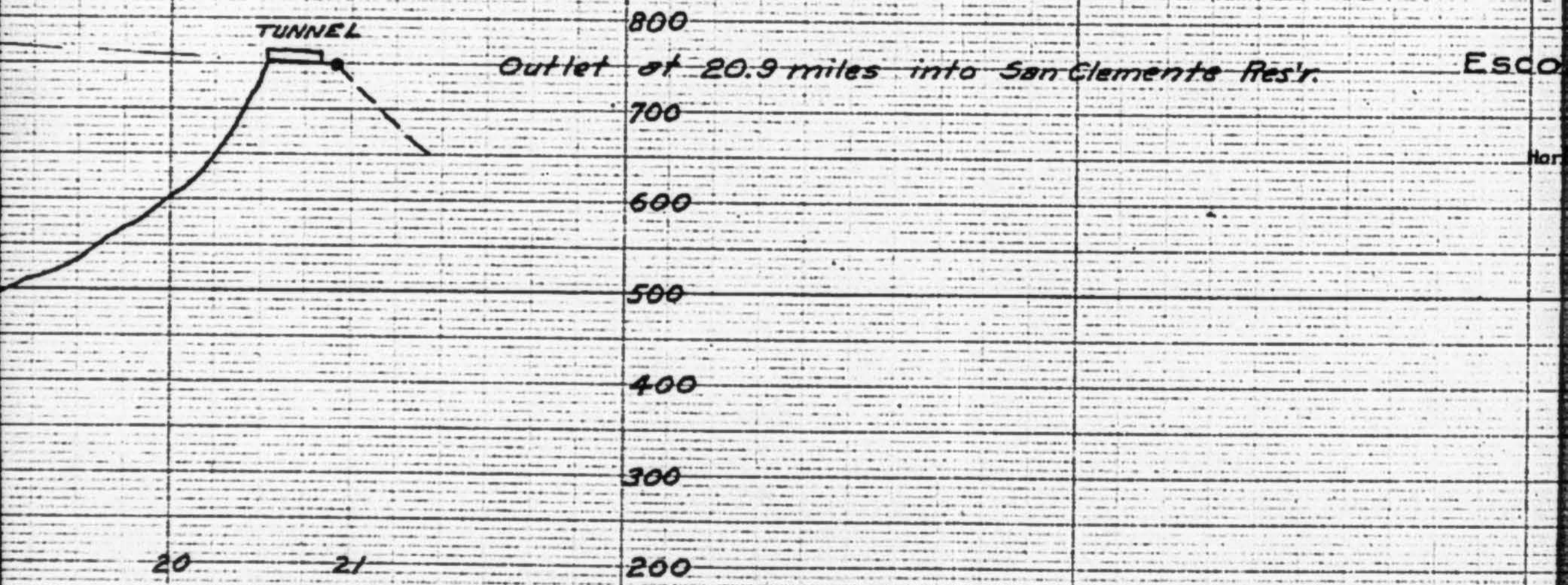






1056100

1108180



VOLCAN LAND & WATER CO.

Miniature Profile

LOW LINE CONDUIT

Connecting

ESCONDIDO & SAN CLEMENTE RESERVOIRS

San Clemente Res'r.

Horizontal Scale : 1 In. = 1 Mile ; Vertical Scale : 1 In. = 200 Ft.

*Accompanying Report of W.S. Post, Engr.*

*December 1915*

Drawing No. 552

File No. D-50

**Ed Fletcher Papers**

**1870-1955**

**MSS.81**

**Box: 41 Folder: 11**

**Business Records - Reports - Post, W.S - "Report  
on Escondido-San Clemente Project of Volcan Co."**



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