

WILLIAM S. POST  
ASSOC. MEM. A. S. C. E.  
FLETCHER BLDG., 924 8TH ST.  
SAN DIEGO, CALIFORNIA

November 22, 1916.

Mr. Ed Fletcher,  
Mgr V L & W Co.

Dear Sir:-

Subject: Second Report on Proposed Power Development  
from Sutherland Reservoir.

In reply to your letter of November 22nd, you wish the cost of a small diverting dam at Sutherland, the conduit line to and including power drop and the power house.

Referring to my report of August 1st, you will see that I proposed a power house of about 3,000 theoretical horse power. If you will omit for the present the construction of the Sutherland Reservoir, it still would be desirable to retain a sufficient conduit capacity to take care of this maximum output. It would not pay to enlarge the line later although it is not necessary to install the electrical machinery.

On page 2 of my report of August 2nd, I stated that if the construction of the reservoir is omitted, that the annual average output would be about 700 K. W. In the following estimate the Black Canyon Feeder is also omitted.

This estimate then provides for a full sized conduit line, a diversion dam only at Sutherland, a pressure pipe and a power house for installation of 500 K.W. net. Such a storage will vary from almost no output in the five summer months, and perhaps 200 K.W. in two others, and for the remainder of the year 500 K.W.

Mr. Ed Fletcher,  
page 2.

ESTIMATE OF COST

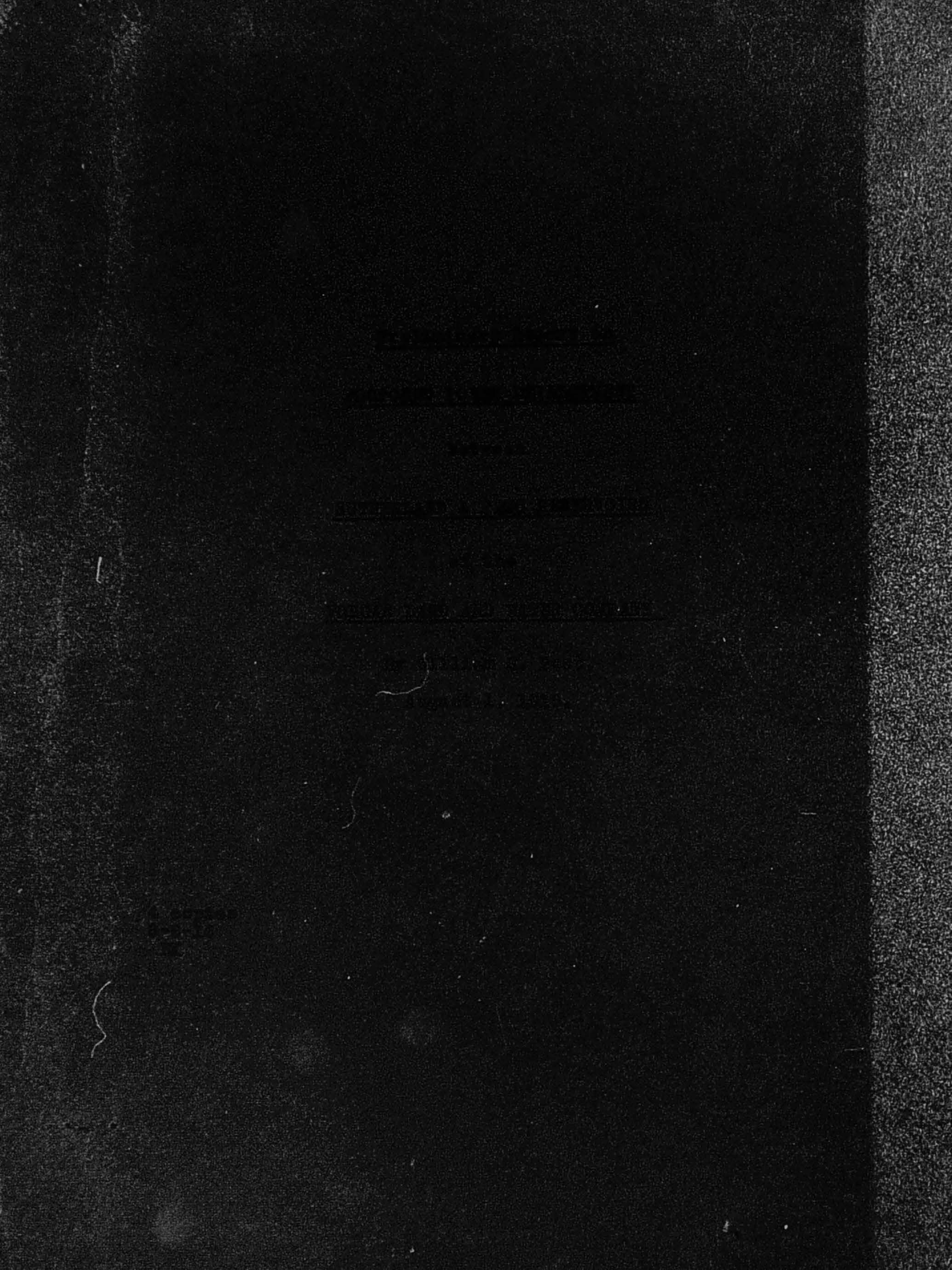
<u>Sutherland Diverting Dam</u> -----	\$10,000
<u>Conduit</u>	
Concrete pipe line, 36" diam., 22,000 lin. ft. at \$3.00 a foot -----	66,000
Steel pipe, light heads, 36" diam., 2,063 lin.ft. at \$5. a foot -----	10,315
Power Pressure line, 20" diam., 2,200 lin. ft. at \$10 -----	22,000
<u>Overhead on the above items, 15%</u> -----	<u>16,285</u>
Total to bring water to the power house -----	\$124,600

If the installation is to be for 500 K.W. net, the additional cost will be about \$25,000 or a total of \$150,000.

Yours very truly,

*Wm. S. Post*

WSP:K



Preliminary Report on  
PROPOSED POWER DEVELOPMENT  
 between  
SUTHERLAND & PAMO RESERVOIRS  
 of the  
VOLCAN LAND AND WATER COMPANY

By William S. Post,  
 August 1, 1916.

General Description

This plan proposes the building of Sutherland Dam, a branch pipe line from Black Canyon, and  $4\frac{1}{2}$  miles of conduit to a point directly opposite the upper end of the Pamo Reservoir. A fall of 880 feet can be developed here.

A power house is proposed with a station capacity of 3,000 theoretical horse power, or 2,100 H.P. maximum saleable equivalent to 1,600 K.W.

The Reservoir capacity suggested is sufficient to fairly equalize the winter and summer flows in a normal season. This would require a height of 110 feet, and a storage capacity of 11,800 acre feet.

The Water Supply in acre feet is as follows for the years observed:

<u>Year</u>	<u>Santa Ysabel proper 53 sq. miles</u>	<u>Black Canyon Feeder 17 sq. miles</u>	<u>Total</u>
1912-13	4,370	948	5,318
1913-14	10,450	2,359	12,809
1914-15	31,130	6,923	38,053
1915-16	95,250	21,000	116,230
Probable Average Year	14,000	2,600	16,600

The saleable Kilowatts for the above years would have been as follows with the maximum installation of 2,250 K W theoretical proposed:

<u>Year</u>	<u>Annual K W Output Saleable</u>
1912-13	400 K W
1913-14	1,000 "
1914-15	1,600 "
1915-16	1,600 "
Average year	1,200 "

If the construction of the Reservoir were omitted but the pipe line and plant built, the output would be somewhat as follows:

<u>Year</u>	<u>Annual K W Output Saleable</u>
1912-13	400 K W
1913-14	600 "
1914-15	800 "
1915-16	800 "
Average year (say)	700 "

Estimate of Cost

Sutherland Reservoir

Multiple Arch Type Dam at Site "A".  
110 feet high - Spillway over top and sides of dam.

Lands - 360 Acres at \$50 -----	\$18,000	
Multiple Arch Dam -----	200,000	
Excavation -----	5,000	
Clearing Reservoir -----	2,000	
Outlet Well and Gates -----	10,000	
Road Changes -----	5,000	
Overhead - 15% -----	36,000	276,000

Conduit

Concrete Pipe Line - 36" diam. 3 miles at \$15,000 -----	45,000	
Steel Pipe - light heads, 36" diam. 1.6 miles at \$25,000 -----	40,000	
Branch Steel Pipe from Black Canyon, 30" diam. 1 mile at \$20,000 ee-----	20,000	
Overhead ---- 15% -----	16,000	121,000

Power Plant

Pressure Pipe - 20" diam. - 2,500 lin. ft. (approx) at \$10 -----	25,000	
Installation - 2,250 K W at \$45 per KW	101,000	
Overhead -----	19,000	145,000

Transmission Line -

Say to connect with S D Cons. Gas & Electric at Posters, 20 miles at \$2,500 including overhead and rights of way -----		50,000
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GRAND TOTAL ----- \$ 592,000  
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Procedure

The survey for the lower portion of this power project is now being made. The upper portion is part of the "Ramona Conduit" which has already been granted by the Interior Department for irrigation purpose.

The original water filings at Sutherland and at Black Canyon do not recite power as a proposed use. Therefore an application is being prepared to the State Water Commission asking for a power right of 3,000 K W theoretical.

Immediately thereafter an application to the Interior Department for the remaining power canal right of way will follow for power purposes. The exact status of the right of way already granted and its relation to the one to be applied for will be passed on by Mr. Huber.

Conclusions

1. A plant taking the natural flow of the stream without regulating storage of Sutherland Reservoir would produce an average output of 700 K W saleable for an approximate expenditure of \$316,000. The amount of such power would vary directly with the flow of the River, and would be of interest only to a large power user like the San Diego Gas Company. They could afford to pay \$50 per K W for this power or a gross income of \$35,000 per year.

2. A plant with Sutherland Dam built to 110 feet high, would produce an average continuous output (well regulated as to peak loads) of 1,200 K W saleable, for an approximate expenditure of \$592,000. This would be peak load power and is worth \$100 per K W per year, and should yield a gross income of \$120,000 per year.

3. The Sutherland Reservoir and about half of the conduit is equally important for irrigation sale of water in the Ramona district and in connection with filling Santa Maria Reservoir, whenever the project advances to that stage. At no time need there be any waste of water for if not required for power, it may proceed for storage in Santa Maria Reservoir.

power  
house  
Elev 1240

Power  
Line

987.5  
Elev 1200

985 ft Contour - Pamo Reservoir

23

24



power  
house  
Elev 1240

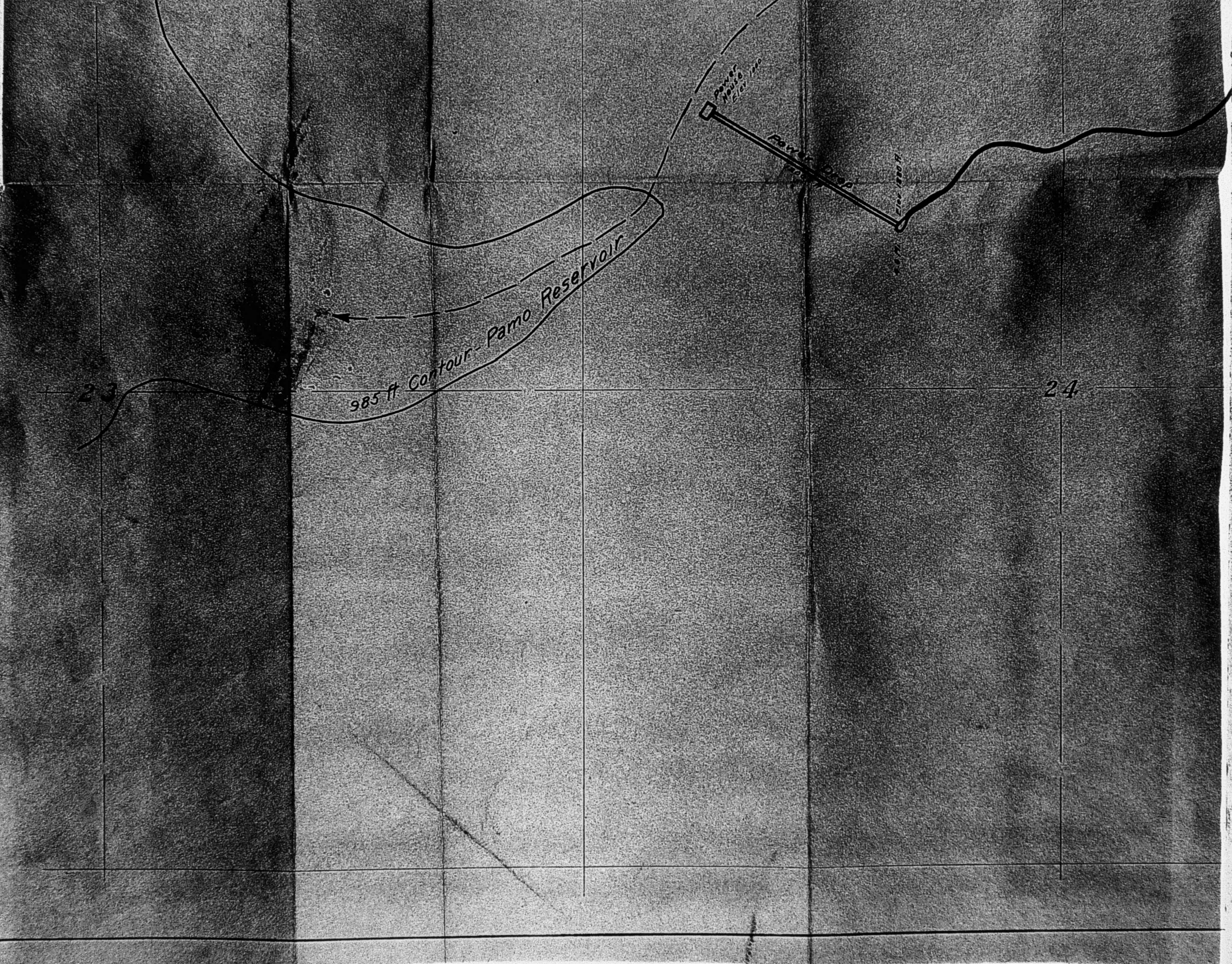
Power Pipe

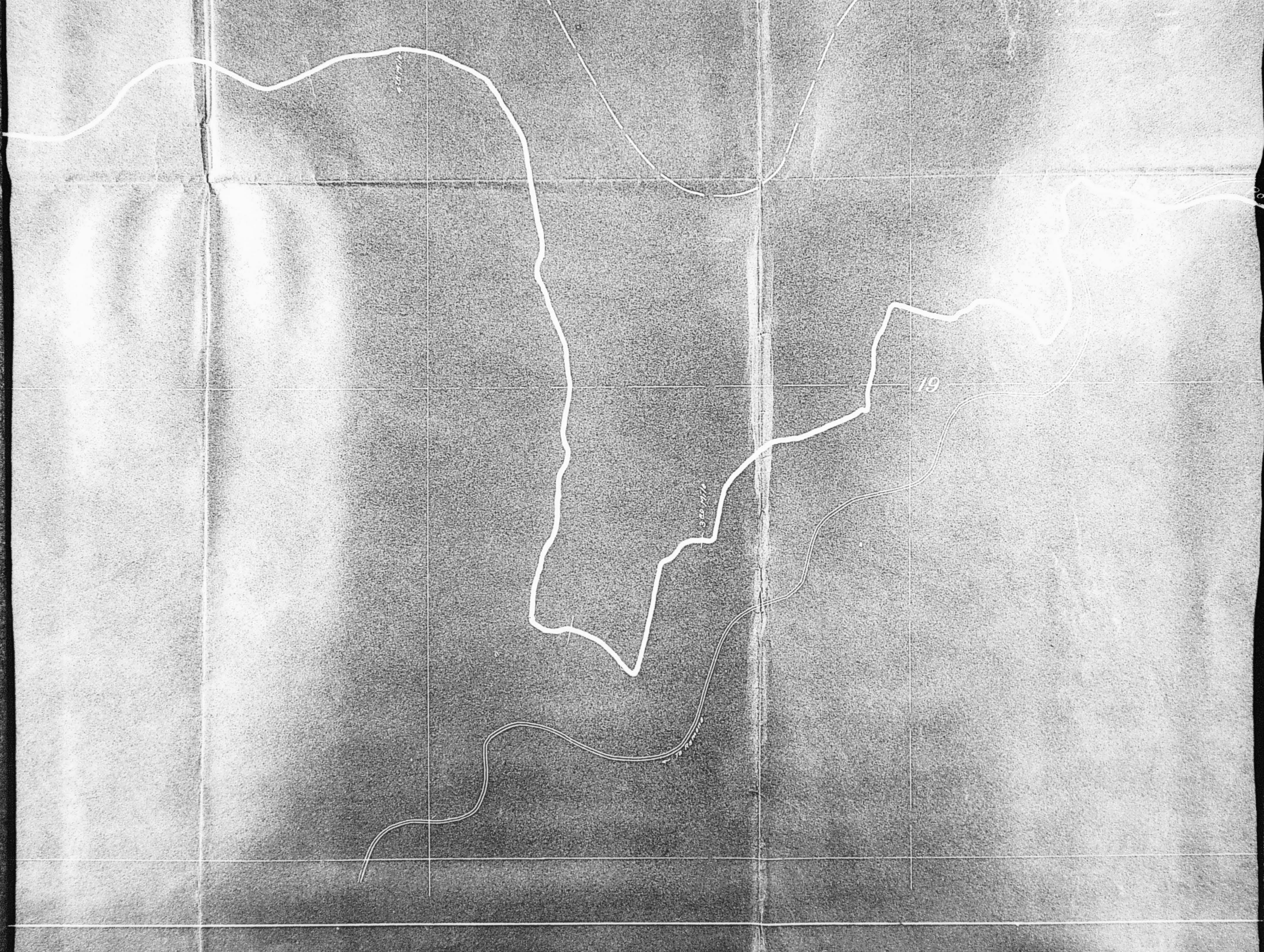
Elev 1200 ft

985 ft Contour - Pamo Reservoir

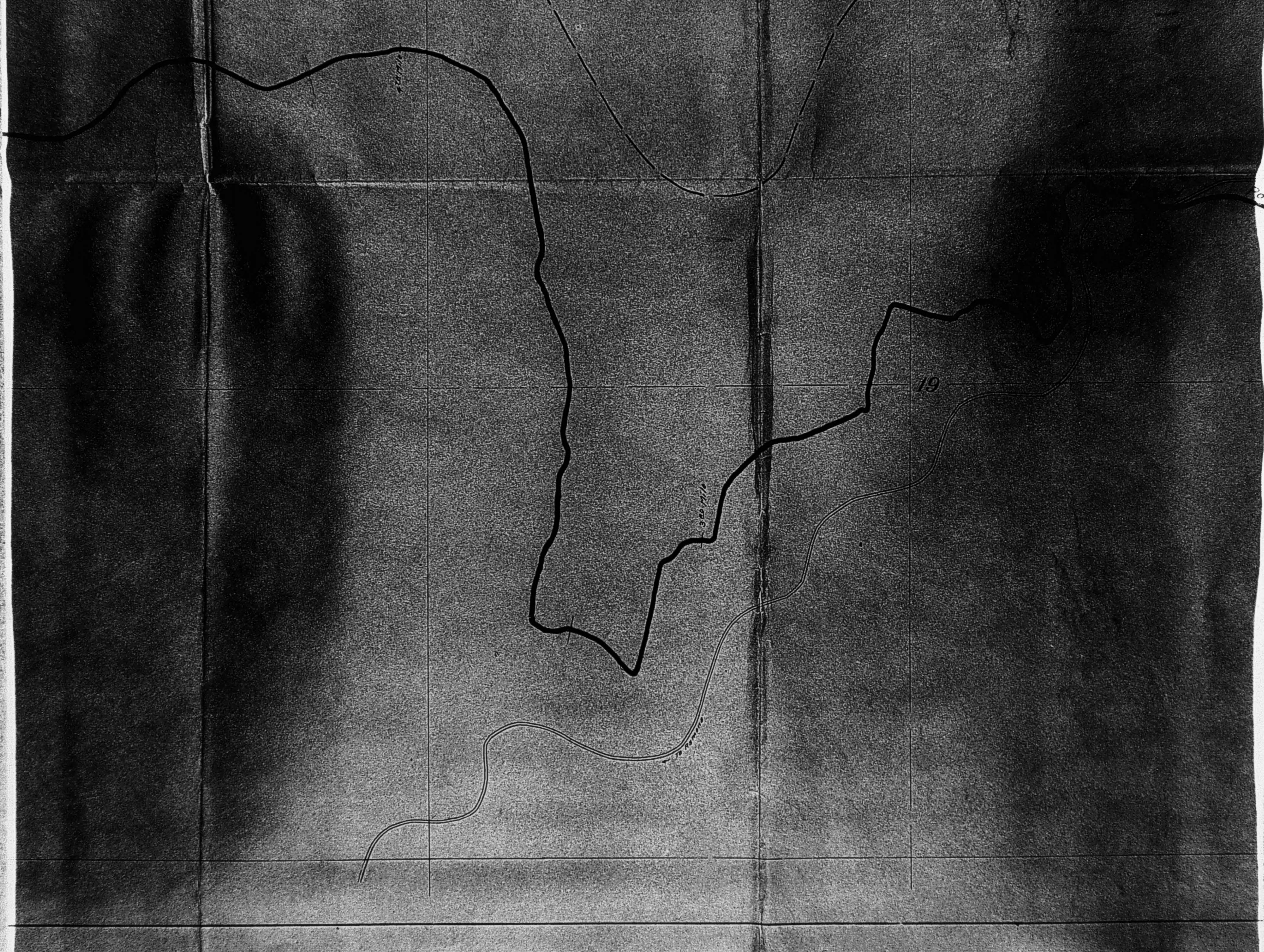
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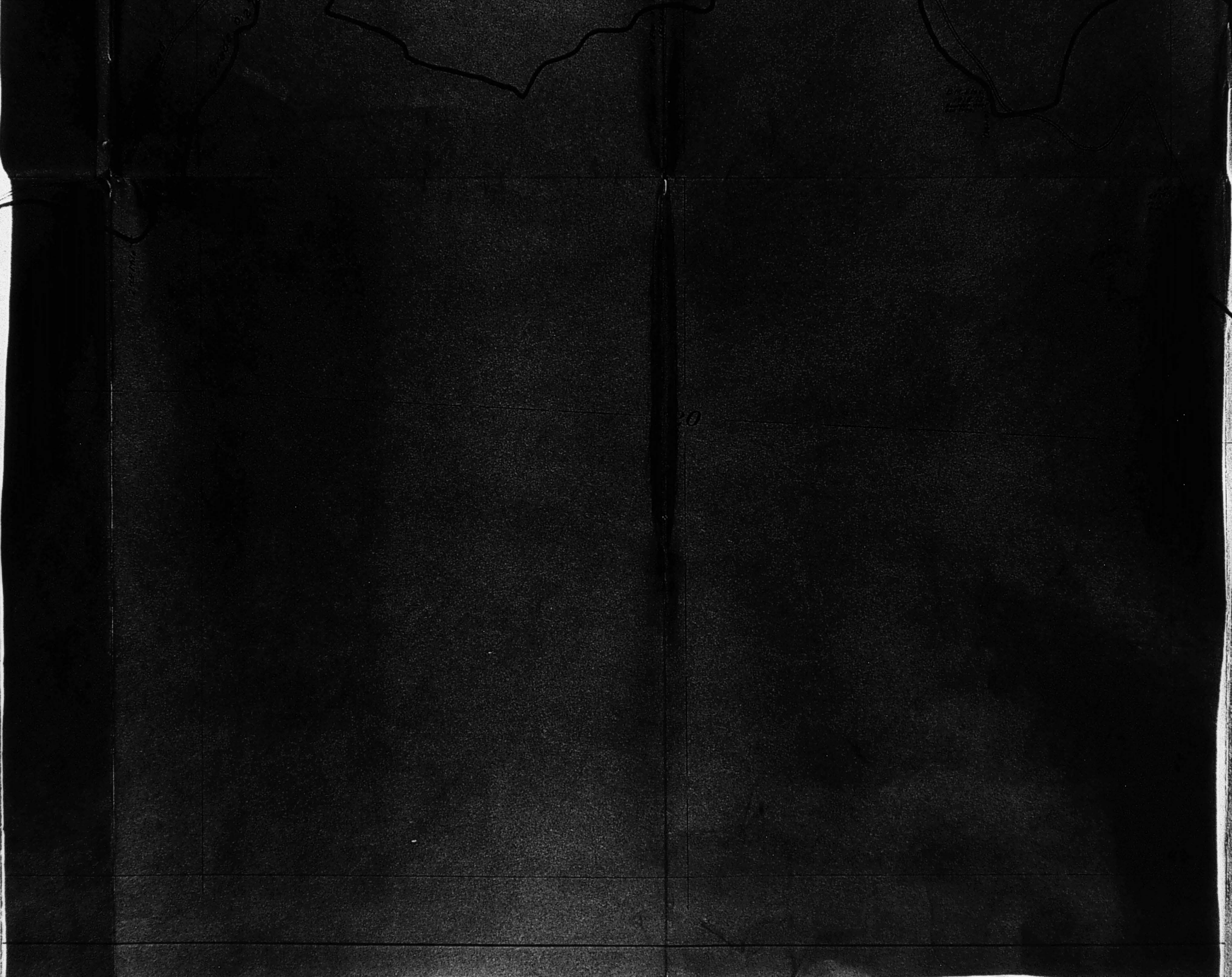


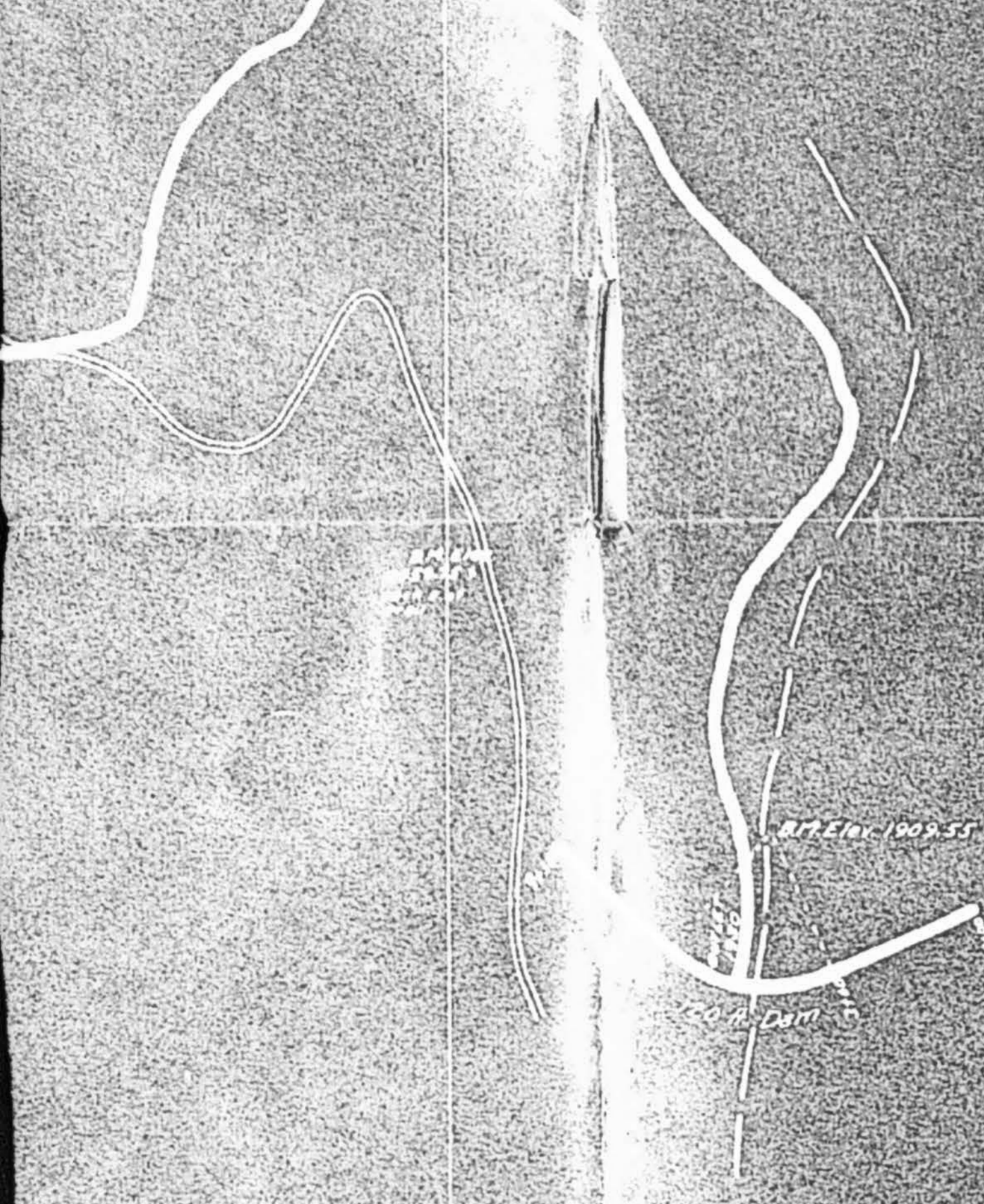












**VOLCAN LAND & WATER CO.**  
 Tentative location for proposed  
**SUTHERLAND-PAMO POWER CONDUIT.**

SCALE 1 IN = 400 FT.

REFERENCE MAP 186 D10

W. S. POST CHIEF ENGR.

LEVEL BOOK 49

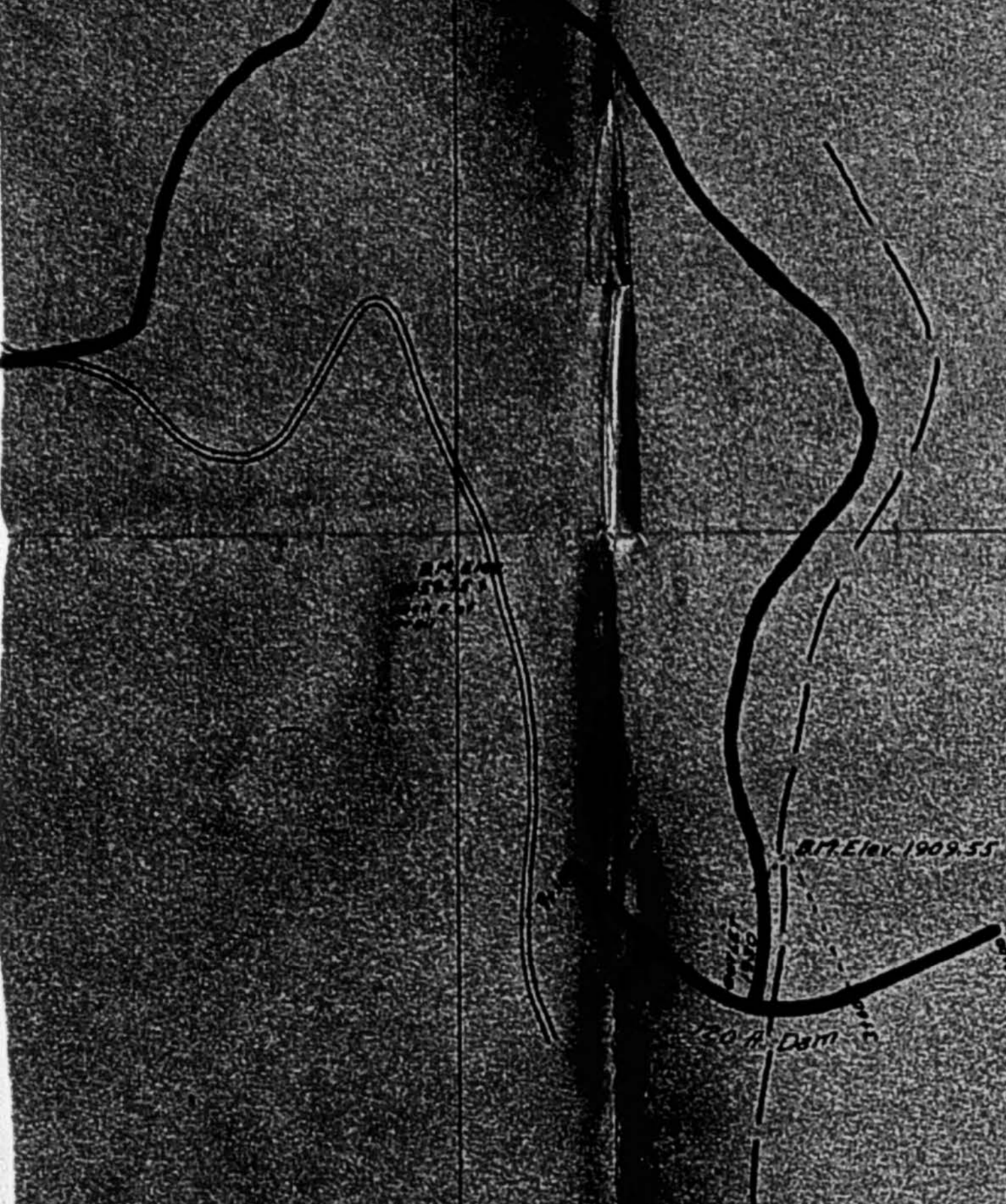
DATE July 28, 186

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DRAWING No. 593

FILE No. D.90

Tentative location for proposed Sutherland-Pamo Power Conduit. 200 D.90



**VOLCAN LAND & WATER CO.**  
 Tentative location for proposed  
**SUTHERLAND-PAMO POWER CONDUIT.**

SCALE 1 IN = 400 FT.

REFERENCE MAP 186 D10

W. S. POST CHIEF ENGR.

LEVEL BOOK 49

DATE July 28, 1966

DRAWN BY T.R.E.

DRAWING No. 593

FILE No. D90

Tentative location for proposed Sutherland-Pamo Power Conduit. 223 D90

**Ed Fletcher Papers**

**1870-1955**

**MSS.81**

**Box: 41 Folder: 17**

**Business Records - Reports - Post, W.S - "Second Report on Proposed Power Development from Sutherland Reservoir"**



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