

1895 San Diego Flume Co. offered to sell a large block of water S.D. City council turned it down Babcock managed the Cayama Water Company; also manager of the San Diego Water Company, which was operated as a public utility, rates being fixed annually by the city council.

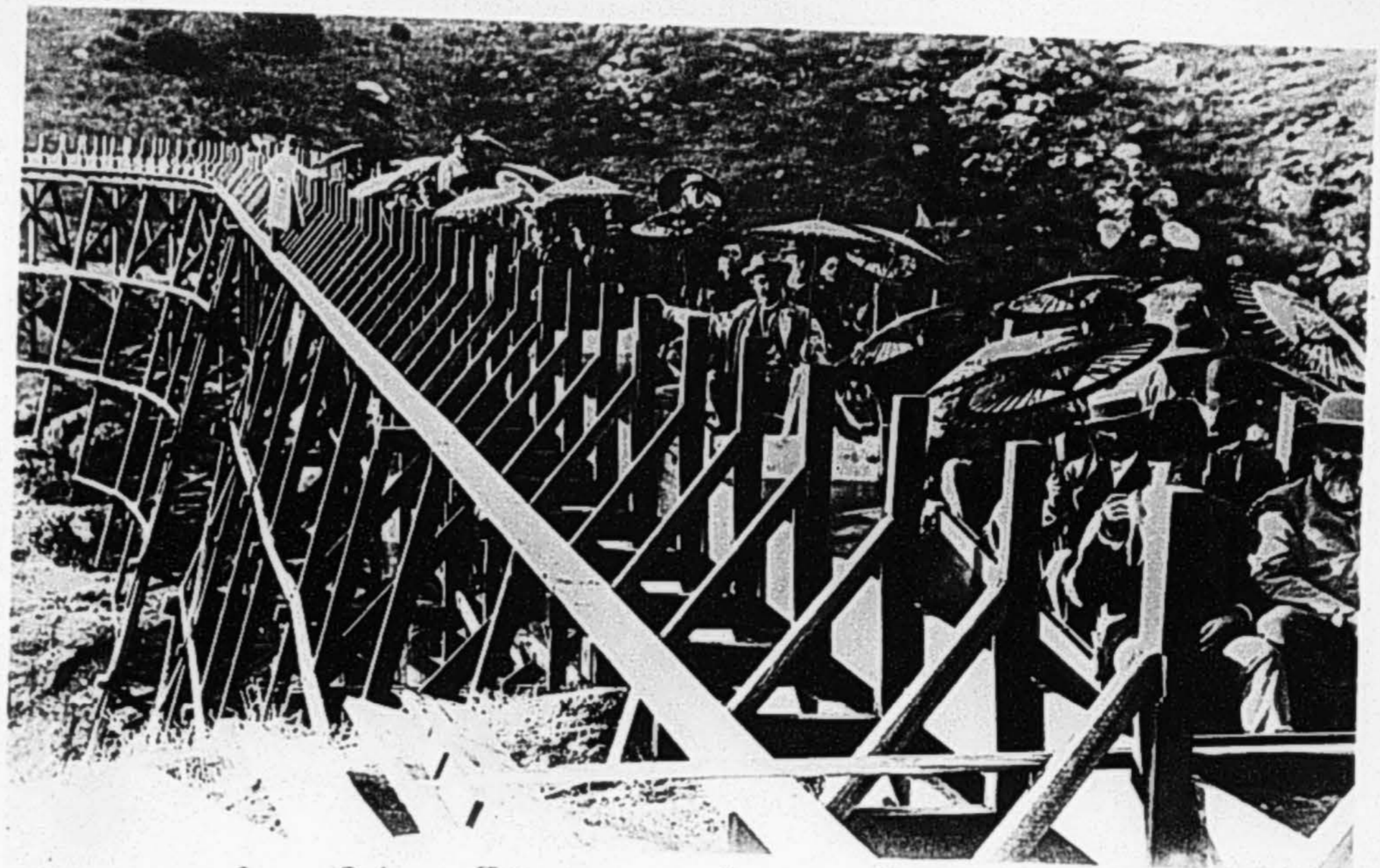
Water filings June 1st, 1910 at Fletcher dam.  
Certificate of due diligence.  
Water filings at El Capitan in 1911  
Acquisition El Monte pumping plants.  
Pumping rights from El Capitan reservation granted by government

Mission Gorge No. 3 acquired in 1918. Water filings later.

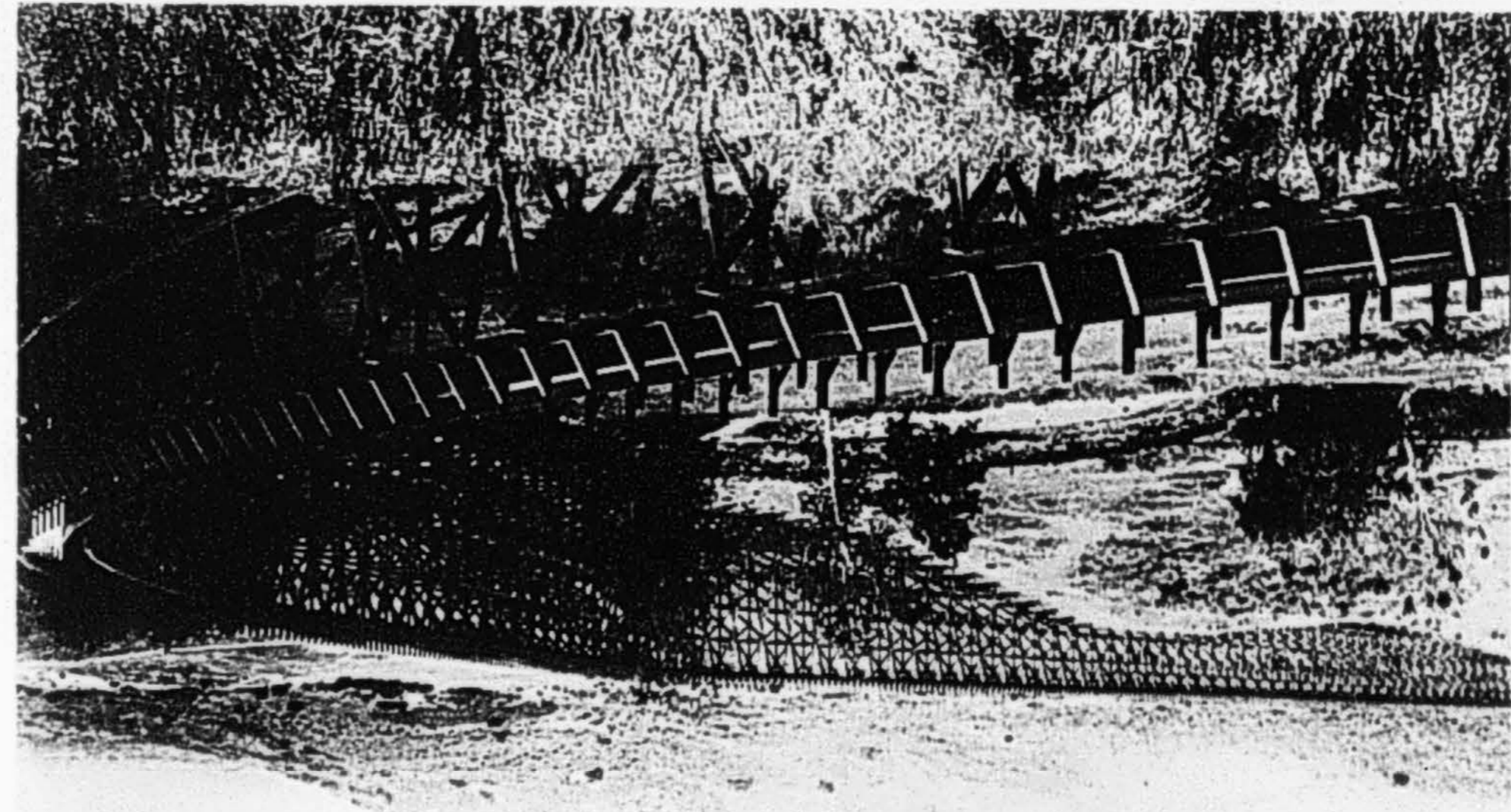
Improvements made on system including Murray Dam.

Cities and towns developed.

*T. J. ...  
W. E. ...*



Photographer, San Diego Flume - Geo. W. ... San Di



From the letters of Ed Fletcher, the following letters were removed to the alphabetized correspondence files:

"SAN DIEGO FLUME CO. AND WATER HISTORY CORRESPONDENCES"

- LUCE, M. A., January 4, 1919
- HOWELLS, J. M., January 9, 1919
- SMITH, JOSEPH H., January 13, 1919
- HEILION, M. C. of the San Diego Flume Co.:  
     Flume Co. to BRYAN, T. J., July 7, 1905  
     Fletcher to Heilion, June 10, 1910

NOTICE OF APPROPRIATION OF WATER

The San Diego Flume Company hereby claims and appropriates all the waters of Boulder Creek in the County of San Diego, California, to the extent of Two Thousand Miner's Inches measured under a four inch pressure, whether above or below ground and now flowing or hereafter to flow at the following point on said stream, the same being the point where this notice is posted and the point at which the Company intends to divert said water, to-wit:

The narrow gorge between the two most northern peaks of the Guyamaca Mountains where the creek leaves the meadows between the Laguna and the Mountains, said water is claimed to the head of said creek.

Said water is appropriated, claimed and intended for irrigation and domestic use and mechanical purposes.

The place where it is intended to use said water are the City of San Diego, Ex Mission Rancho, Rancho El Cajon and

The Company intends to divert said water by means of a dam in said stream and by a flume ditch tunnel or other aqueduct three feet wide and two feet deep or less if the fall will permit and by iron pipes twenty inches in diameter or less if the fall will permit.

This water is claimed as a part of the water and flume system already begun on the San Diego River by Wm. E. Robinson and others whose rights the Company has acquired and as a branch of said system, the main work upon which is now being done upon the main line on said river to be connected to this with a flume or pipe.

The San Diego Flume Company  
Geo. D. Copeland, Pres.

A. G. Platt, Secretary  
Posted July 31, 1886

Received for record Aug. 4th, 1886 at 9 O'clock A.M. at request of T. B. Van Dyke.

S. A. McDowell, County Recorder

## Exhibit No. 7

## NOTICE OF APPROPRIATION OF WATER.

The San Diego Flume Company hereby claims and appropriates all the waters of the South Fork of the San Diego River in the County of San Diego, California, to the extent of Four Thousand Miner's Inches measured under a four inch pressure whether above or below ground, and now flowing or hereafter to flow, at the following point on said stream, the same being the point where this notice is posted and the point at which the Company intends to divert said water, to-wit:

On the South Fork of the San Diego River at a point about one mile above the junction with the main river and as near as can be told in section thirty-six or thereabouts Township 14 North, Range 2 East, San Bernardino Meridian.

Said water is appropriated, claimed and intended for irrigation and domestic use and mechanical purposes.

The places where it is intended to use said water are the City of San Diego, Ex Mission Rancho, Rancho of El Cajon and other places between the point of diversion and the sea-board.

The Company intends to divert said water by means of a dam in said stream and by a flume, ditch, tunnel or other aqueduct four wide and three deep or less if the fall will permit and by iron pipes -- inches in diameter or less if the fall will permit.

This water is claimed as a part of the water and Flume system already begun on the San Diego River by Wm. E. Robinson and others, whose rights the company has acquired and as a branch of said system, the main work upon which is now being done upon the main line on said river to be connected to this with a flume or pipe.

THE SAN DIEGO FLUME COMPANY

George D. Copeland, President

(SEAL)

A. C. Platt, Secretary,  
Witness to Posting,  
R. H. Stretch, June 29, 1886,

Received for record July 2, 1886 at 9 o'clock A.M.  
at request of T. S. Van Dyke.

By S.A. McDowell, County Recorder,  
J. S. Sandeman, Deputy.

## NOTICE OF APPROPRIATION OF WATER

The San Diego Flume Company hereby claims and appropriates all the waters of the San Diego River to the head of Boulder Creek in the County of San Diego, California, to the extent of Six Thousand Miner's Inches measured under a four inch pressure whether above or below ground and now flowing or hereafter to flow, at the following point on said stream the same being the point where this Notice is posted and the point at which the Company intends to divert said water, to-wit:

About One Thousand feet above the lower end of the Boulder Wash known as Rocky Bar above Capitan Grande on said river, where the river has been excavated to bed rock by Wm. E. Robinson and associates.

Said water is appropriated, claimed and intended for irrigation and domestic use and mechanical purposes.

The places where it is intended to use said water are the City of San Diego, Ex Mission Rancho, Rancho of El Cajon and the company intends to divert said water by means of a dam in said stream and by a flume ditch, tunnel or other aqueduct six feet wide and four feet deep or less if the fall will permit and by iron pipes 30 inches in diameter or less if the fall will permit.

The San Diego Flume Company,

A.D. Platt, Sec.

George D. Copeland, President.

Posted on the ground May 28, 1886,  
Received for record June 1, 1886 at 4 o'clock P.M. at request  
of T. S. Van Dyke.

S. A. McDowell, County Recorder,

By J. J. Sandeman, Deputy Recorder.

EXHIBIT D

Copy of No. 4.

NOTICE OF APPROPRIATION.

NOTICE IS HEREBY GIVEN: That the undersigned B. Otterstedt does hereby claim all the flood water of the San Diego River, and all surface and subterranean water of said river, not otherwise appropriated, flowing at the point where this notice is posted to the extent of 100,000 Miner's Inches, measured under a four inch pressure; said water to be impounded by means of a dam and at this point and stored at this point and at various reservoirs to which said flood and other water is intended to be conveyed;

That the point of intended diversion is at or near the dam known as the Diverting Dam of the San Diego Flume Company;

That the purposes for which the water is claimed is primarily for domestic and irrigation purposes;

That the place of intended use is on lands lying between the point of diversion westward to the Pacific Ocean;

That the means by which it is intended to divert, and to impound, and convey the same are by means of dams, and by means of a canal consisting of ditches, flumes, tunnels, pipes and conduits, all of the capacity and size sufficient to store and carry said 100,000 Miner's Inches from the intended point of diversion to the point of use thereof.

Dated June 1, 1910.

B. Otterstedt  
Appropriator.

Witness: Geo. A. Doyle.

Recorded at request of Claimant June 1, 1910 at 36 min. past 3 O'Clock P.M.

NOTICE OF APPROPRIATION.

NOTICE IS HEREBY GIVEN, that the undersigned, L. A. Olsen, claims and appropriates all the water flowing or hereafter to flow in the channel of the San Diego River, in the County of San Diego, State of California, at the point where this notice is posted, being in the northwest quarter of Section 8, Township 15, South, Range 2 East, San Bernardino Meridian, together with the water of all creeks or affluents of said river, to the extent of Five Hundred Miners Inches, measured under a four inch pressure of the continuous flow of said stream.

The purposes for which said L. A. Olsen appropriates and claims said water are for the irrigation of land in the said County of San Diego, State of California, and for horticultural and agricultural purposes on said lands and for domestic purposes.

The places of intended use of said water are on lands within the Rancho El Cajon and Ex Mission San Diego, and for domestic purposes in the Cities of La Mesa, East San Diego, and San Diego.

The means by which said L. A. Olsen intends to divert the said water is by the construction of a solid dam across the channel of said river at the point where this notice is posted, as aforesaid, 50 feet in height, more or less, in order to divert sufficient waters of said stream to make up with the flow of said stream the said continuous flow of five hundred inches of water so measured as aforesaid; also by means of three pipe lines 12 inches in diameter on a grade of 16 feet per mile; and also by means of a flume, cement aqueduct, and tunnels, the same to be 6 feet wide and 2 feet in height on a grade of 4.75 feet per mile.

The place of intended diversion of said water is the place where said dam is to be constructed, and where this notice is posted as heretofore stated, and also at points along the margin of the reservoir created by said dam, where water will be diverted by pumping.

IN WITNESS WHEREOF, I put my hand this 12th day of June 1914.

L. A. Olsen  
Appropriator.

J. N. Mullins }  
E. F. Stockley } Witnesses.

NOTICE OF APPROPRIATION

NOTICE IS HEREBY GIVEN, that the undersigned, W. E. Keenan, claims and appropriates all the water flowing or hereafter to flow in the channel of the San Diego River, in the County of San Diego, State of California, at the point where this notice is posted, being in the southwest quarter of Section 22, Township 14, South, Range 2 East, San Bernardino Meridian, to the extent of Fifty Miners Inches, measured under a 4 inch pressure of the continuous flow of said stream.

The purposes for which said W. E. Keenan appropriates and claims said water are for the irrigation of land in the said County of San Diego, State of California, and for horticultural and agricultural purposes on said lands and for domestic purposes.

The places of intended use of said water are on lands within the Rancho El Cajon and Ex Mission San Diego, and for domestic purposes in the Cities of La Mesa, East San Diego, and San Diego.

The means by which said W. E. Keenan intends to divert the said water is by means of wells constructed across the channel of said river at the point where this notice is posted as aforesaid; also by means of a pumping plant; also by means of two pipes 6 inches in diameter on a grade of 16 feet per mile, and also by means of a flume, cement aqueduct, and tunnels, the same to be 6 feet wide and 2 feet in height on a grade of 4.75 feet per mile.

The place of intended diversion of said water is the place where said wells are constructed and said pumping plant is located, and where this notice is posted, as heretofore stated.

IN WITNESS WHEREOF, I put my hand this 12th day of June, 1914.

W. E. Keenan  
Appropriator.

EXHIBIT D

Copy of No. 4 (Continued)

I, B. Otterstedt, in consideration of Ten Dollars (\$10.00) do hereby grant, bargain, sell, assign and transfer to Ed Fletcher, all water and water rights and privileges and all claims and right to appropriate water referred to in the notice of appropriation dated the 1st day of June, 1910, and subscribed by me and filed for record in the office of the County Recorder of the County of San Diego, State of California, on the 1st day of June, 1910, and recorded in Book Number 4 of Water Claims, at page 51 in said County Recorder's office and all my rights and privileges in or under such appropriation and notice of appropriation, and also all my rights, title, interest and claims in or to the water referred to in said notice of appropriation and all my right to appropriate, take, impound and use said water and any water flowing, or that may hereafter flow in the San Diego River, in the County of San Diego, State of California, or any of its affluents or tributaries.

To have and to hold all the above mentioned water and water rights and privileges and property unto the said Ed Fletcher, his heirs and assigns forever.

IN WITNESS WHEREOF, I hereunto set my hand this 14th day of February, 1913.

B. Otterstedt.

State of Oregon,        )  
County of Multnomah } SS.

On this 14th day of February, A.D. 1915, before me, A. J. Moore, a Notary Public in and for the said County and State, residing therein, duly commissioned and sworn, personally appeared B. Otterstedt, known to me to be the person whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in this certificate first above written.

A. J. MORE,  
Notary Public in and for  
the County of Multnomah,  
State of Oregon

(SEAL)

I, W. E. Keenan, in consideration of Ten Dollars (\$10.00), the receipt of which is hereby acknowledged, bargain, sell, assign and transfer to Ed. Fletcher, all water and water rights, privileges and all claims and right to appropriate water referred to in the notice of appropriation dated this 12th day of June, 1914, subscribed by me and a copy of which is hereto attached and made a part of this instrument and I further hereby grant, bargain, sell, assign and transfer to said Ed Fletcher, all my right, title, interest and claim in or to the water referred to in the said notice of appropriation and all my right to appropriate to take and use and impound said water and all my right to the water of the San Diego River, or any of its affluents or tributaries.

IN WITNESS WHEREOF, I have hereunto set my hand this 7th day of July, 1914.

W. E. Keenan.

STATE OF CALIFORNIA )  
                          ) SS.  
COUNTY OF SAN DIEGO )

On this 7th day of July, in the year One Thousand Nine Hundred and Fourteen, before me, Lou B. Mathews, a Notary Public in and for the County of San Diego, personally appeared W. E. Keenan, known to me to be the person whose name is subscribed to the above instrument, and he duly acknowledged to me that he executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal, of my office, in the County of San Diego, the day and year in this certificate first above written.

Lou B. Mathews

Notary Public in and for the County of San Diego, State of California.

(SEAL)

My Commission expires January 16, 1915.

I, L. A. Olson, in consideration of Ten Dollars (\$10.00), the receipt of which is hereby acknowledged, bargain, sell, assign and transfer to Ed. Fletcher, all water and water rights, privileges and all claims and right to appropriate water referred to in the notice of appropriation dated this 12th day of June, 1914, subscribed by me and a copy of which is hereto attached and made a part of this instrument and I further hereby grant, bargain, sell, assign and transfer to said Ed. Fletcher, all my right, title, interest and claim in or to the water referred to in the said notice of appropriation and all my right to appropriate to take and use and impound said water and all my right to the water of the San Diego River, or any of its affluents or tributaries.

IN WITNESS WHEREOF, I have hereunto set my hand this 7th day of July, 1914.

L. A. Olson

STATE OF CALIFORNIA )  
                          ) SS.  
COUNTY OF SAN DIEGO )

On this 7th day of July, in the year One Thousand Nine Hundred and Fourteen, before me, Lou B. Mathews, a Notary Public in and for the County of San Diego, personally appeared L. A. Olson, known to me to be the person whose name is subscribed to the above instrument, and he duly acknowledged to me that he executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal, of my office, in the County of San Diego the day and year in this certificate first above written.

LOU B. MATHIEWS.

Notary Public in and for the County of San Diego, State of California.

(SEAL)

My Commission expires January 16, 1915.

(Notice of Appropriation of Consolidated Water Co.)

(5000 Miners Inches at Monte Pump)

NOTICE OF APPROPRIATION

Notice is hereby given that the undersigned, the Consolidated Water Company, a corporation, claims and appropriates all the waters flowing or hereafter to flow in the channel of the San Diego River in the County of San Diego, State of California, at the point at which this notice is posted, being a willow tree, North 26° 45' West, 163.3 feet from a stone monument set in the intersection of the center line of Julian Avenue and the boundary lines common to Tracts "R" and "S" Rancho El Cajon, to the extent of Five Thousand, (5000) miner's inches measured under a four-inch pressure, of the continuous flow of said stream, whether flowing on the surface of the ground or underground.

The purpose for which said company claims the said waters are for sale, rental and distribution for irrigation of lands for agricultural and horticultural purposes, for mining and manufacturing, mechanical, domestic and all other lawful and useful purposes.

The places of intended use are Sheekels Mesa, Jamal Rancho, Tia Juana Valley, head of the bay region, Jamacha Rancho, El Cajon, National Rancho, Otay Rancho, Otay Mesa, Otay Valley, Spring Valley, El Cajon Rancho, Ex Mission Rancho, Linda Vista, the Pueblo lands of San Diego and all the neighboring and adjacent lands and all the lands that can be irrigated from the waters of said stream; also the cities of San Diego, National City, Coronado, Otay, Tia Juana, and any and all neighboring and adjacent lands, cities, towns, villages, hamlets or places; also all towns, cities, hamlets, villages, manufacturing centers, mining camps or any other source of lawful and useful demands for said water that may hereafter arise upon the territory herein described or adjacent thereto, all in the County of San Diego, State of California.

The means by which the said Company intends to divert the said water is by the sinking or driving of wells in the bed of said stream, the placing of a pumping plant or plants necessary to develop and supply said water and such pipe lines and flumes as may be necessary for said purpose, and the flumes, pipe lines, reservoirs and distributing system of the San Diego Flume Company now in use and hereafter to be constructed, and such other distributing flumes and pipe lines as may be necessary to distribute and supply said waters to the places above mentioned.

The pipe lines and flumes connecting the wells sunk or driven and hereafter to be sunk or driven with the flume line of the said San Diego Flume Company, will be as follows:

Four, six, eight and eleven inch pipe, 14 inch by 19 inch flume or larger sized pipes and flumes if necessary to carry the amount of water developed.

Consolidated Water Company  
By John D. Werks,  
Its Attorney.

Witness to the posting of said notice,  
This 16th day of March, 1899.

George Putnam.

State of California )  
County of San Diego ) 1-58

George Putnam - being duly sworn, on his oath says that he did, on the sixteenth day of March, 1899, post a copy of the foregoing notice at the place designated therein, which place was conspicuous.

Subscribed and sworn to before me,  
this 16th day of March, 1899.

George Putnam.

Laura B. Anderson,  
Notary Public,  
San Diego, Calif.

Laura B. Anderson,  
Notary Public in and for the  
County of San Diego,  
State of California.

Recorded at the request of M. C. Healion, March 25, 1899, at 15 min.  
past 3 o'clock, P. M.

Fee 80¢

Jno. F. Forward, Recorder,  
By A. P. Johnson, Jr.,  
Deputy Recorder.

Recorded in Book 3, Page 268  
of "Water Claims."

SAN DIEGO FLUME CO.

ESTIMATE OF MATERIAL IN THE 7TH & 8TH MILES OF FLUME AND TRESTLES.

COMPLETED FEB'Y. 6TH 1888.

MORSE & SMITH, CONTRACTORS.

KIND OF MATERIAL IN WORK.	FT. B.M.	PRICE.	AMOUNT.
15 FLUME BOWNS, 8 FT. LONG, 120. FT.			
348 DO DO 12 FT. DO 4176 FT.			
289 DO DO 16 FT. DO 4624 FT.			
91 DO DO 20 FT. DO 1820 FT.			
743 DO DO 10740 FT.			
SHORTAGE & AVOIDABLE WASTE 70			
AT 17 I-3 B.M. FR. FT. 10670	184947		
EXTRA LUMBER IN 18 & 20 SIDES,	1867		
21 STOP GATES, - - 462			
1 WASTE GATE, - - 650	1112		
TOTAL FLUME LINING PLANK, -	187,926	49.25	\$9255.36
FLUME SILLS, 756 - 6 X 8 X 12	27218		
1928 - 4 X 6 X 12	46272		
DO POSTS, 1484 - 4 X 6 X 4	11372		
3884 - 4 X 4 X 4	20715		
DO BRACES 5368 - 3 X 4 X 3	16104		
DO STRINGERS, - 4 X 6	34778		
TRESTLE DO - 4 X 12	15232		
" " 6 X 12	11424		
FLUME MUD PLANK, 2169 2 X 12 X 9	39042		
EXTRA STRINGERS & 1464 BLOCKS, 4 X 6 X 8	2368		
RUN PLANK, 2 X 10 10560	17600		
12 DRAIN BOXES 1385 & 1 WASTE GATE	976		
	2361		
TOTAL ROUGH LUMBER IN FLUME, -	244,982	44.25	\$10840.45
TRESTLES, 0 TO 20 IN GREATEST HEIGHT,	16,655.	40.25	670.36
DO 20 TO 40 DO	10,239	44.75	458.20
DO 60 TO 85 DO	59,177	48.75	2884.88
ONE TRUSS BRIDGE - 80 FT. SPAN,		26.00	2080.00
EMPIA FOR ONE WASTE GATE 1626 AND			
PLANING BRIDGE TIMBER 6704	8,335	5.00	41.68
TOTAL,			\$28230.93
AMOUNT ALLOWED ON FINAL SETTLEMENT,			1912.64
			\$28143.57

I CERTIFY THE ABOVE ESTIMATE TO BE CORRECT,

J. M. Graham  
CHP. ENG'R.

ESTIMATE OF MATERIAL IN THE 9TH & 10TH MILES OF FLUME AND TRESTLES.

COMPLETED JAN'Y. 20 -- 1888.

MOORE & SMITH,

CONTRACTORS.

KIND OF MATERIAL IN WORK.	FT. B.M.	PRICE.	AMOUNT.
TRESTLES, 0 TO 20 FT. IN GREATEST HEIGHT.	32,285.	40.25	\$1,299.47
DO 20 TO 40 FT. DO.	14,015.	44.75	627.17
FLUME LINING PLANK. - - -	183,647.	49.25	9,047.32
DO POSTS, SILLS, BRACES, STRINGERS, STRINGERS ON TRESTLES, AND OTHER ROUGH LUMBER			
IN FLUME, - - - - -	246,184.	44.25	10,904.22
ROUGH LUMBER IN TUNNEL NO. 3. -	1,751.	36.75	64.40
TOTAL, - - - - -			\$21,943.03
AMOUNT ALLOWED ON FINAL SETTLEMENT, - - - - -			143.83
			\$22,086.83

I CERTIFY THE FOREGOING ESTIMATE TO BE CORRECT,

J. M. Graham

CHP. ENG'R.

THE 7TH AND 8TH MILES CAN BE COMPLETED IN TWO WEEKS.



*file*

SAN DIEGO FLUME CO.

ESTIMATE OF MATERIAL IN THE 7TH &  
8th MILES OF FLUME AND TRESTLES.

COMPLETED FEB'Y. 6th 1888.

MORSE & SMITH, CONTRACTORS.

KIND OF MATERIAL IN WORK.	FT. B.M.	PRICE.	AMOUNT
15 Flume Boxes, 8 ft. long, 120 ft.			
348 Do Do 12 ft. Do 4176 ft.			
289 Do Do 16 ft. Do 4624 ft.			
91 Do Do 20 ft. Do 1820 ft.			
<u>743</u> Do Do <u>10740</u> ft.			
Snortage & Avoidable Waste 70			
At 17 1-3 B.M. Pr.Ft. 10670	184947:		
Extra Lumber in 18 & 20 Sides,	1867:		
21 Stop Gates, - - 462			
1 Waste Gate, - - 650	1112:		
Total Flume Lining Plank, - -	187,926	49.25	\$9255.36
Flume Sills, 756 - 6 x 6 x 12	27216:		
Do Posts, 1928 - 4 x 6 x 12	46272:		
Do Braces, 1484 - 4 x 6 x 4	11872:		
Do Stringers, 3884 - 4 x 4 x 4	20715:		
Trestle Do, - 4 x 6	16104:		
" " 6 x 12	34776:		
Flume Mud Plank, 269 2 x 12 x 9	15232:		
Extra Stringers & 1464 Blocks, 4 x 6 x 8	11424:		
Run Plank, 2 x 10 10560	39042:		
12 Drain Boxes 1385 & 1 Waste Gate	2368:		
976:	17600:		
2361:			
Total Rough Lumber in Flume, -	244,982	44.25	\$10840.45
Trestles, 0 to 20 in Greatest Height,	16,655	40.25	670.36
Do 20 to 40 Do	10,239	44.75	458.20
Do 60 to 85 Do	59,177	48.75	2884.88
One Truss Bridge - 80 Ft.Span,		26.00	2080.00
Extra for one waste gate 1626 and			
Planing Bridge Timber 6709	8,335	5.00	41.68
TOTAL,	-	-	\$26230.93
Amount Allowed on Final Settlement,	-	-	1912.64
			<u>\$28143.57</u>

I Certify the Above Estimate to be Correct,

(Signed) J. M. Graham

CHF. ENG'R.

ESTIMATE OF MATERIAL IN THE 9TH &  
10TH MILES OF FLUME AND TRESTLES.

COMPLETED JAN'Y 20 -- 1888.

MOORE & SMITH.

CONTRACTORS.

KIND OF MATERIAL IN WORK.	FT. B.M.	PRICE.	AMOUNT
Trestles, 0 to 20 Ft. in Greatest Height	32,285.	40.25	\$ 1,299.47
Do 20 to 40 Ft. Do.	14,015.	44.75	627.17
Flume Lining Plank. - - -	183,647.	49.25	9,047.82
Do Posts, Sills, Braces, Stringers, String-			
ers on Trestles, and Other Rough Lumber			
In Flume, - - - - -	246,184.	44.25	10,904.22
Rough Lumber In Tunnel No. 3.	1,751.	36.75	64.40
TOTAL, - - - - -	-	-	\$21,943.08
Amount Allowed on Final Settlement,	-	-	143.85
			<u>\$22,086.93</u>

I Certify the Foregoing Estimate To Be Correct,

(Signed) J. M. Graham.....

CHF. ENG'R.

The 7th and 8th Miles Can be Completed in Two Weeks.



THE SAN DIEGO FLUME COMPANY'S ENTERPRISE

The commanding elevation occupied by the works under construction by the San Diego Flume Company, their far reaching design in accumulating from different sources the waters of distant streams, their costliness, the wide-extent of the district commanded, and the fact that they terminate at the city of San Diego, which may receive its supply at high pressure on the summits of its greatest elevations, render them in many respects more important to the prosperity of the region than any other, and second in rank to the Sweetwater dam and its distribution only because they are yet in an incomplete state.

DISTRICT AND WORKS:- As far as they have been outlined by what has been begun or completed, the works consist of a storage reservoir on the head-waters of the Boulder creek tributary of the San Diego River, a diverting dam of masonry in the river proper, and a line of flume thirty-six miles in length - skirting the canon's side for twenty-one miles, then circling south of the Valley of El Cajon, and finally emerging upon the mesa ten miles east of the city of San Diego. The plans of the company contemplate the diversion of the head-waters of the Tia Juana and Sweetwater rivers on the south, and the San Dieguito on the north, into the head of the main flume, the construction of various additional storage reservoirs in the mountains, and a distributary reservoir at the end of the flume, the development of tributaries of the San Diego by tunnels under their beds and gathering them into the main conduit by smaller lateral flumes, and the distribution of the water from the end of the main flume by pipe lines over the mesa.

The field of irrigation development which these works command embraces the entire valley of the San Diego River, including El Cajon, the high mesas between the river and the Sweetwater on the south, and the Linda Vista mesa north of San Diego, an aggregate area of seventy-five thousand to one hundred thousand acres. The flume line proper dominates the whole of El Cajon, and a portion of the upper Sweetwater valley, while the pipe lines, which are to be laid westerly from the end of the flume, command the mesa east of the city. In order to reach the Linda Vista mesa, a long pressure pipe will be needed to pass the depression of Mission valley. The distribution generally over the mesa might be by pipes under pressure, or by cement pipe channels, as explained in subsequent chapters hereof, relating to San Bernardino county works.

STORAGE RESERVOIR:- The main dependence of the works for a summer and fall supply is at present the Cuyamaca reservoir, located forty-three miles northeast of San Diego in the Cuyamaca mountains, at an altitude of four thousand five hundred feet. The water-shed of this reservoir is about fifteen square miles in area, draining two of the highest peaks of the range. The reservoir is formed by an earthen dam six hundred and thirty five feet long on top, forty feet in height, thrown across the outlet of a broad, flat mountain valley. The little streams tributary to the reservoir are supplied by the winter rains and melting snow of early spring. From the eastern rim of the water-shed the country drops abruptly into the desert. The hills on this side are low and barren. The two Cuyamacas Peaks on the west are clothed with forests of pine and oak.

As compared with the Sweetwater reservoir, its capacity when full is 63 per cent of the latter. The full-water reservoir space covers over one thousand acres. Its capacity, according to the elevation of its water above the outlet is as follows:

	Mill. Galls.	Cubic Ft.
5 feet above outlet	.11	15,060
10 feet above outlet	5.04	675,065
15 feet above outlet	126.54	16,817,400
20 feet above outlet	523.15	69,940,300
25 feet above outlet	1,262.10	168,750,200
30 feet above outlet	2,542.28	315,159,500
35 feet above outlet	3,759.11	499,880,950

CUYAMACA DAM:- The site of the dam was one which had all the surface indications of solid rock. The whole surface was covered with loose granite bowlders, and before sinking test pits, preparations and plans had been made for building a masonry dam. The excavation for foundation developed a bed of clay instead of bed-rock as anticipated, and an abundance of good clay being found in the immediate neighborhood, the plans were changed and an earth-work dam built. A puddle trench was cut under the center of the embankment, and the clay filling built up in layers. The embankment has a base of one hundred and fifteen feet, inside slope of two to one, outside slope of one and one half to one, top width fifteen feet. The high-water mark is fixed at five feet below the top, at which point a waste-way fifty feet wide is placed on one side. The water-face of the dam is covered with stone riprap laid, dry, eight inches in thickness.

The outlet culvert is of masonry three and a half feet wide by four feet six inches high inside, one hundred and twenty feet long, its bottom placed at the level of the original surface with a fall of three and a half feet in its length. At the upper end it opens into the base of a circular brick tower eight feet in diameter outside, five feet in diameter inside, and carried to the level of the top of the dam. This tower is provided with two gates of wood, closing openings three feet wide by four feet six inches high. The lowest opening is at the bottom of the tower, the second fifteen feet nine inches higher, immediately above the lower. These gates slide up and down in wooden grooves, and as they are to be moved by chains or ropes, are not convenient, particularly when they are to be closed quickly under pressure. An iron gate is provided inside the tower to close the head of the outlet culvert. The work was begun late in the fall of 1886, and completed about the middle of February, 1887, in time to catch a part of the only heavy rainfall of the season of 1886-87. The catchment was about thirty-three million cubic feet, equivalent to a little over an inch in depth over the water-shed, and filled the reservoir to fifteen feet in depth. The reservoir was filled to a depth of twenty-four feet by the rainfall of the following season, 1887-88. Both seasons were dry ones, as compared with the ordinary mountain rainfall. It is intended to release the water at the dam and allow it to follow the rocky canon of Boulder creek, ten miles, to the diverting dam in the river.

DIVERSION AND DELIVERY WORKS:- The diversion is made from the San Diego river about thirty miles from its mouth, at an elevation of about eight hundred feet above sea-level, and where the stream, falling at the rate of about thirty feet per mile, is in an open canon flanked by barren mountain slopes rugged and steep.

SAN DIEGO DIVERTING DAM:- The diverting dam is built of masonry of the following dimensions: Maximum height, 54.5 feet; length, 447.5 feet; width at top, 5 feet; up stream batter, 1 1/2 feet in 20 feet; back batter, 7 feet in 20; width at base, 18 feet. The dam contains 4,000 cubic yards of masonry, and required 2,410 Barrels of cement. The average depth of excavation in the bowlders that formed the bed of the stream was ten to twelve feet, and the foundation rests upon the soft, disintegrating granite, forming the bed-rock of the country. This material may be readily cut with the pick and crumbles on exposure to the air. After the dam was completed and tested, the leakage was considered excessive, and the upper face was again stripped to the foundation, and an apron of masonry two feet thick was sunk to a depth of some six feet lower than the original base. The wall was then repointed and partially plastered on the face. The top of the dam is at an altitude of 815.5 feet. In alignment of the dam has an angle in the center whose apex is pointed up stream. Otherwise the structure is straight, depending upon the weight of its mass for stability.

The head of the flume passes through the wall with wooden gates to control the water. The level of the flume bed is nine feet below the top of the dam,

or four feet below the overflow weir. The main waste weir is two hundred and ten feet long, with a secondary weir twenty feet long. The floor of these weirs is of pine plank spiked to timbers that are bolted to the masonry. In addition to the overfall waste weirs, there are two culverts passing through the dam for draining the basin above. One of these is 2.5 feet square seven feet below the grade of the flume, the other three feet square, eight feet lower than the first.

**MAIN CONDUIT: FLUME LINE:-** The flume is set on a bed cut in the mountain side except where it is supported on trestling. All fills are made with loose rock laid with some care on the outer face. Its total length is thirty-six miles. The grade is 4.75 feet per mile.

**TUNNELS:-** There are eight tunnels upon the work, lined with masonry on the sides, timbered overhead, except in solid rock, and plastered with cement on bottom and sides.

Tunnels No. 1 is 330 feet long; No. 2 is 230; No. 3 is 85; No. 4 is 705; No. 5 is 319; No. 6 is 316; No. 7 is 1,905; No. 8 is 280. Total 4,168 feet. The tunnels are finished six feet wide by six feet one inch high in the clear. In loose material the sides are walled up with masonry twelve inches thick to a height of four feet, on top of which rests timbering, six by eight-inch, with lagging of three-inch plank; the bottom and sides being finished smoothly with cement.

**FLUME:-** The flume is made in rectangular form, five feet ten inches wide by three feet ten inches deep, in the clear. The bottom and sides are of two-inch redwood plank, planed on the inside. The frames, placed at intervals of four feet, consist of a sill four by six inches by twelve feet, two posts four by four inches by four feet, and two diagonal braces two by four inches, three feet three inches long. The sub-structure where it rests on the ground consists of mud-sills of redwood, two by twelve inches by nine feet, two stingers four by six inches, one under each side of the flume box, and a block eight inches long supporting the sill in the center. Where on trestle, the sills of the flume rest on three longitudinal stringers, two of which are four by twelve inches, and one in center six by twelve inches. The trestle bents are placed sixteen feet apart, and for trestles up to twenty feet in height, consist of two posts eight by eight inches set on a batter of one to six, a cap eight by eight inches by six feet, a sill eight by eight inches of proper length, and two diagonal sway braces two by ten inches. For higher trestles, more posts are introduced, and trussed bridges carry the flume over the deepest gorges that are crossed. Ten million feet of timber will be consumed in the structure. The flume has a theoretical capacity when filled within three inches of the top of one hundred and ten cubic feet per second, or about five thousand five hundred miner's inches. The flume for its full length of 36.6 miles is now carrying water, with sideboards sixteen inches high; the remaining boards for full completion are to be added later. (1) Water was being delivered in El Cajon Valley, and irrigation commenced from it in the latter part of June.

**DISTRIBUTION SYSTEM:- PIPES & RESERVOIR:-** From the end of the flume to San Diego, the main pipe line will be nine miles in length to the top of the mesa overlooking the city. A branch pipe one mile in length will deliver surplus water to a reservoir to be constructed for storing the unused delivery. A main four miles long will be required to tap this reservoir and join the through line below. This reservoir is called the City reservoir, and will have a capacity of seven hundred and sixty-one million gallons, covering an area of one hundred acres. It will be formed by a masonry dam fifty feet high, located in a narrow gorge through blue trap rock, whose width at a height of thirty feet is but fifty feet. Its elevation above sea-level is four hundred and sixty feet at the base.

Note (1) This data and that of the following financial statement have been revised while in process of publication to later dates than originally written for.

**COST OF THE WORKS:-** The following statement made on authoritative data shows the cost to October 20, 1888, with the main conduit completed, as above:

Surveying, engineering, and superintendence:	\$54,821.55
Tunneling and grading (contract, \$58,544.71; day work, \$76,092.87)	154,637.58
Miscellaneous construction (digging trestle pits, ditching culverts, hauling supplies, etc.)	38,409.51
Rights of way	481,555.00
Flume construction	486,956.09
Expense account	24,624.04
Telephone	689.72
Wagon roads	7,228.03
Cuyamaca dam construction	47,057.63
Diverting dam construction	51,601.59
Total cost of works to date	<u>\$847,578.72</u>

To this must be added the cost of land for reservoir sites:	
Cuyamaca and City reservoirs, about	\$76,908.00
Interest account	25,853.56
Legal services and expenses in litigation	<u>8,449.70</u>
TOTAL	<u>\$111,211.26</u>

This makes a grand total of expenditure to date of \$959,789.98 met by the company. The original projectors of the enterprise claim to have spent \$10,000 on surveys and preliminary work before the company was organized. This brings the water to Eucalyptus pass, on the western rim of El Cajon valley, on the highest point of the mesa commanded by the flume, a distance of ten miles from San Diego. The estimated cost of the pipe line to the city is about \$65,000, including the loop to the City reservoir (one mile north from the main pipe at a point about two miles west of the flume terminus) and return connections with the main four miles below the City reservoir - fifteen miles in all, of fifteen-inch pipe. The City reservoir dam is estimated at \$34,000.

**OPERATION AND MAINTENANCE:-** The San Diego Flume Company undertakes to distribute its water supply under specific contracts to furnish stated quantities of water, annually, in perpetuity, at designated points, in an agreed manner, and for uses named in each case and no other. The holder of such contract has a "water-right" in the flume supply. If held for irrigation, the right is made appurtenant to certain described lands, the property of the holder.

**IRRIGATORS' WATER-RIGHTS:-** The agreements recite in the form of a preamble the great benefits to accrue to the region generally "by the reclamation of the now desert mesas surrounding the city of San Diego by water brought from the distant mountain ranges," and specifically acknowledge the enhancements in value of the property of the contracting party by reason of this general beneficentiation brought about by the construction of the "vast, complicated, and unusually expensive system of works", by the anticipated benefits for the lands for which the specified water rights are taken, "and as an inducement" to the company "to incur great and unusual expense in and about the increase of its works, and to aid and encourage it in its attempts to secure a large and reliable supply of water, etc." and in consideration of the covenant on the part of the company to deliver water in certain amounts, etc. for use on the lands described, the contracting party agrees to pay, etc., a certain sum (in the nature of a bonus), when the water becomes available for his use, or at some other period named.

And the, "in further consideration of the premises and as an inducement to the company to extend and improve its works from time to time, and to aid in extending, improving, and maintaining the same so as to increase either the flow of water, by which increase the value of all the lands in the vicinity of the lands," of the contracting party, and his own lands, also, "will necessarily be continually

enhanced by reason of the increased certainty of sufficient water for irrigation purposes in the driest seasons," the contracting party agrees for himself and his heirs, etc., to pay a sum annually (apparently in lieu of a rental for the use of the waters). Then follow certain conditions of forfeiture, to the general effect that if the contracting party fails to comply with the terms of the contract he forfeits his right forever without recourse. All covenants and agreements made by the land owner for the land described go with it, and are binding upon all future owners of it, and as security for performance of them the lands are mortgaged to the Flume company.

In accepting the agreement, the Flume company binds itself, etc., to furnish annually for use on the land described, and none other, a water-supply in measure and mode of delivery as specified; provided, that the company's water-supply be not shortened by the company's ability to deliver it be not impaired by the act of God, or the elements, or failure of the average rainfall in the mountains, or by the operation of law, public enemies, or by riot or insurrection, or by accident to the works of the company. In event of short supply from any of these causes, each piece of land for which a water-right is taken is entitled to a pro rata of such water as can be supplied during the period that such impairments shall exist, and as shall be consistent with like fulfillment of other contracts of the company and the full supplying of cities and towns.

The contracting party agrees that none of the water furnished him under his contract shall be used on any other land than that specified in the agreement, nor sold for any other purpose, or at all, ~~except~~ with the land, and that none of the water furnished him shall be allowed to run to waste, but shall be carefully utilized and when not wanted on his lands shall be shut off therefrom and retained in the company's flume or other conduit. In further consideration of the benefits and watersupply to be obtained the contracting party grants the flume party right of way for its pipes, flumes, or other conduits, over the lands for which the water-rights are purchased; and also grants, bargains, and sells to the company, all his rights, whether he is a riparian owner or otherwise, to divert, use, and impound the waters of San Diego river, or of other streams, rights to which are claimed by the Flume company. In brief, the individual irrigator's water rights are attached to the land, and convey only the perpetual right to take water at a certain fixed rate per annum (not less than \$3 per acre).

At the beginning of the enterprise a few water-rights were sold at the rate of \$150 per miner's inch. As the work progressed values were increased, and in the summer of 1887 the company contracted to sell four hundred inches to the San Diego Land and Water Company at the rate of \$2,200 per inch, which has since been reduced by special agreement to \$800 per inch. The total amount of sales and contracts by the Flume company amount to \$57,200, in addition to the sale of several hundred acres of land with water-rights. (1)

**WATER SUPPLY AND WATER CLAIMS** - The volume of supply which may be safely reckoned upon by these works, as a minimum, cannot be definitely estimated, on account of the general lack of statistics as to rainfall. A record kept at Julian (elev. 4,200 ft.) for five years gives a mean rainfall of 37.55 inches (max. 61.62 in., min. 25.89 in.). Julian is located in the watershed of the San Diego, on the mountain top, a few miles north of Cuyamaca Reservoir. Other records kept for short periods north and south of Julian seem to agree substantially with this record.

The water shed above the diverting dam is about one hundred and ten square miles. And there are feeders to be brought in or taken up whose drainage areas will aggregate forty-five to fifty miles more. With a mean rainfall that can be relied upon, the supply to the streams distributed evenly through the year would, no doubt, far more than suffice to maintain the flow of the flume to its full capacity the year through. This even distribution could only be affected by means of storage reservoirs, but on account of the lack of sites on the water-shed it is doubtful whether this can be accomplished.

(Note (1) This data is only up to June, 1888)

Assuming that the ordinary flow of the river is sufficient to keep up the probable demand from November first to May first of each year, without drawing from reservoirs, and that the maximum draft from reservoirs will occur from June first to November first of each year, the amount necessary to be stored each year will be, approximately, fourteen thousand million gallons. The Cuyamaca reservoir and the City reservoir combined will store less than one third of this volume, no allowance being made for evaporation. Hence, it is evident that very much further storage is requisite to give the enterprise a full measure of usefulness. The company have contemplated several additional reservoirs, as hereafter mentioned.

**APPROPRIATION CLAIMS:-** Claims to water have been posted and recorded, covering all the tributaries of the San Diego river at all favorable points of diversion, as well as the streams on adjacent water-sheds that may be brought into the same system. The filings and claims, except those at the diverting dam on the main stream, are each made as for a part of branch of the main system, and the work on the flume is supposed to obviate the necessity of special work under each filing. These claims filed are presented as an instance of an extended application of this method of acquiring claims to water as follows:

STREAM	APPROPRIATOR	Date Posting	Date Filing	Purpose, Means of Diversion, etc. Place of Diversion	Amts. claimed
San Diego River	S. H. Marlette	June 17, 1885	June 25, 1885	At point 100 yds above Rocky Bar (site of diverting dam is at Rocky Bar)	6,000 inches
Same	W. E. Robinson	Aug. 17, 1885	Aug. 25, 1885	About 2000 ft. above Rocky Bar	All water to extent of 6,000 inches
Sweetwater River	W.E. Robinson & T.S. Van Dyke	Dec. 3, 1885	12/11/85	At a point about 3 miles above Dr. Post's near mouth of upper canon of Sweetwater. For use on Jamacha Ro., Ro de la Nacion, and Otay Ro, claimed as branch of main system	4,000 inches
S. D. River	S. D. Flume Co.	5/28/86	6/1/86	About 1000 ft. above Rocky Bar	6,000 "
Upper Sweet-water or Guatay Creek	Same	6/25/86	6/26/86	Diverts at first falls of creek above Descauso about 1 1/2 miles. Intended for use in city San Diego, Ex Mission Ro., Ro dela Nacion, Jamacha, and Sweetwater Valley as part of main system	2,000 "

STREAM	APPROPRIATION	Date Posting	Date Filing	Purpose, Means of diversion, etc. Place of diversion	Amts. Claimed.
Santa Ysabel Creek	S.D. Flume Co.	June 24, 1886	6/26/86	At point in gorge where creek leaves Santa Ysabel Valley. All waters claimed to heads of 3 main branches.	2,000 in.
Ballena Creek	Same	6/24/86	6/26/86	Part of main system. This is the "Ballena" Reservoir site appropriation	1,000 in.
So. Fork S.D. River	Same	6/29/86	7/2/86	Diverts by flume one mile above mouth	4,000 in.
Boulder Creek Fork San Diego River	Same	7/31/86	8/4/86		2,000 in.
Pine Valley Creek	Same	1886	1885		2,000 in.
Chocolate Creek Fork of S.D. River	Same	8/14/86	8/19/86	Diverts at point 3/4 mile above fork of creek	100 in.
Same	Same	Same	Same	Diverts 1,600 ft. from flume crossing	100 in.
Dye Valley Fork San Diego River	Same	9/16/86	9/20/86	This is the appropriation for the Upper Dye Valley Reservoir	2000 in.
Japatul Valley Fork of Sweetwater	Same	6/27/86		This is at the dam site in Japatul Valley	500 in.
San Diego River	Same	8/27/87	9/3/87	Proposes to divert at Knowles ranch, some miles below diverting dam	500 in.
Coleman Creek Fork	Same	3/27/88	3/31/88	Point of diversion about 2/3 mile above junction of Coleman and Boulder Creeks	1,000 in.
Same	Same	Same	Same	250 yards above Blattner's house	1,000 in.
Same	Same	Same	Same	1/3 mile above Coleman and Boulder Creeks	1,000 in.

RIPARIAN AND OTHER RIGHTS - It is stated that riparian rights on the stream below the diverting dam have been purchased, or the claim adjusted, so as to dispose of the possibility of future litigation on that score - the riparian owners generally surrendering all claims to damage on account of diversion or storage of the water, or any injury that might ensue by reason of the proposed works. These rights were thus obtained without cost, as an encouragement to the construction of the flume as a general benefit to the country. But one man received compensation, and this was in consideration of his prior appropriation of water. Being the only prior appropriator, and having irrigated but a small field, he was given a contract for an equivalent supply from the flume.

Governor R. W. Waterman brought suit in 1887 to have the Cuyamaca dam removed as a nuisance, on account of the fear of an excessive percolation into the Stonewall mine, owned by him, from the reservoir, and because his lands were flooded by the waters. The Flume company sought to condemn the land belonging to Governor Waterman that was in the reservoir basin. These suits never came to trial, but were compromised; the company paying fully for the lands and giving certain guarantees.

HISTORY OF THE WORK AND FINANCIAL OUTLOOK:- The enterprise was conceived by T. S. Van Dyke and W. E. Robinson, whose familiarity with the mountain streams and reservoirs sites was obtained on frequent hunting excursions. They made the water claims and surveys to prove the general feasibility of the scheme, prior to the incorporation of the San Diego Flume Company, May 14, 1886. The capital stock of the company was fixed at \$1,000,000 chiefly subscribed by citizens of San Diego. Surveys were prosecuted during the summer of 1886, and in the fall of that year contracts were let for the diverting dam on the river, and the Cuyamaca storage dam. The actual construction of the flume was begun in the summer of 1887, after grading of its foundation had been in progress for some months.

Of the ten thousand shares of the company, two thousand were given to Robinson in consideration of the transfer of his interests, appropriation, surveys, maps, rights of way, deeds, assignments of riparian rights, etc., to be non-assessable until the completion of the flume, when he was to pay an amount equal to the pro rata assessments that may have been levied up to that time. Of the remaining eight thousand shares, seven thousand seven hundred and sixty-six shares were subscribed by residents of San Diego and outside capitalists (San Francisco and Eastern) directly interested in the advancement of San Diego. The remaining two hundred and thirty-four shares are still in the treasury. Some of the shares subscribed were sold at a premium, the total amount thus realized on premiums being about \$40,000. (Data of June 1888)

The first assessment was levied in September, 1886 of \$5 per share, to begin work on the two dams. Since then three other assessments of \$10 each have been levied. The total amount raised by assessment has been \$271,810. (The above is from data of June. Since then to October twentieth another assessment of \$5 has been levied. The total amount raised by assessment and loans on stock has been \$423,975.84, with the last assessment not yet paid.) An issue of \$600,000 of twenty year 6 per cent bonds was authorized, and about \$300,000 were sold at 95 cents. In addition to these resources, the company has sold a considerable portion of a three thousand acre tract of land lying at the terminus of the flume on the mesa. They bought the land for \$10 per acre, and sold it for \$100 to \$300 per acre, with water-rights at the rate of one inch to ten acres. They have also sold or contracted for water-rights amounting in all to seven hundred and fifty inches, of which nearly one half was at the rate of \$800 per inch, and the remainder at \$150 and upward, to \$2,000 per inch. Partial payments have been received on some of these sales. A part of the contract work was payable in bonds. They have recently obtained a loan of \$100,000, for which bonds are given as security with the option to purchase at 90 per cent. This amount is considered to be enough to carry the flume to the end of the route, and on this sufficient completion of the flume for use it is expected that the remaining bonds can be placed to provide funds for building the City reservoir, laying the pipes across the mesa, and to put on the upper side-planking of the flume. (The work has now been completed except the upper-side planking, as told on pp. 73 and 74 ante. October 1888)

The next work then to be done will be the construction of additional mountain reservoirs. In Dye Canyon fork of the San Diego, there are two sites selected, and one in the Ballena on one of the tributaries of the Santa Maria creek, a fourth in Japatul Valley on the Upper Sweetwater, to be fed by means of a flume from the headwaters of Cottonwood creek (a tributary of the Tia Juana river). And, finally, there will have to be connecting flumes for the diversion of the waters of the two last.

named reservoirs, into the San Diego River watershed above the diverting dam. No detailed estimate of the cost of this extension of the scheme has been made, and no data is available of the capacity of the various reservoirs, but the extension is admitted to be essential to the scheme, in order that there may be a water supply for much fuller delivery than is now at command during the irrigating season.

TOTAL COST; ESTIMATED:- On the basis of construction to date, the completion of works now commenced, to utilize the present water-supply, including the mesa pipe line and the City reservoir, will cost \$1,089,000, not including distribution.

Say	\$1,000,000.00
(The flume with one board on each side, carrying water within two inches of top, will deliver about nine hundred inches.) Estimated cost of extension of system to endeavor to secure for every irrigating season, according to project, a full supply to capacity of flume (5,500 inches -110 cubic feet per second)	600,000.00
Total	\$1,700,000.00

It is even possible that these works, carried out as they might be to advantage within the next ten years, to secure, store, and bring in all available water to supply the flume run, would cost \$2,000,000.

If the works go no further towards securing and carrying additional waters, and deliver but eight hundred and fifty inches, the revenue derivable at \$90 per inch per annum (On the basis of an inch of water to thirty acres, and \$3 per acre per year, which are the figures for a number of the company's contracts. The supply of water for municipal purposes is an anticipated source of revenue, but the conditions are not settled, and matters are yet too uncertain to justify any further attempt at estimating a probable income, for entry in this report). is \$76,500. Allowing, say \$15,000 per annum for running expenses, and say \$25,000 per annum interest on bonds, this would be less than 6 per cent ~~per annum interest on bonds~~ on the cost after deducting amount received from sale of water rights. There being no allowance in the above estimate made for a sinking fund (for insurance and repairs, which on a work of this kind must be liberally provided for), it would seem that as an irrigating enterprise it must be carried further forward with a strong hand, to reap deserved success.

San Diego River Works and Projects  
Mission Valley Water Company

DISTRICT AND WORK:° Second in rating to the Flume company's works, diverting the waters of San Diego River, is an enterprise projected by the Mission Valley Water Company. The scheme contemplates the erection of a masonry dam in the lower canon of the San Diego river, some twelve miles above the mouth of that stream, for the storage and diversion of the winter flow; the construction of a masonry conduit, and laying of iron pipes in a series of eight storage reservoirs of varying elevation and capacity; and the supply of irrigation to about ten thousand acres of valley land within the boundaries of Mission valley, and some eight thousand or ten thousand acres lying adjacent to the San Diego River, and along San Diego bay and False Bay.

Mission Valley is the local name which the lower valley of the San Diego has acquired by reason of its having been selected by the Jesuit missionaries as the site of their first California mission establishment. ~~It is~~ Its length is ten to twelve miles, with an average width of one mile, bordered on either side by the mesa lands lying two hundred to three hundred feet higher than the valley. At the mouth of the river a wide area of alluvial soil has been formed by the deposits of floods debouching into the bay. The lands sought to be irrigated are principally of a sandy, alluvial character, adapted to market ~~gax~~ gardening when under cultivation by irrigation.

No works of any importance have been attempted for irrigation in this district since those of the mission fathers fell into disuse. The latter consisted of a ~~at~~ diverting dam of brick in the canon, and an earthen canal of large dimensions along the south side of the valley extending almost its whole length to Old San Diego with a branch crossing the river to the north side, supplying the orchards and fields around the Old Mission. Traces of these canals are yet to be seen, and the diverting dam is intact. It is located about a mile above the site selected by the Mission Valley Water Company for their diversion, and is near the west line of the Cajon rancho.

DIVERTING, DELIVERY, AND STORAGE WORKS:- The base of the diverting dam is at an elevation of one hundred and ~~nig~~ ninety feet above sea-level, and it is proposed to carry it to a height of eighty (these figures are as reported ~~to the~~ according to the plans. It is not stated whether it is proposed to increase the thickness of the foundation before carrying the work to its full height.) feet, where the length of top will be about four hundred feet. The foundation for this dam, about ten feet high, sixteen feet

thick at base, and two hundred feet long, has already been built of granite masonry laid in Portland cement on bedrock. It is proposed to carry it about ten feet higher the first year, and for temporary purposes lay a pipe sixteen inches in diameter down the valley to Old Town and Roseville. When completed to its full height of eighty feet, the reservoir formed by this dam will store about one thousand five hundred million gallons. It will be long and narrow, seeing that it is located in the canon.

The other works projected are as follows: From the diverting dam a cement-lined conduit, twelve feet wide on the bottom, six feet deep, on grade of four feet per mile, is planned for along the south side of the river one mile, where, according to the plans, it will branch into two conduits eight feet wide by four feet deep, one of which will cross the river to the north side and extend three and one half miles to Reservoir No. 5 and the other will follow the south side for two and one half miles and terminate in Reservoir No. 2. Other reservoirs will be supplied by pipes laid on grade lines beyond the ends of the open conduits. The estimated capacities and elevation of the various reservoirs projected are as follows:

Reservoirs	Distances from Diverting Dam Miles	Elevation of top of dam Feet	Height of Dam Feet	Capacity of Reservoir Mill. Galls
Diverting Dam		270	80	1,500
No. 1	1½	180	30	124
No. 2	3½	170	70	2,205
No. 3	3	160	60	448
No. 4	9			382
No. 5	4½	160	60	1,545
No. 6		120	40	125
No. 7		120	40	534
No. 8		140	90	2,141
Total				9,002

All of the dams for the subsidiary storage reservoirs are to be of earth. No careful estimate of cost has been made, and it seems improbable that the entire system of storage as outlined will be carried out for at least many years to come.

WATER SUPPLY:- The San Diego river is especially intermittent in its flow in its lower course, and in midsummer and fall is frequently nearly dry at the site of this diverting dam, and for miles above and below. In winter its volume sometimes reaches fifty thousand inches or more, and it is believed by the projectors of the enterprise, for four months of winter and spring the flow will exceed an average of ten thousand inches daily. The appropriation will always be subject in some degree to the prior diversion of the San Diego Flume Company higher up the stream. The diverting dam is located to utilize all the stream in its lower course, and it advantageously commands the district which it seeks to supply.

HISTORY OF PROJECT AND WATER CLAIMS:° The Mission Valley Water Company was incorporated in July, 1887, with a nominal capital of seven thousand five hundred shares of \$100 each, par value. A filing was made on ten thousand inches of water at the point of diversion, and work was begun on the construction of the diverting dam in the fall of 1887. The parties chiefly in interest are citizens of San Diego, who are following the judgment of the Jesuit priests who selected this same field for the establishment of their first footing in California, and made this the point where the first of many notable irrigation works was constructed, and where irrigation is believed to have been first successfully practiced in the State.

THE SAN DIEGUITO RIVER PROJECT  
Pamo Water Company's Proposed Works

DISTRICT AND PROJECT:° A notable scheme projected for the utilization of water of the San Dieguito or Bernardo river is that of the Pamo Water Company, which seeks to provide irrigation facilities to Poway valley and the Linda Vista mesa, lying between the San Diego river, and Penasquitas creek, near the coast, by means of a storage dam on the headwaters of the river below the mouth of Pamo creek, and a flume twentyfive miles long terminating in a secondary storage reservoir on the mesa, near the lands to be watered. The field which would be commanded by the intended works largely exceeds their projected capacity for supply, as the main conduit will skirt the San Pasqual and Bernardo valleys before reaching the particular district to which, under the project, the water is to be specially applied. No other works now outlined dominate this region, except those from the more distant supply of the San Luis Rey Flume Company, and these two above named valleys alone could consume the flow of the proposed flume by the Pamo company.

STORAGE AND DELIVERY WORKS:° Above the valley of San Pasqual the river occupies a rocky canon some three and a half to four miles in length opening out above the canon into the Pamo valley, at the mouth of Pamo creek, an important tributary to the river, draining a portion of the Mesa Grande. At the head of this canon the company design building a masonry dam on bedrock, eighty feet high, four hundred feet long on the crest, one hundred and seventy five feet long on the bottom, which will form a reservoir having a capacity of about three thousand million gallons.

From the dam an iron pipe at least thirty inches in diameter will carry the water through the canon, whence it will be conveyed by a flume about four by four feet, skirting the hillsides far above the river, past the San Pasqual and Bernardo valleys to a gap in the divide between the Bernardo and Poway valleys; thence through the gap, skirting the Poway valley, and terminating in a reservoir of two thousand million gallons capacity, to be formed by a second masonry dam, forty feet in height, two hundred to two hundred and fifty feet long on crest, one hundred to one hundred and twenty five feet long on base. The stream and its tributaries above the proposed point of diversion has a water shed area of nearly one hundred and fifty square miles, of which fully two thirds has an altitude of over three thousand feet, and reaching as high as six thousand feet. The two principal tributaries are Pamo and Santa Isabel creeks, both perennial streams of comparatively large volume, draining a portion of the Volcan mountain and the Mesa Grande.

The elevation of the base of the main storage and diverting dam is eight hundred and fifty feet above sea level. This reservoir basin is a long narrow valley of alluvial soil inclosed on either side by precipitous hills and mountains. The site of the dam is at a point where hard, gray granite crops out, affording abundant material for construction purposes. The material at the lower reservoir, for dam building, will be a hard basaltic rock of close texture. The altitude at base is about seven hundred feet, which readily commands the tract to be watered, its elevation being two hundred to six hundred feet above the sea. The elevation of the upper dam as compared to the great area of arable lands that may be reached from it by gravity, facilitates the choice of routes for conduit. The San Pasqual valley (elevation 550 feet) Bernardo valley, (elevation 440 feet), the Escondido valley (elevation 650 feet), and Poway valley (elevation 500 feet), are all within comparatively easy reach, as the main conduit will follow the divides above them.

That the chief reliance of the works will depend upon the winter flow of the stream stored by reservoirs, for summer use, is as true of this enterprise as of all other projected in San Diego county. The fact that the streams in this case never go entirely dry should add materially to the effectiveness of the enterprise, seeing that they may largely contribute to make up the inevitable losses in transit and in evaporation from the surface of the reservoirs. But without storage the supply would be unreliable for the irrigation of any considerable area. The winter flow, however, will probably much exceed the capacity of the present projected means of storage and transit.

HISTORY; ORGANIZATION:° The Pamo Water Company which has taken up this stream was incorporated in March, 1888, with a capital stock of \$1,000,000, in ten thousand shares of \$100, par value. Thus far nothing has been done beyond the work of making preliminary surveys and the purchase of the lands to be embraced by the reservoir. The company propose to make the landholders along the route directly interested in the project by taking contracts for deeds to a portion of their lands as consideration for water rights for the remainder, the deeds to be made in advance and held in escrow, or to be made on the completion of the works. With a land subsidy of this character, they consider that they will have tangible assets to hypothecate for the money needed to construct the works.

SAN LOUIS REY RIVER PROJECTS  
San Luis Rey Flume Company

DISTRICT AND PROJECT:- Steps were taken in 1886 by several San Diego land operators looking to the systematic utilization of the San Luis Rey river, and the irrigation of the coast mesa in the vicinity of Oceanside near its mouth, on the south side. An organization was affected, and surveys for a canal or flume line were made, and water rights were filed upon at the second narrows, some five miles below Pala, where the elevation is about three hundred and seventy five feet. A submerged dam extending from bluff to bluff, seven hundred feet, to raise the under flow to the surface was contemplated, but the cost of the work, the long line of conduit required, and the uncertainty of the water supply available at the point of diversion selected, led to the expansion of the project and the formation of the present company, with a large capital and embracing a more comprehensive scheme. The new company set to work to acquire all water rights on the river that might in any way conflict with their proposed appropriations, as well as riparian right along the stream.

STORAGE AND DELIVERY WORKS PROPOSED:- An outline of the main project is, briefly, the construction of a mammoth reservoir dam on Warner's ranch, a canal from the canon of the river some miles below the dam, extending about twenty miles along the mountain and rolling hillsides south and west of the river, and a secondary storage reservoir at the terminus of the canal in Bear valley at an elevation of one thousand three hundred feet. From this commanding elevation, but twenty miles from the sea at the nearest point, and thirty five miles from the city of San Diego, the territory that may be served is only limited by the supply of water available. Pipe lines are projected in various directions. The main conduit drops into this secondary reservoir with a direct fall of seven hundred feet, and the utilization of this water power and transmission by electricity to points of use are contemplated.

The company have brought actions to condemn the land on Warner's ranch required for purposes of the reservoir. Until the possession of these lands is ~~required for purposes~~ acquired, the work will necessarily be confined to the construction of the conduit and lower reservoir dam, where the lands have already been acquired. The first pipe line to be laid from the Bear valley reservoir will probably be through Escondido and San Marcos valleys to Oceanside. San Pasqual, Bernardo, and Poway valleys are also readily commanded, and the coast mesa between Oceanside and San Diego and north of Oceanside. The full development of this scheme would take several years to accomplish, and the total cost of works to fully avail of its possibilities would no doubt exceed a million dollars. (As this report goes to press (October) it is learned that the company has secured \$500,000 with the engagement of as much more, from New York capitalists, on the basis of its bonds, and land and water rights contracts, and that the work is to be immediately pushed forward).

SANTA MARGARITA RIVER PROJECT  
Fall Brook Water and Power Company

DISTRICT AND PROJECT:° The existing diversion of water from the Temecula or Santa Margarita river are unimportant compared with that projected and under construction by the



Fall Brook Water and Power Company. This company was organized in 1887, with the purpose of erecting a capacious storage dam at the head of Temecula canon, and carrying the waters in a flume and pipe line to a body of some thirty thousand acres of rolling table lands in the vicinity of Fall Brook, lying to the south of the river, twelve to fifteen miles inland from the coast. Ten miles of flume, and two miles of pipe line laid on a ~~gradient~~ gradient of eight feet per mile comprise the main ~~conduit~~ conduit. An average flow of eight hundred miner's inches, maintained by the living waters of the stream, as supplemented during the dry season of the year by water stored in the reservoir, is the delivery counted upon by the company.

The proprietors of the Santa Margarita ranch, at the mouth of the river, have an appropriation at the lower end of the canon., which may interfere with the plans of the Fall Brook company. To avoid this difficulty, it is proposed to return to the stream the water belonging to the rancho at the end of the flume line, and utilize the fall of five hundred feet for water power. The company have purchased certain conflicting riparian rights along the stream, and hope to have their works completed at \$200,000. The character of the country to be irrigated, its picturesque beauty, clothed with live oak ~~if~~ trees, and the special adaptability of the soil to the growth of the citrus fruits, render the project an interesting one.

TIA JUANA RIVER PROJECT  
The Mount Tecarte Land and Water Company.

DISTRICT AND PROJECT:° Reviewing this region by the route alone which the streams have been described - the order of their geographical position from the state boundary northerly - the first irrigation project is found immediately at the line, and is international in its scope, in that it aims to utilize both the American and Mexican tributaries of the Tia Juana river; to carry American waters through Mexican territory, and to deliver them again in the United States; to store both Mexican and American waters for irrigating Mexican and American soils; and to harmonize local questions of international water rights, by serving lands on either side of the line equally with water to the extent of the capacity of the stream. Eight reservoir sites have been selected for storage.

The Otay mesa lying north of the Tia Juana river, at an elevation of three hundred to seven hundred feet, extending as far north as the Otay river, and lying chiefly on the American side, is the principal field to be commanded. A subsidy of one fourth, of certain large bodies of these lands on the American side, and one half on the Mexican side, is being negotiated by the company with land owners as a consideration for water rights for the remainder. The proposed main conduit flumes are two in number. One, to convey the waters of the Cottonwood fork some sixteen miles to the upper edge of the Otay mesa, is to start at an elevation of sixteen hundred feet and run part way south of the line, although a tunnel has been projected to avoid passing the border, if need be. The second flume line is planned to lead out from the main stream at a point on the boundary three fourths of a mile below the Tecarte fork. This is a mere outline of the character of the enterprise, upon which no actual work has yet been started beyond the preliminary surveys. The extent of the field commanded by the proposed works is very large, and irrigation need be limited only to the supply of water available, and the measure of success in its storage.

ORGANIZATION:° The Mount Tecarte Land and Water Company, which has taken up this project, was incorporated February, 1888, with a capital stock of \$3,500,000, in three hundred and fifty thousand shares of \$10 each. Since that date the company has made contracts with a number of land owners on the Otay mesa to supply their lands with water, and are preparing for construction on the upper flume line during the coming season.

OTAY RIVER PROJECTS  
The Otay Water Company's Scheme

For some years past preparations have been made periodically by the Otay Water Company, whose leaders were of the Coronado Beach Company, for the construction of a mammoth dam at the lower canon of the Otay, but as yet nothing of importance has been done. The proposed dam was to be of concrete, one hundred feet in height. Its site is four hundred and sixty six feet above tide water, and the capacity of the reservoir when full would be about eight thousand million gallons.

Otay Mesa Scheme

On a southerly branch of the Otay that joins the main stream below the canon, a masonry dam, to be sixty feet high and two hundred and sixty feet long on top, was started in 1887 by a partnership association of three San Diegans. After spending some \$10,000 in roads and foundation, the work was stopped. The reservoir was to be but three hundred million gallons capacity, and to cover seventeen acres. Its limited water shed and light rainfall render it of minor importance. It was designed for the irrigation of a part of the Otay mesa.

SWEETWATER RIVER IRRIGATION AND WATER SUPPLY WORKS  
The San Diego Land & Town Company's Works

Because the first of the various projected irrigation works in the county, depending on storage for supply, that has been completed, the enterprise of the San Diego Land and Town Company is thus far first in interest. The engineering works would be notable in any country, and the lesson which the enterprise is working out on the subject of large storage reservoirs for the conservation of winter water for summer irrigation in this dry country is already highly instructive. It is now looked to with satisfaction by San Diegans, as a type of what may be accomplished under even unfavorable circumstances upon nearly all the streams of this region.

DISTRICT AND WORKS:- The works consist of a high masonry dam, forming a large storage reservoir, and an extensive system of iron pipes reaching thence for distribution over a great part of the district commanded by the reservoir. The district embraces the Lower Sweetwater valley, and the mesa lands bordering San Diego bay, to the north and south of the Sweetwater, and extending back to an elevation of one hundred and seventy five to two hundred feet above sea level. In general this elevation is reached in two to two and a half miles from the bay shore. Its area within the limits of the National rancho, including National City, is about fifteen thousand acres. The water may be carried both north and south, beyond the limits of the rancho, by an extension of the pipes, and it is feasible to cover nearly forty thousand acres by the system. Any ~~such~~ extension would, however, enter the district ~~system~~ more directly commanded by other projected works, and at present the distribution is confined to the lines of the National rancho.

STORAGE RESERVOIR:- The reservoir site is located almost entirely within the Rancho Jamacha (as the dam is but one thousand feet inside the boundary of the National Rancho) having an extreme length of three and a half miles and a maximum width of three fourths of a mile. It is inclosed by high hills, and lies at the foot of Mt. St. Miguel, whose elevation is about two thousand five hundred feet, the most conspicuous peak lying near the coast.

SWEETWATER DAM: The dam is located across the canon of Sweetwater river, near the head of the rocky pass, ~~thru~~ through which the river escapes from Jamcha valley. At the beginning, a dam wholly of earth was contemplated. The best of clay was available for a puddle wall, and an earthen dam could have been built more cheaply than the masonry structure ultimately cost. The superior quality and unlimited quantity of the stone on the spot, however, decided the adoption of that material. When the work was begun the dominant idea was to secure a water supply of some volume as soon as possible. The question of quantity that might be stored, the area of land that might be served, the volume of supply needed, or the relative costs of different heights of structure were not preliminarily studied or at all considered.

The plan originally was to build a dam fifty feet high above the general level of the canon bed sixty feet above the general level of the river channel, or sixty five feet above the general level of the bedrock plane which was exceedingly uneven. When, however, it was ascertained some months after the work had begun, and subsequent to the development of facts that are usually known before any decision or plan is reached - that a greater supply was desirable than such a dam could assure, and that an increase in height afforded such a great advantage in retaining a supply sufficient for more than

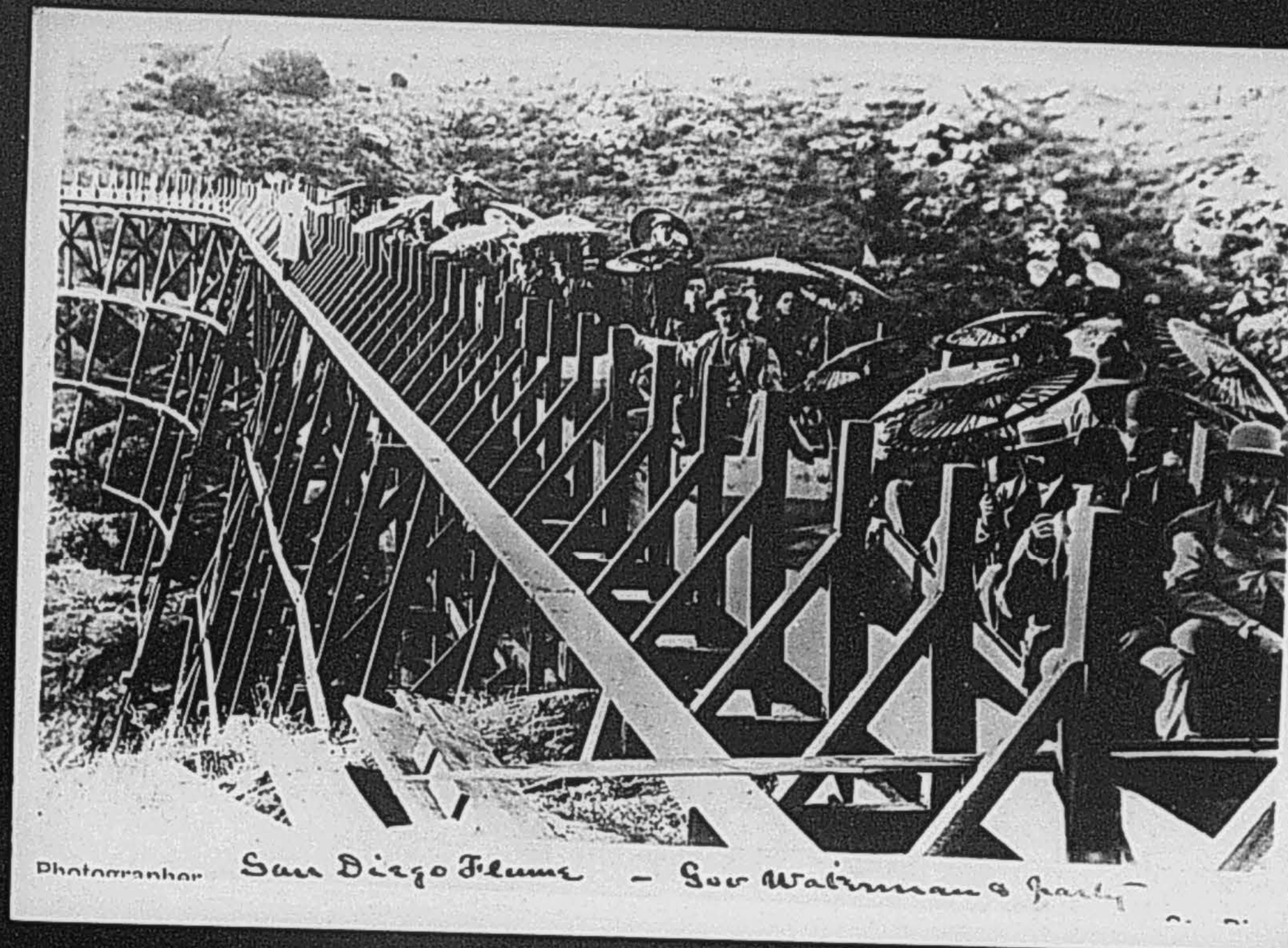
one season, and that holding water at a higher average level would serve some most desirable higher lands, it was decided to continue the structure to the height of ninety feet.

Before this decision was reached the originally planned work was nearly completed. The subsequent work necessitated an increase in the width of base. The lower toe of the dam was stripped to bed rock and the new ~~work started~~ work started from the bottom, joining and overlapping the old work in successive steps, which had been left for the purpose on the lower face. As completed the dam has the following dimensions: ~~That~~ Thickness at base forty six feet, at top twelve feet; height ninety feet to floor of roadway; length on top three hundred and forty feet, at base about one hundred feet. In plan the dam lies in the form of an arch, whose radius is two hundred and twenty-two feet to the upper face line at the top. Including gate tower, waste-way walls, and other immediate accessories, it contains twenty thousand five hundred and seven cubic yards of masonry.

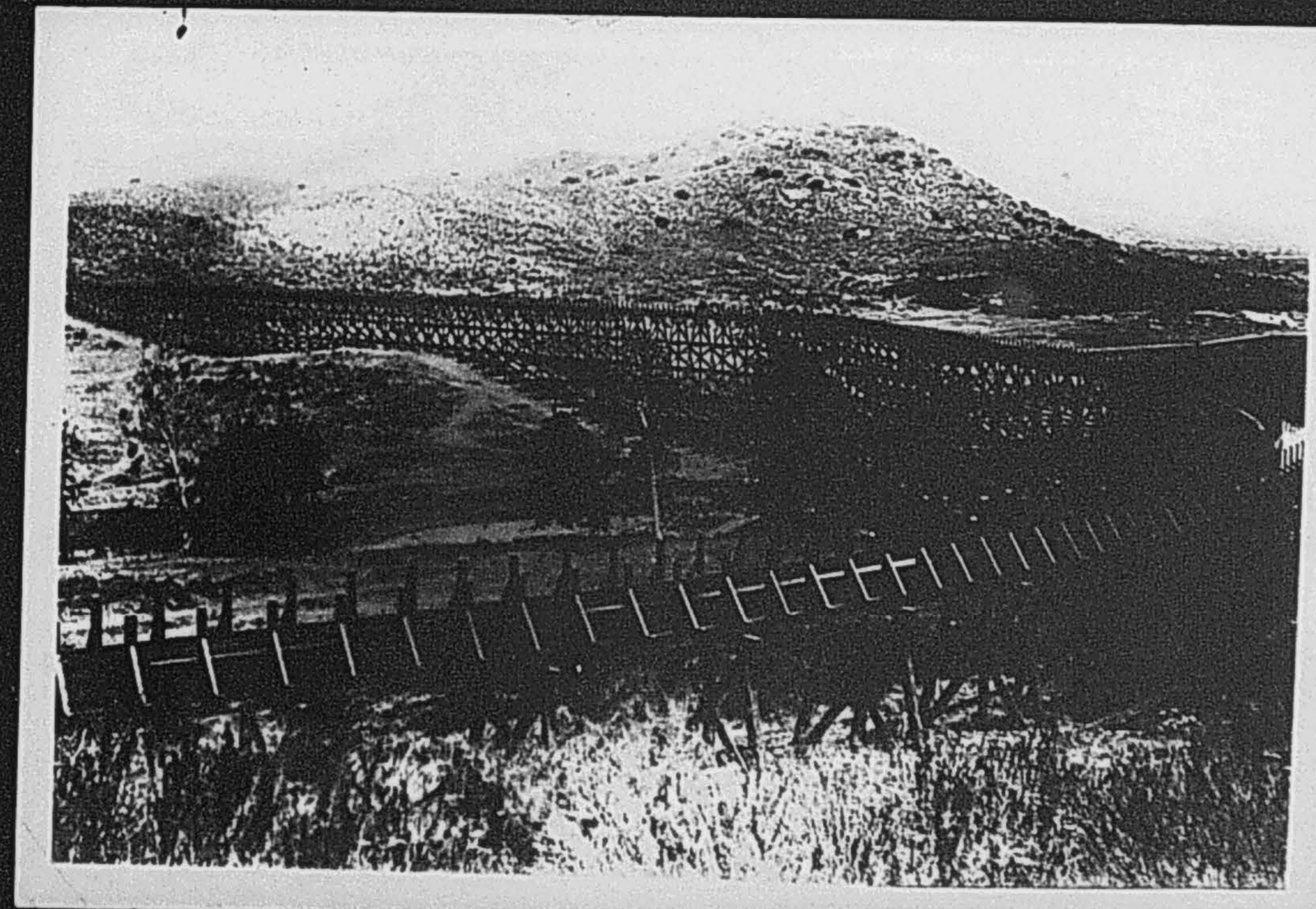
The masonry is of the type known as rough rubble —rough blocks of stone, laid without courses or ranges, with all interstices filled with smaller stones and mortar of Portland cement rammed in place. Along the upper face at top runs a parapet wall, three and one half feet high and two feet thick, which serves not only as a guard wall to the roadway on that side, but which, when the reservoir is full, will serve to prevent waves from washing over the roadway. This road, which is wide enough for a carriage drive, is protected on the lower side by an iron fence, the posts of which are imbedded in the masonry, and set at intervals of six feet. A stone stairway with iron railing reaches from top of dam to bottom of canon below the structure at the north end.

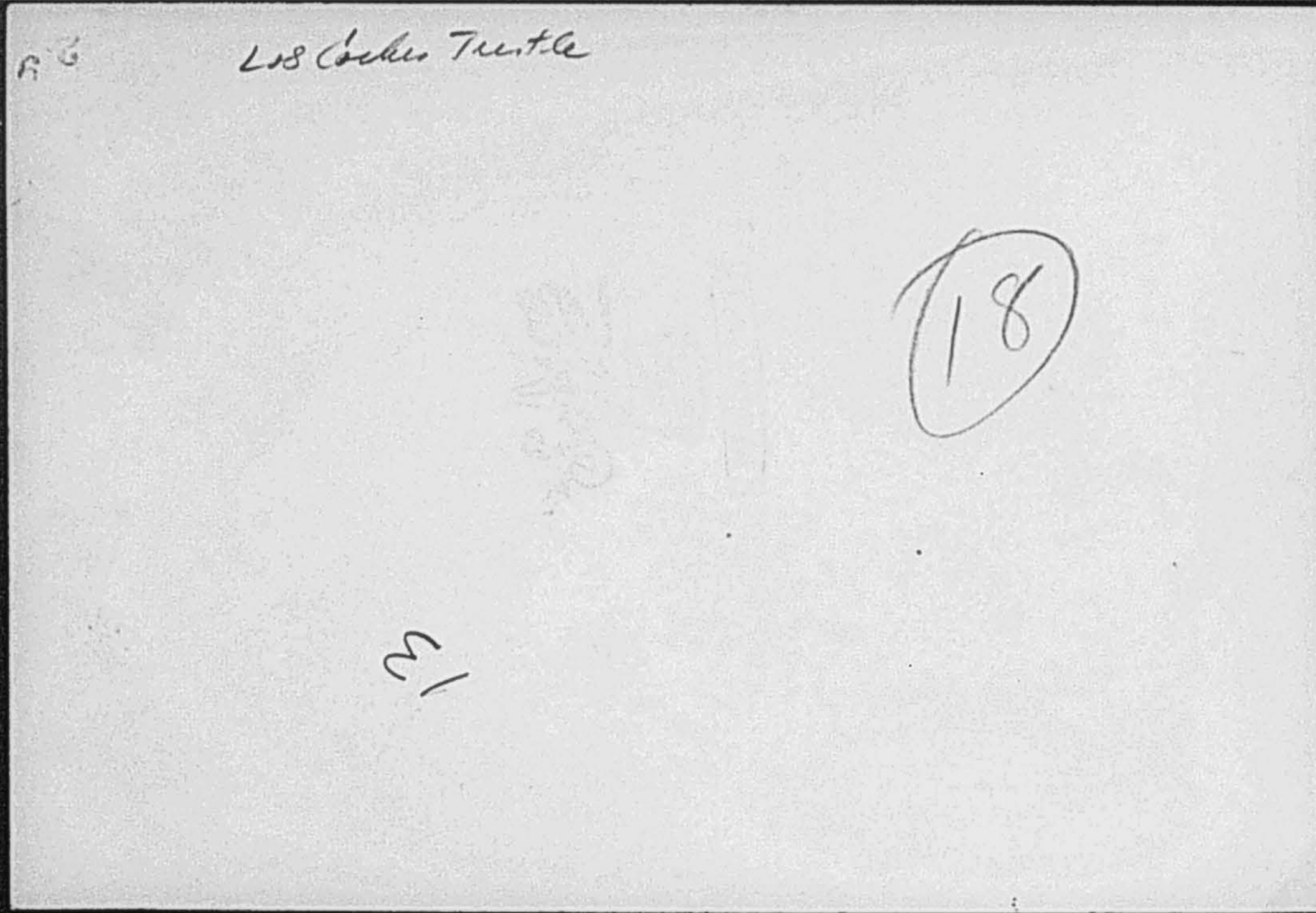
The waste way is located at the south end. It consists of a weir opening forty feet in length by five feet in depth, divided into eight bays, of five feet each, by masonry piers, inclined on the face to receive loose flash boards. By removing these boards, the water level can be lowered five feet from the top of dam. A training wall built parallel with the direction of the canon forms one side of this flood escape channel and carries the waste water fifty feet below the lower toe of the dam, where it falls down an incline over the face of the canon wall. The capacity of the waste way is one thousand five hundred cubic feet per second, and is designed to carry the maximum flood flow of the stream when the reservoir is full. There is no sluice way at the bottom of the dam other than the main conduit, which has a thirty inch blow off gate one thousand six hundred feet below, capable of ~~discharging~~ discharging three hundred cubic feet per second.

The delivery to the main conduit is effected through a masonry tower, situated fifty feet above the dam, and reaching three feet above high water mark. Cast iron elbows, twentyfour and thirty six inches in diameter, are placed at intervals of ten feet from the top to bottom. These open upward with bell mouths, that may be closed with plain cast iron covers. The work was begun in November, 1886 and finished in March, 1888, occupying sixteen and one half months in construction.



Photographer San Diego Films - Gov. Wainman's Party





**Ed Fletcher Papers**

**1870-1955**

**MSS.81**

**Box: 53 Folder: 6**

**Business Records - Water Companies - Cuyamaca  
Water Company - San Diego Flume Company -  
Flume Company history, photos and memorabilia**



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