

Delmar PI

FROM THE PAPERS OF THE SAN DIEGUITO MUTUAL WATER COMPANY, FROM THE PAPERS OF ED FLETCHER:

FROM THE PAPERS RELATING TO THE CONSTRUCTION OF THE DEL MAR-LA JOLLA PIPE LINE, the following letters were removed to the alphabetical correspondence files:

BARTL, Ed. A.

Bartl to King, 9/6/19

King to Bartl, (2 letters) 9/10/19, 9/24/19

JUDY, Wilbur H.

Judy to Fletcher, (2 letters) 3/27/20, 4/29/20

Fletcher to Judy, 6/22/20

KING, Thomas H.

King to Fletcher, (3 letters) 3/29/19, 6/26/19, 8/27/19

Fletcher to King, 4/24/19

King to First National Bank, San Diego, 4/9/20

King to Miss Mary Fletcher 8/18/20

King to Merchants National Bank, San Diego 4/9/20

Rankin, W. J. Jr. to King, 5/2/19

King to Southern Trust & Commerce Bank, San Diego
4/9/20

RHODES, F. A.

Fletcher to Rhodes, (with intercompany letter
attached) 8/9/20

Rhodes to King, 9/23/20

U.S. RAILROAD ADMINISTRATION (J.H. Bauman, Agent) to

Fletcher 6/25/20

REMOVED TO THE ALPHABETIZED BUSINESS CORRESPONDENCE were all
1919-1920 correspondence with the following companies:

Baker Iron Works

Los Angeles Manufacturing Co.

Machinery Supply Co.

McLaughlin, L. F.

Mercereau Bridge & Construction Co.

National Meter Co.

Pacific Tank & Pipe Co.

Pioneer Truck Co.

Rapid Blueprint Co.

Redwood Manufacturers Co.

Russ Lumber & Mill Co.

San Diego Glazed Cement Pipe Co.

Sparling, R. W. C.

Waterproof Paint Co.

Water Works Supply Co.

Western Pipe & Steel Co.

Western Reinforced Concrete Pipe Co.

Western Metal Supply Co.

San Diego, California.
July 28, 1920.

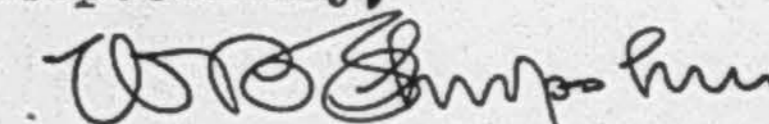
Miss Fletcher,

Dear Miss Fletcher:

Replying to Miss I.B. Leimbacher's letter
of July 27th regarding milage of Bent Bros. trenching machine
on the Del Mar - La Jolla pipe line. Attached I give you
copy of the data from which these computations were made.

The machine also dug about two and one-half
miles of trench for the 18" Concrete Pipe, which does not
appear in the above computation as it is covered by our
contract with the San Diego Glazed Cement Pipe Company
who employed Bent Bros. to excavate this part of the trench.

Respectfully,



---TRENCH EXCAVATION---
 By
 BENT BROTHERS
 For
 S.F.L.&I. Co. DEL MAR PIPE LINE.

DATE	STATION	DISTANCE Lin. Ft.	TOTAL Lin. Ft.
May 10 - 20	61+50 to 68+95	745	1462
	70+33 to 77+50	717	
May 11 - 20	77-50 to 78+57	107	1361
	78-88 to 81-30	242	
	81-38 to 91-50	1012	
May 12 - 20	91-50 to 95-67	417	629
	95-88 to 98-00	212	
May 13 - 20	99-50 to 105-04	554	965
	105-88 to 107-54	166	
	108-60 to 111-05	245	
May 14 - 20	111-05 to 113-21	216	362
	113-29 to 114-75	146	
May 15 - 20	114-75 to 123-80	905	905
May 17 - 20	123-80 to 128-12	432	2105
	128-37 to 130-15	178	
	130-25 to 132-20	195	
	133-00 to 146-00	1300	
May 18 - 20	146-00 to 168-65	2265	2265
May 19 - 20	168-65 to 174-00	535	735
	174-80 to 176-80	200	
May 20 - 20	176-80 to 187-20	1040	1040
TOTAL		11829 Lin. Ft.	11829 Lin. Ft.

Checked by
 W. D. McFadden.

---TRENCH EXCAVATION---
 By
 BENT BROTHERS
 For
 FLETCHER-HENSHAW.

DATE	STATION	DISTANCE Lin. Ft.	TOTAL Lin. Ft.
May 20 - '20	187+20 to 187+43	23	223
	188+35 to 190+35	200	
May 21 - '20	190+35 to 201+10	1075	1075
May 22 - '20	201+10 to 217+63	1653	2370
	217+83 to 225+00	717	
May 23 - '20	225+00 to 237+20	1220	1220

Total

4888 Lin. FT. 4888 Lin. FT.

Checked by W.D. McFadden

June - 1920 La Jolla to Biological Station
 102+60 to 108+00

7850.6 Lin. Ft.
 540.0

13278.6

Checked by J. W. Williams
 of City Engineers Office.

Total Trench Excavated for S. F. L. I. Co.
 Henshaw- Fletcher
 Total

11829.0 lineal feet = .4712% 87.83
 13278.6 = .5288% 96.56
 25107.6 100% 186.39

477
 55

Day labor
material - picks & shovel - used for by
day labor

Exc. slabs - too small to rent
redwood cradles =

Superintendent's expenses - Harritt
Engineering salary:
of expense -

As supposed to have done all engineering but Harritt
done it & we shipped water to each
See that pipe, its cover in

Will monthly estimates - same as County -
Blank to be signed by Eng for them who does actual
field work & Judy approves or ok & signed
by Harritt as Supt of work for Co.

Each sub contract will have a no. estimate -
Propose to handle day labor in same way
Should there be an additional contract
of no. estimates sufficient - should we have by Allip
OK as to form

12576986
897046 92
by 148126 . 15 -
b62 - 1/10

69-22

Reservoir plans changed ^{By Judy} after
contract drawn & executed
Original plans called for a
circular concrete reservoir with
re-inforced vertical walls

Present form is a rectangular
reservoir built of earth & lined with
concrete - 3" thick

Cost \$4000 less.

(See pg 19 Spec.) allowing
chgs only for grade or location.

Chgd location of line for 2 mi just
n. of town of La Jolla - which lengthens
line all 1000 ft & increases cost
\$2000 "

Change Plans: - 412727.43
762 1200000 / grade

location 1-2 7/10-10-10
 mine 1-2 1/2 1/2 1/2 1/2
 attendant 9-8 1/2 1/2 1/2
 unit 1/2 1/2 1/2 1/2
 1/2 1/2 1/2 1/2

Reservoir cost abt 24,000

1/2 1/2 1/2 1/2 1/2 1/2

two direct connected
 single stage centrifugal to 1/2 at 10
 1/2 273 plus 70 map 1/2
 "A" 1/2 1/2 1334, 0 d 1/2
 1/2 1/2 1/2 1/2 air 1/2
 1/2 suction 1/2 1/2 1/2
 1/2 1/2 184 1/2 del mas land

1/2 1/2 as intake end and all
 1/2 1/2 1/2 1/2 1/2 1/2

66 1/2 1/2 1/2 1/2 1/2
 1/2 1/2 1/2 1/2 1/2

Judy & Fletcher 1/2 1/2

1/2 1/2 1/2 1/2 1/2

Hysin & appron = Contracts
 Alexander new plans & approved
 contracts

Didn't have plans for either
 reservoir at time of signing of contract.

FLETCHER-SWIMONS INVESTMENT COMPANY
 IN ACCOUNT WITH
 F. & W. THUM CO.

Form of Monthly Estimate

HENSHAW - FLETCHER
LAJOLLA PIPELINE
Progress Report

Job.....
Report No.....
Date.....1920 Contractor.....

Estimate		Completed	
Item	Amount	Amount	Cost
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
Totals and Averages			

Less 25%.....
Amount Payable.....
Previous Payments per Report No.....
Amount due this Payment

The above named work was inspected.....1920 and same was found to be.....% completed as shown on above Progress Report.

Engr.
There is due the Contractor the sum of \$.....

which amount we respectfully recommend be paid.

Approved City Manager of Operation
" Superintendent of Construction.

6-5-20 King
Approval of Higgins on Bent Bros
Fenton cont. app by Judy
" " Higgins

Pac. Lumber Co cont = wood stain =
app by Judy
" " Higgins

Bent S.D. Glazed C.P. Co =
2 conts { 15000 laying pipe & furniture
Dig their own trench } app { Higgins
Judy

We dig Pac Lumber portion - that is what Bent does

Cont with Fenton - app Higgins
Judy

No May estimates yet

Cont S.D. & C.P. Co for lining the reservoir - app Judy
Higgins

Dear Sir:

In the construction of the La Jolla Pipe Line, we are incurring various items of expense for day labor on portions of the work which are not to be subcontracted, and for various and sundry materials needed from day to day incidental to the doing of the work. As instances, we mention additional engineering work in excess of that being furnished by the City, office and overhead expenses, picks and shovels used by day laborers and keeping tools in repair, redwood cradles, superintendent's salary, etc., etc.

We have called our attorney's attention to Paragraph "Third" of "Article I" of the contract dated January 26th, 1920, between us and the Common Council and the Board of Water Commissioners relating to the construction of the line and the leasing by the City thereof with an option to purchase, and he advises us that in his opinion this clause was intended to cover only such work as should be subcontracted and such purchase of materials as should be made in quantity, and not to such portions of the work as we should do by day labor or such materials as should be necessarily incidental to the doing of the work.

However, we contemplate giving you full information of all moneys expended and plan to render you monthly statements showing all expenditures made during the preceding month for your approval and in substantially the form a copy of which is attached hereto, and we inquire whether that procedure will be satisfactory to you and will be deemed by you to be in compliance with our obligations under the contract.

Respectfully,

April 21, 1920.

Col. Ed Fletcher,
San Diego, California.

Dear Sir: Your Mr. King and myself have had a conference with City Attorney S. J. Higgins and City Auditor Moody with reference to the purchase by you and your associates of \$25,000.00 of municipal bonds and the payment by the City of \$25,000.00 to you for the option of the City to purchase the pipe line which you are constructing to La Jolla, and the following procedure has been agreed upon.

1. The Common Council has by resolution already authorized the investment of \$25,000.00 of its idle moneys in certain municipal bonds which have been issued and remain unsold after having been offered to the State Board of Control and to the public. This will place \$25,000.00 in the proper fund from which payment on this option can be made. You are at once to file a verified claim upon this fund for this amount, and the City Attorney is this afternoon to have the Council authorize its payment by ordinance.

2. You are to file with the City Clerk a written offer to purchase these \$25,000.00 of bonds so purchased by the City, at par and accrued interest, and your bid should state that the offer is made conditioned upon the approval by Attorney John C. Thomson, of New York, as to their validity. The City Council is thereupon to accept your bid and authorize the City Treasurer to deliver these bonds to you upon payment of the purchase price.

(Fletcher, 4-21-'20, p. 2.)

3. The warrant which is to be issued you in payment for the option is to be held by the City Auditor until such time as the bonds are ready for delivery to you by the City Treasurer. Then you will indorse this warrant for \$25,000.00 to the City Treasurer and give him in addition your check for the accrued interest on the bonds and the bonds will be delivered to you. It will take some ten days or two weeks to procure the final opinion on the bonds. A preliminary opinion is already on file which approves the entire issue, subject only to a "legal sale" for "par and accrued interest". The City is, under the law, authorized to purchase its own bonds, and when this sale shall be made as above indicated, I can see no reason why the procurement of this final opinion should be more than a matter of course. If you should desire to use these bonds without waiting for this final opinion, I am of the opinion you could safely do so, providing that the City Treasurer at the time of delivering them to you gives you a writing stating that they are being delivered "subject to the favorable opinion as to their validity by John C. Thomson, of New York" and that in the event this opinion should not be procured that "you are to have the right to return the same and be returned the amount of their purchase price."

Respectfully,

April 27th, 1920.

Wm. G. Henshaw and Ed Fletcher,
San Diego, California.

Gentlemen:

My attention has been directed to Paragraph "Third" of "Article I" of the contract between you and the Common Council and Board of Water Commissioners of the City of San Diego, California, relating to the construction by you and the leasing to the City with the option to purchase of what is to be known as the "La Jolla Pipe Line". This paragraph reads as follows:

"Third: In order that the purchase price provided in the option hereinafter granted to said city may as to said city be just and reasonable and any or all contracts entered into by said Wm. G. Henshaw and Ed Fletcher for the purchase of materials or for the payment of labor in connection with said pipe line or for the construction of all or any portion of said pipe line shall before being executed be approved by the City Attorney and by the Manager of Operations of said City or such engineer as the City may employ for that purpose."

You state that in the construction of the line various expenditures are being made for materials, laborers, engineering, incidentals, etc., for which no sub-contract is let, and inquire whether under this contract it is necessary to secure the approval of the City Attorney and Manager of Operations for such expenditures.

I am of the opinion that the contract would not be so construed and that this clause was intended to provide only for such work as should be subcontracted and for such materials as should be purchased in quantities and not merely

such as necessarily would from day to day incidentally arise in the doing of the work.

However, the language is somewhat ambiguous, and I advise that you address a letter to the Common Council and Board of Water Commissioners informing them that the above is the construction that you place upon this clause and request to be advised if they concur.

You state, however, that there are special reasons why at this time you do not wish to address them concerning this matter, and as an alternative, I advise that you address the Manager of Operations and the City Attorney a letter such as I inclose herewith.

Respectfully,

MEMORANDUM OF PROCEDURE TO GET \$25,000
FOR OPTION OF LAJOLLA PIPE LINE

City Auditor says for the Operating Department to issue requisition, which goes to the Purchasing Department, and then they make an order, and claim, and then we go to the Auditing Department and verify this claim.

April 22nd. Telephoned Mr. Judy who said he would issue requisition and give it to the purchasing department this afternoon.

Claim for 25000 drawn to A
 Aug Com.
 Held A, 174999276
 7793 63176 625000
 1793 1777671209/
 7762
 2717 1761
 25000
 Did by 25000 - 17600 =

Buy of Jern...
 17679-6 Sale

8

January _____, 1921.

Messrs. William G. Henshaw and Ed Fletcher,
 San Diego, California.

Gentlemen:-

This is to advise you that the damage to my Pueblo Lot 1361, caused by the escape of water from the La Jolla Reservoir upon its breaking on or about December 13th, 1920, has been satisfactorily remedied, and the ditch filled in and the premises restored to good order and satisfactory condition.

Very truly,

PETITION FOR PERMISSION TO LAY WATER PIPES IN GRAND
AVENUE, RAILROAD AVENUE, AND OTHER ROADS.

-----oOo-----

TO THE HONORABLE,

THE BOARD OF SUPERVISORS OF THE
COUNTY OF SAN DIEGO, STATE OF CALIFORNIA.

The undersigned respectfully represents unto Your Honorable Body that it is engaged in constructing an eighteen-inch Redwood pipe line from the main line of the San Dieguito Mutual Water Company's distribution system to connect with the La Jolla Pipe Line, now under construction, for the purpose of conveying water from the Lake Hodges Dam for use in the City of San Diego.

That it is necessary that a portion of said pipe line be constructed in, along, and across the following portions of the following county roads, to-wit:

Crossing the Santa Fe Ranch Road at the north end of the dyke across the San Dieguito River; also from the north end of the county bridge crossing the San Dieguito River at San Dieguito Drive; thence southerly along Grand Avenue to an intersection with the northerly line of Lot Fifteen (15) of Del Mar Re-Subdivision No. 1, as shown on map of said Re-Subdivision on file in the office of the County Recorder of San Diego County; also on that portion of the old Santa Fe Right of Way commonly known as Ocean Avenue from its intersection with the State Highway to its intersection with 13th Street; also on that portion of the old Santa Fe Right of Way commonly known as Stratford Court from its northerly intersection with 12th Street to its intersection with 9th Street; and also along that portion of the old Santa Fe Right of Way commonly known as said Railroad Avenue to the easterly limits of the Subdivision of Del Mar, as shown on Map No. 368, on file in the office of the said County Recorder.

That accompanying this petition is a map and profile

I John W Sachs am willing to give an easement for an 18. inch pipe line through my tract of land free, and for such free easement I John W Sachs. Heirs and assignee want 2000. gallons of water per day free, an average of 30000. gallons water per month during life time of said pipe line. and all water over that amount we need for this tract 23. acres more or less at the same price you get from the city of san Diego not to exceed 10. cents per 1000. gallons, now in regards to the old Rail Road bed were the pipe line is to go. this is intended for a street and I reserve the right for such street, you must keep the top over pipe line level fit for traffic and for driving over it, Legal discription of my tract

West 1/2 of N.E. 1/4 of S.E. 1/4 section 23 Twp 14.
Range 4. N. 20.2 acs, and West 2 1/2 acs of lot
S.E. 1/4 of S.E. 1/4. section 23 Twp 14. Range 4. N.

showing the said roads and the portions thereof over, across, and under which the said pipe is desired to be laid, and showing the depths which it is proposed such pipe shall be laid.

WHEREFORE, the undersigned respectfully petitions Your Honorable Body for permission to construct the said pipe line in the said portion of the said roads, as shown on the said map, and it undertakes and agrees that in the event such permission be granted, that it will leave the said roads in the same condition as it was before the placing of the said pipe, that it will properly maintain the same, and that it will save harmless the County of San Diego from any damage or liability by reason of accident occurring as a result of or in the course of laying the said pipe, or in the maintenance and operation thereof; and that in the event of the grade of the said roads being changed, that petitioner will take up and place the said pipe so as to conform with the grade re-established. Petitioner further agrees that it will, when so required by the County of San Diego acting through its Board of Supervisors, remove and take up any and all pipes so laid by petitioner, or its assigns, and will leave the roads and highways in as good condition as they were at the time of the taking up of such pipes, and that whenever required by the said Board it will remove the said pipes to a new location in said roads.

Respectfully submitted,

SANTA FE LAND IMPROVEMENT COMPANY,

By W. E. HODGES
Its Vice President

1 PETITION FOR PERMISSION TO LAY WATER PIPES IN SORRENTO ROAD.

2 -----oOo-----

3 TO THE HONORABLE,

4 THE BOARD OF SUPERVISORS OF THE
5 COUNTY OF SAN DIEGO, STATE OF CALIFORNIA.

6 The undersigned respectfully represent unto Your Honor-
7 able Body that they are under contract with the City of San Diego,
8 California for the construction of a sixteen and eighteen inch
9 wood stave, steel and concrete pipe line for the purpose of con-
10 veying water from the Lake Hodges Dam to be used in the said City,
11 and which said pipe line is known as the "La Jolla Pipe Line".

12 That it is necessary that a portion of the said pipe
13 line be constructed in, along, and across a certain highway in
14 the County of San Diego commonly known as "Sorrento Road" from a
15 point where the said road intersects the State Highway Southerly
16 a distance of approximately one mile.

17 That accompanying this petition is a map showing the
18 said road and the portion thereof over, across and under which the
19 said pipe is desired to be laid, and showing the depths which it
20 is proposed such pipe shall be laid.

21 WHEREFORE, the undersigned respectfully petition Your
22 Honorable Body for permission to construct the said pipe line in
23 the said portion of the said road, as shown on the said map, and
24 they undertake and agree that in the event such permission be
25 granted that they will leave the said road in the same condition
26 as it was before the placing of the said pipe, that it will proper-
27 ly maintain the same, and that they will save harmless the County
28 of San Diego from any damage or liability by reason of accident
29 occurring as a result of or in the course of laying the said pipe,
30 or in the maintenance and operation thereof; and that in the event
31 of the grade of the said road being changed, that petitioners will
32 take up and place the said pipe so as to conform with the grade
33 re-established. Petitioners further agree that they will, when .

so required by the County of San Diego acting through its Board of Supervisors, remove and take up any and all pipes so laid by petitioners, or their assigns, and will leave the roads and highways in as good condition as they were at the time of the taking up of such pipes, and that whenever required by the said Board they will remove the said pipes to a new location in said road.

Respectfully submitted,

offices for a month or more before someone filled them out, more as a matter of form than anything else. Then when Mr. Ericsson was passing through Washington on his way to visit one of his sons in the officers' training camp at Camp Lee, he was told by a friend that a big job was coming his way. When he returned to Chicago he found the Camp Grant work awaiting him.

It was midwinter and there were 5 ft. of frost in the ground but work was begun at once and rushed along. The base hospital and warehouses constituted the work to be done under the first contract, the amount involved being about \$1,000,000. When that work was done an additional \$7,420,000 contract for the enlargement of the camp was awarded to Henry Ericsson Co. It included a host of frame buildings, 15 miles of roads, 30 miles of

sewer and water pipe, and it was fast approaching completion when the war ended.

No account, however brief, of Mr. Ericsson's career could omit reference to the 4 years he spent as Building Commissioner under the younger Carter Harrison. The story of all that happened during his incumbency of the office is too long to tell here, but as usual he did a good job.

"What is the name of your new magazine?" asked Mr. Ericsson at the end of our talk.

"Successful Methods," was the reply. "Well you might say that the only successful method I know is to get out and scratch like Sam Hill."

In accord with Mr. Ericsson's suggestion we'll say so, and stop right there.

PUMP SIZES FOR CONCRETE ROAD WORK

How to Determine the Proper Size of Pump for Use Under Various Conditions

Pumping facilities on concrete road construction are frequently inadequate. Select a pump to fit your several conditions—excess pump capacity is highly desirable.

Q. What factors control the size of the pump?

A. The amount of water required, the vertical distance the water is to be lifted, the horizontal distance the water is to be pumped, the size of the pipe, and to some extent, the bends and valves.

Q. What size pipe should be used?

A. Use not less than 2-in. pipe. Discard all defective lengths and rethread all poor ends.

Q. How do you find the vertical lift?

A. By determining the difference in elevation between the pump and the highest point in the pipe line.

Q. How do you find the horizontal distance?

A. Measure it.

Q. What effect do the size of pipe and valves and bend have on the size of the pump?

A. The friction between the water and the pipe uses up much of the power of the pump, and to a much smaller extent the friction due to valves and bends dissipates the power of the pump. The smaller the pipe the greater the friction.

Q. How far may the pump be above the water surface?

A. Not to exceed 20 ft. and a foot valve and strainer should be on the end of the surface pipe.

Q. How should valves and extra pump joints be spaced?

A. Space valves and extra pump joints about 1000 ft. apart, 2 in. and 1 in. tees from 200 to 300 ft. apart, and unions about 500 ft. apart.

Q. How is water hammer prevented?

A. Use an air chamber.

Q. How much water is required on concrete road work?

A. From 20 to 60 gal. a minute.

Q. How do you find the loss due to friction in the pipe, valves, bends, etc.?

A. These losses are computed in terms called head. The following table gives the losses under various conditions:

TABLE I. LOSS OF HEAD (IN FEET) IN 2-IN. PIPE IN PUMPING WATER VARIOUS DISTANCES

Water required per min.	1 mile	2 miles	3 miles	4 miles
20 gallons.....	51 ft.	102 ft.	153 ft.	204 ft.
30 gallons.....	110	220	330	440
40 gallons.....	194	388	582	776
50 gallons.....	296	592	888	1,184
60 gallons.....	468	936	1,404	1,872

Q. How do you find the horsepower required to raise water to various heights?

A. The theoretical horsepower required (a horsepower is that power required to raise 33,000 lbs. 1 ft. in 1 min.) is given in the following table for various heights:

TABLE II. THEORETICAL HORSEPOWER REQUIRED TO DELIVER VARIOUS QUANTITIES OF WATER LIFTED DIFFERENT HEIGHTS

Water delivered per minute	Height to be raised (in feet)					
	100	200	300	400	500	600
20 gallons..	.050 hp.	1.00 hp.	1.50 hp.	2.00 hp.	2.50 hp.	3.00 hp.
30 gallons..	.75	1.50	2.25	3.00	3.75	4.50
40 gallons..	1.00	2.00	3.00	4.00	5.00	6.00
50 gallons..	1.25	2.50	3.75	5.00	6.25	7.50
60 gallons..	1.50	3.00	4.50	6.00	7.50	9.00

Q. What is the actual horsepower required?

A. Due to various losses in the mechanical operation of the pump, etc., it is necessary to use a much higher power engine than theoretically required. Multiply the theoretical horsepower by 4 for deliveries of 30 gal. per minute or less and by 3 for deliveries of from 30 to 125 gallons per minute.

Q. I need 40 gal. a minute pumped 2 miles over a hill 100 ft. above the pump. How large a pump shall I use?

A. Here is the solution:

From Table I:

Loss in head in pipe line.....	388 ft.
Vertical height up hill.....	100 ft.
Estimated loss of head in valves, elbows, etc.....	20 ft.
Total head	508 ft.

From Table II:

Theoretical hp. required.....	5 horsepower
Actual hp. required for engine and pump, three times theoretical hp.....	15 horsepower

Q. Who says this is a good way to figure the size of pump required?

A. Clyde E. Learned, highway engineer, U. S. Bureau of Public Roads, Washington, D. C. in *Public Roads* for June.

BOOKKEEPING WITH MODELS

Visual Method Makes it Easy to Keep Track of Equipment



MODELS are used by the Great Lakes Dredge & Dock Co. to keep track of the location of various pieces of equipment. In the main office in Chicago are display cases 7 by 14 ft., placed on tables covered with 1/4-in. plate glass tops. The cases are divided into sections, and each section is labeled according to the job it represents. In the cases are placed pieces of cardboard of various colors; white to indicate plant that is working; green to indicate plant that is idle; and salmon to indicate plant that is under repair. A red card indicates work awarded but not yet started.

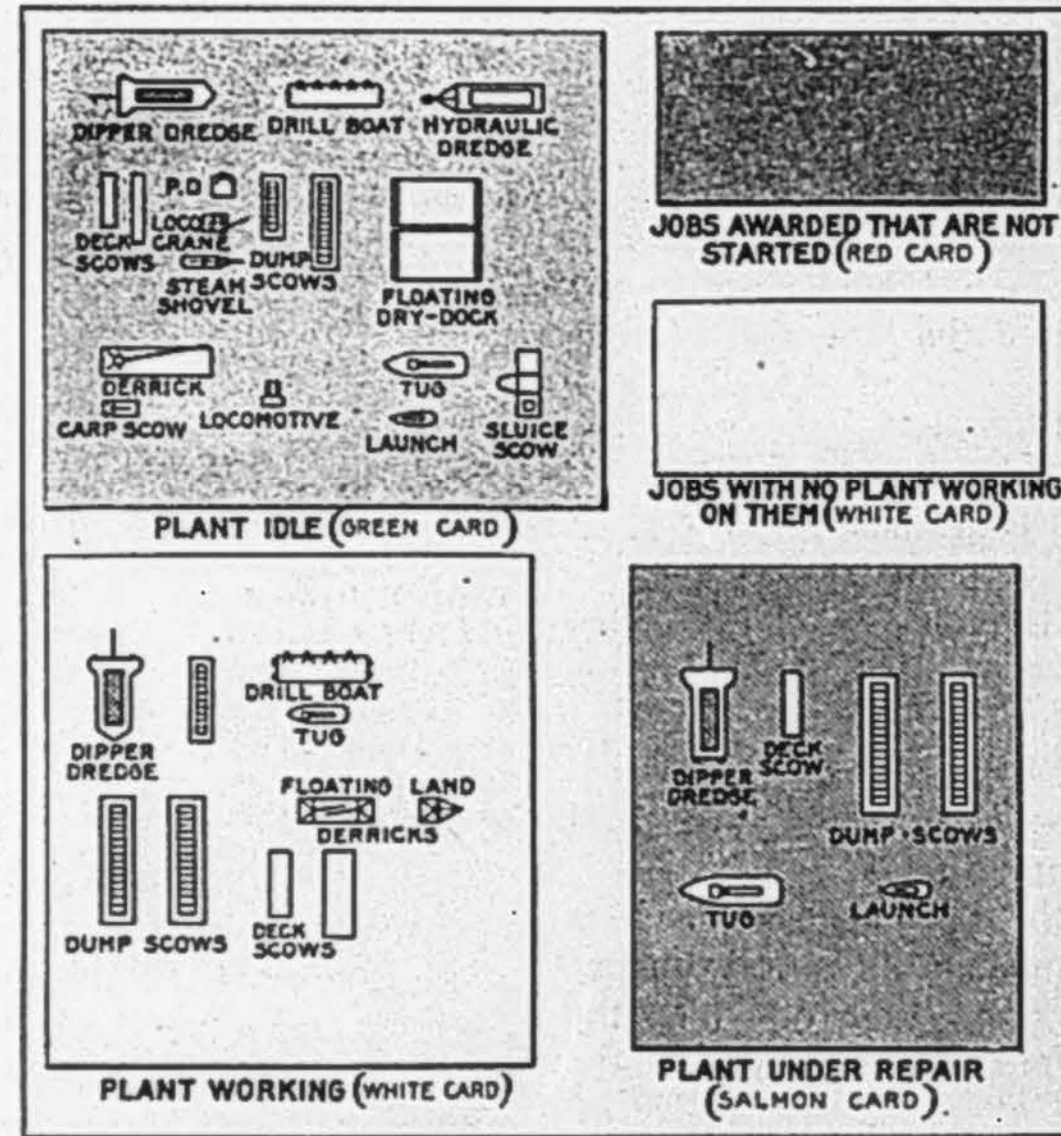
Models of each piece of heavy equipment, numbering about 600, are made to a scale of 25 ft. to the inch. These models are placed on the various sheets of cardboard in accordance with existing conditions and are given numbers which help to identify them.

The models representing steel equipment are painted gray. Those representing wood are varnished. In addition, each one of these models shows the main features of the machine it represents.

This system of keeping track of equipment has been successfully used for several years. While it applies to movable plant only and does not include smaller equipment it enables executives to visualize working progress, and has considerable value for instruction use.

The models are shifted every morning according to the daily reports of the superintendents of the various construction projects scattered over the country.

This method of keeping track of equipment can be applied to other types of work. Highway drainage and building contractors engaged on several jobs at once should be interested.



ALL PRESENT OR ACCOUNTED FOR

TRAFFIC DETOUR NECESSARY

Construction Progress Trebled in Massachusetts

A REPORT of the Massachusetts Highway Commission states that on a resurfacing job it was provided that the contractor should resurface only half the width of the road at a time, keeping flag men at each end and letting the traffic through in single file. Early in the spring when there was but little traffic, this was possible, although it slowed up the work materially.

When the heavy summer traffic began, however, the road became so congested and so many automobiles were always waiting at each end, that there was almost a continuous procession. They kept the sub-base constantly rutted and rough, and almost prevented the teams from getting there that had to haul the material on to the road so that it could be built. It also caused long delays and many complaints, not only from the contractor because he couldn't do his work, but from the motorists themselves.

It was found that little work could be done under these conditions and it was decided to detour the traffic for a few weeks. As a result the rate of progress on the work trebled.

STRAW COAT FOR ROAD

In the construction of concrete roads at Camp Grant, Illinois, during the winter straw and other refuse from the stables were successfully used to protect the concrete. The protecting material was all hauled to the roads in dump wagons and placed in a layer 4 to 5 in. thick. This proved a most effective means of protection during extremely cold weather

and was easy to remove when it was no longer needed.



COVERING THE ROAD

HAULING FROM STEAM SHOVELS

Number of Wagons Required for Different Lengths of Haul

INFORMATION as to the number of wagons required to take care of the output of a steam shovel for different lengths of haul is sadly lacking.

The following table gives data from which an approximate estimate may be made:

Haul in ft.	Round Trips	Cu. yd. per day per team with 1/2-yd. wagons
500	105	157
1,000	53	79
2,000	26	40
3,000	17	26
5,000	10	15
10,000	4	6

Daily output in cu. yds.	Haul 1,000 ft.	Haul 3,000 ft.	Haul 10,000 ft.
250	3	10	41
300	4	12	50
500	8	20	84

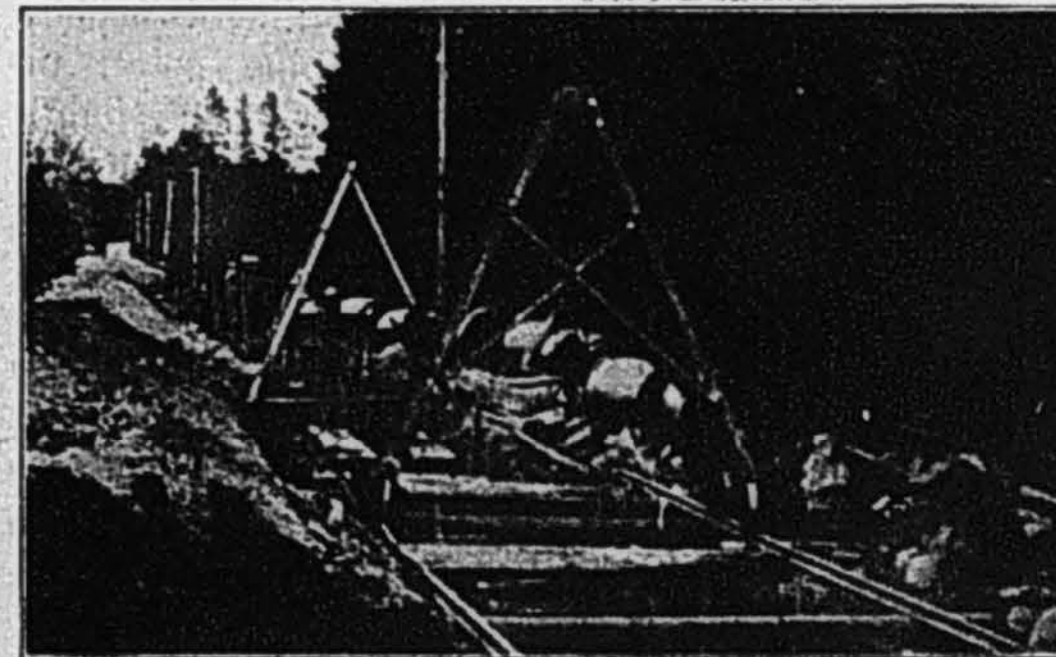
On a road job in Minnesota 5 wagons are serving a 3/4-yd. steam shovel on a 300-ft. haul and are kept busy.

At Hamilton, Ohio, a steam shovel with a 3/4-yd. bucket, loading gravel on a 3 to 10 ft. face, loaded 480 2-cu. yd. wagons in 9 hrs., and 60 teams were estimated as necessary to keep the shovel busy on a 1-mile haul. The same shovel handled clay out of a 6 to 12 ft. face and should be able to load 360 2-yd. wagons in 9 hrs. This would require 45 teams to haul the material away on a 1-mile haul, 8 trips to the team.

HEAVY PIPE IS HANDLED BY STEEL FRAME

Handling heavy sewer pipe into a deep trench calls for considerable ingenuity if breakage is to be reduced to a minimum. The apparatus illustrated was used on a sewer job in Quebec, Canada. It followed the trenching machine and was used to lower the pipe into place.

The apparatus consisted of a double A frame made up of steel angle bars meeting at a common point and



FRAME WHICH DID THE TRICK

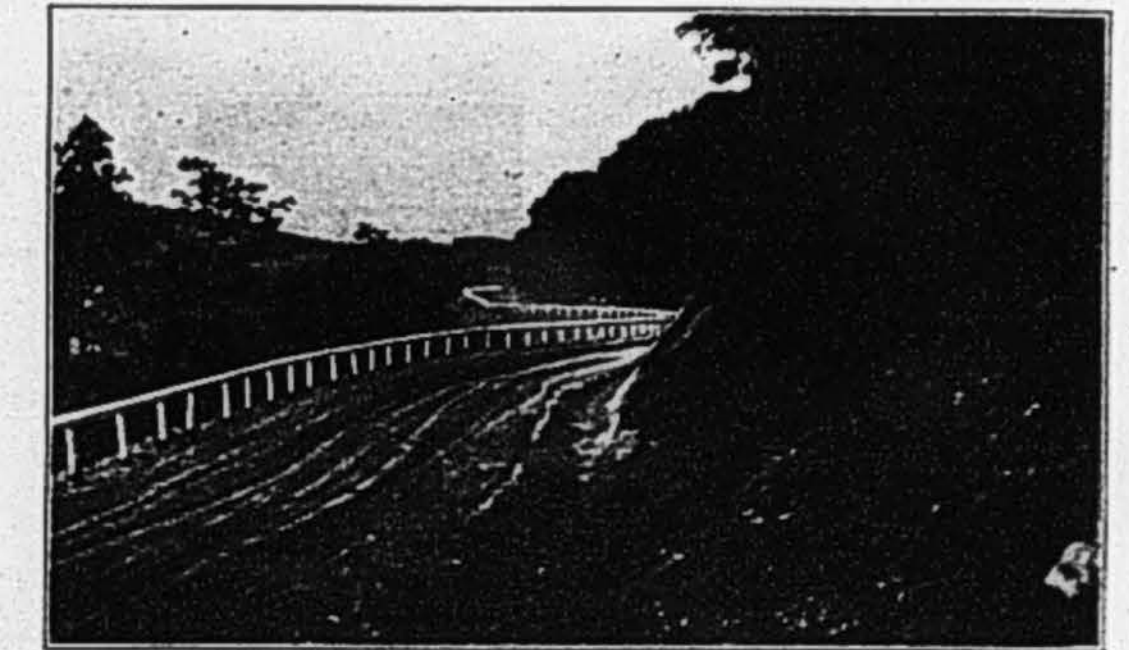
securely riveted. The frame was mounted on four wheels as shown and was thoroughly cross braced. The hand winch securely mounted on one side of the frame and a double chain block furnished the power for handling the pipe. Light track was laid on either side of the trench over which the apparatus traveled.

This machine also was used successfully in lifting heavy boulders out of the trench.

HEAVY STEAM SHOVEL WORK

Side-Hill Job Handled Efficiently by 1 1/2 Cu. Yd. Shovel and Wagons

A SECTION of road 2.3 miles in length near Wabasha, Minn., furnished an opportunity to demonstrate the utility of the steam shovel for side-hill work. The road was cut from a side-hill which had an average slope of



ROAD BUILT WITH STEAM SHOVEL AND WAGONS

2:1. A 1 1/2 cu. yd. shovel and wagons handled the whole job. The cost of this job and the quantities of material used are as follows:

Item	Quantity	Unit Price	Total Cost
Clearing and grubbing.....	\$ 285.00
Solid rock, cu. yd.....	17,185	\$1.75	30,073.75
Loose rock, cu. yd.....	6,305	.85	5,359.25
Earth, cu. yd.....	19,252	.33	6,353.16
Overhaul, cu. yd.....	20,371	.015	305.57
Rip rap, cu. yd.....	135	3.00	405.00
Guard rail, lin. ft.....	5,592	.40	2,236.80
Placing culverts.....	105.86
Culvert end walls, cu. yd.....	38.96	18.00	701.28
Temporary surfacing, cu. yd...	1,955	.60	1,173.00
Culvert haul, cu. yd.....	119.3	1.00	119.30
Total			\$47,162.97

Clearing and grubbing took place over about half the length of the road. The trees averaged about 6 in. in diameter with about 50 to the acre and some rather heavy undergrowth.

The excavation was in soft, seamy sandstone and earth. The seams were horizontal and gopher holes about 18 in. in diameter were made and loaded with from 4 to 6 cans of black blasting powder. The stone was soft enough so that these holes could be cut out with a bar. The blasting simply loosened the rock so that the shovel could handle it.

The cuts were limestone and sandstone ledge and were handled on a 500-ft. overhaul basis. Side slopes and rock cut were 1/4:1. A 23-ft. roadway in rock cuts and a 24-ft. roadway in earth were provided. The earth was sandy loam in some places and clay in others. Clay was used for temporary surfacing.

S. J. Groves & Sons Co., Minneapolis, Minn., were the contractors, and C. M. Mathis the county highway engineer.

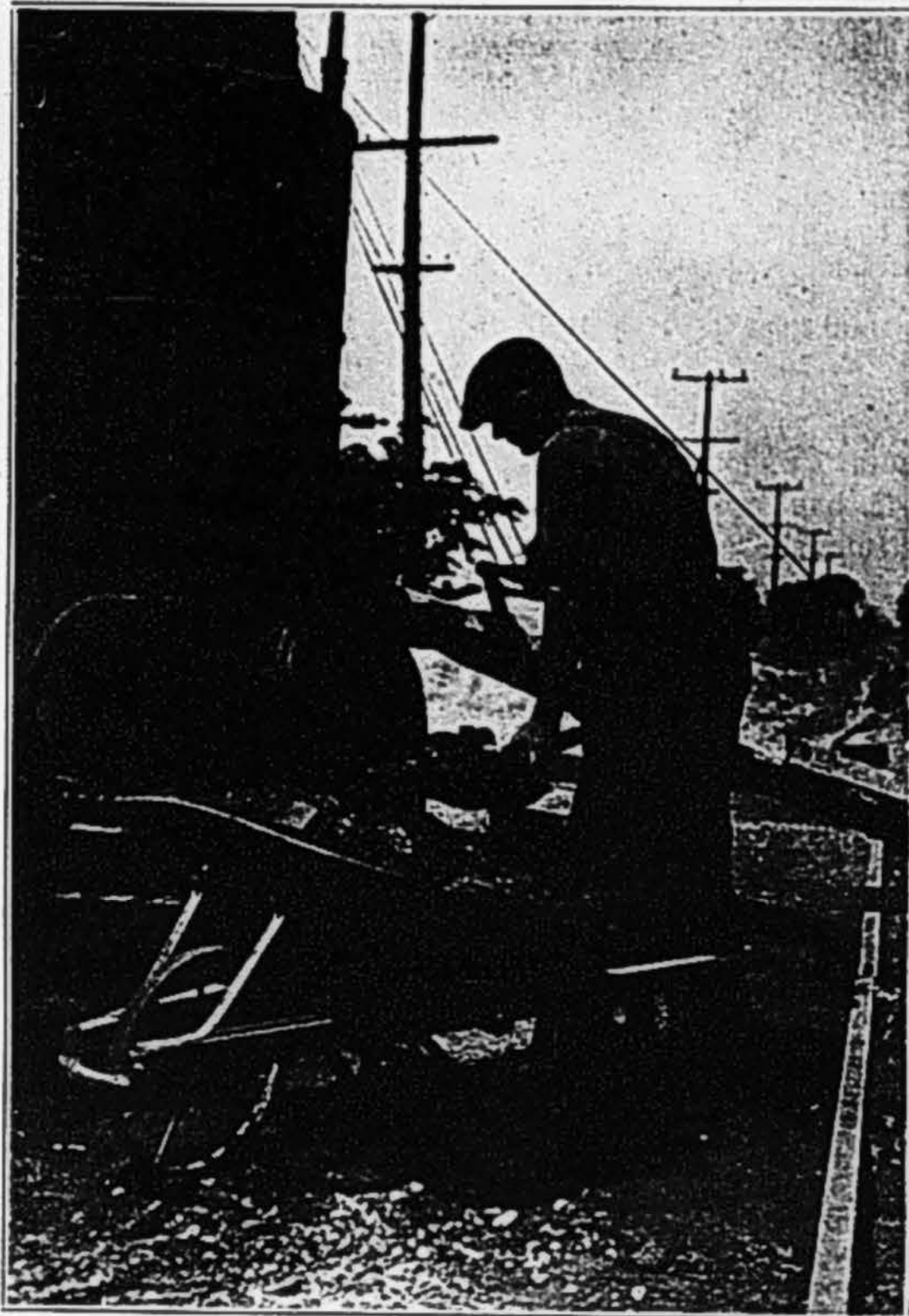
SERVICE HINTS

WHEELBARROW HINTS

The variety of the uses for wheelbarrows on the average construction job is so great that the value of the tool is not fully appreciated. Try doing without wheelbarrows for a time and see how quickly they are missed.

Just watch your mixer gang on a rush job and you will be impressed with two facts: (1) it is the wheelers who regulate the speed of your mixer, and the subsequent amount of finished concrete out of the discharge spout; and (2) the wheelbarrows get the hardest knocks, roughest treatment, and most general neglect of any piece of equipment on the job.

It surely pays to keep the wheelbarrows in proper repair, and to use the best of judgment in the selection of types. Nothing can slow up the job more than shaky, crippled wheelbarrows. Also there are wheelbarrows, especially designed for wheeling concrete, others for dirt, and still others for brick, sand or gravel and any of them may be used for odd jobs such as shown in the illustration. It is economy to get wheelbarrows which are made for the job.



A WHEELBARROW ON THE JOB

MEASURING AGGREGATE

There are various methods by which a contractor may determine pay quantities for material used in road building. Car weights are used to a great extent but care

must be used in accepting them since the moisture content of the gravel varies greatly, especially in material used for road surface.

This is also true of fine crushed stone. If payment is by the cu. yd. it is well to know just how much a cu. yd. weighs when wet, damp and dry. This point should be watched carefully where payment for hauling is based on the cu. yd. mile haul and material is delivered in railroad cars.

Material sometimes is paid for by place measurement after the road has been built. This calls for careful inspection on the part of the engineer. Perhaps as fair a way as any for measuring gravel hauled in motor trucks is to estimate the size of the load at some point in transit.

If the measurement is made at the loading point, the contractor has a slight advantage; if it is made at the dumping point, the advantage is slightly against him.

FINISHING WAREHOUSE FLOORS

The floors of the warehouse at the foot of 39th Street and Winchester Avenue, Chicago, which was built for use by the United States Quartermaster Department, were left rough, that is, they were poured to within about 1/2 in. from the top and when the concrete had hardened the surface was uneven. Later a top finish of 1:1 1/2 cement, sand and mortar was applied dry as possible and the mixture was floated and troweled into a somewhat hard and uniform surface. This floor finish was mixed with a separate mixer operated by electricity and moved from floor to floor. The main mixing plant was kept busy with the upper floors while the lower ones were being surfaced.

The building was erected by E. W. Sproul & Co.; S. Scott Joy was the architect; A. F. Stein the structural engineer; and Maj. S. L. Nelson, construction quartermaster, was in charge of the work.

REHANDLING EARTH BY MACHINE

A successful method of transporting earth with a dragline has come into use. This method involves the piling of material in a long windrow, moving the machine to the other side of the windrow and handling the earth again to its final position. In other words, the dragline can be used not only for excavation but also for transporting earth.

On one job, by two handlings, draglines are now placing material 500 ft. or more from the point of excavation. If the first digging is in water the dragline can be mounted on a scow equipped with spuds.

In excavating for the Drake Hotel in Chicago, Anderson Bros., the contractors, are transporting the earth about 100 ft. with steam shovels and then lifting it out of the pit and loading into wagons.

1 THIS AGREEMENT and LEASE made and entered into at
2 San Diego, California this 26th day of January 1920
3 by and between THE CITY OF SAN DIEGO a municipal corporation
4 organized and existing under a free holder's charter sometimes
5 referred to as "The City" or "Said City" acting by and through the
6 Common Council and the Board of Water Commissioners of said city
7 as first party and WM. G. HENSHAW of San Francisco, California and
8 ED FLETCHER of San Diego, California sometimes hereafter referred
9 to as "Henshaw and Fletcher" or "Said Henshaw and Fletcher",
10 WITNESSETH:

11 WHEREAS, the City has heretofore entered into a
12 written contract with the said parties of the second part bearing
13 date the 26th day of January 1918 for the purchase for
14 the period of ten years of a minimum of Three-hundred sixty-five
15 million (365,000,000) gallons of water per year and a maximum of
16 One-billion ninety-five million (1,095,000,000) gallons of water
17 per year at the rate of ten cents (10¢) per thousand gallons at
18 the times and in the manner as in said contract provided and which
19 said contract is now on file in the office of the City Clerk of
20 said City endorsed: "Contract between The City of San Diego first
21 party and Wm. G. Henshaw and Ed Fletcher second parties for the
22 purchase of water" and marked Document Number 126761 and

23 WHEREAS, The City in order to enable it to secure
24 delivery of the water so provided to be purchased and sold by
25 said contract hereinbefore referred to is desirous of having con-
26 structed a sixteen/and eighteen inch wood stave, steel and concrete pipe line /
27 commencing at a point marked "Point of delivery" on the blue-print
28 map hereto attached and marked "Exhibit A" and hereby referred to
29 and made a part hereof and terminating at a point marked "Point
30 of termination" on said blueprint map hereinbefore referred to
31 and is further desirous of leasing said pipe line when constructed
32 from the parties of the second part and of securing in addition
33 thereto an option to purchase the same and using said pipe line

1 during the term of said lease as a part of said city's transmission
2 and water distributing system.

3 NOW, THEREFORE, it is mutually agreed by and between
4 the parties hereto as follows:

5 ARTICLE I.

6 First: That said Wm. G. Henshaw and Ed Fletcher parties
7 of the second part hereby agree at their own cost and expense to
8 construct said pipe line/and to complete the same within seven
9 months from the date of the execution of this contract, delays
10 caused by strikes. inability to obtain material, the elements or
11 due to other causes over which they shall have no control excepted.
12 Said pipe line shall be ^{from} ~~sixteen~~ ^{to eighteen} inches in diameter and shall extend
13 from the point marked "Point of delivery" on the blueprint hereto
14 attached and marked "Exhibit A" along the course and line as outlined
15 and described on said blueprint so marked "Exhibit A" to the point
16 marked "Point of termination of pipe line" on said blueprint so
17 marked "Exhibit A".

18 Second: The work of constructing said pipe line/and reservoir
19 commences within two months from the date hereof and said pipe
20 line/and reservoir shall be completed as hereinafter provided and shall be con-
21 structed in a thoroughly workmanlike manner according to the plans
22 and specifications hereto attached marked "Exhibit B" and by refer-
23 ence made a part hereof and under the direction and supervision
24 of the Manager of Operations of said City.

25 Third: In order that the purchase price provided in the
26 option hereinafter granted to said city may as to said city be just
27 and reasonable any and all contracts made or entered into by said
28 Wm. G. Henshaw and Ed Fletcher for the purchase of materials or
29 for the payment of labor in connection with said pipe line or for
30 the construction of all or any portion of said pipe line shall be-
31 fore being executed be approved by the City Attorney and by the
32 Manager of Operations of said City or such engineer as the City
33 may employ for that purpose.

1 Fourth: (For and in consideration of the sum of One Dollar
2 (\$1.00) per year payable in advance on the first day of each and
3 every January commencing with the first day of January 1920 the City
4 hereby leases, demises and lets unto the said Wm. G. Henshaw and
5 Ed Fletcher for the purpose of constructing ~~and maintaining~~ thereon
6 the pipe line hereinbefore referred to for the term of ten years a
7 strip of land six feet in width over and across the Pueblo Lands of
8 said City) and which said strip so leased is more particularly shown
9 and delineated upon the blueprint hereto attached marked "Exhibit A"
10 as the location of the said pipe line. / The City also agrees that the
11 location of said strip of land shall be marked and staked on the
12 ground by the city engineer and that the said city engineer shall
13 furnish to the parties of the second part all engineering assistance
14 needed by them in the location and construction of said pipe line. /
15 Said City further agrees to procure for said Henshaw and Fletcher
16 free of cost to them, a right of way for said pipe line six feet in
17 width/ with right of ingress and egress thereto over and across any
18 and all land not owned or controlled by said city on the line of
19 said pipe line as shown upon said Exhibit "A".

20 ARTICLE II.

21 The said Wm. G. Henshaw and Ed Fletcher hereby
22 covenant with the said City of San Diego that they will lease said
23 pipe line/when constructed to said city and they do and each of them
24 does by these presents demise and let unto said city the said pipe
25 line/upon the following terms and conditions, to-wit:

26 (a) (The term of this lease shall be for a period of ten
27 years from and after the date when such pipe line/^{and reservoir} shall be completed
28 and the delivery of water therefrom shall begin.)

29 (b) The City hereby covenants and agrees that it will pay
30 to said second parties as rental for said pipe line/^{and reservoir} during the term
31 of this lease the sum of Sixteen Hundred Fifty Dollars per
32 month, payable in advance on the 1st day of each and every month
33 during said term commencing with the day and month when said pipe
line/^{and reservoir} shall have been completed, and the delivery of water therefrom

shall begin, and continuing during the term of this lease.

1 (c) It is further covenanted and agreed that during the
2 term herein provided for and commencing with the time when said pipe
3 and reservoir line/is completed and the delivery of water therefrom begins the
4 city will maintain said pipe line/in good condition and repair at
5 its own expense.

6 (d) That in order promptly to make the payments of rental
7 above specified and provided for the city hereby covenants and agrees
8 that it will by appropriate proceedings establish and maintain a fund
9 to be known as "The La Jolla Pipe Line Fund" from which appropriations
10 shall be made from time to time for such rental payments and that it
11 will at all times while this lease shall be in force and effect keep
12 in said fund sufficient money promptly to make the monthly rental
13 payments hereby required by it to be made.

14 ARTICLE III.

15 (a) For and in consideration of the sum of Twenty-five
16 thousand (\$25,000.00) Dollars to be paid within sixty days from and
17 after the date of the execution of this agreement said Henshaw and
18 Fletcher hereby agree to give and grant and do hereby give and grant
19 to said city the exclusive option to purchase said pipe line/at any
20 time on or before the expiration of the leasehold period of said
21 pipe line at the actual cost of said pipe line/and reservoir to said parties of
22 the second part plus simple interest on such actual cost at the rate
23 of seven per cent per annum on such cost from the date each item of
24 such cost is actually paid out by said second parties. Said second
25 parties hereby further covenant and agree that they will within
26 ninety days after the completion of said pipe line/and reservoir file with the
27 City Clerk of said city a statement of the cost of construction of
28 said pipe line/which statement shall contain an itemized statement
29 of all disbursements made in the construction and completion of said
30 pipe line/and the sum thus ascertained plus interest thereon at the
31 rate of seven per cent per annum on such cost from the date each
32 item of such cost is actually paid out by said second parties.

33 (b) It is further agreed by and between the parties here-
to that in the event that the city shall elect to purchase the said
pipe

and reservoir
line/under the option hereinbefore granted that then and in that
1 event and upon the making of such purchase the city shall be entitled
2 to receive and shall receive credit upon the purchase price for the
3 said sum of Twenty-five thousand (\$25,00.00) Dollars so paid by it
4 for said option plus interest thereon at the rate of seven per cent.
5 per annum from and after the date of such payment.

6 (c) In the event that the city shall not elect to exercise
7 the option to purchase said pipe line ^{and reservoir}/hereinbefore granted to it then
8 and in that event the said city shall be entitled to a credit for the
9 said sum of Twenty-five thousand (\$25,000.00) Dollars so paid by it
10 for said option plus interest at the rate of seven per cent per
11 annum from the date when said payment of Twenty-five thousand(\$25,000)
12 Dollars is made upon the rental so to be paid by it ^{and reservoir} for said pipe line/
13 which said credit shall be applied upon the rentals for the last
14 three years of the term of said lease.

15 (d) It is further covenanted and agreed by and between the
16 parties that in the event the city shall elect to purchase said pipe
17 line ^{and reservoir}/that then and in that event in addition to the said sum of
18 Twenty-five thousand (\$25,000.00) Dollars so paid for the option
19 price as hereinbefore provided the city shall be entitled to have
20 all rentals theretofore paid by it to said Wm. G. Henshaw and
21 Ed Fletcher for the rental of said pipe line ^{and reservoir}/credited upon said
22 purchase price and the city shall only be compelled to pay the
23 difference, if any, between the said sum of Twenty-five thousand
24 (\$25,000.00) plus interest and the rentals theretofore paid by it
25 and the cost of said pipe line ^{and reservoir}/ plus interest as hereinbefore
26 provided.

27 (e) Upon the election of the city to purchase under this
28 option and the payment of the purchase price as hereinbefore pro-
29 vided for the said Wm. G. Henshaw and Ed Fletcher agree by a good
30 and sufficient conveyance to convey to said city the title to said
31 pipe line ^{and reservoir}/and the unexpired term of the lease of the land upon
32 which said pipe line ^{and reservoir}/is constructed, if any therebe, free and
33 clear of all incumbrances.

(f) Said Wm. G. Henshaw and Ed Fletcher further covenant and agree with said city that they will keep said pipe line/during and reservoir the period of construction and also during the leasehold period free from any and all liens of any kind or character whatsoever and that they will neither encumber or suffer to be encumbered or hypothecate said pipe line/and reservoir; provided however that this covenant shall not be construed to prevent the said Wm. G. Henshaw and Ed Fletcher from assigning this contract or pledging any payments to be made hereunder to any bank or banks in the City of San Diego as security for any money advanced or to be advanced by any such bank for the purpose of constructing such pipe line; and reservoir

(g) In the event the city does not elect to purchase said pipe line/and reservoir under the option herein contained then the city agrees upon the expiration of the term herein provided for to surrender possession of said pipe line/and reservoir to the second parties hereto in good condition, wear and tear and damage by the elements alone excepted.

ARTICLE IV.

It is hereby mutually agreed that nothing in this contract is intended to or does impose any liability or debt upon said city for an amount of money equal to the aggregate of all rental payments that are mentioned, specified or provided for herein; but on the contrary the debt or liability created hereby for such rentals is only that which arises from month to month as the said rentals accrue and that all payments to become due hereunder for such rentals can be made by said city from time to time without violating any of the terms or provisions of the Constitution of the State of California or the terms and provisions of the Charter of said City relating to the power of said city to incur liability or debt.

IN WITNESS WHEREOF the said city pursuant to Ordinance of its Common Council duly and regularly adopted has caused this agreement to be executed in its corporate name by its Common Council attested by its City Clerk and the seal of the city to be hereto affixed and the board of Water Commissioners of said City have by

1 Resolution duly and regularly adopted caused this agreement to be
2 executed by its members and attested by its Secretary and said
3 Henshaw and Fletcher have duly executed this agreement the day and
4 year first above written.

5 THE CITY OF SAN DIEGO.

6 (Signed) L. J. Wilde
Mayor

7
8 " Fred A. Heilbron

9 " Don M. Stewart

10
11 " By: Harry Weitzel

12 " John A. Held

13 " Virgilio Bruschi

14
15 Members of Common Council.

16
17 ATTEST:

18 Allen H. Wright
City Clerk

19 Charles E. Sumner

20 Horace B. Day

21
22 Horace Aughe
23 Board of Water Commissioners
of the City of San Diego

24 ATTEST:

25 Luril Palmer
Secretary

26 Parties of the first part

27
28
29 Parties of the second part

30 I hereby approve the form of the foregoing contract this
31 21st day of January, 1920

32 S. J. Higgins
33 City Attorney

E + B

THIS AGREEMENT, made and entered into at San Diego, California, this 26th day of January, 19 20, by and between THE CITY OF SAN DIEGO, a municipal corporation organized and existing under a freeholders' charter, sometimes hereinafter referred to as "The City", or "Said City", acting by and through the Common Council and the Board of Water Commissioners of Said City, first party, and WILLIAM G. HENSHAW, of San Francisco, California, and ED FLETCHER, of San Diego, California, sometimes hereinafter referred to as "Henshaw and Fletcher", or "Said Henshaw and Fletcher", second parties.

WHEREAS, it is provided in Article II, Chapter II, Section 1, Paragraph 29, of the Charter of Said City that the Common Council thereof has power to adopt, enter into and carry out means for securing a supply of water for the use of Said City or its inhabitants, or for irrigation purposes therein and along the line of its water supply; and

WHEREAS, it is provided in Article V, Chapter 1, Section 4, of said Charter of Said City that the Board of Water Commissioners shall have exclusive charge and supervision of the conservation and impounding of water by Said City, and of the water, water rights, water works, water impoundment system, and other properties of Said City used in the development of said water impounding system; and

WHEREAS, due to the growth of Said City in population and industries and the location within and adjacent to Said City by the Federal Government of military, naval and aviation establishments, a greatly increased demand has been made and will continue to be made upon the water system owned and operated by Said City, and by reason of said increased demand the daily consumption of water in Said City and in adjacent communities supplied by Said City greatly exceeds the daily safe net yield of the water system

owned by Said City, thereby causing a present existing shortage of water supply to Said City and to communities, industries and establishments depending for water supply upon said system of Said City; and

WHEREAS, said Common Council and said Board of Water Commissioners, pursuant to powers conferred and duties imposed upon them, as aforesaid, are desirous of immediately providing for an increased water supply to Said City to the end that the present existing shortage of water supply may be partly remedied during the time this agreement is in force; and

WHEREAS, for the purpose of partially relieving said water shortage, temporarily and during the time this agreement is in force, Said Henshaw and Fletcher (upon the understanding and express condition that no part of the water mentioned herein, or delivered and sold hereunder, is hereby or by such delivery and sale dedicated, or intended to be dedicated to the public use or to Said City or to its inhabitants) have offered to deliver as hereinafter stated, and to sell to Said City water in the quantity and of the character hereinafter states; and Said City, for the purposes stated, has accepted said offer.

NOW, THEREFORE, THIS AGREEMENT WITNESSETH:

ARTICLE I.

In consideration of the covenants herein undertaken on the part of The City and the faithful keeping of them by it according to their true intent and purpose, Said Henshaw and Fletcher, jointly and severally, upon their own behalf, and upon behalf of their, and each of their heirs, executors, administrators, and assigns, hereby undertake and agree:

First: That, during the time this agreement is in force, they will sell to Said City the quantity of water which Said City hereinafter agrees to buy at and for the price of ten (10¢) cents per thousand (1,000) gallons, payable as hereinafter stated.

Second: That during said time they will deliver said water to Said City through a Sixteen (16) ^{7 Eighteen} inch wood stave, steel and concrete pipe line, under pressure, at the point marked "Point of delivery" on the blueprint map hereto attached, marked "Exhibit A", hereby referred to and made a part hereof.

Third: That said water so delivered shall be chlorinated at their expense, if the Said City shall so require in writing, and be of such quality as to be certifiable by the Board of Health of the State of California as safe for domestic use; said quality to be determined by samples of said water taken out of said pipe line within the last twenty-five (25) feet of said pipe line and before it reaches said point of delivery.

ARTICLE II.

In consideration of the covenants herein undertaken on the part of Said Henshaw and Fletcher, and the faithful keeping thereof by them according to their true intent and purpose, the Said City agrees:

First: To purchase and receive from Said Henshaw and Fletcher, during the time this agreement is in force and effect, the quantity of water following:

1. During that part of the calendar year 1920 in which this agreement shall be in effect, at least one million (1,000,000) gallons per day of twenty-four (24) hours.

2. During the first six months of the calendar year 1921 at least one million (1,000,000) gallons per such day.

3. During the last six months of the calendar year 1921 and during each calendar year thereafter at least two million (2,000,000) gallons per such day.

Second: To provide and install, and thereafter maintain in good condition and repair, at its own cost and expense and without cost or expense to Said Henshaw and Fletcher, or either of them, at the point of delivery above mentioned, a Ventura meter, or other standard measuring device, of capacity sufficient to measure at least three million (3,000,000) gallons per day of twenty-four (24) hours.

Third: That it will pay for said water at the rate of ten (10¢) cents per one thousand (1,000) gallons and make payment therefor monthly as follows:

1. For each calendar month of the year 1920 during which this agreement shall be in effect, payment shall be made for the total number of gallons of water taken by it during such month as shown by the meter reading hereinafter provided for, unless such total shall be less than an average of one million (1,000,000) gallons per day during such month, in which case payment shall be made for one million (1,000,000) gallons of water for each day of such month regardless of such meter reading.

2. For each of the first six calendar months of the year 1921, payment shall be made for the total number of gallons of water taken by it during such month as shown by said meter reading hereinafter provided for, unless such total shall be less than an average of one million (1,000,000) gallons of water per day during such month, in which case payment shall be made for one million (1,000,000) gallons of water for each day of such month regardless of such meter reading.

3. For each of the last six calendar months of the year 1921, payment shall be made for the total number of gallons of water taken by it during such month as shown by said meter reading, unless such total shall be less than an average of two million (2,000,000) gallons per day during such month.

in which case payment shall be made for two million (2,000,000) gallons of water for each day of such month regardless of such meter reading.

4. For each calendar month in each calendar year after 1921, during which this agreement shall be in effect, payment shall be made for the total number of gallons of water taken by it during such months as shown by said meter reading, unless such total shall be less than an average of two million (2,000,000) gallons per day during such month, in which case payment shall be made for two million (2,000,000) gallons of water for each day of such month regardless of such meter reading.

Said monthly payments will be made promptly upon the presentation by Said Henshaw and Fletcher of statement therefor; said statement to be in the form and said payments to be made in the manner provided for by the provisions of the Freeholders' Charter of Said City; but upon the express understanding and agreement that any amount of water paid for by Said City but not taken by it shall be delivered to it upon written request therefor. But nothing in this contract shall obligate Said Henshaw and Fletcher to deliver to Said City more than three million (3,000,000) gallons of water per day; and nothing in this contract shall be construed as giving The City the right to have delivery of any quantity of water paid for and not taken except within the calendar year that such payments were made.

Fourth: That in order promptly to make the payments above specified it will, by appropriate proceedings, establish and maintain a fund to be known as the Water Purchasing Fund, from which appropriation shall be made from time to time for such payments; and it will at all times while this agreement shall be in force and effect, keep in said fund sufficient money promptly to make the monthly payments hereby required by it to be made.

ARTICLE III.

For the considerations stated it is hereby mutually understood and agreed:

First: That nothing in this contract is intended to, or does, impose any liability or debt upon Said City for an amount of money equal to the aggregate of all payments that are mentioned, specified or provided for herein; but on the contrary the debt or liability created hereby is only that which arises from month to month and from year to year as water is delivered to and taken by Said City pursuant to the terms of this agreement; and that all payments to become due hereunder can be made by Said City from time to time without violating any of the terms or provisions of the constitution of the State of California or the terms or provisions of the Charter of Said City relating to the power of Said City to incur liability or debt.

Second: That the meter or other measuring device hereinbefore mentioned shall be read on the last day of each calendar month during the time this agreement shall be in force and effect by a joint representative of Said City and Said Henshaw and Fletcher, which reading shall be reported in writing by such representative to Said City and Said Henshaw and Fletcher for the purpose of determining finally the amount of water actually delivered to and taken by Said City during said month. If Said City and Said Henshaw and Fletcher cannot agree upon such joint representative he shall be appointed by one of the judges of the Superior Court of the State of California, in and for the County of San Diego. The expense of such representative shall be borne and paid one-half by Said City and one-half by Said Henshaw and Fletcher.

Third: That in the event of any substantial break in, injury to, or destruction of the whole or any part of the water works or system from or through which Said Henshaw and Fletcher deliver the water herein mentioned to Said City, caused by or due to circumstances or occurrences over which Said Henshaw and Fletcher have no control, then and in such event Said Henshaw and Fletcher shall be relieved from all obligations hereunder, unless within five (5) days from such occurrence they, or either of them, shall notify Said City in writing that the necessary repair or reconstruction will be made; and in the event of such notice said obligations shall be suspended for such period of time as in the exercise of reasonable diligence such repair or reconstruction can be made (including said five (5) days), strikes and other causes over which Said Henshaw and Fletcher shall have no control excepted. Further, that an entire depletion or exhaustion of the waters of Lake Hodges reservoir, located on the San Dieguito River in San Diego County, California, by reason of drought shall, during said period of drought, relieve Said Henshaw and Fletcher from their obligations hereunder to deliver water to Said City.

Fourth: That during any period of time in which Said Henshaw and Fletcher are unable to make delivery of water in accordance with the terms hereof by reason of the matters and things specified in the next preceding paragraph hereof The City shall be relieved from all obligations hereunder to pay for water during such period; and should there be a diminution in the supply or flow of water by reason whereof Said Henshaw and Fletcher are not able to deliver the minimum quantity of water herein specified, then during any such period of such diminution The City shall only be obligated to pay for the quantity

of water actually delivered to it as shown by the meter reading.

Fifth: That in the event The City shall fail promptly to pay for water delivered to it hereunder at the rate and at the time hereinbefore stated and such default shall continue for a period of sixty (60) days after the time when such payment shall become due hereunder, Said Henshaw and Fletcher, or either of them in case of inability of the other to act, shall have the right if they, or either of them in case of disability of the other to act, so elect, to terminate this agreement and to discontinue further delivery of water hereunder without incurring any liability to The City or any resident or inhabitant thereof on account of such termination of this agreement; but it is expressly understood and agreed that nothing in this paragraph of this agreement shall in any wise operate to deprive Said Henshaw and Fletcher, or either of them, of any right they may have against The City on account of such default on its part. A waiver or failure to take advantage of any one such default on the part of The City by Said Henshaw and Fletcher, or either of them, shall not be construed as a waiver of any such default subsequently occurring.

Sixth: That this agreement is not intended to, does not, and shall not be construed as in any wise dedicating said quantity of water, or any part thereof, to the public use, to Said City or to its inhabitants, or to in any wise limit the right of Said Henshaw and Fletcher, or either of them, to deal with others and dispose of said water, in any way they see fit, upon any termination of this agreement.

Seventh: That if Said City shall so elect it shall have the right to purchase of Said Henshaw and

Fletcher, during the time this agreement is in force and effect, such quantity of water in addition to that hereinbefore mentioned as will make a maximum amount of three million (3,000,000) gallons per day, at the rate of ten (10¢) cents per thousand gallons, provided that Said City shall give to Said Henshaw and Fletcher a ten (10) days' notice in writing of its intention to take such additional water, which writing shall state that Said City desires an additional quantity of water within the limits above stated, delivered through said pipe line at the point of delivery hereinbefore mentioned, under the terms of this agreement.

Eighth: That Said Henshaw and Fletcher shall not be liable for any damage or loss which The City or any resident or inhabitant thereof shall sustain by reason of the stoppage or diminution in the supply or flow of water caused by any break in, injury to, or destruction of any part of said pipe line not occasioned by their own negligence, or for any stoppage or diminution in the supply of water agreed to be furnished under this contract occasioned by drought or failure of the water supply from which said water is derived, or by earthquake or action of the elements, or any other cause of whatsoever kind or nature not preventable by Said Henshaw and Fletcher by the exercise on their part of reasonable care.

Ninth: That to enable The City to equalize the distribution and use of the water taken by it hereunder in accordance with the current necessities of The City, it is agreed that if during the first ten months of any calendar year beginning with January 1, 1922, while this agreement shall be in effect, The City shall have paid for not less than six hundred sixty-nine million (669,000,000) gallons of water, then and in such event,

The City, for and during the last two months of such calendar year, shall be required and obligated to pay only for the total number of gallons of water taken by it during each of said months as shown by said meter reading, unless such total shall be less than an average of one million (1,000,000) gallons of water per day, in which case payment shall be made by Said City for one million (1,000,000) gallons of water for each day of such month regardless of said meter reading; it being expressly understood and agreed that The City shall pay for at least seven hundred thirty million (730,000,000) gallons of water during such calendar year, regardless of the total quantity of water taken by it during such year as shown by said meter readings; and also for whatever quantity it shall take in excess of said minimum within the limits hereinbefore stated.

Tenth: That this agreement shall be in force and effect from and after the date of the completion and acceptance by Said City of a pipe line extending from that section of the City of San Diego commonly known as La Jolla to the point of delivery hereinbefore mentioned, pursuant to the terms of a contract between the parties hereto of even date herewith, and not before.

Eleventh: That unless sooner terminated as hereinbefore provided, this agreement shall be and remain in force and effect for a period of ten (10) years from and after the date at which delivery of water hereunder shall begin.

Twelfth: That this agreement shall apply, bind and inure to the benefit of successors, heirs and assigns hereof, as the case may be.

IN WITNESS WHEREOF, The City pursuant to a

Ordinance
resolution of its Common Council, duly and regularly
adopted, has caused this agreement to be executed in
its corporate name by its Common Council and its Mayor,
attested by its City Clerk, and the seal of The City to
be hereunto affixed, and the Board of Water Commissioners
of Said City have by resolution duly and regularly adopted
caused this agreement to be executed by its members and
attested by its secretary, and Said Henshaw and Fletcher
have duly executed this agreement the day and year first
above written.

THE CITY OF SAN DIEGO

Fred A. Heilbron

BY:

Don M. Stewart

L. J. Wilde
As its Mayor.

By:

Harry K. Weitzel

Jno. A. Held

Virgilio Bruschi
Members of Common Council.

ATTEST:

Allen H. Wright
City Clerk

Charles E. Sumner

Horace B. Day

ATTEST:

Luril Palmer
Secretary.

Horace Aughe
Board of Water Commissioners
of the City of San Diego.

Parties of the first part.

Parties of the second part.

I hereby approve the form of the foregoing contract this
21st day of January, 1920.

S. J. Higgins
City Attorney

B O N D.

KNOW ALL MEN BY THESE PRESENTS, That we, WM. G. HENSHAW, of San Francisco, California, and EDW FLETCHER, of San Diego, California, as principals, and M.T. Gilmore and A.P. Johnson, Jr., residents of San Diego California, State of California, are jointly and severally bound unto THE CITY OF SAN DIEGO, a municipal corporation in the County of San Diego, State of California, in the sum of FIVE THOUSAND DOLLARS . (\$5000.00), lawful money of the United STATES of America, to be paid to said The City of San Diego, for the payment of which, well and truly to be made, we hereby bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

Signed by us and dated this 26th day of January, 1920.

THE CONDITION OF THE ABOVE AND FOREGOING OBLIGATION IS SUCH THAT WHEREAS, the said principals have entered into the annexed contract with The City of San Diego, to construct a sixteen-inch wood stave, steel and concrete pipe, line commencing at a point marked "Point of delivery" on the blueprint map attached to said contract and marked " Exhibit A", and terminating at a point marked "Point of termination " on said blueprint map hereinbefore referred to, all as more particularly and in detail set forth in the contract annexed hereto, which said contract is dated the 26th day of January, 1920; said contract , together with the exhibits attached thereto, being " Exhibit A" and "Exhibit B", respectively, comprising fourteen (14) sheets; and reference is hereby made to such contract and to the exhibits attached thereto for a more particular description of the terms of said contract, and the work to be done thereunder.

NOW, THEREFORE, IF said principals shall faithfully per-

Construct

form the said contract, then the above obligation is to be void, otherwise to remain in full force and effect.

IN WITNESS WHEREOF, the said principals and sureties have hereunto subscribed their names the day and year first hereinabove written.

Wm. G. Henshaw

Ed. Fletcher.

Principals

M. T. Gilmore

A. P. Johnson, Jr.

Sureties.

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

On this 19th day of February, A.D. 1920, before me H.E.Crane, a Notary Public, in and for the said County of San Diego, State of California, residing therein, duly commissioned and sworn , personally appeared M.T. Gilmore and A.P. Johnson, Jr. personally known to me to be the persons whose names are subscribed to the within Instrument, and they duly acknowledged to me that they executed the same.

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

H.E.Crane

Notary Public, in and for the County of San Diego, State of California,.
My commission expires _____

(SEAL)

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

M.T. Gilmore and A.P. Johnson, Jr.

sureties in the within undertaking, being duly sworn, say, each for himself, and not ~~for~~ one for the other, that he is worth the sum ~~xxx~~ specified in said undertaking, over and above all his just debts and liabilities (exclusive of property exempt from execution), and that he is a resident within the State of California and a free- holder there in.

M.T. Gilmore

A.P. Johnson, Jr.

Subscribed and sworn to before me
this 19th day of February, 1920.

H.E. Crane
Notary Public, in and for San Diego
County, State of California.

(SEAL)

I hereby approve the form of the within bond , this 19th
day of February, 1920.

S.J. Higgins
City Attorney of the City of San Diego
By _____
Deputy City Attorney

Approved by a majority of the members of the Common Council
of the City of San Diego, California this 11th day of March, 1920.

Harry K. Weitzel.
Jno. A. Held
Vir^{gil} J. Dio Bruschi
Don M. Stewart
Fred M. Hullin^{eilbray}
Members of the Common Council.

a = Area of x section of channel in feet

p = Wetted perimeter or length of wetted border of cross section of channel in feet

$R = \frac{a}{p}$ = Mean hydraulic Radius

S = slope

n = Coefficient of Roughness
Kutter Formula

C = Coefficient in Chezy formula

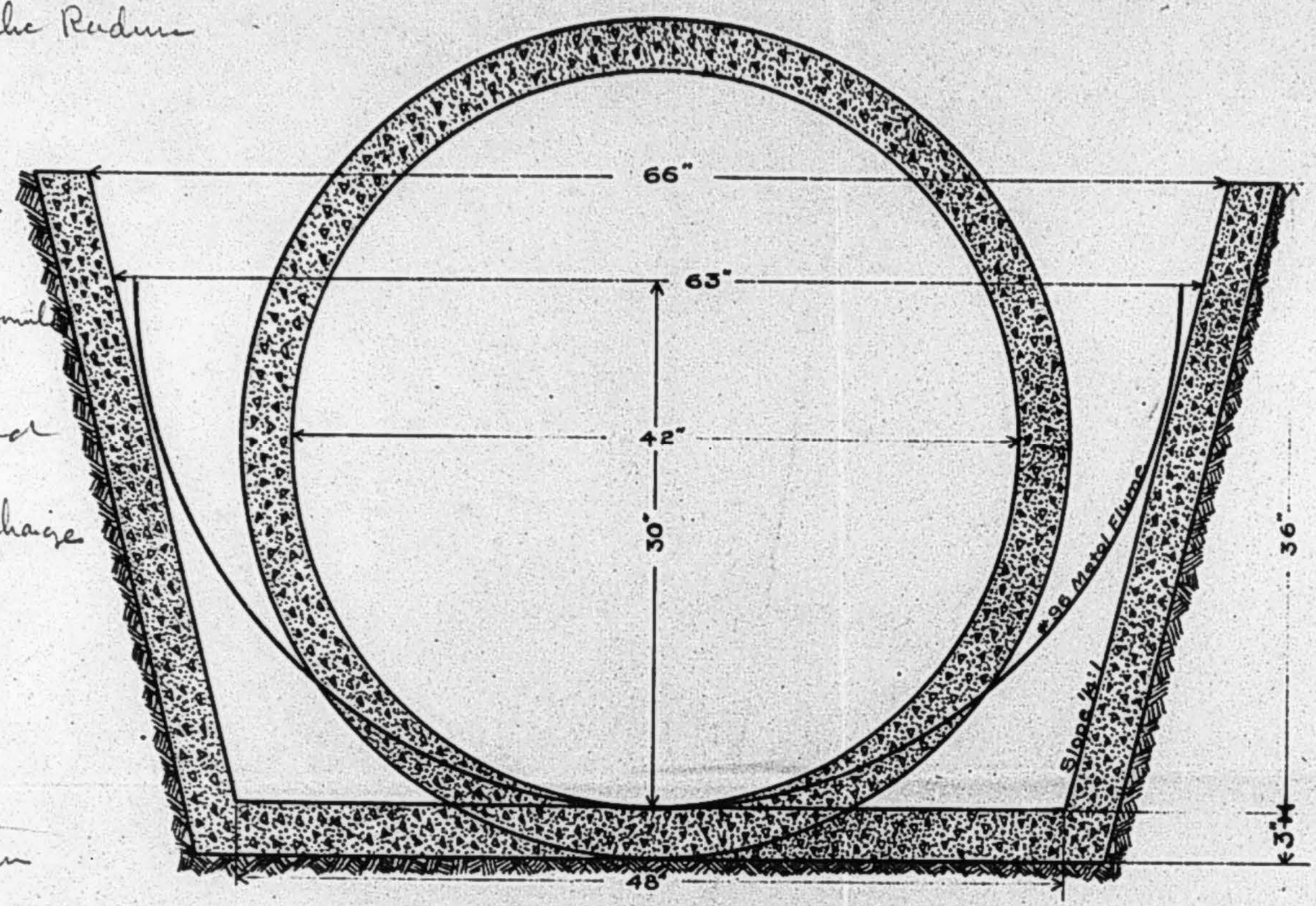
V = mean velocity in feet per second

$Q = aV$ = Total discharge in second feet

$V = C \sqrt{RS}$

get value of C from table using value of n at .012 selecting nearest value for R

Interpolate for S if necessary



Conduit
(With 6" Free Board)

- $S = .00045$
- $n = .012$
- $A = 11.56$
- $P = 9.17$
- $R = 1.26$
- $C = 132$
- $V = 3.14$
- $D = 36.30$



Metal Flume
(Total Capacity)

- $S =$
- $n =$
- $A =$
- $P =$
- $R =$
- $C =$
- $V =$
- $D =$



42" Concrete Pipe
(Total Capacity)

- $S = .001$
- $n = .012$
- $A = 9.62$
- $P = 11.0$
- $R = 0.874$
- $C = 124$
- $V = 3.67$
- $D = 35.31$



SAN DIEGUITO MUTUAL WATER CO.
RELATION AND CAPACITY
OF
CONCRETE CONDUIT, METAL FLUME
AND
CONCRETE PIPE.
SCALE 1 IN = 10 IN

REFERENCE MAP _____ E.W. CASE CHIEF ENGR
FIELD BOOK NO _____ DATE July 1917

DRAWN BY W.D.M.F. & Z.R. DRAWING NO. 209
CHECKED BY _____ FILE NO. S 2

Ed Fletcher Papers

1870-1955

MSS.81

Box: 48 Folder: 12

**Business Records - Water Companies - Volcan
Land and Water Company - San Dieguito System
- Santa Fe Land Improvement Company/
Santa Fe Irrigation District - La Jolla Pipeline**



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