

**REVISED REPORT
AND ESTIMATES**

**OF
INTERCEPTING SEWAGE SYSTEM
AND SEWAGE PUMPING PLANTS
FOR THE CITY OF SAN DIEGO.**

JANUARY 1933.

By

**CHARLES G. FRISBIE
CONSULTING ENGINEER.**

Document No. 281095
FILED FEB 9 1933
By ALLEN H. WRIGHT City Clerk
FRED W. SICK Deputy

REVISED
REPORT
ON
A SEWERAGE COLLECTION SYSTEM
FOR
THE CITY OF SAN DIEGO
INCLUDING
SPECIFICATIONS
AND
DETAILED ESTIMATE OF COST
BY
CHAS. G. FRISBIE.
Consulting Engineer.

JANUARY, 1933.

CHAS. G. FRISBIE
CONSULTING ENGINEER
1201 HIBERNIAN BUILDING
LOS ANGELES, CALIFORNIA
METROPOLITAN 1618

January 16, 1935.

City Manager,
City of San Diego,
San Diego, California.

Dear Sir:

In compliance with the terms of the contract, entered into January 2, 1931, by the Council of the City of San Diego providing for a study and compilation of plans and specifications and estimates for a sewerage collection system for the City of San Diego, I am herewith submitting the final revised and corrected plans, specifications, estimates, and report called for under the above contract.

Respectfully,


CHAS. G. FRISBIE.

GGF/MP.

**SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO**

PUMPING PLANT ESTIMATE

PUMPING PLANT NO. 13- KURTZ & HORTENSIA STS.

Excavation-		1530 Cu.yds.	@\$4.00	\$ 6,120.00
	Sinking the caisson			4,500.00
	Pumping cost			300.00
	Cutting edge			200.00
	Guide piles and driving			175.00
	Backfill	200 Cu.yds.	" 0.50	100.00
Concrete-	Bottom	4864 Cu.yds.	" 0.40	1,946.00
	Exterior walls	2284 Sq.ft. 20"	" 1.27	2,901.00
	" "	572 " " 2'2" av"	1.45	829.00
	Partition wall	909 " " 18"	" 1.00	909.00
Slabs-	Balcony	160 Sq.ft. 6"	" 0.38	61.00
	Roof	1170 " " 13 1/2"	" 0.69	807.00
Shafts above roof-				
	1- 24" diam. #693-	5 Lin.ft.	" 2.50	13.00
	(M.H. shaft)			
	Walls for shaft	140 Sq.ft. 10"	" 0.63	88.00
	(426)			
	Walls for shaft	90 Sq.ft. 8"	" 0.58	52.00
	(3'9" x 2'5")			
	Walls for shaft	88 Sq.ft. 8"	" 0.58	51.00
	(3'8 1/2" x 3'8 1/2")			
Pump foundations		65 Cu.ft.	" 0.40	26.00
Floatwell		32 " "	" 0.40	13.00
Haunch under balcony floor		31 Lin.ft.	" 0.75	23.00
Columns-	2-Col.No.1 triangular	48 Lin.ft.	" 2.10	101.00
	2- Co.No.2 1.5'x1.5'	48 " "	" 2.35	113.00
	2- Col.No.4 horizontal	32 " "	" 2.25	72.00
Beams-	Floor beams #1-12"x12"	12 Lin.ft.	" 0.87	10.00
	" " #2-12"x12"	8 " "	" 0.87	7.00
	2- vert.beams 24"x24"	51 " "	" 3.07	157.00
	2-roof beams #1	21 " "	" 2.05	43.00
	2'x1.5'			

NEW ING PLANT NO. 13- KURTZ & HORTANVIA STS. continued.

2	Roof beams #2- 2"x1.5"	20 Lin.ft.	@ \$2.05	\$ 50.00
2	" " #3- 2'4"x1'9"	28 " "	" 2.65	74.00
2	" " #4- 2'4"x1'6"	24 " "	" 2.34	56.00
2	" " #5- 2'x1'6"	8 " "	" 2.05	16.00
2	" " #6- 1'x1'6"	12 " "	" 1.16	14.00
1	" " #7- 1'x1'6"	8 " "	" 1.16	9.00
1	" " #8A - 8'x1'6"	6 " "	" 0.94	6.00
1	" " #8B - 8'x1'6"	6 " "	" 0.94	6.00
Iron and steel-				
	Spiral staircase - steel			200.00
	Steel ladder	17 Lin.ft.	" 1.50	26.00
	Balcony railing	30 " "	" 2.00	60.00
	1- R.H.P & C. 24" diam. #69B		" 15.00	15.00
	1-rectangular 2'5"x3'5"		" 75.00	75.00
	1- rectangular 4'0"x6'0" Machinery shaft cover			155.00
	1- rectangular 3'0"x3'0"			125.00
	Walk over wet pit	51 Lin.ft.		245.00
	Grates over sump			308.00
	Steps			10.00
	Miscellaneous iron and steel			25.00
	Expansion joints- asphalt & copper strip-			
		50 Lin.ft.	@ 0.75	38.00
	Finishing and painting concrete			325.00
	Plant charges			2,470.00
	Incidentals			2,500.00
	Liability insurance \$2,000 @ \$6.25 per \$100			500.00
	Bond			510.00
	Engineering, profit, overhead and contingencies 30%			27,527.00
				2,252.00
				35,785.00
	Pumps, electrical equipment, pipes and fittings			12,942.00
	TOTAL			48,727.00

**SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO**

PUMPING PLANT ESTIMATE

PUMPING PLANT NO. 14-

Excavation- Dry	700 cu.yds.	@ \$1.25	\$ 675.00
Wet	1813 " "	" " 4.00	7,252.00
Sinking the caisson			5,750.00
Pumping cost			450.00
Guide piles and driving			200.00
Cutting edge			250.00
Backfill - 325 cu.yds.		@ 0.50	163.00
Concrete-			
Bottom	6150 Cu.ft.	" 0.40	2,460.00
Exterior wall - 20"	3662 Sq.ft.	" 1.27	4,651.00
" " 27"	869. " "	" 1.49	1,295.00
Partition " 27"	1320 " "	" 1.49	1,967.00
Concrete ring for cutting edge included under cutting edge.			
Haunch under motor room	58 Lin.ft.	1.75	102.00
Slabs-			
Motor room floor - 10"	541 Sq.ft.	" 0.56	303.00
Roof slab- 13½"	1423 " "	" 0.69	982.00
Shafts above roof-			
1- 24" diam. 5"	6 Lin.ft.	2.50	15.00
1- 4.5'x6.5' - 10"	155 Sq.ft.	0.63	98.00
1-3.75'x 2.42' - 8"	61 " "	0.58	35.00
1-3.72'x3.72' - 8"	99 " "	0.58	57.00
Beams-			
2- Floor #1-1.5'x1'	22 Lin.ft.	1.16	26.00
2- " #2-1.5'x1'	22 " "	1.16	26.00
2- " #7- 2'x2'	28 " "	2.86	80.00
2- Roof #1- 2'x2.75'	35 " "	3.83	126.00
1- " #2- " "	19 " "	3.83	73.00
2- " #3- 1'x1.5'	22 " "	1.16	26.00
2- " #4- 1'x1'	16 " "	0.87	14.00
2- " #5- 1'x1.5'	22 " "	1.16	26.00
2- " #6- 2'x2.75'	28 " "	3.83	107.00
Columns-			
2- Col. #2- 2'x2'	70 Lin.ft.	3.40	238.00
2- " #1- 2'x2.4'	70 " "	4.03	282.00

PUMPING PLANT NO.14- continued.

Iron and steel-

Steel ladder	84 Lin.ft. @ \$1.50	\$ 126.00
1- M.H.P&C -24" diam. #69B		15.00
1- Rectangular M.H.P&C- 2'5" x 3'9"		75.00
1- " " 3'8 1/2" x 3'8 1/2"		125.00
1- " machinery shaft cover 4'6" x 6'6"		165.00
Walk over wet pit	33 Lin.ft.	260.00
Sump grates		330.00
Floor grates		56.00
Miscellaneous iron and steel		35.00
Expansion joints	70 Lin.ft. @ \$0.75	53.00
Finishing and painting concrete		450.00
Plant charges		2,675.00
Incidentals		3,200.00
Liability insurance \$11,000 @ \$6.25 per \$100		688.00
Bond		675.00
		<u>56,857.00</u>
Engineering, profit, overhead and contingencies 30%		11,057.00
		<u>47,914.00</u>
Pumps, electrical equipment, pipes and fittings		<u>80,153.00</u>
	TOTAL	68,067.00

INTRODUCTION:

The Council of the City of San Diego, on January 2, 1931, entered into a contract calling for studies, surveys, profiles, plans and specifications for a sewerage collection system for the City of San Diego. By a resolution of the Council at a later date I was named as the engineer to perform the work called for in the contract mentioned.

The contract of January 2, 1931 required that the work be completed within one year, but before the expiration of the year an expansion of forty-five days was requested by me and granted by the Council.

The contract required that the work to be done should be approved by the Manager before the same should be accepted by the City.

We realized that for the Manager to approve the sewerage collection plans it would be necessary for him and the City Engineer's office to keep in close contact with the work and the general scheme as it was evolved, and have consulted with these departments throughout the work.

We have had splendid and intelligent co-operation on the part of the City Manager, the City Planning Engineer and the City Engineer's office and we believe that their interest and advice in making fundamental decisions and in checking the work as it progressed has been conducive to a better general plan and consequently advantageous to the City of San Diego.

PRESENT CONDITIONS:

The sewerage of La Jolla, Pacific Beach, Point Loma, Ocean Beach, Mission Beach and San Diego at the present time flows into the Pacific Ocean and San Diego Bay through numerous outfall sewers. The untreated sewerage flowing into the ocean and the bay is objectionable and unsanitary and tends to pollute the beaches and the waters of San Diego Bay.

PURPOSE OF PLANS:

The fundamental purpose of these studies and plans is to provide San Diego and its suburbs with a sewerage collection system that will adequately provide for future growth and will concentrate the sewerage at the most feasible locations for present treatment, thus eliminating the objectionable features now existing.

EXISTING RECORDS:

Thousands of maps, profiles and plans of existing sewers, tanks, sewerage pumping plants, streets and apartment structures are on file in the City Engineer's office.

Many maps and records pertaining to population, type of buildings and city growth are on file in the office of the City Planning Commission compiled under the direction of the City Planning Engineer.

COMPILATION OF RECORDS:

All of the above records have been scanned and wherever found of value to these studies prints have been made or the data copied or transferred to other maps. All the existing sewers in San Diego were transferred to large maps on a scale of 400 feet to the inch. These maps showed the size of pipes, elevation of inverts, location of manholes and street grades wherever such data was necessary in making the studies for design. Copies of these maps have been filed with the City Engineer's office.

The entire area from which sewerage was to be collected was divided into drainage areas and these areas transferred to tracing paper. These areas were laid over the maps of the City Planning Commission and the various buildings of different types counted and recorded on each area and these tracings have been filed with the City Engineer's office.

Prints of street plans, sewer plans and profiles were obtained in all of the areas where such detail was necessary.

SURVEYS:

Over many sections where the construction of intercepting sewers would be necessary no street plans or profiles were available, which necessitated surveys over these lines.

GAGE READINGS:

At a number of points on existing sewers gage readings of the twenty-four hour flow were obtained, and later these readings combined with the data on population contributing to the flow plotted on curves and tabulated. These curves and tabulations are shown on Exhibits Nos. 1, 2, 3, 4 and 5 attached hereto.

POPULATION:

The population of San Diego has increased as a whole 100% each ten years for the period between 1910 and 1930. The rate of growth over the entire area has not been uniform. In some sections the growth has not been over 50% in a ten year period while in some areas the growth was over 500%.

The population indicated by the census in some areas is less than the actual population that will be contributing sewerage on account of the floating population not included in the census count. This floating population consists of local people who stay

at the beaches over week ends and during summer months and of non-residents who live in San Diego during only a portion of each year. On account of the disparity between the actual people living in a particular area at some season of the year and that indicated by the census count, the buildings in each drainage area were counted and the maximum density of population for any season of the year for the corresponding area calculated from these counts.

CITY GROWTH:

A careful study of the present density of population was made in each drainage area and an estimate made of the probable future growth for the next 30 years so that adequate capacity would be provided in the design of the collection sewers. The rate of growth for the future in different sections of the city would vary, dependant upon the present density of population, the nature of improvements, the topography and the desirability of the various areas for residential or business purposes. The tabulation of present population, density, future population and density with the total population that will be contributing sewerage at any point on the collection lines have been filed with the City Engineer's office.

PROVISION FOR FUTURE GROWTH:

The collection sewers and pumping plants have been designed of a capacity ample for the growth of the city for the next 30 years.

DESIGN:

The design of sewers is based on an average daily flow of 75 gallons of sewerage per capita, a minimum flow rate of 37.5 gallons, and a maximum flow rate of 126 gallons per capita daily. The sewers are designed of sufficient size to carry the maximum flow that would occur 30 years hence, The hydraulic data used in the design is embodied in the curves attached hereto and shown in Exhibits Nos. 1 to 32 inclusive.

GENERAL PLAN:

The general plan of sewerage collection for the various sections of the City is as outlined below:

LA JOLLA AND PACIFIC BEACH:

A collection sewer to intercept all possible existing and future sewer lines has been located running from the north portion of La Jolla to the lower end of Horse Canyon. All of the sewerage from the lower areas along the coast and just north of La Jolla is to be pumped into the main collection line by a series of 7 sewage pumps. Five of these pumping plants will be new plants and two will be existing plants with a few changes.

POINT LOMA, OCEAN BEACH, MISSION BEACH:

A collection sewer is located along the west side of Point Loma through Ocean Beach to a point near the San Diego River northwest of Old San Diego where the sewer is to discharge into the main collection sewer running to the proposed disposal plant at the foot of 32nd Street. The sewerage from Mission Beach and from the low portion of Ocean Beach is to be pumped into the interceptor by 2 pumping plants which are existing plants and which will require some change of equipment and remodeling to meet the new conditions.

The remaining portion of Point Loma on the east slope is to be served by a collection sewer located along the east side of the peninsula and thence northeasterly to a point on the main collection sewer about 3000 feet southeasterly from the point where the West Point Loma and Mission Beach lines are to enter the same. The area that is too low to be served by gravity flows into two pumping plants from which the sewerage is to be pumped into the collection sewer. One of these pumping plants is an existing plant that can be utilized with slight modification and the other is to be a new plant.

ROMERO:

The area northeast of the San Diego River and north of Old San Diego is to be served by a short collection sewer that discharges into the main lines about 1000 feet southeasterly from the most northeasterly end thereof.

MIS ION VALLEY:

All of the Mission Valley south of the San Diego River and the residential area sloping north toward Mission Valley are to be served by a collection sewer that starts from a

point just north of La Mesa Colony and discharges into the main collection sewer at a point just northwest of Old San Diego.

OLD SAN DIEGO AND SAN DIEGO:

A large sewer main is to be located along the bay and runs in a southeasterly direction to the foot of 32nd Street. This line is to convey all of the sewerage from Point Loma, Mission Beach, Ocean Beach, Mission Valley, Old San Diego and the main portion of the City of San Diego to a proposed treatment plant near the Destroyer Base at the foot of 32nd Street. Two pumping plants are to be located in this line to lift the sewerage to an elevation sufficient to get a proper grade.

One sub-main about a mile long will be brought in to the main just south of the last pumping plant to intercept several of the higher existing sewers and to eliminate as much pumping as possible.

CHOLLAS VALLEY AND SOUTH CHOLLAS VALLEY:

A collection main is to be constructed from the east boundary of San Diego in a southwesterly direction down the Chollas Valley to the foot of 32nd Street. A branch line about 4 miles long comes into the main Chollas Valley line in the vicinity of 40th Street. This branch line will serve the drainage area just north of the Chollas Valley.

Another main sewer is to be constructed down the South Chollas Valley to serve the area drained into that valley.

The general locations of all these collection lines, pumping plants and sites for treatment are shown on the topographic map attached hereto as Exhibit "A".

PLANS:

Plans of all the sewer lines, pumping plants and appurtenant structures have been made on standard sheets and filed with the City Manager.

ESTIMATES:

Careful estimates have been made of the costs of the various sewer collection lines, the pumping plants, the pressure lines and the appurtenant structures. Several studies were made of different plans of sewerage collection and treatment of certain portions of the sewage at different points and the comparative costs considered in deciding on the plan adopted. The estimates and comparative costs are shown in appendix 1.

STUDIES FOR ALTERNATE PLANS:

A plan for collecting for treatment all of the sewage from Point Loma, Mission Beach, Ocean Beach, Moreno, Mission Valley and Old San Diego to a site about one mile northwest of Old San Diego was given consideration. This site for treatment would not be far removed from a large high class residential area and would be in the path of the prevailing winds. This plan was compared with the plan of carrying the sewage from the above areas to the proposed treatment plant site at the foot of 32nd Street.

The 32nd Street Treatment Plant site is far removed from any desirable residential areas, is located where the prevailing winds will blow away from the city and is preferable in every respect as a treatment site, if the costs of the latter plan would not exceed the former by an excessive amount.

These two plans for the purpose of discussion and comparison and comparative estimates we shall designate as Plan No. 1 and Plan No. 2.

Under Plan No. 1 the location of the treatment site is not so desirable as Plan No. 2, the investment cost in treatment plant per million gallons daily capacity is greater and the cost of treatment per million gallons will be greater than would obtain under Plan No. 2, but the investment cost in pipe lines and the cost of pumping will be less under Plan No. 1 than under Plan No. 2. The advantages and disadvantages of the two plans, so far as cost is concerned, fairly well offset one another with the advantage of location very decidedly in favor of No. 2 Plan which latter plan was adopted.

For the comparative costs under Plan No. 1 and Plan No. 2 see Estimate No. 30 in Appendix No. 1.

A plan for running another line above the C-1 Low Line through the main part of San Diego was given consideration. This higher line would be costly and its construction through the main part of San Diego undesirable, but it would eliminate some pumping at Pumping Plant No. 14. However the added cost of pumping is more than offset by the interest and amortization on the added investment of the higher line.

The plan of intercepting the sewage in the higher line we shall call Plan No. 3 and that of permitting the sewage to flow to C-1 Low Line to be lifted by Pumping Plant No. 14 we shall call Plan No. 4. For the comparative costs under Plan No. 3 and Plan No. 4 see Estimate No. 31, Appendix No. 1. It was finally decided to have a short higher line that would be only about a mile long and would not pass through the main part of San Diego but that would intercept most of the sewage without pumping.

I herewith submit the above report with the accompanying data, plans, specifications and estimates.


Consulting Engineer.

APPENDIX NO. 1.

COST ESTIMATES

COMPARATIVE COSTS

BETWEEN PLANS NOS. 1 AND 2.

AND

BETWEEN PLANS NOS. 3 AND 4.

**SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO**

SUMMARY OF LENGTHS OF PIPE:

1,232.93	Ft.	6"	V.C. pipe
12,883.70	"	8"	" "
41,832.32	"	10"	" "
26,763.49	"	12"	" "
44,747.00	"	15"	" "
29,633.04	"	18"	" "
23,829.83	"	21"	" "
39,801.48	"	24"	" "
26,215.70	"	27"	R.C.
7,423.98	"	30"	" "
1,853.56	"	33"	" "
784.40	"	36"	" "
2,603.21	"	39"	" "
3,817.82	"	42"	" "
14,154.18	"	45"	" "
7,151.51	"	51"	" "
9,012.23	"	63"	" "
8,494.34	"	66"	" "
2,112.90	"	75"	" "
1,811.14	"	4"	C.I.
240.28	"	6"	" "
3,815.46	"	8"	" "
6,244.05	"	10"	" "
36.00	"	12"	" "
4,321.76	"	14"	" "
60.00	"	15"	" "
582.00	"	16"	" "
37.16	"	18"	" "
46.70	"	20"	" "
252.00	"	21"	" "
48.00	"	24"	" "
684.64	"	27"	" "
350.82	"	30"	" "
30.63	"	42"	" "

322,913.06 Total Lin.ft. or 61.158 Miles.

.320 Lin.ft. of double barrellled siphon each 45" diam.
258 " " " " " " " " " " 30" "

NOTE: Lengths of Siphon include inlets and outlets.

ESTIMATES

SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO

RE-CAPITULATION

LA JOLLA & PACIFIC BEACH "A"- 1 LINE.

Pipe lines and appurtenant structures	\$220,081.25
Pumping plants- new- Nos. 1,2,3,4&5	27,808.00
Pumping plants - existing - Nos. 6&7	2,792.00
Removing portion of concrete and filling some existing tanks.	1,000.00
	<hr/>
	\$251,681.25

POINT LOMA, MISSION BEACH,
OCEAN BEACH, EAST POINT LOMA.

Pipe lines and appurtenant structures B-1 Line	\$197,248.99
Pipe lines and appurtenant structures B-2 Line	145,118.14
Pumping Plant Nos. 9&10 to B-1 Line	4,881.00
Pumping plant Nos. 11&12 to B-2 Line	6,441.00
	<hr/>
	\$351,623.13

MORENO LINE- B-3 LINE.

Pipe line and appurtenant structures	\$ 51,247.67
--------------------------------------	--------------

MISSION VALLEY LINES- B-3 LINE.

Pipe lines and appurtenant structures	\$279,893.97
---------------------------------------	--------------

CHOLLAS VALLEY LINE- C-2 LINE.

Pipe lines and appurtenant structures:	
Main Line	\$176,509.52
West Branch	39,973.91
	<hr/>
	\$216,483.43

SOUTH CHOLLAS VALLEY LINE- C-3 LINE.

Pipe lines and appurtenant structures	\$107,695.82
---------------------------------------	--------------

MAIN LINE- OLD TOWN AND SAN DIEGO
TO PUMP NO. 14- G-I LOW LINE.

Pipe lines and appurtenant structures	\$637,041.50
Pumping Plants Nos. 13&14	116,794.00
	<hr/>
	\$753,835.50

STUB LINE TO LOW LINE
BEARDSLEY STREET

Pipe line and appurtenant structures	\$ 5,697.92
--------------------------------------	-------------

MAIN HIGH LINE BRANCH
TO CE HIGH LINE BELOW
PUMPING PLANT NO.14.

Pipe line and appurtenant structures	\$ 42,700.72
--------------------------------------	--------------

MAIN TRUNK LINE FROM
PUMP NO. 14 TO SEND ST.
SEWERAGE TREATMENT PLANT.

Pipe line and appurtenant structures	\$294,644.24
--------------------------------------	--------------

STUB LINE DIRECT TO
SEND ST. TREATMENT PLANT.

Pipe line and appurtenant structures	<hr/> \$ 17,379.96
--------------------------------------	--------------------

Total cost of sewerage collection system	\$2,572,285.61
--	----------------

ESTIMATED COST TREATMENT PLANTS:

Rose Canyon-			
1932 capacity	850,000	g.d.	\$145,000.00
1962 "	3,500,000	"	306,000.00
			<hr/> \$ 306,000.00

32nd. Street plant-			
1932 capacity	12,000,000	g.d.	\$750,000.00
1962 "	40,000,000	"	2,000,000.00
			<hr/> \$2,000,000.00

Total cost collection system & Treatment plants	\$4,678,285.61
---	----------------

ESTIMATE NO. 30.

POINT LOMA, MISSION BEACH, OCEAN BEACH, MISSION VALLEY,
MORENO, OLD TOWN, SEWAGE- COMPARATIVE COSTS.

<u>ITEM.</u>	<u>PLAN NO.1</u> <u>Sewage to N.</u> <u>of Old Town.</u>	<u>PLAN NO.2.</u> <u>Sewage to</u> <u>32nd. Street.</u>
B-4 Line	\$ 93,314.00	-----
B-5 Line	46,000.00	\$ 51,248.00
C-1 Low	352,500.00	637,041.00
C-1 High below Pump #14	302,562.00	294,844.00
Pump #13	6,500.00	48,727.00
Pump #14	63,500.00	68,087.00
Pumps operating cost, capitalized	-----	84,100.00
Treatment plant cost	282,750.00	195,000.00
Treatment plant cost, capitalized	504,784.00	299,100.00
Total comparative costs	\$ 1,651,910.00	\$ 1,678,127.00

NOTE: All items that have no bearing on the comparative costs are omitted.

ESTIMATE NO. 31.

COMPARATIVE COSTS

BETWEEN PLANS NOS. 3 AND 4.

<u>ITEM.</u>	<u>PLAN NO.3.</u> Intercepting part with C-1- High Line.	<u>PLAN NO.4.</u> Sewage dropped into C-1- Low Line.
C-1 Low Line	\$ 560,250.00	\$ 637,041.00
C-1 High Line	221,194.00	42,700.00
Pump No. 14	63,000.00	68,067.00
Pump operating costs: Capitalized	-----	53,800.00
Total comparative costs	\$ 844,444.00	\$ 801,608.00

SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO

DESIGNATED AS A-1 LINE

LA JOLLA & PACIFIC BEACH LINE:

Length:								
2505.64	ft.	Av. cut	4.75'	-8"	Cast iron	1.93		\$ 4,835.89
1832.25	"	"	8'	-12"	Sewer pipe	1.52		2,785.02
1361.43	"	"	14'	-12"	"	1.92		2,613.95
420.61	"	"	4.5'	-15"	"	1.76		740.27
1780.24	"	"	8'	-15"	"	2.02		3,596.08
1247.49	"	"	11'	-15"	"	2.51		2,881.70
2783.03	"	"	16.5'	-15"	"	2.76		7,881.16
313.61	"	"	8'	-18"	"	2.67		837.34
2412.00	"	"	12'	-18"	"	2.89		6,970.68
2693.54	"	"	14'	-18"	"	3.08		8,296.10
3053.14	"	"	8'	-21"	"	3.20		9,770.05
7362.27	"	"	11.5'	-21"	"	3.55		26,136.06
2615.67	"	"	19'	-21"	"	4.29		11,225.51
3539.97	"	"	15'	-21"	"	3.89		13,770.48
36.00	"	"	6'	-21"	C.I.	5.60		201.60
216.00	"	on piers		-21"	"	8.76		1,892.16
2945.86	"	Av. cut	8'	-24"	Sewer pipe	3.86		11,371.02
577.56	"	"	10'	-24"	"	4.06		2,344.89
3651.52	"	"	12'	-24"	"	4.28		15,628.51
1358.16	"	"	15'	-24"	"	4.56		6,193.21
1420.00	"	"	20'	-24"	"	5.10		7,242.00
499.60	"	"	4'-5'	-10"	"	1.02		509.59
1404.27	"	"	6'-8'	-10"	"	1.15		1,614.91
864.09	"	"	8'-10'	-10"	"	1.33		1,149.24
1166.18	"	"	10'-12'	-10"	"	1.52		1,772.59
1093.46	"	"	12'-15'	-10"	"	1.74		1,902.62
1409.31	"	"	15'-18'	-10"	"	1.98		2,790.43
704.50	"	"	22'-25'	-10"	"	2.65		1,866.93
60.00	"	"	20'	-10"	C.I.	4.25		255.00
120.00	"	on piers		-10"	"	4.25		510.00
3500.00	"	Av. cut	4'-	take	"			
		up and relay		-10"	"	1.40		4,900.00
489.75	"	Av. cut	4'	-10"	"	2.46		1,204.79
805.30	"	"	6'	-10"	"	2.58		2,053.52
361.21	"	"	8'	-10"	"	2.67		964.43
520.24	"	"	12'	-10"	"	3.08		1,602.34
482.53	"	"	5'-6'	-12"	Sewer pipe	1.36		656.24
578.17	"	"	6'-8'	-12"	"	1.48		855.69
1191.09	"	"	12'-14'	-12"	"	1.88		2,239.25
148.28	"	"	16'	-12"	"	2.06		305.46
302.15	"	"	9.5'	-12"	"	1.65		496.55
36.00	"	on piers		-12"	C.I.	4.77		171.72
936.18	"	Av. cut	5'	-6"	Sewer pipe	0.73		683.41
1173.44	"	"	4'	-4"	C.I.	1.13		1,325.99
553.31	"	"	10'	-4"	"	1.52		841.03

**SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO**

DESIGNATED AS A- 1 LINE

LA JOLLA AND PACIFIC BEACH LINE: (Contd.)

Length:

41.17 ft. on piers	8" C.I.	@\$2.95	\$ 117.35
10 " Av. out	4' -6" "	1.55	15.50
12 " " "	15' -6" "	2.27	27.24
57.41 " " "	15' -8" "	2.69	154.43
284.90 " " "	6' -8" Sewer pipe	0.96	273.50
257.54 " " "	10' -8" " "	1.12	288.44
<u>63,189.07</u> " total or		Sub total	178,563.65
11.97 miles			

2548.5 Lin.ft. manholes 2 ft. & under in diameter @		\$11.20	\$ 28,543.20
5550 Sq.ft. 3" to 4" paving to remove	@	0.03	166.50
34800 " Sq.ft. 5" to 6" " " " "	"	0.05	1,740.00
3510 " 7" to 8" " " " "	"	0.07	245.70
5550 " 3" to 4" " " replace	"	0.18	999.00
34800 " 5" to 6" " " " "	"	0.25	8,700.00
3510 " 7" to 8" " " " "	"	0.32	<u>1,123.20</u>
GRAND TOTAL			\$ 220,081.85

**SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO**

DESIGNATED AS B- 1 LINE

WEST POINT LOMA:

Lengths:

1593.22	Ft. Av. cut	9'-10'	Very wet	30"	R.C. pipe	⊙	\$12.50	\$17,415.25
854.89	" "	11'-12'	" "	30"	" "	"	13.15	11,233.91
496.00	" "	3'-4'	Quite wet	27"	" "	"	9.15	4,538.40
274.12	" "	5'-6'	Very	27"	" "	"	10.45	2,864.35
2666.90	" "	7'-8'	" "	27"	" "	"	11.15	29,735.94
1772.46	" "	9'-10'	" "	27"	" "	"	11.60	20,560.54
826.60	" "	11'-12'	" "	27"	" "	"	12.10	2,741.66
1114.10	" "	13'-14'	Quite	27"	" "	"	10.68	11,898.59
792.00	" "	17'-18'	" "	27"	" "	"	11.65	9,325.20
684.64	on piles		Very	27"	C.I.	"	23.50	16,029.04
209.77	Ft. Av. cut	5'-6'	Dry	24"	V.C.	"	3.70	776.15
235.00	" "	11'-12'	" "	24"	" "	"	4.31	1,012.85
227.57	" "	17'-18'	" "	24"	" "	"	4.89	1,112.82
104.00	" "	5'-6'	" "	15"	" "	"	1.72	178.88
747.40	" "	9'-10'	" "	15"	" "	"	2.06	1,539.64
1128.00	" "	11'-12'	" "	15"	" "	"	2.24	2,524.72
908.40	" "	13'-14'	" "	15"	" "	"	2.42	2,192.33
652.00	" "	15'-16'	" "	15"	" "	"	2.61	1,701.72
1066.49	" "	17'-18'	" "	15"	" "	"	2.81	2,996.84
186.00	" "	19'-20'	" "	15"	" "	"	3.02	561.72
321.00	" "	21'-22'	" "	15"	" "	"	3.25	1,043.25
311.00	" "	23'-24'	" "	15"	" "	"	3.49	1,085.39
193.00	" "	3 - 4	" "	12"	" "	"	1.20	231.60
376.00	" "	5 - 6	" "	12"	" "	"	1.34	503.84
376.00	" "	11 - 12	" "	12"	" "	"	1.76	661.76
376.00	" "	15 - 16	" "	12"	" "	"	2.04	767.04
375.00	" "	23 - 24	" "	12"	" "	"	2.69	1,011.44
407.21	" "	5'-6'	" "	10"	" "	"	1.02	415.56
526.59	" "	7'-8'	" "	10"	" "	"	1.18	621.38
606.59	" "	9'-10'	" "	10"	" "	"	1.36	824.96
2267.55	" "	11'-12'	" "	10"	" "	"	1.55	3,514.70
537.19	" "	19'-20'	" "	10"	" "	"	2.30	1,235.54
574.30	" "	22'-23'	" "	10"	" "	"	3.06	1,737.36
772.50	" "	3'-4'	" "	8"	" "	"	0.83	641.18
158.28	" "	5'-6'	Very wet	6"	C.I.	"	2.25	356.13
856.32	" "	3'-4'	" "	14"	" "	"	4.66	3,990.65
2060.94	" "	5'-6'	" "	14"	" "	"	5.11	10,531.40
1404.50	on bridge brackets			14"	" "	"	3.94	5,533.73
22240.13	Lin. ft. or 5.349 miles							
577	" "	of manholes	2 ft. & under	dry	⊙		11.20	6,462.40
50	" "	" "	2 "	wet			12.00	600.00
896	" "	" "	over 2 ft.	"			16.00	4,736.00
19235	Sq. ft.	3" to 4 1/2"	pavement to remove				0.03	576.99
18720	" "	5" to 6"	" "				0.05	936.00
19235	" "	3" to 4 1/2"	" replace				0.18	3,461.94
18720	" "	5" to 6"	" "				0.23	4,300.00

TOTAL

\$197,248.99

**SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO**

DESIGNATED AS B-2 LINE

EAST POINT LOMA:

Length:

869.26	Ft.	Av. cut	5'-6'	Very wet	24"	VC pipe	\$8.90	\$7,736.41
659.94	"	"	7'-8'	"	24"	"	9.57	6,183.64
1307.68	"	"	9'-10'	"	24"	"	9.85	12,880.65
760.00	"	"	11'-12'	"	24"	"	10.35	7,866.00
785.06	"	"	5'-6'	"	21"	"	8.10	6,358.99
348.43	"	"	7'-8'	"	21"	"	8.48	2,954.69
2074.28	"	"	9'-10'	"	21"	"	8.85	18,357.38
892.00	"	"	11'-12'	"	21"	"	9.25	8,251.00
989.57	"	"	13'-14'	"	21"	"	9.62	9,519.66
348.43	"	"	13'-14'	Quite wet	21"	"	8.58	2,989.53
532.00	"	"	7'-8'	Dry	18"	"	8.50	1,330.00
803.00	"	"	9'-10'	"	18"	"	8.68	2,152.04
1065.00	"	"	11'-12'	"	18"	"	2.87	3,066.55
116.00	"	"	13'-14'	"	18"	"	3.05	363.80
266.00	"	"	15'-16'	"	18"	"	3.23	859.18
883.00	"	"	17'-18'	"	18"	"	3.41	3,011.03
1164.00	"	"	9'-10'	"	15"	"	2.16	2,514.24
266.00	"	"	13'-14'	"	15"	"	2.48	659.68
1064.00	"	"	17'-18'	"	15"	"	2.80	2,979.20
527.00	"	"	19'-20'	"	15"	"	2.98	1,570.46
255.00	"	"	3'-4'	Very wet	12"	"	3.22	821.10
659.86	"	"	5'-6'	Dry	12"	"	1.34	884.21
739.42	"	"	9'-10'	"	12"	"	1.61	1,190.47
7.90	"	"	1-2	Very wet	10"	"	2.45	19.35
300.00	"	"	3-4	"	10"	"	2.85	855.00
599.94	"	"	5-6	"	10"	"	3.25	1,949.80
374.00	"	"	7-8	"	10"	"	3.65	1,365.10
340.31	"	"	9-10	"	10"	"	4.05	1,378.26
369.83	"	"	11-12	"	10"	"	4.49	1,660.54
2066.87	"	"	13-14	"	10"	"	4.93	10,288.27
933.40	"	"	15-16	Dry	10"	"	1.89	1,764.13
522.25	"	"	21-22	Quite Wet	10"	"	5.98	3,123.05
665.93	"	"	5'-6'	Dry	8"	"	0.87	579.36
270.00	"	"	7'-8'	"	8"	"	0.96	259.20
37.16	"	thru existing tank	"	"	18"	C.I."	4.94	183.87
168.00	"	Av. cut	1'-2'	"	10"	C.I."	1.98	332.64
811.24	"	"	3'-4'	"	8"	C.I."	1.90	1,561.36
400.00	"	"	3'-4'	Quite wet	8"	C.I."	2.77	1,108.00
84.59	"	"	11'-12'	Dry	4"	C.I."	1.55	130.80
60.00	"	"	3'-4'	"	6"	"	1.44	86.40

25,406.15 lin. ft. or 4.812 miles.

EAST POINT LOMA: E-2 LINE (Contd.)

426	Lin. ft. of manholes 2 ft. or under Dry	⊙ \$11.20	\$ 4,771.20
425	" " " " 2 ft. or under Wet	⊙ 12.00	5,100.00
1215	Sq. ft. 4" pavement to remove	⊙ 0.03	36.45
5955	" " 5'-6" " " "	⊙ 0.05	297.75
245	" " 8" " " "	⊙ 0.07	17.15
1215	" " 4" " " replace	⊙ 0.18	218.70
5955	" " 5'-6" " " "	⊙ 0.25	1,488.75
245	" " 8" " " "	⊙ 0.32	<u>78.40</u>
	TOTAL		\$143,112.14

**SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO**

DESIGNATED AS B- 5 LINE

NOTE:

Length:

1361.17	ft. Av. cut	10'-12'	Very wet	18"	Sewer pipe	@ \$7.06	\$9,409.86
1876.28	" "	13'-14'	" "	18"	" "	7.42	13,922.00
336	" on piling		" "	16"	C.I.	14.50	4,872.00
1094.04	" Av. cut	4'-6'	Quite wet	18"	Sewer pipe	3.57	3,905.72
981.47	" "	7'-10'	Very wet	18"	" "	5.57	5,461.83
871.98	" "	11'-13'	" "	18"	" "	6.42	5,596.11
647.00	" "	14'-	" "	18"	" "	6.75	4,367.25

**7167.94 Total ft. or
1.36 miles.**

267	Lin. ft. manholes under 8 ft. diameter-	wet	@ 12.00	3,204.00
25	Sq. ft. - 4 1/2" paving to remove		@ 0.05	1.25
25	" " " " to replace		@ 0.25	6.25
	TOTAL			\$51,247.67

**SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO**

DESIGNATED AS B-5 LINE

MISSION VALLEY LINE:

Length:

1952.76	Ft. Av. cut	6'-7'	Dry	27"	R.C. pipe	0	\$6.62	\$12,927.27
2062.00	"	"	8'-9'	"	"	"	6.85	14,124.70
1959.48	"	"	8'-9'	Very wet	27"	"	11.35	22,240.10
1530.80	"	"	10'-11'	"	27"	"	11.69	18,201.21
1006.00	"	"	10 - 11	Dry	27"	"	7.15	7,172.78
352.90	"	"	12 - 13	Very wet	27"	"	12.42	4,404.19
1854.00	"	"	14'-15'	Dry	27"	"	7.60	14,090.40
627.00	"	"	14'-15'	Slightly wet	27"	"	9.50	5,231.10
1006.98	"	"	16'-17'	"	27"	"	9.78	9,848.25
450.00	"	"	16'-17'	Dry	27"	"	7.97	3,586.50
3768.92	"	"	4'-5'	"	24"	V.C.	5.61	13,605.80
7262.27	"	"	6'-7'	"	24"	"	5.79	27,524.00
2482.49	"	"	8'-9'	"	"	"	5.92	9,880.31
2722.69	"	"	10'-11'	"	"	"	4.15	11,299.16
2146.09	"	"	12'-13'	"	"	"	4.36	9,356.93
1309.00	"	"	14'-15'	"	"	"	4.57	5,922.13
171.00	"	"	16'-17'	"	"	"	4.79	819.09
1015.99	"	"	18'-19'	"	"	"	5.01	5,090.11
374.39	"	"	20'-21'	"	"	"	5.27	1,972.04
371.44	"	"	22'-23'	"	"	"	5.60	2,080.06
482.15	"	"	26'-27'	"	"	"	6.25	3,013.44
256.00	"	"	30'-31'	"	"	"	6.92	1,771.22
48.00	"	on piers	"	"	"	C.I.	9.90	475.20
1313.60	"	Av. cut	6'-7'	Dry	18"	V.C.	2.61	3,422.50
731.50	"	"	8'-9'	"	"	"	2.73	1,997.00
1458.50	"	"	10'-11'	"	"	"	2.86	4,171.31
876.81	"	"	12'-13'	"	"	"	3.00	2,620.43
359.00	"	"	14'-15'	"	"	"	3.17	1,158.03
404.95	"	"	16'-17'	"	"	"	3.34	1,352.53
3702.49	"	"	6'-7'	"	18"	"	1.89	6,997.71
2092.62	"	"	8'-9'	"	"	"	2.06	4,510.80
875.54	"	"	10'-11'	"	"	"	2.23	1,952.45
60.00	"	on piers	"	"	"	C.I.	5.60	336.00
505.30	"	Av. cut	4'-5'	"	10"	V.C.	0.98	495.19
4436.42	"	"	6'-7'	"	"	"	1.13	5,013.15
3980.22	"	"	8'-9'	"	"	"	1.28	5,094.68
652.41	"	"	12'-13'	"	"	"	1.59	1,037.33
736.56	"	"	4'-5'	"	8"	V.C.	0.80	589.09
3817.02	"	"	6'-7'	"	"	"	0.90	3,435.32
5016.71	"	"	8'-9'	"	"	"	1.07	5,267.82
806.41	"	"	10'-11'	"	"	"	1.24	999.95

67,036.21 Lin. ft. or 12.697 miles.

MISSION VALLEY LINE:(Contd.)

1578 Lin. ft. of manholes 2 ft. and under	Dry	@ \$11.20	\$17,673.60
417 " " " " over 2 ft.	Wet	15.00	6,255.00
341 Sq. ft. of 6" paving to remove		0.05	17.05
560 " " of 7" - 8" " " "		0.07	39.20
341 " " 6" " " replace		0.25	85.25
560 " " 7" - 8" " " "		0.32	<u>179.20</u>
	TOTAL		\$29,003.97

SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO

DESIGNATED AS C-1 LOW LINE

MAIN LINE- OLD TOWN AND SAN DIEGO TO PUMP NO. 14:

Length:	Ft.	Av. cut							
641.69	"	"	12'-13'	Very wet	63"	R.C. pipe	@25.05	\$16,074.33	
1308.79	"	"	14'-15'	"	63"	"	25.85	33,832.22	
1798.64	"	"	16'-17'	"	63"	"	26.67	47,969.73	
4283.49	"	"	18'-19'	"	63"	"	27.59	118,181.49	
198.62	"	"	20'-21'	"	63"	"	28.41	5,642.79	
668.99	"	"	29'	"	63"	"	31.75	21,240.43	
28.01	"	"	32'	"	63"	"	32.97	923.49	
894.07	"	"	12'-13'	"	51"	"	17.75	15,869.74	
2288.16	"	"	14'-15'	quite wet	51"	"	18.08	41,369.93	
2169.52	"	"	16'-17'	"	51"	"	18.73	40,635.11	
385.81	"	"	18'-19'	"	51"	"	19.38	7,477.00	
1034.91	"	"	20'-21'	Slightly	51"	"	15.94	16,496.47	
299.04	"	"	22'-23'	"	51"	"	16.43	4,913.23	
1669.70	"	"	10'-11'	"	45"	"	12.43	20,754.37	
3018.25	"	"	12'-13'	"	45"	"	12.80	38,633.60	
1858.65	"	"	14'-15'	"	45"	"	13.21	24,552.77	
1095.59	"	"	16'-17'	"	45"	"	13.63	14,932.89	
286.58	"	"	20'-21'	"	45"	"	14.50	4,155.41	
360.40	"	"	22'-23'	"	45"	"	14.95	5,387.98	
1399.53	"	"	16'-17'	very wet	42"	"	17.45	24,421.80	
2347.90	"	"	18'-19'	"	42"	"	18.25	42,849.18	
34.19	"	"	20'-21'	"	42"	"	19.10	653.03	
1088.81	"	"	12'-13'	"	30"	"	13.25	14,426.73	
450.00	"	"	14'-15'	"	30"	"	13.95	6,277.50	
1774.50	"	"	16'-17'	"	30"	"	14.70	25,085.15	
24.28	"	"	14'-15'	"	21"	V.C.	8.65	210.02	
30.63	"	"	16'-17'	Dry	42"	C.I.	24.00	735.12	
350.82	"	"	10'-11'	quite wet	30"	"	15.04	5,276.33	
53.75	"	"	4'-5'	Dry	15"	V.C.	1.71	91.91	
317.05	"	"	6'-7'	"	15"	"	1.87	592.88	
197.85	"	"	8'-9'	"	15"	"	2.05	405.59	
541.11	"	"	8'-9'	"	10"	"	1.20	649.33	
626.13	"	"	10'-11'	"	10"	"	1.45	907.89	
170.00	"	"	12'-13'	"	10"	"	1.61	273.70	
45.33	"	"	6'-8'	"	8"	"	1.05	47.60	
58.50	"	"	4'-5'	"	6"	"	0.73	42.71	
71.50	"	"	6'-7'	"	6"	"	0.85	60.78	
33,870.79	Lin.ft.		or 6.415 miles.						
55.00	"	"	of manholes 2ft. & under			@	11.75	646.25	
1266.00	"	"	" " over 2 ft. (wet)				18.50	23,421.00	
1170.00	Sq.ft.		5"-6" pavement to remove				0.05	58.50	
24212.00	"		7"-8" " " " "				0.07	1,694.84	
266.00	"		11" " " "				0.09	23.94	
1170.00	"		5"-6" " " replace				0.25	292.50	
24212.00	"		7"-8" " " " "				0.32	7,747.84	
266.00	"		11" " " "				0.40	106.40	
TOTAL							\$	637,041.50	

**SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO**

DESIGNATED AS C-1 HIGH LINE

**MAIN HIGH LINE BRANCH
TO C-1 HIGH LINE BELOW PUMPING
PLANT NO. 14**

Length:

348.50	Ft. Av. cut	14'-15'	Dry	39"	R.C. Pipe	0	\$10.53	\$3,669.71
422.71	"	"	"	39"	"	"	10.84	4,582.18
702.00	"	"	"	39"	"	"	11.16	7,834.32
376.00	"	"	"	39"	"	"	11.48	4,316.48
718.00	"	"	"	39"	"	"	12.16	8,730.58
326.12	"	"	"	24'	V.C.	"	3.72	1,213.17
402.18	"	"	"	24'	"	"	3.90	1,568.50
376.94	"	"	"	24'	"	"	4.31	1,624.61
336.00	"	"	"	10"	"	"	1.07	359.52
260.00	"	"	"	10"	"	"	1.43	371.80
40.00	"	"	"	8"	"	"	0.88	35.20
4308.45	Lin. ft. or	0.816 miles						
56	Lin. ft. manholes	2 ft. or under	Dry			0	11.20	627.20
177	"	over 2 ft.	"				15.65	2,770.05
10297	Sq. ft. 5" - 6½"	paving to remove					0.05	514.85
5300	"	7"	"				0.06	318.00
10297	"	5" - 6½"	"	replace			0.25	2,574.25
5300	"	7"	"	"			0.30	1,590.00
				TOTAL				\$42,700.72

**SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO
DESIGNATED AS C-1 HIGH LINE**

**MAIN TRUNK LINE FROM
PUMP NO. 14 TO THE 3RD ST.
SEWERAGE TREATMENT PLANT:**

Length:

453.74	Ft.	Av. cut	10'-11'	Very wet	75"	R.C. pipe	0.29.15	\$13,226.52
1221.85	"	"	14'-15'	"	75"	"	30.89	37,742.95
417.31	"	"	18'	"	75"	"	32.67	13,633.62
1485.79	"	"	4'-5'	"	66"	"	23.55	34,990.35
946.08	"	"	8'-9'	"	66"	"	24.95	23,604.70
308.95	"	"	12'-13' slightly	"	66"	"	22.75	7,022.61
632.50	"	"	14'-15'	"	66"	"	23.12	14,623.40
29.23	"	"	14'-15'	"	66"	"	23.12	675.80
1118.08	"	"	16'-17'	"	66"	"	23.75	26,554.40
1224.10	"	"	20'-21'	"	66"	"	25.11	30,737.15
1312.00	"	"	22'-23'	"	66"	"	25.78	33,823.36
656.00	"	"	24'-25'	"	66"	"	26.52	17,397.12
717.61	"	"	26'-27'	"	66"	"	27.15	19,483.11
<u>320.00</u>	"	double barrelled reinforced concrete siphon						14,322.00

10,643.24 Lin. ft. or 2.054 Miles

351	Lin. ft. of Manholes over 2 ft. wet	0	18.75	6,581.25
1200	Sq. ft. of 6" pavement to remove		0.05	60.00
1200	" " " 6" " " replace		0.25	<u>300.00</u>

TOTAL \$294,844.24

**SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO**

**STUB LINE TO LOW LINE
BEARDSLEY STREET:**

Length:

236.54	Ft.	Av. cut	4'-5'	Very wet	10"	V.C. pipe	0	\$ 2.95	\$ 697.79
268.54	"	"	12'-13'	"	10"	"	"	4.65	1,235.94
146.00	"	"	16-17'	"	10"	"	"	6.04	881.84
43.97	"	"	20'-21'	"	10"	"	"	7.45	327.55
48.00	"	"	4'-5'	"	10"	C.I.	"	2.84	136.32
171.55	on piers			Wet	10"	"	"	4.85	832.02
31.00	Ft.	Av. cut	10'-11'	"	12"	V.C.	"	4.65	144.15
<u>46.70</u>	"	"	12'-13'	"	20"	C.I.	"	2.40	392.28
1,012.30	Lin. ft.	or 0.192	Miles						
92	"	"	manholes 2 ft. and under	Wet	0			12.50	<u>1,150.00</u>
								TOTAL	\$ 5,897.92

SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO

DESIGNATED AS C-2 LINE

CHOLLAS VALLEY LINE:

Length:

258.00	Ft. double	barrelled	Siphon				\$10,287.00
601.88	"	Av. cut	7'-8'	Dry	45"	R.C. Pipe @ \$10.93	6,378.55
642.09	"	"	9'-10'	"	45"	"	7,127.20
231.41	"	"	11'-12'	"	45"	"	2,614.93
1775.27	"	"	13'-15'	"	45"	"	20,433.36
356.30	"	"	16'-17'	quite			
				wet	45"	"	5,544.08
690.93	"	"	18'-20'	Dry	45"	"	8,304.98
1391.13	"	"	15'	very wet	45"	"	21,145.18
388.20	"	"	4'-6'	Dry	36"	"	3,398.75
388.20	"	"	7'-8'	"	36"	"	3,454.98
506.24	"	"	7'-8'	"	33"	"	4,090.42
617.93	"	"	9'-10'	"	33"	"	5,079.38
477.00	"	"	11'-12'	"	33"	"	3,987.72
820.39	"	"	13'-14'	"	33"	"	1,877.72
353.97	"	"	7'-8'	"	30"	"	2,591.06
840.40	"	"	9'-10'	"	30"	"	6,289.38
604.79	"	"	11'-12'	"	30"	"	4,602.45
908.25	"	"	7'-8'	"	18"	V.C.	2,425.03
1482.74	"	"	9'-10'	"	18"	"	4,095.67
1281.55	"	"	11'-12'	"	18"	"	3,767.76
288.14	"	"	13'-14'	"	18"	"	820.35
1096.46	"	"	4'-6'	"	15"	"	1,962.66
2426.22	"	"	7'-8'	"	15"	"	4,731.12
4357.52	"	"	9'-10'	"	15"	"	9,065.64
547.30	"	"	11'	"	15"	"	1,225.96
963.69	"	"	4'-6'	"	12"	"	1,349.17
2338.59	"	"	7'-8'	"	12"	"	3,531.27
2184.64	"	"	9'-10'	"	12"	"	3,604.66
624.38	"	"	4'-6'	"	10"	"	636.87
3433.84	"	"	7'-8'	"	10"	"	3,982.56
791.65	"	"	9'-10'	"	10"	"	1,082.89
197.88	"	"	11'	"	10"	"	291.97
25.89	"	"	13'-15'	"	24"	"	116.51
44.15	"	"	13'-14'	"	6"	"	52.10
30.00	"	"	17'-8'	"	16"	C.I.	130.50
216.00	"	on piers			16"	"	1,209.60

33,561.88 Lin. ft. or 6.356 miles including Siphon

720	Lin.ft. of manholes 2 ft or under - dry	11.20	8,064.00
378	" " " " over 2 ft.	15.75	5,955.50
25	" " " " " "	17.50	437.50
150	Sq.ft. 4 1/2" paving to remove	0.035	5.25
1050	" " 5'-6" " " "	0.05	52.50
510	" " 7'-8" " " "	0.07	35.70
150	" " 4 1/2" " " replace	0.20	30.00
1050	" " 5'-6" " " "	0.25	262.50
510	" " 7'-8" " " "	0.32	163.20

TOTAL \$ 176,509.52

**SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO**

DESIGNATED AS C-2 LINE

WEST BRANCH OF C-2 LINE

Length:									
1445.86	Ft.	Av.	cut 6'-8'	Dry	15"	Sewer pipe	@	\$1.92	\$2,776.05
1543.23	"	"	" 9'-10'	"	15"	"	@	2.15	3,317.94
1517.11	"	"	" 11'-13'	"	15"	"	@	2.36	3,580.38
371.00	"	"	" 18'	"	15"	"	@	2.88	1,068.48
6031.90	"	"	" 6'-8'	"	12"	"	@	1.48	8,927.21
2572.49	"	"	" 9'-10'	"	12"	"	@	1.65	4,244.61
1390.46	"	"	" 11'-13'	"	12"	"	@	1.82	2,530.64
577.32	"	"	" 14'-15'	"	12"	"	@	1.97	1,157.32
2296.35	"	"	" 5'-6'	"	10"	"	@	1.02	2,342.28
1743.97	"	"	" 7'	"	10"	"	@	1.12	1,953.25
380.40	"	"	" 9'-10'	"	10"	"	@	1.37	520.95
<u>19810.09</u>	"	or							

3.752 miles. total.

586 Lin. ft. manholes 2 ft. and under	@	11.20	6,563.20
312 Sq. ft. 5" to 6" paving to remove	@	0.05	15.60
312 " " " " " " " replace	@	0.25	<u>78.00</u>

TOTAL \$38,973.91

**SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO**

DESIGNATED AS C-3 LINE

SOUTH CHOLLAS VALLEY LINE:

Length:									
695.15	Ft.	Av. cut	12'-13'	Very wet	27"	R.C. pipe	@	12.85	\$ 8,932.68
504.61	"	"	4'-5'	Dry	27"	"	"	6.35	3,204.27
316.00	"	"	6'-7'	"	27"	"	"	6.59	2,082.44
556.60	"	"	8'-9'	"	27"	"	"	6.83	3,801.58
1390.14	"	"	10'-11'	"	27"	"	"	7.07	9,828.29
669.12	"	"	12'-13'	"	27"	"	"	7.32	4,897.96
1054.85	"	"	14'-15'	very wet	27"	"	"	12.95	13,660.31
391.08	"	"	16'-17'	Dry	27"	"	"	7.88	3,081.71
186.05	"	"	18'-19'	"	27"	"	"	8.06	1,499.56
336.00	"	"	8'-9'	"	24"	V.C.	"	3.97	1,333.92
186.00	"	"	10'-11'	"	24"	"	"	4.16	773.76
1075.60	"	"	12'-13'	"	24"	"	"	4.36	4,689.62
381.57	"	"	10'-11'	"	21"	"	"	3.47	1,324.05
1075.16	"	"	12'-13'	"	21"	"	"	3.68	3,960.27
1154.85	"	"	8'-9'	"	18"	"	"	2.71	3,129.64
5371.25	"	"	10'-11'	"	18"	"	"	2.93	15,737.76
1308.30	"	"	12'-13'	"	18"	"	"	3.06	3,990.32
991.28	"	"	8'-9'	"	15"	"	"	2.06	2,042.04
1244.17	"	"	10'-11'	"	15"	"	"	2.24	2,786.94
1848.49	"	"	12'-13'	"	15"	"	"	2.42	4,473.35
236.00	"	"	20'-21'	"	15"	"	"	3.18	750.48
628.22	"	"	12'-13'	"	12"	"	"	1.89	1,187.34
326.00	"	"	16'-17'	"	12"	"	"	2.10	684.60
114.60	"	"	16'-17'	"	6"	"	"	1.55	177.63

22,042.09 Lin.ft. or 4.175 Miles.

50	Lin.ft.	of manholes	over 2 ft.	- wet	@	\$16.25	812.50	
164	"	"	"	-dry		15.50	2,542.00	
529	"	"	2 ft. & under	- dry		11.20	5,924.80	
1020	Sq.ft.	5"-6"	paving to remove			0.05	51.00	
200	"	8"	"	"		0.08	16.00	
1020	"	5"-6"	"	replace		0.25	255.00	
200	"	8"	"	"		0.32	64.00	
TOTAL							\$	107,895.82

**SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO**

DESIGNATED AS C-4 LINE

**STUE LINE DIRECT TO 3RD ST.
TREATMENT PLANT:**

Length:

240.54	Lin. ft.	Av. cut 15'	Very wet	10"	V.C.Pipe @	\$5.85	\$1,407.16
387.07	"	"	" 19'-20'	"	10"	"	2,783.03
387.06	"	"	" 21'-22'	"	10"	"	3,053.90
483.65	"	"	" 23'-24'	"	10"	"	4,154.55
484.55	"	"	" 25'-26'	"	10"	"	4,506.32

1,982.87 Lin. ft. or 0.3755 Miles

118. Lin. ft. of Manholes under 2 ft.

@ 12.50 1,475.00

TOTAL \$17,379.96

**SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO**

PUMPING PLANT ESTIMATE

PUMPING PLANT NO. 1- NORTH LA JOLLA.

Excavation-	347 Cu.yds.	@\$1.25	\$ 434.00
	Pumping cost		175.00
	Cofferdam		1,095.00
Concrete-			
Walls-	Exterior walls 1116 Sq.ft. Av. 14$\frac{1}{2}$"	@ 0.77	859.00
	Partition wall 234 " " " 15"	" 0.79	185.00
	Float well walls 185 " " " 6"	" 0.48	89.00
Slabs-	Bottom slab 553 Cu.ft.	" 0.40	221.00
	Floor slab 70 Sq.ft. 6"	" 0.38	27.00
	Roof slab 91 " " 10"	" 0.56	51.00
	Roof slab 65 " " 7"	" 0.43	28.00
	Roof slab 20 " " 6"	" 0.38	8.00
Beams-	"A" 14 Lin.ft. 8"x10"	" 0.64	9.00
	"B" 14 " " 10"x12"	" 0.80	11.00
	"C" 4 " " 6"x6"	" 0.25	1.00
Shafts above roof-			
	Float well and vent shaft		
	99 Sq.ft. 6" wall	" 0.48	48.00
	30 " " 7" "	" 0.53	16.00
	M.H. shaft		
	83 " " 6" "	" 0.58	48.00
	5$\frac{1}{2}$ Lin.ft. 26" diam.	" 2.50	14.00
Iron and steel-			
	Bar grates in wet pit and floor grate		35.00
	2- circular # 60B & 416L M.H.F. & C. "15.00		30.00
	1- Sq. M.H.F. & C - 2'5"x 3'9"		75.00
	M.H. steps		20.00
	Platform over wet pit		55.00
	Finishing and painting concrete		100.00
	Plant rental		125.00
			3,759.00
	Engineering, profit and contingencies 25%		940.00
			4,699.00
	Pumps, electrical equipment, pipes and fittings		3,136.00
			7,835.00
	TOTAL		7,835.00

SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO

PUMPING PLANT ESTIMATE

PUMPING PLANT NO. 2- NORTH LA JOLLA.

Excavation-	266 Cu. yds.		@ \$1.00	\$	266.00
	Shoring and sheet piling				95.00
Concrete-					
Walls-	exterior walls	512	Sq.ft.	10"	" 0.63 323.00
	"	248	"	12"	" 0.69 171.00
	"	225	"	12 $\frac{1}{2}$ "	" 0.71 160.00
	partition	221	"	12"	" 0.69 153.00
	float well	174	"	6"	" 0.48 84.00
Slabs-					
	Bottom slab	243	Cu.ft.		" 0.40 97.00
	Floor	86	Sq.ft.	6"	" 0.38 33.00
	Roof	207	"	8"	" 0.46 95.00
	"	27	"	6"	" 0.38 10.00
Beams-					
	"A"	16 $\frac{1}{2}$	Lin.ft.	8"x8"	" 0.58 10.00
	"B"	16 $\frac{1}{2}$	"	12"x12"	" 0.93 15.00
Plank walk over wet wall					55.00
Shafts above roof-					
Float well & vent shaft walls	36	Sq.ft.	6" wall	0.48	17.00
	11	"	8" wall	0.58	6.00
M.H. shaft	24	"	8" wall	0.58	14.00
26" diam. M.H. shaft	2	Lin.ft.		2.50	5.00
Iron and steel-					
Bar grates in wet pit and floor grate					55.00
2 circular # 69B & 416L M.H.P. & C			"	15.00	30.00
M.H. steps					15.00
1 M.H.P. M C - rectangular					75.00
Finishing and painting concrete					75.00
Plant rental					50.00
					<u>1,889.00</u>
Engineering, profit and contingencies 25%					472.00
					<u>2,361.00</u>
Pumps, electrical equipment, pipes and fittings					3,041.00
			TOTAL		<u><u>5,402.00</u></u>

SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO

PUMPING PLANT ESTIMATE

PUMPING PLANT NO. 3- LA JOLLA.

Excavation-	140 cu.yds.		@ \$3.00	\$ 420.00
	Shoring and sheeting			157.00
	Pumping			150.00
	Breaking out	portion old tank		50.00
Concrete-				
	Walls- exterior walls	202 sq.ft.	13 1/2"	@ 0.75 152.00
	" " "	259 " "	10 "	" 0.63 163.00
	Wall next to tank	202 " "	12"	" 0.72 145.00
	Wall in old tank	44 " "	12"	" 0.72 32.00
Slabs-				
	Bottom slab	254 Cu.ft.		" 0.40 102.00
	Floor "	80 Sq.ft.	6"	" 0.38 30.00
	Roof "	113 " "	6"	" 0.38 43.00
Beams-		27 Lin.ft.	6"x12" "	" 0.61 16.00
	Beam "C" included in wall			++++--
	Columns " " "			-----
	Shafts above roof - none			-----
Iron and steel-				
	Steps and ladder			10.00
	1 rectangular M.H.F. & C			75.00
	Sump and floor grates			15.00
Finishing and painting concrete				50.00
Plant rental				95.00
				<u>1,703.00</u>
Engineering, profit and contingencies 25%				426.00
				<u>2,129.00</u>
Pumps, electrical equipment, pipes and fittings				<u>3,495.00</u>
			TOTAL	5,624.00

**SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO**

PUMPING PLANT ESTIMATE

PUMPING PLANT NO. 6.- LA JOLLA.

Excavation-		211 Cu.yds.	\$1.25	\$ 264.00
	Shoring and sheet piling			94.00
Concrete-				
	Exterior walls	450 Sq.ft. 12"	" 0.69	311.00
	Exterior walls	458 " " 10"	" 0.63	289.00
	Partition wall	215 " " 10"	" 0.63	135.00
	Float well wall	81 " " 6"	" 0.48	39.00
Slabs-				
	Bottom slab	321 Cu.ft.	" 0.40	128.00
	Roof slab	220 Sq.ft. 6"	" 0.42	92.00
	Floor slab	70 Sq.ft. 6"	" 0.38	27.00
Beams-				
	Beam "A" 14 Lin.ft. 6"x8"		" 0.40	6.00
	Beam "B" 14 " " 6"x12"		" 0.61	9.00
	3 1/2 " " 6"x8"		" 0.28	1.00
Shaft above roof				
	26" diam. M.H. 1 Lin.ft.		" 2.50	3.00
	Rectangular M.H. 15 Sq.ft. 8"		" 0.58	9.00
Iron and steel-				
	Cover over float well			10.00
	1- 26" diam. #416L M.H.F.& C.			15.00
	1- Rectangular M.H.F.& C.			75.00
	Sump and floor grates			35.00
	Steps			10.00
Finishing and painting concrete				75.00
Plant rental				50.00
				1,677.00
Engineering, profit and contingencies 25%				419.00
				2,096.00
Pumps, electrical equipment, pipe and fittings				2,281.00
	TOTAL			4,377.00

**SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO**

PUMPING PLANT ESTIMATE

PUMPING PLANT NO. 5- LA JOLLA.

Excavation-					
	Shoring and sheeting	220 Cu.yds.	@\$1.25	\$	275.00
					94.00
Concrete-					
	Walls - exterior	480 Sq.ft.	1 1/2" "	0.67	322.00
	" "	496 " "	10 " "	0.63	312.00
	Partition wall	214 " "	10 " "	0.63	135.00
	Float well walls	80 " "	6" "	0.48	38.00
Slabs-					
	Bottom slabs	325 Cu.ft.	" "	0.40	130.00
	Floor slab	70 Sq.ft.	6" "	0.38	27.00
	Roof slab	200 " "	6 1/2" "	0.40	80.00
Shafts above roof-					
	1- 26" diam. 5"	2 Lin.ft.	" "	2.50	5.00
	Entrance shaft	30 Sq.ft.	6" "	0.58	17.00
Beams-					
	Beam "A"- 6"x8"	14 Lin.ft.	" "	0.40	6.00
	Beam "B"- 6"x12"	7 " "	" "	0.61	4.00
	Beam "C"- 8"x12"	7 " "	" "	0.70	5.00
	6"x6"	4 " "	" "	0.28	1.00
Finishing and painting concrete					75.00
Plank walk over wet pit					50.00
Iron and steel-					
	Sump grate and floor grate				35.00
	1- 26" diam. M.H.F.&C #416L				15.00
	1- Rectangular M.H.F.&C.				75.00
	Steps				10.00
	Steel cover over float wells				10.00
	Plant rental				110.00
					<u>1,831.00</u>
Engineering, profit and contingencies 25%					458.00
					<u>2,289.00</u>
Pumps, electrical equipment, pipes and fittings					2,281.00
					<u>4,570.00</u>
			TOTAL		

**SEWERAGE COLLECTION SYSTEM
CITY OF SAN DIEGO**

PUMPING PLANT ESTIMATE

PUMPING PLANT NO. 11- EAST POINT LOMA.

Excavation-		240 Cu.yds.	@ \$1.25	\$ 300.00
	Pumping cost			120.00
	Cofferdam			1,076.00
Concrete-				
	Exterior walls-	990 Sq.ft. 15"	@ \$ 0.79	782.00
	Partition wall	218 " " 13 1/2"	" 0.75	164.00
	Float well	80 " " 6"	" 0.43	34.00
Slabs-				
	Bottom slab	512 Cu.ft.	" 0.40	205.00
	Floor "	70 Sq.ft. 6"	" 0.38	27.00
	Roof "	210 " " 8 1/2"	" 0.48	101.00
Beams-				
	Beam "A" 6"x8"	14 Lin.ft.	" 0.40	5.60
	" "B" 9"x12"	14 " "	" 0.75	11.00
	6"x8"	4 " "	" 0.25	1.00
Shafts above roof-				
	1- 26" diam. 5"	1 1/2 Lin.ft.	" 2.50	4.00
	Entrance shaft	18 Sq.ft. 8"	" 0.55	10.00
Plank walk over wet pit				50.00
Steel and iron-				
	Sump grate and floor grate			35.00
	1- 26" diam. # 416L M.H.F.& C.			15.00
	1- Rectangular M.H.F.&C			75.00
	M.H. steps			10.00
	Steel plate over float wells			10.00
Finishing and painting concrete				75.00
Plant rental				125.00
Engineering, profit and contingencies 25%				3,240.00
				810.00
				4,050.00
Pumps, electrical equipment, pipes and fittings				2,216.00
				6,266.00
			TOTAL	

ESTIMATES OF ALTERATIONS
TO EXISTING PUMPING PLANTS.

PUMPING PLANT NO. 6.

Pacific Beach No. 1.

New pumps, motors, starters and pipe and fittings to connect with existing intake and pressure pipes.

\$ 2,492.00

PUMPING PLANT NO. 7.

Pacific Beach No. 2.

Changing runners in 2 pumps from 4" to 12" to 4" by 10".
Changing pipe line.

\$ 225.00
75.00

PUMPING PLANT NO. 9.

Mission Beach.

New pumps, motors, starters and pipe and fittings to connect with existing intake and pressure pipes.

\$ 2,621.00

PUMPING PLANT NO. 10.

Ocean Beach.

New pumps, motors, starters and pipe and fittings to connect with existing intake and pressure pipes.

\$ 2,200.00

PUMPING PLANT NO. 12.

Changing pipe lines

\$ 175.00

PUMPING PLANT NO. 15.

No changes in plant. To be abandoned.

GAGE POINT NO 15

DATE GAGE READING	THURSDAY MAY 14 31
SIZE PIPE 16	SLOPE 0.0028
MIN. FLOW PER HOUR	720.0 CF = 5386.0 GAL
AV. " " " "	1297.4 CF = 9705.2 GAL
MAX. " " " "	2376.0 CF = 17773.7 GAL
TOTAL FLOW FOR 24 HOURS	31137.6 CF = 232924.8 GAL
AREA SERVED 978 ACRES	
AVERAGE FLOW PER ACRE 0.0037 CFS.	
POPULATION SERVED 5746.	
DISCHARGE PER CAPITA 2.48 G.P.S.	5.42 CF = 40.5 GAL.
AV. DISCHARGE PER CAPITA PER SECOND = .000063	
MAX. " " " " " "	= .000115
LOCATION - ON 10" INTERCEPTOR AT HOYTENIA AND AVENUE STREETS PROJECT	

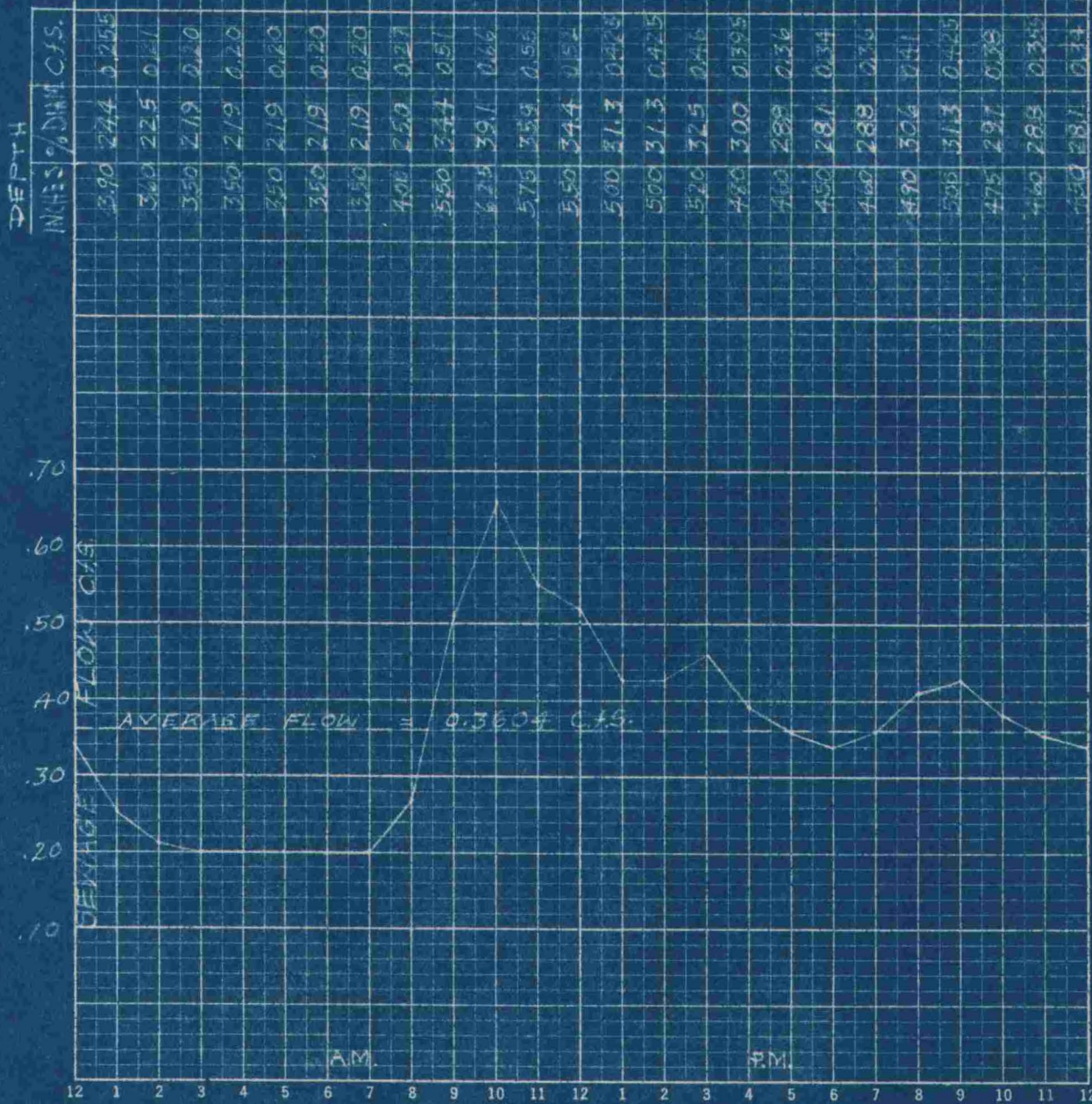


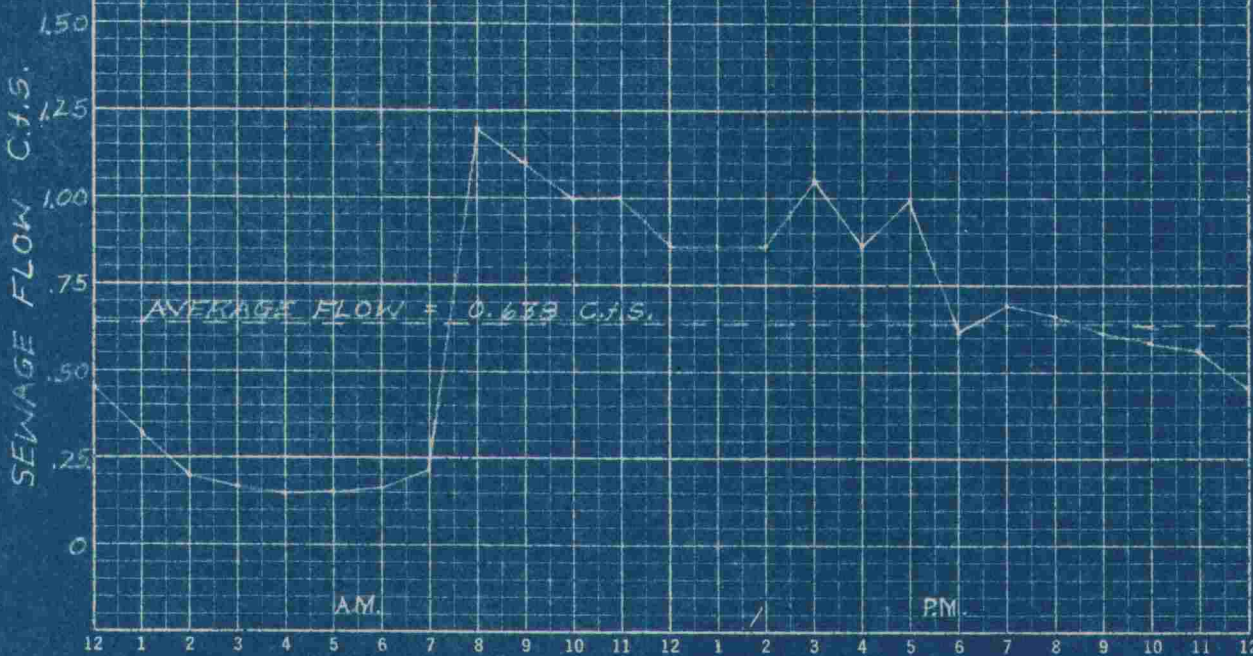
Exhibit 1.

GAGE POINT No. 18

DATE GAGE READING THURSDAY MAY 21, 1931

MIN. FLOW PER HOUR	504.0 C.F. = 3770.2 GAL.
AV. " " "	2296.8 C.F. = 17181.2 GAL.
MAX. " " "	4320.0 C.F. = 32315.8 GAL.
TOTAL FLOW FOR 24 HOURS	55123.2 C.F. = 412349. GAL.
AREA SERVED 656 ACRES	
AVERAGE FLOW PER ACRE .00097 C.F.S.	
POPULATION SERVED 6576	
DISCHARGE PER CAPITA 24 HRS. 8.38005 = 62.7 GAL.	
AV. DISCHARGE PER CAPITA PER SECOND = .000097	
MAX. " " " " "	= .000182
LOCATION - QUINCE AND CALIFORNIA STREETS - OLIVE STREET DRYWELL	

DEPTH	INCHES	% DAY	C.F.S.
	3.00	27.4	32
	2.50	17.9	20
	2.40	17.1	17
	2.25	16.0	15
	2.25	16.4	15
	2.40	17.1	17
	3.70	19.3	22
	6.00	42.9	120
	5.70	40.7	110
	5.50	37.2	100
	5.50	39.3	100
	5.00	35.7	86
	5.00	35.7	86
	5.50	39.3	105
	5.00	35.7	86
	4.00	33.5	38
	4.00	30.0	67
	4.50	32.1	69
	4.50	31.4	66
	4.20	20.0	67
	4.10	20.3	53
	4.00	23.4	56
	3.60	25.7	45

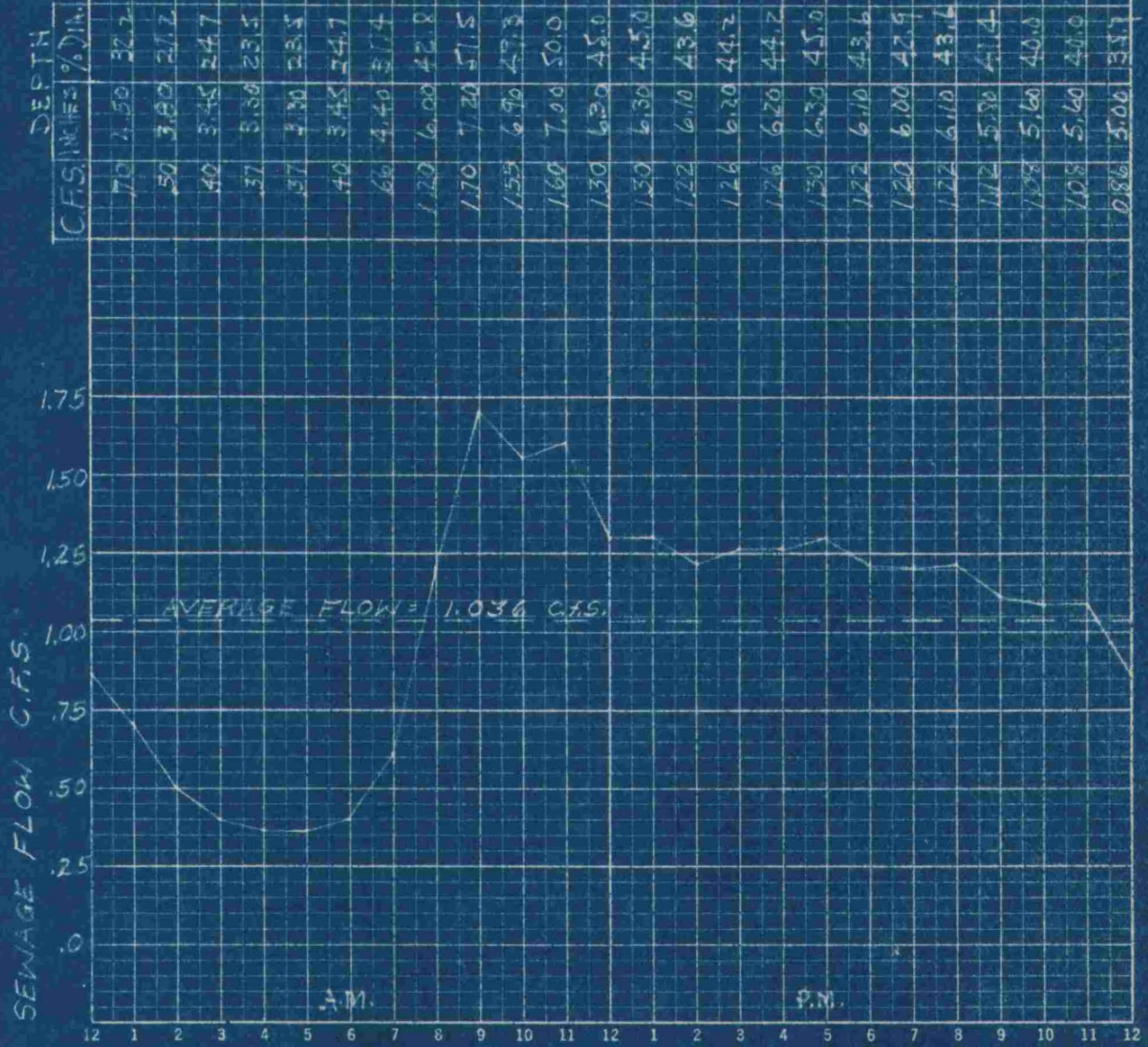


14" Pipe Slope .004 Exhibit 2

GAGE POINT No. 21

DATE GAGE READING TUESDAY MAY 26, 1931

MIN. FLOW PER HOUR	1332 C.F.	=	9967.03 GAL.
AV. FLOW PER HOUR	3729.6 C.F.	=	27899.27 GAL.
MAX. FLOW PER HOUR	6120 C.F.	=	45780.46 GAL.
TOTAL FLOW FOR 24 HRS.	89510.4 C.F.	=	679582.55 GAL.
AREA SERVED	865 ACRES		
AVERAGE FLOW PER ACRE	.0012 C.F.S.		
POPULATION SERVED	13219		
DISCHARGE PER CAPITA 24 HRS	6.771 C.F.S.	=	31.4 GAL.
AV. DISCHARGE PER CAPITA PER SECOND	.000078		
MAX. " " " " " "	.000129		
LOCATION	LAUREL AND CALIFORNIA STREETS - OLIVE STREET OUTFALL		



KEUFFEL & ESSER CO., N. Y. NO. 335-150
One Day by Hours.

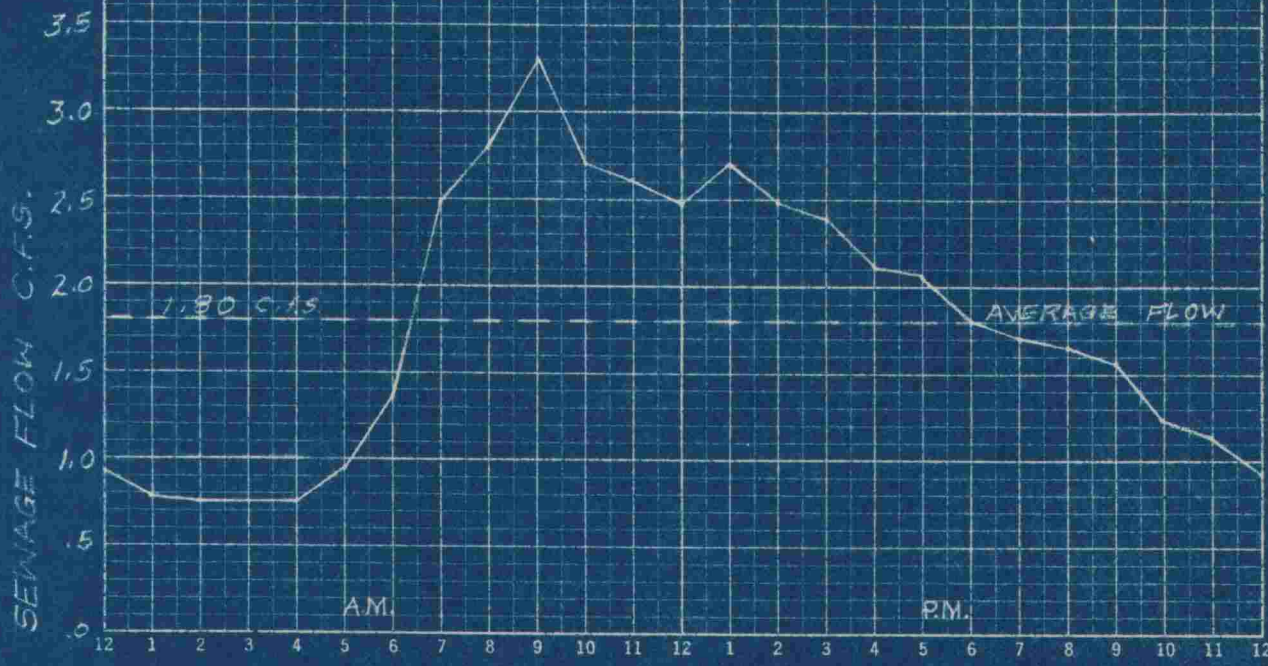
14" Pipe Slope .004 Exhibit 3

GAGE POINT No. 24

DATE GAGE READING MONDAY JUNE 22, 1931

MIN. FLOW PER HOUR 2700 C.F. = 20,197 GAL.
 AVERAGE FLOW PER HOUR 6480 C.F. = 48,474 GAL.
 MAX. FLOW PER HOUR 11,560 C.F. = 85,943 GAL.
 TOTAL FLOW FOR 24 HRS. 155,320 C.F. = 1,163,367 GAL.
 AREA SERVED 309 ACRES
 AREA DOWN TOWN SERVED 85 1/2 ACRES
 AVERAGE FLOW DOWN TOWN C.F. per ACRES per HOUR = .0124
 AVERAGE FLOW RESIDENTIAL DIST. C.F.S. per ACRE = .0033
 LOCATION - EIGHTH AND L STREETS

DEPTH INCHES	% DIA. C.F.S.
5.00	20.8
4.90	20.7
4.80	20.4
4.90	20.4
5.50	22.9
6.20	25.2
8.30	36.7
9.40	38.2
10.00	41.7
7.10	28.0
8.90	37.0
9.50	35.4
8.10	35.8
8.50	35.4
8.60	35.0
8.00	33.4
7.90	32.9
7.00	31.6
7.40	30.8
7.20	30.0
6.70	28.4
6.75	26.0
5.90	24.6
5.40	22.5



24" Pipe

Slope .0015

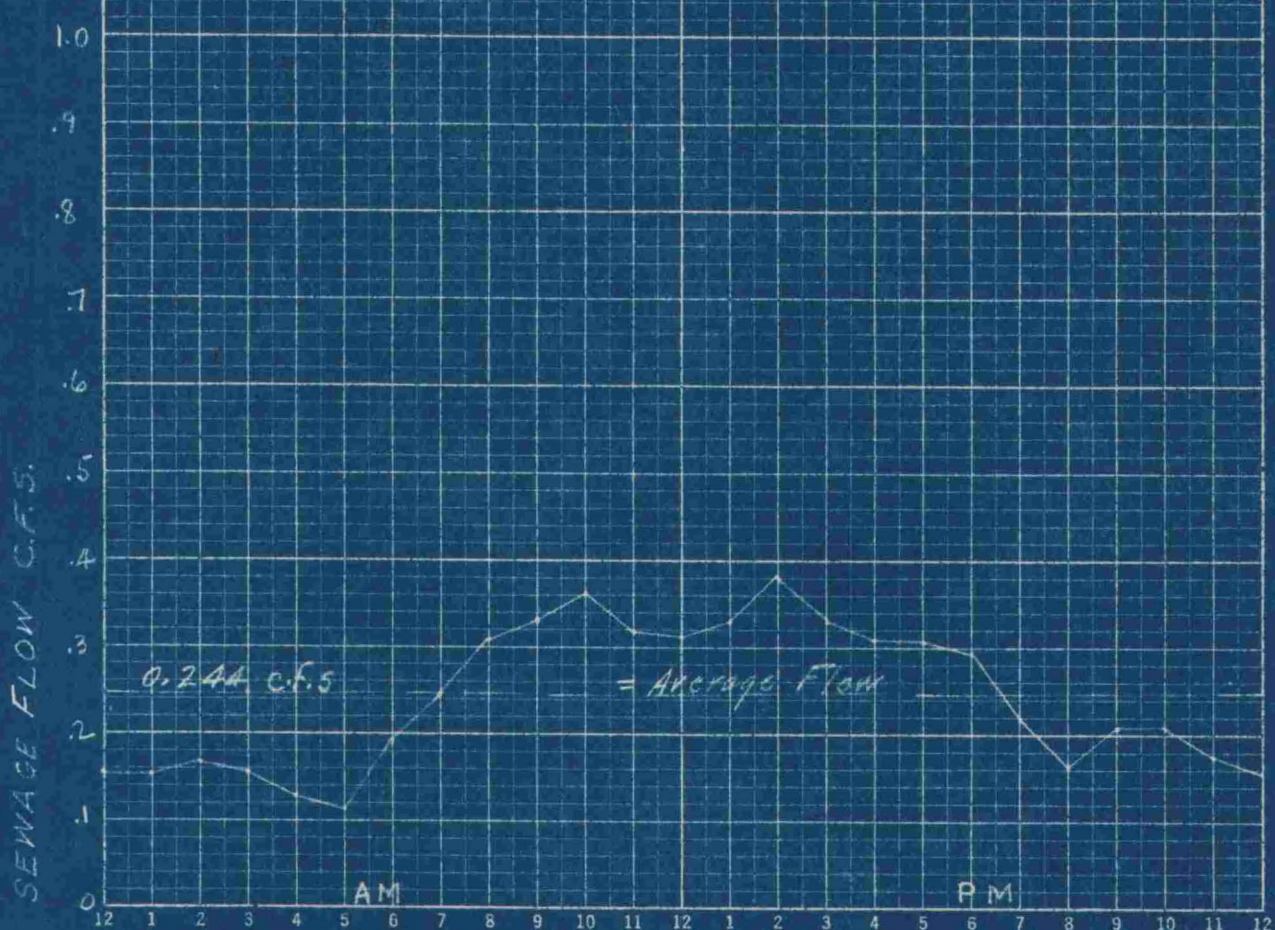
Exhibit 4

GAGE POINT No. 25

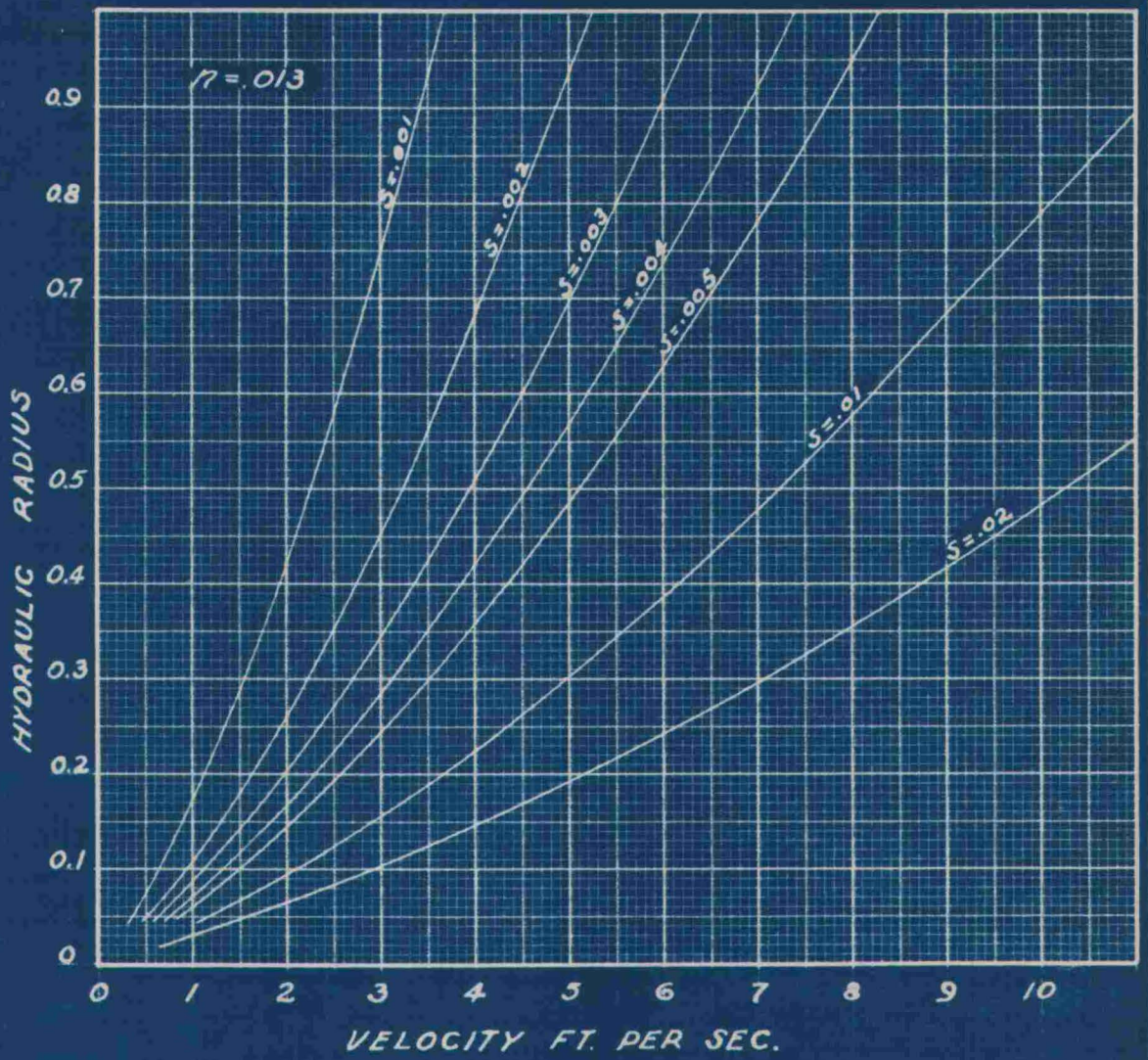
DATE GAGE READING, THURSDAY, JUNE 23, 1931.

Minimum Flow Per Hour	418. C.F.	=	3,127. Gal.
Average Flow Per Hour	878. C.F.	=	6,568. Gal.
Maximum Flow Per Hour	1,368. C.F.	=	10,233. Gal.
Total Flow In 24 Hours	21,082. C.F.	=	157,704. Gal.
Area Served = 37.5 Acres			
Area Down Town Served = 19.80 Acres			
AVERAGE FLOW ENTIRE AREA C.F.S. per ACRE = .0065			
LOCATION = SEVENTH AND K STREETS			

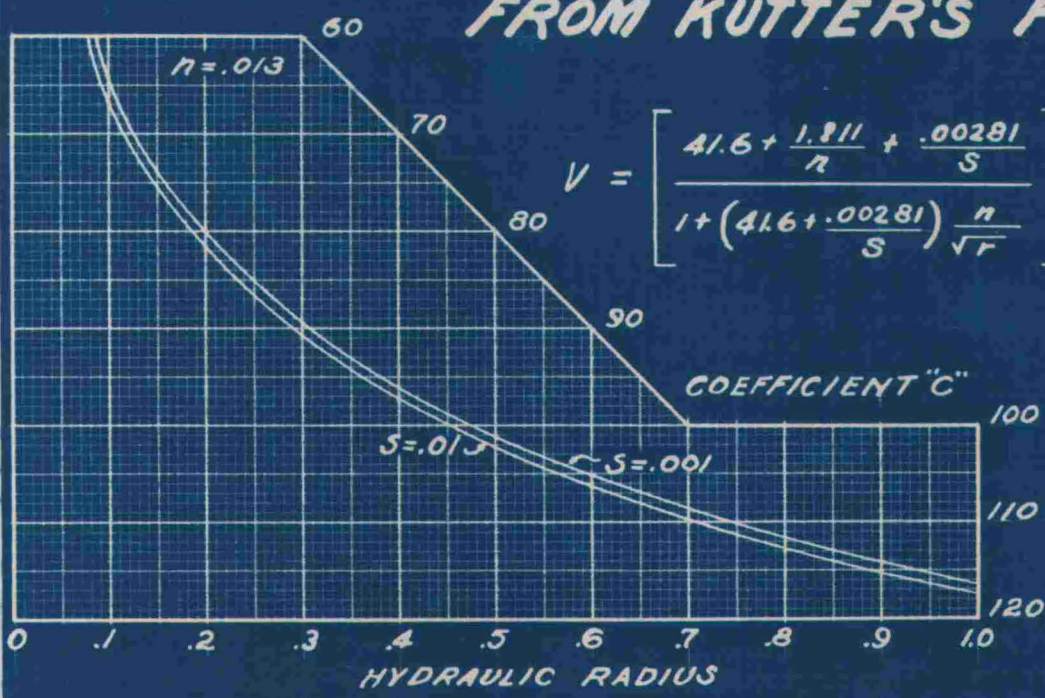
DEPTH INCHES	96 DIA. C.F.S.	C.F.S.
2.20	36.7	.155
2.30	38.3	.167
2.40	36.7	.155
2.50	33.3	.127
1.90	31.7	.116
2.50	41.7	.176
2.80	46.7	.244
2.20	53.3	.308
3.35	55.8	.332
3.50	53.3	.362
3.25	54.2	.318
3.25	53.7	.312
3.30	55.0	.317
3.60	60.0	.380
3.35	55.5	.330
3.20	53.3	.308
3.15	52.5	.303
3.10	51.7	.294
2.65	44.0	.219
2.25	37.5	.161
2.55	42.5	.205
2.55	42.5	.205
2.35	38.7	.172
2.60	36.7	.156



6" Pipe Slope .0125 Exhibit 5.

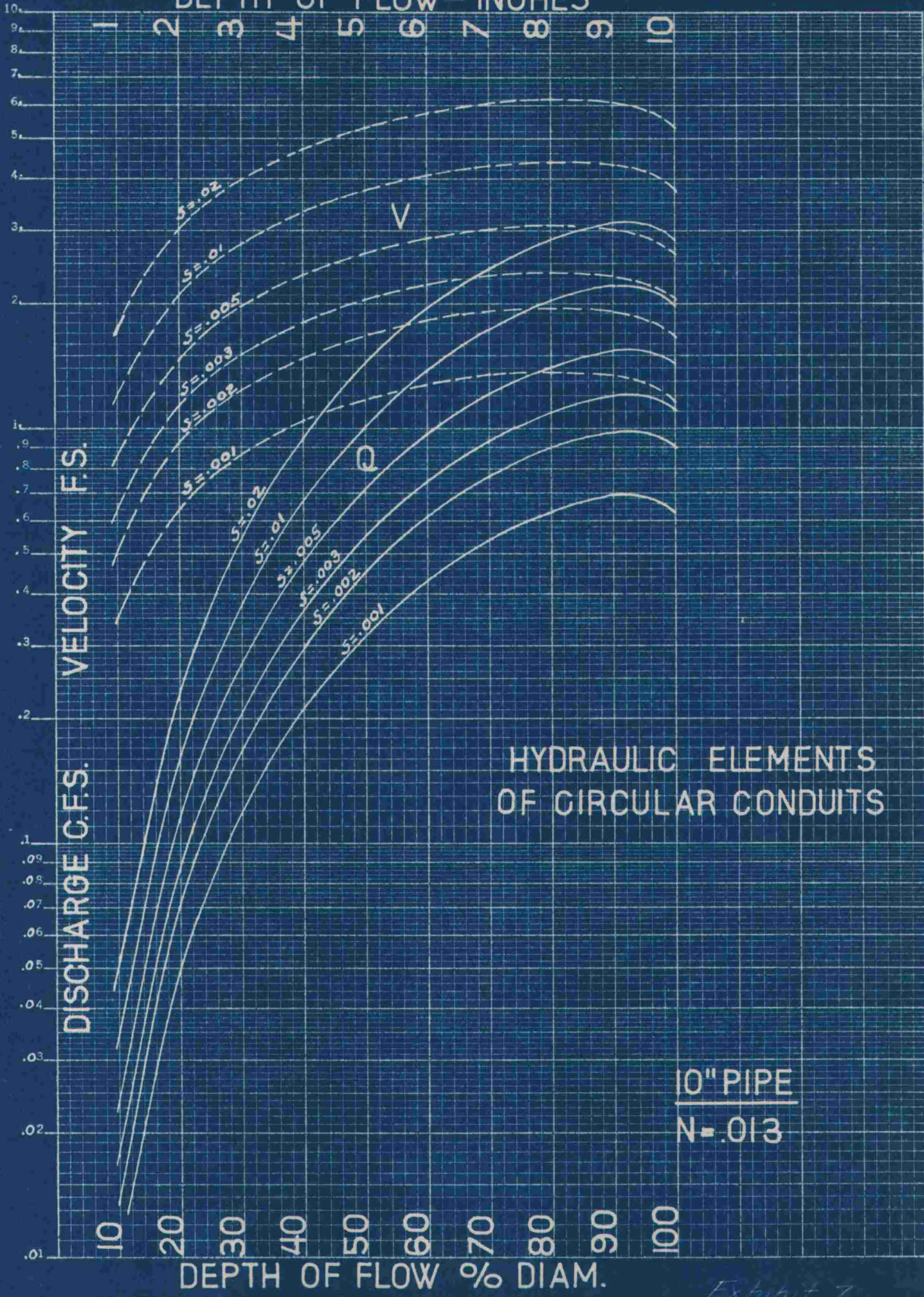


FROM KUTTER'S FORMULA



$$V = \left[\frac{41.6 + \frac{1.49}{n} + \frac{.00281}{S}}{1 + \left(\frac{41.6 + .00281}{S} \right) \frac{n}{\sqrt{r}}} \right] \sqrt{rS}$$

DEPTH OF FLOW—INCHES



HYDRAULIC ELEMENTS OF CIRCULAR CONDUITS

10" PIPE
 $N = 0.013$

KEUFFEL & ESSER CO., N. Y. NO. 359-71
 Semi-Logarithmic, 3 Cycles x 10 to the inch

Exhibit 7

DEPTH OF FLOW- INCHES

VELOCITY F.S.

DISCHARGE C.F.S.

HYDRAULIC ELEMENTS OF CIRCULAR CONDUITS

12" PIPE
N = .013

DEPTH OF FLOW % DIAM.

KEUFFEL & ESSER CO., N.Y. NO. 493-71
Semi-Logarithmic, 3 Cycles x 10 to the inch.

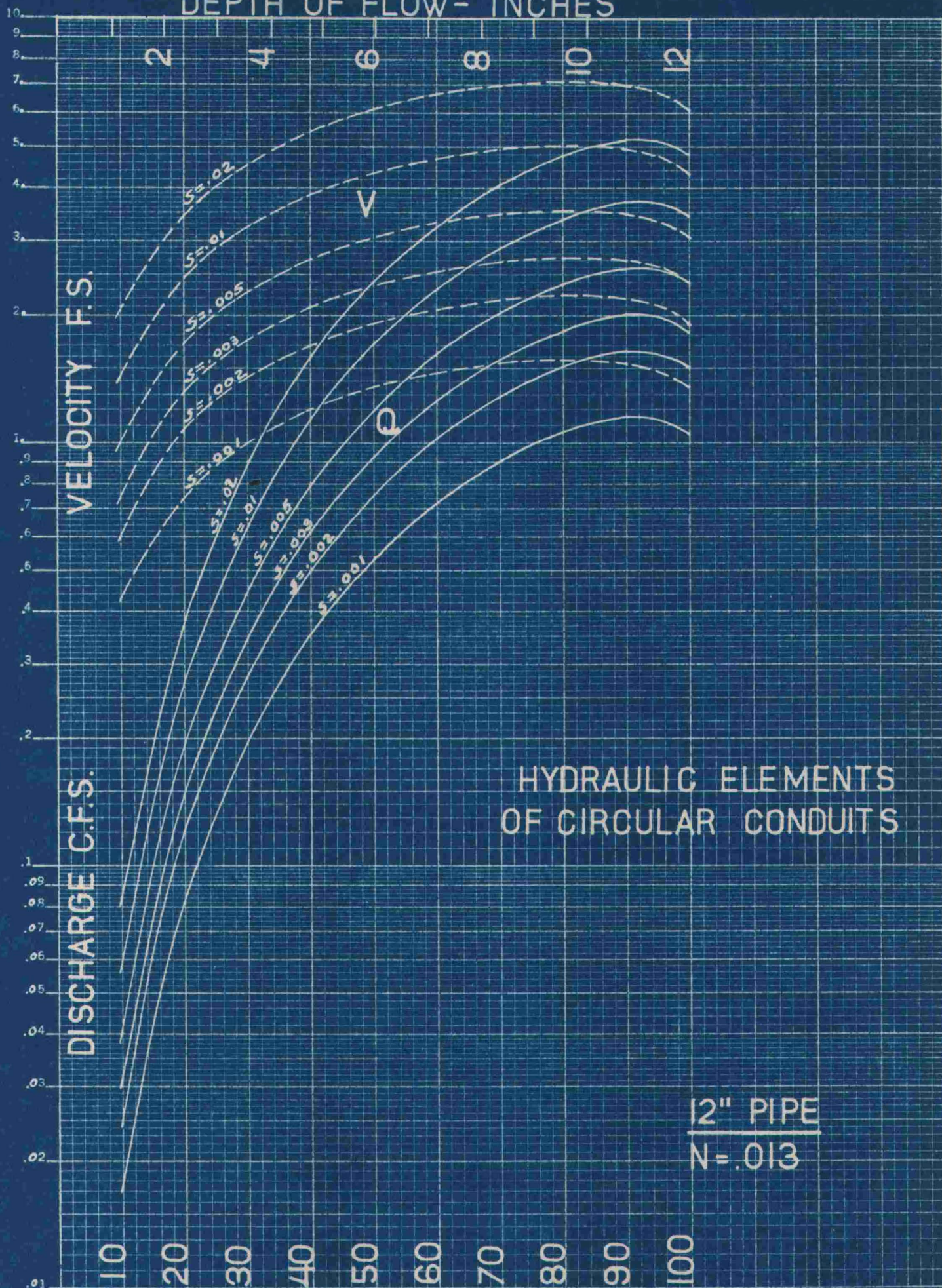


Exhibit 8

DEPTH OF FLOW - INCHES

VELOCITY F.S.

DISCHARGE C.F.S.

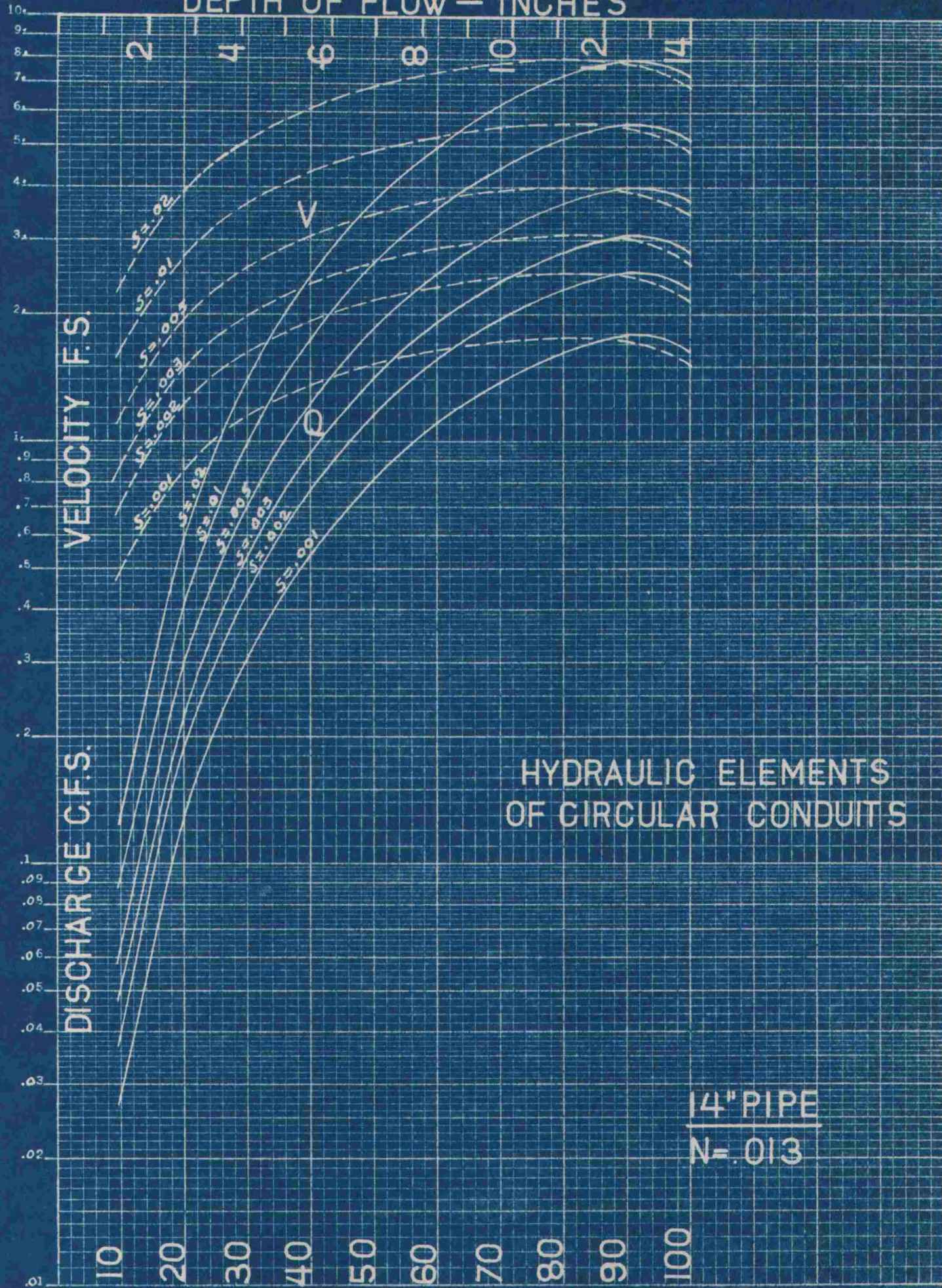
HYDRAULIC ELEMENTS OF CIRCULAR CONDUITS

14" PIPE
N = .013

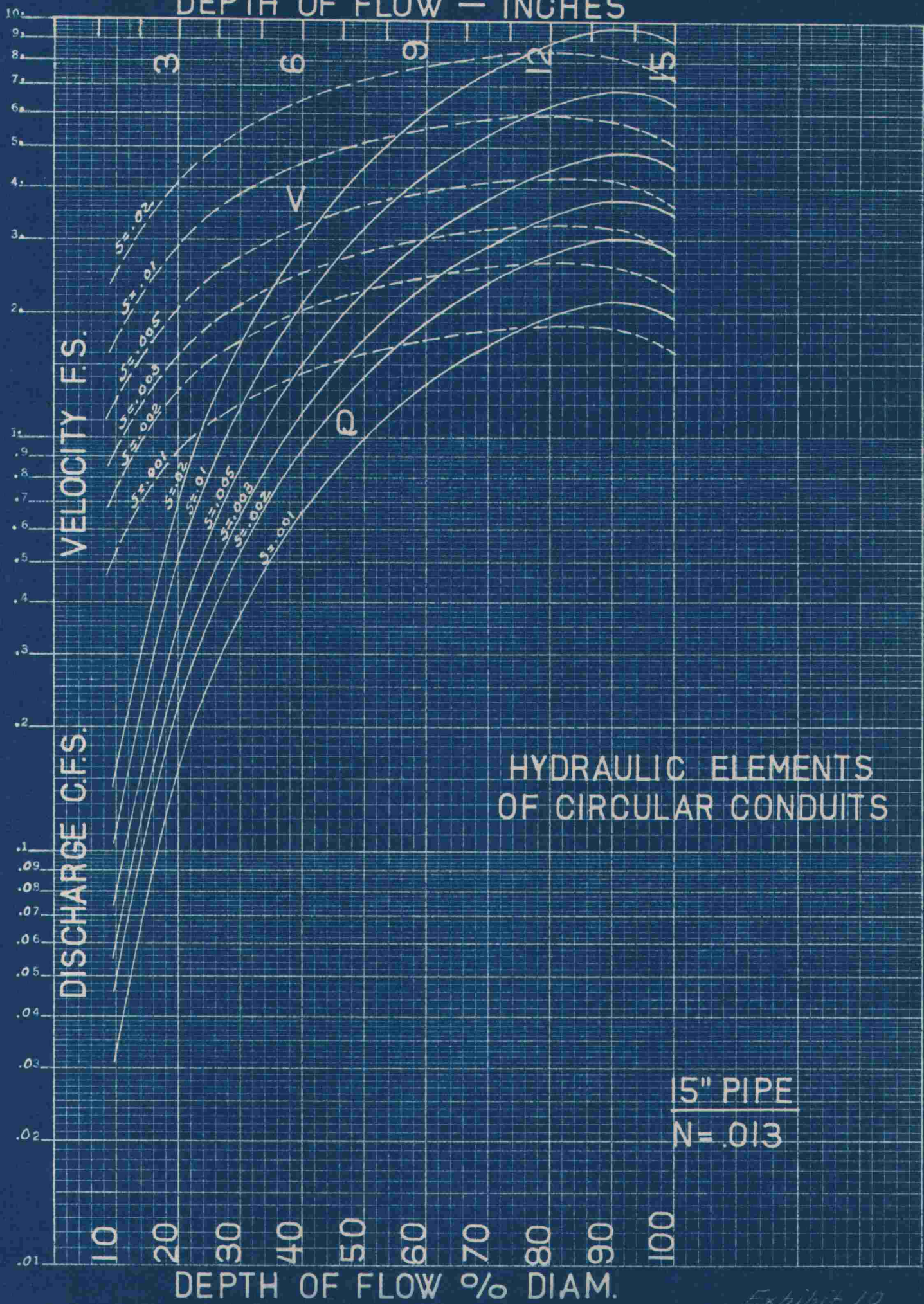
DEPTH OF FLOW % DIAM.

Exhibit 9

KEUFFEL & ESSER CO. N. Y. NO. 359-71
Semi-Logarithmic, 3 Cycles x 10 to the inch.



DEPTH OF FLOW - INCHES



HYDRAULIC ELEMENTS OF CIRCULAR CONDUITS

15" PIPE
 $N = .013$

DEPTH OF FLOW % DIAM.

Exhibit 10

DEPTH OF FLOW - INCHES

VELOCITY F.S.

DISCHARGE C.F.S.

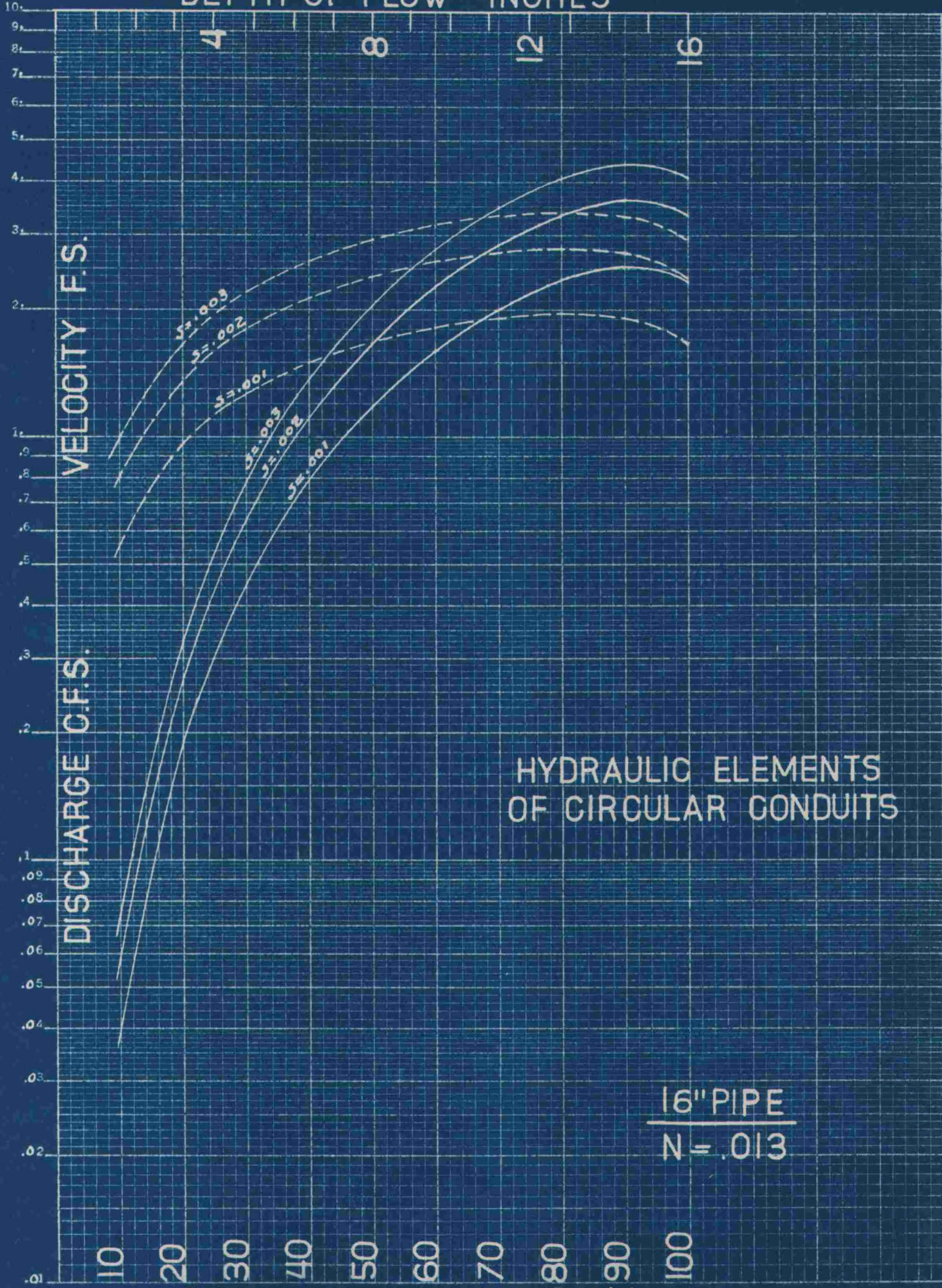
HYDRAULIC ELEMENTS OF CIRCULAR CONDUITS

16" PIPE
N = .013

DEPTH OF FLOW % DIAM.

EXHIBIT 11

KEUFEU & ESSER CO., N. Y. NO. 358-271
Sewerage and Sanitation Engineers



DEPTH OF FLOW - INCHES

VELOCITY F.S.

DISCHARGE C.F.S.

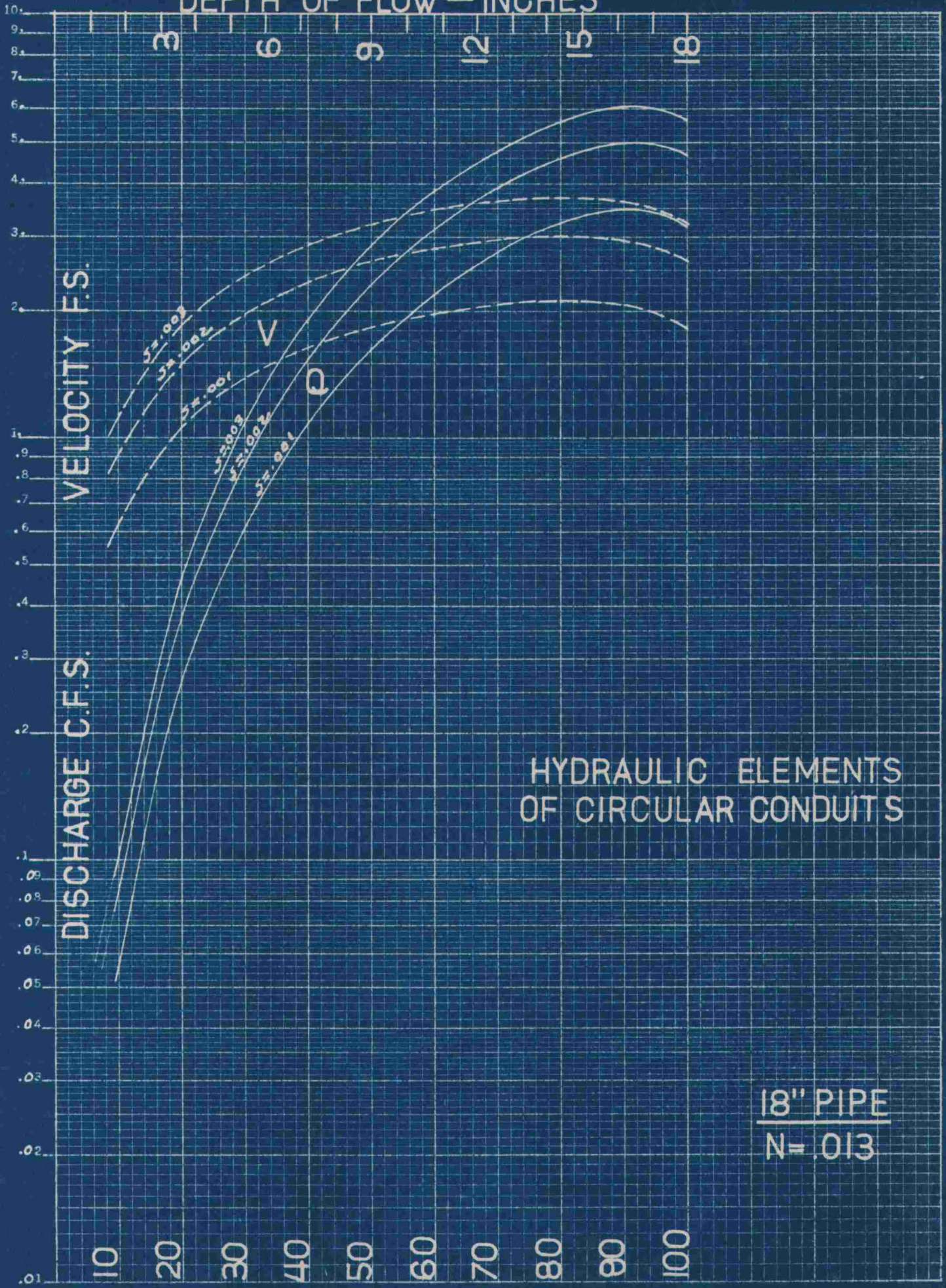
HYDRAULIC ELEMENTS OF CIRCULAR CONDUITS

18" PIPE
N = .013

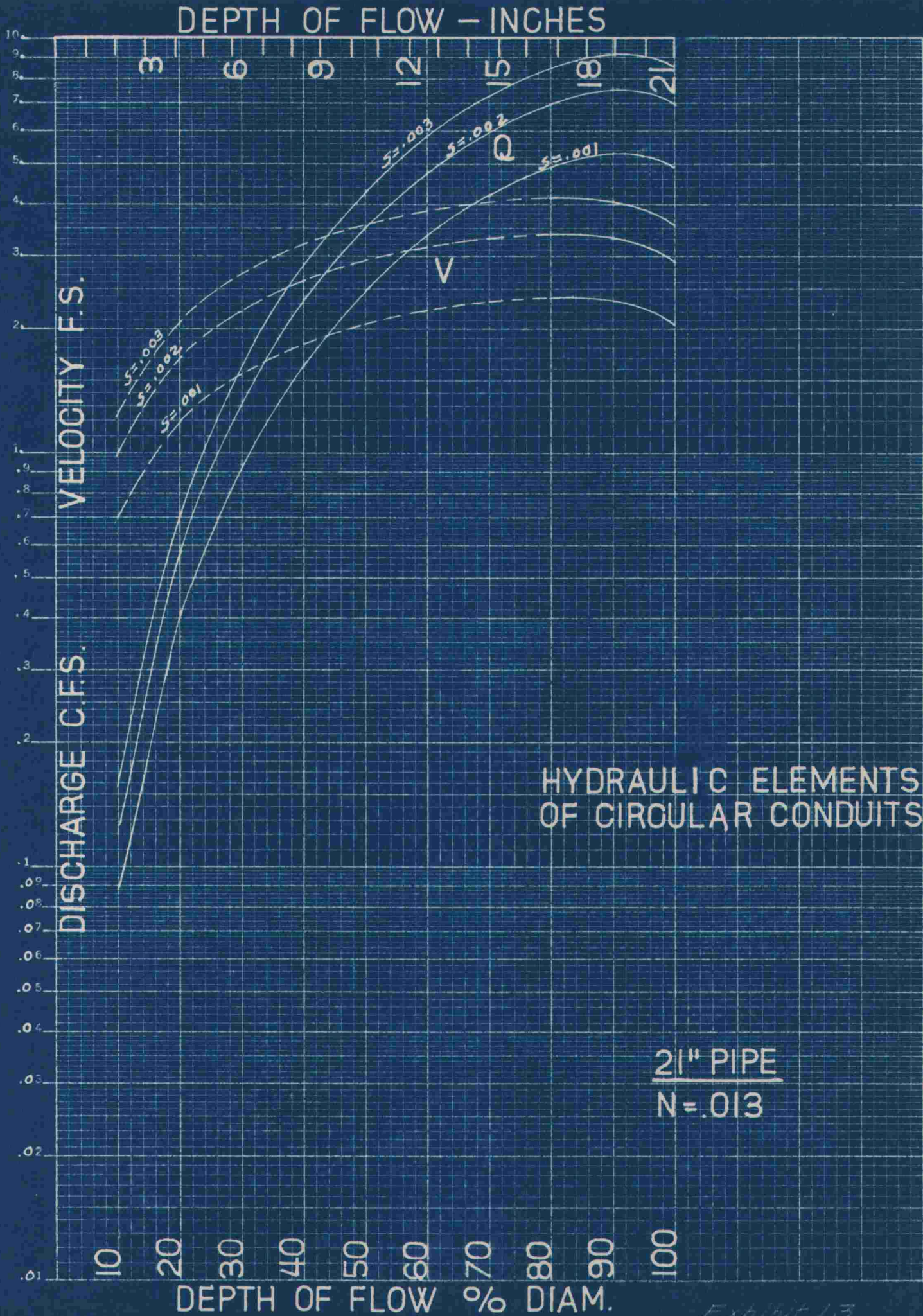
DEPTH OF FLOW % DIAM.

Exhibit 12

KEUFFEL & ESSER CO., N. Y. NO. 465-71
Sumner-Locardi Imbr. 3 Copies 10 to the inch.

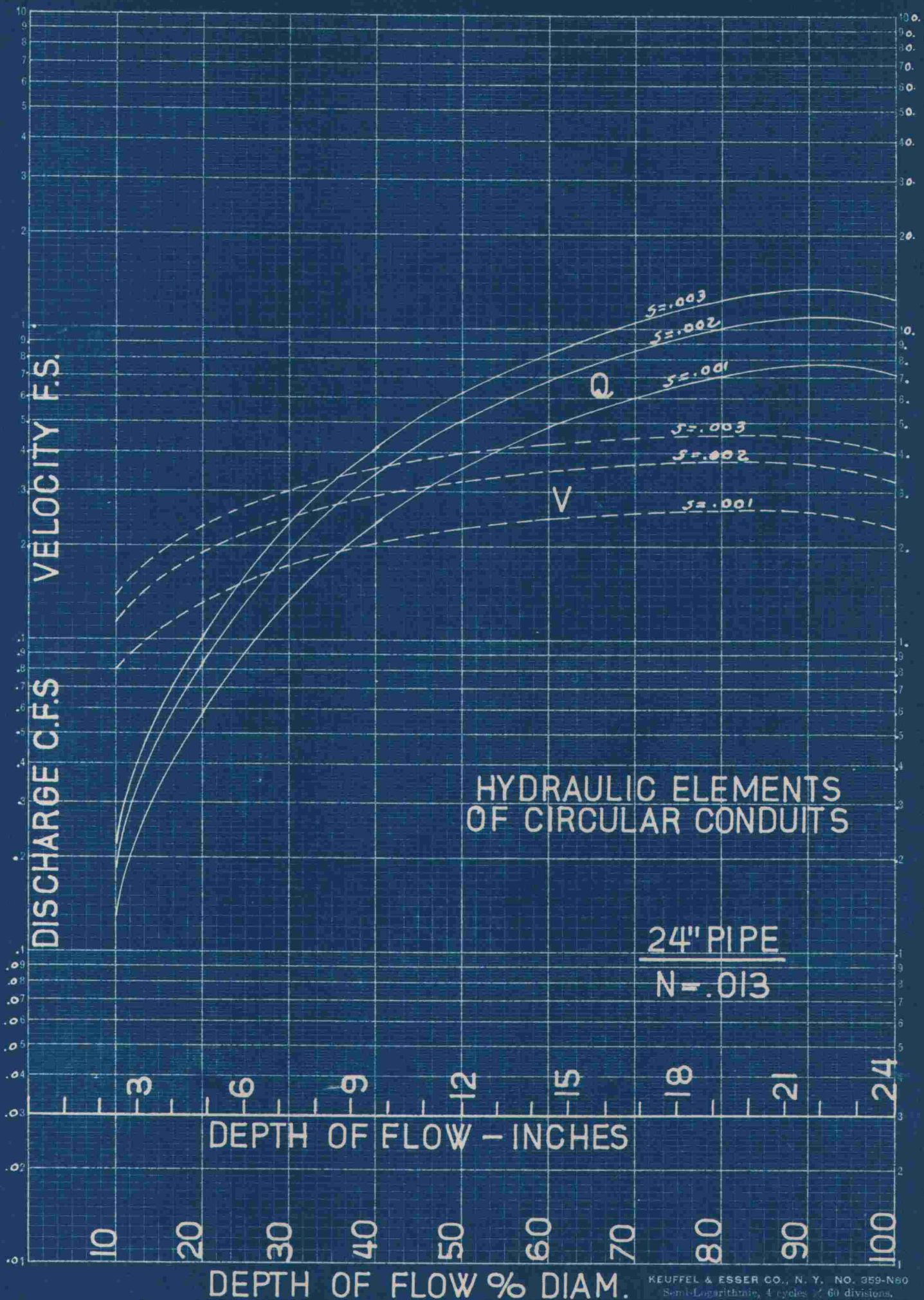


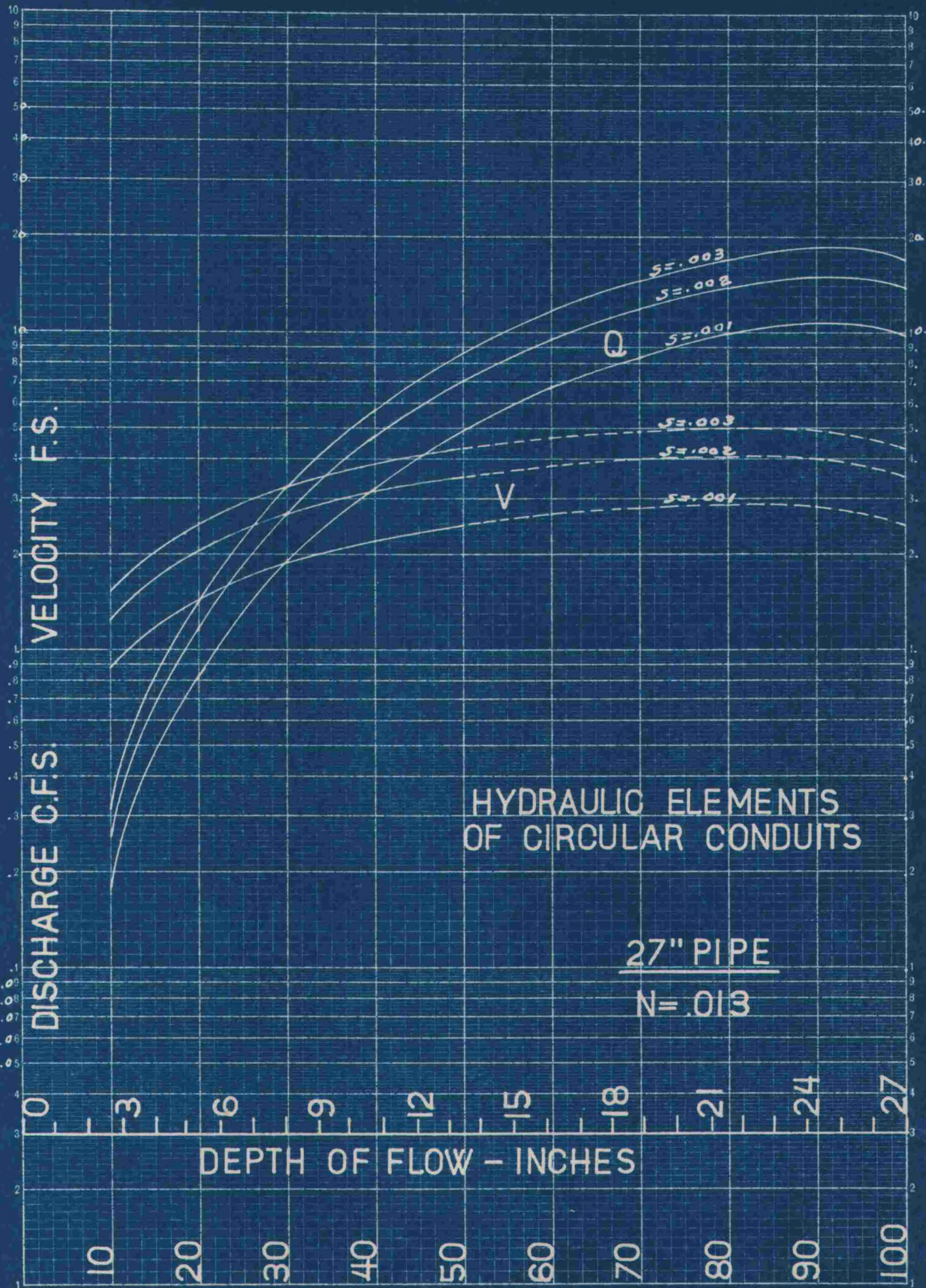
KEUFFEL & ESSER CO., N. Y. NO. 489-71
Scale: Logarithmic, 3 Cycles x 10 to the inch.



HYDRAULIC ELEMENTS OF CIRCULAR CONDUITS

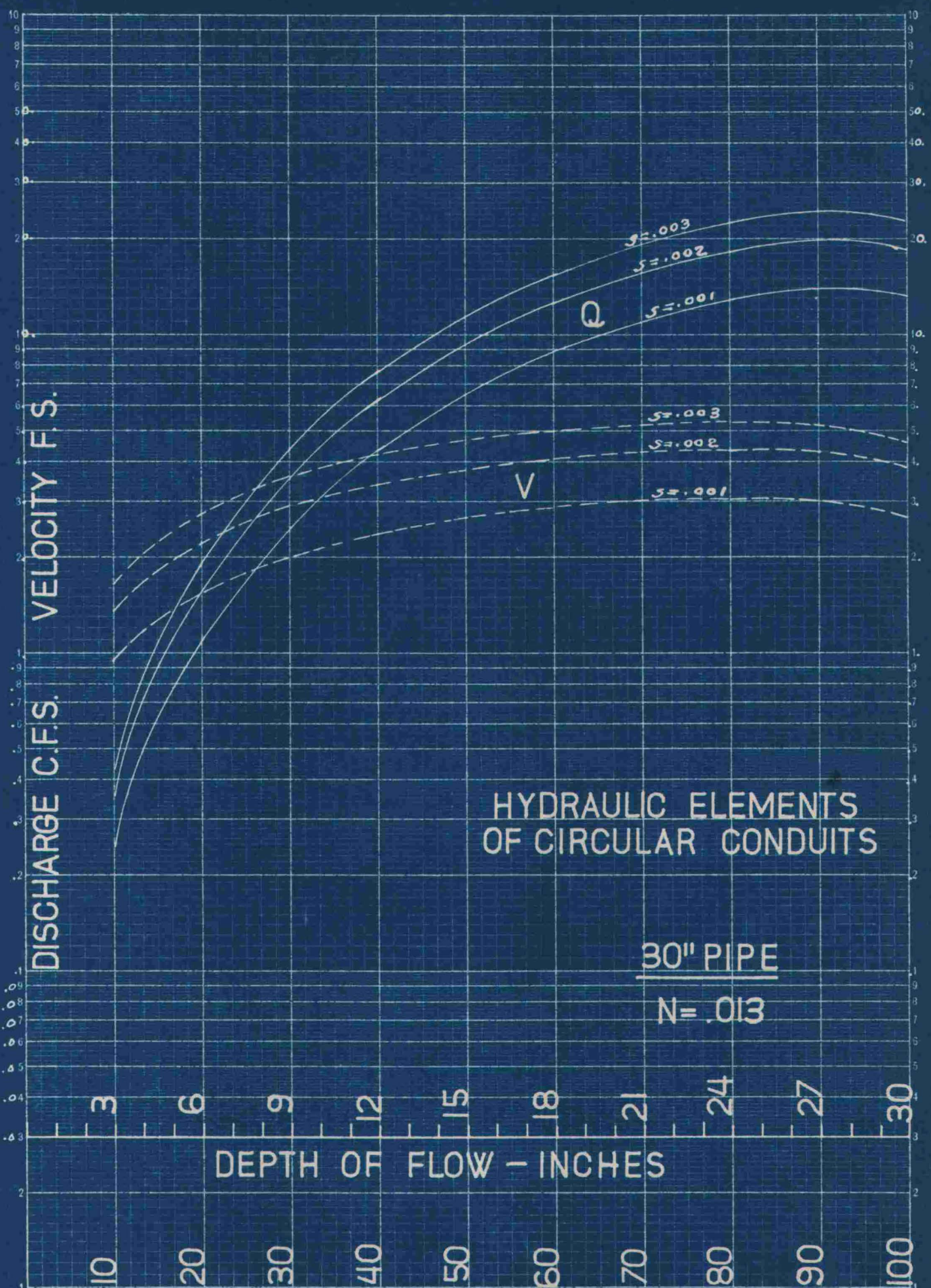
21" PIPE
N = 0.13





HYDRAULIC ELEMENTS
OF CIRCULAR CONDUITS

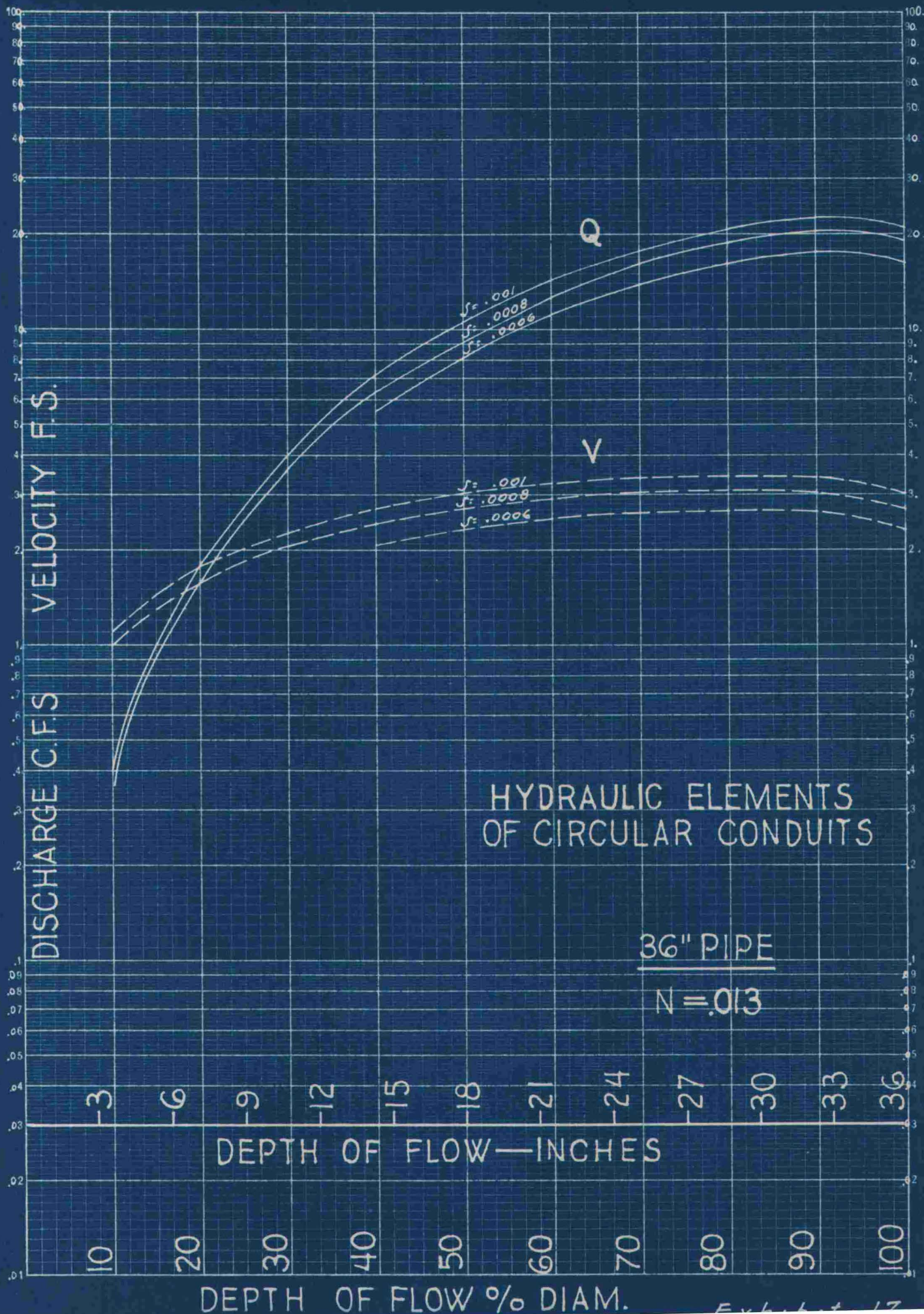
27" PIPE
 $N = .013$

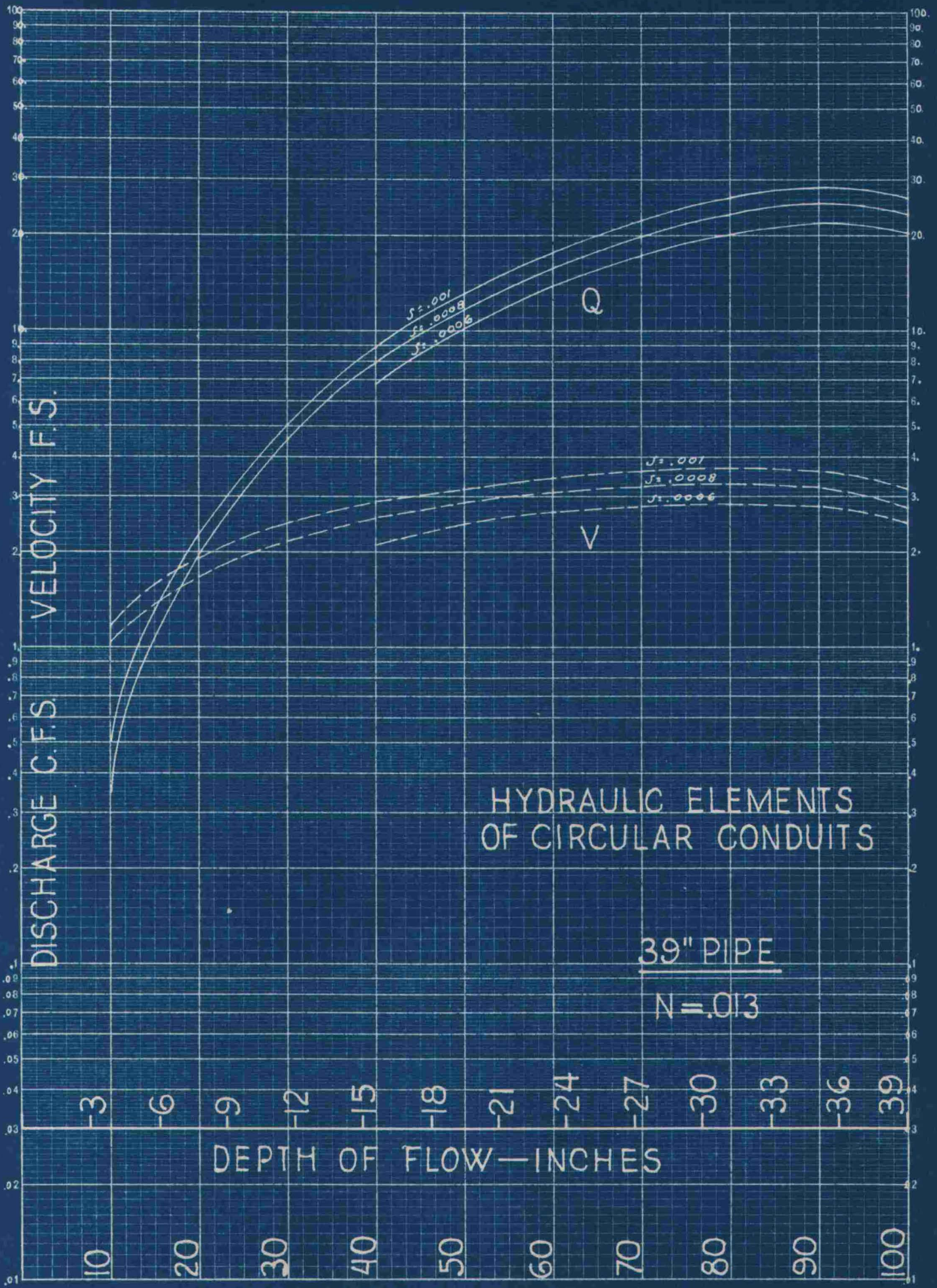


HYDRAULIC ELEMENTS
OF CIRCULAR CONDUITS

30" PIPE
 $N = .013$

DEPTH OF FLOW % DIAM.



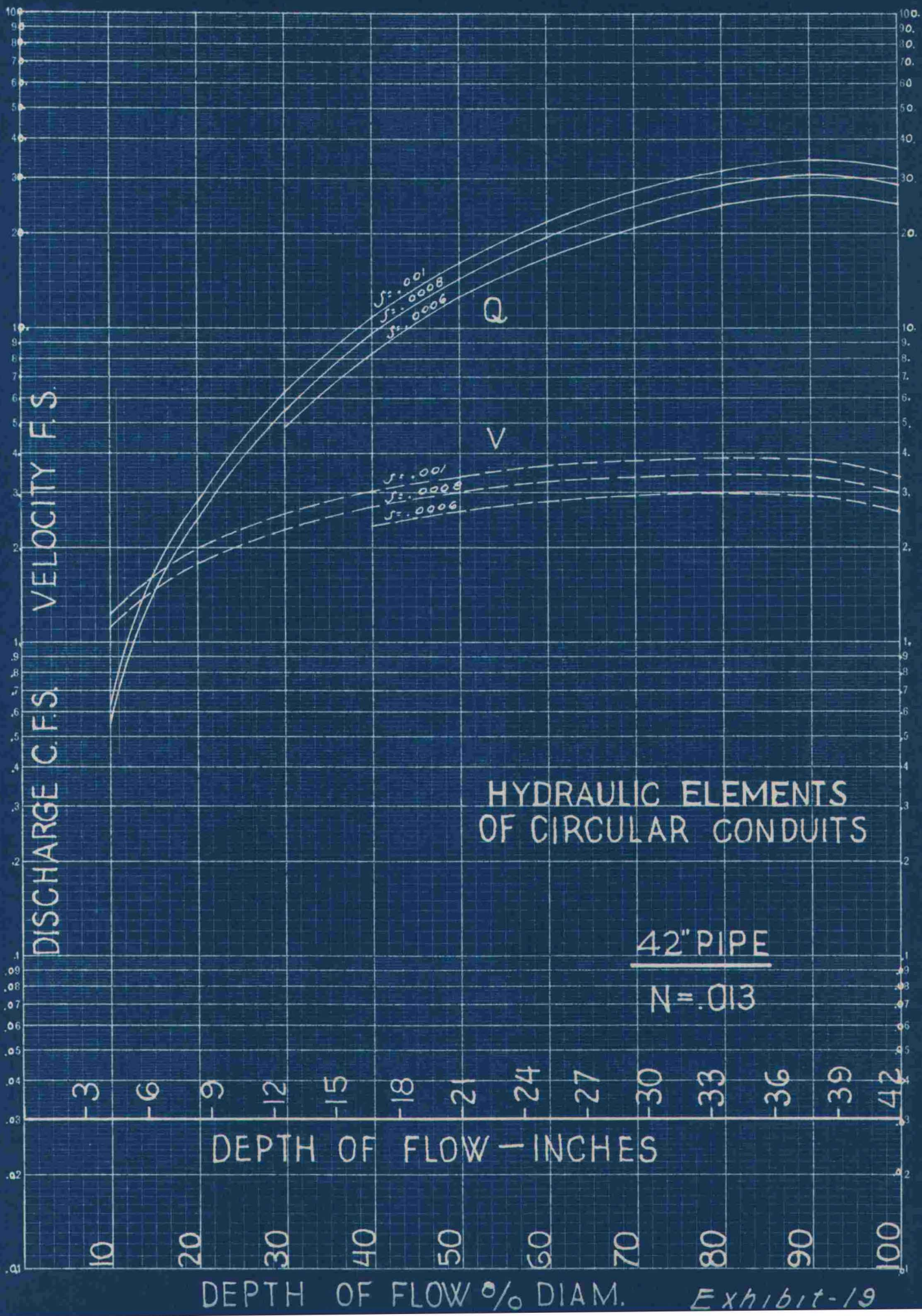


HYDRAULIC ELEMENTS
OF CIRCULAR CONDUITS

39" PIPE
 $N = 0.013$

DEPTH OF FLOW % DIAM.

Exhibit-18



HYDRAULIC ELEMENTS OF CIRCULAR CONDUITS

42" PIPE
 $N = 0.013$

