

SEWER STUDY
Riverwalk
SAN DIEGO, CALIFORNIA

April 2020

Prepared For:
CITY OF SAN DIEGO DEVELOPMENT SERVICES DIVISION
Administration Building
1222 First Avenue, 5th Floor
San Diego, CA 92101

Prepared By:



PROJECT DESIGN CONSULTANTS

Planning | Landscape Architecture | Engineering | Survey

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Project No. 4361.00

For: SD Riverwalk, LLC
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Prepared By: BR
Checked By: SM

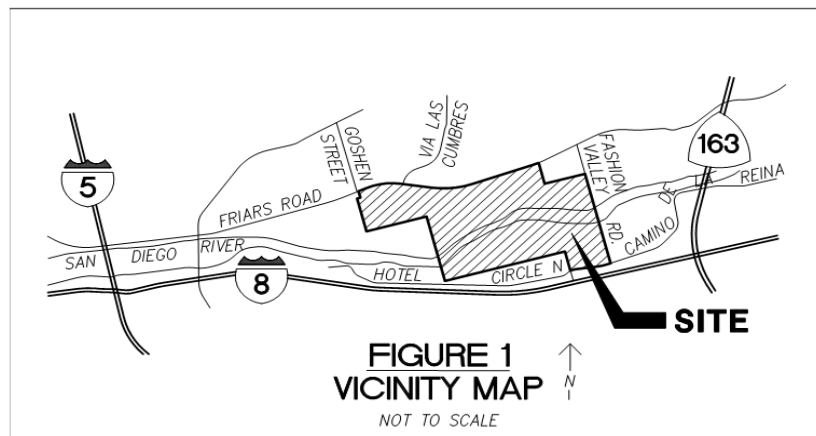
Riverwalk SEWER STUDY

Introduction:

This report serves as a sewer system analysis for the Riverwalk project site in San Diego, California. The project is located in Mission Valley bordered to the north by Friars Road, to the east by Fashion Valley Road, and to the south by Hotel Circle North. Refer to Figure 1 for the vicinity map of the Riverwalk project.

The Riverwalk project proposes an amendment to the existing Levi-Cushman Specific Plan to replace the 195-acre Riverwalk property with the Riverwalk Specific Plan and redevelop the existing golf course as a walkable, transit-centric, and modern live-work-play mixed-use neighborhood that features an expansive River Park along the San Diego River. The mix and quantity of land uses would change from what is approved in the existing Levi-Cushman Specific Plan to include 4,300 multi-family residential dwelling units; 152,000 square feet of commercial retail space; 1,000,000 square feet of office and non-retail commercial; approximately 95 acres of park, open space, and trails; adaptive reuse of the existing golf clubhouse into a community amenity; and a new Green Line Trolley stop within the development. Improvements to surrounding public infrastructure and roadways would be implemented as part of the Riverwalk project, including improvements to the Fashion Valley Road crossing of the San Diego River as a 10- to 15-year storm event crossing. The project would also include a habitat restoration effort on-site to create and/or enhance 25.16 acres of native habitats along the San Diego River, within and adjacent to the MHPA, and setting aside area for establishing a future wetland habitat mitigation bank.

The project would establish Irrevocable Offers of Dedication (IODs) for two Community Plan Circulation Element roadways envisioned in the Mission Valley Community Plan Update: future Riverwalk Street “J,” which would cross the San Diego River in a north-south direction; and future Riverwalk Street “U,” which would travel approximately east-west along the southern project site boundary and connect to future Street “J.” Street “J” would be an elevated roadway crossing the river valley. Per the City’s Planning Department, these roads are regional facilities with uncertain funding, design, and construction timing. While these improvements would not be constructed as part of the project, the project would grant the City IODs for the required rights-of-way to construct these roads in the future.



Riverwalk SEWER STUDY

Purpose of Study:

The purpose of this study is to provide a sewer system analysis for the proposed Riverwalk project. The intent of said study shall help determine the impact the project has on the existing City of San Diego sewer system.

The sewer system analysis has been performed to determine the adequacy of the proposed public sewer systems within the project boundary. No assessment on the existing sewer system was required due to city confirmation that the existing 78-inch North Mission Valley Trunk Sewer has capacity for all projected future flows by Irina Itkin on June 12, 2018 via email.

Study Area:

The study area for this report is the project boundary. Refer to Figure 1.

Design Criteria and Project Flows:

The City of San Diego Sewer Design Guide (Revised May 2015) provided the design criteria applied to the analysis of the sewer system in this report.

Table 1 summarizes the projected flows from the project site for the existing conditions and proposed redevelopment conditions. The proposed redevelopment of the project site will increase projected sewage flows by 844,880 GPD, or 3018 EDUS (1 EDU = 280 GPD).

TABLE 1								
SEWER FLOW SUMMARY								
LAND USE	AREA (SF)	AREA (ACRES)	UNITS	DENSITY (DU/AC)	POPULATION FACTOR (PEOPLE/UNIT)	EQUIVALENT POPULATION	UNIT FLOW (GPD/PERSON)	FLOW (GPD)
Existing Condition								
Clubhouse	5,000.00	0.11	---	12.5	3.5	6	80	480
Restrooms (SW Corner)	1,000.00	0.02	---	12.5	3.5	2	80	160
Open Space	8,492,351.31	194.82	---	...	0	0	0	0
Existing Total Flow								640
Proposed Condition								
Lot 1 Residential	80,124.03	1.84	115	63	2.4	279	80	22,320
Lot 2 Residential	69,327.71	1.59	110	70	2.4	268	80	21,440
Lot 3 Residential	77,582.04	1.78	125	71	2.4	304	80	24,320

Riverwalk SEWER STUDY

TABLE 1								
SEWER FLOW SUMMARY								
LAND USE	AREA (SF)	AREA (ACRES)	UNITS	DENSITY (DU/AC)	POPULATION FACTOR (PEOPLE/UNIT)	EQUIVALENT POPULATION	UNIT FLOW (GPD/PERSON)	FLOW (GPD)
Lot 4 Residential	69,890.98	1.60	125	78	2.2	276	80	22,080
Lot 5 Residential	60,479.16	1.39	130	94	2.2	288	80	23,040
Lot 6 Residential	52,775.12	1.21	125	104	2.2	278	80	22,240
Lot 7 Residential	37,570.44	0.86	95	111	1.8	173	80	13,840
Lot 8 Residential	50,136.56	1.15	110	96	2.2	244	80	19,520
Lot 8 Retail	21,200.00	0.49	...	12.5	3.5	22	80	1,760
Lot 9 Retail	27,000.00	0.62	...	12.5	3.5	28	80	2,240
Lot 9 Office	41,400.00	0.95	...	10.9	3.5	37	80	2,960
Lot 10 Residential	74,044.32	1.70	45	27	3	138	80	11,040
Lot 10 Retail	21,600.00	0.50	...	12.5	3.5	22	80	1,760
Lot 11 Residential	47,785.52	1.10	95	87	2.2	210	80	16,800
Lot 12 Residential	47,385.16	1.09	95	88	2.2	211	80	16,880
Lot 13 Residential	44,346.33	1.02	95	94	2.2	211	80	16,880
Lot 14 Residential	48,458.94	1.11	105	95	2.2	233	80	18,640
Lot 15 Residential	42,178.77	0.97	120	124	1.8	217	80	17,360
Lot 16 Residential	97,969.16	2.25	170	76	2.2	377	80	30,160
Lot 17 Amenity (Office)	24,000.00	0.55	...	10.9	3.5	22	80	1,760
Lot 18 Residential	38,737.62	0.89	115	130	1.8	209	80	16,720
Lot 19 Residential	41,053.08	0.94	115	123	1.8	209	80	16,720
Lot 20 Residential	44,802.02	1.03	80	78	2.2	177	80	14,160
Lot 21 Residential	38,522.97	0.88	75	85	2.2	166	80	13,280

Riverwalk SEWER STUDY

TABLE 1								
SEWER FLOW SUMMARY								
LAND USE	AREA (SF)	AREA (ACRES)	UNITS	DENSITY (DU/AC)	POPULATION FACTOR (PEOPLE/UNIT)	EQUIVALENT POPULATION	UNIT FLOW (GPD/PERSON)	FLOW (GPD)
Lot 22 Residential	45,487.26	1.04	85	82	2.2	189	80	15,120
Lot 22 Retail	11,500.00	0.26	...	12.5	3.5	12	80	960
Lot 23 Retail	8,000.00	0.18	...	12.5	3.5	9	80	720
Lot 24 Office	23,600.00	0.54	...	10.9	3.5	21	80	1,680
Lot 24 Retail	14,000.00	0.32	...	12.5	3.5	15	80	1,200
Lot 25 Residential	46,265.28	1.06	115	109	1.8	209	80	16,720
Lot 25 Retail	5,000.00	0.11	...	12.5	3.5	6	80	480
Lot 26 Residential	43,756.16	1.00	105	105	2.2	233	80	18,640
Lot 27 Residential	75,270.06	1.73	145	84	2.2	320	80	25,600
Lot 28 Residential	92,502.46	2.12	145	69	2.4	352	80	28,160
Lot 29 Retail	2,000.00	0.05	...	12.5	3.5	3	80	240
Lot 30 Residential	77,130.42	1.77	150	85	2.2	332	80	26,560
Lot 31 Residential	138,018.30	3.17	185	59	2.4	449	80	35,920
Lot 32 Residential	88,371.52	2.03	135	67	2.4	327	80	26,160
Lot 33 Residential	77,159.19	1.77	140	80	2.2	312	80	24,960
Lot 34 Residential	47,981.99	1.10	115	105	2.2	255	80	20,400
Lot 34 Retail	3,100.00	0.07	...	12.5	3.5	4	80	320
Lot 35 Residential	40,535.30	0.93	115	124	1.8	208	80	16,640
Lot 36 Residential	34,200.20	0.79	80	102	2.2	177	80	14,160
Lot 37 Residential	35,057.42	0.80	85	106	2.2	188	80	15,040
Lot 38 Clubhouse Retail	5,000.00	0.11	...	12.5	3.5	6	80	480

Riverwalk SEWER STUDY

TABLE 1								
SEWER FLOW SUMMARY								
LAND USE	AREA (SF)	AREA (ACRES)	UNITS	DENSITY (DU/AC)	POPULATION FACTOR (PEOPLE/UNIT)	EQUIVALENT POPULATION	UNIT FLOW (GPD/PERSON)	FLOW (GPD)
Lot 39 Residential	58,323.74	1.34	105	79	2.2	233	80	18,640
Lot 39 Retail	5,000.00	0.11	...	12.5	3.5	6	80	480
Lot 40 Residential	59,112.65	1.36	110	82	2.2	245	80	19,600
Lot 41 Residential	107,558.12	2.47	175	71	2.4	421	80	33,680
Lot 42 Residential	131,356.87	3.02	265	88	2.2	584	80	46,720
Lot 43 Office	122,600.00	2.81	...	10.9	3.5	108	80	8,640
Lot 44 Retail	3,900.00	0.09	...	12.5	3.5	4	80	320
Lot 44 Office	118,600.00	2.72	...	10.9	3.5	104	80	8,320
Lot 45 Retail	5,000.00	0.11	...	12.5	3.5	6	80	480
Lot 46 Retail	3,200.00	0.07	...	12.5	3.5	4	80	320
Lot 46 Office	168,200.00	3.86	...	10.9	3.5	148	80	11,840
Lot 47 Retail	1,750.00	0.04	...	12.5	3.5	2	80	160
Lot 47 Office	87,350.00	2.01	...	10.9	3.5	77	80	6,160
Lot 48 Retail	1,750.00	0.04	...	12.5	3.5	2	80	160
Lot 48 Office	87,350.00	2.01	...	10.9	3.5	77	80	6,160
Lot 49 Office	175,450.00	4.03	...	10.9	3.5	154	80	12,320
Lot 50 Office	175,450.00	4.03	...	10.9	3.5	154	80	12,320
Lot 51 Retail	6,500.00	0.15	...	12.5	3.5	7	80	560
Lot 52 Retail	6,500.00	0.15	...	12.5	3.5	7	80	560
Proposed Total Flow								845,520
Net Increase								844,880

Riverwalk SEWER STUDY

Existing Sewer System:

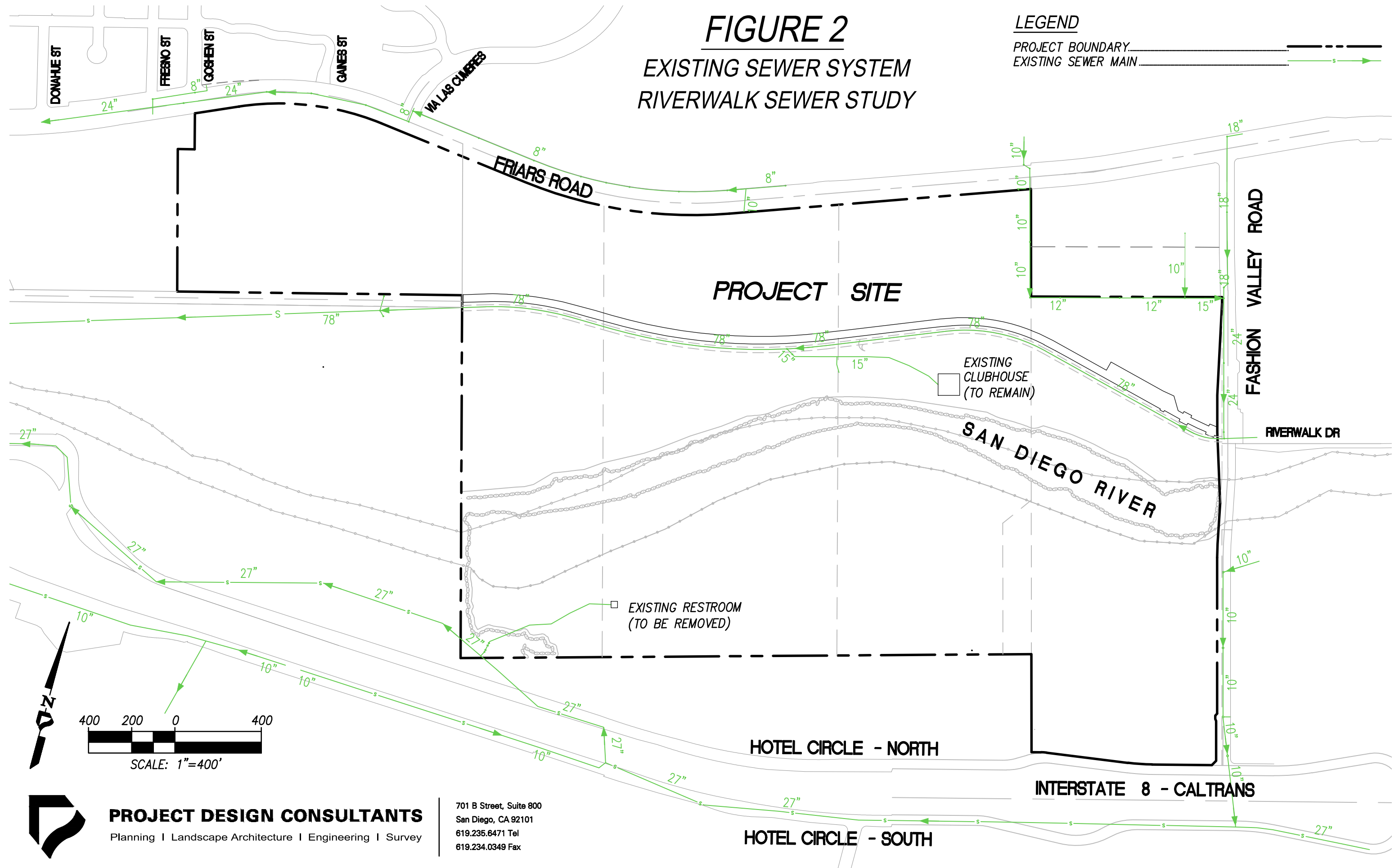
Per the SPLASH Utility Exhibit maintained by SANGIS and available record drawings, in the project site vicinity there are two sewer lines that convey flow to the 78-inch North Mission Valley Trunk Sewer. On-site there is an existing 15-inch line for the existing golf course clubhouse that conveys flow to the west. Off-site there is an existing 24-inch line in Fashion Valley Road that conveys flow to the south after it receives flow from offsite developments near the intersection of Friars Road and Fashion Valley Road. There is an existing 15-inch line stubbed out off-site that is currently not in use near the western portion of the project site. All three sewer lines connect to the 78-inch North Mission Valley Trunk Sewer. There is an existing private sewer lateral servicing the existing golf course restrooms near the southwest corner of the project site that conveys flow to the south. This private lateral connects to the 27-inch Mission Valley Trunk sewer that passes east to west through the southwest corner of the project site.

Refer to Figure 2 for the existing sewer system within and surrounding the project site.

FIGURE 2
EXISTING SEWER SYSTEM
RIVERWALK SEWER STUDY

LEGEND

PROJECT BOUNDARY: 
 EXISTING SEWER MAIN: 



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Riverwalk SEWER STUDY

Proposed Sewer System Analysis:

The project proposes to introduce four points of connection to the existing sewer system for four independent sewer systems. Refer to Figure 3 and Figure 4 for the proposed sewer system.

Point of connection one (POC #1) will connect to the northern unused off-site 15-inch line stub out near the western portion of the project site. Upstream of POC #1 are proposed public 12-inch and 10-inch sewer lines that make up the first sewer system (SYSTEM 1). SYSTEM 1 will convey sewage for twenty separate lots comprised of residential, retail, and office space with a cumulative total population served of 4,507. Prior to POC #1, the maximum depth/Diameter (d/D) ratio in this system in the proposed 12-inch line is 0.43.

Point of connection two (POC #2) will connect to the off-site 24-inch line in Fashion Valley Road. Upstream of POC #2 are proposed 10-inch sewer lines that make up the second sewer system (SYSTEM 2). SYSTEM 2 will convey sewage for two separate lots comprised of residential areas with a cumulative total population served of 1,005. Prior to POC #2, the maximum depth/Diameter (d/D) ratio in this system in the proposed 10-inch line is 0.25.

Point of connection three (POC #3) will connect to the southern unused off-site 15-inch line stub out near the western portion of the project site. Upstream of POC #3 are proposed 10-inch sewer lines that make up the third sewer system (SYSTEM 3). SYSTEM 3 will convey sewage for six separate lots comprised of residential and retail space with a cumulative total population served of 1,471. Prior to POC #3, the maximum depth/Diameter (d/D) ratio in this system in the proposed 10-inch line is 0.36.

Point of connection four (POC #4) will connect to the 78-inch North Mission Valley Trunk Sewer in an off-site existing manhole in Fashion Valley Road. Upstream of POC #4 are proposed 10-inch sewer lines that make up the fourth sewer system (SYSTEM 4). SYSTEM 4 will convey sewage for twenty-six separate lots comprised of residential, retail and office space, in addition to the future park facilities, with a cumulative total population served of 3,586. Prior to POC #4, the maximum depth/Diameter (d/D) ratio in this system in the proposed 10-inch line is 0.44.

The results of the analysis indicate that all proposed sewer systems are adequately sized by not exceeding the maximum depth/Diameter (d/D) of 0.5. Note, SYSTEM 4 has a sewer lines sections that do not meet the minimum 2 feet per second velocity requirement. However, the minimum slope for these sections are at least 1.0%. Refer to Appendix A for Sewer Design Guide references. Refer to Appendix B for the tabulated proposed sewer system analysis and Figure 4 for the corresponding sewer study exhibit. No assessment on the existing sewer system was required due to city confirmation that the existing 78-inch North Mission Valley Trunk Sewer has capacity for all projected future flows by Irina Itkin on June 12, 2018 via email.

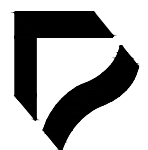
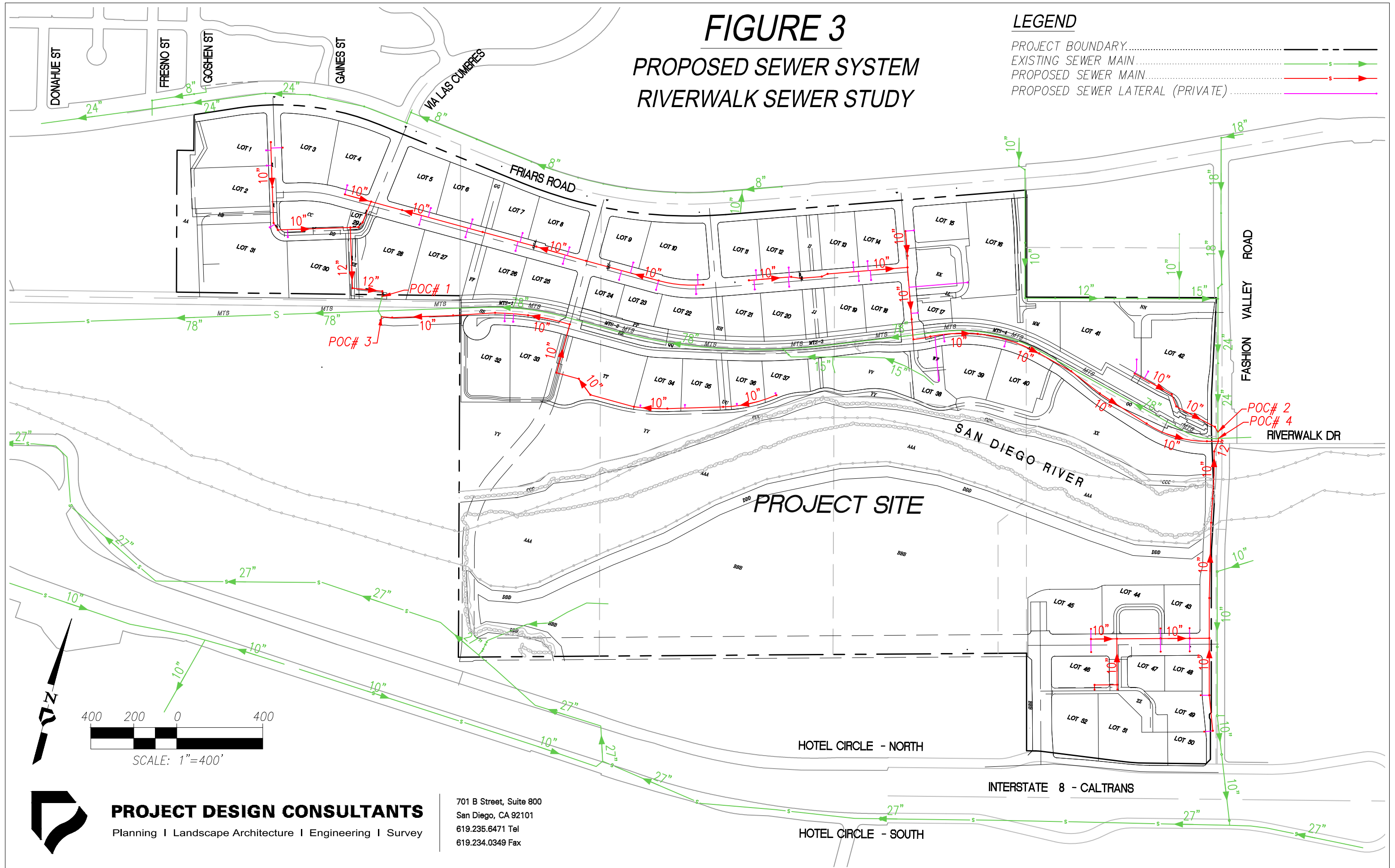
FIGURE 3

PROPOSED SEWER SYSTEM

RIVERWALK SEWER STUDY

LEGEND

PROJECT BOUNDARY.....
 EXISTING SEWER MAIN.....
 PROPOSED SEWER MAIN.....
 PROPOSED SEWER LATERAL (PRIVATE).....



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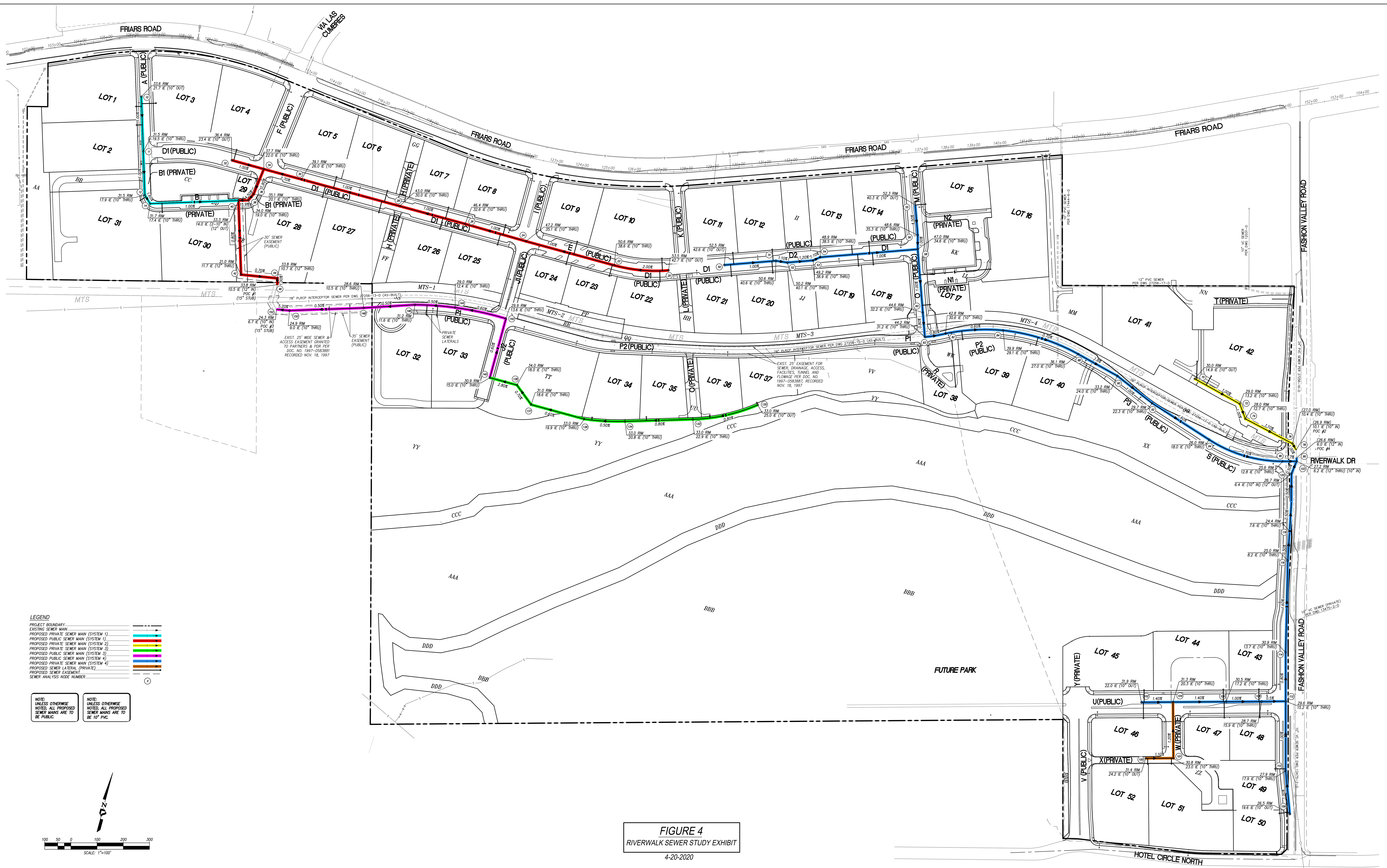
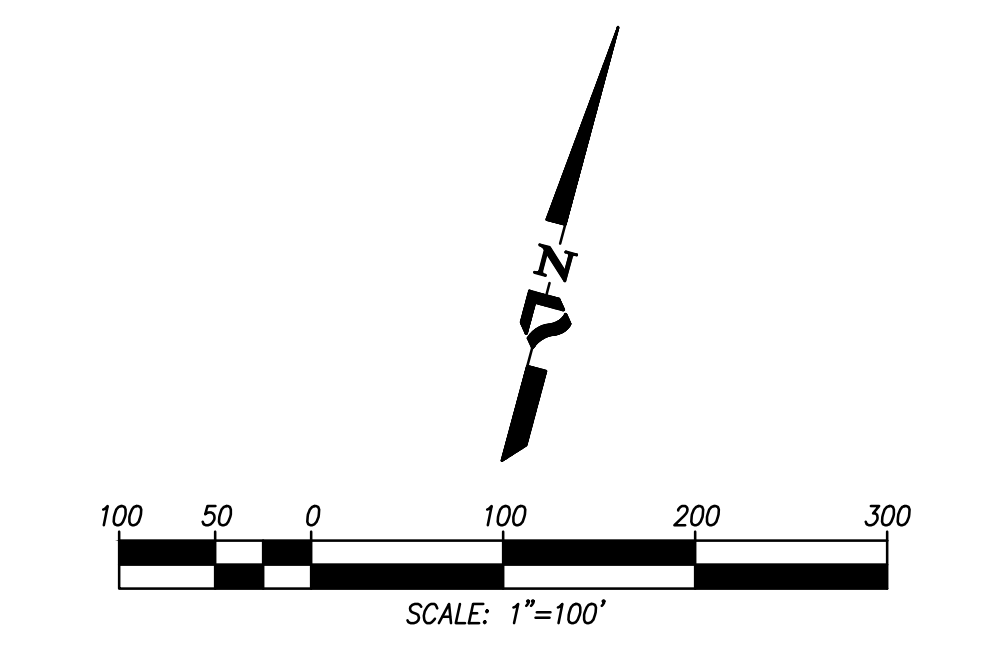


FIGURE 4
RIVERWALK SEWER STUDY EXHIBIT
4-20-2020

- LEGEND
- PROJECT BOUNDARY
 - EXISTING SEWER MAIN
 - PROPOSED PRIVATE SEWER MAIN (SYSTEM 1)
 - PROPOSED PUBLIC SEWER MAIN (SYSTEM 1)
 - PROPOSED PRIVATE SEWER MAIN (SYSTEM 2)
 - PROPOSED PRIVATE SEWER MAIN (SYSTEM 3)
 - PROPOSED PUBLIC SEWER MAIN (SYSTEM 3)
 - PROPOSED PRIVATE SEWER MAIN (SYSTEM 4)
 - PROPOSED PUBLIC SEWER MAIN (SYSTEM 4)
 - PROPOSED SEWER LATERAL (PRIVATE)
 - PROPOSED SEWER EASEMENT
 - SEWER ANALYSIS NODE NUMBER

NOTE: UNLESS OTHERWISE NOTED, ALL PROPOSED SEWER MAINS ARE TO BE PUBLIC.

NOTE: UNLESS OTHERWISE NOTED, ALL PROPOSED SEWER MAINS ARE TO BE 10" PVC.



Riverwalk SEWER STUDY

Conclusions:

The proposed Riverwalk project will include approximately 4,300 multi-family residential dwelling units; approximately 152,000 square feet of neighborhood retail space; approximately 1,000,000 square feet of office; approximately 106 acres of park, open space, and trails that would serve the project and surrounding community and would implement the San Diego River Park Master Plan; adaptive reuse of the existing golf clubhouse into a community amenity; and a new Green Line Trolley stop/transit center within the development. The proposed development intends to discharge 100% of its sewage into the aforementioned four points of connection which will ultimately be conveyed by the 78-inch North Mission Valley Trunk Sewer. Refer to Appendix B for the tabulated proposed sewer system analysis and Figure 4 for the corresponding sewer study exhibit.

Based on the proposed sewer system analysis, it is our professional opinion that the project can be serviced by constructing on-site gravity sewers and connecting to the existing City of San Diego sewer system.

Note: Examination of the existing sewer mains for gases that might corrode and/or result in post construction above ground odors/health issues was not part of this sewer study. The developer would need to hire a firm specializing in sewer main gas testing and analysis to handle such matters. This analysis can be performed at a future date during final engineering design.

**Riverwalk
SEWER STUDY**

EXHIBIT A

**COPY OF TABLE 1-1 AND FIGURE 1-1
FROM CITY OF SAN DIEGO
SEWER DESIGN GUIDE**

**Riverwalk
SEWER STUDY**

**TABLE 1-1
CITY OF SAN DIEGO SEWER DESIGN GUIDE
DENSITY CONVERSIONS**

Zone	Maximum Density (DU/Net Ac)	Population per DU	Equivalent Population (Pop/Net Ac)
AR-1-1, RE-1-1	0.1	3.5	0.4
RE-1-2	0.2	3.5	0.7
AR-1-2, RE-1-3	1	3.5	3.5
RS-1-1, RS-1-8	1	3.5	3.5
RS-1-2, RS-1-9	2	3.5	7.0
RS-1-3, RS-1-10	3	3.5	10.5
RS-1-4, RS-1-11	4	3.5	14.0
RS-1-5, RS-1-12	5	3.5	17.5
RS-1-6, RS-1-13	7	3.5	24.5
RS-1-7, RS-1-14	9	3.5	31.5
RX-1-1	11	3.4	37.4
RT-1-1	12	3.3	39.6
RX-1-2, RT-1-2, RU-1-1	14	3.2	44.8
RT-1-3, RM-1-2	17	3.1	52.7
RT-1-4	20	3.0	60.0
RM-1-3	22	3.0	66.0
RM-2-4	25	3.0	75.0
RM-2-5	29	3.0	87.0
RM-2-6	35	2.8	98.0
RM-3-7, RM-5-12	43	2.6	111.8
RM-3-8	54	2.4	129.6
RM-3-9	73	2.2	160.6
RM-4-10	109	1.8	196.2
RM-4-11	218	1.5	327.0

**Riverwalk
SEWER STUDY**

**TABLE 1-1
CITY OF SAN DIEGO SEWER DESIGN GUIDE
DENSITY CONVERSIONS (Continued)**

Zone	Maximum Density (DU / Net Ac)	Population Per DU	Equivalent Population (Pop/Net Ac)
Schools/Public	8.9	3.5	31.2
Offices	10.9	3.5	38.2*
Commercial/Hotels	12.5	3.5	43.7*
Industrial	17.9	3.5	62.5*
Hospital	42.9	3.5	150.0*

Figures with asterisk (*) represent equivalent population per floor of the building.

Definitions:

DU = Dwelling Units

Ac = Acreage

Pop = Population

Net Acreage is the developable lot area excluding areas that are dedicated as public streets in acres. Gross Area is the entire area in acres of the drainage basin, including lots, streets, etc.

For undeveloped areas, assume Net Acreage = 0.8 x Gross Area in Acres

For developed areas, calculate actual Net Acreage.

Tabulated figures are for general case. The tabulated figures shall not be used if more accurate figures are available.

Population is based on actual equivalent dwelling units (EDU) or the maximum estimate obtained from zoning.

Conversion of Fixture Units to Equivalent Dwelling Units (EDU): The Water Meter Data Card, maintained by the Development Services Department, contains a table of plumbing fixtures that should be used for determining the equivalent dwelling units (EDU's) for the purpose of estimating the rate of wastewater generation in residential, commercial, or industrial areas. Currently, the basis for conversion is: 20 fixtures = 1 EDU and 1 EDU = 280 gallons of wastewater per day.

In high rise building areas, flow rates shall be based on the most current, adopted edition of the applicable Plumbing Code, assuming one lateral per area. The most conservative flow rate shall govern.

Riverwalk SEWER STUDY

PUBLIC UTILITIES DEPARTMENT PEAKING FACTOR FOR SEWER FLOWS (Dry Weather)

Ratio of Peak to Average Flow* Versus Tributary Population

<u>Population</u>	<u>Ratio of Peak to Average Flow</u>	<u>Population</u>	<u>Ratio of Peak to Average Flow</u>
200	4.00	4,800	2.01
500	3.00	5,000	2.00
800	2.75	5,200	1.99
900	2.60	5,500	1.97
1,000	2.50	6,000	1.95
1,100	2.47	6,200	1.94
1,200	2.45	6,400	1.93
1,300	2.43	6,900	1.91
1,400	2.40	7,300	1.90
1,500	2.38	7,500	1.89
1,600	2.36	8,100	1.87
1,700	2.34	8,400	1.86
1,750	2.33	9,100	1.84
1,800	2.32	9,600	1.83
1,850	2.31	10,000	1.82
1,900	2.30	11,500	1.80
2,000	2.29	13,000	1.78
2,150	2.27	14,500	1.76
2,225	2.25	15,000	1.75
2,300	2.24	16,000	1.74
2,375	2.23	16,700	1.73
2,425	2.22	17,400	1.72
2,500	2.21	18,000	1.71
2,600	2.20	18,900	1.70
2,625	2.19	19,800	1.69
2,675	2.18	21,500	1.68
2,775	2.17	22,600	1.67
2,850	2.16	25,000	1.65
3,000	2.14	26,500	1.64
3,100	2.13	28,000	1.63
3,200	2.12	32,000	1.61
3,500	2.10	36,000	1.59
3,600	2.09	38,000	1.58
3,700	2.08	42,000	1.57
3,800	2.07	49,000	1.55
3,900	2.06	54,000	1.54
4,000	2.05	60,000	1.53
4,200	2.04	70,000	1.52
4,400	2.03	90,000	1.51
4,600	2.02	100,000+	1.50

*Based on formula: $\text{Peak Factor} = 6.2945 \times (\text{pop})^{-0.1342}$
(Holmes & Narver, 1960)

FIGURE 1-1

**Riverwalk
SEWER STUDY**

EXHIBIT B

PIPE HYDRAULIC CALCULATIONS

(Calculations performed using Hydraflow Extension for AutoCAD Civil 3D)

SEWER STUDY SUMMARY: PROPOSED CONDITIONS
RIVERWALK

WBS. NO. _____

FOR: CITY OF SAN DIEGO

BY: PROJECT DESIGN CONSULTANTS

SHEET 1 OF 1

DATE: 12/4/2019

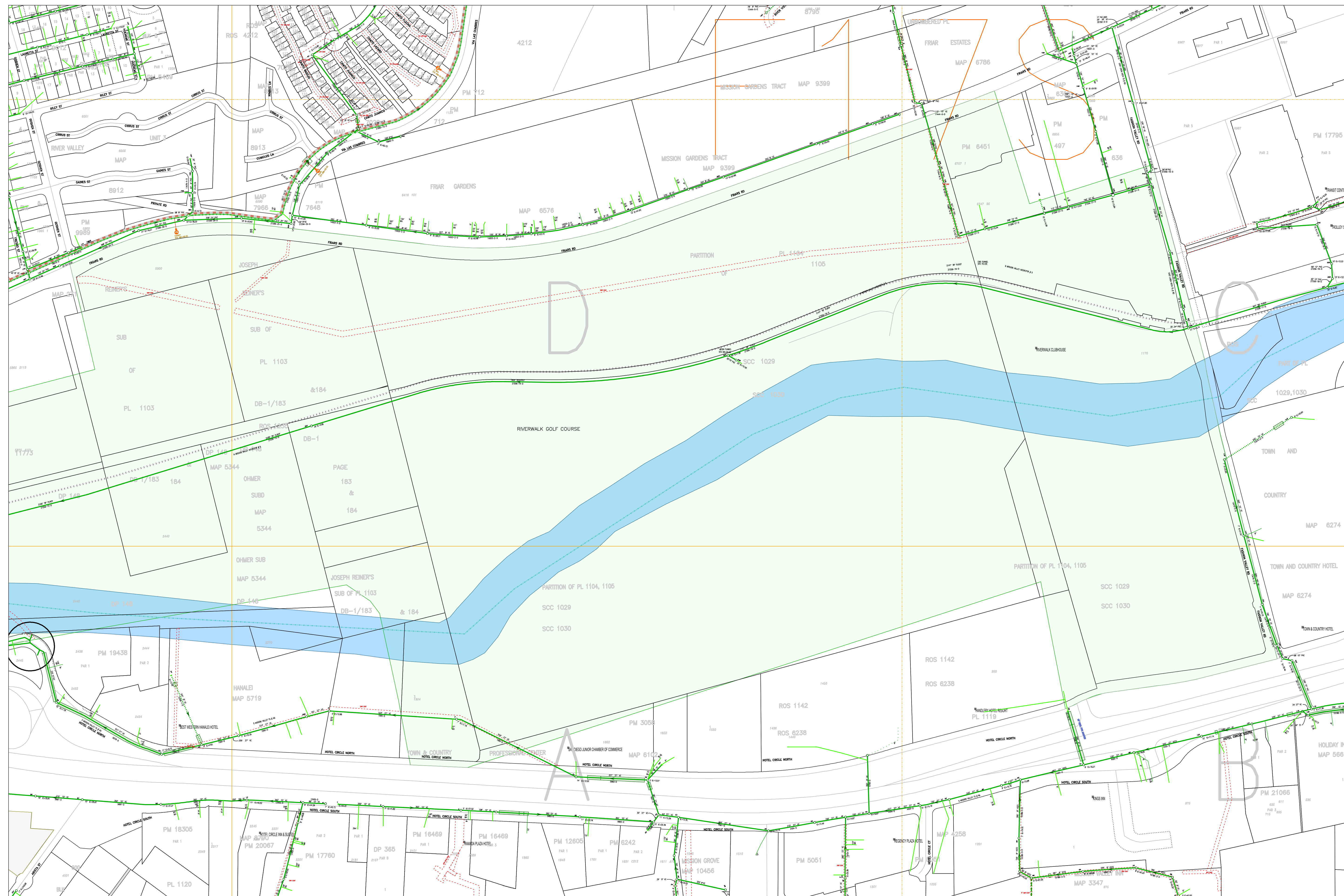
REFER TO PLAN SHEET: N/A

FROM	TO	POPULATION SERVED		SEWAGE PER CAPITA PER DAY (GPD)	AVERAGE DRY WEATHER FLOW (GPD)	DRY WEATHER PEAKING FACTOR	PEAK DRY WEATHER FLOW (GPD)	PEAK FLOW (DESIGN FLOW)		LINE DIAMETER (D) (in)	DESIGN SLOPE (%)	dn (FT)	dn/D	VELOCITY (FT/S)	REMARKS
		IN-LINE	CUMULATIVE TOTAL					MGD	CFS						
SYSTEM 1															
20	22	361	361	80	28,880	2.86	82,479	0.082	0.128	10	2.00	0.12	0.14	2.80	Lot 10 and 22 residential and retail
22	24	110	471	80	37,680	2.76	103,837	0.104	0.161	10	1.00	0.15	0.18	2.35	Lot 9 and 24 retail and office, lot 23 retail
24	26	481	952	80	76,160	2.51	190,966	0.191	0.295	10	1.00	0.21	0.25	2.81	Lot 8 and 25 residential and retail
26	28	406	1,358	80	108,640	2.39	259,726	0.260	0.402	10	1.00	0.24	0.29	3.07	Lot 7 and 26 residential
28	30	1,238	2,596	80	207,680	2.19	455,152	0.455	0.704	10	1.00	0.32	0.39	3.59	Lot 5, 6, 27 and 28 residential
30	34	0	2,596	80	207,680	2.19	455,152	0.455	0.704	10	2.70	0.25	0.30	5.13	...
32	34	276	276	80	22,080	2.96	65,372	0.065	0.101	10	1.00	0.12	0.15	2.05	Lot 4 residential
34	36	3	2,875	80	230,000	2.16	497,210	0.497	0.769	10	1.90	0.29	0.34	4.64	Lot 29 retail
36	38	0	2,875	80	230,000	2.16	497,210	0.497	0.769	10	4.50	0.23	0.27	6.32	...
38	40	0	2,875	80	230,000	2.16	497,210	0.497	0.769	10	15.90	0.17	0.20	9.89	...
10	12	851	851	80	68,080	2.55	173,294	0.173	0.268	10	1.00	0.20	0.24	2.73	Lot 1, 2, and 3 residential
12	14	449	1,300	80	104,000	2.40	250,094	0.250	0.387	10	1.00	0.24	0.28	3.03	Lot 31 residential
14	40	332	1,632	80	130,560	2.33	304,526	0.305	0.471	10	1.00	0.26	0.31	3.21	Lot 30 residential
40	42	0	4,507	80	360,560	2.04	733,816	0.734	1.135	12	0.80	0.41	0.41	3.72	...
42	44	0	4,507	80	360,560	2.04	733,816	0.734	1.135	12	0.70	0.43	0.43	3.55	...
44	46	0	4,507	80	360,560	2.04	733,816	0.734	1.135	12	1.00	0.39	0.39	4.04	Point of Connection 1
SYSTEM 2															
70	72	1,005	1,005	80	80,400	2.49	200,137	0.200	0.310	10	1.00	0.21	0.25	2.85	Lot 41 and 42 residential
72	74	0	1,005	80	80,400	2.49	200,137	0.200	0.310	10	1.00	0.21	0.25	2.85	...
74	76	0	1,005	80	80,400	2.49	200,137	0.200	0.310	10	1.10	0.21	0.25	2.94	...
76	78	0	1,005	80	80,400	2.49	200,137	0.200	0.310	10	1.00	0.21	0.25	2.85	Point of Connection 2
SYSTEM 3															
130	132	365	365	80	29,200	2.85	83,269	0.083	0.129	10	0.80	0.14	0.17	2.03	Lot 36 and 37 residential
132	134	208	573	80	45,840	2.68	123,044	0.123	0.190	10	0.80	0.18	0.21	2.28	Lot 35 residential
134	136	259	832	80	66,560	2.55	169,939	0.170	0.263	10	0.50	0.23	0.28	2.12	Lot 34 residential and retail
136	137	0	832	80	66,560	2.55	169,939	0.170	0.263	10	0.60	0.22	0.27	2.26	...
137	138	0	832	80	66,560	2.55	169,939	0.170	0.263	10	0.70	0.21	0.26	2.39	...
138	140	0	832	80	66,560	2.55	169,939	0.170	0.263	10	2.80	0.15	0.18	3.91	...
140	142	0	832	80	66,560	2.55	169,939	0.170	0.263	10	0.60	0.22	0.27	2.26	...
142	144	0	832	80	66,560	2.55	169,939	0.170	0.263	10	0.60	0.22	0.27	2.26	...
144	146	639	1,471	80	117,680	2.37	278,337	0.278	0.431	10	0.50	0.30	0.36	2.44	Lot 32 and 33 residential
146	148	0	1,471	80	117,680	2.37	278,337	0.278	0.431	10	0.50	0.30	0.36	2.44	...
148	150	0	1,471	80	117,680	2.37	278,337	0.278	0.431	10	0.50	0.30	0.36	2.44	...
150	152	0	1,471	80	117,680	2.37	278,337	0.278	0.431	10	5.20	0.17	0.20	5.62	Point of Connection 3
SYSTEM 4															
50	51	764	764	80	61,120	2.58	157,846	0.158	0.244	10	1.00	0.19	0.23	2.66	Lot 11, 12, 20 and 21 residential
51	52	0	764	80	61,120	2.58	157,846	0.158	0.244	10	1.10	0.18	0.22	2.75	...
52	53	0	764	80	61,120	2.58	157,846	0.158	0.244	10	1.20	0.18	0.22	2.83	...
53	54	0	764	80	61,120	2.58	157,846	0.158	0.244	10	1.10	0.18	0.22	2.75	...
54	58	862	1626	80	130,080	2.33	303,556	0.304	0.470	10	1.00	0.26	0.31	3.20	Lot 13, 14, 18 and 19 residential
55	56	217	217	80	17,360	3.06	53,083	0.053	0.082	10	4.50	0.08	0.09	3.26	Lot 15 residential
56	58	0	217	80	17,360	3.06	53,083	0.053	0.082	10	1.00	0.11	0.13	1.92	...
58	60	399	2242	80	179,360	2.24	400,896	0.401	0.620	10	1.00	0.30	0.36	3.46	Lot 16 residential and lot 17 amenity
60	62	0	2242	80	179,360	2.24	400,896	0.401	0.620	10	0.80	0.32	0.39	3.19	...
62	82	0	2242	80	179,360	2.24	400,896	0.401	0.620	10	0.80	0.32	0.39	3.19	...
82	84	245	2,487	80	198,960	2.20	438,558	0.439	0.679	10	0.60	0.37	0.44	2.94	Lot 38 and 39 retail, lot 39 residential
84	88	245	2,732	80	218,560	2.18	475,725	0.476	0.736	10	0.70	0.37	0.44	3.18	Lot 40 residential
88	90	0	2,732	80	218,560	2.18	475,725	0.476	0.736	10	1.80	0.28	0.34	4.49	...
90	92	0	2,732	80	218,560	2.18	475,725	0.476	0.736	10	1.00	0.33	0.40	3.63	...
92	94	0	2,732	80	218,560	2.18	475,725	0.476	0.736	10	1.60	0.29	0.35	4.30	...
94	96	0	2,732	80	218,560	2.18	475,725	0.476	0.736	10	1.70	0.29	0.35	4.40	...
96	122	0	2,732	80	218,560	2.18	475,725	0.476	0.736	10	13.70	0.17	0.20	9.26	...
100	101	14	14	80	1,120	4.42	4,947	0.005	0.008	10	1.10	0.04	0.04	0.97	Lot 51 and 52 retail
101	104	0	14	80	1,120	4.42	4,947	0.005	0.008	10	1.20	0.03	0.04	1.00	...
102	104	158	172	80	13,760	3.15	43,408	0.043	0.067	10	1.40	0.09	0.11	2.04	Lot 45 and 46 retail, lot 46 office
104	106	0	172	80	13,760	3.15	43,408	0.043	0.067	10	1.40	0.09	0.11	2.04	...
106	108	187	359	80	28,720	2.86	82,083	0.082	0.127	10	1.00	0.14	0.16	2.19	Lot 44 and lot 47 retail and office
108	112	187	546	80	43,680	2.70	118,008	0.118	0.183	10	0.60	0.18	0.22	2.04	Lot 43 office, lot 48 retail and office
109	110	154	154	80	12,320	3.20	39,446	0.039	0.061	10	1.00	0.10	0.11	1.76	Lot 50 office
110	112	154	308	80	24,640	2.92	71,885	0.072	0.111	10	1.00	0.13	0.15	2.11	Lot 49 office
112	114	0	854	80	68,320	2.54	173,823	0.174	0.269	10	0.80	0.21	0.25	2.52	...
114	116	0	854	80	68,320	2.54	173,823	0.174	0.269	10	1.60	0.18	0.21	3.23	...
116	118	0	854	80	68,320	2.54	173,823	0.174	0.269	10	0.50	0.23	0.28	2.13	...
118	120	0	854	80	68,320	2.54	173,823	0.174	0.269	10	0.50	0.23	0.28	2.13	...
120	122	0	854	80	68,320	2.54	173,823	0.174	0.269	10	0.50	0.23	0.28	2.13	...
122	80	0	3,586	80	286,880	2.10	602,050	0.602	0.932	12	0.80	0.37	0.37	3.53	Point of Connection 4

**Riverwalk
SEWER STUDY**

EXHIBIT C

SPLASH EXHIBIT- SEWER



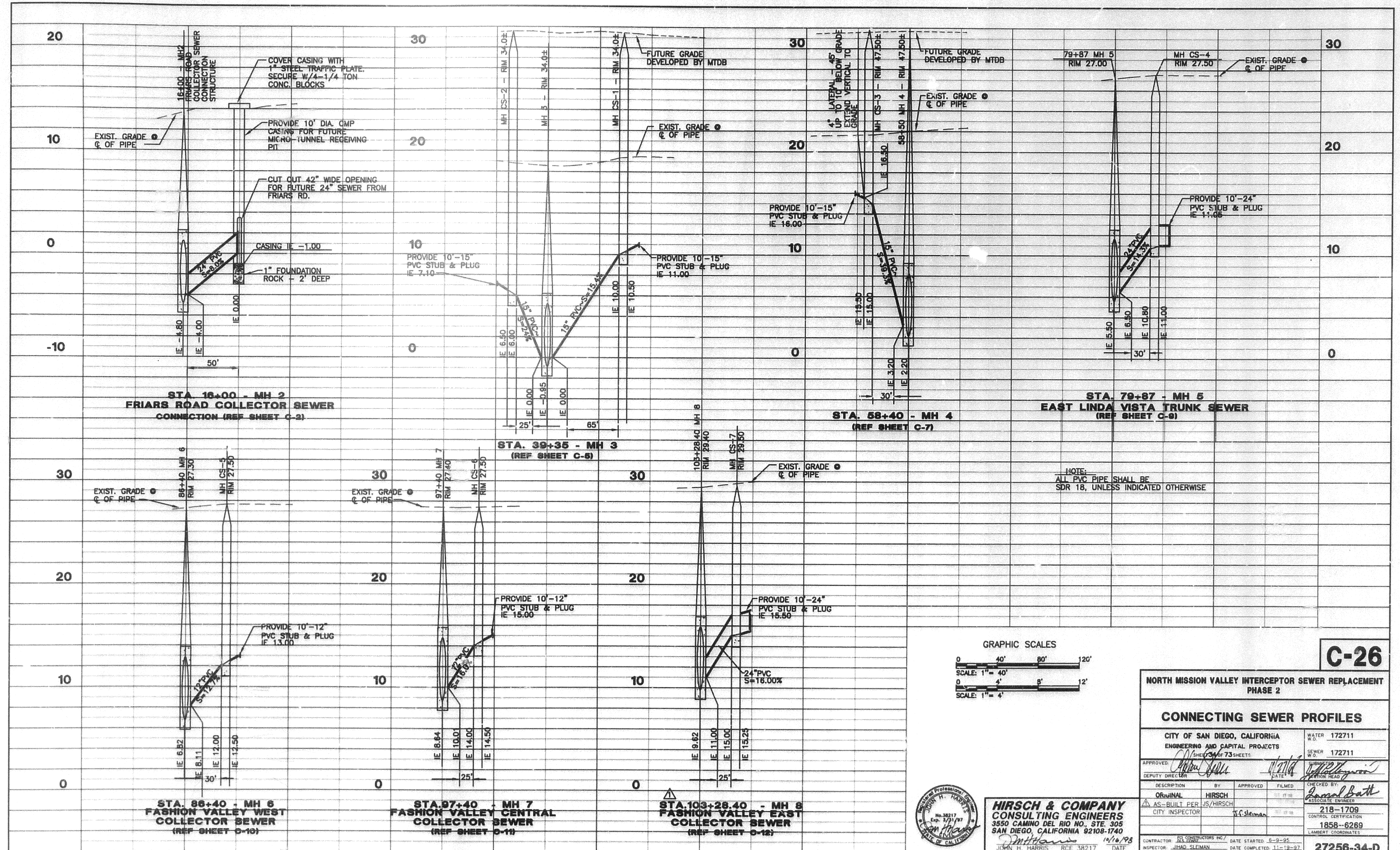
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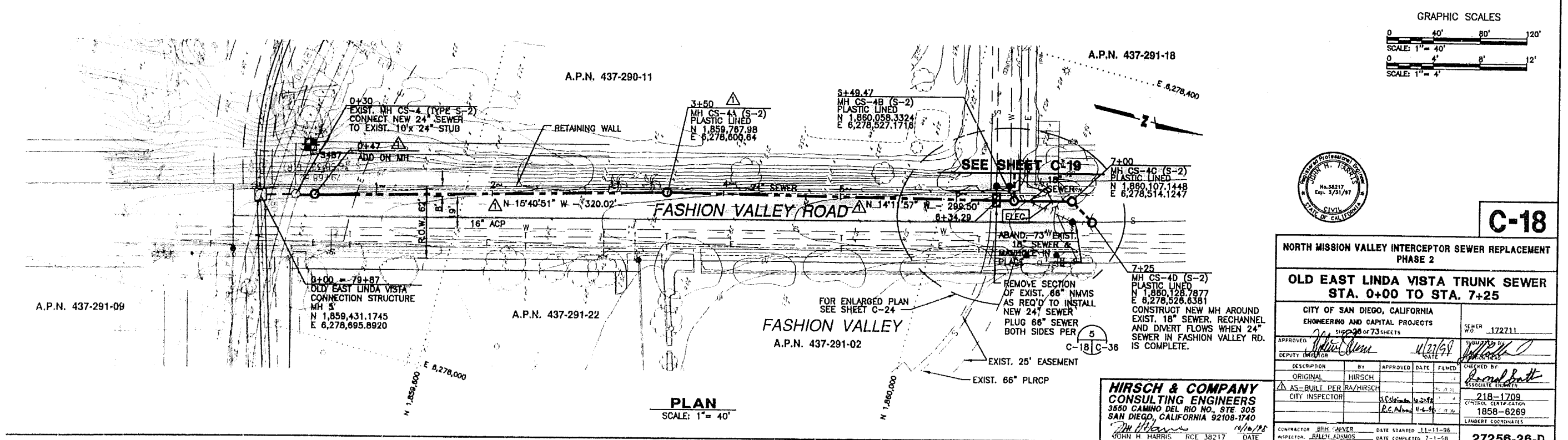
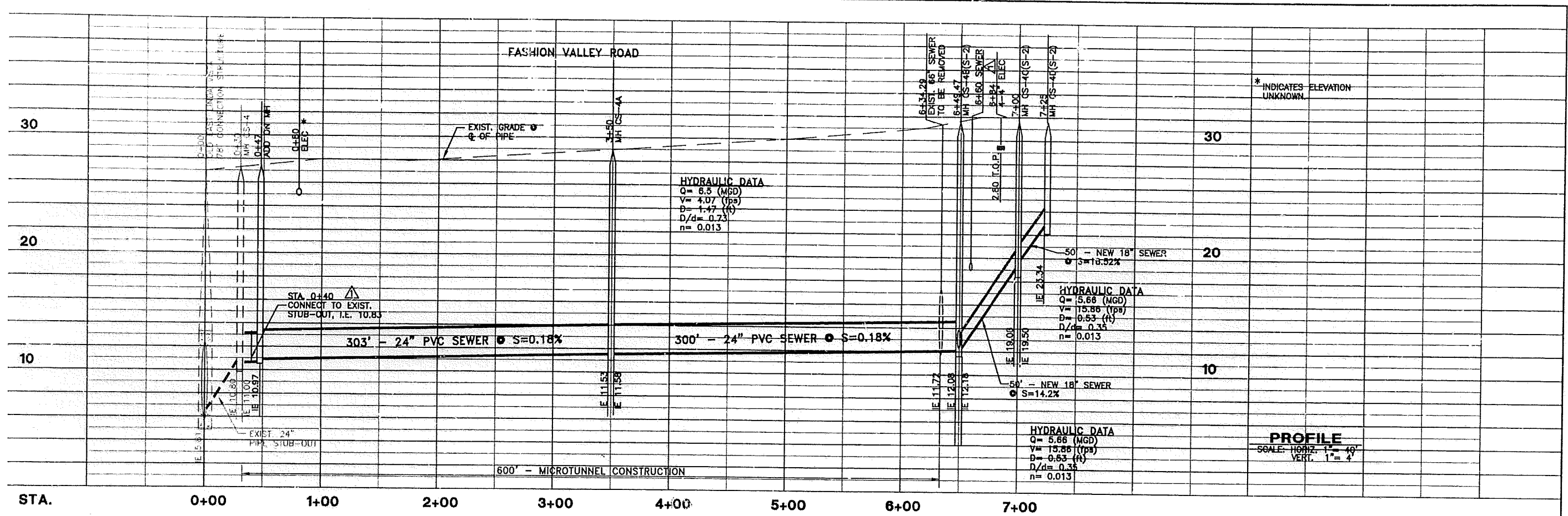
**Riverwalk
SEWER STUDY**

EXHIBIT D

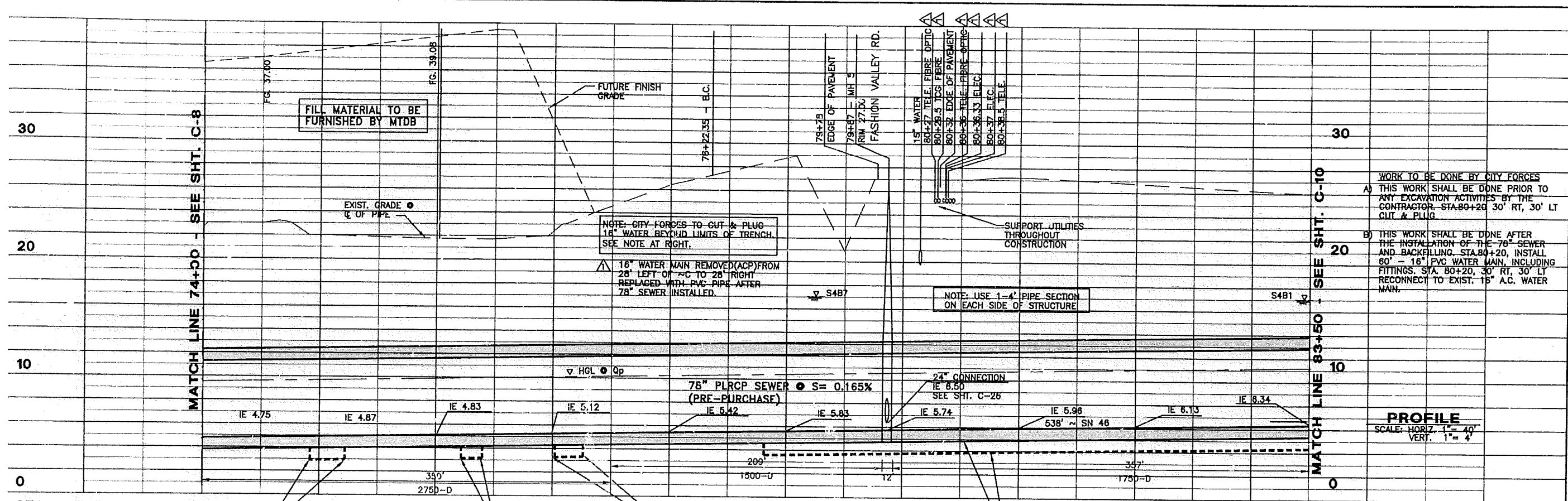
**CITY OF SAN DIEGO
RECORD DRAWINGS**



AS-BUILT



AS-BUILT



PROFILE
SCALE: HORIZ. 1" = 40'
VERT. 1" = 4'

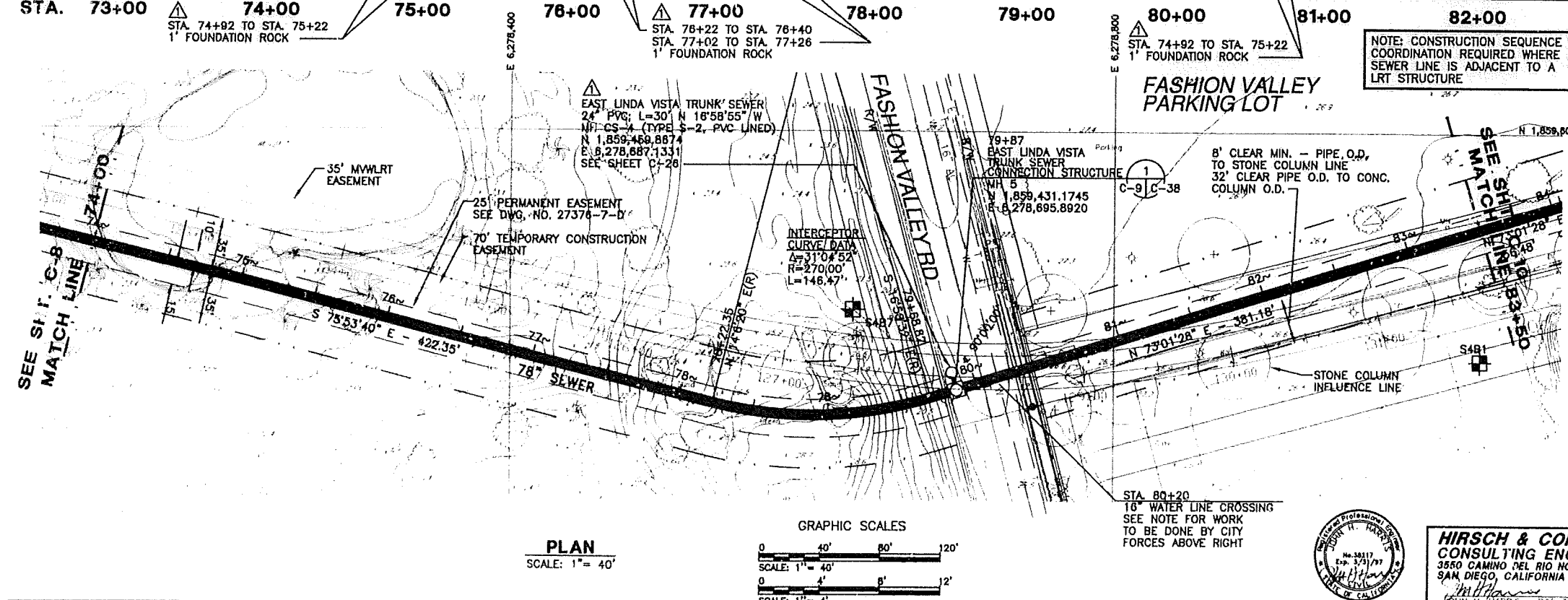
WORK TO BE DONE BY CITY FORCES
A) THIS WORK SHALL BE DONE PRIOR TO ANY EXCAVATION ACTIVITIES BY THE CONTRACTOR. STA. 80+20 30' RT, 30' LT CUT & PLUG.
B) THIS WORK SHALL BE DONE AFTER THE INSTALLATION OF THE 78" SEWER AND BACKFILLING. STA. 80+20, INSTALL 60" - 16" PVC WATER MAIN, INCLUDING FITTINGS. STA. 80+20, 30' RT, 30' LT RECONNECT TO EXIST. 18" A.C. WATER MAIN.

INTERCEPTOR HYDRAULIC DATA

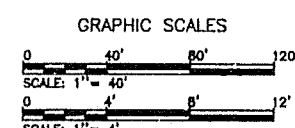
STATION	IE (ELEV.)	D (FT.)	HGL (ELEV.)	Qp (MGD)	V (FPS)	VH (FT.)	EGL (ELEV.)	Dc (FT.)	d (FT.)	D/d
74+00	4.77	4.89	4.46	120.0	7.23	0.81	10.27	3.63	6.50	0.72
78+83	5.71	4.72	10.43	120.0	7.19	0.80	11.23	3.63	6.50	0.72
79+87	5.74	4.78	10.51	118.0	6.98	0.78	11.27	3.60	6.50	0.74
83+80	6.34	4.72	11.06	118.0	7.07	0.78	11.84	3.60	6.50	0.73

NOTE: CONSTRUCTION SEQUENCE COORDINATION REQUIRED WHERE SEWER LINE IS ADJACENT TO A LRT STRUCTURE

ENVIRONMENTAL MITIGATION REQUIREMENTS REFER TO SPECIFICATIONS



PLAN
SCALE: 1" = 40'



HIRSCH & COMPANY
CONSULTING ENGINEERS
3550 CAMINO DEL RIO NO. 305
SAN DIEGO, CALIFORNIA 92108-1740
JOHN H. HIRSCH, P.E. 38217 DATE 11/16/98

C-9

NORTH MISSION VALLEY INTERCEPTOR SEWER REPLACEMENT PHASE 2

78" INTERCEPTOR STA. 74+00 TO STA. 83+50

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING AND CAPITAL PROJECTS

APPROVED: [Signature] DATE: 11/16/98
DEPUTY DIRECTOR: [Signature] DATE: 11/16/98

DESCRIPTION: 78" INTERCEPTOR SEWER REPLACEMENT
BY: HIRSCH
APPROVED: [Signature] DATE: 11/16/98
CITY INSPECTOR: [Signature] DATE: 11/16/98

SEWER NO. 172711
CHECKED BY: [Signature]
DATE: 11/16/98
ASSOCIATE ENGINEER: [Signature]
DATE: 11/16/98
CONTROL VERIFICATION: 218-1709
LABORER COORDINATES: 1858-8289

CONTRACTOR: [Signature] DATE STARTED: 5-9-98
ASPECTOR: JIMMY SLEMAN DATE COMPLETED: 11-19-98

27256-17-D