AVA PACIFIC BEACH

Public Sewer System Analysis

3823, 3863, 3913 Ingraham St & 3952 Jewell St,
SAN DIEGO, CA 92109

OCTOBER 2024

Project Applicant:
AvalonBay Communities, Inc.
2050 Main Street #1200
Irvine, CA 92614

Prepared By:

KIMLEY-HORN AND ASSOCIATES, INC.
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
(619)234-9411

Kimley»Horn

Contents

Tables

Kimley»Horn

1 INTRODUCTION

This report provides a public sewer study for the AVA Pacific Beach project in the City of San Diego. The project belongs to the Pacific Beach Community Plan area and is bordered by Ingraham St to the west, Fortuna Ave to the north, Jewell St to the east, and La Playa Ave to the south. See Figure 1 – Vicinity Map, below.

In the existing condition, the project location is occupied by 564 multi-family dwelling units. The project proposed to redevelop under-utilized parking areas within a 12.96-acre site with an additional 138 dwelling units.

The proposed units will be designed to connect to the gravity sewer that runs through the project site before connecting to the 24" main located in La Playa Ave.

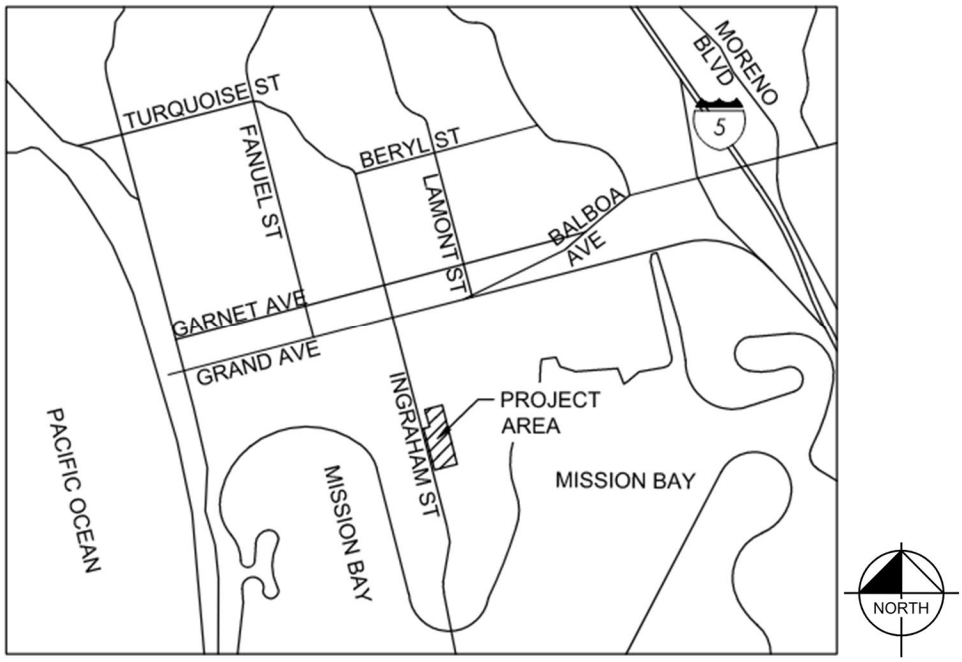


Figure 1 – Vicinity Map

2 PURPOSE OF STUDY

The purpose of this study is to analyze and determine if the existing public gravity sewer system is able to provide adequate capacity for the additional dwelling units it will serve as a part of the proposed project. The study will determine if the public sewer system will conform to the City of San Diego sewer system design standards with the additional flows introduced by the proposed project.

The sewer system to be analyzed includes the network of existing 8" sewer lines that exists within public easements on site as well as the existing public 24" sewer main within La Playa Ave.

Kimley»Horn

3 STUDY AREA

The study area of this sewer report includes the project area and offsite areas that are tributary to the sewer lines that are routed through the project site. The study area also includes the existing 24" sewer main belonging to La Jolla – Pacific Beach Trunk Sewer to which the project is tributary. The entirety of the La Jolla – Pacific Beach Trunk Sewer will not be analyzed as part of this study due to the project size and relatively minor expected wastewater generation compared to the sewer service area. See Attachment A for the Existing and Proposed Sewer Exhibit which encompasses the entirety of the study area.

The sewer from the proposed project will flow to the network of existing 8" sewer lines that exists onsite within public easements. These sewer lines collect flows from properties north of the project location as seen in the Existing and Proposed Sewer Exhibit. All flows that are tributary to the existing on-site sewer lines are considered in this sewer study.

4 CITY OF SAN DIEGO SEWER DESIGN CRITERIA

The sewer system for the proposed project is analyzed according to the Sewer Design Guide, Revised May 2015, City of San Diego Public Utilities Department. A summary of the design criteria is outlined in Table 1 below:

TABLE 1
City of San Diego Public Utilities Department
Sewer System Design Criteria

Criterion	Design Requirement	Design Guide Reference
Sewage Flow Generation	80 Gallons per Capita per Day	1.3.2.2
Dry Weather Peaking Factor	Holmes & Narver, 1960	1.3.2.2 / Figure 1-1
Wet Weather Peaking Factor	Basin Specific	1.3.2.2
Gravity Flow Hydraulic Formula	Manning's Equation	1.3.2.1
Manning's Coefficient	n=0.013	1.3.2.1
Desireable Gravity Flow Velocity	3 fps - 5 fps	1.3.2.1
Minimum Gravity Flow Velocity	2 fps	1.3.2.1
Maximum Gravity Flow Velocity	10 fps	1.3.2.1
Maximum Depth of Flow at Peak Wet Weather		
Pipe Diameter ≤ 15"	$d_n/D = 0.50$	1.3.2.3
Pipe Diameter ≥ 18"	$d_n/D = 0.75$	1.3.2.3
Required Capacity in Existing Sewer Systems Downstream of New Facilities	Projected peak wet weather flow of proposed development less than 10% of total capacity of downstream system	1.7.1

Kimley»Horn

5 AVA PACIFIC BEACH PROPOSED SEWER GENERATION

Sewer generated as part of the AVA Pacific Beach project was generated using the methods outlined in the City of San Diego's Sewer Design Guide. The on-site sewer system was analyzed with the total tributary flows. For off-site tributary flows, Table 1-1 – City of San Diego Sewer Design Guide Density Conversions was used to estimate equivalent population. The dry weather peaking factor was calculated using the Holmes and Narver equation: $PF = 6.2945 \times (pop)^{-0.1342}$. Due to high measured infiltration rates and low annual rainfall, the peak wet weather flow to peak dry weather flow is approximated as 1.0.

See Table 2 for Population Calculations. Table 3 and Table 4 show the existing and proposed sewage generation, respectively.

Table 2: Population Calculations

	Area of Interest	Reach	Area (acres)	Pop/Acre	Dwelling Units	Pop/DU	Population
Existing	Apartments - Zone RM-1-1	1	0.831	45	-	-	37
	School - Zone RM-2-5	2	6.870	31.2	-	-	214
	Houses - Zone RM-1-1	3	0.937	45	188	2.6	531
	AVA Apartments	4	-	-	376	2.6	978
	Total Existing Population						1760
Proposed Increase	Proposed Building 1	3	-	-	69	2.6	179.4
	Proposed Building 2	4	-	-	21	2.6	54.6
	Proposed Building 3		-	-	48	2.6	124.8
	Proposed Increase of Population						359

Table 3: Existing Sewer Generation													
Reach	From Node[1]	To Node[1]	POP. IN-LINE	TOTAL SERVED	PEAK DRY WEATHER FLOW			LINE SIZE (INCHES)	MIN. DESIGN SLOPE (%)	dn (ft)	dn/D	VELOCITY (fps)	COMMENTS
					PEAK/AVG RATIO	M.G.D.	CFS						
1	1	8	37	37	3.87	0.012	0.018	8	0.4%	0.07	0.10	0.91	Offsite Apts
2	2	3	214	214	3.06	0.053	0.081	8	2.0%	0.10	0.15	1.64	School
3	3	8	531	745	2.59	0.154	0.239	8	1.6%	0.20	0.30	3.19	Homes, AVA Apts.
4	8	14	978	1,760	2.31	0.325	0.503	8	0.4%	0.39	0.59	2.34	AVA Apts

Table 4: Proposed Sewer Generation													
Reach	From Node[1]	To Node[1]	POP. IN-LINE	TOTAL SERVED	PEAK DRY WEATHER FLOW			LINE SIZE (INCHES)	MIN. DESIGN SLOPE (%)	dn (ft)	dn/D	VELOCITY (fps)	COMMENTS
					PEAK/AVG RATIO	M.G.D.	CFS						
1	1	15	37	37	3.87	0.012	0.018	8	0.4%	0.07	0.10	0.91	Apartments
13	15	15.1	55	92	3.43	0.025	0.039	8	0.4%	0.10	0.15	1.16	Apartments, AVA BLDG 2
13.1	15.1	16	55	92	3.43	0.025	0.039	8	0.4%	0.10	0.15	1.16	Apartments
14	16	17	55	92	3.43	0.025	0.039	8	0.4%	0.10	0.15	1.16	Apartments
15	17	8	55	92	3.43	0.025	0.039	8	0.4%	0.10	0.15	1.16	Apartments
2	2	3	214	214	3.06	0.053	0.081	8	2.0%	0.10	0.15	2.51	School
3	3	4	710	925	2.52	0.186	0.288	8	1.6%	0.20	0.30	3.37	Homes, AVA BLDG 1, AVA Apts
4	4	5	710	925	2.52	0.186	0.288	8	1.6%	0.20	0.30	3.37	Homes, AVA Apts
5	5	6	710	925	2.52	0.186	0.288	8	1.6%	0.20	0.30	3.37	Homes, AVA Apts.
6	6	7	710	925	2.52	0.186	0.288	8	1.6%	0.20	0.30	3.37	Homes, AVA Apts.
7	7	8	710	925	2.52	0.186	0.288	8	1.6%	0.20	0.30	3.37	Homes, AVA Apts.
8	8	9	1,157	2,119	2.25	0.382	0.591	10	0.6%	0.34	0.41	2.83	AVA Apts
9	9	10	1,157	2,119	2.25	0.382	0.591	10	0.6%	0.34	0.41	2.44	AVA Apts
10	10	11	1,157	2,119	2.25	0.382	0.591	10	0.6%	0.34	0.41	2.44	AVA Apts
11	11	12	1,157	2,119	2.25	0.382	0.591	10	0.6%	0.34	0.41	2.44	AVA Apts

Looking at the normal depth to pipe diameter, Reach 4 of the existing system exceeds the city's design criteria, therefore this section of pipe will be upsized to 10-inches, bringing the dn/D to 0.41.

See **Attachment D** for the supporting Flowmaster sizing calculations.

6 PUBLIC SEWER SYSTEM ANALYSIS

The entirety of the proposed project is tributary to the existing 24" main located in La Playa Ave, which has a slope of 0.26%. At $d_n/D = 0.75$, this 24" main has a capacity of 10.52 CFS. Sewage to be generated as part of the proposed project amounts to 0.088CFS, which is equal to 0.84% of the total capacity of the 24" main. As projected sewage generated as part of the project does not exceed 10% of the public main's capacity, the public sewer system will not be analyzed, per Section 1.7.1 – "Required Capacity Downstream of New Gravity Sewers" of the City of San Diego Sewer Design Guide. See **Attachment C**: 24" Trunk Sewer – La Jolla – Pacific Beach – Capacity for calculations.

7 PROPOSED PUBLIC SEWER EASEMENTS

The proposed project will maintain the general sewer alignment that exists today. In order to ensure adequate access to the sewer lines, the project will dedicate sewer easements to the city which will provide vehicle access to all points of the proposed sewer line as shown in **Attachment B: Proposed**

Sewer Easement Exhibit. In instances where the easement is encroached upon by the existing balconies, the owner understands that special shoring will be required in the event the sewer line needs to be excavated. The pressures at the balcony column foundations were analyzed and it is estimated that the surcharge pressure on the utilities within the influence zone will be approximately 20 PSF; equivalent to a couple inches of soil depth, per the AVA Pacific Beach New Sewer Easement Memorandum, included herein as **Attachment E**.

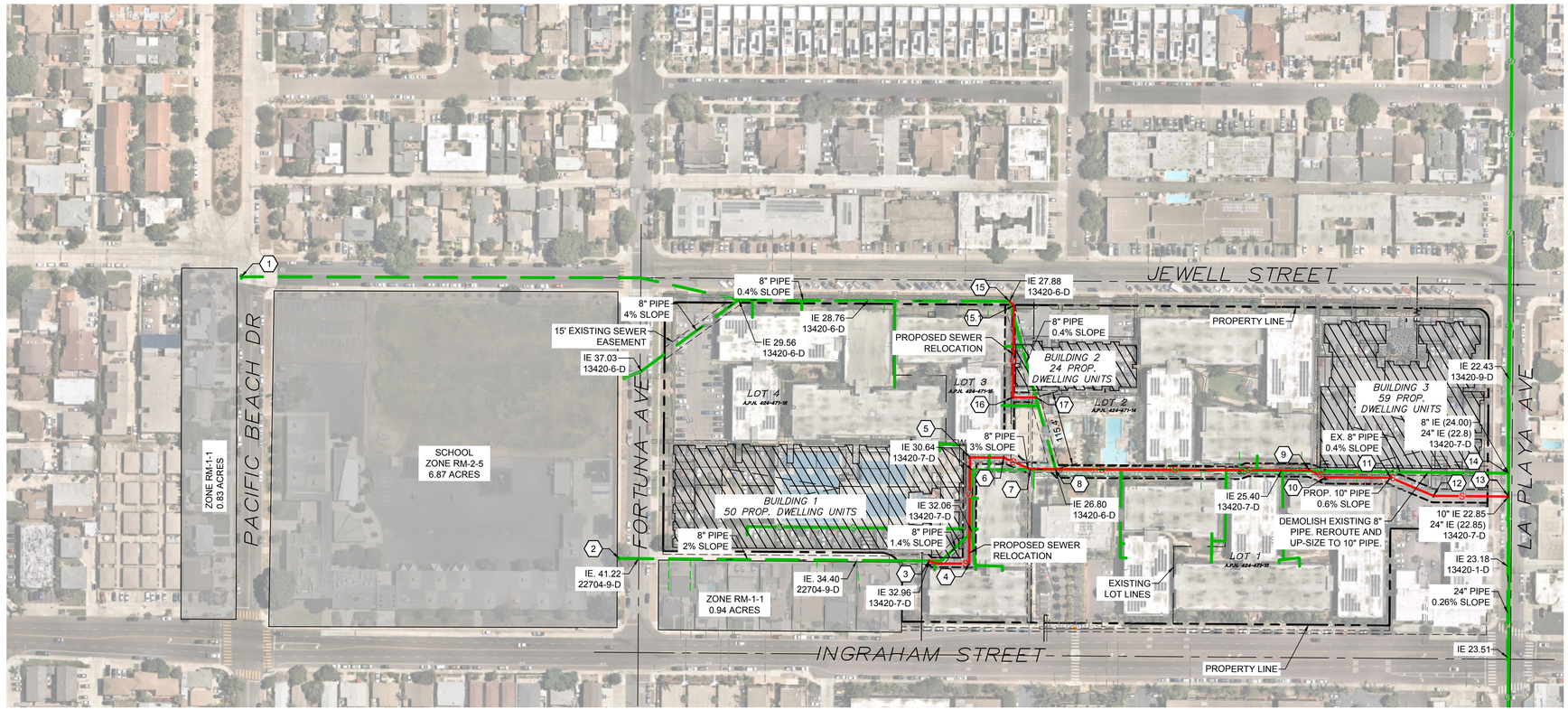
8 CONCLUSIONS AND RECOMMENDATIONS

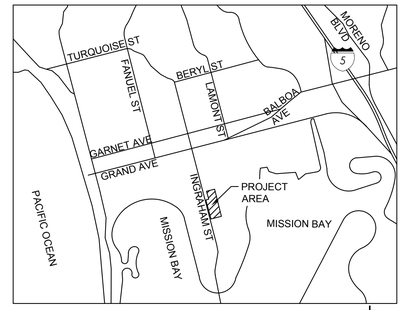
The proposed AVA Pacific Beach project will result in an increase of 0.088 CFS of sewage. These additional flows increase the d_n/D ratio, which exceed the city's design criteria in the existing condition between nodes 8 and 14. Thus, this section of pipe will be upsized to 10". Additionally, a portion of the proposed improvements will encroach into the existing 15' sewer easement that runs through the site. Where this occurs, the sewer line and associated easement will be re-routed to avoid the proposed improvements, see **Attachment A: Existing and Proposed Sewer Exhibit** for all pipes that are to be re-routed and/or resized.

The increase of 0.088 CFS of sewage to be produced as a result of the project are negligent compared to the overall capacity of the exiting 24" public sewer to which the project discharges, thus no improvements are necessary for the trunk sewer line to which the project is tributary.

Attachment A

Existing and Proposed Sewer Exhibit





VICINITY MAP

NTS

NORTH

GRAPHIC SCALE IN FEET

0 50 100 200

NORTH

LEGEND

- EXISTING ONSITE SEWER
- 24" PUBLIC SEWER MAIN LA JOLLA- PACIFIC BEACH - TS
- PROPOSED SEWER RELOCATION
- OFFSITE AREA TRIBUTARY TO ONSITE SEWER
- MANHOLE NODE ID (XX)

Table 3: Existing Sewer Generation

Reach	From Node[1]	To Node[1]	POP. IN-LINE	TOTAL SERVED	PEAK DRY WEATHER FLOW			LINE SIZE (INCHES)	MIN. DESIGN SLOPE (%)	dn (ft)	dn/D	VELOCITY (fps)	COMMENTS
					PEAK/AVG RATIO	M.G.D.	CFS						
1	1	8	37	37	3.87	0.012	0.018	8	0.4%	0.07	0.10	0.91	Offsite Apts
2	2	3	214	214	3.06	0.053	0.081	8	2.0%	0.10	0.15	1.64	School
3	3	8	531	745	2.59	0.154	0.239	8	1.6%	0.20	0.30	3.19	Homes, AVA Apts.
4	8	14	978	1,760	2.31	0.325	0.503	8	0.4%	0.39	0.59	2.34	AVA Apts

Table 4: Proposed Sewer Generation

Reach	From Node[1]	To Node[1]	POP. IN-LINE	TOTAL SERVED	PEAK DRY WEATHER FLOW			LINE SIZE (INCHES)	MIN. DESIGN SLOPE (%)	dn (ft)	dn/D	VELOCITY (fps)	COMMENTS
					PEAK/AVG RATIO	M.G.D.	CFS						
1	1	15	37	37	3.87	0.012	0.018	8	0.4%	0.07	0.10	0.91	Apartments
13	15	15.1	55	92	3.43	0.025	0.039	8	0.4%	0.10	0.15	1.16	Apartments, AVA BLDG 2
13.1	15.1	16	55	92	3.43	0.025	0.039	8	0.4%	0.10	0.15	1.16	Apartments
14	16	17	55	92	3.43	0.025	0.039	8	0.4%	0.10	0.15	1.16	Apartments
15	17	8	55	92	3.43	0.025	0.039	8	0.4%	0.10	0.15	1.16	Apartments
2	2	3	214	214	3.06	0.053	0.081	8	2.0%	0.10	0.15	2.51	School
3	3	4	710	925	2.52	0.186	0.288	8	1.6%	0.20	0.30	3.37	Homes, AVA BLDG 1, AVA Apts
4	4	5	710	925	2.52	0.186	0.288	8	1.6%	0.20	0.30	3.37	Homes, AVA Apts
5	5	6	710	925	2.52	0.186	0.288	8	1.6%	0.20	0.30	3.37	Homes, AVA Apts.
6	6	7	710	925	2.52	0.186	0.288	8	1.6%	0.20	0.30	3.37	Homes, AVA Apts.
7	7	8	710	925	2.52	0.186	0.288	8	1.6%	0.20	0.30	3.37	Homes, AVA Apts.
8	8	9	1,157	2,119	2.25	0.382	0.591	10	0.6%	0.34	0.41	2.83	AVA Apts
9	9	10	1,157	2,119	2.25	0.382	0.591	10	0.6%	0.34	0.41	2.44	AVA Apts
10	10	11	1,157	2,119	2.25	0.382	0.591	10	0.6%	0.34	0.41	2.44	AVA Apts
11	11	12	1,157	2,119	2.25	0.382	0.591	10	0.6%	0.34	0.41	2.44	AVA Apts

NOTE: REACH IDENTIFICATION LABELS CORRESPOND TO FLOWMASTER HYDRAULIC CALCULATIONS.

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
PHONE: 619-234-9411
WWW.KIMLEY-HORN.COM

EXISTING AND PROPOSED SEWER EXHIBIT
AVA PACIFIC BEACH
SAN DIEGO, CALIFORNIA

Attachment B

Proposed Sewer Easement Exhibit

LEGEND

- EXISTING SEWER
- PROPOSED SEWER
- PROPOSED SEWER EASEMENT
- EXISTING SEWER EASMENT TO BE VACATED

JEWELL STREET

FORTUNA AVENUE

LA PLAYA AVENUE

INGRAHAM STREET

PROPERTY LINE

15" EXISTING SEWER EASEMENT

PROPOSED SEWER EASEMENT

EXISTING SEWER EASEMENT TO BE VACATED

EXISTING SEWER EASEMENT

VEHICLE ACCESS ROAD. COMBINATION SIDEWALK, TURFBLOCK, AND CONCRETE BANDS

BUILDING 1

BUILDING 2

BUILDING 3

LOT 1
A.P.N. 424-471-13

LOT 2
A.P.N. 424-471-14

LOT 3
A.P.N. 424-471-15

LOT 4
A.P.N. 424-471-16

A

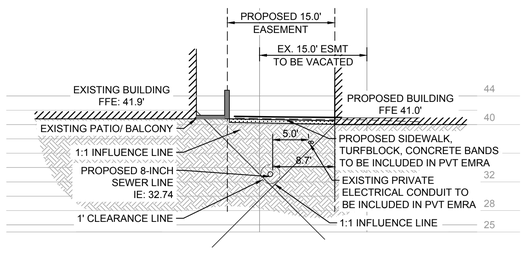
B

C

D

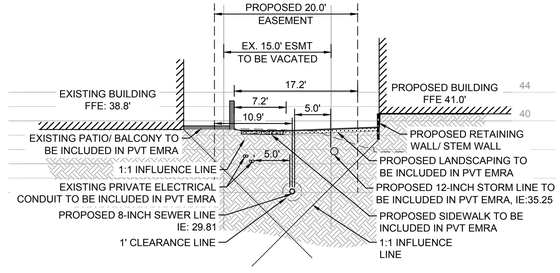
GRAPHIC SCALE IN FEET
0 25 50 100

NORTH



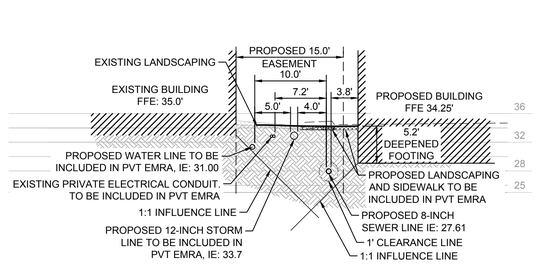
SEWER CROSS SECTION A-A

SCALE: 1" = 10'



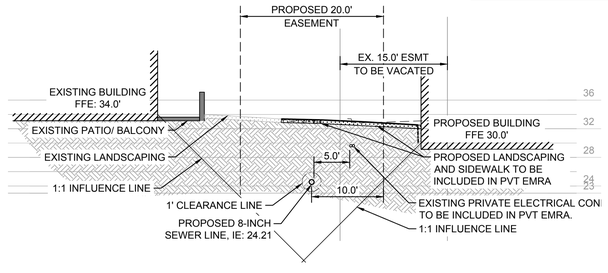
SEWER CROSS SECTION B-B

SCALE: 1" = 10'



SEWER CROSS SECTION C-C

SCALE: 1" = 10'



SEWER CROSS SECTION D-D

SCALE: 1" = 10'

Kimley»Horn

401 B STREET, SUITE 600, SAN DIEGO, CA 92101
PHONE: 619-234-9411
WWW.KIMLEY-HORN.COM

PROPOSED SEWER EASEMENT EXHIBIT
AVA PACIFIC BEACH
SAN DIEGO, CALIFORNIA

Attachment C

24” Trunk Sewer - Capacity

24" Trunk Sewer - La Jolla - Pacific Beach - Capacity

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.003 ft/ft
Normal Depth	18.0 in
Diameter	24.0 in

Results	
Discharge	10.52 cfs
Flow Area	2.5 ft²
Wetted Perimeter	4.2 ft
Hydraulic Radius	7.2 in
Top Width	1.73 ft
Critical Depth	13.9 in
Percent Full	75.0 %
Critical Slope	0.005 ft/ft
Velocity	4.16 ft/s
Velocity Head	0.27 ft
Specific Energy	1.77 ft
Froude Number	0.607
Maximum Discharge	12.41 cfs
Discharge Full	11.53 cfs
Slope Full	0.002 ft/ft
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	18.0 in
Critical Depth	13.9 in
Channel Slope	0.003 ft/ft
Critical Slope	0.005 ft/ft

Attachment D

On-Site Sewer System Flowmaster Sizing Calculations

Reach 1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.004 ft/ft
Diameter	8.0 in
Discharge	0.02 cfs

Results	
Normal Depth	0.1 ft
Flow Area	0.0 ft²
Wetted Perimeter	0.4 ft
Hydraulic Radius	0.0 ft
Top Width	0.41 ft
Critical Depth	0.1 ft
Percent Full	10.6 %
Critical Slope	0.008 ft/ft
Velocity	0.91 ft/s
Velocity Head	0.01 ft
Specific Energy	0.08 ft
Froude Number	0.731
Maximum Discharge	0.82 cfs
Discharge Full	0.76 cfs
Slope Full	0.000 ft/ft
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.1 ft
Critical Depth	0.1 ft
Channel Slope	0.004 ft/ft
Critical Slope	0.008 ft/ft

Reach 2

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.020 ft/ft
Diameter	8.0 in
Discharge	0.08 cfs

Results	
Normal Depth	0.1 ft
Flow Area	0.0 ft²
Wetted Perimeter	0.5 ft
Hydraulic Radius	0.1 ft
Top Width	0.47 ft
Critical Depth	0.1 ft
Percent Full	14.8 %
Critical Slope	0.007 ft/ft
Velocity	2.51 ft/s
Velocity Head	0.10 ft
Specific Energy	0.20 ft
Froude Number	1.696
Maximum Discharge	1.84 cfs
Discharge Full	1.71 cfs
Slope Full	0.000 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	14.8 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.1 ft
Critical Depth	0.1 ft
Channel Slope	0.020 ft/ft
Critical Slope	0.007 ft/ft

Reach 8

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.004 ft/ft
Diameter	8.0 in
Discharge	0.04 cfs

Results	
Normal Depth	0.1 ft
Flow Area	0.0 ft²
Wetted Perimeter	0.5 ft
Hydraulic Radius	0.1 ft
Top Width	0.48 ft
Critical Depth	0.1 ft
Percent Full	15.5 %
Critical Slope	0.007 ft/ft
Velocity	1.16 ft/s
Velocity Head	0.02 ft
Specific Energy	0.12 ft
Froude Number	0.762
Maximum Discharge	0.82 cfs
Discharge Full	0.76 cfs
Slope Full	0.000 ft/ft
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.1 ft
Critical Depth	0.1 ft
Channel Slope	0.004 ft/ft
Critical Slope	0.007 ft/ft

Reach 13/13.1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.004 ft/ft
Diameter	8.0 in
Discharge	0.04 cfs

Results	
Normal Depth	0.1 ft
Flow Area	0.0 ft²
Wetted Perimeter	0.5 ft
Hydraulic Radius	0.1 ft
Top Width	0.48 ft
Critical Depth	0.1 ft
Percent Full	15.5 %
Critical Slope	0.007 ft/ft
Velocity	1.16 ft/s
Velocity Head	0.02 ft
Specific Energy	0.12 ft
Froude Number	0.762
Maximum Discharge	0.82 cfs
Discharge Full	0.76 cfs
Slope Full	0.000 ft/ft
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.1 ft
Critical Depth	0.1 ft
Channel Slope	0.004 ft/ft
Critical Slope	0.007 ft/ft

Reach 14

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.004 ft/ft
Diameter	8.0 in
Discharge	0.04 cfs

Results	
Normal Depth	0.1 ft
Flow Area	0.0 ft²
Wetted Perimeter	0.5 ft
Hydraulic Radius	0.1 ft
Top Width	0.48 ft
Critical Depth	0.1 ft
Percent Full	15.5 %
Critical Slope	0.007 ft/ft
Velocity	1.16 ft/s
Velocity Head	0.02 ft
Specific Energy	0.12 ft
Froude Number	0.762
Maximum Discharge	0.82 cfs
Discharge Full	0.76 cfs
Slope Full	0.000 ft/ft
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.1 ft
Critical Depth	0.1 ft
Channel Slope	0.004 ft/ft
Critical Slope	0.007 ft/ft

Reach 15

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.004 ft/ft
Diameter	8.0 in
Discharge	0.04 cfs

Results	
Normal Depth	0.1 ft
Flow Area	0.0 ft²
Wetted Perimeter	0.5 ft
Hydraulic Radius	0.1 ft
Top Width	0.48 ft
Critical Depth	0.1 ft
Percent Full	15.5 %
Critical Slope	0.007 ft/ft
Velocity	1.16 ft/s
Velocity Head	0.02 ft
Specific Energy	0.12 ft
Froude Number	0.762
Maximum Discharge	0.82 cfs
Discharge Full	0.76 cfs
Slope Full	0.000 ft/ft
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.1 ft
Critical Depth	0.1 ft
Channel Slope	0.004 ft/ft
Critical Slope	0.007 ft/ft

Reach 3

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.016 ft/ft
Diameter	8.0 in
Discharge	0.29 cfs

Results	
Normal Depth	0.2 ft
Flow Area	0.1 ft²
Wetted Perimeter	0.8 ft
Hydraulic Radius	0.1 ft
Top Width	0.61 ft
Critical Depth	0.2 ft
Percent Full	29.4 %
Critical Slope	0.007 ft/ft
Velocity	3.36 ft/s
Velocity Head	0.18 ft
Specific Energy	0.37 ft
Froude Number	1.576
Maximum Discharge	1.64 cfs
Discharge Full	1.53 cfs
Slope Full	0.001 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	29.4 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.2 ft
Critical Depth	0.2 ft
Channel Slope	0.016 ft/ft
Critical Slope	0.007 ft/ft

Reach 4

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.016 ft/ft
Diameter	8.0 in
Discharge	0.29 cfs

Results	
Normal Depth	0.2 ft
Flow Area	0.1 ft²
Wetted Perimeter	0.8 ft
Hydraulic Radius	0.1 ft
Top Width	0.61 ft
Critical Depth	0.2 ft
Percent Full	29.4 %
Critical Slope	0.007 ft/ft
Velocity	3.36 ft/s
Velocity Head	0.18 ft
Specific Energy	0.37 ft
Froude Number	1.576
Maximum Discharge	1.64 cfs
Discharge Full	1.53 cfs
Slope Full	0.001 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	29.4 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.2 ft
Critical Depth	0.2 ft
Channel Slope	0.016 ft/ft
Critical Slope	0.007 ft/ft

Reach 5

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.016 ft/ft
Diameter	8.0 in
Discharge	0.29 cfs

Results	
Normal Depth	0.2 ft
Flow Area	0.1 ft²
Wetted Perimeter	0.8 ft
Hydraulic Radius	0.1 ft
Top Width	0.61 ft
Critical Depth	0.2 ft
Percent Full	29.4 %
Critical Slope	0.007 ft/ft
Velocity	3.36 ft/s
Velocity Head	0.18 ft
Specific Energy	0.37 ft
Froude Number	1.576
Maximum Discharge	1.64 cfs
Discharge Full	1.53 cfs
Slope Full	0.001 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	29.4 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.2 ft
Critical Depth	0.2 ft
Channel Slope	0.016 ft/ft
Critical Slope	0.007 ft/ft

Reach 6

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.016 ft/ft
Diameter	8.0 in
Discharge	0.29 cfs

Results	
Normal Depth	0.2 ft
Flow Area	0.1 ft²
Wetted Perimeter	0.8 ft
Hydraulic Radius	0.1 ft
Top Width	0.61 ft
Critical Depth	0.2 ft
Percent Full	29.4 %
Critical Slope	0.007 ft/ft
Velocity	3.36 ft/s
Velocity Head	0.18 ft
Specific Energy	0.37 ft
Froude Number	1.576
Maximum Discharge	1.64 cfs
Discharge Full	1.53 cfs
Slope Full	0.001 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	29.4 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.2 ft
Critical Depth	0.2 ft
Channel Slope	0.016 ft/ft
Critical Slope	0.007 ft/ft

Reach 7

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.016 ft/ft
Diameter	8.0 in
Discharge	0.29 cfs

Results	
Normal Depth	0.2 ft
Flow Area	0.1 ft²
Wetted Perimeter	0.8 ft
Hydraulic Radius	0.1 ft
Top Width	0.61 ft
Critical Depth	0.2 ft
Percent Full	29.4 %
Critical Slope	0.007 ft/ft
Velocity	3.36 ft/s
Velocity Head	0.18 ft
Specific Energy	0.37 ft
Froude Number	1.576
Maximum Discharge	1.64 cfs
Discharge Full	1.53 cfs
Slope Full	0.001 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	29.4 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.2 ft
Critical Depth	0.2 ft
Channel Slope	0.016 ft/ft
Critical Slope	0.007 ft/ft

Reach 9

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.006 ft/ft
Diameter	10.0 in
Discharge	0.59 cfs

Results	
Normal Depth	0.3 ft
Flow Area	0.2 ft²
Wetted Perimeter	1.2 ft
Hydraulic Radius	0.2 ft
Top Width	0.82 ft
Critical Depth	0.3 ft
Percent Full	40.8 %
Critical Slope	0.006 ft/ft
Velocity	2.83 ft/s
Velocity Head	0.12 ft
Specific Energy	0.46 ft
Froude Number	0.988
Maximum Discharge	1.83 cfs
Discharge Full	1.70 cfs
Slope Full	0.001 ft/ft
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.3 ft
Critical Depth	0.3 ft
Channel Slope	0.006 ft/ft
Critical Slope	0.006 ft/ft

Reach 10

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.006 ft/ft
Diameter	10.0 in
Discharge	0.59 cfs

Results	
Normal Depth	0.3 ft
Flow Area	0.2 ft²
Wetted Perimeter	1.2 ft
Hydraulic Radius	0.2 ft
Top Width	0.82 ft
Critical Depth	0.3 ft
Percent Full	40.8 %
Critical Slope	0.006 ft/ft
Velocity	2.83 ft/s
Velocity Head	0.12 ft
Specific Energy	0.46 ft
Froude Number	0.988
Maximum Discharge	1.83 cfs
Discharge Full	1.70 cfs
Slope Full	0.001 ft/ft
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.3 ft
Critical Depth	0.3 ft
Channel Slope	0.006 ft/ft
Critical Slope	0.006 ft/ft

Reach 11

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.006 ft/ft
Diameter	10.0 in
Discharge	0.59 cfs

Results	
Normal Depth	0.3 ft
Flow Area	0.2 ft²
Wetted Perimeter	1.2 ft
Hydraulic Radius	0.2 ft
Top Width	0.82 ft
Critical Depth	0.3 ft
Percent Full	40.8 %
Critical Slope	0.006 ft/ft
Velocity	2.83 ft/s
Velocity Head	0.12 ft
Specific Energy	0.46 ft
Froude Number	0.988
Maximum Discharge	1.83 cfs
Discharge Full	1.70 cfs
Slope Full	0.001 ft/ft
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.3 ft
Critical Depth	0.3 ft
Channel Slope	0.006 ft/ft
Critical Slope	0.006 ft/ft

Reach 12

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.006 ft/ft
Diameter	10.0 in
Discharge	0.59 cfs

Results	
Normal Depth	0.3 ft
Flow Area	0.2 ft²
Wetted Perimeter	1.2 ft
Hydraulic Radius	0.2 ft
Top Width	0.82 ft
Critical Depth	0.3 ft
Percent Full	40.8 %
Critical Slope	0.006 ft/ft
Velocity	2.83 ft/s
Velocity Head	0.12 ft
Specific Energy	0.46 ft
Froude Number	0.988
Maximum Discharge	1.83 cfs
Discharge Full	1.70 cfs
Slope Full	0.001 ft/ft
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.3 ft
Critical Depth	0.3 ft
Channel Slope	0.006 ft/ft
Critical Slope	0.006 ft/ft

Attachment E

AVA Pacific Beach New Sewer Easement Memorandum – VCA Project No.: 10-11941

MEMO

February 15, 2023

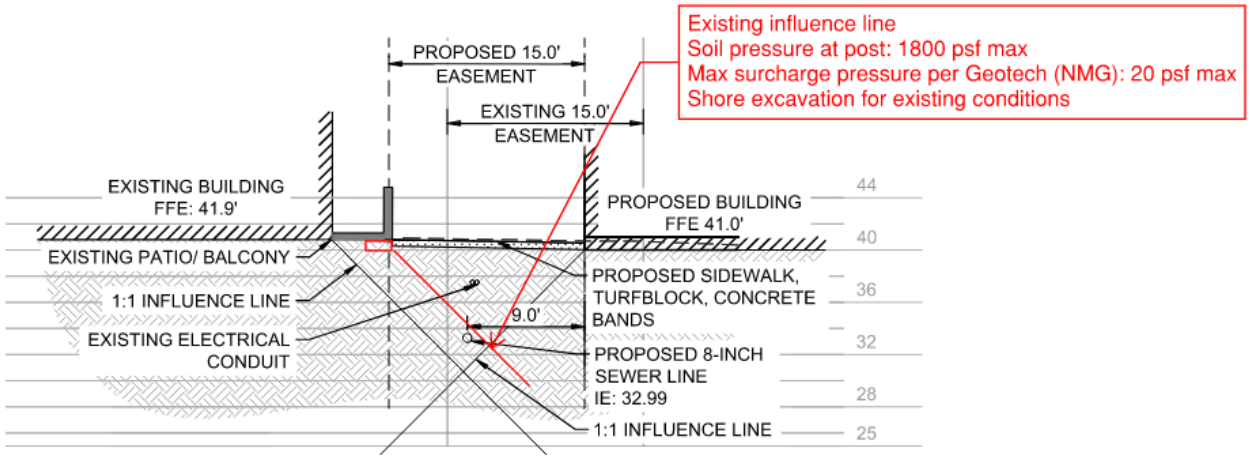
AvalonBay Communities
Attn: Sofia Zamora
11111 Santa Monica Blvd, Suite 1700
Los Angeles, CA 90025

Re: AVA Pacific Beach
New Sewer Easment
VCA Project No.: 10-11941

The intent of the project design is to provide the required utility easement for the new sewer line while maintaining the existing building balconies. The attached sketches indicate the influence line to the new sewer based on an estimation of the existing balcony loads and footing conditions. The existing buildings have influence zones that overlaps the new sewer as shown in civil sections A-A and B-B below.

The maximum soil pressure in the review was limited to 1800 psf. Based on this pressure at the balcony column foundations, the geotechnical engineer estimates that the surcharge pressure on utilities within the influence zone will be approximately 20 psf. This is a small surcharge pressure and is equivalent to a couple of inches of soil depth.

To install the new utilities the trench will need to be braced or shored due to the depth to the new sewer line as well as the proximity to the other existing utilities adjacent to the new sewer and the existing balcony foundations.

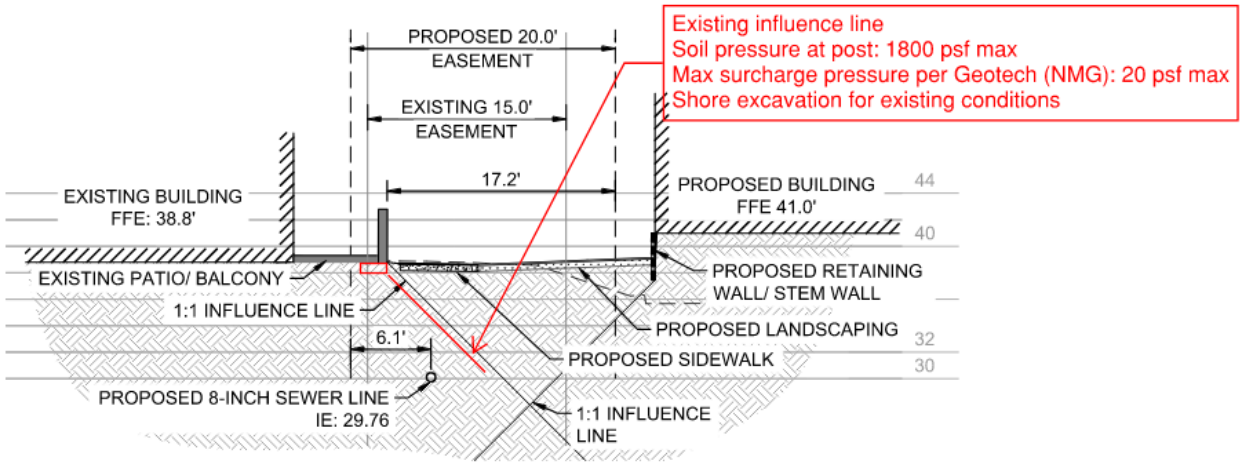


SEWER CROSS SECTION A-A

SCALE: 1" = 10'

VCA Structural

MEMO



SEWER CROSS SECTION B-B

SCALE: 1" = 10'

VCA Structural
Brett Kaufmann, S.E.
Principal