



Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING

Sewer Capacity Study

Sequoia Commerce Center

Southeast Corner of 190th Street and Van Ness Avenue
Torrance, CA
APN: 7352-016-001, 002, 003
P24-07

PREPARED FOR:

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March 14, 2024

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TEI Job No. 4221

SEWER CAPACITY STUDY
FOR
SEQUOIA COMMERCE CENTER.

PREPARED UNDER
THE SUPERVISION OF

REINHARD STENZEL , PE DATE

R.C.E. 56155

EXP. 12/31/24

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1. INTRODUCTION

A. Project Location

The project site is located along the east side of Van Ness Avenue between West 190th Street and 195th in the city of Torrance, California. Please see the following page for a vicinity map.

B. Study Purpose

The purpose of this study is to analyze the impacts this project will have on the local sanitary sewer lines. The study includes all tributary flow in the sewer system from the project site to the 48-inch LACSD trunk line.

2. PROJECT DESCRIPTION

The project site is approximately 14.02 acres. The site is currently used as a business park with multiple buildings and auto parking throughout. The project proposes to construct two industrial type III-B warehouse buildings. The building will be supported by truck yards, auto parking, drive aisles, and landscaping. Each building will have their own sewer lateral connection to an offsite sewer.

Building One

Building one has an area of 112,700 square feet on a 6.4-acre lot. The LACSD 48-inch sewer trunk runs along building one's western frontage in Van Ness Avenue. Building one will be connecting to the existing 18-inch sewer line in West 190th Street. From here the flow will continue west to connect to the trunk line in Van Ness Avenue which is approximately 400 feet away.

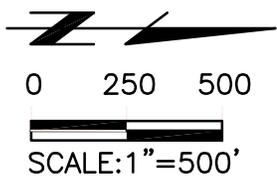
Building Two

Building two has an area of 147,500 square feet on a 7.79-acre lot. The LACSD 48-inch sewer trunk runs along building two's western frontage in Van Ness Avenue. A direct connection to the trunk will be made with a 6-inch lateral on the southern end of the building. Therefore, the tributary area affecting the trunk in Van Ness Avenue will be solely the 147,500 square-feet of building two.

Please refer the following page for a vicinity map and Appendix A for Figure 1-1, Sewer Facilities Map



Vicinity Map of Sequoia Commerce Center



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3. SEWER CAPACITY ANALYSIS

Each building within the project site was analyzed individually due to their independent sewer connections. Building one utilizes a 6-inch lateral for its connection to West 190th Street. Building one is analyzed with the tributary area because it does not make a direct connection to the sewer trunk like building two does. Building two utilizes a 6-inch lateral for its connection directly to the sewer trunk in Van Ness Avenue. Per the County of Los Angeles Estimated Average Daily Sewage Flow both buildings were analyzed as industrial with a zoning coefficient of 0.021 cfs/acre. Please see table 1.1 below to see the on-site sewer generation rate for building two as well as the d/D value.

Table 1.1 On-Site Sewer Connection from Building 2 to Van Ness Trunk

Table 1.1 On-site Sewer Connection FROM Building 2 to Van Ness Trunk												
Location	Pipe		*Capacity (cfs)	Building Area (acre)	Zone Type	Coefficient (cfs/acre)	Average Flow (cfs)	Peak Flow Factor	Peak Flow (cfs)	Depth (ft)	Velocity (ft/sec)	d/D (ft/ft)
	Size (ft.)	Slope (ft/ft)	1/2 Full(<15")									
Building 2 Connection to Van Ness Trunk	0.5	0.02	0.400	3.39	M-2	0.021	0.07	2.5	0.18	0.21	3.03	0.42
* Calculated using Kutter's Formula with n=0.013 (as in S-C4 graph in PC Procedural Manual)												
Software Used: AES 2016 HELE 1 - Nonpressure flow analysis												

Table 1.1 is representative of the added flow to the sewer trunk in Van Ness Avenue due to the direct connection.

The existing sewer pipes were analyzed using the County of Los Angeles Department of Public Works (LADPW) Sewer Manual S-C4 chart for a maximum design capacity. Maximum design capacity is as follows, half full for pipes less than 15-inches, three-quarters full for pipes larger than 15-inches. The chart is based on Kutter's Formula. The cumulative calculated flow for each segment was compared to the sewer capacity at each segment. The equation for the tributary sewer discharge is:

$$Q_{ave} = ZA$$

Where, Q_{ave} = Average Sewer Discharge (cfs)

Z = Estimated Average Daily Sewer Flow (cfs/acre)

A = Parcel Area (acres)

To account for peak flow rates at various times of the day, peak flow discharge is estimated by:

$$Q_{peak} = Q_{ave} \times PF$$

Where, Q_{peak} – Peak Sewer Discharge (cfs)

Q_{ave} = Average Sewer discharge (cfs)

PF = Peaking Factor = 2.5 (Applied to proposed and existing flow rates)

The tributary area is approximately 89.04 acres. With the addition of the Sequoia Commerce Center, the tributary area increases by the area of building one (2.59 acres). Table 1.2 illustrates how the average and peak sewage flow from the tributary area was determined. In the proposed condition, Table 1.3 shows the tributary area's flow while accounting for building one's sewage flow. Table 1.4 demonstrates the flow between the pertinent reaches of sewer line in the existing condition. The d/D value in both tables will be representative of the peak flow scenario.

The proposed connection point for building one is at the existing manhole 9, which continues west to Van Ness Avenue via an 18-inch sewer line. There are two reaches between our connection point, MH09 to MH07, then MH07 to MH03, totaling about 400 feet. MH03 is the existing manhole servicing the 48-inch sewer trunk in Van Ness Avenue. Since there is no additional flow between the site's proposed connection and the connection with the sewer trunkline, the results for both reaches will be the same.

Table 1.2 Tributary Area Flow Calculations

Table 1.2 Tributary Area Flow Calculations					
Tributary Area Upstream of MH 09 (Including Building 1 Discharge) (Acre)	Zone Type	Coefficient (cfs/acre)	Average Flow (cfs)	Peak Flow Factor	Peak Flow (cfs)
91.63	M-2	0.021	1.92423	2.5	4.810575

Table 1.3 Proposed Condition: Off-Site Sewer Reaches in West 190th Street.

Table 1.3 Off-Site Sewer Reaches Proposed Condition												
Location	Pipe		*Capacity (cfs) 3/4 Full(>15")	Tributary Area (acre)	Zone Type	Coefficient (cfs/acre)	Average Flow (cfs)	Peak Flow Factor	Peak Flow (cfs)	Depth (ft)	Velocity (ft/sec)	d/D (ft/ft)
	Size (ft.)	Slope (ft/ft)										
W. 190th Street. MH 09 - MH 07 (Includes Building 1 Discharge)	1.5	0.0032	5.420	95.44	M-2	0.021	2.00	2.5	5.01	1.02	3.77	0.68
W. 190th Street. MH 09 - MH 03	1.5	0.0032	5.420	95.44	M-3	0.021	2.00	2.5	5.01	1.02	3.77	0.68

*18-inch sewer d/D maximum value = 0.75

Table 1.4 Existing Condition: Off-Site Sewer Reach in West 190th Street

Table 1.4 Off-Site Sewer Reaches Existing Condition												
Location	Pipe		*Capacity (cfs) 3/4 Full(>15")	Tributary Area (acre)	Zone Type	Coefficient (cfs/acre)	Average Flow (cfs)	Peak Flow Factor	Peak Flow (cfs)	Depth (ft)	Velocity (ft/sec)	d/D (ft/ft)
	Size (ft.)	Slope (ft/ft)										
W. 190th Street. MH 09 - MH 07 Existing Condition	1.5	0.0032	5.420	89.04	M-2	0.021	1.87	2.5	4.67	1.00	3.72	0.67
W. 190th Street. MH 09 - MH 03	1.5	0.0032	5.420	89.04	M-3	0.021	1.87	2.5	4.67	1.00	3.72	0.67

*18-inch sewer d/D maximum value = 0.75

Refer to Figure 1-1 for the Sewer Facilities Map, Appendix B for the hydraulic calculations, and Appendix C for the as builts.

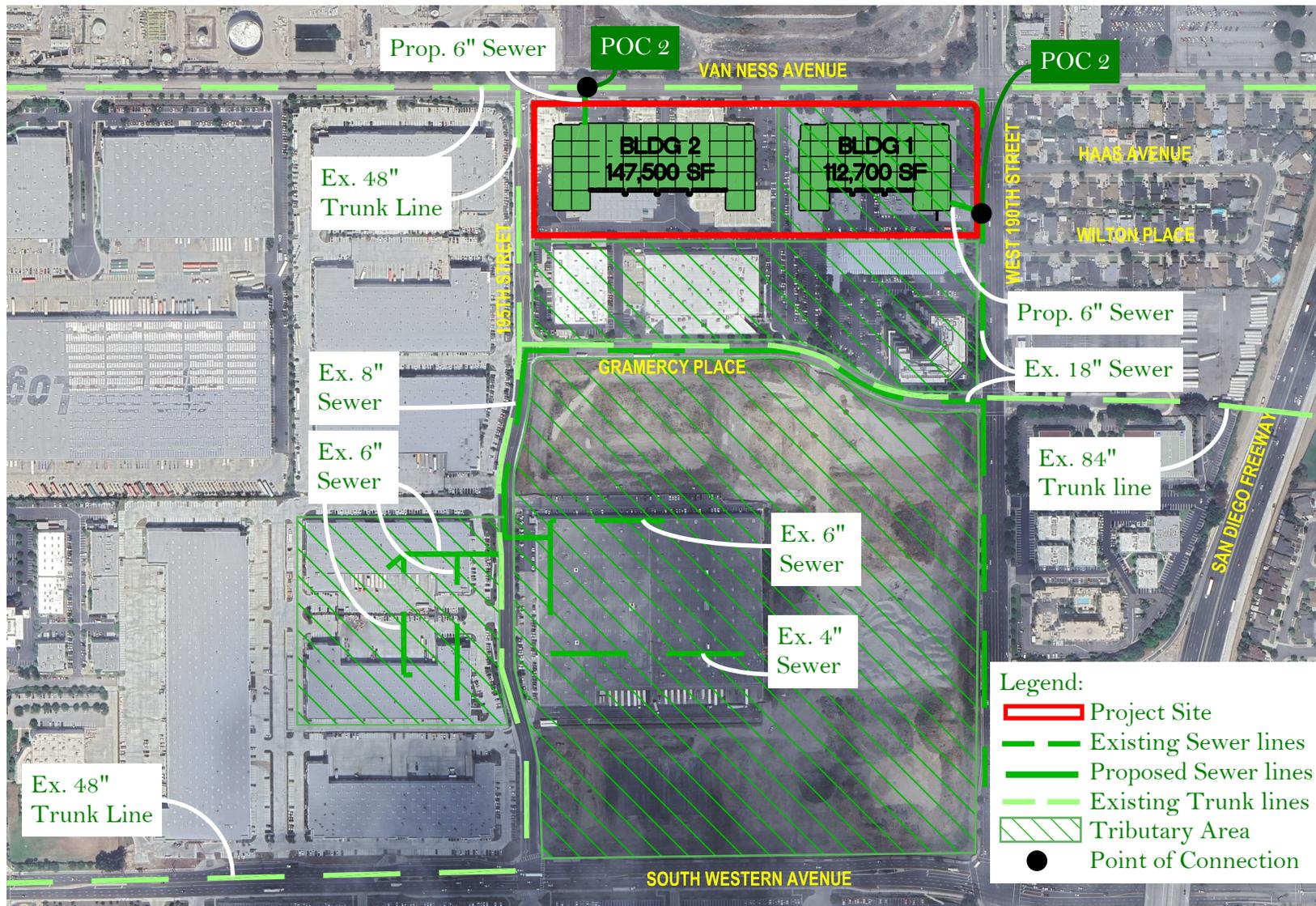
4. RESULTS AND CONCLUSION

Our analyzation of the pertinent sewer section shows that the sewer has available capacity in the existing condition per the LADPW Sewer Manual S-C4 chart for a maximum design capacity. In the existing condition the capacity of the 18-inch pipe in West 190th Street is less than three-quarters full during a peak flow event. When analyzing the sewer section with the addition of the Sequoia Commerce Center, there is still additional capacity. The depth over diameter ratio is to be no more than 0.75. Analysis shows that in the proposed condition, the 18-inch sewer pipeline in West 190th Street has a d/D value of 0.67 which is adequate per the LADPW.

APPENDIX - A REFERENCE MATERIAL

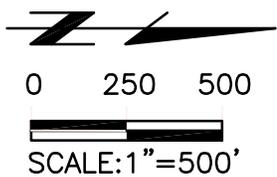
LOS ANGELES COUNTY SEWER FLOW FACTORS

CITY OF TORRANCE ZONING MAP



Sources: City of Torrance Sewer Index Map 2015
LACSD Map 2024

Figure 1-1 Sewer Facilities
Sequoia Commerce Center



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Estimated Average Daily Sewage Flows for Various Occupancies

Occupancy	Abbreviation	*Average daily flow	
Apartment Buildings:			
Bachelor or Single dwelling units	Apt	100	gal/D.U. → 150
1 bedroom dwelling units	Apt	150	gal/D.U. → 200
2 bedroom dwelling units	Apt	200	gal/D.U. → 250
3 bedroom or more dwelling units	Apt	250	gal/D.U. → use 300 GPD per SMD
Auditoriums, churches, etc.	Aud	5	gal/seat
Automobile parking	P	25	gal/1000 sq ft gross floor area
Bars, cocktails lounges, etc.	Bar	20	gal/seat
Commercial Shops & Stores	CS	100	gal/1000 sq ft gross floor area
Hospitals (surgical)	HS	500	gal/bed
Hospitals (convalescent)	HC	85	gal/bed
Hotels	H	150	gal/room
Medical Buildings	MB	300	gal/1000 sq ft gross floor area
Motels	M	150	gal/unit
Office Buildings	Off	200	gal/1000 sq ft gross floor area
Restaurants, cafeterias, etc.	R	50	gal/seat
Schools:			
Elementary or Jr. High	S	10	gal/student
High Schools	HS	15	gal/student
Universities or Colleges	U	20	gal/student
College Dormitories	CD	85	gal/student

*Multiply the average daily flow by 2.5 to obtain the peak flow

Zoning Coefficients

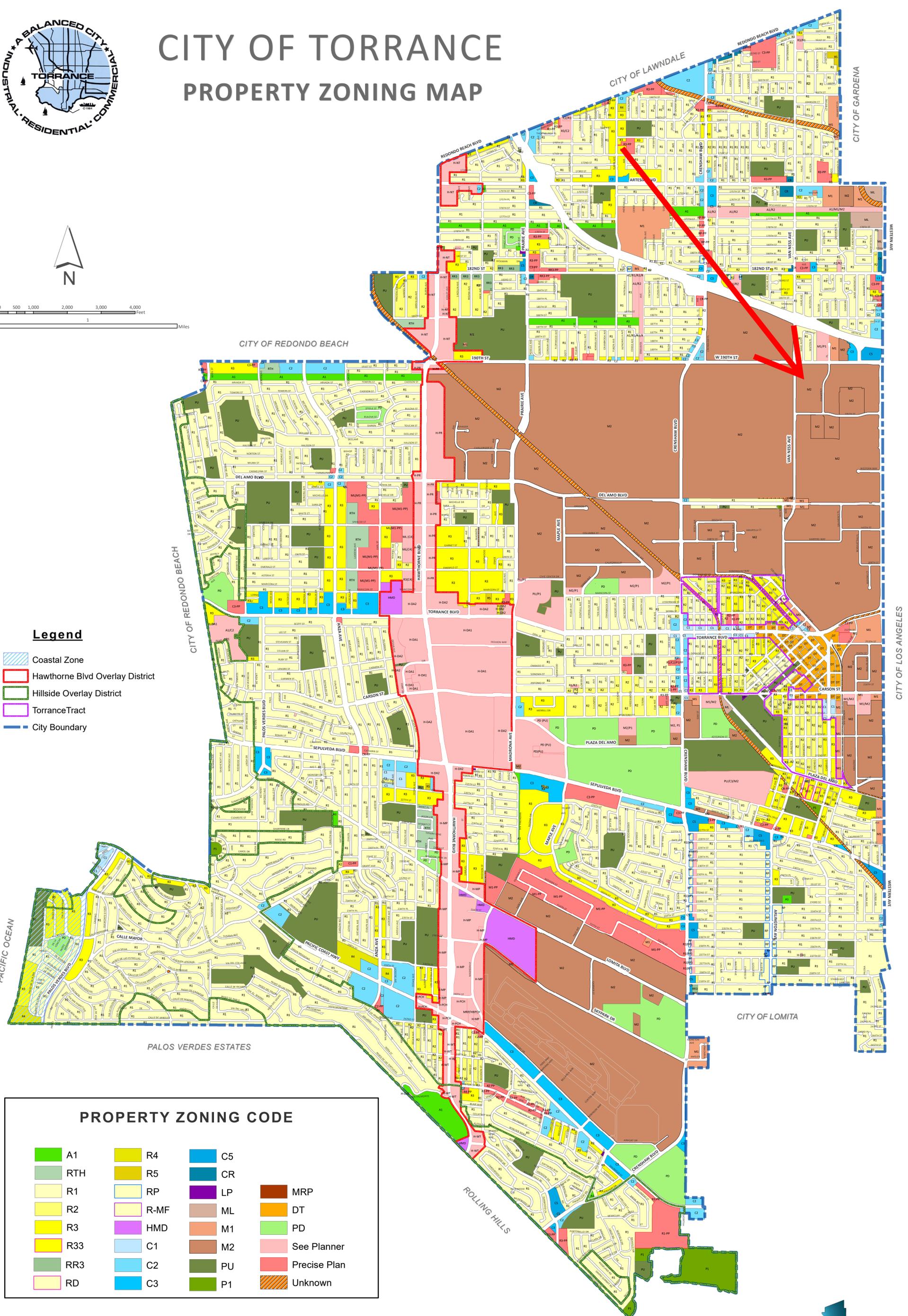
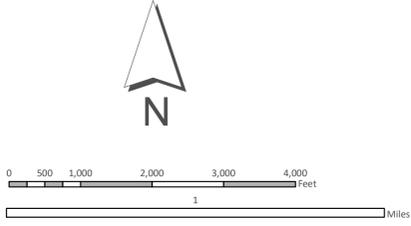
Zone	Coefficient (cfs/Acre)
Agriculture -----	0.001
Residential*:	
R-1 -----	0.004
R-2 -----	0.008
R-3 -----	0.012
R-4 -----	0.016*
Commercial:	
C-1 through C-4 -----	0.015*
Heavy Industrial:	
M1 through M-4 -----	0.021*

*Individual building, commercial or industrial plant capacities shall be the determining factor when they exceed the coefficients shown

+ Use 0.001 (cfs/unit) for condominiums only



CITY OF TORRANCE PROPERTY ZONING MAP



Legend

- Coastal Zone
- Hawthorne Blvd Overlay District
- Hillside Overlay District
- TorranceTract
- City Boundary

PROPERTY ZONING CODE

A1	R4	C5	
RTH	R5	CR	
R1	RP	LP	MRP
R2	R-MF	ML	DT
R3	HMD	M1	PD
RR3	C1	M2	See Planner
RD	C2	PU	Precise Plan
	C3	P1	Unknown

THIS MAP IS ACCURATE ONLY TO THE LAST REVISION DATE.
FOR MORE COMPLETE INFORMATION
PLEASE CONTACT THE COMMUNITY DEVELOPMENT DEPARTMENT AT (310) 618-5990

APPENDIX - B CALCULATIONS

OFF-SITE DEPTH AND FLOW CALCULATIONS (EXISTING AND PROPOSED)

ON-SITE DEPTH AND FLOW CALCULATIONS

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TIME/DATE OF STUDY: 16:50 03/14/2024
=====

Problem Descriptions:
TEI JOB NO. 4221
EXISTING CONDITION S. 190TH SEW
DEPTH MH09-MH-07-MH-03

>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER (FEET) = 1.500
PIPE SLOPE (FEET/FEET) = 0.0032
PIPEFLOW (CFS) = 4.67
MANNINGS FRICTION FACTOR = 0.013000
=====

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH (FEET) = 0.83
CRITICAL FLOW AREA (SQUARE FEET) = 1.003
CRITICAL FLOW TOP-WIDTH (FEET) = 1.491
CRITICAL FLOW PRESSURE + MOMENTUM (POUNDS) = 64.25
CRITICAL FLOW VELOCITY (FEET/SEC.) = 4.654
CRITICAL FLOW VELOCITY HEAD (FEET) = 0.34
CRITICAL FLOW HYDRAULIC DEPTH (FEET) = 0.67
CRITICAL FLOW SPECIFIC ENERGY (FEET) = 1.17
=====

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH (FEET) = 1.00
FLOW AREA (SQUARE FEET) = 1.25
FLOW TOP-WIDTH (FEET) = 1.413
FLOW PRESSURE + MOMENTUM (POUNDS) = 68.09
FLOW VELOCITY (FEET/SEC.) = 3.724
FLOW VELOCITY HEAD (FEET) = 0.215
HYDRAULIC DEPTH (FEET) = 0.89
FROUDE NUMBER = 0.697
SPECIFIC ENERGY (FEET) = 1.22
=====

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TIME/DATE OF STUDY: 14:46 03/14/2024
=====

Problem Descriptions:
TEI JOB NO 4221
DEPTH CALC
MH09-MH07

>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER (FEET) = 1.500
PIPE SLOPE (FEET/FEET) = 0.0032
PIPEFLOW (CFS) = 4.81
MANNINGS FRICTION FACTOR = 0.013000
=====

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH (FEET) = 0.84
CRITICAL FLOW AREA (SQUARE FEET) = 1.023
CRITICAL FLOW TOP-WIDTH (FEET) = 1.488
CRITICAL FLOW PRESSURE + MOMENTUM (POUNDS) = 66.81
CRITICAL FLOW VELOCITY (FEET/SEC.) = 4.704
CRITICAL FLOW VELOCITY HEAD (FEET) = 0.34
CRITICAL FLOW HYDRAULIC DEPTH (FEET) = 0.69
CRITICAL FLOW SPECIFIC ENERGY (FEET) = 1.19
=====

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH (FEET) = 1.02
FLOW AREA (SQUARE FEET) = 1.28
FLOW TOP-WIDTH (FEET) = 1.397
FLOW PRESSURE + MOMENTUM (POUNDS) = 71.00
FLOW VELOCITY (FEET/SEC.) = 3.744
FLOW VELOCITY HEAD (FEET) = 0.218
HYDRAULIC DEPTH (FEET) = 0.92
FROUDE NUMBER = 0.688
SPECIFIC ENERGY (FEET) = 1.24
=====

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TIME/DATE OF STUDY: 14:41 03/14/2024
=====

Problem Descriptions:
TEI JOB NO 4221
MH09-MH07
3/4 FLOW CAPACITY

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER (FEET) = 1.500
FLOWDEPTH (FEET) = 1.125
PIPE SLOPE (FEET/FEET) = 0.0032
MANNINGS FRICTION FACTOR = 0.013000
>>>> NORMAL DEPTH FLOW (CFS) = 5.42
=====

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH (FEET) = 1.12
FLOW AREA (SQUARE FEET) = 1.42
FLOW TOP-WIDTH (FEET) = 1.299
FLOW PRESSURE + MOMENTUM (POUNDS) = 84.77
FLOW VELOCITY (FEET/SEC.) = 3.811
FLOW VELOCITY HEAD (FEET) = 0.226
HYDRAULIC DEPTH (FEET) = 1.09
FROUDE NUMBER = 0.642
SPECIFIC ENERGY (FEET) = 1.35
=====

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=====

Problem Descriptions:
TEI JOB NO 4221
MH07-MH03 (TRUNK)
3/4 FLOW CAPACITY

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER (FEET) = 1.500
FLOWDEPTH (FEET) = 1.125
PIPE SLOPE (FEET/FEET) = 0.0032
MANNINGS FRICTION FACTOR = 0.013000
>>>> NORMAL DEPTH FLOW (CFS) = 5.42
=====

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH (FEET) = 1.12
FLOW AREA (SQUARE FEET) = 1.42
FLOW TOP-WIDTH (FEET) = 1.299
FLOW PRESSURE + MOMENTUM (POUNDS) = 84.77
FLOW VELOCITY (FEET/SEC.) = 3.811
FLOW VELOCITY HEAD (FEET) = 0.226
HYDRAULIC DEPTH (FEET) = 1.09
FROUDE NUMBER = 0.642
SPECIFIC ENERGY (FEET) = 1.35
=====

Problem Descriptions:
TEI JOB NO 4221
MH 09- MH07
3/4 FLOW CAPACITY

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER (FEET) = 1.500
FLOWDEPTH (FEET) = 1.125
PIPE SLOPE (FEET/FEET) = 0.0032
MANNINGS FRICTION FACTOR = 0.013000
>>>> NORMAL DEPTH FLOW (CFS) = 5.42
=====

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH (FEET) = 1.12
FLOW AREA (SQUARE FEET) = 1.42
FLOW TOP-WIDTH (FEET) = 1.299
FLOW PRESSURE + MOMENTUM (POUNDS) = 84.77
FLOW VELOCITY (FEET/SEC.) = 3.811
FLOW VELOCITY HEAD (FEET) = 0.226
HYDRAULIC DEPTH (FEET) = 1.09
FROUDE NUMBER = 0.642

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Problem Descriptions:
TEI JOB NO. 4221
DEPTH CALC - PROPOSED CONDITION
MH09-07-03

>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER (FEET) = 1.500
PIPE SLOPE (FEET/FEET) = 0.0032
PIPEFLOW (CFS) = 5.01
MANNINGS FRICTION FACTOR = 0.013000
=====

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH (FEET) = 0.86
CRITICAL FLOW AREA (SQUARE FEET) = 1.050
CRITICAL FLOW TOP-WIDTH (FEET) = 1.483
CRITICAL FLOW PRESSURE + MOMENTUM (POUNDS) = 70.51
CRITICAL FLOW VELOCITY (FEET/SEC.) = 4.773
CRITICAL FLOW VELOCITY HEAD (FEET) = 0.35
CRITICAL FLOW HYDRAULIC DEPTH (FEET) = 0.71
CRITICAL FLOW SPECIFIC ENERGY (FEET) = 1.21
=====

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH (FEET) = 1.06
FLOW AREA (SQUARE FEET) = 1.33
FLOW TOP-WIDTH (FEET) = 1.370
FLOW PRESSURE + MOMENTUM (POUNDS) = 75.27
FLOW VELOCITY (FEET/SEC.) = 3.770
FLOW VELOCITY HEAD (FEET) = 0.221
HYDRAULIC DEPTH (FEET) = 0.97
FROUDE NUMBER = 0.674
SPECIFIC ENERGY (FEET) = 1.28
=====

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Analysis prepared by:

TIME/DATE OF STUDY: 09:49 03/19/2024
=====

Problem Descriptions:
TEI JOB NO. 4221
DEPTH VALUE - BUILDING 1
SITE TO 190TH STREET

>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER (FEET) = 0.500
PIPE SLOPE (FEET/FEET) = 0.0100
PIPEFLOW (CFS) = 0.33
MANNINGS FRICTION FACTOR = 0.009000
=====

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH (FEET) = 0.29
CRITICAL FLOW AREA (SQUARE FEET) = 0.119
CRITICAL FLOW TOP-WIDTH (FEET) = 0.493
CRITICAL FLOW PRESSURE + MOMENTUM (POUNDS) = 1.78
CRITICAL FLOW VELOCITY (FEET/SEC.) = 2.783
CRITICAL FLOW VELOCITY HEAD (FEET) = 0.12
CRITICAL FLOW HYDRAULIC DEPTH (FEET) = 0.24
CRITICAL FLOW SPECIFIC ENERGY (FEET) = 0.41
=====

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH (FEET) = 0.22
FLOW AREA (SQUARE FEET) = 0.08
FLOW TOP-WIDTH (FEET) = 0.497
FLOW PRESSURE + MOMENTUM (POUNDS) = 3.00
FLOW VELOCITY (FEET/SEC.) = 3.916
FLOW VELOCITY HEAD (FEET) = 0.238
HYDRAULIC DEPTH (FEET) = 0.17
FROUDE NUMBER = 1.676
SPECIFIC ENERGY (FEET) = 0.46
=====

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Analysis prepared by:

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=====

Problem Descriptions:

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER (FEET) = 0.500
PIPE SLOPE (FEET/FEET) = 0.0200
PIPEFLOW (CFS) = 0.18
MANNINGS FRICTION FACTOR = 0.013000
=====

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH (FEET) = 0.21
CRITICAL FLOW AREA (SQUARE FEET) = 0.079
CRITICAL FLOW TOP-WIDTH (FEET) = 0.494
CRITICAL FLOW PRESSURE + MOMENTUM (POUNDS) = 1.21
CRITICAL FLOW VELOCITY (FEET/SEC.) = 2.264
CRITICAL FLOW VELOCITY HEAD (FEET) = 0.08
CRITICAL FLOW HYDRAULIC DEPTH (FEET) = 0.16
CRITICAL FLOW SPECIFIC ENERGY (FEET) = 0.29
=====

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH (FEET) = 0.16
FLOW AREA (SQUARE FEET) = 0.05
FLOW TOP-WIDTH (FEET) = 0.467
FLOW PRESSURE + MOMENTUM (POUNDS) = 1.35
FLOW VELOCITY (FEET/SEC.) = 3.259
FLOW VELOCITY HEAD (FEET) = 0.165
HYDRAULIC DEPTH (FEET) = 0.12
FROUDE NUMBER = 1.680
SPECIFIC ENERGY (FEET) = 0.33
=====

Problem Descriptions:

TEI JOB NO. 4221
DEPTH
BUILDING 2 - SITE TO VAN NESS

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER (FEET) = 0.500
PIPE SLOPE (FEET/FEET) = 0.0200
PIPEFLOW (CFS) = 0.18
MANNINGS FRICTION FACTOR = 0.013000
=====

CRITICAL-DEPTH FLOW INFORMATION:

```

-----
CRITICAL DEPTH (FEET) = 0.21
CRITICAL FLOW AREA (SQUARE FEET) = 0.079
CRITICAL FLOW TOP-WIDTH (FEET) = 0.494
CRITICAL FLOW PRESSURE + MOMENTUM (POUNDS) = 1.21
CRITICAL FLOW VELOCITY (FEET/SEC.) = 2.264
CRITICAL FLOW VELOCITY HEAD (FEET) = 0.08
CRITICAL FLOW HYDRAULIC DEPTH (FEET) = 0.16
CRITICAL FLOW SPECIFIC ENERGY (FEET) = 0.29
=====

```

NORMAL-DEPTH FLOW INFORMATION:

```

-----
NORMAL DEPTH (FEET) = 0.16
FLOW AREA (SQUARE FEET) = 0.05
FLOW TOP-WIDTH (FEET) = 0.467
FLOW PRESSURE + MOMENTUM (POUNDS) = 1.35
FLOW VELOCITY (FEET/SEC.) = 3.259
FLOW VELOCITY HEAD (FEET) = 0.165
HYDRAULIC DEPTH (FEET) = 0.12
FROUDE NUMBER = 1.680
SPECIFIC ENERGY (FEET) = 0.33
=====

```

HYDRAULIC ELEMENTS - I PROGRAM PACKAGE
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Ver. 23.0 Release Date: 07/01/2016 License ID 1435

Analysis prepared by:

TIME/DATE OF STUDY: 13:27 03/14/2024
=====

Problem Descriptions:
TEI JOB NO. 4221
1/2 FULL CAPACITY (cfs)
BUILDING 1 - SITE TO 190TH

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER (FEET) = 0.500
FLOWDEPTH (FEET) = 0.250
PIPE SLOPE (FEET/FEET) = 0.0100
MANNINGS FRICTION FACTOR = 0.013000
>>>> NORMAL DEPTH FLOW (CFS) = 0.28
=====

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH (FEET) = 0.25
FLOW AREA (SQUARE FEET) = 0.10
FLOW TOP-WIDTH (FEET) = 0.500
FLOW PRESSURE + MOMENTUM (POUNDS) = 1.55
FLOW VELOCITY (FEET/SEC.) = 2.858
FLOW VELOCITY HEAD (FEET) = 0.127
HYDRAULIC DEPTH (FEET) = 0.20
FROUDE NUMBER = 1.137
SPECIFIC ENERGY (FEET) = 0.38
=====

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Analysis prepared by:

TIME/DATE OF STUDY: 13:29 03/14/2024
=====

Problem Descriptions:
TEI JOB NO. 4221
1/2 FULL CAPACITY (cfs)
BUILDING 2 - SITE TO VAN NESS

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

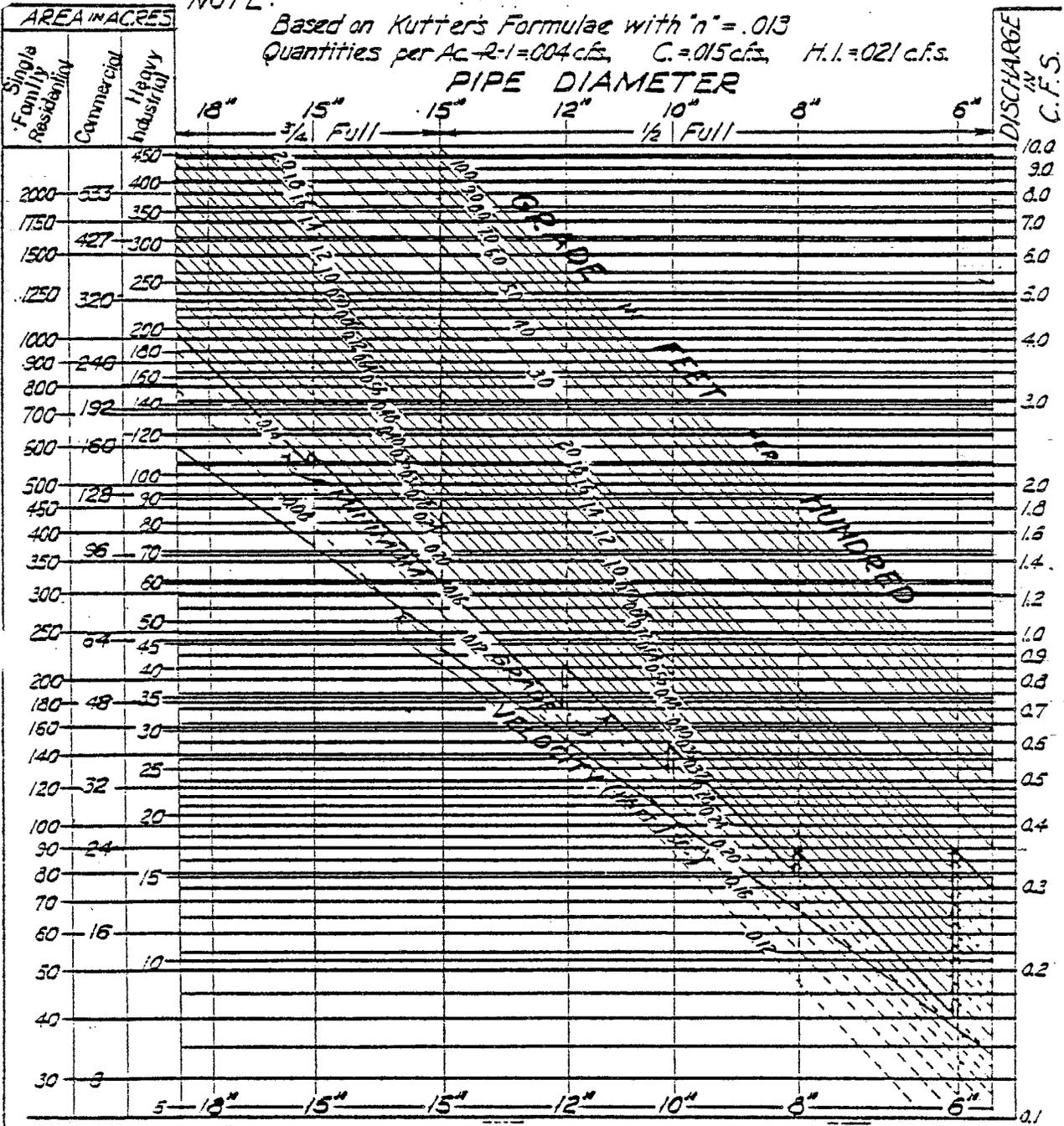
PIPE DIAMETER (FEET) = 0.500
FLOWDEPTH (FEET) = 0.250
PIPE SLOPE (FEET/FEET) = 0.0200
MANNINGS FRICTION FACTOR = 0.013000
>>>> NORMAL DEPTH FLOW (CFS) = 0.40
=====

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH (FEET) = 0.25
FLOW AREA (SQUARE FEET) = 0.10
FLOW TOP-WIDTH (FEET) = 0.500
FLOW PRESSURE + MOMENTUM (POUNDS) = 3.11
FLOW VELOCITY (FEET/SEC.) = 4.041
FLOW VELOCITY HEAD (FEET) = 0.254
HYDRAULIC DEPTH (FEET) = 0.20
FROUDE NUMBER = 1.607
SPECIFIC ENERGY (FEET) = 0.50
=====

NOTE:

Based on Kutter's Formulae with $n = .013$
 Quantities per Ac - $R-1 = 004$ cfs, $C = 015$ cfs, $H.I. = 021$ cfs.



NOTE: USE 15" 1/2 FULL FOR COMPUTING DESIGN CAPACITY OF A NEW SEWER SYSTEM.
 USE 15" 3/4 FULL FOR CHECKING CAPACITY OF EXIST. SEWER SYSTEM.

FLOW DIAGRAM FOR THE DESIGN OF CIRCULAR SANITARY SEWERS

COUNTY OF LOS ANGELES
 DEPARTMENT OF COUNTY ENGINEER - FACILITIES

COUNTY ENGINEER
 STANDARD

S-C4

DATE: 3/80

DESIGN

[Signature]
 ASSISTANT DEPUTY

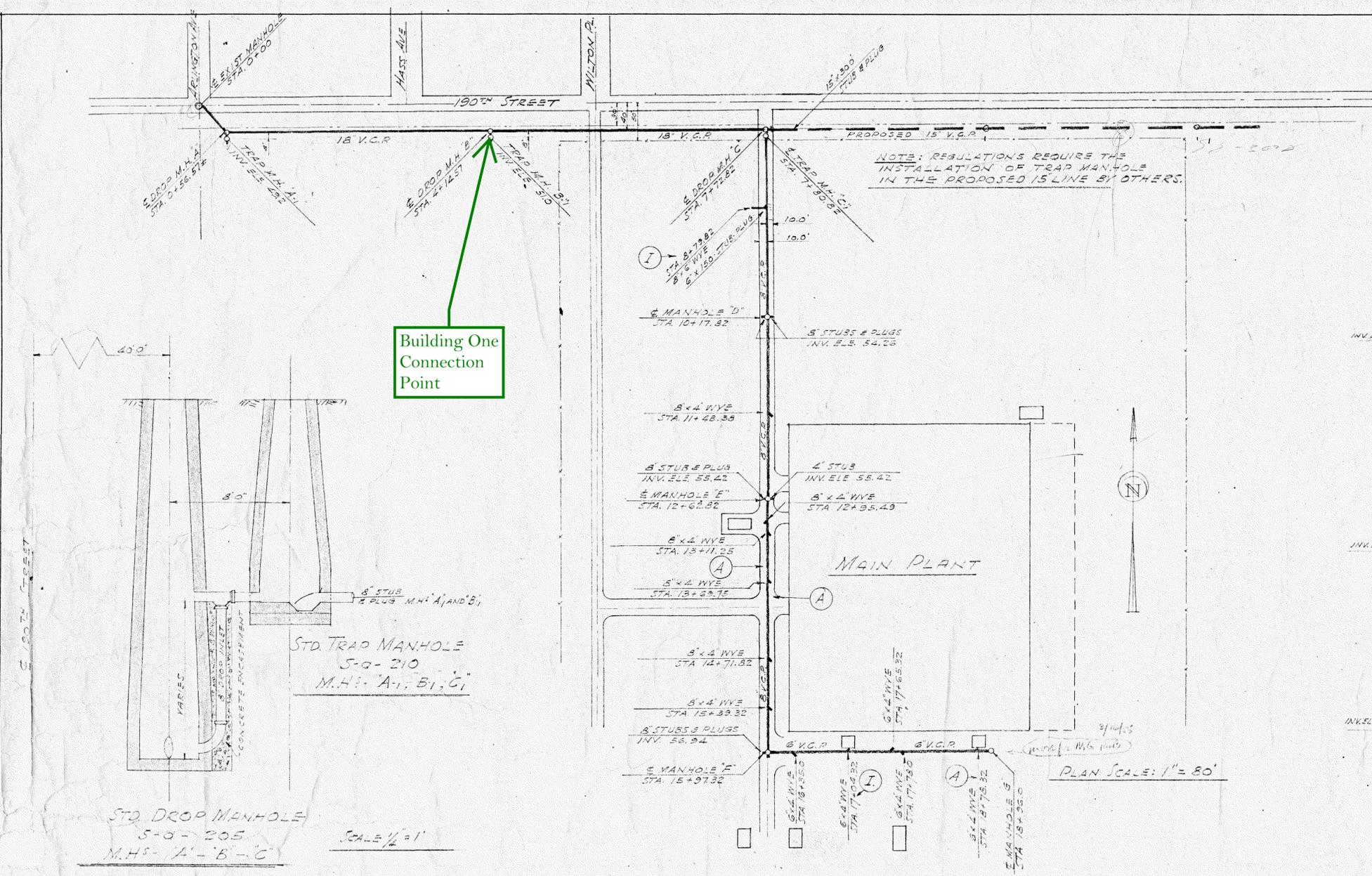
[Signature]
 COUNTY ENGINEER

[Signature]
 2210223

APPENDIX - C AS BUILTS

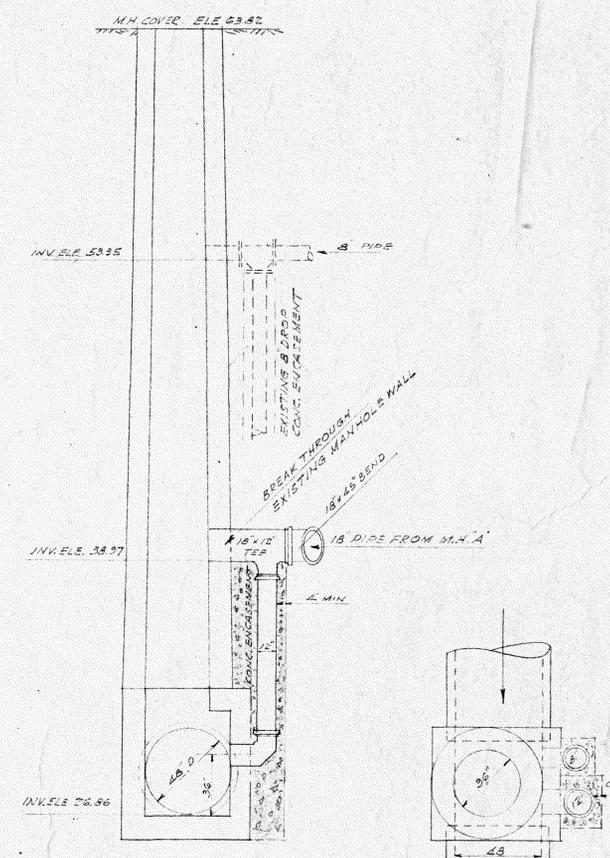
CITY OF TORRANCE ATLAS MAPS

LOS ANGELES COUNTY PLANS SS-3007



NOTE: REGULATIONS REQUIRE THE INSTALLATION OF TRAP MANHOLE IN THE PROPOSED 15\"/>

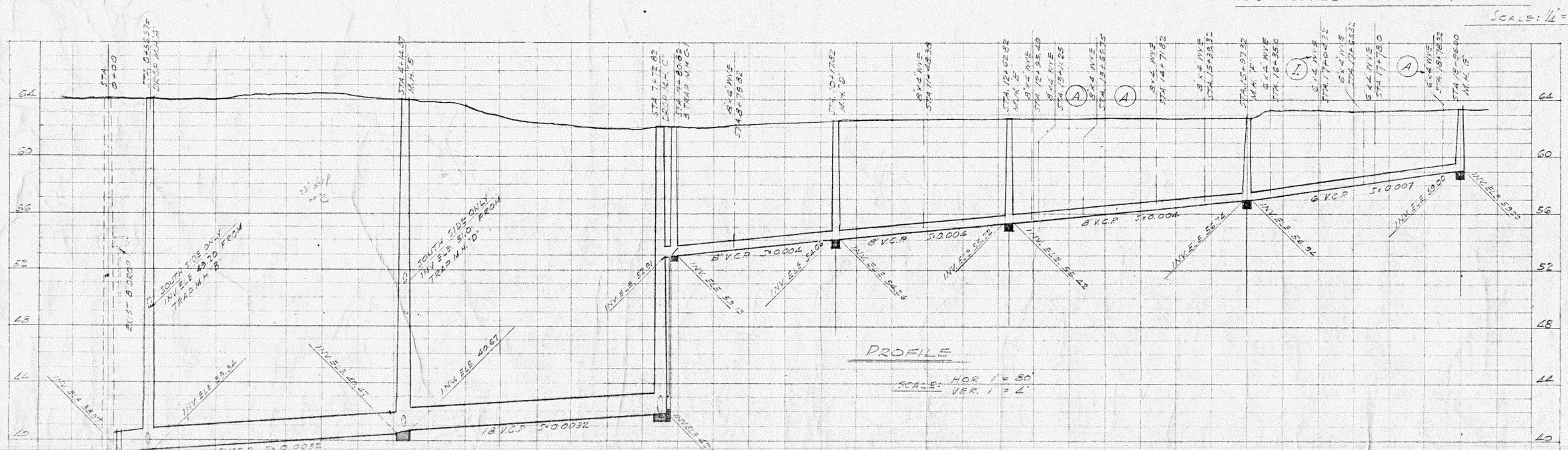
Building One Connection Point



SECTION PLAN SHOWING CONNECTION TO EXISTING MANHOLE TYPE B 53-202

NOTE: LOCATE 12\"/>

STD. DROP MANHOLE 5-9-205 M.H.S. 'A'-'B'-'C' SCALE: 1/4\"/>



PROFILE SCALE: HOR 1\"/>

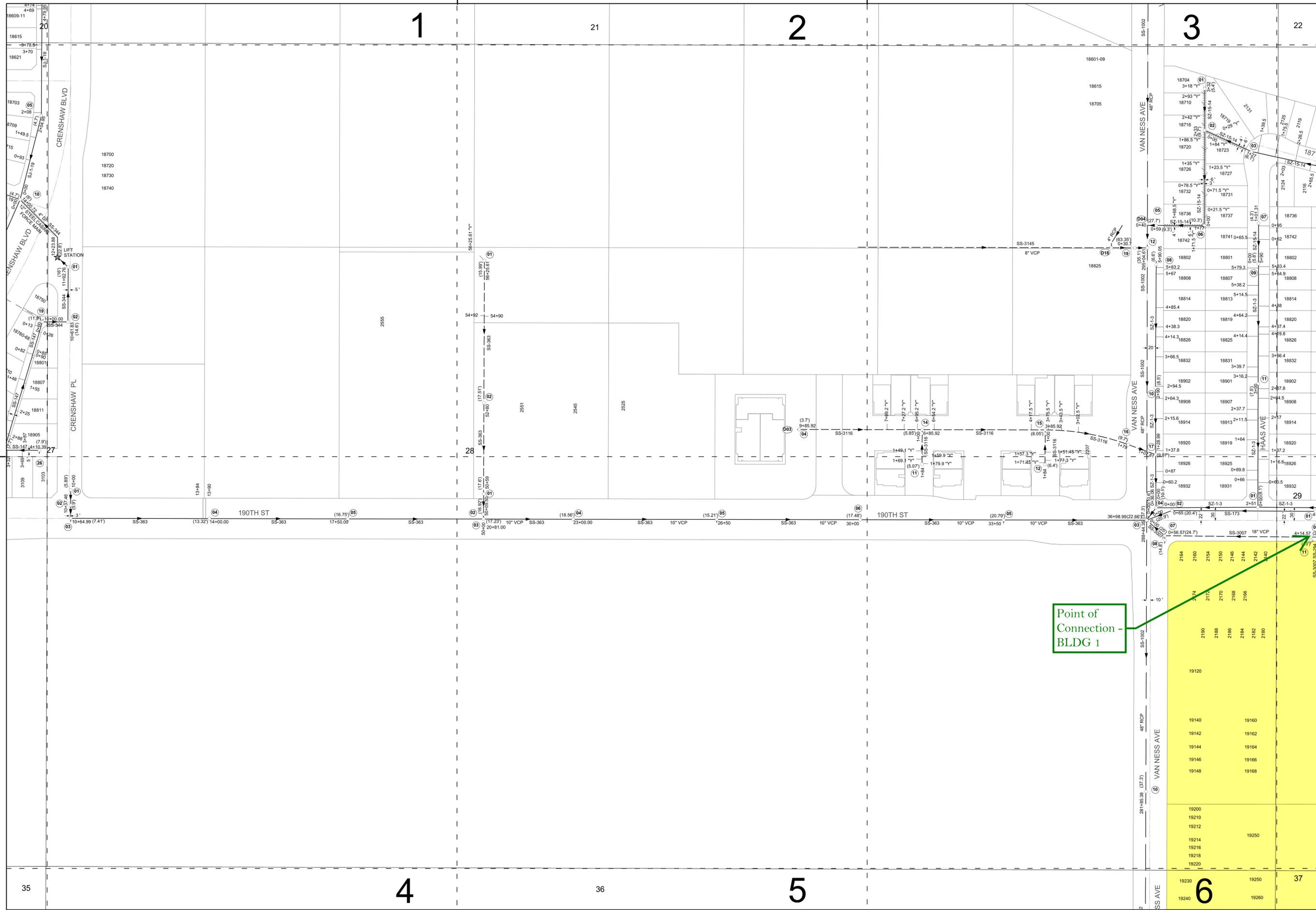
NOTES
 MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE STANDARDS OF THE COUNTY SANITATION DISTRICT OF LOS ANGELES COUNTY - CALIFORNIA.
 SEE DRAWINGS M-3 & M-4 FOR SANITARY LINES INSIDE OF BUILDINGS.

APPROVED BY A.M. RAWN, CHIEF ENGINEER, LOS ANGELES COUNTY SANITATION DISTRICT NO. 5.
 BY E.L. POTHMANN, OFFICE ENGINEER
 FEB 7 1955
 CITY OF TORRANCE
 BY John H. Smith, 2/9/55, DIST. TO CITY ENGINEER
 Ronald W. Bishop, 2/8/55, CITY ENGINEER

LOS ANGELES WORKS
 TORRANCE, CALIFORNIA
 SEWER MAIN

BETHLEHEM PACIFIC COAST STEEL CORPORATION
 FABRICATED STEEL CONSTRUCTION

LOS ANGELES DRAFTING ROOM WORKS
 IN CHARGE MADE BY
 CHECKED BY TRACED BY
 REVISED LAST ASSEMBLY



CITY OF TORRANCE

SANITARY SEWERS

DRAWN: SY DATE: July 27, 2021
 CHECKED: NA, SY REV:

LEGEND

8" SEWER UNLESS INDICATED

STA. DEPTH
 0+00 (6.6')

1" 0.0' H.C. TO P.L.
 0+00 8.0'

0+75" C.O.
 0+50" H.C. TO CURB

CHIMNEY

LIFT STATION M.H.

SS-100 PLAN NO.

COUNTY SEWER
 PRIVATE SEWER
 ABAND. SEWER & MH
 STREET CENTER LINE
 SEWER EASEMENT



20	21	22
27	28	29
35	36	37

SHEET NO. 28

3

2

4

5

6

CITY OF TORRANCE

SANITARY SEWERS

DRAWN: TT DATE: Feb 10, 2015
 CHECKED: NA, SY REV:

LEGEND
 8" SEWER UNLESS INDICATED
 STA. DEPTH 0+00 (6.6)

- 1+00 H.C. TO P.L.
- 0+90
- 0+75" C.O.
- 0+50" C.O.
- 0+30" C.O.
- 0+15" C.O.
- CHIMNEY
- LIFT STATION M.H.
- SS-100 PLAN NO.

- COUNTY SEWER
- PRIVATE SEWER
- ABAND. SEWER & MH
- STREET CENTER LINE
- SEWER EASEMENT



21	22	22E
28	29	29E
36	37	37E

SHEET NO.29

Point Of Connection - BLDG 1

TRIBUTARY AREA

TRIBUTARY AREA



1

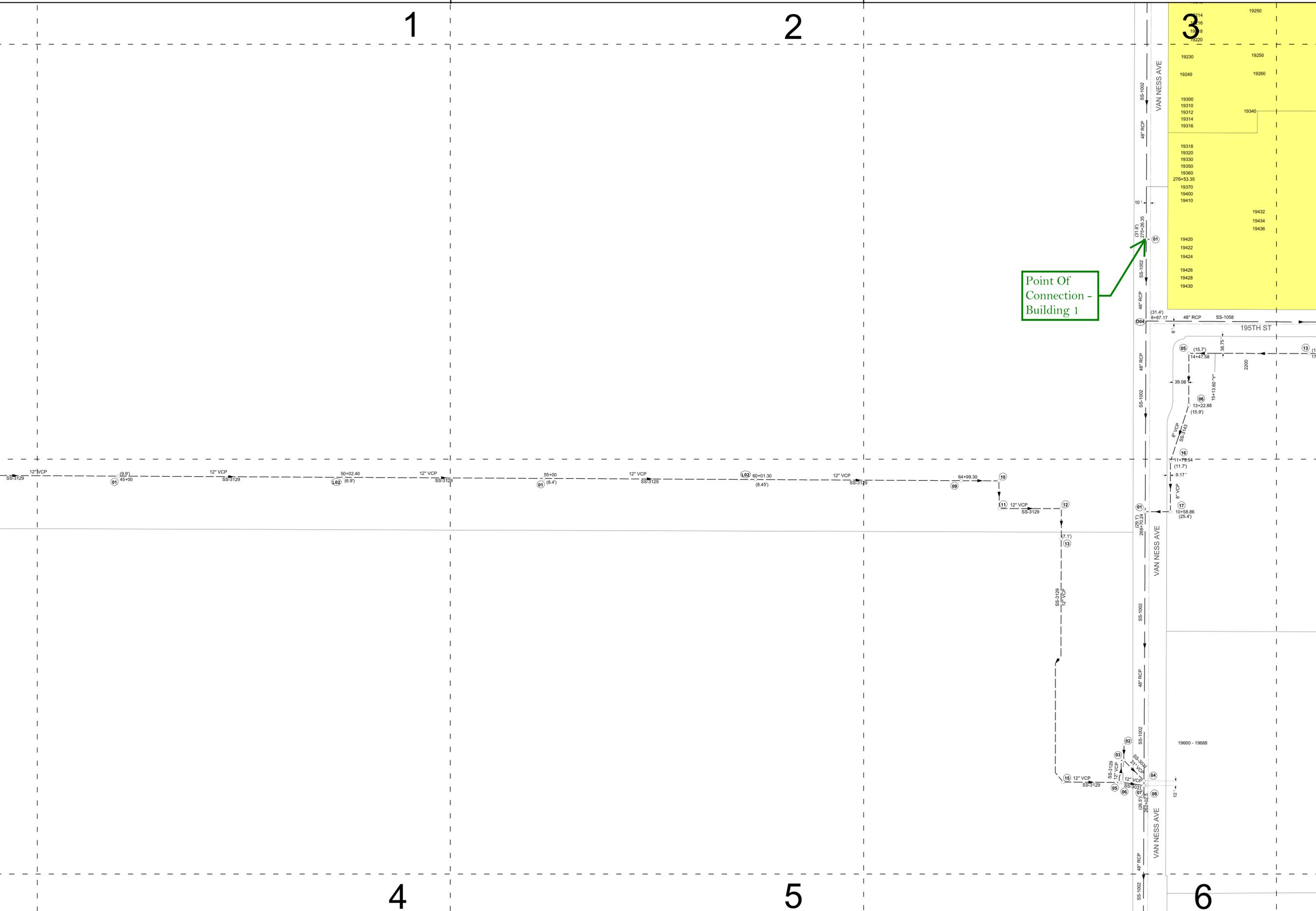
2

3

4

5

6



Point Of
Connection -
Building 1

CITY OF TORRANCE

SANITARY SEWERS

DRAWN: TT DATE: Apr 07, 2020
 CHECKED: NA, SY REV: Dec 02, 2019

LEGEND

1+00 H.C. TO P.L.
 0+80
 0+75" V.C.
 C.O.
 0+50" V.C.
 H.C. TO CURB

8" SEWER UNLESS INDICATED
 STA. DEPTH
 0+00 (6.6')

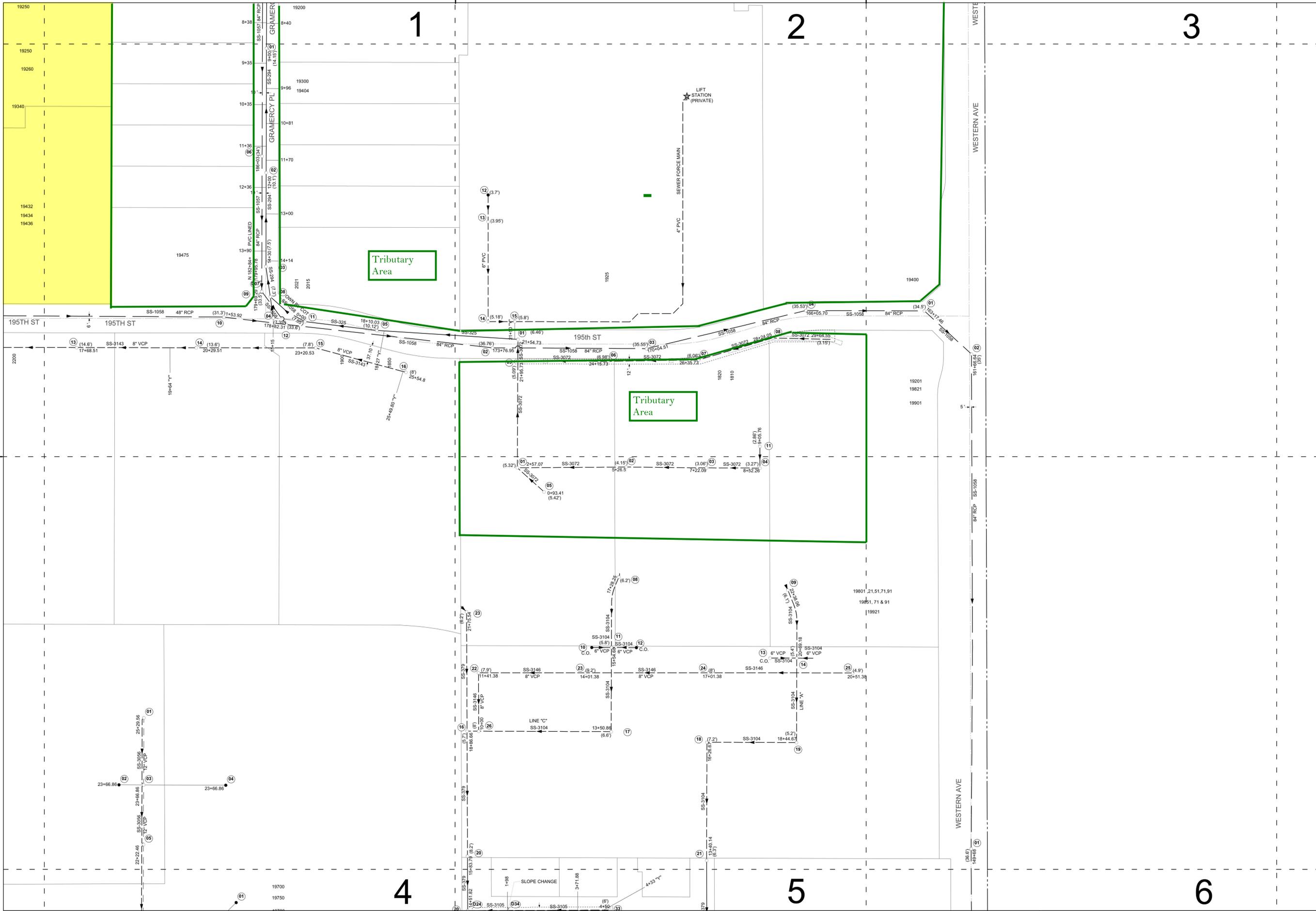
CHIMNEY
 LIFT STATION M.H.
 SS-100

COUNTY SEWER
 PRIVATE SEWER
 ABAND. SEWER & MH
 STREET CENTER LINE
 SEWER EASEMENT



27	28	29
35	36	37
43	44	45

SHEET NO. 36

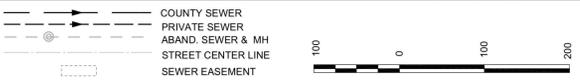


CITY OF TORRANCE

SANITARY SEWERS
 DRAWN: FM DATE: NOV 02, 2023
 CHECKED: NA, SY REV:

LEGEND
 8" SEWER UNLESS INDICATED
 STA. DEPTH
 0+00 (6.6')

1+00 H.C. TO PL.
 0+80
 0+75 "Y"
 0+50 "Y"
 H.C. TO CURB
 CHIMNEY
 LIFT STATION M.H.
 SS-100 PLAN NO.



28	29	29E
36	37	37E
44	45	45E

SHEET NO. 37