

# **DEXTER WILSON ENGINEERING, INC.**

WATER • WASTEWATER • RECYCLED WATER

CONSULTING ENGINEERS

## **SEWER SYSTEM ANALYSIS FOR THE GARRISON PROJECT IN THE CITY OF OCEANSIDE**

April 15, 2025

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FOR THE GARRISON PROJECT  
IN THE CITY OF OCEANSIDE**

April 15, 2025



4-15-2025

**Prepared by:  
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Job No. 509-153

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April 15, 2025

509-153

Hunsaker & Associates San Diego, Inc.  
9707 Waples Street  
San Diego, CA 92121

Attention: Ryan Martin, Vice President

Subject: Sewer System Analysis for the Garrison Project in the City of Oceanside

**Introduction and Purpose**

The Garrison project is located in the City of Oceanside west of Garrison Street between Oceanside Boulevard and Mesa Drive. Access to the project is from Garrison Street. Water service for the Garrison project will be provided by the City of Oceanside.

The proposed Garrison project is a residential development on an approximately 8.3-acre parcel. It is situated within a previous elementary school site. The proposed project would develop 140 townhome residential units. Finished floor elevations within the project range from a low of 104 feet to a high of 117 feet in elevation.

The purpose of this letter-report is to analyze the existing and proposed sewer system for the Garrison project and determine if there are any sewer system deficiencies created by the proposed development of this property.

A Vicinity Map for the project is shown on Figure 1 and a preliminary site plan for the project is included in Appendix A.

### **Sewer System Design Criteria**

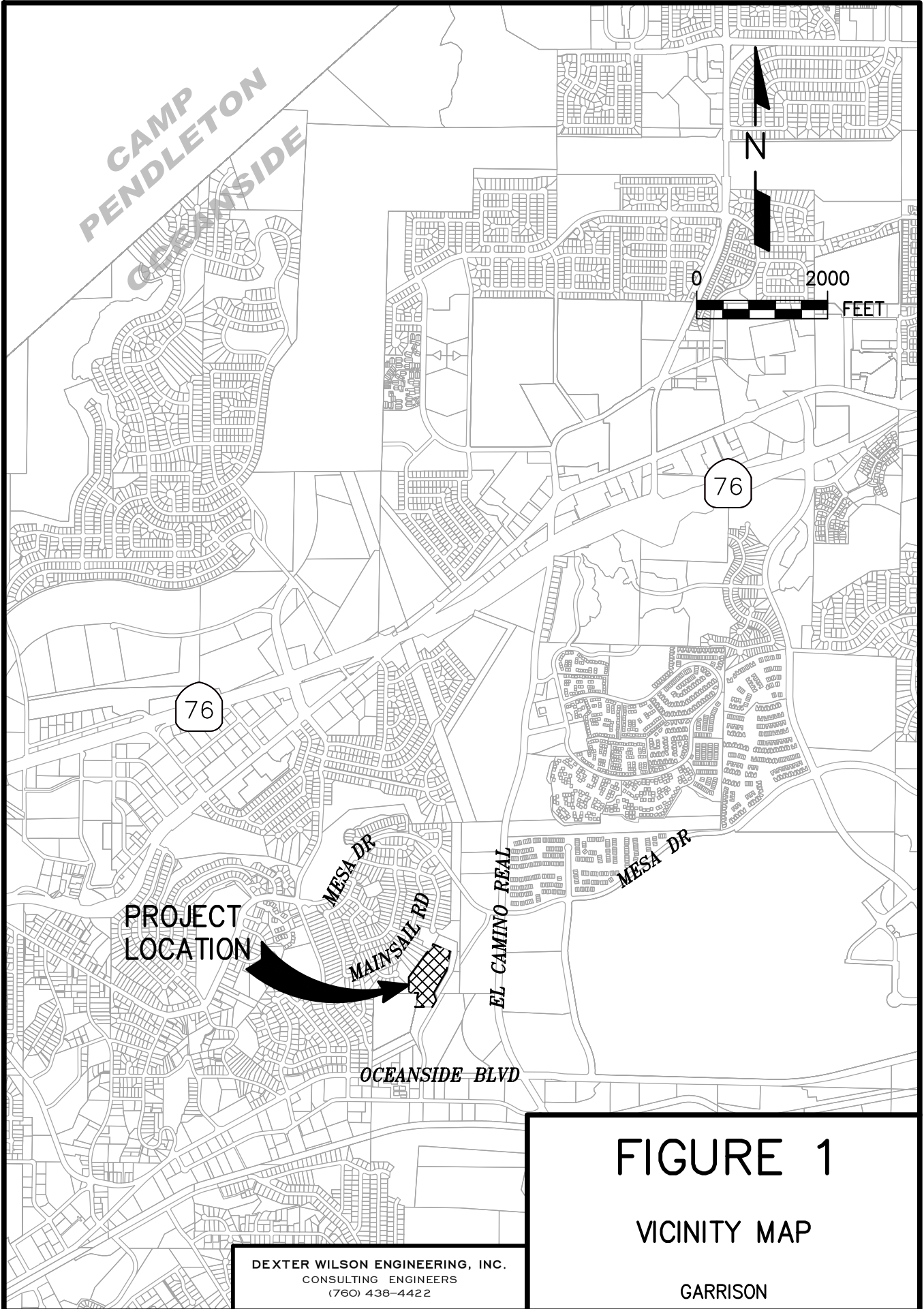
The design criteria used for the evaluation of the offsite sewerage system impacts by the Garrison project are based on the City of Oceanside Water Utilities Department, Water, Sewer, and Reclaimed Water Design & Construction Manual, August 2017, Section 3, Sewer Systems Design Guidelines (Design & Construction Manual), and Sewer Master Plan, unless otherwise indicated. A copy of the pertinent sections in the City's Manual and Master Plan where the design criteria is located is attached as Appendix B.

**Sewer Generation Rates.** The sewer generation rates for the project and surrounding area are presented as Table 1 below.

<b>TABLE 1 GARRISON PROJECT CITY OF OCEANSIDE SEWER GENERATION RATES</b>	
<b>Land Use</b>	<b>Generation Rate</b>
Low-Density (Single-Family) Residential	170 gpd/DU
Mid-Density (Multi-Family) Residential	140 gpd/DU
Industrial & Commercial	1,000 gpd/ac
Hotels	100 gpd/room

### **Peaking Factors**

The peaking factor for residential development is identified in the City of Oceanside Design & Construction Manual. To convert average dry weather flows to peak wet weather flows, the peaking factors in Table 2 were used.



<b>Population</b>	<b>Peak Factor</b>
< 500	3.5
500-1000	2.75
1000-5000	2.50

<sup>1</sup> 70 gpd per person

The peaking factor for non-residential flow (i.e. industrial, commercial, hotels, etc.) is given as a formula in the Design & Construction Manual. The formula is stated:  $Q_p = 1.84 \times Q_a^{0.92}$ , where  $Q_p$  equals peak flow in cubic feet per second (cfs) and  $Q_a$  equals average flow in cfs.

### **Manning's "n"**

The gravity sewer analyses are prepared using a computer spreadsheet calculation which uses the Manning Equation for all of its calculations. The Manning's "n" used by the computer spreadsheet calculation is held as a constant for all depths in a circular conduit. The value of Manning's "n" used for this study is 0.013 per the City's Design & Construction Manual and Master Plan.

### **Depth and Velocity of Flow in Gravity Sewers**

Gravity sewer lines are designed to convey peak wet weather flow. New sewer pipelines that are 10-inches in diameter and smaller are designed to convey this flow with a maximum depth-to-diameter (d/D) ratio of 0.50. New sewer pipelines that are 12-inches and larger in diameter are designed for a maximum d/D ratio of 0.67. Gravity sewer lines are designed to maintain a minimum velocity of 2.0 feet per second at peak flow to prevent the deposition of solids. Existing sewer pipelines are required to convey the peak wet with a maximum d/D ratio of 1.0.

**Onsite Gravity Sewer Lines**

For evaluation of the proposed private gravity sewer lines, City standards akin to offsite public sewer lines were used. Minimum size and slope are 8-inch diameter and 0.4 percent or 6-inch and 1.0 percent respectively for all proposed onsite gravity sewer lines.

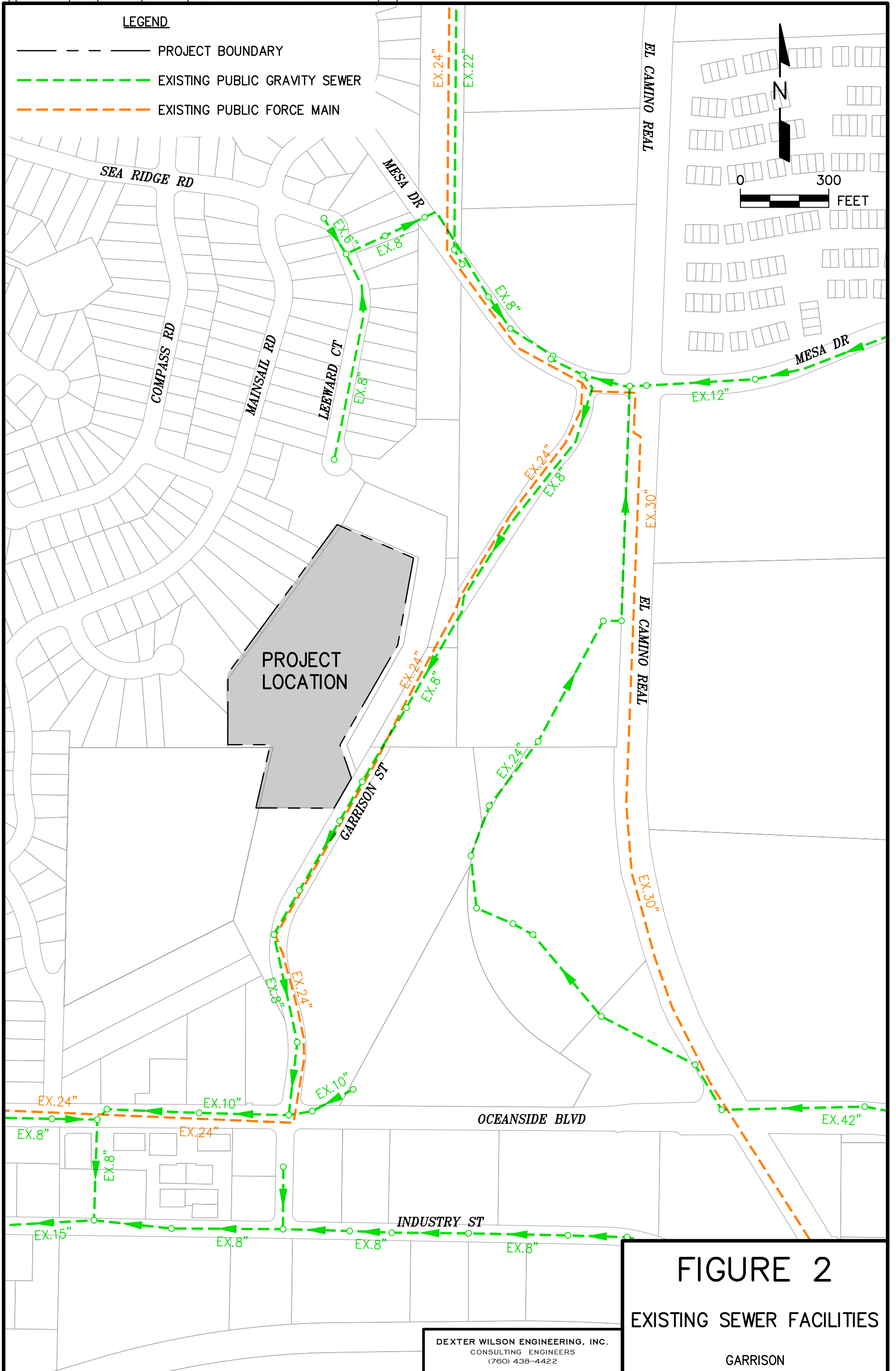
**Existing Sewer System**

There is an existing gravity sewer line adjacent to the project site which will be utilized to serve the project. This existing 8-inch diameter line in Garrison Street at the eastern boundary of the project will be utilized by the project and conveys flow southward and ultimately connects to the trunk sewer line at Industry Street. Figure 2 presents the existing public sewer facilities within the project area. Appendix B provides the City’s As-Built Drawings for this area.

**Existing Sewer Flows.** The sewer system analysis for the Garrison project will need to consider sewage flows from existing development upstream and downstream of the project. The Garrison project will be a relatively upstream development within this particular stretch of gravity sewer. Table 3 summarizes the estimated sewage flows from existing development.

<b>TABLE 3 EXISTING SEWER FLOWS ALONG GARRISON ST. &amp; OCEANSIDE BLVD.</b>			
<b>Description</b>	<b>Quantity</b>	<b>Generation Factor</b>	<b>Average Sewage Flow</b>
Garrison Street	180 MF DUs	140 gpd/DU	25,200 gpd
	8.3 ac Education	1,000 gpd/ac	8,300 gpd
Oceanside Boulevard (east)	60 MF DUs	140 gpd/DU	8,400 gpd
	9 ac Commercial	1,000 gpd/ac	9,000 gpd
Oceanside Boulevard (west)	365 SF DUs	170 gpd/DU	62,050 gpd
	209 MF DUs	140 gpd/DU	29,260 gpd
	6 ac Commercial	1,000 gpd/ac	6,000 gpd
<b>Total Average Flow</b>			<b>148,210 gpd</b>
<b>Total Peak Flow</b>			<b>370,525 gpd</b>

<sup>1</sup> Total peak flow includes a peaking factor of 2.5



**FIGURE 2**  
**EXISTING SEWER FACILITIES**

### **Proposed Sewer Facilities**

The projected sewer flow from the Garrison project is based on 140 townhome units and an average generation rate of 140 gpd per multi-family unit. Table 4 provides the summary of projected sewage flows for the project.

<b>TABLE 4 GARRISON PROJECTED SEWAGE FLOWS</b>				
<b>Description</b>	<b>Quantity</b>	<b>Generation Factor</b>	<b>Average Sewage Flow</b>	<b>Peak Sewage Flow<sup>1</sup></b>
Multi-Family Residential	140 DUs	140 gpd/DU	19,600 gpd (14 gpm)	68,600 gpd (48 gpm)

<sup>1</sup> Total peak flow includes a peaking factor of 3.5

The project will construct a private gravity collection system onsite that will all flow to a new sewer manhole in Garrison Street.

### **Sewer System Analysis**

To analyze the impact of the Garrison project on the existing sewer system, a hydraulic analysis was conducted up to the existing 15-inch trunk sewer line at Industry Street.

Appendix C provides the hydraulic analysis output and Exhibit A provides the corresponding Sewer Manhole Diagram. To perform this analysis, we obtained As-Built Drawings of the existing sewer system so that the pipe sizes and slopes could be input into the spreadsheet. A key component of the hydraulic analysis is to estimate existing flows within the sewer lines that will be utilized to serve the Garrison project. Table 3 provided the summary of existing flows from existing offsite downstream development.



### **Sewer System Analysis Results**

Appendix C presents the results of the hydraulic analysis for the Garrison project. The results indicate that the existing downstream system has adequate capacity to serve the project. With the additional sewer flow from the Garrison project, all sections of the existing 8-inch and 10-inch sewer lines will flow less than a 0.50 d/D ratio during peak flow conditions.

A summary of the impacts to the existing downstream gravity sewer to the proposed Garrison project is shown below in Table 5.

<b>Existing Downstream Sewer Section</b>	<b>Maximum d/D Ratio</b>		<b>Minimum Velocity, fps</b>	
	<b>Existing Flow</b>	<b>Existing plus Project Flow</b>	<b>Existing Flow</b>	<b>Existing plus Project Flow</b>
8-inch Diameter	0.42	0.44	1.6	1.8
10-inch Diameter	0.27	0.28	2.0	2.0

### **Conclusions and Recommendations**

The following conclusions have been made related to providing sewer service to the Garrison project.

1. The 140-unit Garrison project can receive sewer service by connecting to a public 8-inch diameter gravity line in Garrison Drive and connecting to the existing system.
2. Figure 2 provides the existing sewer facilities surrounding the project area.
3. The development of the project is projected to result in an average sewage flow of 19,600 gpd.
4. The project will construct a private gravity sewer collection system onsite.

5. A sewer system analysis was conducted (Appendix C) and indicates that all existing downstream sewer lines up to the existing 15-inch trunk sewer line at Industry Street have adequate capacity to convey peak flows from existing development plus the Garrison project while maintaining the City required depth-to-diameter ratio of less than 0.50 for existing 8-inch and 10-inch sewer pipelines. Exhibit A within Appendix C presents the existing tributary sewer system in the greater project vicinity.
6. Figure 3 presents the proposed sewer system in the immediate project vicinity.
7. The proposed private onsite gravity sewer system will be designed according to the California Plumbing Code and/or City of Oceanside design standards to comply with all design criteria (depth, velocity, minimum slope, etc.). Proposed sewer lines for the project are recommended to be SDR-35 PVC.

Thank you for the opportunity to assist you with the sewer system planning for the Garrison project. If you have any questions regarding the information and conclusions presented in this report, please do not hesitate to call.

Dexter Wilson Engineering, Inc.



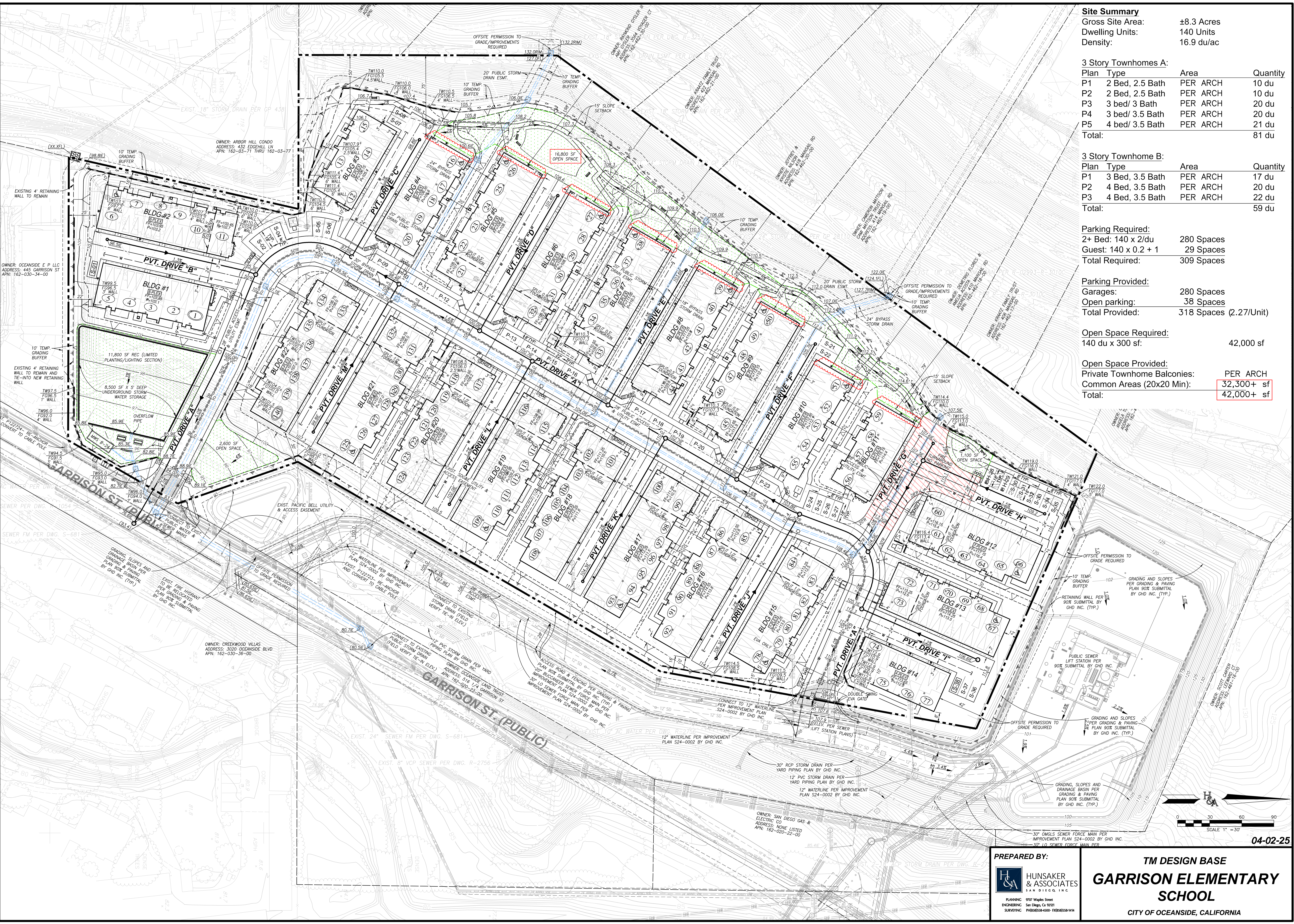
Steven Henderson, P.E.

Attachments

SH:ah

**APPENDIX A**

**PRELIMINARY SITE PLAN**



**Site Summary**

Gross Site Area:	±8.3 Acres
Dwelling Units:	140 Units
Density:	16.9 du/ac

**3 Story Townhome A:**

Plan	Type	Area	Quantity
P1	2 Bed, 2.5 Bath	PER ARCH	10 du
P2	2 Bed, 2.5 Bath	PER ARCH	10 du
P3	3 bed/ 3 Bath	PER ARCH	20 du
P4	3 bed/ 3.5 Bath	PER ARCH	20 du
P5	4 bed/ 3.5 Bath	PER ARCH	21 du
<b>Total:</b>			<b>81 du</b>

**3 Story Townhome B:**

Plan	Type	Area	Quantity
P1	3 Bed, 3.5 Bath	PER ARCH	17 du
P2	4 Bed, 3.5 Bath	PER ARCH	20 du
P3	4 Bed, 3.5 Bath	PER ARCH	22 du
<b>Total:</b>			<b>59 du</b>

**Parking Required:**

2+ Bed: 140 x 2/du	280 Spaces
Guest: 140 x 0.2 + 1	29 Spaces
<b>Total Required:</b>	<b>309 Spaces</b>

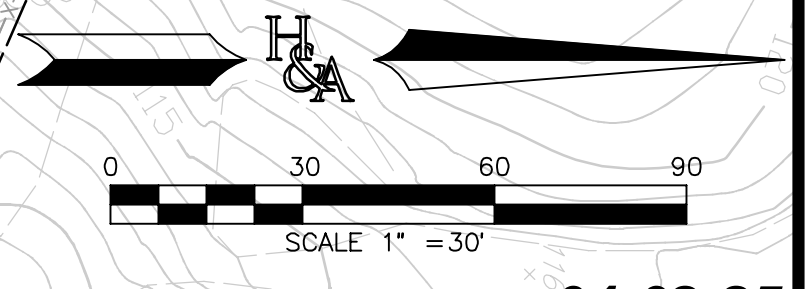
**Parking Provided:**

Garages:	280 Spaces
Open parking:	38 Spaces
<b>Total Provided:</b>	<b>318 Spaces (2.27/Unit)</b>

**Open Space Required:** 140 du x 300 sf: 42,000 sf

**Open Space Provided:**

Private Townhome Balconies:	PER ARCH
Common Areas (20x20 Min):	32,300+ sf
<b>Total:</b>	<b>42,000+ sf</b>



04-02-25

PREPARED BY:

**HUNSAKER & ASSOCIATES**  
SAN DIEGO, INC.

PLANNING: 9707 Wiggins Street  
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SURVEYING: PH088058-6000- PD088058-1414

**TM DESIGN BASE**

**GARRISON ELEMENTARY SCHOOL**

CITY OF OCEANSIDE, CALIFORNIA

**APPENDIX B**

**CITY OF OCEANSIDE DESIGN CRITERIA  
AND AS-BUILT DRAWINGS**

## **SECTION 3 - SEWER SYSTEMS DESIGN GUIDELINES**

### **3.1 GENERAL**

- A. All sewer system construction shall conform to the most recent edition of the City of Oceanside's Water, Sewer, and Reclaimed Water Design & Construction Manual.
- B. If a conflict arises between the requirements in this manual, the order of precedence shall take place:
  - 1. Sections 1-4, Required Notes, & Appendix
  - 2. Standard Drawings
  - 3. Standard Specifications
- C. If the standard that is sought does not appear in this Manual, then the following standards shall be utilized in the order listed:
  - 1. State of California Department of Health Services
  - 2. American Water Works Association (AWWA) Standards
  - 3. San Diego County Regional Standard Drawings
  - 4. Standard Specifications for Public Works Construction (SSPWC or "Greenbook"), latest Edition.

Exceptions to this and all other guidelines appearing in this manual may be allowed only upon the approval of the Water Utilities Director.

- B. The sewer facilities listed below will require telemetry and control equipment to be incorporated into the design of the facility. The Water Utilities Department will provide specific design requirements when improvement plans are submitted for Plan Check.
  - 1. Treatment Facilities
  - 2. Sewer Lift Stations and force mains
  - 3. Metering Stations

### **3.2 MAINS**

- A. Minimum size shall be 8 inches.
- B. All mains not meeting the minimum main diameter and material shall be replaced to meet current design requirements. This is applicable for all new commercial, industrial, institutional, and residential developments of four (4) units or more. Where the full replacement length(s) from manhole to manhole along the property frontage length impacts more than one main and significantly exceeds the developed

property(ies) or is deemed in excess of the overall project cost, the developer may pay an in-lieu fee upon the approval of the Water Utilities Director.

- C. Slip-lining or replacement of sewer mains 8-inch or larger may be required if the main is determined to be in poor condition per CCTV report.
- D. For diameters 10 inches and smaller, maximum depth of flow shall not exceed 1/2 the diameter. For diameters 12 inches and larger, depth of flow shall not exceed 2/3 the diameter.
- E. No vertical or horizontal curves shall be permitted, unless otherwise approved by the Water Utilities Director.
- F. The maximum slope of sewer line shall be 14% unless otherwise approved by the Water Utilities Director.
- G. If the main and/or lateral is at a depth of 20 feet or more than the type of pipe material must be approved by the Water Utilities Department. Calculations must be provided to the Water Utilities Department to verify that the pipe material will accommodate the design depths.
- H. Locations:
  - 1. Alley: Mains shall be offset a minimum of 3 feet from the centerline to clear alley gutter. Separation from waterlines shall be per Oceanside Standard Drawing S-1 and S-1a.
  - 2. Street: Sewer main locations shall be located in center of the street. A minimum 10-foot separation outside of pipe to outside of pipe from waterlines shall be maintained.
  - 3. Streets with 84 feet of right-of-way or more may require special location as approved by the Water Utilities Director.
  - 4. Minimum cover for sewer mains shall be 6 feet below the finished grade, unless otherwise approved by the Water Utilities Director.

I. Minimum Slopes:

A minimum velocity of 2 FPS shall be maintained at peak flow. Where 2 FPS is not attainable, a minimum slope of 1.6% shall be used. When velocities are 2.0 FPS or greater the following design criteria will govern:

<u>Pipe Diameter</u>	<u>Minimum Slope</u>
8 Inch	0.50%
10 Inch and larger	0.40%

J. Demands:

- 1. Average daily sewer generation rates shall be:

LAND USE	LAND USE CATEGORY	UNITS

Low Density Residential	EA-R, EB-R, SDF-R	170 gpd/EDU
Mid Density Residential	MDA-R, MDB-R, MDC-R, HD-R, UHD-R	140 gpd/EDU
Industrial	LI	1,000 gpd/acre
Commercial	CC, NC, GC, SC, PC, GI, RP-I, CI, PI	1,000 gpd/acre
Hotels		100 gpd/room

Peak daily flows for residential developments, shall be based on a ratio of peak to average flow as shown below:

<u>Population</u>	<u>Ratio of Peak to Average Flow</u>
Less than 500	3.5
500 to 1,000	2.75
1,000 to 5,000	2.50
Greater than 5,000	2.00

3. Peak daily flows for all other uses shall be based on the following formula:

$$Q_p = 1.84 Q_a^{.92}$$

Where  $Q_p$  = Peak Flow in CFS  
 $Q_a$  = Average Flow in CFS

- I. Residential area easements shall be constructed by the developer. They shall be fenced on both sides parallel to the easement with a gate at the entrance and the exit. Easements shall be dedicated to the City and maintained by Property Owner with a lock feature.
- J. All sewer mains not located within the public right-of-way shall be provided with a minimum 20-foot wide sewer easement. In some special cases, a wider easement may be required; the Water Utilities Director shall determine size. All easements shall be easily accessible to City maintenance equipment with all weather roadways. An access road will be built for trucks and as approved by the Water Utilities Department.
- K. All utility easements that contain sewer mains, which will be publicly maintained, shall demonstrate that the largest vehicle within the Sewer Collections Fleet can transverse the streets without damage to both public and private property. The turning radius of this vehicle will be made available upon request.
- L. Where water and sewer mains are located within the same easement, the minimum easement size shall be 30 feet wide. All easements shall be easily accessible to the City’s maintenance equipment with all-weather access roadways. No trees or structures or building overhang are allowed within the City easements. When easements are located on private properties, the property owner shall keep the easement free and clear of weeds and debris.
- M. 3-inch minimum width color coded detector tape marked “SEWER” in 1-½ inch black letters shall be placed on the compacted and graded bedding material one foot above and centered over the sewer main prior to backfilling the trench.

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## PLANNING AND EVALUATION CRITERIA

The City's sanitary sewer collection system was modeled and evaluated based on the planning criteria defined in this chapter. The planning criteria address the collection system capacity, acceptable gravity sewer pipe slopes, maximum allowable depth of flow, design velocities, and changes in pipe size.

### 6.1 GRAVITY SEWERS

Gravity sewer pipe capacities are dependent on many factors. The factors include roughness of the pipe, the chosen maximum allowable depth of downstream flow conditions, and limiting velocity and slope. The following sections describe the factors that account for the determination of existing and future pipeline capacities in the City's collection system.

#### 6.1.1 Manning Coefficient (n)

The manning coefficient 'n' is a friction coefficient that varies with respect to pipe material, size of pipe, depth of flow, smoothness of joints, root intrusion, and other factors. For sewer pipes, the manning coefficient typically ranges between 0.011 and 0.017, with 0.013 being a representative value used for system planning purposes. Due to unknown conditions of existing pipelines, a conservative manning "n" factor of 0.013 was initially used for the evaluation of all existing collection system pipelines. Pipe roughness values were adjusted within the stated typical range during calibration. The evaluation of all proposed pipelines used a manning "n" factor of 0.013.

#### 6.1.2 Flow Depth Criteria (d/D)

The primary criterion used to identify capacity deficient sewers or to size new sewer improvements is the maximum flow depth to pipe diameter ratio (d/D). The d/D value is defined as the depth of flow (d) in a pipe during peak (design) flow conditions divided by the pipe's diameter (D). Based on Carollo's experience, City staff input, and industry standards, the criteria listed in Table 6.1 were used. The following paragraphs explain these criteria in more detail.

##### 6.1.2.1 Flow Depth for Existing Sewers

Maximum flow depth criteria for existing sanitary sewers are established based on a number of factors, including the acceptable risk tolerance of the utility, local standards and codes, and other factors. Using a conservative d/D ratio when evaluating existing sewers may lead to unnecessary replacement of existing pipelines. Conversely, lenient flow depth criteria could increase the risk of sanitary sewer overflows (SSOs). Ultimately, the maximum allowable flow depth criteria should be established to be as cost effective as

possible while at the same time reducing the risk of SSOs to the greatest extent possible. For Oceanside, pipelines were flagged if the d/D exceeded 1.0 (i.e., pipelines that surcharged were flagged).

<b>Table 6.1 Maximum Flow Depth Criteria Sewer System Master Plan Update City of Oceanside</b>	
<b>Maximum Flow Depth for Existing Sewers</b>	
Peak Wet Weather Flow:	Maximum d/D = 1.0
<b>Maximum d/D for New Sewers</b>	
<u>Pipe Diameter (inches)<sup>(1)</sup></u>	<u>Maximum d/D Ratio (during Peak Flows)<sup>(1)</sup></u>
10 and smaller	0.50
12 and larger	0.67
<u>Note:</u>	
(1) Obtained from City of Oceanside's Design and Construction Manual: Section 3- Sewer Systems; <a href="http://www.ci.oceanside.ca.us/gov/water/admin/manual.asp">http://www.ci.oceanside.ca.us/gov/water/admin/manual.asp</a>	

A capacity deficient sewer (i.e., system bottleneck) raises the hydraulic grade line of upstream sewers, leading to backwater conditions. The greater the capacity deficiency, the higher water levels will surcharge upstream of the bottleneck pipeline (or pipelines). The hydraulic model is used to determine “backwater” pipelines in order to specify which specific pipelines are the actual root causes of the capacity deficiency. Capital projects are proposed to provide greater flow capacity for the deficient sewers, which eliminates the backwater conditions that cause surcharging.

The criteria summarized in Table 6.1 was used to evaluate existing sewers in the collection system as part of this Master Plan. However, should a development project be considered that proposes a change to the current zoning or land use density, a more conservative criteria will be used by the City to conduct the evaluation of available capacity. Should a zoning change be proposed by a development project, the criteria established below for the sizing of new sewers will be used. The City will use the more conservative criteria to provide reserve capacity due to the uncertainty inherent with flow estimations during the planning phases of development projects.

### **6.1.2.2 Flow Depth for New Sewers**

When designing sewer pipelines, it is common practice to adopt different flow depth criteria for various pipe sizes. Design d/D ratios typically range from 0.5 to 0.92, with the lower values typically used for smaller pipes, which may experience flow peaks greater than design flow or blockages from debris, paper, or rags. The City's Water Utilities Department standards for the evaluation of existing sewers and sizing new trunk lines are summarized in Table 6.1. For pipelines 10 inches and smaller in diameter, the max d/D value is 0.5 or

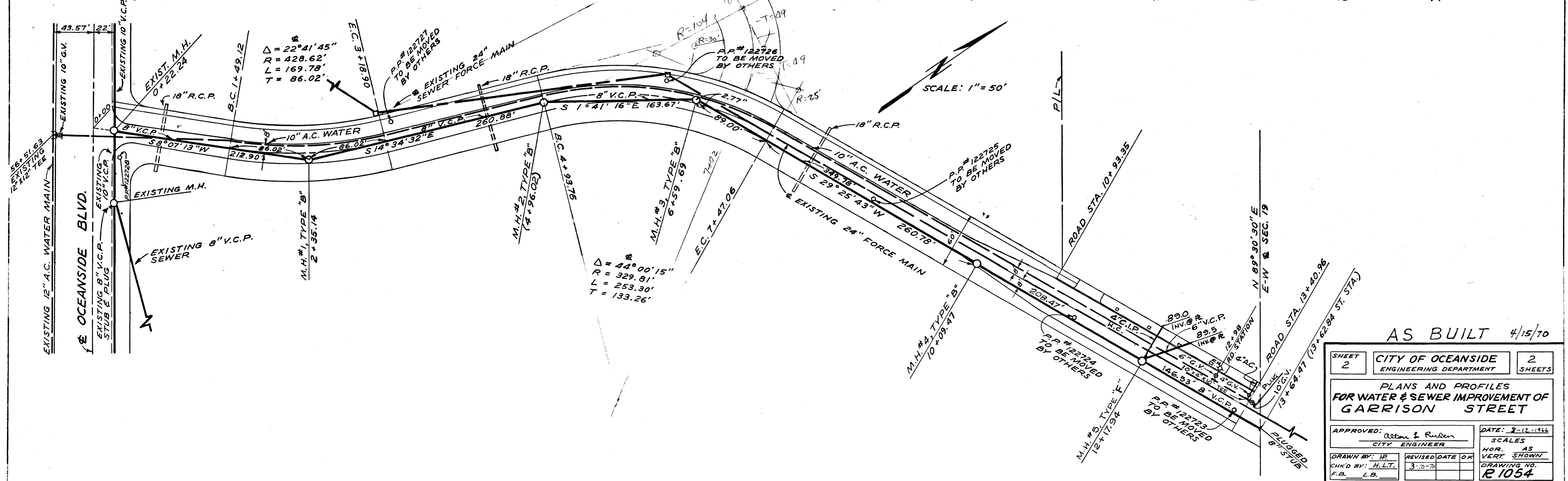
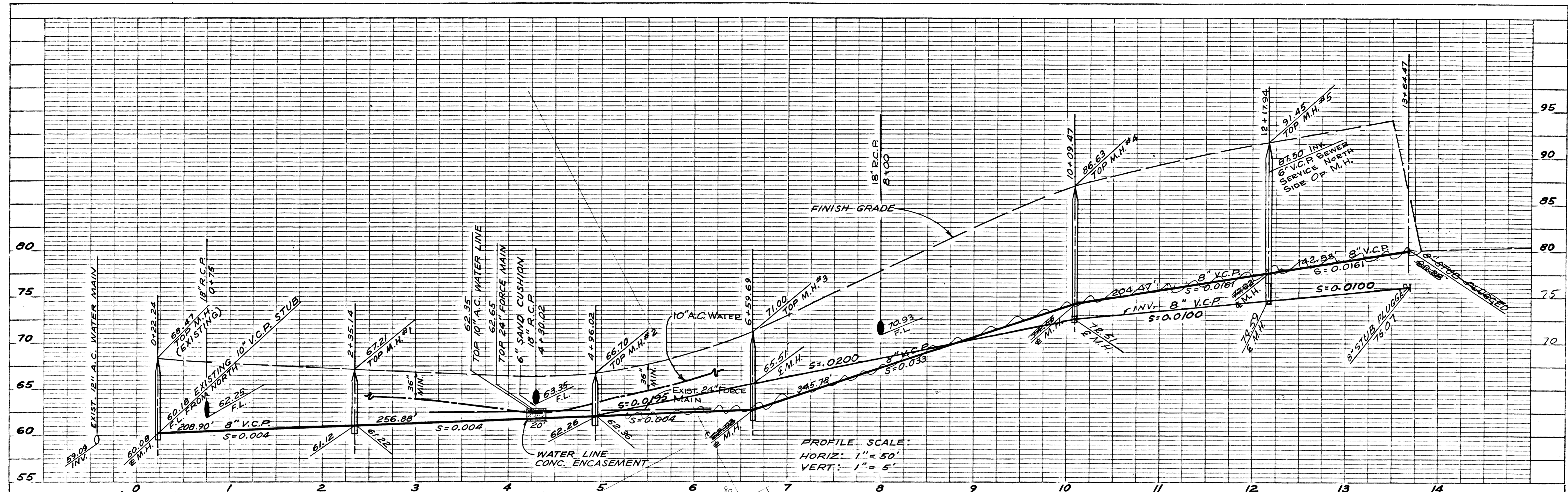
## **6.2 LIFT STATIONS AND FORCE MAINS**

Industry standard practice is to require that sewage lift stations have sufficient capacity to pump peak flows with the largest pump out of service (firm capacity).

Force main piping should be sized to provide a minimum velocity of 3 ft/s at the design flow rate of the lift station and no more than 8 ft/s. For the determination of head loss, the Hazen Williams Equation is used with a C-factor of 120. These factors are typical for sewer system master planning purposes.

PROFILE	SHEET
NO. 1	1
NO. 2	2
NO. 3	3
NO. 4	4
NO. 5	5
NO. 6	6
NO. 7	7
NO. 8	8
NO. 9	9
NO. 10	10
NO. 11	11
NO. 12	12
NO. 13	13
NO. 14	14

PLAN	SHEET
NO. 1	1
NO. 2	2
NO. 3	3
NO. 4	4
NO. 5	5
NO. 6	6
NO. 7	7
NO. 8	8
NO. 9	9
NO. 10	10
NO. 11	11
NO. 12	12
NO. 13	13
NO. 14	14



AS BUILT 4/15/70

SHEET 2	CITY OF OCEANSIDE ENGINEERING DEPARTMENT	2 SHEETS
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**PLANS AND PROFILES  
FOR WATER & SEWER IMPROVEMENT OF  
GARRISON STREET**

APPROVED: <i>Alan J. Ruder</i> CITY ENGINEER	DATE: 2-12-1966
DRAWN BY: HP	REVISOR: DATE OR
CHKD BY: H.L.T.	3-7-70
F.B. L.B.	

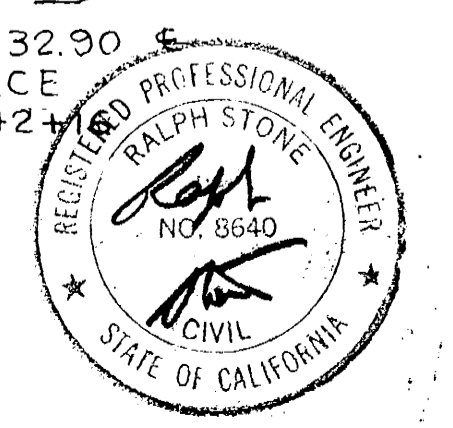
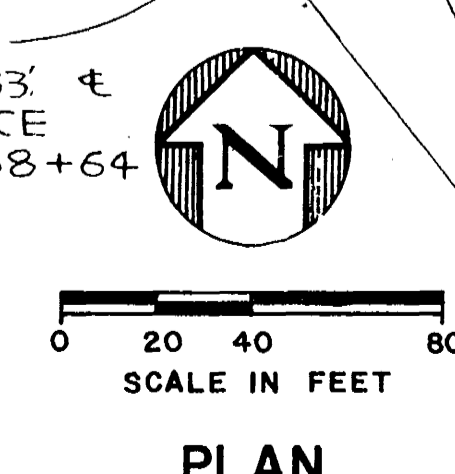
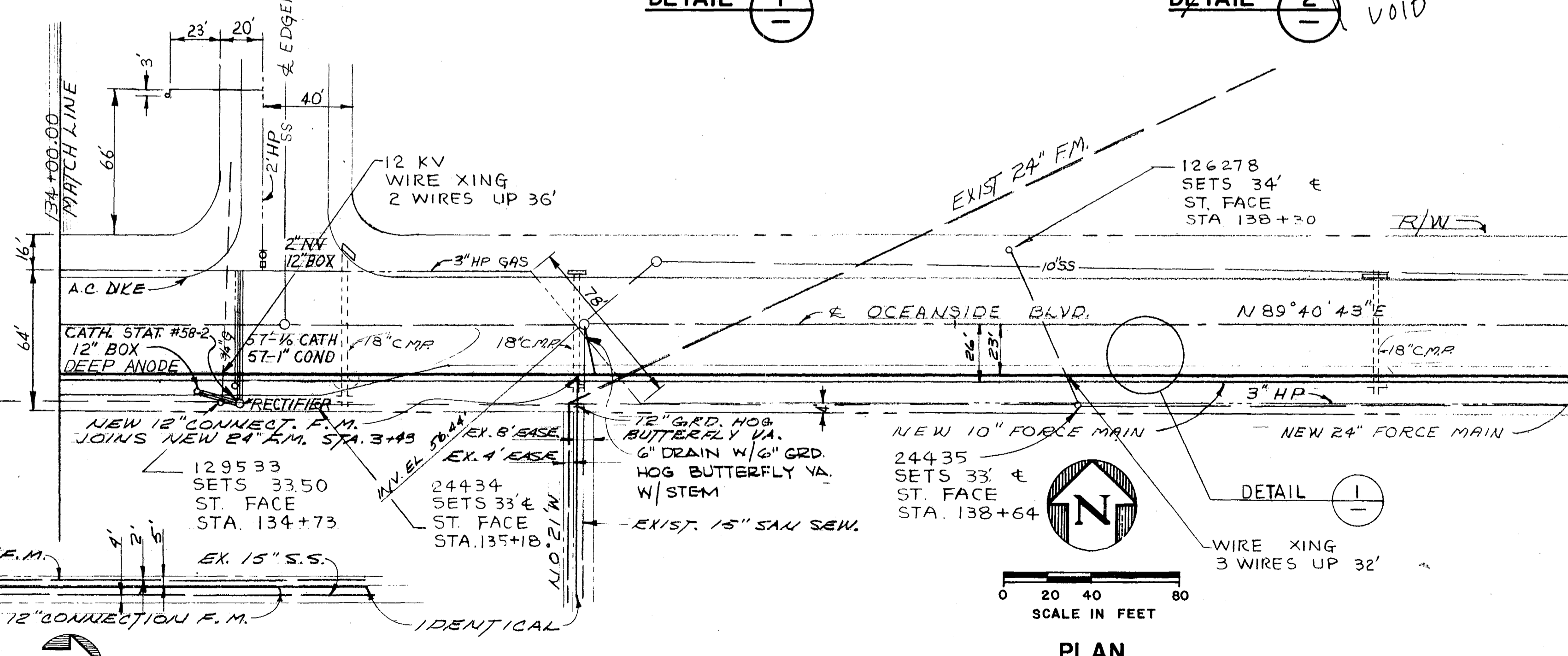
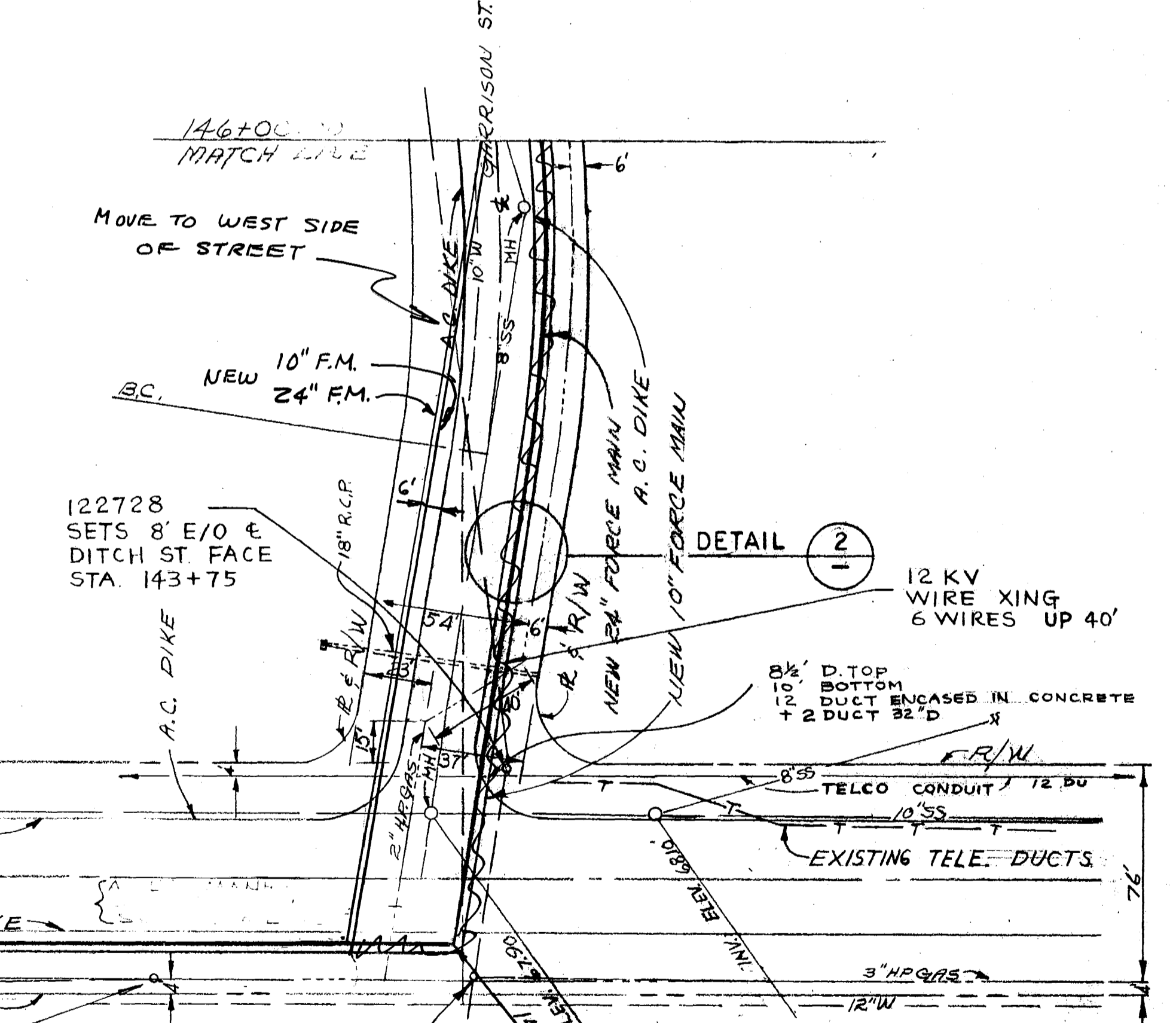
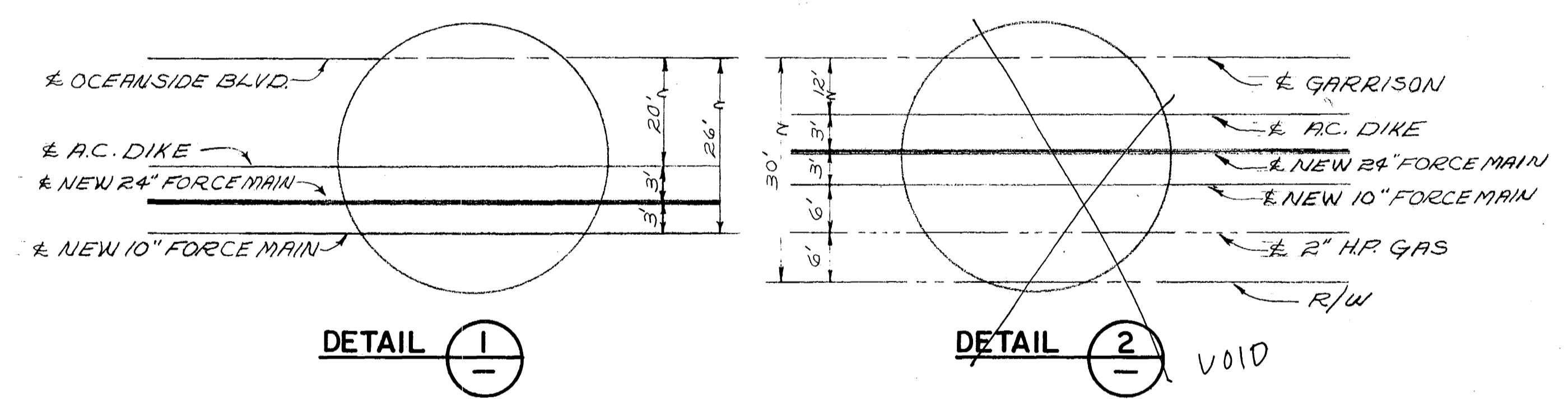
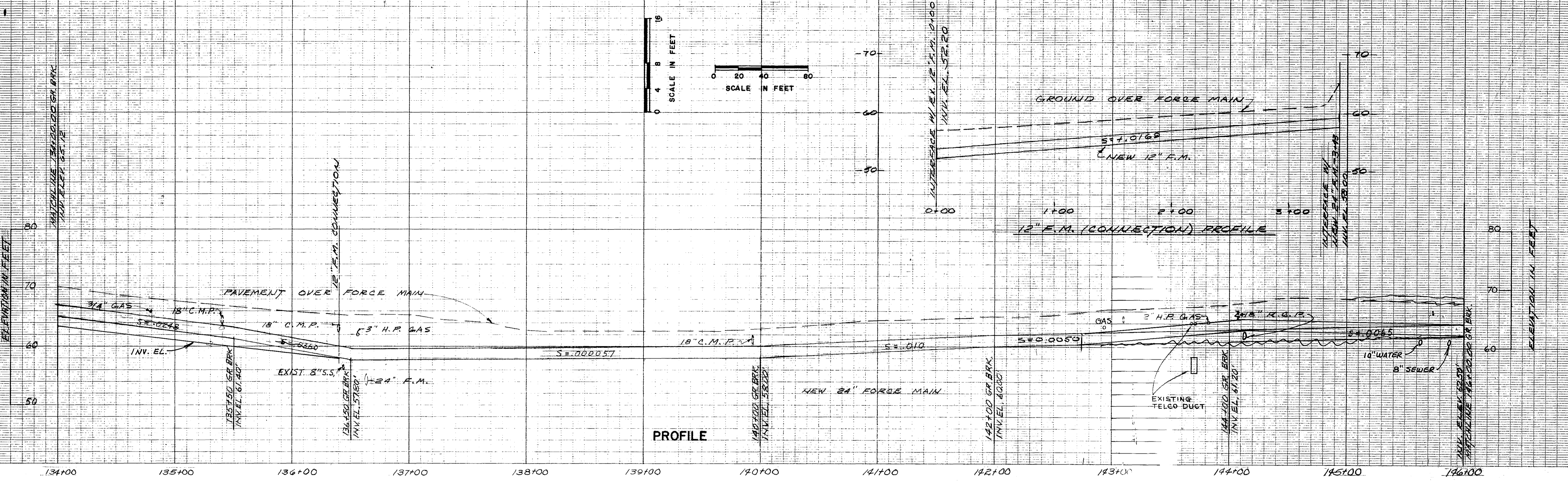
SCALES  
AS SHOWN  
VERT. SHOWN  
DRAWING NO.  
**R-1054**

DRAWING NUMBER

DRAWING NUMBER

DRAWING NUMBER

DRAWING NUMBER



122728  
SETS 8' E/O &  
DITCH ST FACE  
STA. 143+75

122729  
SETS 3190 &  
ST. FACE  
STA. 143+27

AS BUILT 3-75

**RALPH STONE & COMPANY, INC.**  
ENGINEERS  
10954 Santa Monica Blvd. 478-1501 Los Angeles, Calif. 90025

CITY OF OCEANSIDE, CA.

ENTERED POLES & WIRES BY SAN DIEGO GAS & ELECTRIC 8/29/73 YSL

ENTERED UTILITY LOCATIONS BY SAN DIEGO GAS & ELECTRIC 7/20/73 RPM

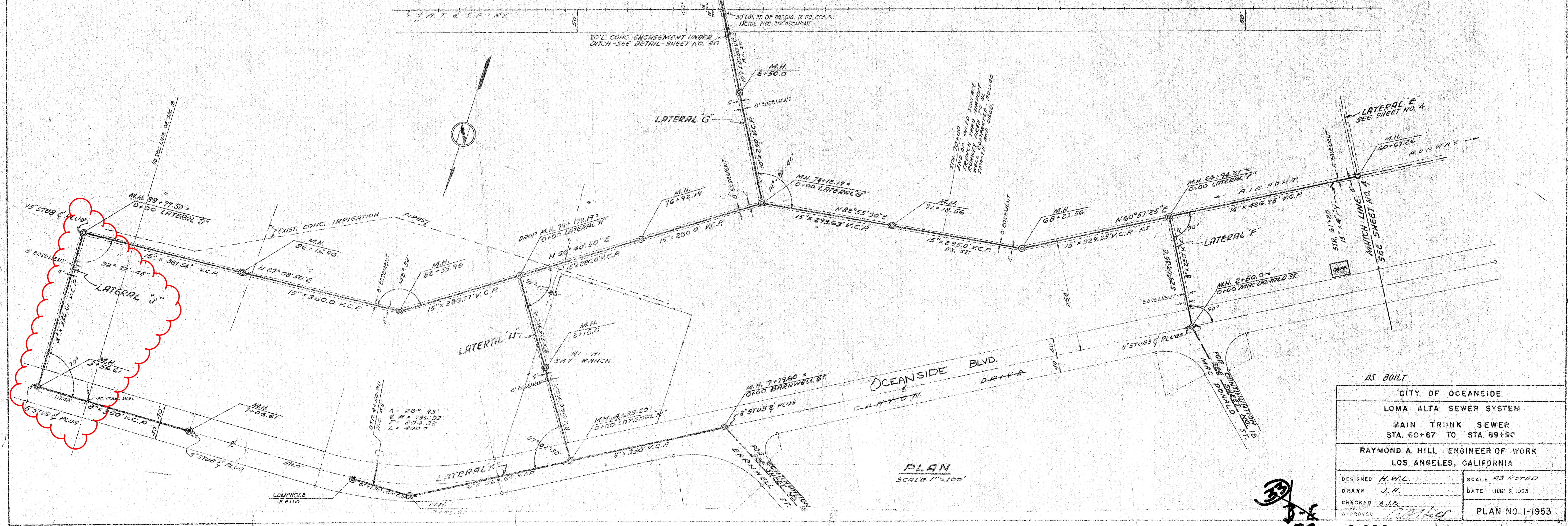
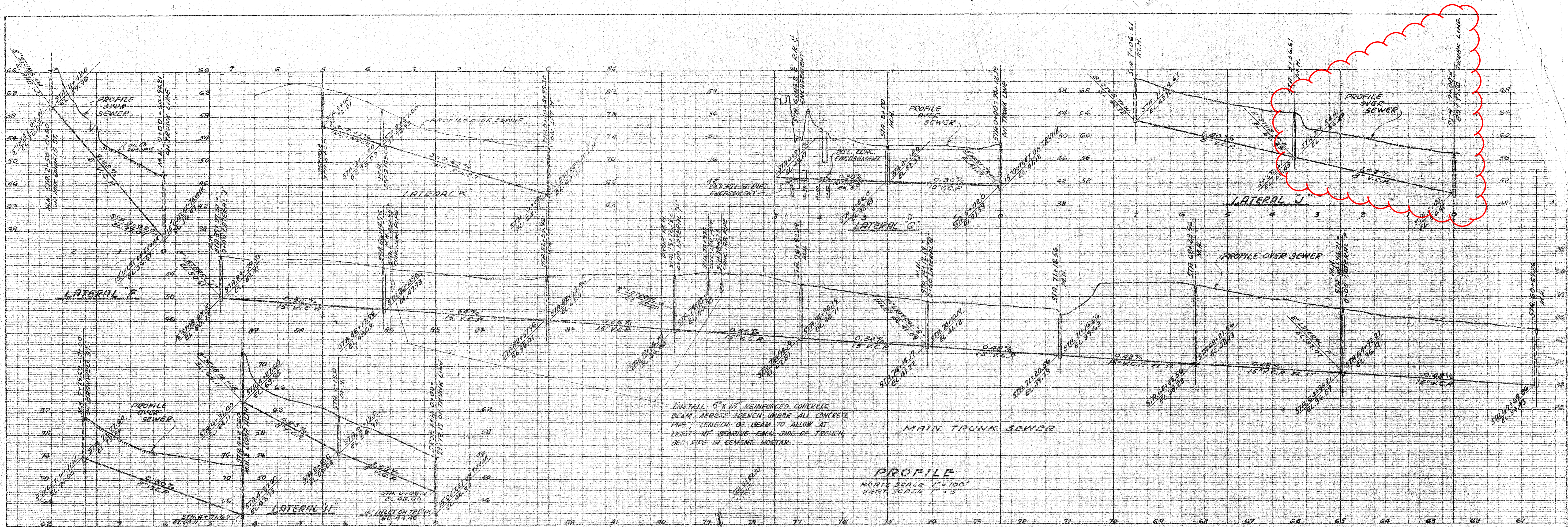
APPROVED *Alton L. Ruden*  
ALTON L. RUDEN (R.E. N°10163) - CITY ENGINEER

**LS-J PIPELINE**  
**PLAN AND PROFILE**  
**STA. 134+00.00 TO STA. 146+00.00**

DR. *L.T. ISN* JOB 135  
SCALE NOTED  
APP. *R* DATE 11/19/71

DWG. NO. 4.1-P14

S-680



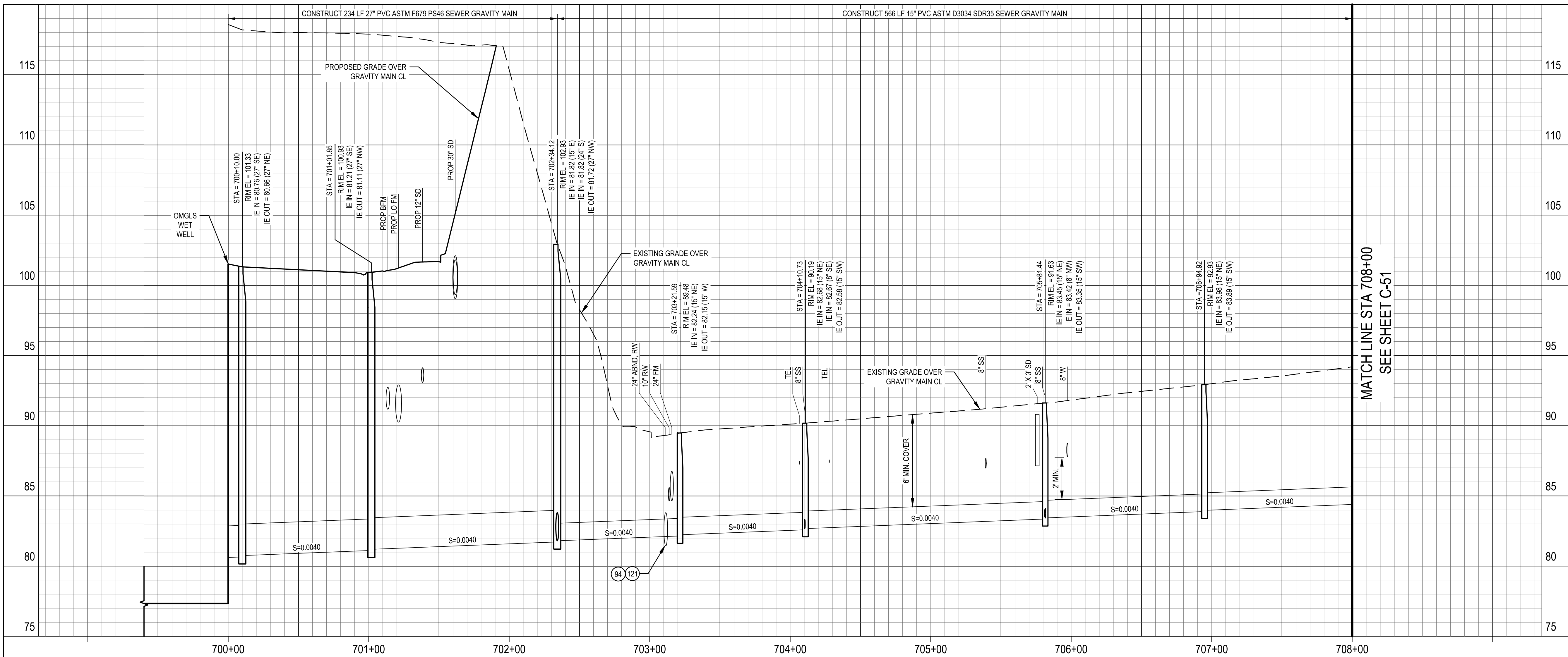
AS BUILT	
CITY OF OCEANSIDE	
LOMA ALTA SEWER SYSTEM	
MAIN TRUNK SEWER	
STA. 60+67 TO STA. 89+50	
RAYMOND A. HILL ENGINEER OF WORK	
LOS ANGELES, CALIFORNIA	
DESIGNED H.W.L.	SCALE AS NOTED
DRAWN J.R.	DATE JUNE 5, 1953
CHECKED S.L.P.	PLAN NO. 1-1953
APPROVED [Signature]	SHEET 5 OF 22

5-232

30  
 5-2  
 3A

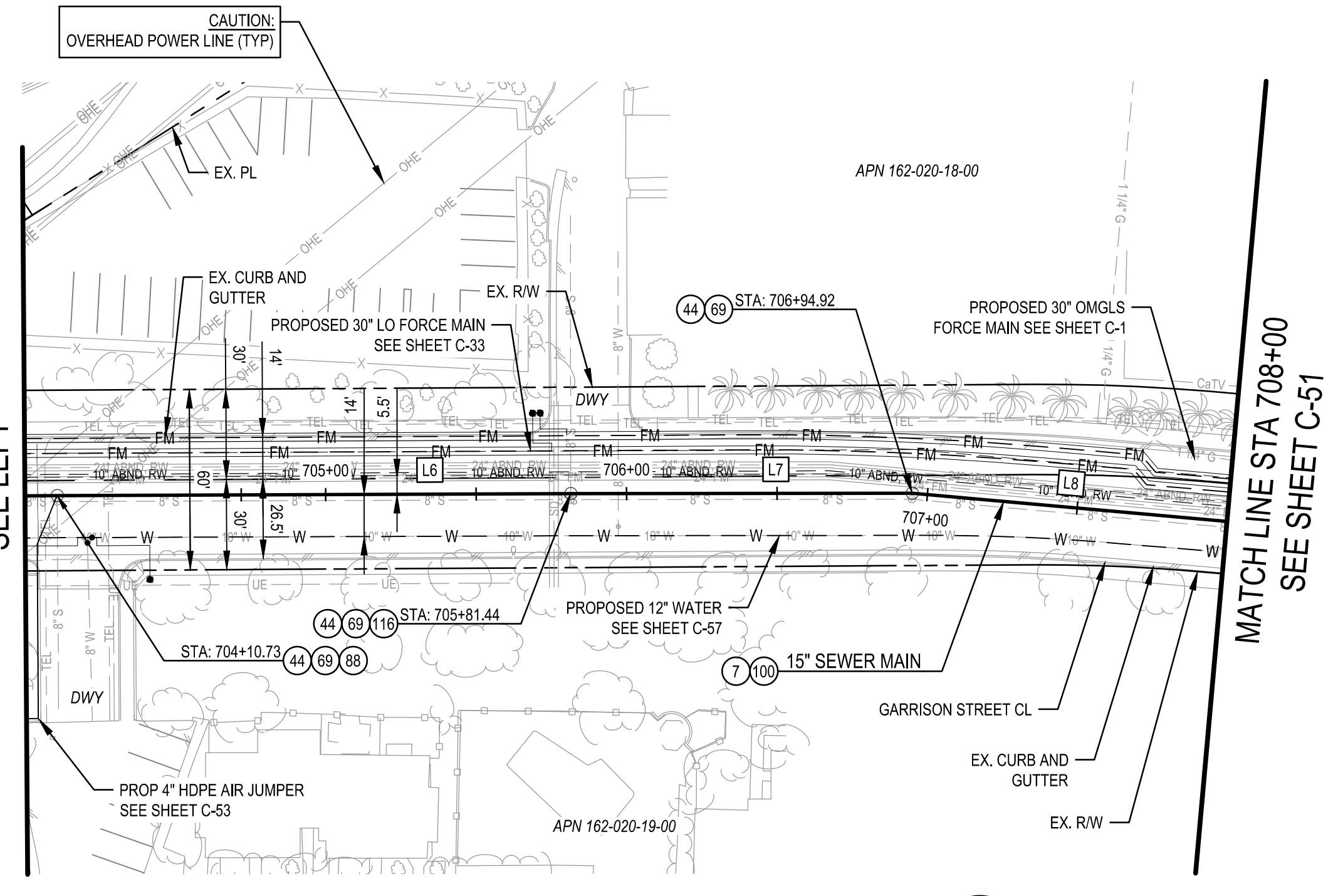
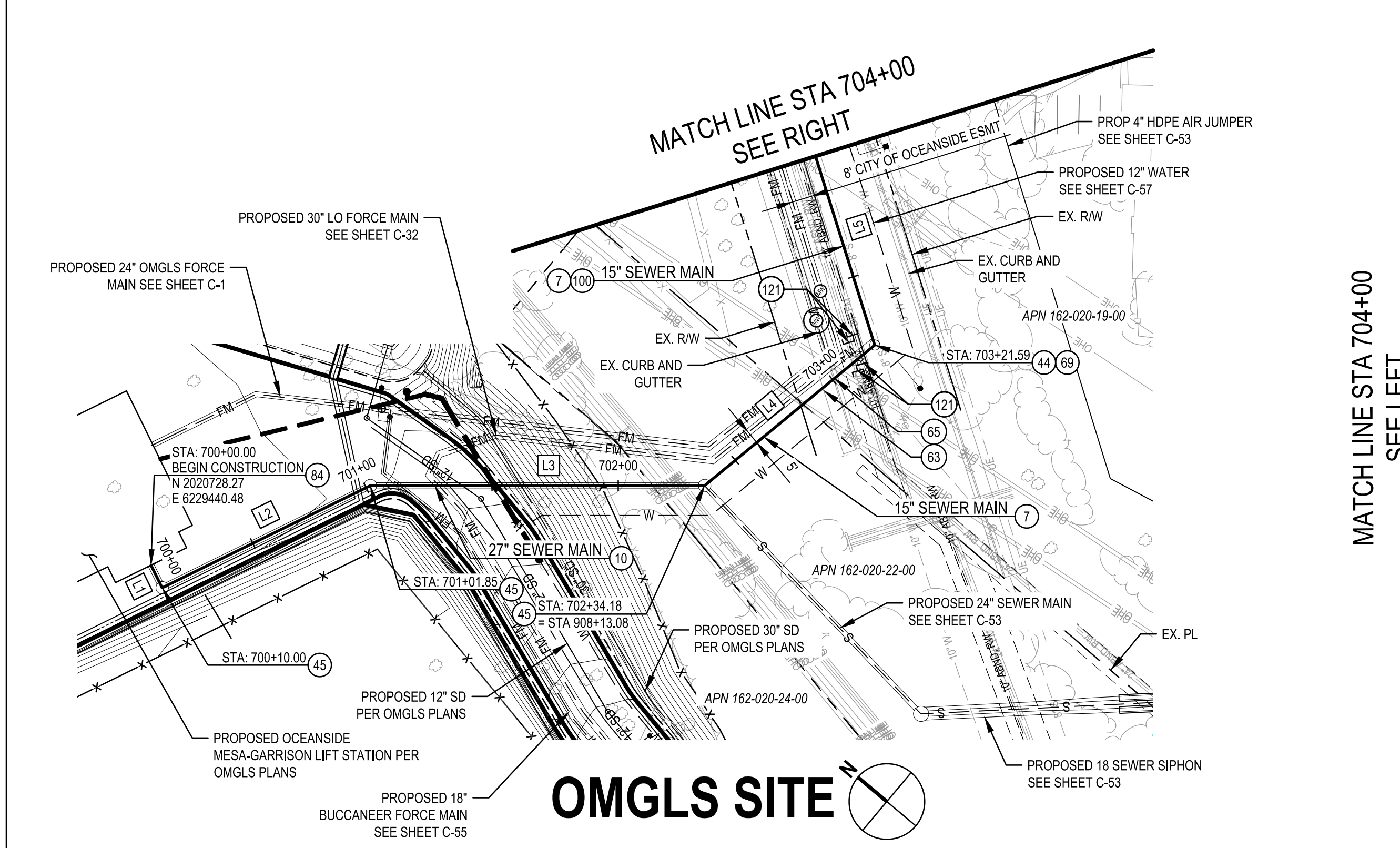
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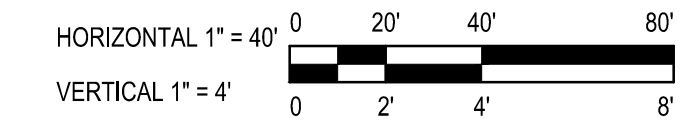
- SHEET GENERAL NOTES**
- DESIGN BUILDER SHALL POTHOLE AND VERIFY ALL UTILITY CROSSINGS AND POINTS OF CONNECTION.
  - PLANS SHOW APPROXIMATE LOCATION OF APPURTENANCES. DESIGN BUILDER TO FIELD VERIFY IF ANY CONFLICTS WITH PLACEMENT OF ABOVE GROUND APPURTENANCES AND LATERALS BETWEEN APPURTENANCES AND SEWER FORCE MAIN. CITY REPRESENTATIVE SHALL APPROVE FINAL LOCATION OF APPURTENANCES.
  - A MINIMUM 12" VERTICAL CLEARANCE BETWEEN EXISTING UTILITIES AND PROPOSED PIPELINES SHALL BE MAINTAINED AT CROSSING UNLESS OTHERWISE SHOWN.
  - DESIGN BUILDER MAY SELECT PVC OR HDPE PIPE MATERIAL BASED ON THE FIELD CONDITIONS. DESIGN BUILDER TO NOTIFY ENGINEER OF MATERIAL CHANGE PRIOR TO INSTALLATION.
- SHEET CONSTRUCTION NOTES**
- CONSTRUCT 15" PVC ASTM D3034 SDR35 SEWER GRAVITY MAIN. TRENCH BACKFILL AND RESURFACING PER DETAILS 1-4, SHEET C-63.
  - CONSTRUCT 27" PVC ASTM F679 PS46 SEWER GRAVITY MAIN. TRENCH BACKFILL AND RESURFACING PER DETAILS 1-4, SHEET C-63.
  - CONSTRUCT 4' DIAMETER MANHOLES PER CITY OF OCEANSIDE STANDARD DRAWING NO. S-5
  - CONSTRUCT 5' DIAMETER MANHOLES PER CITY OF OCEANSIDE STANDARD DRAWING NO. S-6
  - SAWCUT, REMOVE AND REPLACE CONCRETE SIDEWALK TO THE NEAREST JOINT PER SDRSD G-07
  - SAWCUT, REMOVE AND REPLACE CONCRETE CURB AND GUTTER TO THE NEAREST JOINT PER SDRSD G-02
  - REMOVE EXISTING MANHOLE
  - CONNECT TO OMGLS SITE PIPING PER OMGLS PLAN SET
  - CONNECT TO EXISTING 8" SEWER PER DETAIL 1, SHEET C-72
  - REMOVE AND DISPOSE OF INTERFERING PORTIONS OF 24" ABANDONED RECYCLED WATER PER SDRSD STANDARD DRAWING WP-03
  - REMOVE AND DISPOSE OF INTERFERING PORTIONS OF 8" SEWER AND MANHOLES
  - CONNECT TO EXISTING 8" SEWER PER DETAIL 2, SHEET C-72
  - CUT AND PLUG ABANDONED PIPELINE PER SDRSD STANDARD DRAWING WP-03

90% SUBMITTAL -- NOT FOR CONSTRUCTION 10/25/2024



**DATA TABLE**

NO	Δ / BEARING	R	L	T	DESCRIPTION
L1	S23° 47' 58.51"W	-	10.00'	-	27" PVC SEWER MAIN
L2	S66° 12' 03.81"E	-	91.85'	-	27" PVC SEWER MAIN
L3	S40° 04' 08.60"E	-	132.33'	-	27" PVC SEWER MAIN
L4	S79° 37' 18.49"E	-	87.40'	-	15" PVC SEWER MAIN
L5	N32° 32' 33.58"E	-	89.15'	-	15" PVC SEWER MAIN
L6	N32° 44' 17.82"E	-	170.70'	-	15" PVC SEWER MAIN
L7	N32° 53' 13.85"E	-	113.48'	-	15" PVC SEWER MAIN
L8	N38° 02' 49.96"E	-	181.28'	-	15" PVC SEWER MAIN



**Underground Service Alert**

CALL 811

TWO WORKING DAYS BEFORE YOU DIG

**APPROVED REVISIONS**

NO.	APPROVED REVISIONS	BY	DATE	ENGINEER OF WORK SEAL

**ENGINEER OF WORK**

**GHD**

GHD Inc.  
 320 Goddard Suite 200  
 Irvine California 92618 USA  
 T 949 646 5200 F 949 648 5299

**CITY NAVD88 BENCHMARK**

Description: SET BRASS DISK IN CURB WITH TRIANGLE/OUNCH STAMP "LS 7854" FLUSH

Location: EAST CORNER OF CB ON WLY POC ON NLY RETURN OF WLY ENTRANCE  
 IN MISSION CENTER, 6' NW OF CURB OF MISSION NEAR McDONALD'S

Record From: RECORD OF SURVEY MAP NO. 21787

Elev: 44.59 Datum: MSL

**C-50**

SHEET 55 CITY OF OCEANSIDE ENGINEERING DIVISION 81 SHEETS

PUBLIC IMPROVEMENT PLAN FOR  
**SEWER GRAVITY MAIN PLAN AND PROFILE**  
**GARRISON ST: STA 700+00 TO STA 708+00**

ACCEPTED BY

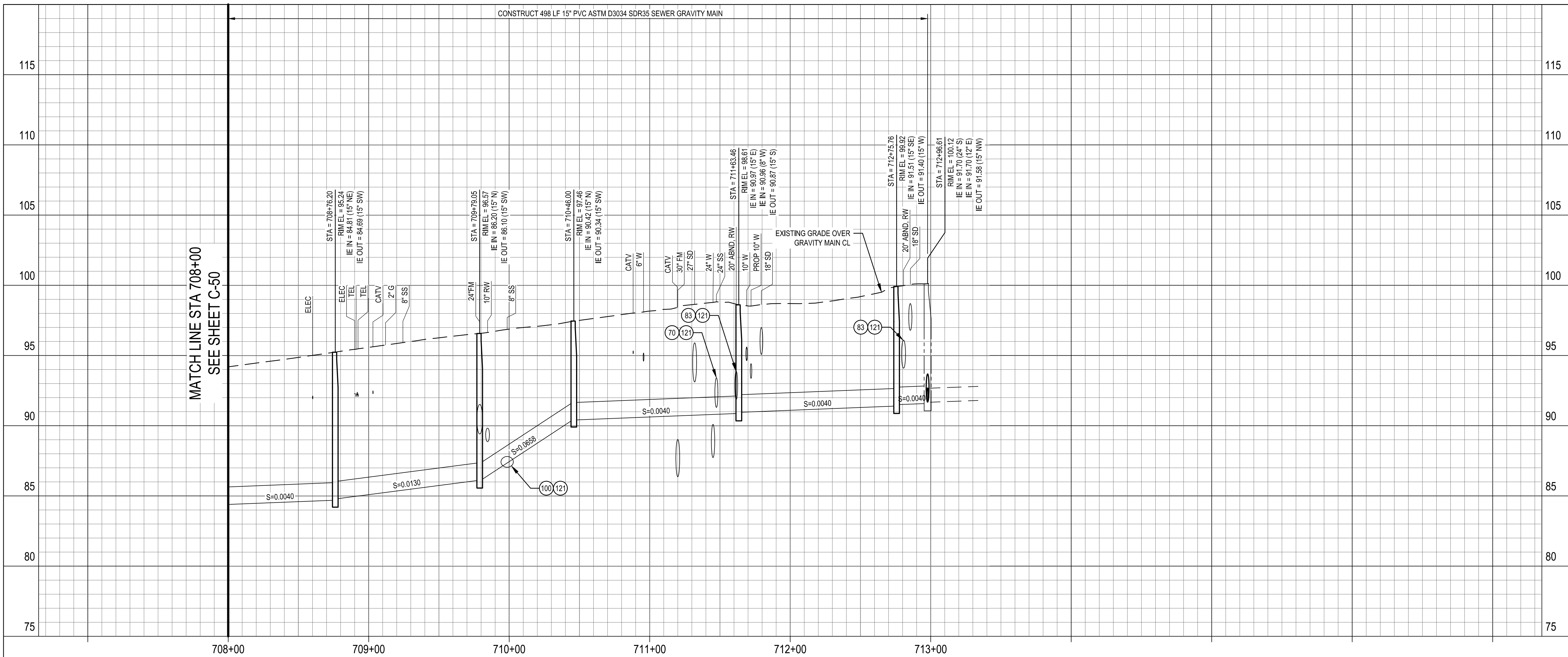
CITY ENGINEER: Brian K. Thomas P.E. 60907 Date:

Prepared under the direction of: Reviewed By: PLAN NUMBER

Sign: TIMOTHY JOYCE 10/25/2024 PA 10/25/2024 S24-00002

PRINT Name: Date: Initials: Date:

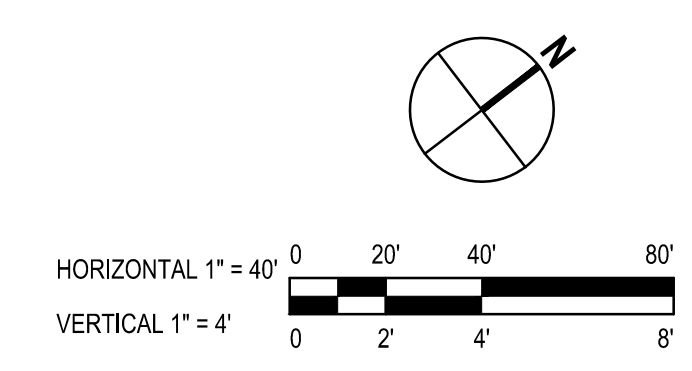
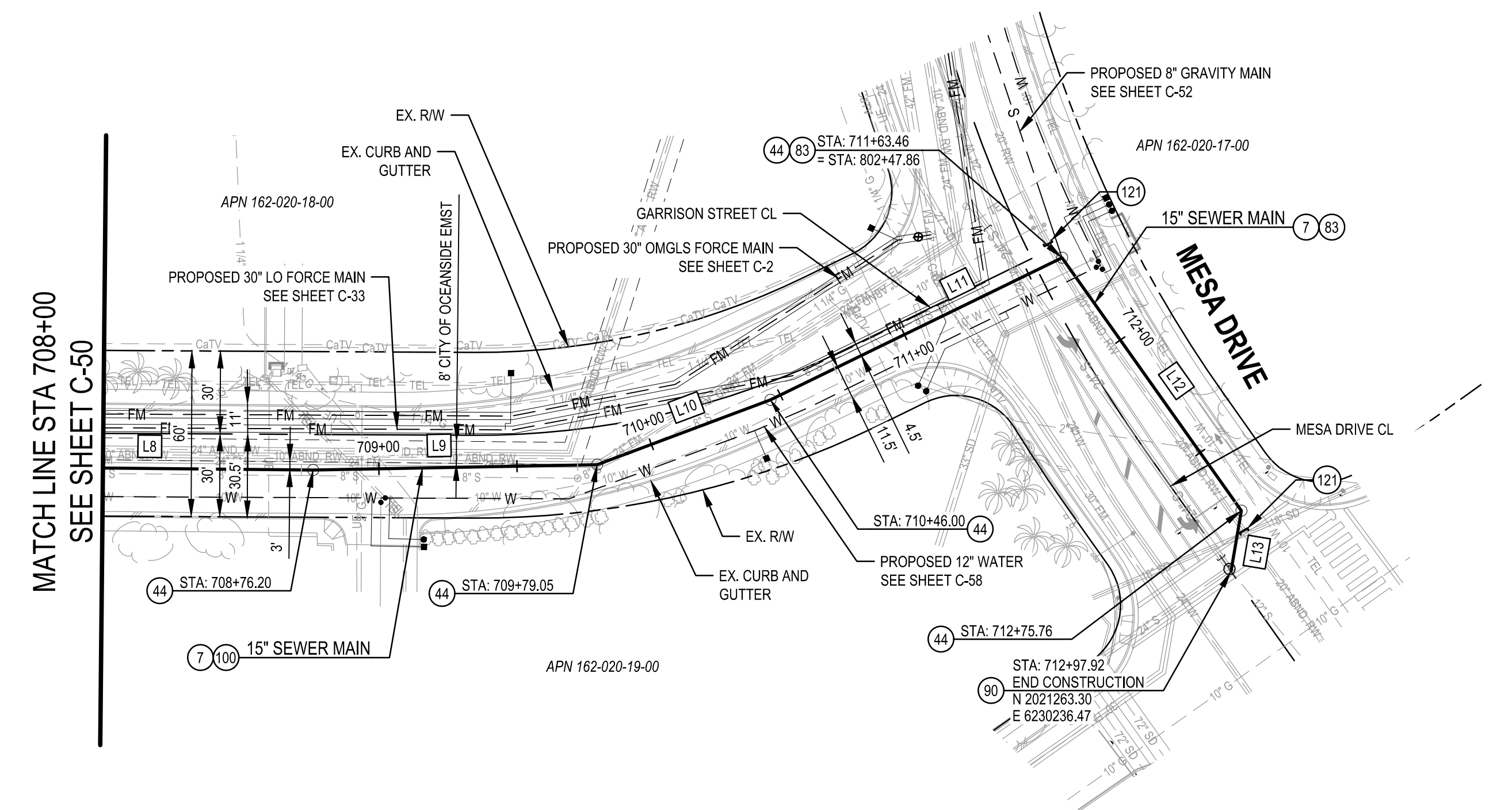
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- SHEET GENERAL NOTES**
- DESIGN BUILDER SHALL POTHOLE AND VERIFY ALL UTILITY CROSSINGS AND POINTS OF CONNECTION.
  - PLANS SHOW APPROXIMATE LOCATION OF APPURTENANCES. DESIGN BUILDER TO FIELD VERIFY IF ANY CONFLICTS WITH PLACEMENT OF ABOVE GROUND APPURTENANCES AND LATERALS BETWEEN APPURTENANCES AND SEWER FORCE MAIN. CITY REPRESENTATIVE SHALL APPROVE FINAL LOCATION OF APPURTENANCES.
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- SHEET CONSTRUCTION NOTES**
- (7) CONSTRUCT 15" PVC ASTM D3034 SDR35 SEWER GRAVITY MAIN. TRENCH BACKFILL AND RESURFACING PER DETAILS 1-4, SHEET C-63.
  - (44) CONSTRUCT 4' DIAMETER MANHOLES PER CITY OF OCEANSIDE STANDARD DRAWING NO. S-5
  - (70) REMOVE AND DISPOSE OF INTERFERING PORTIONS OF 24" ABANDONED SEWER AND MANHOLES.
  - (83) REMOVE AND DISPOSE OF INTERFERING PORTIONS OF 20" ABANDONED RECYCLED WATER
  - (90) MODIFY AND CONNECT TO EXISTING MANHOLE PER DETAIL 3, SHEET C-72
  - (100) REMOVE AND DISPOSE OF INTERFERING PORTIONS OF 8" SEWER AND MANHOLES
  - (121) CUT AND PLUG ABANDONED PIPELINE PER SDRSD STANDARD DRAWING WP-03

**DATA TABLE**

NO	Δ / BEARING	R	L	T	DESCRIPTION
L8	N38° 02' 49.96"E	-	181.28'	-	15" PVC SEWER MAIN
L9	N36° 22' 34.97"E	-	102.85'	-	15" PVC SEWER MAIN
L10	N16° 57' 22.15"E	-	66.95'	-	15" PVC SEWER MAIN
L11	N11° 30' 17.49"E	-	117.46'	-	15" PVC SEWER MAIN
L12	S87° 51' 06.34"E	-	112.30'	-	15" PVC SEWER MAIN
L13	S42° 45' 13.42"E	-	22.87'	-	15" PVC SEWER MAIN



**GARRISON STREET**


**Underground Service Alert**

**CALL 811**

TWO WORKING DAYS BEFORE YOU DIG

NO.	APPROVED REVISIONS	BY	DATE	ENGINEER OF WORK SEAL

ENGINEER OF WORK



GHD Inc.  
 320 Goddard Suite 200  
 Irvine California 92618 USA  
 T 949 646 5200 F 949 648 5299

**CITY NAVD88 BENCHMARK**

Description: SET BRASS DISK IN CURB WITH TRIANGLE/OUNCH STAMP "LS 7854" FLUSH

Location: EAST CORNER OF CB ON WLY POC ON NLY RETURN OF WLY ENTRANCE  
 IN MISSION CENTER, 6' NW OF CURB OF MISSION NEAR McDONALD'S

Record From: RECORD OF SURVEY MAP NO. 21787

Elev: 44.59 Datum: MSL

**C-51**

SHEET 56 CITY OF OCEANSIDE ENGINEERING DIVISION 81 SHEETS

PUBLIC IMPROVEMENT PLAN FOR  
**OMGLS FM, OMG FM, MALS FM, AND LAND OUTFALL REPLACEMENT**  
**SEWER GRAVITY MAIN PLAN AND PROFILE**  
**GARRISON ST: STA 708+00 TO STA 712+97±**

ACCEPTED BY

CITY ENGINEER: Brian K. Thomas P.E. 60907 Date: \_\_\_\_\_

Prepared under the direction of: Reviewed By: PLAN NUMBER  
 Sign: TIMOTHY JOYCE 10/25/2024 PA 10/25/2024 S24-00002  
 PRINT Name: Date: Initials: Date:

## **APPENDIX C**

### **SEWER ANALYSIS RESULTS**

The following conditions were modeled for the Garrison Project:

1. Existing Flows
2. Existing Plus Project Flows
- Exhibit A – Manhole Diagram

DATE: 4/14/2025

**SEWER STUDY SUMMARY**

FOR: Garrison, City of Oceanside - Existing Flows  
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 2  
 REFER TO PLAN SHEET: Exhibit A

JOB NUMBER: 509-153

FROM	TO	IN-LINE LOW DEN RES. EDUs	IN-LINE MID DEN RES. EDUs	AVG. RES DRY WEATHER FLOW (gpd)	PEAKING FACTOR RES.	PEAK FLOW RES. (gpd)	IN-LINE COM/IND ACRES	TOTAL COM/IND ACRES	AVG. COM/IND DRY WEATHER FLOW (gpd)	PEAKING FACTOR COM/IND	PEAK FLOW COM/IND (gpd)	COMBINED PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	AS-BUILT SLOPE (%)	DEPTH K' <sup>(1)</sup>	dn (feet)	dn/D <sup>(2)</sup>	C <sub>a</sub> for Velocity <sup>(3)</sup>	VELOCITY (f.p.s.)	COMMENTS
												M.G.D.	C.F.S.								
5	4	0	0	0	3.50	0	8.3	8.3	8,300	2.61	21,637	0.022	0.033	8	1.00	0.012832	0.07333	0.11	0.0470	1.60	Existing Garrison Elementary
4	3	0	0	0	3.50	0	0.0	8.3	8,300	2.61	21,637	0.022	0.033	8	3.30	0.007064	0.06000	0.09	0.0350	2.15	
3	2	0	180	25,200	3.50	88,200	0.0	8.3	8,300	2.61	21,637	0.110	0.170	8	0.40	0.102997	0.21333	0.32	0.2167	1.76	Creekwood Villas
2	1	0	0	25,200	3.50	88,200	0.0	8.3	8,300	2.61	21,637	0.110	0.170	8	0.40	0.102997	0.21333	0.32	0.2167	1.76	
1	0	0	0	25,200	3.50	88,200	0.0	8.3	8,300	2.61	21,637	0.110	0.170	8	0.40	0.102997	0.21333	0.32	0.2167	1.76	
0	90	0	60	33,600	3.50	117,600	0.0	8.3	8,300	2.61	21,637	0.139	0.215	10	0.50	0.064409	0.20833	0.25	0.1535	2.02	Terrace Gardens
90	80	0	0	33,600	3.50	117,600	9.0	17.3	17,300	2.46	42,526	0.160	0.248	10	0.50	0.074072	0.22500	0.27	0.1711	2.09	Ex. Retail Oceanside Blvd.
80	70	0	0	33,600	3.50	117,600	0.0	17.3	17,300	2.46	42,526	0.160	0.248	10	0.50	0.074072	0.22500	0.27	0.1711	2.09	
70	60	365	209	124,910	2.50	312,275	6.0	23.3	23,300	2.40	55,927	0.368	0.570	8	1.64	0.170517	0.28000	0.42	0.3130	4.10	Ex. Res. Edgehill Ln. and Foussat Rd. Connection with 15" Trunk Sewer

Total Res. Units  
814

Total Com/Ind  
23.3

Min Slope  
0.40

Min dn/D  
0.09

Min Vel  
1.60

Max Slope  
3.30

Max dn/D  
0.42

Max Vel  
4.10

RES. = Residential  
 COM. = Commercial  
 IND. = Industrial

Note: 1 Low Density Res. = 170 gpd  
 1 Mid Density Res. = 140 gpd  
 1 Commercial/Industrial Acre = 1,000 gpd

1 K' based on n = 0.013  
 2 dn/D using K' in Brater King Table 7-14  
 3 From Brater King Table 7-4 based on dn/D

DATE: 4/14/2025

**SEWER STUDY SUMMARY**

FOR: Garrison, City of Oceanside - Existing plus Project Flows  
 BY: Dexter Wilson Engineering, Inc.

SHT 2 OF 2  
 REFER TO PLAN SHEET: Exhibit A

JOB NUMBER: 509-153

FROM	TO	IN-LINE LOW DEN RES. EDUs	IN-LINE MID DEN RES. EDUs	AVG. RES DRY WEATHER FLOW (gpd)	PEAKING FACTOR RES.	PEAK FLOW RES. (gpd)	IN-LINE COM/IND ACRES	TOTAL COM/IND ACRES	AVG. COM/IND DRY WEATHER FLOW (gpd)	PEAKING FACTOR COM/IND	PEAK FLOW COM/IND (gpd)	COMBINED PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	AS-BUILT SLOPE (%)	DEPTH K' <sup>(1)</sup>	dn (feet)	dn/D <sup>(2)</sup>	C <sub>a</sub> for Velocity <sup>(3)</sup>	VELOCITY (f.p.s.)	COMMENTS
												M.G.D.	C.F.S.								
5	4	0	140	19,600	3.50	68,600	0.1	0.1	100	3.71	371	0.069	0.107	8	1.00	0.040905	0.13333	0.20	0.1118	2.15	Project P.O.C.
4	3	0	0	19,600	3.50	68,600	0.0	0.1	100	3.71	371	0.069	0.107	8	3.30	0.022517	0.10000	0.15	0.0739	3.25	
3	2	0	180	44,800	2.75	123,200	0.0	0.1	100	3.71	371	0.124	0.191	8	0.40	0.115876	0.22667	0.34	0.2355	1.83	Creekwood Villas
2	1	0	0	44,800	2.75	123,200	0.0	0.1	100	3.71	371	0.124	0.191	8	0.40	0.115876	0.22667	0.34	0.2355	1.83	
1	0	0	0	44,800	2.75	123,200	0.0	0.1	100	3.71	371	0.124	0.191	8	0.40	0.115876	0.22667	0.34	0.2355	1.83	
0	90	0	60	53,200	2.75	146,300	0.0	0.1	100	3.71	371	0.147	0.227	10	0.50	0.067848	0.21667	0.26	0.1623	2.01	Terrace Gardens
90	80	0	0	53,200	2.75	146,300	9.0	9.1	9,100	2.59	23,549	0.170	0.263	10	0.50	0.078570	0.23333	0.28	0.1800	2.10	Ex. Retail Oceanside Blvd.
80	70	0	0	53,200	2.75	146,300	0.0	9.1	9,100	2.59	23,549	0.170	0.263	10	0.50	0.078570	0.23333	0.28	0.1800	2.10	
70	60	365	209	144,510	2.50	361,275	6.0	15.1	15,100	2.49	37,524	0.399	0.617	8	1.64	0.184687	0.29333	0.44	0.3328	4.17	Ex. Res. Edgehill Ln. and Foussat Rd. Connection with 15" Trunk Sewer

Total Res. Units
954

Total Com/Ind
15.1

Min Slope
0.40

Min dn/D
0.15

Min Vel
1.83

Max Slope
3.30

Max dn/D
0.44

Max Vel
4.17

RES. = Residential  
 COM. = Commercial  
 IND. = Industrial

Note: 1 Low Density Res. = 170 gpd  
 1 Mid Density Res. = 140 gpd  
 1 Commercial/Industrial Acre = 1,000 gpd

1 K' based on n = 0.013  
 2 dn/D using K' in Brater King Table 7-14  
 3 From Brater King Table 7-4 based on dn/D



# EXHIBIT A

## MANHOLE DIAGRAM

DEXTER WILSON ENGINEERING, INC.  
CONSULTING ENGINEERS  
(760) 438-4422

GARRISON