

Appendix L
Sewer System Analysis

**SEWER SYSTEM ANALYSIS
FOR THE
OTAY 250
SPECIFIC PLAN AMENDMENT
(SPA 15-001, TM 5607)**

April 4, 2016



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Job No. 701-012

April 4, 2016

701-012

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Attention: Andrea Rosati, Vice President

Subject: Sewer System Analysis for the Otay 250 Specific Plan Amendment (SPA 15-001, TM-5607)

Introduction

This letter-report summarizes our efforts to evaluate the sewer system requirements for the proposed Otay 250 Specific Plan Amendment (Project). The project is within the East Otay Mesa Sewer Service Area (EOM SSA) of the San Diego County Sanitation District (SDCSD). The EOM SSA facilities connect to City of San Diego (City) sewer facilities for conveyance to treatment facilities and disposal. This study provides information on planning criteria, projected sewer generation rates, existing facilities, and proposed facilities associated with serving the project. This study provides recommended sewer facilities specific to the needs of the Otay 250 Specific Plan Amendment, but takes into account San Diego County (County) and City of San Diego regional planning for the area.

Project Overview

The Project is 220.3 acres in size and is located along the north side of Otay Mesa Road just east of State Route 125. Figure 1 provides a location map for the project. The project proposes up to 3,158 residential dwelling units, 1,389,564 square feet of technology park, and 84,842 square feet of commercial development.

\\ARTIC\DWG\701012\FIGURES\FIGURE 1.DWG 09-22-15 08:57:41 LAYOUT: LAYOUT1

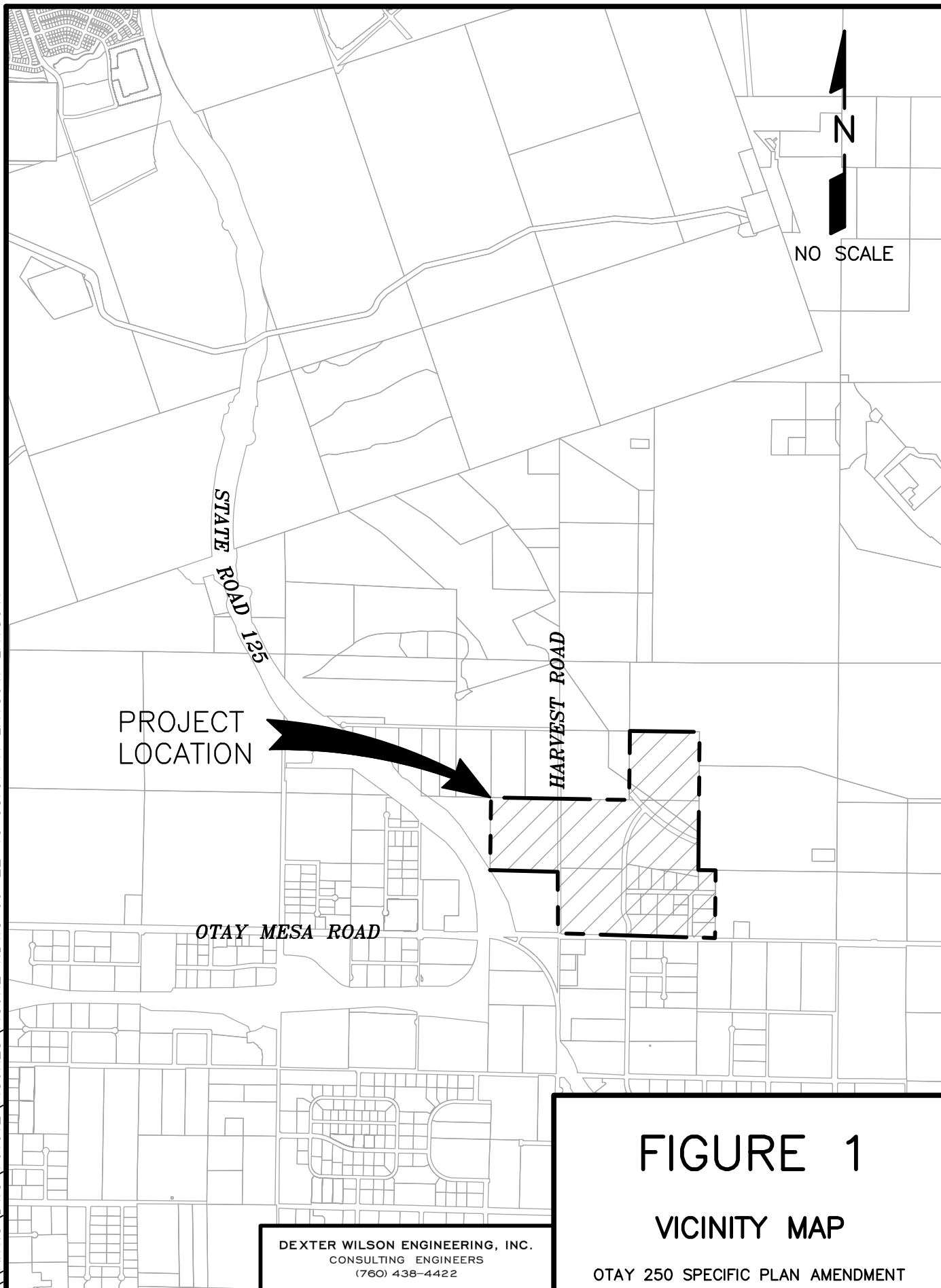


FIGURE 1

VICINITY MAP

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OTAY 250 SPECIFIC PLAN AMENDMENT

Purpose of Study

The purpose of this study is to provide the required sewer system improvements that will be necessary to serve the proposed Specific Plan Amendment for the Otay 250 property. This report will also serve as supporting documentation for the Project's environmental report for the Specific Plan Amendment.

Planning Criteria

The planning criteria used in this study are in accordance with the January 2013 East Otay Mesa Sewer Service Area, Sewer Master Plan (EOM SSA Sewer Master Plan). The criteria pertinent to this study are summarized below.

- Peaking Factor = $6.2945 * \text{Population}^{-0.1342}$
- Manning's n coefficient = 0.013
- Minimum Dry Weather Peak Flow Velocity = 2 fps
- Maximum Velocity = 10 fps
- Max depth to diameter ratio (d/D) for diameter less than or equal to 15 inches = 0.50
- Max depth to diameter ratio (d/D) for diameter greater than or equal to 18 inches = 0.75
- Sewer Generation Factor, Commercial = 1,500 gpd/acre
- Sewer Generation Factor, Multi-Family Residential = 192 gpd/DU

The sewer generation factors in the EOM SSA Sewer Master Plan are based on the County's criteria while the peak factor is based on the City's criteria and is a function of population. In order to convert from flow rates to population for peaking, the City factor of 80 gpd/capita will be used.

Projected Sewer Generation

Table 1 summarizes the projected average sewer generation for the project. A detailed projection of sewer generation by land use area is included with the hydraulic analysis in Appendix A.

TABLE 1 OTAY 250 SPECIFIC PLAN AMENDMENT PROJECTED SEWER GENERATION				
Land Use	Area	Units	Generation Factor	Generation, gpd
Multi-Family Residential	110.9	3,158	192 gpd/DU	606,336
Industrial Park	47.7	--	1,500 gpd/acre	71,550
Commercial	7.8	--	1,500 gpd/acre	11,700
Open Space	53.9	--	--	--
TOTAL	220.3	3,158		689,586

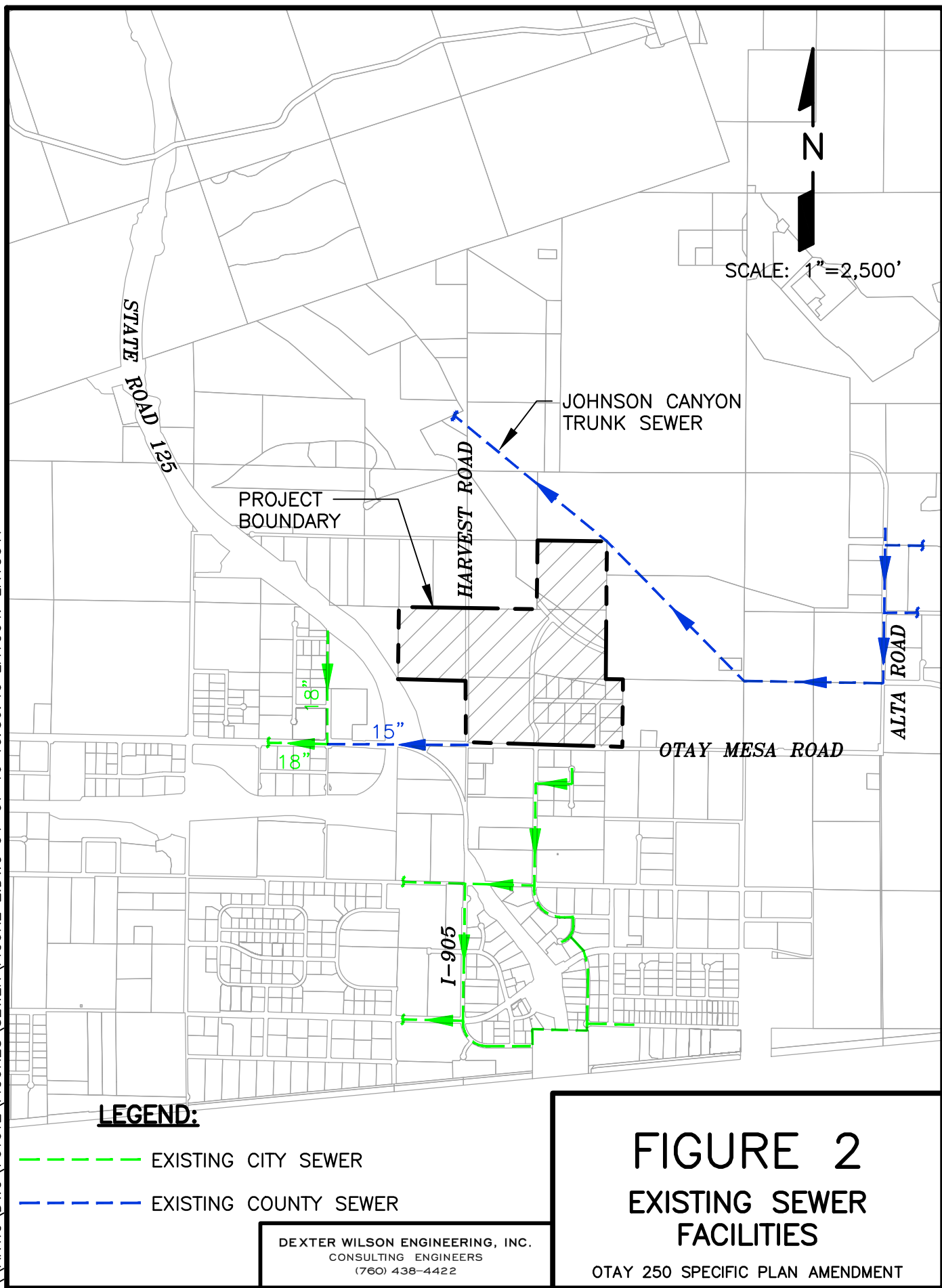
As shown, projected average day demand is 689,586. This flow equates to an equivalent population of 8,620 based on the City's criteria and a peaking factor of 1.87 with a resulting peak flow 1,286,488 gpd.

Existing Facilities

There are both SDCSD and City sewer facilities within the vicinity of the project. All SDCSD facilities within the vicinity connect downstream to City facilities. A SDCSD gravity sewer pipeline flows from east to west in Otay Mesa Road. The existing line is a 15-inch pipe that starts at the corner of the project boundary at the Intersection of Otay Mesa Road and Harvest Road and flows west to the intersection of Otay Mesa Road and Piper Ranch Road where it connects to an 18-inch City gravity sewer line which continues in the same direction.

There is also an 18-inch City gravity sewer pipeline that flows from north to south in Piper Ranch Road which connects to the aforementioned 18-inch line in Otay Mesa Road. Figure 2 displays the existing facilities in the project vicinity.

\\ARTIC\DWG\701012\FIGURES\SEWER\FIGURE 2.DWG 04-01-16 10:36:40 LAYOUT: LAYOUT1



There are other existing facilities near the project, but these facilities convey flow to other sewer drainage basins and, therefore, are not pertinent to this report.

Sewer System Analysis

Manning's equation was used to analyze the proposed sewer system to the point of connection with the existing sewer lines. Appendix A provides the hydraulic analysis results and Exhibit A provides the corresponding node diagram. Figure 3 provides the recommended sewer system for the project.

Proposed Sewer System

Sewer service can be provided to the Project by the SDCSD. The proposed sewer system will consist of 8-inch through 12-inch sewer lines. The maximum d/D in the proposed system is 0.50. The proposed system will connect to the SDCSD 15-inch pipeline at the corner of Otay Mesa Road and Harvest Road. Another connection will be made to the 18-inch City line in Piper Ranch Road at the intersection of Piper Ranch Road and Zinser Road. The proposed sewer line sizing in this study is based on estimated pipe slopes. The sewer line sizing should be confirmed during final engineering of the project when actual pipe slopes are known.

Off-Site Capacity Analysis

The projected onsite sewer flows are greater than what is shown in the EOM SSA Sewer Master Plan. The EOM SSA Sewer Master Plan shows the project is within the EOM-2 Basin. This basin has a projected flow of 514,905 gpd with 249,661 gpd of flow from the Project. The estimated flows for the Project from this study are 689,586 gpd. Accounting for the 0.44 mgd increase in estimated flows from the Project, the revised total EOM-2 Basin flow is projected to be 0.95 mgd. The EOM SSA Sewer Master Plan cites the available capacity for the EOM-2 Basin in the trunk sewer to which the basin connects is 1.00 MGD from the City Otay Mesa Trunk Sewer Master Plan Update. Thus, even with the

increase in onsite flows, the revised total projected flows are still within the planned capacity in the offsite sewer system. The existing 15-inch SDCSD gravity sewer line in Otay Mesa Road was analyzed as part of this study (Appendix A) and found to flow at a maximum d/D of 0.33 with the addition of project flows.

Conclusions

The following conclusions have been made based on our evaluation of the project sewer system:

1. The project can receive sewer service from the SDCSD.
2. Proposed sewer lines ranging from 8-inch to 12-inch are recommended as shown on Figure 3.
3. The project will result in increased flows of 0.44 mgd as compared to the EOM SSA Sewer Master Plan, but the total projected flow from the sewer basin is still less than what was used to evaluate the planned capacity of the downstream system.
4. The existing 15-inch SDCSD line in Otay Mesa Road has adequate capacity to serve the project.

If you have any questions on the information contained herein, please let us know.

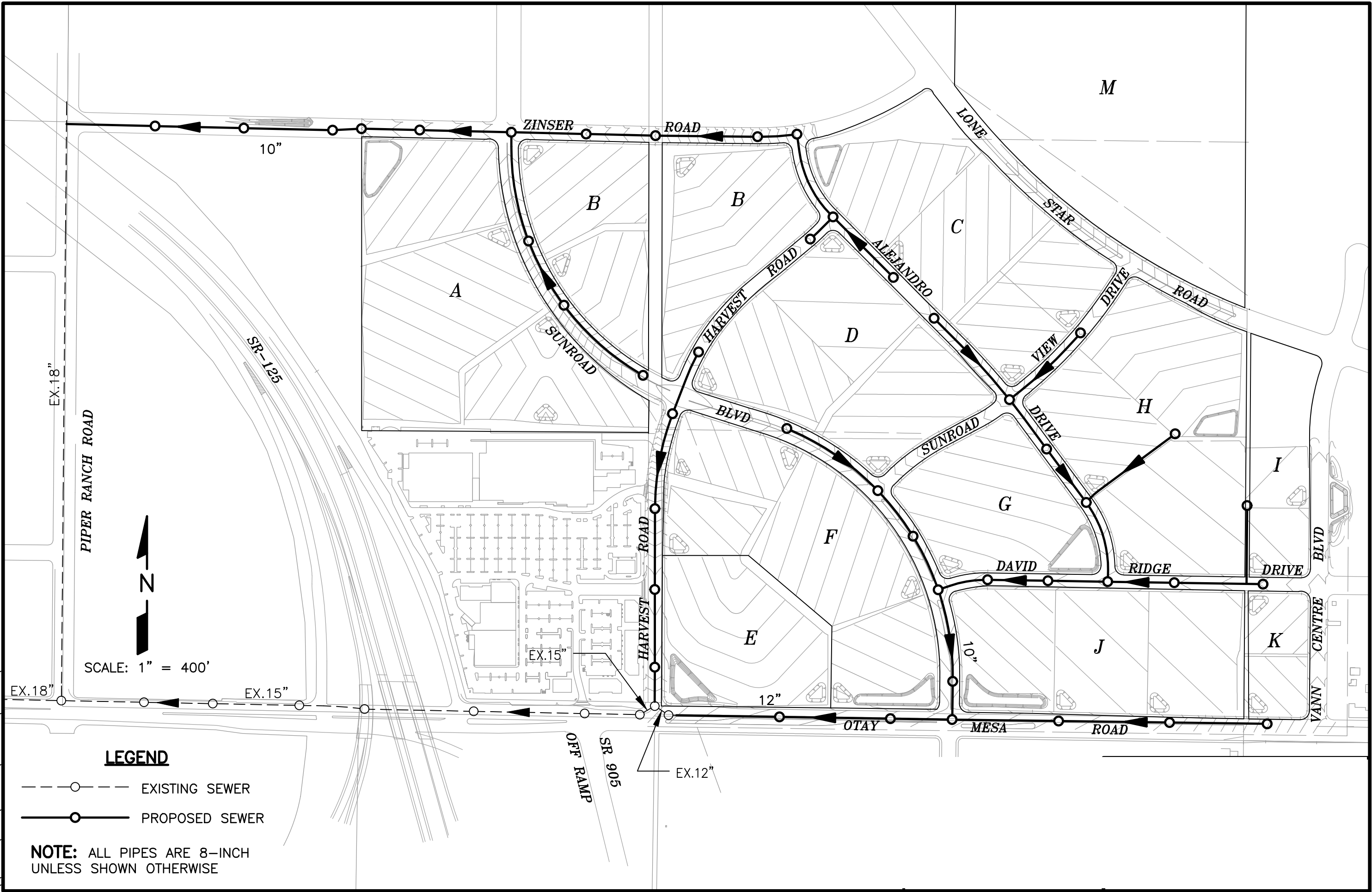
Dexter Wilson Engineering, Inc.



Stephen M. Nielsen, P.E.

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\\ARTIC\DWG\701012\FIGURES\SEWER\FIGURE 3.DWG 03-29-16 11:15:29 LAYOUT: LAYOUT



APPENDIX A

HYDRAULIC ANALYSIS

**OTAY 250 SPECIFIC PLAN AMENDMENT
PROJECTED SEWER GENERATION
BY PLANNING AREA**

Planning Area	Land Use	Area, acres	Units	Denisty, units/acre	Generation Factor	Generation, gpd
A	Residential	10.1	303	30	192 gpd/DU	58,176
	Tech Park	15.2	--	--	1500 gpd/ac	22,800
	Open Space	0.2	--	--	--	0
B	Residential	18.3	586	32	192 gpd/DU	112,512
	Tech Park	1	--	--	1500 gpd/ac	1,500
	Open Space	2.1	--	--	--	0
C	Residential	17.1	548	32	192 gpd/DU	105,216
	Tech Park	0.9	--	--	1500 gpd/ac	1,350
	Open Space	0.3	--	--	--	0
D	Residential	16.9	540	32	192 gpd/DU	103,680
	Tech Park	0.4	--	--	1500 gpd/ac	600
	Commercial	0.5	--	--	1500 gpd/ac	750
E	Residential	4	79	20	192 gpd/DU	15,168
	Tech Park	0.6	--	--	1500 gpd/ac	900
	Commercial	6.8	--	--	1500 gpd/ac	10,200
F	Residential	7.4	148	20	192 gpd/DU	28,416
	Tech Park	11.1	--	--	1500 gpd/ac	16,650
G	Residential	10	200	20	192 gpd/DU	38,400
	Commercial	0.5	--	--	1500 gpd/ac	750
H	Residential	20.6	624	30	192 gpd/DU	119,808
	Tech Park	1.1	--	--	1500 gpd/ac	1,650
I	Tech Park	4	--	--	1500 gpd/ac	6,000
J	Residential	6.5	130	20	192 gpd/DU	24,960
	Tech Park	9.8	--	--	1500 gpd/ac	14,700
K	Tech Park	3.6	--	--	1500 gpd/ac	5,400
M	Open Space	51.3	--	--	--	0
TOTAL		220.3	3,158			689,586

LINE	FROM	TO	IN-LINE FLOW (gpd)	AVG. DRY WEATHER FLOW (gpd)	SEWAGE PER CAPITA DAY (GPD)	POPULATION SERVED	PEAKING FACTOR	PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' ⁽¹⁾	dn (feet)	dn/D ⁽²⁾	C _a for Velocity ⁽³⁾	VELOCITY (f.p.s.)	Planning Area Contribution
									M.G.D.	C.F.S.								
	14	12	17,761	17,761	80	222	3.0	54,143	0.054	0.084	8	3.70	0.016694	0.08667	0.13	0.0600	3.14	1/6 C
	12	10	17,761	35,522	80	444	2.8	98,668	0.099	0.153	8	2.10	0.040380	0.13333	0.20	0.1118	3.07	Flow from MH 22
	10	8	121,458	156,980	80	1,962	2.3	357,205	0.357	0.553	8	2.20	0.142827	0.25333	0.38	0.2739	4.54	1/3 H + Flow from MH 20
	8	6	28,275	185,255	80	2,316	2.2	412,279	0.412	0.638	8	1.10	0.233131	0.33333	0.50	0.3930	3.65	1/2 G + Flow from MH 18
	6	5	77,118	262,373	80	3,280	2.1	557,258	0.557	0.862	10	1.20	0.166396	0.34167	0.41	0.3032	4.10	Flow from MH 18
	5	4	66,761	329,134	80	4,114	2.1	678,105	0.678	1.049	12	0.55	0.183926	0.44000	0.44	0.3328	3.15	1/2 E, 1/4 F
	4	3	0	329,134	80	4,114	2.1	678,105	0.678	1.049	15	0.55	0.101442	0.40000	0.32	0.2167	3.10	
	3	2	34,515	363,649	80	4,546	2.0	739,255	0.739	1.144	15	0.55	0.110590	0.41250	0.33	0.2260	3.24	Off-site - Otay Mesa Crossings LLC Property ¹
	2	1	17,430	381,078	80	4,763	2.0	769,836	0.770	1.191	15	6.67	0.033070	0.22500	0.18	0.0961	7.93	Off-site - Piper Ranch LP Property ²
	22	12	17,761	17,761	80	222	3.0	54,143	0.054	0.084	8	2.00	0.022706	0.10000	0.15	0.0739	2.55	1/6 C
	20	10	80,972	80,972	80	1,012	2.5	201,369	0.201	0.312	8	2.70	0.072680	0.18000	0.27	0.1711	4.10	2/3 H
	18	8	8,700	8,700	80	109	3.4	29,187	0.029	0.045	8	1.10	0.016504	0.08667	0.13	0.0600	1.69	I, 1/2 K
	16	6	77,118	77,118	80	964	2.5	193,044	0.193	0.299	8	1.90	0.083058	0.19333	0.29	0.1890	3.56	1/3 D, 1/2 F, 1/2 G
	15	5	42,360	42,360	80	530	2.7	114,914	0.115	0.178	8	1.10	0.064980	0.16667	0.25	0.1535	2.61	J, 1/2 k
	26	24	35,010	35,010	80	438	2.8	97,436	0.097	0.151	8	0.78	0.065430	0.16667	0.25	0.1535	2.21	1/3 D
	24	4	24,401	59,411	80	743	2.6	154,016	0.154	0.238	8	1.10	0.087091	0.19333	0.29	0.1890	2.84	1/2 E, 1/4 F
	106	104	182,062	182,062	80	2,276	2.2	406,119	0.406	0.628	8	2.20	0.162385	0.27333	0.41	0.3032	4.66	2/3 B, 2/3 C, 1/3 D
	104	102	118,980	301,042	80	3,763	2.1	627,699	0.628	0.971	10	1.50	0.167642	0.35000	0.42	0.3130	4.47	1/3 A + Flow from MH 108
	102	100	0	301,042	80	3,763	2.1	627,699	0.628	0.971	10	1.47	0.169344	0.35000	0.42	0.3130	4.47	2/3 A, 1/3 B
	108	104	91,988	91,988	80	1,150	2.4	224,882	0.225	0.348	8	2.00	0.094307	0.20667	0.31	0.2074	3.77	2/3 A, 1/3 B

^{1.} 34,515 gpd of sewer generation based on Table 4-2 from January 2013 East Otay Mesa Sewer Service Area Sewer Master Plan for 23.01 Acres at 1,500 gpd/acre for Technology Business Park Land Use

^{2.} 17,430 gpd of sewer generation based on Table 4-2 from January 2013 East Otay Mesa Sewer Service Area Sewer Master Plan for 20.15 Acres at 865 gpd/acre for Light Industrial Land Use

Max dn/D

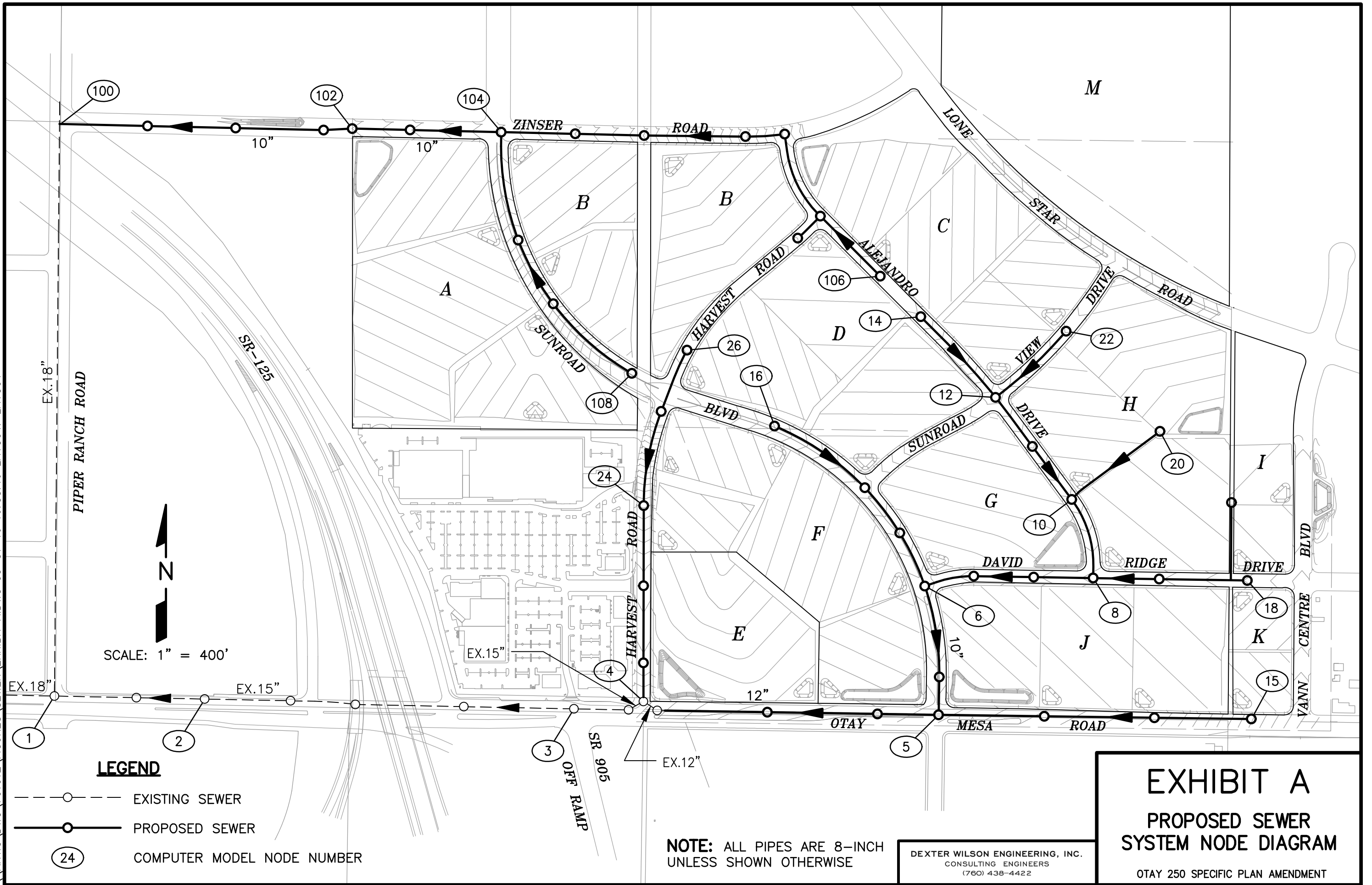
0.50

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

\\ARTIC\DWG\701012\FIGURES\SEWER\EXHIBIT A.DWG 03-31-16 16:35:16 LAYOUT: LAYOUT



LEGEND

- EXISTING SEWER
- PROPOSED SEWER
- (24) COMPUTER MODEL NODE NUMBER

NOTE: ALL PIPES ARE 8-INCH
UNLESS SHOWN OTHERWISE

DEXTER WILSON ENGINEERING, INC.
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EXHIBIT A
PROPOSED SEWER
SYSTEM NODE DIAGRAM

OTAY 250 SPECIFIC PLAN AMENDMENT