RANCHO LA HABRA SPECIFIC PLAN

DRAFT ENVIRONMENTAL IMPACT REPORT
SCH NO. 2015111045

CITY OF LA HABRA
February 2018

Appendix S
Water System Hydraulic Analysis

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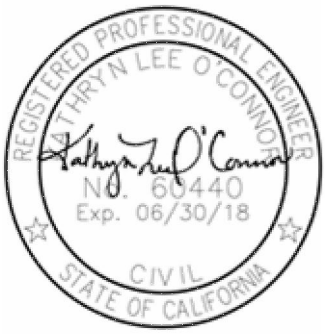

Water System Hydraulic Analysis

Date: September 8, 2016

For: City of La Habra
Department of Public Works:
Sewer and Water Division
La Habra, CA

By: Katie O'Connor, P.E.
Hunsaker & Associates Irvine, Inc
.

Project: **Rancho La Habra Tentative Tract 17845**

Hunsaker & Associates Irvine, Inc. (H&A) is pleased to submit the Water System Hydraulic Analysis for Tract 17845. This analysis has been prepared to describe the proposed water system for the aforementioned residential development project in the City of La Habra. The project lies within the jurisdiction of the City of La Habra and their standards have been used for this report. Hydraulic model was prepared using Haestad Methods software, Bentley WaterCad V8i, to model various flows during steady state conditions. The purpose of this analysis is to determine sizing for the proposed water system, as well as to ensure adequate fire flow and water pressure during different demand scenarios.

THE PROPOSED WATER SYSTEM FOR TRACT 17845 PROJECT MEETS THE DESIGN STANDARDS SPECIFIED BY THE CITY OF LA HABRA. This evaluation is based on existing and known conditions and should be re-evaluated if these conditions change or new information becomes available. Any interpretation of the information presented in this report should be referred to H&A to ensure the integrity of the results.

Project Location

The Tentative Tract 17845 is located between Beach Boulevard and Idaho Street, south of Imperial Highway, in the City of La Habra. The proposed tract is located on the existing Westridge Golf Course. The general project location is shown on exhibit entitled, “Vicinity Map – Figure 1.”

Summary of Findings

1. The development will include 7.3 acres of multifamily development, 20,000 square feet of retail development (or 49 multifamily units) on 2.4 acres, recreation facilities, 51.8 acres of single family development, and 89.1 acres of open space.

2. Water supply for the proposed project will be provided by the City of La Habra through the existing Zone 1 (548 HGL) pressure zone water system. The Static Hydraulic grade was calculated to be 538 feet based on a fire hydrant flow test on Imperial Highway, near the corner on Idaho Street. The fire flow test was performed by Provo Engineering. The fire flow test, along with the calculations to determine hydraulic grades, is included in the Appendix for Reference.

3. The proposed onsite water system consists of 8-inch diameter water mains and includes four connections to the existing City of La Habra water mains surrounding the project. The proposed water system will have two connections into the existing 8-diameter water main in Beach Boulevard (Junctions 21 & 22), one connection into the existing 8-inch diameter water main within La Habra Hills Drive (Junction 11), and the final connection will be to the existing 12-inch water main in Idaho Street (Junction 52) as shown in Figure 2.

4. For this analysis, water demands have been calculated based on land use duty factors provided in the City of La Habra Water System Master Plan Update, by Daniel Boyle/Psomas Engineering. The water demand duty factors used in this report are as follows:

Table 1: Average Daily Demand (ADD) Factor Based on Development Type

Development Type	**GPD/acre**
Low Density Residential	1700
High Density Residential	3000
Open Space	500
Commercial	2200

The peaking factors, provided by the City of La Habra, to obtain maximum daily demands (MDD) and peak hour demands (PH) are applied to the average daily demand as follows:

Maximum Daily Demands: MDD = 2.2 x ADD

Peak Hour Demands: PH = 3.3 x ADD

5. The Water Supply Assessment (WSA), prepared by PACE, is used to verify that the City has a sufficient water supply to provide for the demand of the proposed project. According to the WSA, the existing development, a golf course, has a water usage of 276 acre-feet yearly and the proposed development will have a water usage of 180 acre-feet yearly. WSA determines that the proposed project will equate to a 35% reduction in water use for the site. This WSA water demands are based on water usage per capita daily and percentage of outdoor space irrigated.

The total average daily demand from the WSA is 111 gpm. The total average daily demand calculated using the City Waster Master Plan Update duty factors is 105 gpm. Due to the differences in duty factors used in the WSA and this analysis, the average daily demands for the proposed project are slightly different. Since the average daily demand in each analysis is comparable, it was elected to use the slightly more conservative demand from the WSA to determine pressures and pipe sizes.

6. Several different water pressure zones surround the proposed project. The existing system within Beach Boulevard, Imperial Highway, and La Habra Hills Drive is within Zone 1 (548 HGL). The existing pipes within Idaho Street are within Zone 1 (548 HGL), Zone 20 (611 HGL), and Zone 21 (562 HGL). Junctions 33 and 34 represent existing zone break valves within the existing system. The value at Junction 33 separates the Zone 1 from Zone 20. The value at Junction 34 separates Zone 21 from Zone 20. These valves have been closed by the City of La Habra's Water and Sewer Maintenance Division to create pressure zone breaks.

7. In the proposed water system model, two reservoirs were modeled. A reservoir was modeled at the location of the fire flow test, R3. This fire flow test allowed for all the demands within the Zone 1 system to be accounted for and an appropriate hydraulic grade elevation be calculated. The fire flow test, performed by Provo Engineering, reported that the residual pressure of 126 PSI was at the observed volume of 1424 GPM. From this information, a hydraulic grade elevation of 538 was calculated for static, 537 for peak hour conditions, and 525 for maximum day plus fire flow condition.

   A reservoir was also modeled at the location of a proposed pressure reducing valve, R4, within Idaho Street. The hydraulic grade elevation for this reservoir was assumed to be at the Zone 1 HGL elevation of 548 feet.

   The ultimate condition will require the following O&M modifications: the zone break valve at Junction 34, which has been closed by the City of La Habra, will be opened and the existing valve at Junction 56 will be closed. (The valve at 33 would remain closed.) By opening the valve at 34 and closing the valve at 56, the existing pipes between these valves would be converted from Zone 20 to Zone 21. The pressure reducing valve at R4 would drop the pressure in these pipes from the Zone 21 to Zone 1 for the connection into the proposed development. This would allow the entire proposed system within Tract 17845 to be serviced from the Zone 1 water supply. The water system schematic is shown on the attached "Proposed Water System Model – Figure 2."

8. Based on communication with Brian Jones, City of La Habra Sewer and Water Manager, there is sufficient capacity in the existing Zone 1 system to provide adequate water service to the proposed project. Zone 1 is serviced by two reservoirs. The Puente Hills Reservoir has a capacity of 5.0 million gallons and the Serv Byerrum Reservoir has a capacity of 9.3 million gallons. Storage Reservoir Summary Data, Table 2-1, from the City of La Habra Water Master Plan Update, completed by Daniel Boyle/ Psomas Engineering in 2007, provided by Mr. Jones, is included in the appendix.

9. H&A estimated the flow constant "K" using Affinity Laws to determine the HGL of the water supply at static, peak hour demands, and maximum day demands plus 1500 gpm fire flow events. The flow constant for this water system is $K = Q / H_f^{0.54}$ where H_f is the difference (in feet) of the measured static and residual pressure at the test flow. The "K" value for the water system is estimated to be **435** based on the fire flow test included in the Appendix.

10. In order to calculate the pipe sizes, velocities and available pressure of the proposed water system for Tract 17845, we have prepared a hydraulic model

using WaterCad v8i by Haestad Methods. The summary of outputs from the model runs are included in the Appendix of this report.

11. The proposed water system provides pressures greater than 40 psi for all nodes during peak hour demands. The minimum in-track peak hour pressure experienced was **79 psi** with an estimated HGL of 537 feet at the modeled reservoir on Imperial Highway. The location of the modeled reservoir is shown on Figure 2. The following table summarizes the peak hour model run:

Table 3 – Summary of Peak Hour Model Run

Total Flow (gpm)	Minimum in-tract Residual Pressure	
	(node)	(psi)
367	J-52	**79**

12. Fire flow requirement were taken from 2013 California Fire Code (CFC) based on the largest building size and construction type. Based on the preliminary design of this project, it was assumed that construction type V is to utilized for this project. Construction type V-B requires fire flow of 2,750 gpm for up to 11,300 square feet and construction type V-B requires fire flow of 2750 gpm for up to 25,500 square feet. The CFC and the City of La Habra allows a 50% reduction in fire flow for the installation of automatic sprinkler systems in one and two-family residential dwellings. The CFC and the City of La Habra allows a 75% reduction in fire flow for the installation of automatic sprinkler systems in buildings other than one and two-family residential dwellings. The CFC minimum required fire flow is 1500 gpm, regardless of automatic sprinkler systems. The required CFC fire flow requirements and the adjusted fire flow requirement are shown below:

Table 4 – Fire Flows Used for Model

Construction Type	Fire Flow
TYPE V- with automatic sprinkler system	1500 gpm

13. The proposed water system provides pressures greater than 20 psi during maximum day demands plus 1500 gpm fire flow events as required by the Fire Department. The total maximum day demand plus fire flow for the proposed development is 1745 gpm. The minimum residual pressure experience for the worst-case 1500 gpm fire flow event was **79 psi** with an estimated HGL of 525 feet at the modeled fire flow test hydrant on Imperial Highway The following table summarizes the MDD plus Fire Flow events:

Table 5 - Summary of Worst Case Fire Flow Model Runs

Fire Flow Node	Node Elevation	MDD+FF at Node	Node HGL	Residual Pressure
Max Day Demand + 1500 gpm Fire Flow				
J-52	365 ft	1500 gpm	547 ft	**79 psi**

14. The static pressures in the proposed project are generally greater than 80 psi. All domestic water meters will require individual pressure reduction devices to reduce the pressure to a maximum of 80 psi for each dwelling unit within the project site

We sincerely trust these calculations will provide sufficient evidence that the proposed water system is adequate for the proposed Tentative Tract 17845. Please contact me at (949) 458-5437 or John Gass at (949) 768-2579 if you have any questions.

klo:
Enclosures
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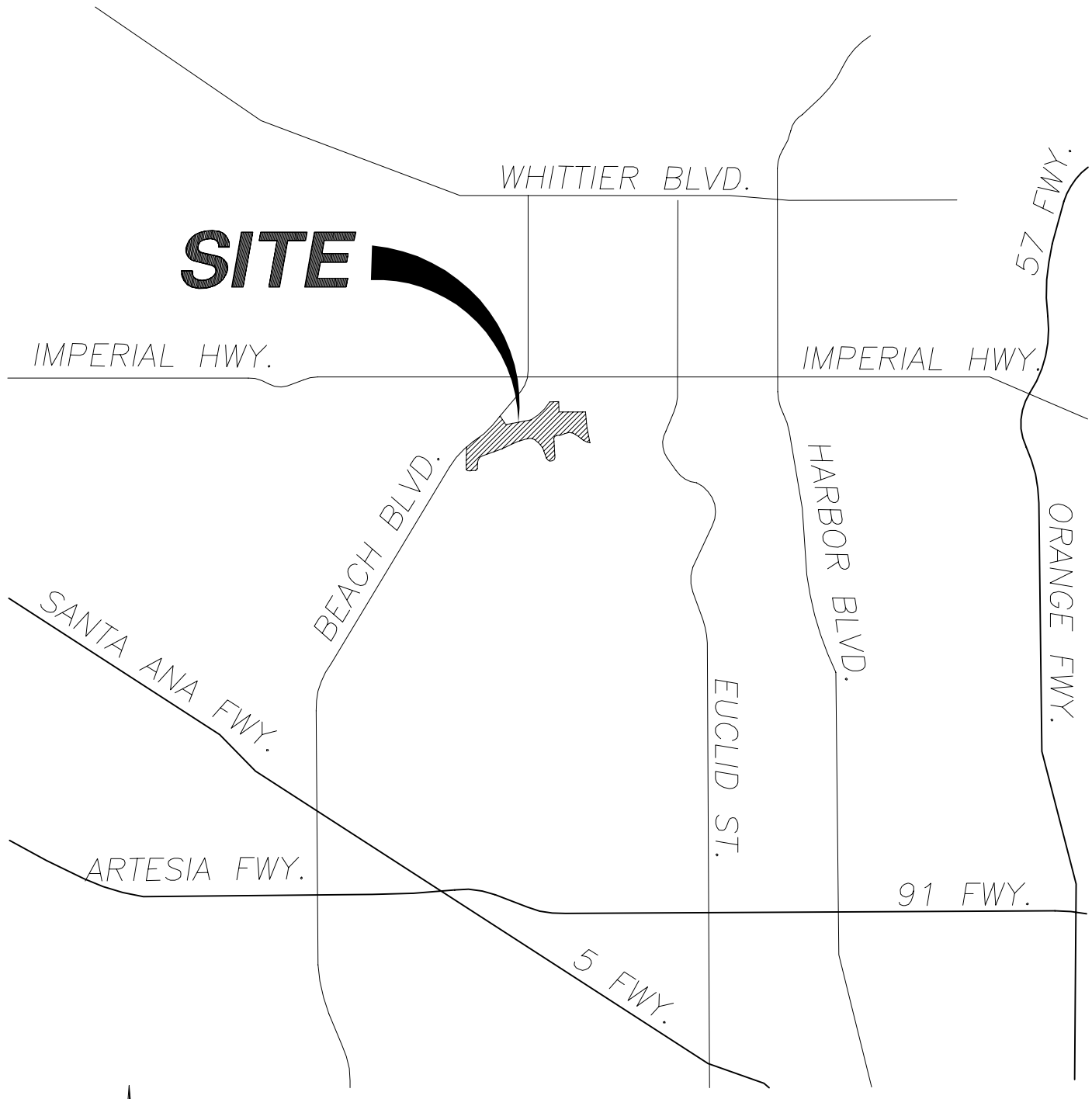

NOT TO SCALE

CITY OF LA HABRA

TRACT 17845

VICINITY MAP

FIGURE 1

W.O. # 0252-93X

DATE: 16 FEB 16

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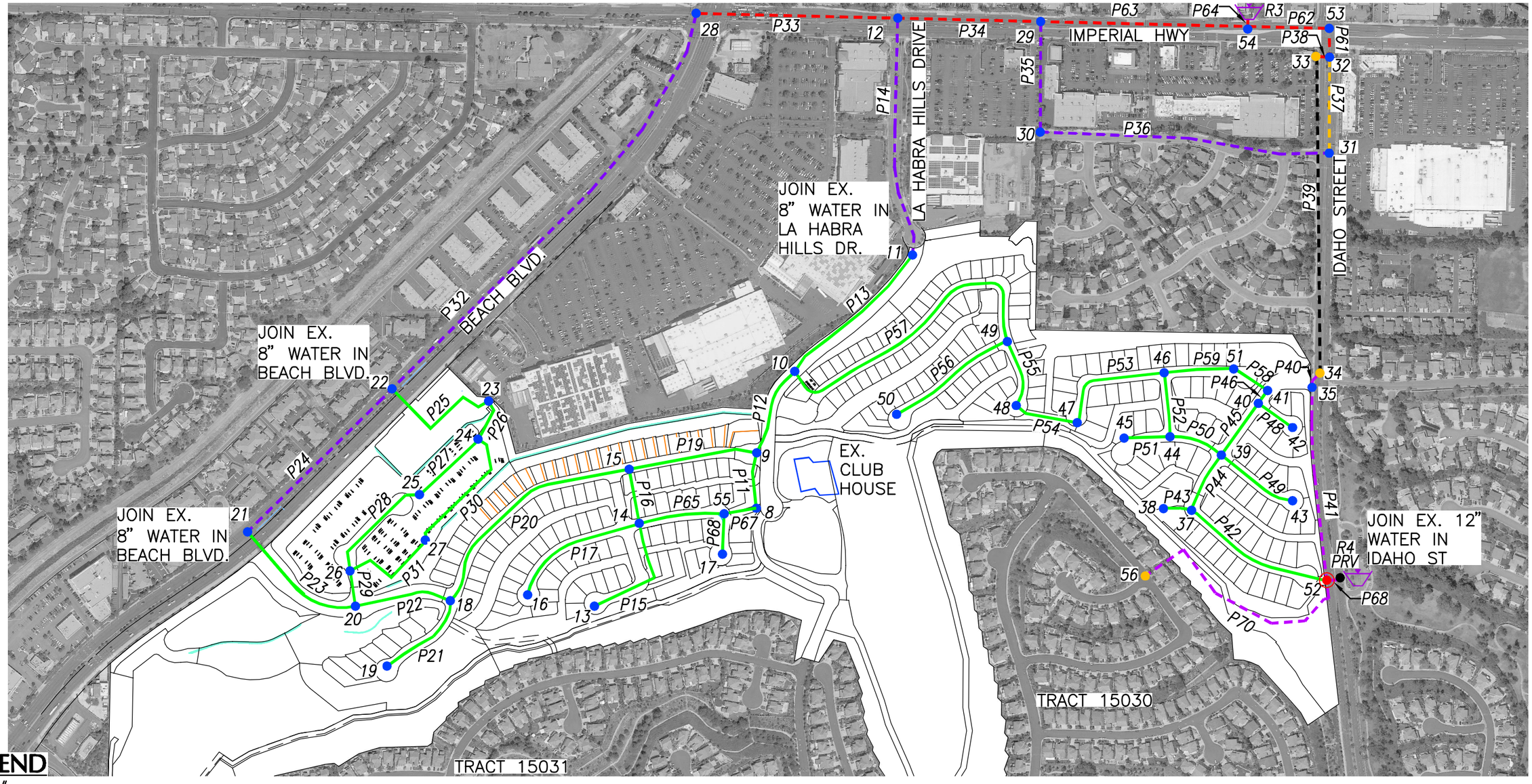

LEGEND

- P# — EXISTING 8" DOMESTIC WATER LINE & PIPE NUMBER (ZONE 1: 548 HGL)
- P# — EXISTING 10" DOMESTIC WATER LINE & PIPE NUMBER (ZONE 1: 548 HGL)
- P# — EXISTING 12" DOMESTIC WATER LINE & PIPE NUMBER (ZONE 1: 548 HGL)
- P# — EXISTING 12" DOMESTIC WATER LINE & PIPE NUMBER (ZONE 21: 562 HGL)
- P# — EXISTING 20" DOMESTIC WATER LINE & PIPE NUMBER (ZONE 20: 611 HGL)
- P# — PROPOSED 8" DOMESTIC WATER LINE & PIPE NUMBER (ZONE 1: 548 HGL)
- # — REACH DIVIDING POINT & JUNCTION NUMBER
- LOCATION OF MODELED FIRE FLOW
- R# — MODELED RESERVOIR
- # — EXISTING VALVE & JUNCTION NUMBER
- PRV — PROPOSED PRESSURE REDUCING VALVE

N

450 225 0 450 900

GRAPHIC SCALE: 1"=450'

PREPARED BY:

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CITY OF LA HABRA
TENTATIVE TRACT NO. 17845

WATER SYSTEM MODEL

JOB NO. 0252-93X | DATE: 1 SEPT 2016

FIGURE 2

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ADD DUTY FACTOR	(GPD/ACRE)	MAX DAY	2.2 *ADD	gpm
LOW DENSITY RESIDENTIAL	1700	PEAK HOUR	3.3 *ADD	gpm
HIGH DENSITY RESIDENTIAL	3000			
OPEN SPACE	500			
COMMERCIAL	2200			
PUBLIC FACILITY	2500			

NODE NUMBER	COMMERCIAL ACERAGE	SINGLE-FAMILY ACERAGE	MULTI-FAMILY ACERAGE	REC AREA ACERAGE	OPEN SPACE ACERAGE	ADD (GPD)	ADD (gpm)	MAX DAY DEMAND (gpm)	PEAK HOUR DEMAND (gpm)	STATIC DEMAND (gp,)
8				3.50		8750	6.1	13.4	20.1	0.0
9						0	0.0	0.0	0.0	0.0
10		6.20			3.60	12340	8.6	18.9	28.3	0.0
11					0.22	110	0.1	0.2	0.3	0.0
12						0	0.0	0.0	0.0	0.0
13		1.80			2.40	4260	3.0	6.5	9.8	0.0
14		7.40				12580	8.7	19.2	28.8	0.0
15		2.80		0.20	0.30	5410	3.8	8.3	12.4	0.0
16					2.10	1050	0.7	1.6	2.4	0.0
17					2.40	1200	0.8	1.8	2.8	0.0
18		4.70			7.40	11690	8.1	17.9	26.8	0.0
19		2.30				3910	2.7	6.0	9.0	0.0
20					25.00	12500	8.7	19.1	28.6	0.0
21						0	0.0	0.0	0.0	0.0
22						0	0.0	0.0	0.0	0.0
23			2.40			7200	5.0	11.0	16.5	0.0
24						0	0.0	0.0	0.0	0.0
25			2.80			8400	5.8	12.8	19.3	0.0
26						0	0.0	0.0	0.0	0.0
27			4.50		2.90	14950	10.4	22.8	34.3	0.0
28						0	0.0	0.0	0.0	0.0
29						0	0.0	0.0	0.0	0.0
30						0	0.0	0.0	0.0	0.0
31						0	0.0	0.0	0.0	0.0
32						0	0.0	0.0	0.0	0.0
33						0	0.0	0.0	0.0	0.0
34						0	0.0	0.0	0.0	0.0
35						0	0.0	0.0	0.0	0.0
37		3.90			5.30	9280	6.4	14.2	21.3	0.0
38		1.00			0.40	1900	1.3	2.9	4.4	0.0
39		2.90			0.40	5130	3.6	7.8	11.8	0.0
40		1.50			0.50	2800	1.9	4.3	6.4	0.0
41						0	0.0	0.0	0.0	0.0
42						0	0.0	0.0	0.0	0.0
43						0	0.0	0.0	0.0	0.0
44		2.80			0.80	5160	3.6	7.9	11.8	0.0
45						0	0.0	0.0	0.0	0.0
46		2.30			1.10	4460	3.1	6.8	10.2	0.0
47		2.90			1.90	5880	4.1	9.0	13.5	0.0
48					3.40	1700	1.2	2.6	3.9	0.0
49		4.70		0.20		8430	5.9	12.9	19.3	0.0
50					22.00	11000	7.6	16.8	25.2	0.0
51						0	0.0	0.0	0.0	0.0
52						0	0.0	0.0	0.0	0.0
53						0	0.0	0.0	0.0	0.0
54						0	0.0	0.0	0.0	0.0
55						0	0.0	0.0	0.0	0.0
56						0	0.0	0.0	0.0	0.0
					TOTALS:		111.2	244.6	366.9	

TTM 17845 -Westridge
Scenario: Static
FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
	296	0	540	106
J-9	280	0	540	112
J-10	253	0	540	124
J-11	223	0	539	137
J-12	225	0	538	136
J-13	297	0	540	105
J-14	271	0	540	116
J-15	260	0	540	121
J-16	280	0	540	112
J-17	299	0	540	104
J-18	250	0	539	125
J-19	289	0	539	109
J-20	224	0	539	137
J-21	197	0	539	148
J-22	205	0	539	145
J-23	215	0	539	140
J-24	227	0	539	135
J-25	223	0	539	137
J-26	221	0	539	138
J-27	222	0	539	137
J-28	218	0	538	139
J-29	229	0	538	134
J-30	231	0	538	133
J-31	253	0	538	123
J-32	241	0	538	129
J-33	241	0	548	133
J-34	315	0	548	101
J-35	316	0	548	100
J-37	359	0	546	81
J-38	360	0	546	81
J-39	341	0	546	89
J-40	323	0	546	96
J-41	321	0	546	97
J-42	330	0	546	93
J-43	349	0	546	85
J-44	334	0	546	92
J-45	335	0	546	91
J-46	315	0	545	100

TTM 17845 -Westridge
Scenario: Static
FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-47	320	0	544	97
J-48	306	0	544	103
J-49	282	0	543	113
J-50	290	0	543	110
J-51	312	0	546	101
J-52	365	0	548	79
J-53	239	0	538	129
J-54	238	0	538	130
J-55	292	0	540	107
J-56	400	0	548	64

TTM 17845 -Westridge
Scenario: MDD+1500 gpm FF
FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-8	296	13	527	100
J-9	280	0	527	107
J-10	253	19	528	119
J-11	223	0	527	131
J-12	225	0	525	130
J-13	297	7	527	100
J-14	271	19	527	111
J-15	260	8	527	116
J-16	280	2	527	107
J-17	299	2	527	99
J-18	250	18	526	120
J-19	289	6	526	103
J-20	224	19	526	131
J-21	197	0	526	142
J-22	205	0	526	139
J-23	215	11	526	135
J-24	227	0	526	129
J-25	223	13	526	131
J-26	221	0	526	132
J-27	222	23	526	132
J-28	218	0	525	133
J-29	229	0	525	128
J-30	231	0	525	127
J-31	253	0	525	118
J-32	241	0	525	123
J-33	241	0	547	132
J-34	315	0	547	100
J-35	316	0	547	100
J-37	359	14	543	80
J-38	360	3	543	79
J-39	341	8	541	87
J-40	323	4	541	94
J-41	321	0	540	95
J-42	330	0	541	91
J-43	349	0	541	83
J-44	334	8	540	89
J-45	335	0	540	89
J-46	315	7	540	97

TTM 17845 -Westridge
Scenario: MDD+1500 gpm FF
FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-47	320	9	537	94
J-48	306	3	536	99
J-49	282	13	534	109
J-50	290	17	534	106
J-51	312	0	540	99
J-52	365	1500	547	79
J-53	239	0	525	124
J-54	238	0	525	124
J-55	292	0	527	102
J-56	400	0	547	64

TTM 17845 -Westridge
Scenario: MDD+1500 gpm FF
FlexTable: Pipe Table

Label	Diam. (in)	Length (ft)	Start Node	Stop Node	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Hydraulic Grade Begin (ft)	Hydraulic Grade End (ft)	Headloss (Friction) (ft) Gradient (ft/ft)
P-11	8	245	J-8	J-9	140	111	0.7	527.2	527.2	0.1
P-12	8	420	J-9	J-10	140	239	1.5	527.2	527.7	0.5
P-13	8	717	J-10	J-11	140	256	1.6	527.7	526.8	0.9
P-14	8	1056	J-11	J-12	140	256	1.6	526.8	525.4	1.4
P-15	8	546	J-13	J-14	140	7	0.0	527.1	527.1	0.0
P-16	8	243	J-14	J-15	140	68	0.4	527.1	527.0	0.0
P-17	8	601	J-16	J-14	140	2	0.0	527.1	527.1	0.0
P-19	8	567	J-9	J-15	140	129	0.8	527.2	527.0	0.2
P-20	8	1027	J-15	J-18	140	188	1.2	527.0	526.3	0.7
P-21	8	444	J-18	J-19	140	6	0.0	526.3	526.3	0.0
P-22	8	439	J-18	J-20	140	164	1.1	526.3	526.1	0.3
P-23	8	602	J-20	J-21	140	54	0.4	526.1	526.0	0.0
P-24	8	892	J-21	J-22	140	54	0.4	526.0	525.9	0.1
P-25	8	567	J-22	J-23	140	45	0.3	525.9	526.0	0.0
P-26	8	191	J-23	J-24	140	56	0.4	526.0	526.0	0.0
P-27	8	354	J-24	J-25	140	31	0.2	526.0	526.0	0.0
P-28	8	501	J-25	J-26	140	44	0.3	526.0	526.0	0.0
P-29	8	163	J-26	J-20	140	91	0.6	526.0	526.1	0.0
P-30	8	587	J-24	J-27	140	24	0.2	526.0	526.0	0.0
P-31	8	441	J-27	J-26	140	47	0.3	526.0	526.0	0.0
P-32	8	2144	J-22	J-28	140	99	0.6	525.9	525.5	0.5
P-33	12	884	J-28	J-12	140	99	0.3	525.5	525.4	0.0
P-34	12	628	J-12	J-29	140	355	1.0	525.4	525.2	0.2
P-35	8	486	J-29	J-30	140	68	0.4	525.2	525.2	0.1
P-36	8	1267	J-30	J-31	140	68	0.4	525.2	525.1	0.1
P-37	10	421	J-31	J-32	140	68	0.3	525.1	525.0	0.0
P-38	12	31	J-32	J-33	140	0	0.0	525.0	547.1	0.0
P-39	20	1384	J-33	J-34	140	0	0.0	547.1	547.1	0.0
P-40	12	65	J-34	J-35	140	0	0.0	547.1	547.1	0.0
P-41	8	855	J-35	J-52	140	0	0.0	547.1	547.1	0.0
P-42	8	708	J-52	J-37	140	600	3.8	547.1	542.7	4.4
P-43	8	103	J-37	J-38	140	3	0.0	542.7	542.7	0.0
P-44	8	307	J-37	J-39	140	583	3.7	542.7	540.9	1.8
P-45	8	278	J-39	J-40	140	255	1.6	540.9	540.6	0.4
P-46	8	47	J-40	J-41	140	250	1.6	540.6	540.5	0.1

TTM 17845 -Westridge
Scenario: MDD+1500 gpm FF
FlexTable: Pipe Table

Label	Diam. (in)	Length (ft)	Start Node	Stop Node	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Hydraulic Grade Begin (ft)	Hydraulic Grade End (ft)	Headloss (Friction) (ft) Gradient (ft/ft)
P-48	8	220	J-42	J-40	140	0	0.0	540.6	540.6	0.0
P-49	8	397	J-43	J-39	140	0	0.0	540.9	540.9	0.0
P-50	8	250	J-39	J-44	140	320	2.0	540.9	540.4	0.5
P-51	8	210	J-44	J-45	140	0	0.0	540.4	540.4	0.0
P-52	8	280	J-44	J-46	140	312	2.0	540.4	539.9	0.5
P-53	8	532	J-46	J-47	140	556	3.6	539.9	537.0	2.9
P-54	8	261	J-47	J-48	140	547	3.5	537.0	535.7	1.4
P-55	8	312	J-48	J-49	140	544	3.5	535.7	534.1	1.6
P-56	12	641	J-49	J-50	140	17	0.1	534.1	534.1	0.0
P-57	8	1369	J-49	J-10	140	515	3.3	534.1	527.7	6.4
P-58	8	162	J-41	J-51	140	250	1.6	540.5	540.3	0.2
P-59	8	322	J-51	J-46	140	250	1.6	540.3	539.9	0.4
P-61	12	124	J-32	J-53	140	68	0.2	525.0	525.0	0.0
P-62	12	302	J-53	J-54	140	68	0.2	525.0	525.0	0.0
P-63	12	962	J-54	J-29	140	288	0.8	525.0	525.2	0.2
P-64	8	11	R-3	J-54	140	355	2.3	525.0	525.0	0.0
P-65	8	382	J-14	J-55	140	95	0.6	527.1	527.1	0.1
P-66	8	179	J-55	J-17	140	2	0.0	527.1	527.1	0.0
P-67	8	144	J-55	J-8	140	97	0.6	527.1	527.2	0.0
P-68	8	15	R-4	J-52	140	2,100	13.4	548.0	547.1	0.9
P-70	12	1063	J-56	J-52	140	0	0.0	547.1	547.1	0.0

TTM 17845 -Westridge
Scenario: MDD+1500 gpm FF
FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-3	525	355	525.0
R-4	548	2100	548.0

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-8	296	20	537	104
J-9	280	0	537	111
J-10	253	28	538	123
J-11	223	0	537	136
J-12	225	0	537	135
J-13	297	10	537	104
J-14	271	29	537	115
J-15	260	12	537	120
J-16	280	2	537	111
J-17	299	3	537	103
J-18	250	27	537	124
J-19	289	9	537	108
J-20	224	29	537	136
J-21	197	0	537	147
J-22	205	0	537	144
J-23	215	17	537	139
J-24	227	0	537	134
J-25	223	19	537	136
J-26	221	0	537	137
J-27	222	34	537	136
J-28	218	0	537	138
J-29	229	0	537	133
J-30	231	0	537	132
J-31	253	0	537	123
J-32	241	0	537	128
J-33	241	0	548	133
J-34	315	0	548	101
J-35	316	0	548	100
J-37	359	21	545	81
J-38	360	4	545	80
J-39	341	12	544	88
J-40	323	6	544	96
J-41	321	0	544	97
J-42	330	0	544	93
J-43	349	0	544	84
J-44	334	12	544	91
J-45	335	0	544	90
J-46	315	10	544	99

TTM 17845 -Westridge
Scenario: Peak Hour Demand
FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-47	320	14	542	96
J-48	306	4	541	102
J-49	282	19	541	112
J-50	290	25	541	108
J-51	312	0	544	100
J-52	365	0	548	79
J-53	239	0	537	129
J-54	238	0	537	129
J-55	292	0	537	106
J-56	400	0	548	64

TTM 17845 -Westridge
Scenario: Peak Hour Demand
FlexTable: Pipe Table

Label	Diam. (in)	Length (ft)	Start Node	Stop Node	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Hydraulic Grade Begin (ft)	Hydraulic Grade End (ft)	Headloss (Friction) (ft) Gradient (ft/ft)
P-11	8	245	J-8	J-9	140	89	0.6	537.3	537.4	0.0
P-12	8	420	J-9	J-10	140	180	1.2	537.4	537.7	0.3
P-13	8	717	J-10	J-11	140	127	0.8	537.7	537.4	0.3
P-14	8	1056	J-11	J-12	140	127	0.8	537.4	537.0	0.4
P-15	8	546	J-13	J-14	140	10	0.1	537.3	537.3	0.0
P-16	8	243	J-14	J-15	140	26	0.2	537.3	537.3	0.0
P-17	8	601	J-16	J-14	140	2	0.0	537.3	537.3	0.0
P-19	8	567	J-9	J-15	140	90	0.6	537.4	537.3	0.1
P-20	8	1027	J-15	J-18	140	104	0.7	537.3	537.0	0.3
P-21	8	444	J-18	J-19	140	9	0.1	537.0	537.0	0.0
P-22	8	439	J-18	J-20	140	68	0.4	537.0	537.0	0.1
P-23	8	602	J-20	J-21	140	3	0.0	537.0	537.0	0.0
P-24	8	892	J-21	J-22	140	3	0.0	537.0	537.0	0.0
P-25	8	567	J-22	J-23	140	28	0.2	537.0	537.0	0.0
P-26	8	191	J-23	J-24	140	11	0.1	537.0	537.0	0.0
P-27	8	354	J-24	J-25	140	1	0.0	537.0	537.0	0.0
P-28	8	501	J-25	J-26	140	18	0.1	537.0	537.0	0.0
P-29	8	163	J-26	J-20	140	42	0.3	537.0	537.0	0.0
P-30	8	587	J-24	J-27	140	11	0.1	537.0	537.0	0.0
P-31	8	441	J-27	J-26	140	24	0.2	537.0	537.0	0.0
P-32	8	2144	J-22	J-28	140	31	0.2	537.0	537.0	0.1
P-33	12	884	J-28	J-12	140	31	0.1	537.0	537.0	0.0
P-34	12	628	J-12	J-29	140	96	0.3	537.0	537.0	0.0
P-35	8	486	J-29	J-30	140	18	0.1	537.0	537.0	0.0
P-36	8	1267	J-30	J-31	140	18	0.1	537.0	537.0	0.0
P-37	10	421	J-31	J-32	140	18	0.1	537.0	537.0	0.0
P-38	12	31	J-32	J-33	140	0	0.0	537.0	547.9	0.0
P-39	20	1384	J-33	J-34	140	0	0.0	547.9	547.9	0.0
P-40	12	65	J-34	J-35	140	0	0.0	547.9	547.9	0.0
P-41	8	855	J-35	J-52	140	0	0.0	547.9	547.9	0.0
P-42	8	708	J-52	J-37	140	463	3.0	547.9	545.2	2.7
P-43	8	103	J-37	J-38	140	4	0.0	545.2	545.2	0.0
P-44	8	307	J-37	J-39	140	438	2.8	545.2	544.2	1.1
P-45	8	278	J-39	J-40	140	188	1.2	544.2	544.0	0.2
P-46	8	47	J-40	J-41	140	182	1.2	544.0	543.9	0.0

TTM 17845 -Westridge
Scenario: Peak Hour Demand
FlexTable: Pipe Table

Label	Diam. (in)	Length (ft)	Start Node	Stop Node	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Hydraulic Grade Begin (ft)	Hydraulic Grade End (ft)	Headloss (Friction) (ft) Gradient (ft/ft)
P-48	8	220	J-42	J-40	140	0	0.0	544.0	544.0	0.0
P-49	8	397	J-43	J-39	140	0	0.0	544.2	544.2	0.0
P-50	8	250	J-39	J-44	140	238	1.5	544.2	543.9	0.3
P-51	8	210	J-44	J-45	140	0	0.0	543.9	543.9	0.0
P-52	8	280	J-44	J-46	140	226	1.4	543.9	543.6	0.3
P-53	8	532	J-46	J-47	140	397	2.5	543.6	542.1	1.5
P-54	8	261	J-47	J-48	140	384	2.5	542.1	541.4	0.7
P-55	8	312	J-48	J-49	140	380	2.4	541.4	540.5	0.8
P-56	12	641	J-49	J-50	140	25	0.1	540.5	540.5	0.0
P-57	8	1369	J-49	J-10	140	336	2.1	540.5	537.7	2.9
P-58	8	162	J-41	J-51	140	182	1.2	543.9	543.8	0.1
P-59	8	322	J-51	J-46	140	182	1.2	543.8	543.6	0.2
P-61	12	124	J-32	J-53	140	18	0.1	537.0	537.0	0.0
P-62	12	302	J-53	J-54	140	18	0.1	537.0	537.0	0.0
P-63	12	962	J-54	J-29	140	78	0.2	537.0	537.0	0.0
P-64	8	11	R-3	J-54	140	96	0.6	537.0	537.0	0.0
P-65	8	382	J-14	J-55	140	67	0.4	537.3	537.3	0.0
P-66	8	179	J-55	J-17	140	3	0.0	537.3	537.3	0.0
P-67	8	144	J-55	J-8	140	69	0.4	537.3	537.3	0.0
P-68	8	15	R-4	J-52	140	463	3.0	548.0	547.9	0.1
P-70	12	1063	J-56	J-52	140	0	0.0	547.9	547.9	0.0

TTM 17845 -Westridge
Scenario: Peak Hour Demand
FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-3	537	96	537.0
R-4	548	463	548.0

HUNSAKER
& ASSOCIATES
IRVINE, INC.

HGL Calculation Based on Hydrant Test on Imperial Hwy (West of Idaho St)

Description	Desired Flow Q_F (gpm)	Dynamic Loss H_F (feet)*	Available HGL_F (feet)**	Test Run
Static	0	0.00	538	1
Peak Hour	367	0.73	537	2
MDD+ FF	1,745	13.08	525	3

* H_F is Static minus Residual (in feet) at Desired Flow

** HGL_F = Test Elevation + Static Pressure - H_F

Hydrant Test Data:

Orifice Dia	2.5 in.	
Static Pressure	130 psi	*300* feet
Residual Pressure	126 psi	*291* feet
Pitot Reading	72 psi	
Observed Flow	1,424 gpm	
Test Elevation	238 feet	

Affinity Equations:

$$K = \frac{Q_R}{H_R^{\wedge 0.54}}$$

- K is Affinity Constant
- Q_R is Test Flow
- Q_F is Desired Flow
- H_R is Static minus Residual (in feet) at Test Flow

$$H_F = \left(\frac{Q_F}{K}\right)^{\wedge 1.85}$$

Affinity Constant: (Using Flow Test Values)

K = 435

Provo Engineering
22931 Savi Ranch Pkwy, Yorba Linda, CA 92887
714-393-3877
email: info-at-socalflowtest.com

Hydrant Flow Test Report

Project	**Westridge Golf Course - Hunsaker WO# 0252-93X**			Test date	**5/7/15**
Address	**1201-1301 W, Imperial Hwy (West of Idaho St)**			Test time	**08:40**
City	**La Habra**	State	**CA**	File no.	**T-631**

Test hydrant location **Second hydrant west of Idaho Street on north side of Imperial Hwy**
Hydr # **na** Elev (ft +/-) **Grade**

Flow hydrant location **First hydrant west of Idaho Street on north side of Imperial Hwy**
Hydr # **na** Elev (ft +/-) **Grade**

Static Pressure **130** PSI Report Date **5/7/15**

Outlet	C-value	Diam	Pitot		Volume	
A	0.9	2.0	**0**	PSI	**0**	GPM
B	0.9	2.5	**72**	PSI	**1424**	GPM
C	0.9	3.0	**0**	PSI	**0**	GPM
D	0.83	4.0	**0**	PSI	**0**	GPM

Residual Pressure **126** PSI at an observed volume of **1424** GPM

Projected Pressure 20 PSI calculates to a volume of **8525** GPM

Although the results are accurate for the date and time given, they may not accurately reflect higher or lower readings which vary due to seasonal conditions and time of day.

Per NFPA 24-10, Table C.4.10.1(a), note 1, $Q=29.84 \times c(d)^2 (p)^{0.5}$

Per NFPA 24-10, Paragraph C.4.10.2, $Q_r = Q_f \times (h_r/h_f)^{0.54}$

Test by: George Provencher

Witness Steve Garcia
Water Tech V
City of La Habra Public Works

Client Katie O'Connor
Hunsaker and Associates
3 Hughes
Irvine, CA 92618

cc: Sgarcia-at-LaHabraCA.gov
Koconnor-at-hunsaker.com

Symbols
(T) = Test hydrant
(F) = Flow hydrant

North

PART II-A

INFORMATION ON FIRE FLOW AVAILABILITY
(To be completed by Water Purveyor)

Location 1201 - 1301 W. IMPERIAL HWY

LA HABRA, CA Hydrant Number N.A.

Distance from Nearest Property Line 10' Size of Hydrant 6x4x2 1/2 Size of Water main 12"

Static PSI 130 Residual PSI 126 Orifice size 2 1/2 Pitot 72

Fire Flow at 20 PSI 8524 Duration 4 HRS Flow Test Date / Time 5/7/15 8:40 AM

Location _____

_____ Hydrant Number _____

Distance from Nearest Property Line _____ Size of Hydrant _____ Size of Water main _____

Static PSI _____ Residual PSI _____ Orifice size _____ Pitot _____

Fire Flow at 20 PSI _____ Duration _____ Flow Test Date / Time _____

Location _____

_____ Hydrant Number _____

Distance from Nearest Property Line _____ Size of Hydrant _____ Size of Water main _____

Static PSI _____ Residual PSI _____ Orifice size _____ Pitot _____

Fire Flow at 20 PSI _____ Duration _____ Flow Test Date / Time _____

PART II-B SPRINKLERED BUILDINGS/PRIVATE FIRE HYDRANTS ONLY

Detector Location (check one) ☐ Above Grade ☐ Below Grade ☐ Either

Backflow Protection Required (Fire Sprinklers/Private Hydrant) (check one) ☐ Yes ☐ No

Minimum Type of Protection Required (check one) ☐ Single Check Detector Assembly

☐ Double Check Detector Assembly ☐ Reduced Pressure Principle Detector Assembly

---

City of La Habra
Water Purveyor

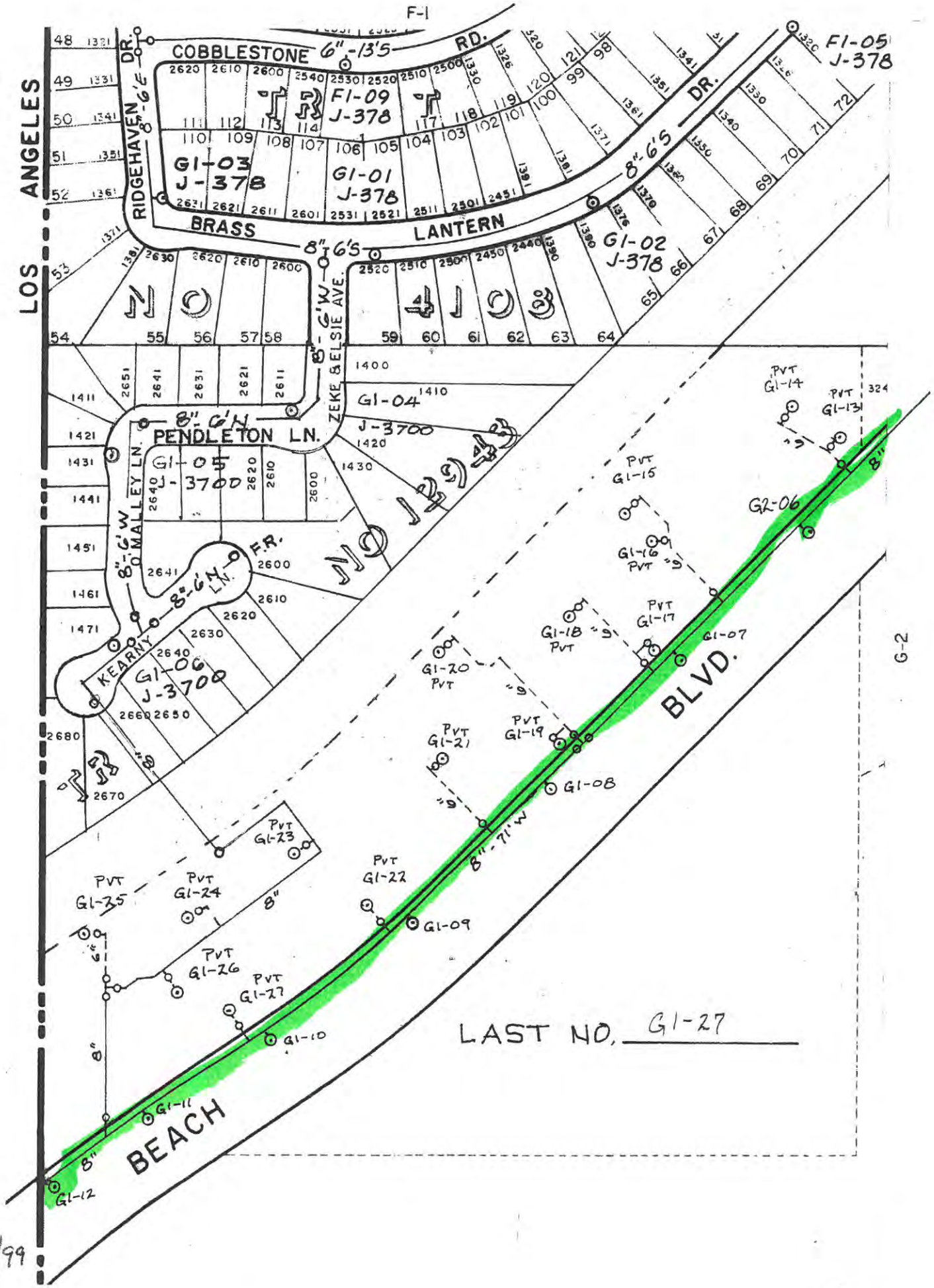
Steve Garcia
Signature

5-7-15
Date

Water Tech V
Title

This Information is Considered Valid for Twelve Months

Fire Department approval of building plans shall be required prior to the issuance of a Building Permit by the jurisdictional Building Department. Any deficiencies in water systems will need to be resolved by the Fire Prevention Division only prior to this department's approval of building plans.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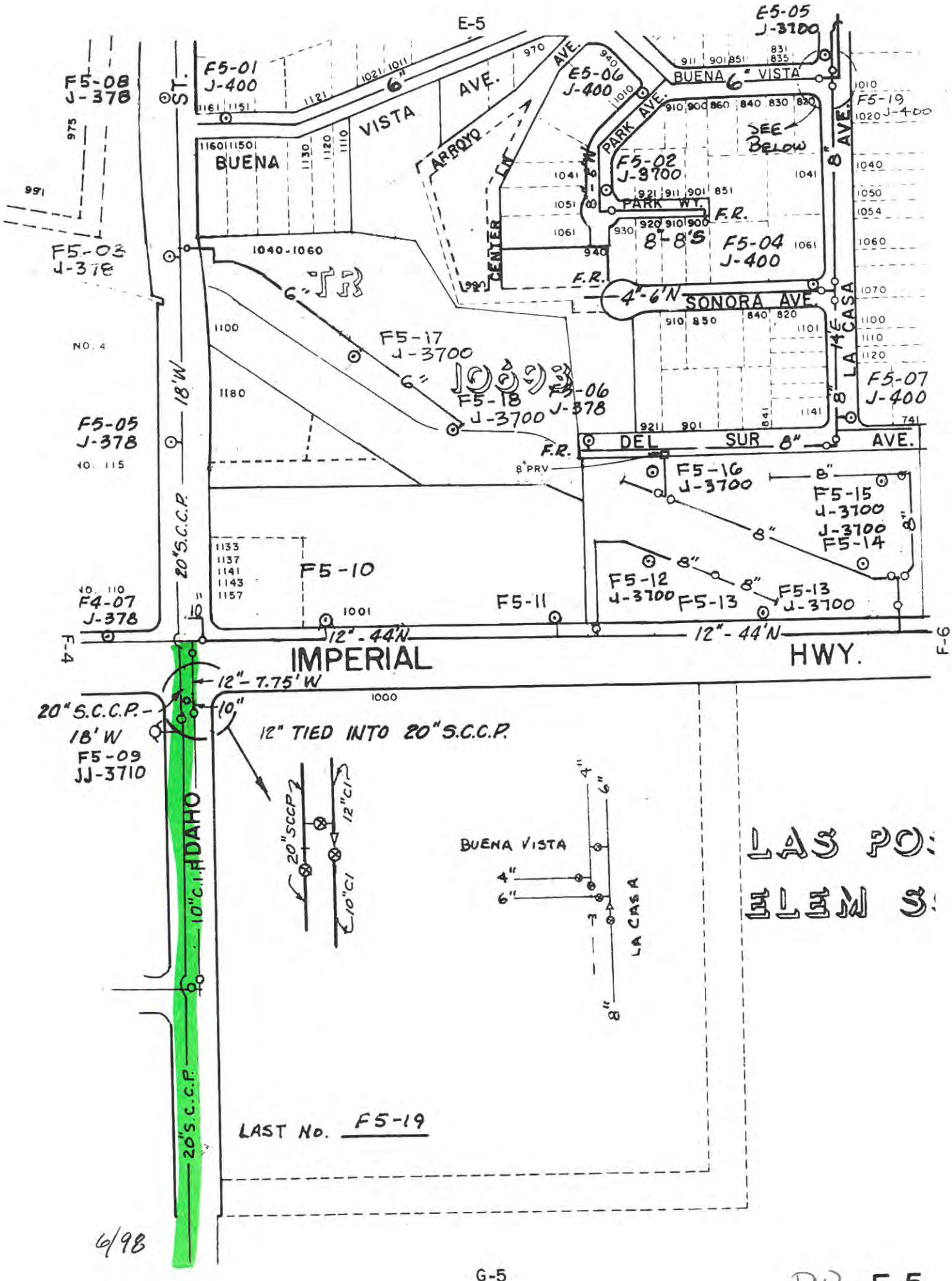
COBBLESTONE RD.
6"-13'S
F1-05
J-378
F1-09
J-378
G1-03
J-378
G1-01
J-378
G1-02
J-378
RIDGEHAVEN DR.
8"-6'E
BRASS LANTERN
8"-6'S
LOS ANGELES
8"-6'W
ZEKE & ELSIE AVE.
G1-04
J-3700
PENDLETON LN.
8"-6'W
G1-05
J-3700
MALLEY LN.
8"-6'W
F.R.
LN.
KEARNY
G1-06
J-3700
PVT G1-14
PVT G1-13
PVT G1-15
G2-06
G1-16 PVT
PVT G1-17
G1-18 PVT
G1-07
G1-20 PVT
PVT G1-21
PVT G1-19
G1-08
BLVD.
PVT G1-23
PVT G1-35
PVT G1-24
PVT G1-22
G1-09
PVT G1-26
PVT G1-27
G1-10
G1-11
BEACH
G1-12
8"-71'W
G-2
LAST NO. G1-27

9/29/99

G-1


E-5
F5-01 J-400
F5-08 J-378
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F5-06 J-400
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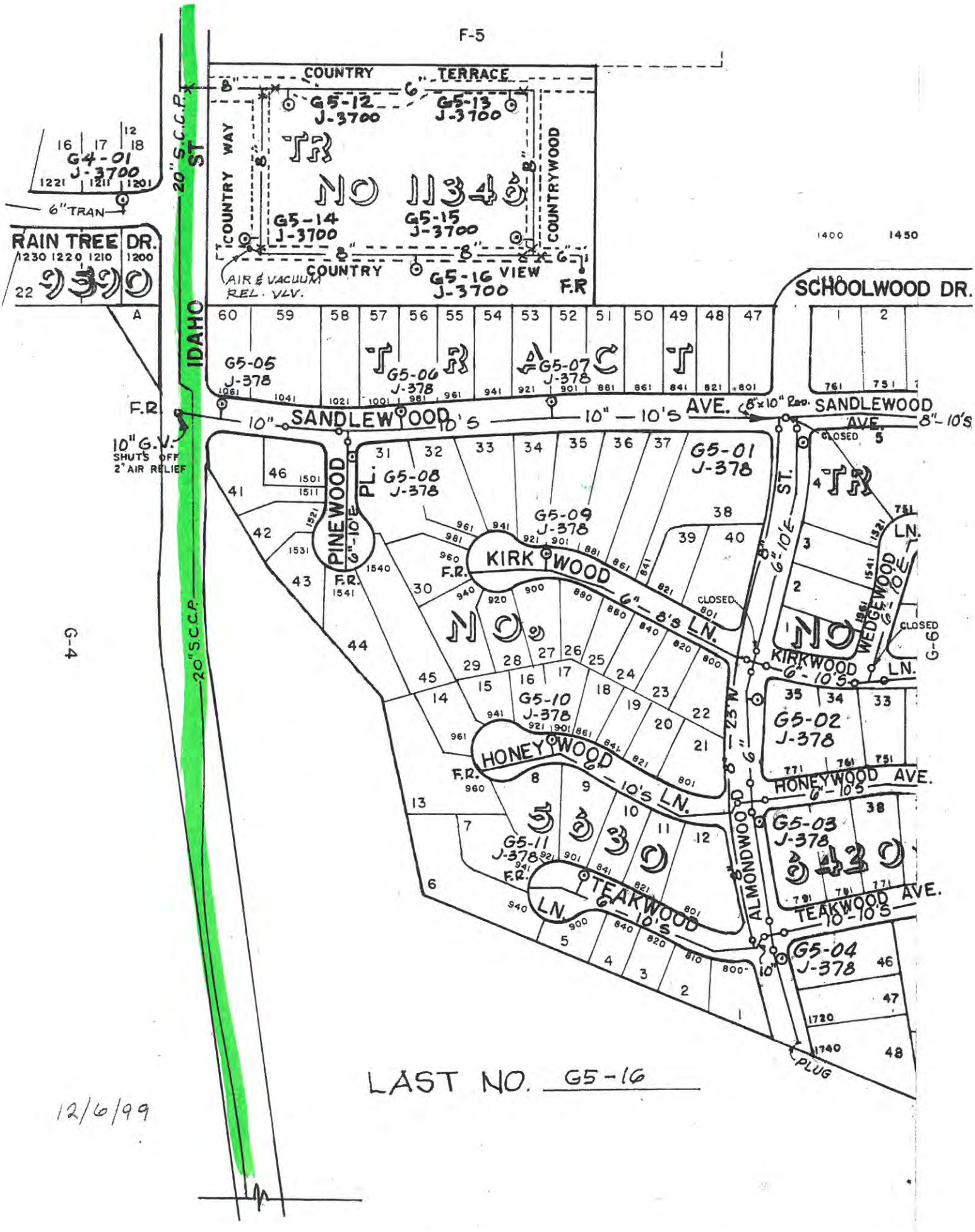
F5-04 J-400
F5-19 J-400
F5-07 J-400
F5-17 J-3700
F5-18 J-3700
F5-06 J-378
F5-05 J-378
F5-16 J-3700
F5-15 J-3700
F5-14 J-3700
F5-12 J-3700
F5-13 J-3700
F5-10
F5-11
F4-07 J-378
F5-09 JJ-3710
BUENA VISTA AVE.
ARROYO CIR.
CENTER
PARK AVE.
PARK WY.
SONORA AVE.
DEL SUR AVE.
LA CASA
IMPERIAL HWY.
IDAHO
SEE BELOW
F.R.
8" PRV
18'W
20"S.C.C.P.
12"-44'N
12"-7.75'W
10"
12" TIED INTO 20"S.C.C.P.
20"SCCP
12"CI
10"CI
BUENA VISTA
LA CASA
LAST No. F5-19
6/98
G-5
F-5
F-4
F-6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COUNTRY TERRACE
G5-12 J-3700
G5-13 J-3700
COUNTRY WAY
COUNTRYWOOD
NO 1134
G5-14 J-3700
G5-15 J-3700
COUNTRY
G5-16 VIEW J-3700
F.R
AIR & VACUUM REL. VLV.
G4-01 J-3700
6" TRAN
20" S.C.C.P.
ST
RAIN TREE DR.
1230 1220 1210 1200
IDAHO
SCHOOLWOOD DR.
G5-05 J-378
G5-06 J-378
G5-07 J-378
F.R.
10" SANDLEWOOD 10's
10" — 10's AVE.
8"x10" Rep. SANDLEWOOD AVE.
8"- 10's
10" G.V.
SHUT'S OFF
2" AIR RELIEF
PINEWOOD PL.
G5-08 J-378
G5-01 J-378
G5-09 J-378
KIRKWOOD 6"— 8's LN.
CLOSED
WEDGEWOOD 6"-10's
KIRKWOOD LN. 6"-10's
G5-10 J-378
HONEYWOOD 6"— 10's LN.
G5-02 J-378
HONEYWOOD AVE. 6"-10's
G5-11 J-378
TEAKWOOD LN. 6"— 10's
ALMONDWOOD DR.
G5-03 J-378
TEAKWOOD AVE. 10-10's
G5-04 J-378
PLUG
LAST NO. G5-16
12/6/99
G-4
G-6
H 5
DW G-5

LAST NO. H5-10

12/6/99

DW H-5

Table 4-3
Existing Land Use and Water Demand Factors

Land Use Description	Abbr.	Area (acres)	Demand Factor[1] (gpd/ac)	Water Demand[1,2] (gpd)
Rural Density Residential	rural	7	1,700	11,888
Low Density Residential	ldr	2,473	1,700	4,203,700
Medium Density Residential	mdr	206	2,500	514,101
High Density Residential	hdr	375	3,000	1,125,607
Mobile Home Park	mob	89	2,000	177,958
Transitional Residential	tra	18	2,000	35,982
Neighborhood Commercial	ncm	53	2,200	116,560
Community Shopping Center	cms	137	2,200	300,779
Central Business District	bus	33	2,200	72,562
Highway Commercial	hwc	254	2,200	559,768
Professional Office	pro	53	2,000	105,493
Commercial Industrial	com	185	2,000	369,524
Light Industrial	lti	228	1,500	341,265
Public Facility	pub	131	2,500	326,892
Open Space (Parks, etc.)	os	319	500	159,401
Railroad R-O-W	rri	54	0	0
Totals		**4,615**		**8,421,480**

(1) Includes unaccounted-for water.
(2) Totals may not agree with product of Area and Demand Factors due to rounding.

PEAKING FACTORS

To determine the water demands for conditions other than an average day's water use, peaking factors were developed. Peaking factors account for fluctuations in demands on a daily or hourly basis. For example, during hot summer days, water use is typically higher than on a cold winter day. Common peaking factors include factors for Maximum Day and Peak Hour demand periods. Peaking factors are determined using the water system demands for a selected period and

Table 2-1
Storage Reservoir Summary Data

Name	Capacity (MG)	Pressure Zone Served	Reservoir Shape	Base Elevation (ft-MSL)	Overflo w Height (ft)	High Water Level (ft-MSL)
Puente Hills	5.0	Zone 1	Rectangular	516	27	543
Sev Byerrum	9.3	Zone 1	Rectangular	516	27	543
Westridge	2.5	Zone 20	Circular	582	29	611

The 67 MG Orange County Reservoir is owned and operated by MWD. Prior to 2006, 10 MG of that storage had been apportioned to the City of La Ha bra as emergency storage. In 2006, MWD revised their method of operating the reservoir and discontinued specific volume entitlements. Now the emergency storage capacity in this reservoir is available to all MWD agencies, subject to MWD's situation during such emergency.

GROUNDWATER WELL

The City operates one groundwater production well (known as the Idaho Street Well) which is located along Idaho Street south of Lambert Road (see Figure 2-1). The well is equipped with a vertical turbine pump and electric motor. There is no backup power installed at this site. The bowls are set at 408 ft. below ground level. The bottom of the casing is about 970 ft. below ground level. A well log and other information pertaining to this well is in the Technical Appendix of the WMPU October 2002 report.

Hexametaphosphate is injected into the deep well to retard the precipitation of iron and calcium in the air stripper, and within the City's distribution system. It also serves to control the reddish color in the water, which can occur when iron oxidizes. The air stripper is currently reducing the ammonia and hydrogen sulfide content in the raw water.

Before the water enters the distribution system, sodium hypochlorite is injected at the retention reservoir. A booster pump located at the site pumps the water from the retention reservoir and into Zone 1. The capacity of this pump is currently about 1,500 gpm, which is greater than production from the well. To avoid emptying the reservoir, the booster pump is cycled on and off. The air stripping tower is approximately 21.5 feet tall. Additional information about the well is summarized in Table 2-2. Information on the booster pump is in Table 2-3.

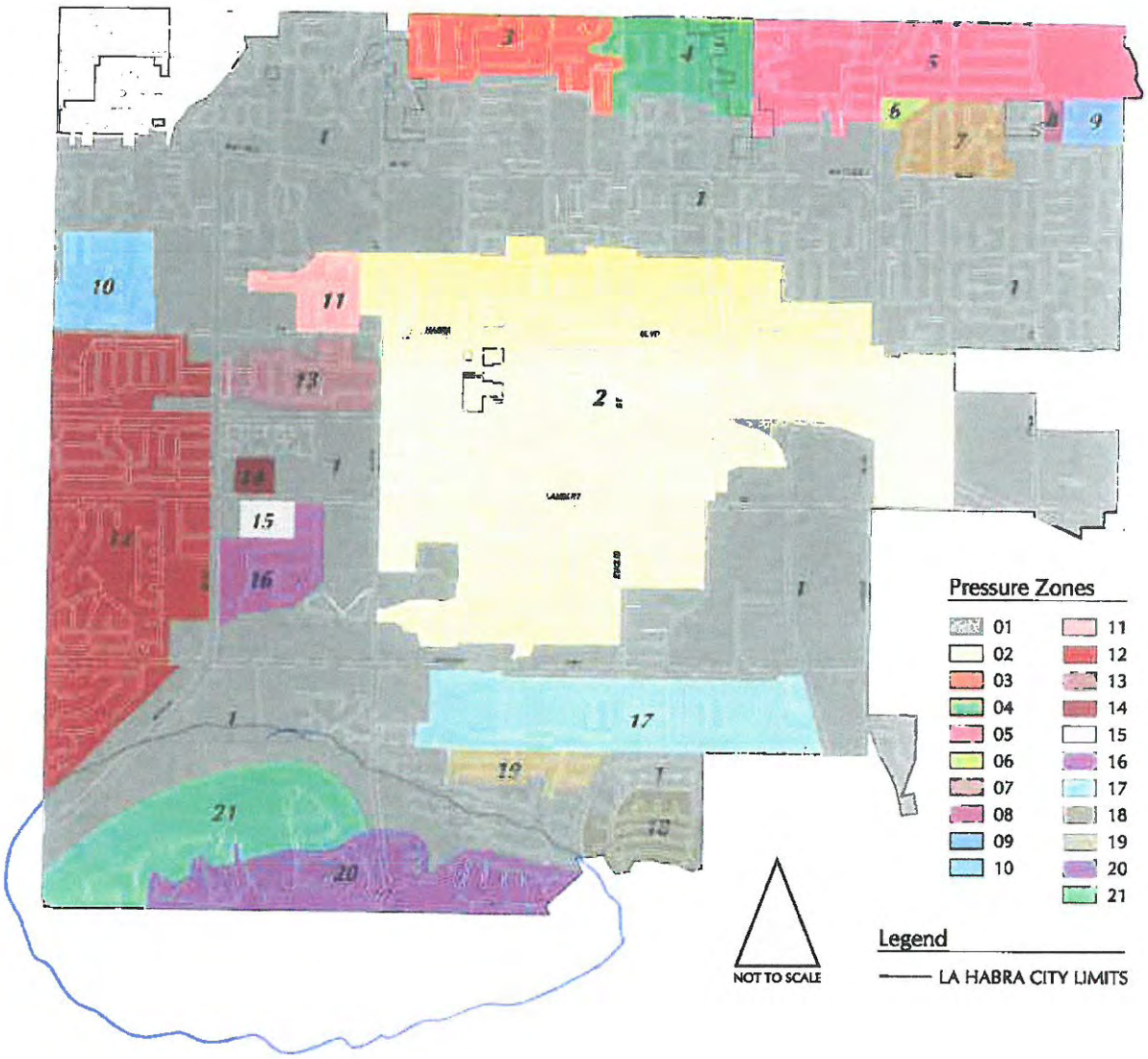

FIGURE 2-2
EXISTING PRESSURE ZONE

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