Technical Memorandum

BLACK WATER CONSULTING ENGINEERS, INC.

To: Criseldo Mina, P.E., Senior Civil Engineer
From: Aja Verburg, P.E.

Subject: Home 2 Suites
Water Distribution System Hydraulic Network Analysis

Date: February 23, 2017

INTRODUCTION

This Technical Memorandum (TM) has been prepared by Black Water Consulting Engineers, Inc. (Black Water) to present the findings of the water distribution system steady-state hydraulic network analysis using Innovyze InfoWater software for the proposed Home 2 Suites project (Project). The City's hydraulic network model of the existing potable water system was obtained from the City's consultant in January 2017 (2017 Water Model). This TM addresses the inclusion of the Project into the 2017 Water Model.

Section 1 provides a general description of the proposed Project, design criteria and assumptions. Section 2 includes the analyses methodology, analyses results. Section 3 includes a discussion of system deficiencies and recommended improvements, and a budgetary cost estimate for the Project improvements.

Engineering reports and documents reviewed and referenced in this TM include the following:

[1] City of Tracy Citywide Water System Master Plan, West Yost Associates, December 2012.
[2] City of Tracy General Plan, Design, Community & Environment, February 2011.

SECTION 1

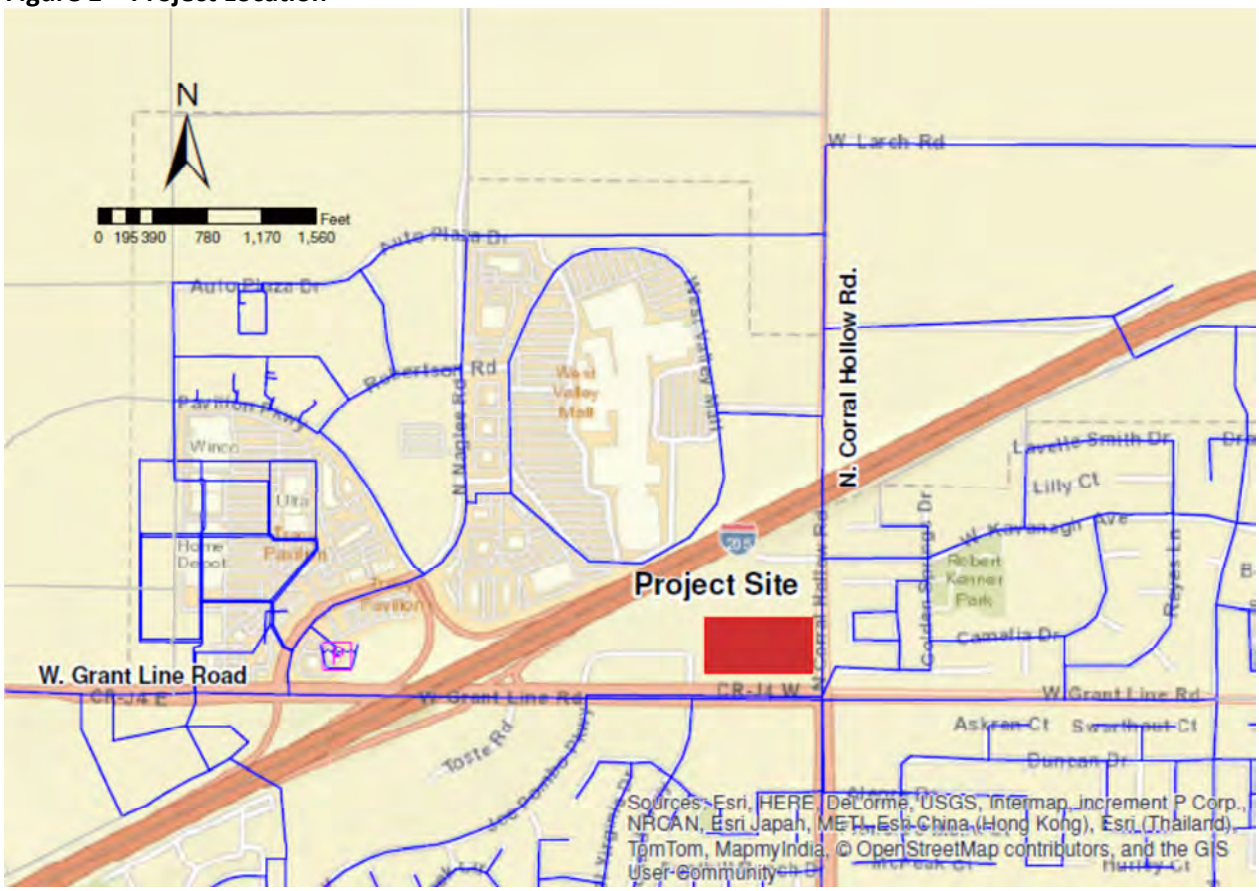
Project Description

The proposed Project is located in Tracy, California, south of Interstate Highway 205, north of W. Grant Line Road, and west of N. Corral Hollow Road refer to Figure 1. The Project utility site plan is included in Appendix A. The Project site area totals approximately 2.6 acres for the proposed hotel and future development. There are 110 units proposed for very high density residential land use and 0.64 acres for future development. The City of Tracy General Plan, February 1, 2011, designates the Project area as office land use.

Water infrastructure to serve the Project includes: 2-inch diameter pipelines for domestic service to the proposed office building and irrigation service via connections to existing 2-inch diameter service laterals from the existing 16-inch diameter water distribution main at W. Grant Line Road; 4-inch

diameter pipelines for domestic service to the hotel building via a connection to an existing 6-inch service lateral from the 12-inch water distribution main at N. Corral Hollow Road; and a new 6-inch diameter looped fire service line with connections to the existing 16-inch water distribution main in W. Grant Line Road and existing 12-inch diameter water distribution main in N. Corral Hollow Road. The proposed buildings are equipped with sprinkler system for fire protection. The Project includes the installation of three on-site fire hydrants. Appendix A includes the conceptual utility plan for the Project.

Figure 1 – Project Location



Existing Potable Water System and Water Model

Design criteria summarized in this section applies to new development, as existing transmission mains are evaluated on a case-by-case basis. This analysis assumes the recommended Capital Improvement Project (CIP) Pipeline Improvements 1a, 1b, and 2 to the City's existing water system, as described in Chapter 7 and 10 of the 2012 City of Tracy Citywide Water System Master Plan (2012 WMP) have been completed. Existing system deficiencies identified include high velocities during peak demand conditions at Locations #1, and #2 on Figure 7-10 of the 2012 WMP, included in Appendix B of this TM. These existing deficiencies have been observed as part of this analysis to document that the proposed development does not significantly impact these deficiencies. Unless impacts by the proposed development are significant to existing deficiencies, they are not identified as system deficiencies resulting from the proposed project.

This analysis includes demands from the proposed development projects:

- Barcelona Infill
- Berg Road Properties
- Harvest Apartments
- 321 E. Grant Line Apartments
- Project Hawk/IPC
- Valpico Apartments
- MacDonald Apartments
- Sierra Hills
- Tiburon Village
- M1/M2 and Infill Parcels 7 and 13
- Middlefield Apartments and Self Storage
- Grant Line Road Apartments (Gateway Crossing)
- Ellis Phase 1A and Phase 1A Extension
- South Lammers Road
- Aspire II
- Pescadero IPT

Infrastructure for the proposed developments may or may not be constructed as of date of this TM, and the final alignments and facility sizes of specific project infrastructure will need to be confirmed through as-builts.

Estimated Project Water Demands

Water demands for the Project were estimated based on the unit water demand factors adopted in the December 2012 City of Tracy Citywide Water System Master Plan (2012 Water Master Plan). The total annual potable water demand for the project is approximately 23 acre-ft per year (af/yr) based on a unit water demand factor of 150 gallons per day (gpd) per dwelling unit (DU) for the very high density residential land us, 1.5 af/ac/yr for office land use, and 4.0 af/ac/yr for irrigation land use (approximately 15% of the total gross acreage). Maximum day demands are estimated to be 200 percent of average day demands, and peak hour demands are estimated to be 340 percent of average day demands [1]. Table 1 summarizes the estimated water demands for the Project. Table 2 summarizes the calculations to estimate average day demands, maximum day demands, and peak hour demands used in the water model in gallons per minute (gpm) and million gallons per day (mgd).

Table 1 – Estimated Project Water Demands

Land Use Designation	Gross Acreage, acres	Dwelling Units, DU	Landscaped Area, acres	Unit Potable Water Demand Factor[a]		Annual Potable Water Demand, af/yr
				gpd/du	af/ac/yr	
Residential - Very High Density	2.55	110		150		18.5
Office	0.64				1.5	1.0
Irrigation[b]			0.38		4.0	1.5
UAFW[c]						1.6
Total	3.19	110	0.38	-	-	22.6

[a]Based on 2012 Water Master Plan.
[b]Consistent with assumptions in 2012 Water Master Plan - 15 percent of gross acres are assumed to be landscaped.
[c]Unaccounted-for water (UAFW) is equal to 7.5 percent of total water demand.

Table 2 – Summary of Average Day Demands, Maximum Day Demands, and Peak Hour Demands

Average Day Demand		Maximum Day Demand[d]		Peak Hour Demand[e]	
gpm	mgd	gpm	mgd	gpm	mgd
14	0.02	28	0.04	48	0.07

[d]Maximum day demand is 2.0 times the average day demand, per the 2012 Water Master Plan.
[e]Peak hour demand is 3.4 times the average day demand, per the 2012 Water Master Plan.

Design Criteria

Water system performance design criteria and analyses requirements for new development are summarized in Table 3.

Table 3 – Design Criteria and Requirements [1]

Component	Criteria
Fire Flow Requirements: Commercial/Office Fire Flow (Sprinklered) (Includes Commercial, Office, Motel/Hotel, and Mixed Use)	3,500 gpm
Water Distribution Line Sizing (Pipes Less than 18-inches in Diameter):	
Average Day Demand Condition	
Minimum Pressure/ Maximum Pressure	40 psi/ 80 psi
Maximum Headloss	7 ft/kft
Maximum Velocity	6 fps
Maximum Day with Fire Flow Demand Condition	
Minimum Pressure (at fire node)	30 psi (single event)
Maximum Head loss	10 ft/kft
Maximum Velocity	12 fps
Peak Hour Demand Condition	
Minimum Pressure	40 psi
Maximum Head loss	7 ft/kft
Maximum Velocity	8 fps
Minimum Pipe Diameter	8 inches
Hazen-Williams "C" Factor	130
Pipeline Material	Ductile Iron

SECTION 2

The results of the existing potable water system hydraulic steady-state analysis are provided for the following potable water demand scenarios:

- Average Day Demand – An average day demand condition was simulated for the water distribution facilities to evaluate the system's capability to meet the average day demand

scenario for the Project. Average day demands are met by the combined supply from treated surface water, storage tanks, and groundwater.

- Maximum Day Demand – A maximum day demand condition was simulated for the water distribution facilities to evaluate the system's capability to meet the maximum day demand scenario for the Project. Maximum day demands are met by the combined supply from treated surface water, storage tanks, and groundwater.

- Maximum Day Demand plus Fire Flow – To evaluate the potable water system during the maximum day demand with fire flow scenario for the Project, individual fire flow demands were simulated at locations along the project where fire service connections are proposed. The maximum day demand scenario is evaluated during the simulated fire flow event at the specified model junction to evaluate that the required minimum pressures are met and maximum velocity requirements are not exceeded. Maximum day plus fire flow demands are met by the combined supply from treated surface water, storage tanks, and groundwater.

- Peak Hour Demand – A peak hour flow condition was simulated for the water distribution facilities to evaluate the system's capability to meet the peak hour demand scenario for the Project. Peak hour demands are met by the combined supply from treated surface water, storage tanks, and groundwater.

Modeling Results

The Project water distribution system is evaluated based on meeting minimum pressures and maximum velocities, consistent with the criteria in Table 3, for each scenario. The Project water distribution system is evaluated based on meeting minimum pressures and maximum velocities, consistent with the criteria in Table 3, for each scenario. Appendix C includes figures showing the water distribution system modeling layout and pressures for each modeling scenario and corresponding data. . The maximum day demand with fire flow scenario is evaluated first, as this is the highest demands scenario.

Maximum Day with Fire Flow Demand Scenario

System pressures at the Project are approximately 45 pounds per square inch (psi) with a maximum velocity of 6 feet per second (fps) for the maximum day demand with fire flow scenario with an applied fire flow demand of 3,500 gpm at the location identified as having the least available fire flow, water model junction J-1-5004. The existing potable water system adequately delivers maximum day demand with fire flow to the Project while meeting the City's minimum pressure criterion of 30 psi and maximum velocity criterion of 12 fps at Project and throughout the existing water system. Figure 2 presents the water distribution system modeling layout and system pressures for this demand scenario.

Peak Hour Demand Scenario

System pressures at the service connections to the Project are approximately 64 psi with a maximum velocity of less than 1 fps for the peak hour demand scenario. The existing potable water system adequately delivers peak hour demands to the Project while meeting the City's minimum pressure criterion of 40 psi and maximum velocity criterion of 8 fps at the Project and throughout the existing water system. Figure 3 presents the water distribution system modeling layout and system pressures for this demand scenario.

Maximum Day Demand Scenario

The system pressures at the service connections to the Project are approximately 60 psi for the maximum day demand scenario with a maximum velocity of less than 1 fps. The existing potable water system adequately delivers maximum day demands to the Project while meeting the City's minimum pressure criterion of 40 psi and maximum velocity criterion of 6 fps at the Project and throughout the existing water system. Figure 4 presents the water distribution system modeling layout and system pressures for this demand scenario.

Average Day Demand Scenario

System pressures at the service connections to the Project are approximately 70 psi for the average day demand scenario with a maximum velocity of 1 fps. The existing potable water system adequately delivers average day demands to the Project while meeting the City's minimum and maximum pressure criterion of 40 psi and 80 psi, respectively, and a maximum velocity criterion of 3 fps at the Project and throughout the existing water system. Figure 5 presents the water distribution system modeling layout and system pressures for this demand scenario.

SECTION 3

System Deficiencies and Recommended Improvements

The hydraulic modeling analysis confirms that the existing system can meet the Project demands while maintaining City's design criteria for average day, maximum day, maximum day demand with fire flow, and peak hour demands at the Project and throughout the existing water system. Based on review of the proposed utility plan and modeling results, the following improvements are recommended:

- Although the analysis did not include modeling of the proposed private on-site infrastructure, the utility plan proposes a 6-inch diameter pipeline for fire service. The minimum pipeline diameter required and recommended for fire serviced is 8-inches.
- An off-site public fire hydrant shall be constructed on W. Grant Line Road.

As discussed in Section 1, this analysis assumes the recommended Capital Improvement Project (CIP) Pipeline Improvements 1a, 1b, and 2 to the City's water system as described in Chapter 7 and 10 of the 2012 WMP have been completed. These improvements are recommended to be completed in order to serve the development. However, the Project does not significantly impact these deficiencies.

Any changes or modifications to the proposed Project or water system layout will require additional hydraulic evaluation.

Budgetary Construction Cost Estimate

A construction cost of $188,750 is estimated for the Project water infrastructure, itemized in Table 4. Quantities are estimates based on the Project schematic utility plan.

Table 4 – Budgetary Construction Cost Estimate

Item	Quantity	Unit	Unit Cost	Subtotal
2-inch diameter piping and valving	400	LF	$60	$24,000
4-inch diameter piping and valving	200	LF	$80	$16,000
8-inch diameter water pipeline and valving	700	LF	$110	$77,000
Hydrant	4	EA	$3,500	$14,000
Connection to Existing City of Tracy Water System	5	EA	$3,000	$15,000
Disinfection and Testing	1	LS	$5,000	$5,000
			Subtotal	$151,000
			25% Contingency	$37,750
			ESTIMATE TOTAL	$188,750

SUMMARY

Based on the modeling results, the City's existing potable water system is adequate to deliver average day, maximum day demands, maximum day plus fire flow, and peak hour demands for the Project. Additionally, the Project does not significantly impact existing system deficiencies. It is recommended that the looped private fire service on the Project site be an 8-inch diameter pipeline and a public fire hydrant be constructed along the project frontage along W. Grant Line Road. A budgetary construction cost of $188,750 is estimated for the Project water system improvements.

APPENDIX A

Conceptual Water Utility Plan

HOME 2
SUITES BY HILTON

W. GRANT LINE ROAD & N. CORRAL HOLLOW ROAD
TRACY, CALIFORNIA

CONCEPTUAL PROTOTYPE RENDERING

PROJECT OWNER

BALU PATEL
TRACY, CA.
PH: 209-596-4920
EM: AMITA KOTECHA [akotecha@comcast.net]

PROJECT DESCRIPTION

A SITE DEVELOPMENT PERMIT TO ALLOW THE CONSTRUCTION OF A 110-ROOM, FOUR STORY HOTEL (74,040 SQUARE FEET), ON AN APPROXIMATELY 2.55 GROSS ACRE SITE.

LEGAL DESCRIPTION

THE LAND REFERRED TO IN THIS REPORT IS SITUATED IN THE COUNTY OF SAN JOAQUIN, CITY OF TRACY, STATE OF CALIFORNIA

ARCHITECT- ENGINEER

LEE GAGE & ASSOCIATES INC.
PH: (559) 439-2222
FAX: (559)660-1342
EMAIL:
LGAGEINC@LGAGEINC.COM
7636 N. INGRAM SUITE 107
FRESNO, CA 93711

CIVIL ENGINEER

SCHACK & COMPANY, INC.
1025 CENTRAL AVE.
TRACY, CA. 95376
PH: 209-835-2178

FRANCHISE

HILTON WORLDWIDE
HOME2

NUMBER OF EMPLOYEES REQUIRED : 5

INDEX

PROJECT INFORMATION

W. GRANT LINE ROAD & N. COORAL HOLLOW ROAD
TRACY, CALIFORNIA

APN: 214-020-34

SITE

	PROPOSED		
	PARCEL	--	TOTAL
SITE AREA (ACRES)	2.55 AC	--	2.55 AC

BUILDING

	PROPOSED	EXISTING	TOTAL (ABOVE)	TOTAL
GUESTROOM UNITS	110	--		110
GROSS FLOOR AREA ABOVE GROUND.	73,070 S.F.	--	73,070 S.F.	
PORTE-COCHERE	1,200 S.F.			73,070 S.F.
NET FOOTAGE OF PROPOSED FLOOR AREA	74,070 S.F.			
PARKING SPACE REQUIRED BY FRANCHISE (NEW RATIO 1 : 1.1)	112 (x1.1)	-- (x1.0)		
PARKING SPACE COUNT	168	--	--	

REVISIONS

COVER SHEET

LEE GAGE & ASSOCIATES, INC.
architecture • engineering • planning
7636 n. ingram ave. 107 fresno, california 93711 (559) 439-2222

PROPOSED:
TRACY HOME2 HOTEL
W. GRANT LINE ROAD & N CORRAL HOLLOW ROAD
TRACY, CALIFORNIA

Z:\PROJECTS\HOME2 TRACY, CA_CD\SD1.DWG

10-12-16

LICENSED ARCHITECT
LEE GAGE
C-6758
REN. 1-31-17
STATE OF CALIFORNIA

GO
SHEET ____
OF ____

PROPOSED SITE PLAN

250.3'

228.3'

TRANSFORMER

TRASH

OFFICE BLDG
4 STORY
28,000 SF
112 PARKING
STALLS REQ'D
1/250 SF

234.6'

140'

50'

PROPOSED PROP LINE

POOL

PATIO

TOWER

HOME 2 by HILTON
4 STORY 110 UNITS
62,560 SQ FT
112 PARKING STALLS REQ'D
(30% COMPACTS MAX.)
168 STALLS PROVIDED

TOWER

DECELERATION LANE
APPROX 10 WIDE

261.7'

SHORTEN CHEVRON STRIPING TO PROVIDE ACCESS TO LEFT TURN LANE FROM PROPOSED DRIVEWAY.

N CORRAL HOLLOW RD

14'

COMMON ENTRANCE

R25'

20'

NO TURN ON RED

W GRANT LINE RD

EXTEND CURB RETURN TO SEPARATE SOUTHBOUND RIGHT TURN MERGE AND VEHICLE MOVEMENTS INTO PROPOSED DRIVEWAY ENTRANCE.

INSTALL SIGNAL CONTROL FOR RIGHT TURN LANE AT CORNER ISLAND TO EXISTING TRAFFIC CONTROL SYSTEM.

NORTH

GRAPHIC SCALE IN FEET
0 25 50 100

Kimley»Horn

PROPOSED DRIVEWAY ACCESS LAYOUTS
OPTION 2

FV-097008216 January 2017

HOME 2 SUITES BY HILTON TRANSPORTATION ENGINEERING ANALYSIS

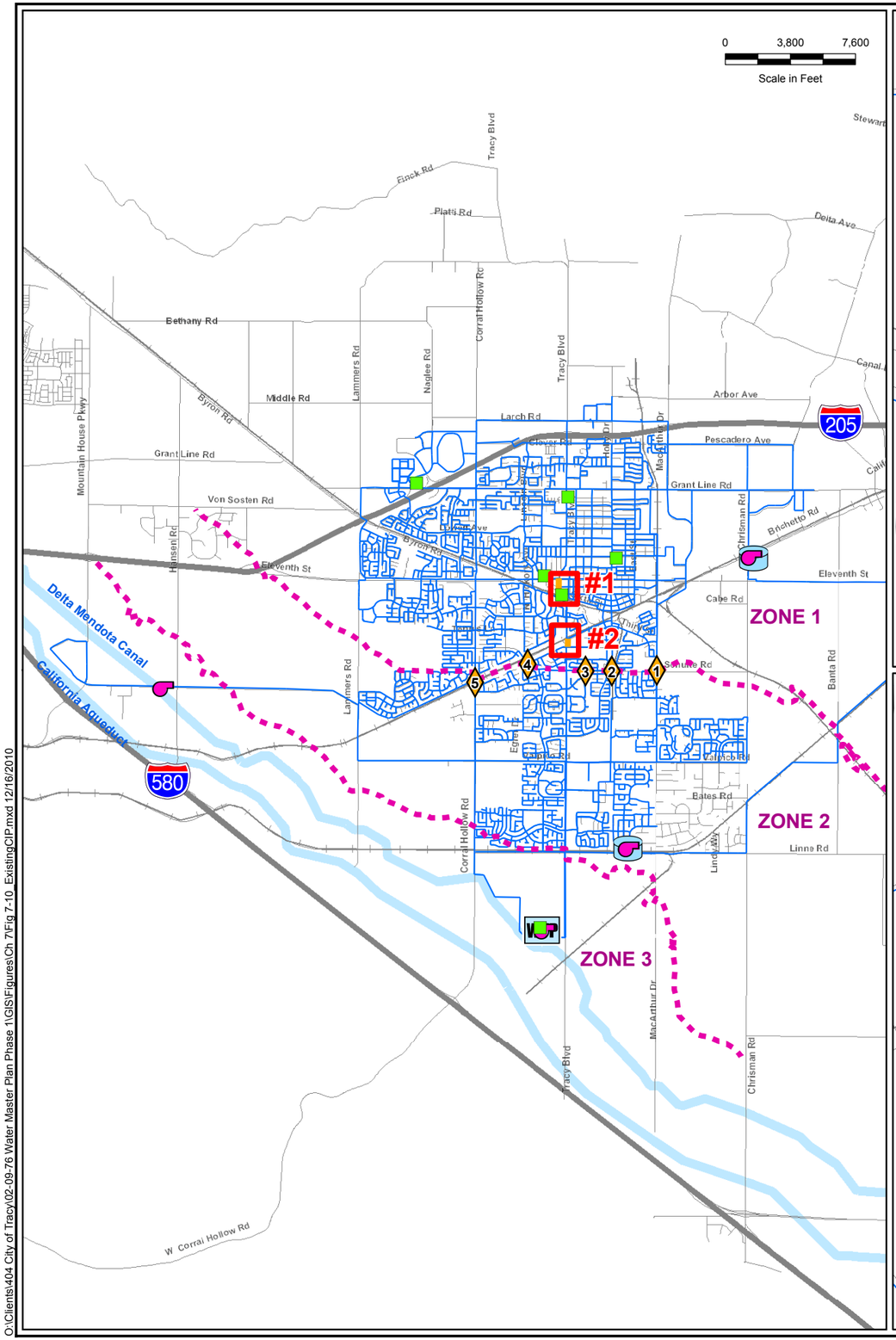
APPENDIX B

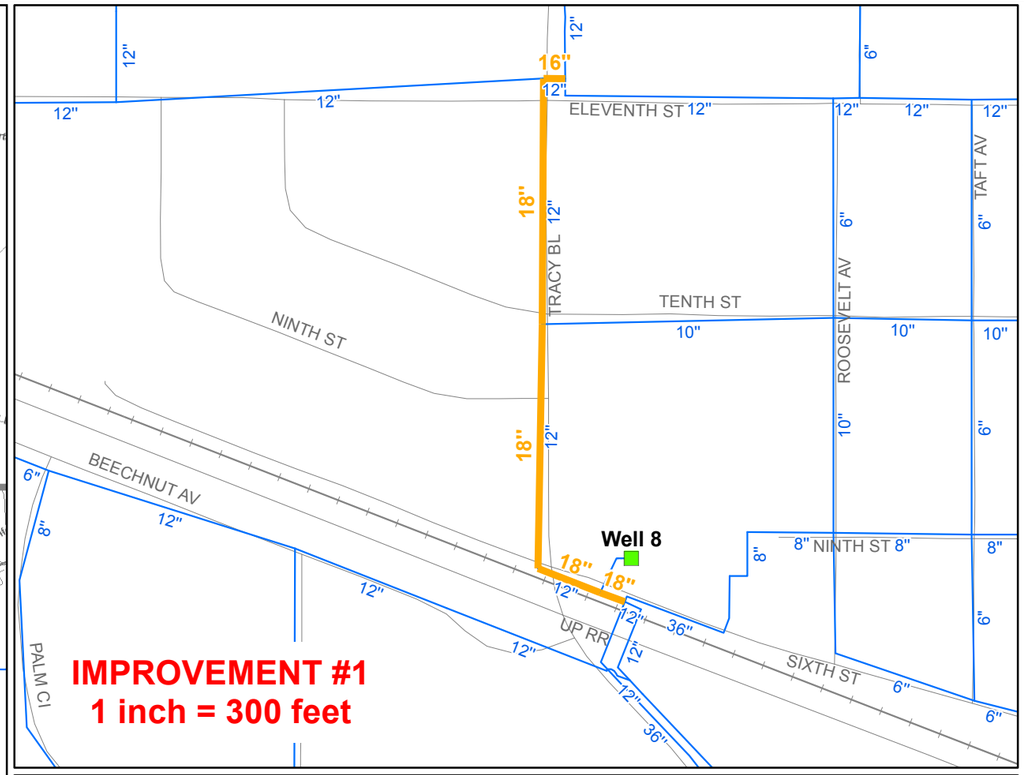
City of Tracy Water System Master Plan
FIGURE 7-10 EXISTING SYSTEM RECOMMENDED IMPROVEMENTS

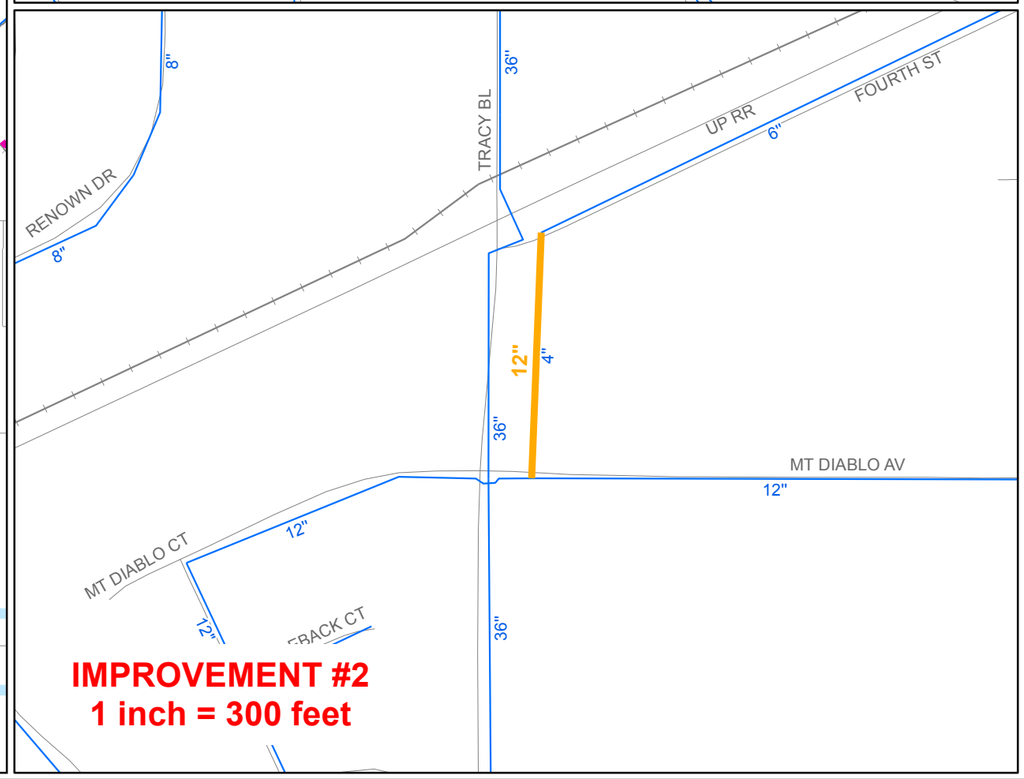
FIGURE 7-10

City of Tracy
Water System Master Plan

EXISTING SYSTEM RECOMMENDED IMPROVEMENTS







NOTE

1. The City's existing hydraulic model is not an all pipes model. Therefore, not all existing pipes are shown.

LEGEND

- Pipeline Improvement
- Storage Tank
- Booster Pump Station
- Groundwater Well
- Pressure Regulating Station
- WTP JJWTP
- Existing Pipeline
- Highway
- Street

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\404 City of Tracy\02-09-76 Water Master Plan Phase 1\GIS\Figures\Ch 7\Fig 7-10_ExistingCIP.mxd 12/16/2010

APPENDIX C

Water Model Data Output and Figures 1-6

Figure 2: Maximum Day Demand with Fire Flow Scenario

Available Fire Flow Report

	ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Available Flow at Hydrant	Available Flow Pressure	Critical Pipe ID	Critical Pipe Velocity
1	J-1-5004	24.40	59.33	163.92	3,500.00	45.26	6,993.46	24.05	P-1-2404	12.00
2	J-1-5002	3.60	59.33	163.94	3,500.00	46.95	8,690.49	20.00	P-1-2394	8.44

Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1	J-1-5002	3,503.60	27.00	135.36	46.95
2	J-1-5004	24.40	27.00	136.48	47.44

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1	J-1-5002	3.60	27.00	136.60	47.49
2	J-1-5004	3,524.40	27.00	131.45	45.26

Pipe Reports

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
1	P-1-2394	J-1-496	J-1-5002	375.21	16.00	130.00	2,211.55	3.53	1.02	2.71	Open
2	P-1-6002	J-1-5002	J-1-1402	559.38	16.00	130.00	-1,292.05	2.06	0.56	1.00	Open
3	P-1-6004	J-1-5004	J-1-728	550.55	12.00	125.00	-290.93	0.83	0.15	0.28	Open
4	P-1-2404	J-1-726	J-1-5004	431.11	12.00	125.00	-266.53	0.76	0.10	0.24	Open

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
1	P-1-2394	J-1-496	J-1-5002	375.21	16.00	130.00	-204.73	0.33	0.01	0.03	Open
2	P-1-2404	J-1-726	J-1-5004	431.11	12.00	125.00	2,145.25	6.09	4.83	11.20	Open
3	P-1-6002	J-1-5002	J-1-1402	559.38	16.00	130.00	-208.33	0.33	0.02	0.03	Open
4	P-1-6004	J-1-5004	J-1-728	550.55	12.00	125.00	-1,379.15	3.91	2.72	4.94	Open

Figure 3: Peak Hour Demand Scenario

Peak Hour Demand Output Data

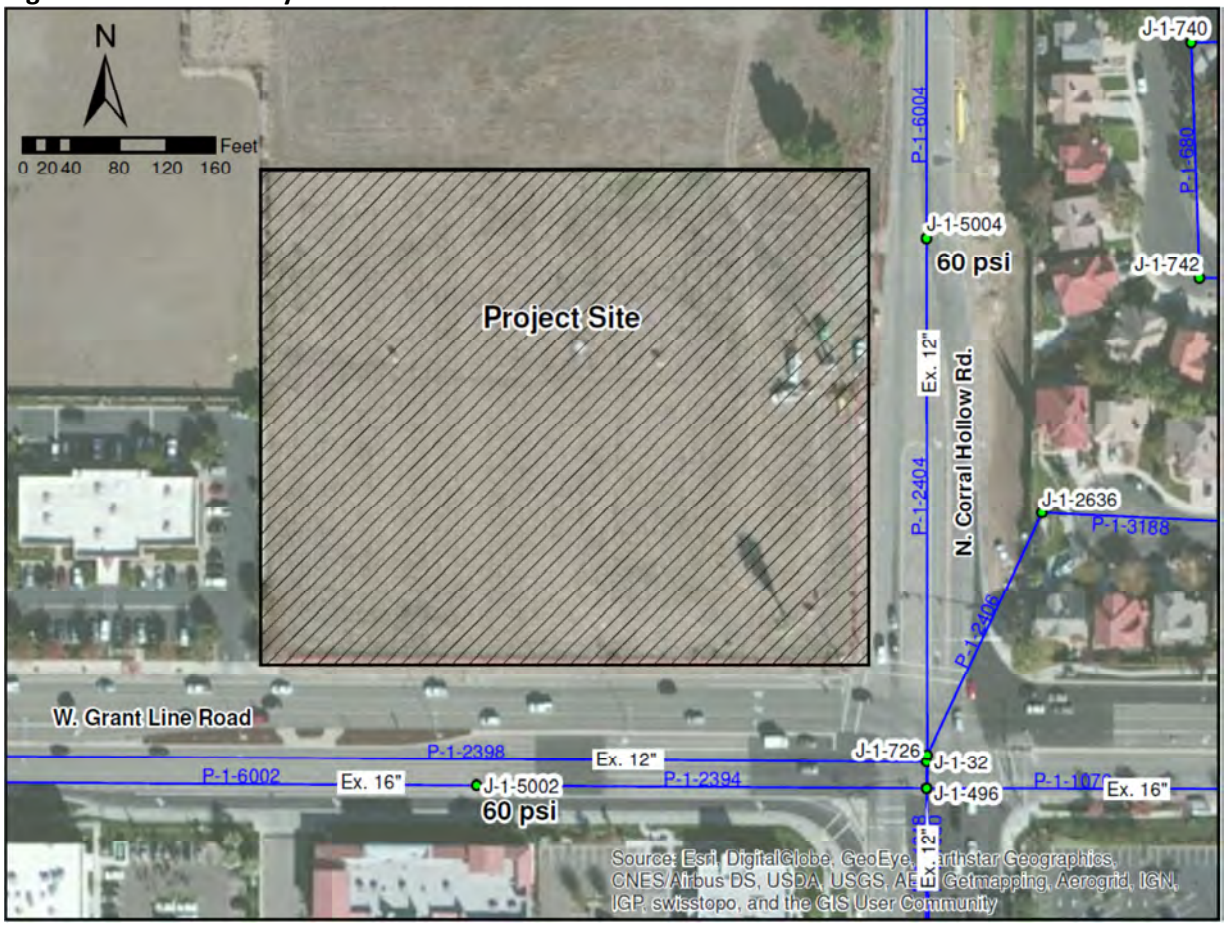
Junction Report

		ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1		J-1-5002	6.12	27.00	174.24	63.80
2		J-1-5004	41.50	27.00	174.24	63.80

Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
1		P-1-2394	J-1-496	J-1-5002	375.21	16.00	130.00	160.46	0.26	0.01	0.02	Open
2		P-1-6002	J-1-5002	J-1-1402	559.38	16.00	130.00	154.34	0.25	0.01	0.02	Open
3		P-1-2404	J-1-726	J-1-5004	431.11	12.00	125.00	38.53	0.11	0.00	0.01	Open
4		P-1-6004	J-1-5004	J-1-728	550.55	12.00	125.00	-2.97	0.01	0.00	0.00	Open

Figure 4: Maximum Day Demand Scenario



Maximum Day Demand Scenario Output Data

Junction Report

		ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1		J-1-5002	3.60	27.00	163.94	59.33
2		J-1-5004	24.40	27.00	163.92	59.33

Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)
1		P-1-2394	J-1-496	J-1-5002	375.21	16.00	130.00	221.69	0.35	0.01	0.04
2		P-1-2404	J-1-726	J-1-5004	431.11	12.00	125.00	123.53	0.35	0.02	0.06
3		P-1-6002	J-1-5002	J-1-1402	559.38	16.00	130.00	218.09	0.35	0.02	0.04
4		P-1-6004	J-1-5004	J-1-728	550.55	12.00	125.00	99.13	0.28	0.02	0.04

Figure 5: Average Day Demand Scenario

Average Day Demand Scenario Output Data

Junction Report

		ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1		J-1-5002	1.80	27.00	189.64	70.47
2		J-1-5004	12.20	27.00	189.63	70.47

Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status	Flow Reversal Count
1		P-1-2404	J-1-726	J-1-5004	431.11	12.00	125.00	87.56	0.25	0.01	0.03	Open	0
2		P-1-6002	J-1-5002	J-1-1402	559.38	16.00	130.00	10.91	0.02	0.00	0.00	Open	0
3		P-1-6004	J-1-5004	J-1-728	550.55	12.00	125.00	75.36	0.21	0.01	0.02	Open	0
4		P-1-2394	J-1-496	J-1-5002	375.21	16.00	130.00	12.71	0.02	0.00	0.00	Open	0