East Area 1 Domestic Water

Technical Report

Santa Paula, CA

Prepared for:

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AND

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April 2007

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Introduction

The proposed East Area 1 project is a mixture of new residential, commercial, retail, open space and public facilities. Situated in Ventura County, the 501-acre East Area 1 project is located directly north of Highway 126 at the eastern edge of the City of Santa Paula. The property is bounded by the foothills of the Topatopa Mountains to the north, Main Street and South Pacific Railroad to the south, Santa Paula Creek to the east, and Haun Creek to the west. Figure 1 shows the regional location of the project site.

FIGURE 1 - REGIONAL LOCATION MAP

Access to the site is provided by Highway 126 at the Hallock Drive intersection. Figure 2 shows the project location.

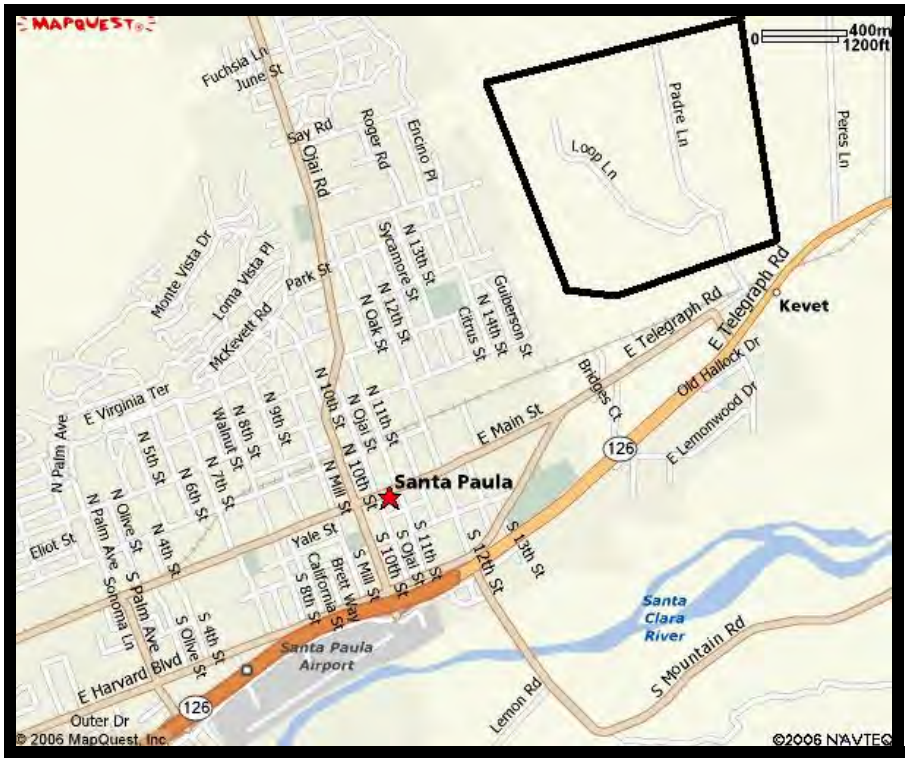

FIGURE 2 – PROJECT LOCATION MAP

Existing Conditions

As the East Area 1 project is fairly remote from the core of the City of Santa Paula and its associated domestic water infrastructure. All of the City's water supply comes from 5 existing wells that pump from the Santa Paula Groundwater Basin that is recharged by Santa Clara River, Santa Paula Creek, and other local streams. This water supply is either treated at the Steckel Conditioning Facility or has the capacity to remove iron and manganese at the well site. As the existing land use at the East Area 1 project site is mainly agricultural in nature, the existing domestic water systems in the project vicinity are sparse. The domestic water facilities that are on site are small diameter pipes. The closest domestic water system is an 6" cast iron pipe, a 12" asbestos cement pipe and a 10" polyvinyl chloride pipe located in Telegraph Road near the intersection with Hallock Drive. These domestic water systems are insufficient to deliver the quantities of water necessary for the East Area 1 development. The City of Santa Paula commissioned a domestic water study for reviewing the City's entire water system, both domestic and recycled. This study, "Potable Water System Master Plan" prepared by Boyle Engineering, was subsequently completed in October 2005. The "Potable Water System Master Plan" identifies East Area 1 as a future expansion area. Once annexed, East Area 1 will be within the City's sphere of influence and anticipates both source and demand from the East Area 1 project as well as other notable projects in and around the City of Santa Paula.

SINGLE ZONE SCENARIO

Objectives

The objective of this study is to provide a blueprint for the design of a single zone scenario domestic water system within the East Area 1 project as well as developing conceptual design parameters for a proposed domestic water storage tank required to service the East Area 1 project. The East Area 1 project will be designed to meet or exceed the City of Santa Paula's domestic water design criterion as established in the "Potable Water System Master Plan". The design guidelines set forth in this report are consistent with those set forth in the City's "Potable Water System Master Plan". However, due to the complexity, uncertainty, and timing of the system wide upgrades and future projects, this study diverges from some of the main concepts in the City's "Potable Water System Master Plan". For instance the entirety of the City-wide domestic water storage, both existing and planned, occurs outside of the EA 1 project. The engineering team, in consultation with the City, for EA 1 felt it prudent to have the EA 1 project be self sufficient in it's storage needs and have incorporated a storage tank in the foothills of the Topatopa mountains north of the EA 1 project. Sizing of this storage facility and related infrastructure is discussed further in this report.

Procedure

The East Area 1 domestic water system was developed utilizing the following 6 basic design steps:

1. Define Design Parameters

   Design parameters for the domestic water system were developed from the City's "Potable Water System Master Plan" as set forth in Chapter 3 – Design Guidelines. The criterion used in this analysis follows those set forth in Table 3-10 found within Chapter 3. The design parameters used for this report are also referenced on Figure 3. Finished grading elevations are based on Figure 3-8 of the Specific Plan. We also assumed 5' depth to water pipe elevation from finished surface.

2. Define Land Use Types and Locations

   Working in conjunction with the land planning team, the land use types within the Specific Plan were placed geographically throughout the site in accordance with the Specific Plan Regulating Plan (see Figure 5-1). A reasonable mix of multi-family homes and single family homes, along with the appropriate commercial, retail, civic,

school, and other Specific Plan uses were spread throughout the site on a block by block basis. During the tentative map stage, a specific water system model will be developed and processed. The modeling included herein will provide for an upper boundary (most conservative) analysis should the ultimate development of EA 1 proceed.

3. Assign Domestic Water Consumption Factors

Based on the aforementioned design parameters, specific domestic water consumption rates were applied to each land use based on type of land use. The domestic water consumption rates for each land use can be seen in Figure 5. The consumption rates were then logically spread out to junctions (nodes) within the domestic water system. See Figure 13 for junction node locations. The overall demands at each junction can be seen in Figure 6.

4. Model Domestic Water System

After each individual junction received a domestic water consumption rate, the resultant water demands were logically linked together in a model. Pipes connecting the various junctions were developed based on potential phasing of the project, demand types and locations, and internal system redundancy. Pipe sizes were iterated between peak hour demand (PHD) modeling and maximum day demand plus fire flow (MDD+F) modeling to achieve consistency of design parameters set forth in this report. The results of these models can be seen in Figure 7 (PHD) and Figures 8-11 (MDD + FF).

5. Prepare Storage Tank Size Estimate

After consumption rates were developed for the entire project, maximum day demands were calculated. From this maximum day value regulatory storage and emergency storage volumes were calculated. Worst case scenario fire flow storage amounts were then calculated. The summation of these three volumes became the storage tank volume. The results of these calculations can be seen in Figure 12. (Parameters set by City's Potable Water System Master Plan (Oct. 2005), pg. 19-20.)

6. Prepare Summary Graphic

After demands were logically linked together in a model a resultant water system graphic was prepared. The results of this model can be seen in Figure 13.

Proposed Domestic Water System

The East Area 1 Specific Plan anticipates a macro phasing of the project as seen in Figure 4-1 of the Specific Plan. Keeping this in mind, and taking into the consideration the proposed grading of the project (Specific Plan, Fig. 3-8), the following layout of the system is proposed:

Project Backbone Facilities – A looped system in the major north-south road (Hallock Drive) and the major east-west road (Central Boulevard) will serve as the internal backbone domestic water system. These domestic water lines are 10" and 12" diameter facilities. Additionally, a ring around the outside of the project's five main phases will complete the project backbone looped system. These domestic water lines are 10" and 12" diameter facilities as well. A quick glance at the Specific Plan's phasing diagram (Figure 4-1) and the proposed water system (Figure 13 herein) shows that the five major phases have been ringed by backbone domestic water facilities, thus creating pods of development that can occur independent of one another.

Project Internal Facilities– Within each of the five major phases are several other domestic water lines. Typically these will be the lines that individual customers will hook up to. The majority of these internal facilities are 8" pipes. A few reaches of internal facilities at the northern end of in the northeast district have been upsized to 12". This is due to the fact that these pipes carry the majority of the flows for all areas. Line losses and velocities eventually upsized these internal lines.

On-site water sources are discussed in the City's Potable Water System Master Plan under Sources of Supply, pg. 81. New wells are proposed and their locations can be seen in the Specific Plan on Fig. 3-3 and Master Plan on Plate 3. This well field diagram is a generalized location of well fields. These well fields are to provide for duty wells and backup well locations. Water supply is then treated at the city's softening plant discussed in Section 11 of the Master Plan, pg. 131. The proposed domestic water system for East Area 1 can be seen in Figure 13, herein.

Proposed Domestic Water Storage Tank

A new domestic water tank is proposed to service East Area 1. This tank has been preliminarily sized with parameters set by the 'Potable Water System Master Plan' (Boyle, Oct. 2005) and the demands shown herein on Figure 5. Tank sizing calculation can be found herein on Figure 12. A preliminary design of the tank was determined by the maximum daily demand and parameter's set by Master Plan, pg. 19-20. It also determined to bury the tank at our proposed elevation of 555', so a reinforced concrete tank will be needed. Connectivity to the City's existing 400 zone will be required to provide redundancy when tank is down for maintenance. Design specifications will be determined at a later date.

Conclusions

Based on the modeling prepared by Huitt-Zollars the East Area 1 domestic water system depicted in Figure 13 is in accordance with City of Santa Paula design guidelines. Pressures and line losses fall within acceptable ranges. A summary of maximum and minimum pressures, line losses, and velocities can be seen in the following table. Further, the East Area 1 domestic water system has been designed to be a "stand alone" project, independent of the City's current and planned storage system.

MODELING SUMMARY

EA1 DW Technical Report

SCENARIO	Max. Pressure (psi)	Min. Pressure (psi)	Max. Line Loss (ft/K ft)	Max. Velocity (fps)
PHD (Fig 7)	116.74	53.79	2.35	2.72
MDD + FF (Fig 8) (1)	105.26	50.45	24.96	9.36
MDD + FF (Fig 9) (2)	116.61	52.98	3.98	3.62
MDD + FF (Fig 10) (1)	104.85	50.46	23.20	9.38
MDD + FF (Fig 11) (2)	115.27	53.33	15.24	6.15

(1) Community College or School Fire Flow – 4,500 gpm

(2) Residential Fire Flow – 1,500 gpm

A comparison of City's Potable Water System Master Plan and EA1 Specific Plan can be seen below:

PROJECT COMPARISON

City PWSMP EA 1 Project vs. Specific Plan Project

	SF RESIDENTIAL	MF RESIDENTIAL	COMMERCIAL	SCHOOL	GOLF COURSE
City PWSMP EA 1 Project (1)	742 DU	158 DU	0 SF	10 AC	163.5 AC
Specific Plan EA 1 Project (2)	607 DU	893 DU	435,000 SF(3)	22.4 AC(4)	0 AC
DIFFERENCE	***- 135 DU***	***+735 DU***	***+435,00 SF***	***+12.4 AC***	***-163.5 AC***

(1) From City of Santa Paula "Potable Water System Master Plan", Table 5-7

(2) From East Area 1 Specific Plan, Table 2-1

(3) Including Light Industrial/Employ. SF

(4) Including Community College AC

References

- Boyle Engineering Corporation, September 2005, "City of Santa Paula Wastewater System Master Plan"
- HDR Town Planning, revision date to be determined, "East Area 1 Specific Plan, Santa Paula, California"

List of Preparers

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FIGURE 3

EAST AREA 1

SUMMARY OF DOMESTIC WATER DESIGN CRITERIA

ITEM	TYPE/SIZE	QUANTITY
Average Domestic Water Consumption Rates		
Attached Product	3.75 Persons/DU 163 gpd/person	610 gpd/DU
Detached Product	3.5 Persons/DU 163 gpd/person	570 gpd/DU
Park	Assumed Negligible for DW services. Irrigation assumed to be RW	n/a
Athletic Fields	Assumed In Associated School Buildings	n/a
Elementary School	20gal/Day/Student 600 Students	12,000 gal/Day
Community College		1.8 AC-FT/YR per ACRE
Civic Uses		15g/SF/Year
Demand Cases		
Studied Cases include the following two design scenarions: PHD & MDD+FF		
Maximum Day Demand (MDD)	MDD = 1.5 X Average Day Demand	
Peak Hour Demand (PHD)	PHD = 1.8 X Average Day Demand	
Fire Flow (FF)	Residential Assumed at 1,500 gpm, 2 hours total duration Commercial assumed at 4,500 gpm, 4 hour duration	
Pipeline Design Parameters		
Minimum Pressure = 60 PSI @ PHD Minimum Pressure = 20 PSI for MDD+FF Maximum Pressure = 150 PSI in main lines Maximum Pressure = 80 PSI at residential structures Maximum Velocity = ±5 fps Maximum Velocity = ±15 fps durring fire flow conditions Maximum Head Loss = 5ft per 1,000 ft of pipe Minimum Pipe Size = 8" Hazen-Williams Coefficient = 120 (6" - 10" pipes) Hazen-Williams Coefficient = 130 (12" and larger pipes)		NOTE: It may be necessary to have PRV's at lower elevation (higher pressure) structures
Storage Tank Design Parameters		
Total Storage	Regulatory Storage + Fire Storage + Emergency Storage	
Regulatory Storage	14 hours at 1.5 x MDD and 10 hours at 03. x MDD	
Fire Storage	4 hours at 4,500 gpm	
Emergency Storage	MDD X 8 Hours	

Figure 4

East Area 1 - Proposed Regulating Plan

Santa Paula, California

04-13-07

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FIGURE 5
EAST AREA 1
SUMMARY OF ULTIMATE DOMESTIC WATER LAND USES AND DEMANDS

PROPOSED LAND USE	DETACHED PRODUCT	DU	ATTACHED PRODUCT	DU	ACRES	KSF	AVERAGE DAILY DEMAND [GPM]	MAXIMUM DAILY DEMAND [GPM]	PEAK HOUR DEMAND [GPM]
PLANNING AREA A - SANTA PAULA CREEK NEIGHBORHOOD									
RESIDENTIAL: NE, NG1-3					33.1				
A1	3.5 Persons/DU 163 gpd/person 570 gpd/DU	9	3.75 Persons/DU 163 gpd/person 610 gpd/DU	0			3.6	5.3	9.6
A2	3.5 Persons/DU 163 gpd/person 570 gpd/DU	23	3.75 Persons/DU 163 gpd/person 610 gpd/DU	5			11.2	16.8	30.3
A3	3.5 Persons/DU 163 gpd/person 570 gpd/DU	11	3.75 Persons/DU 163 gpd/person 610 gpd/DU	9			8.2	12.3	22.1
A4	3.5 Persons/DU 163 gpd/person 570 gpd/DU	12	3.75 Persons/DU 163 gpd/person 610 gpd/DU	5			6.9	10.3	18.5
A5	3.5 Persons/DU 163 gpd/person 570 gpd/DU	9	3.75 Persons/DU 163 gpd/person 610 gpd/DU	16			10.3	15.5	27.9
A6	3.5 Persons/DU 163 gpd/person 570 gpd/DU	15	3.75 Persons/DU 163 gpd/person 610 gpd/DU	17			13.1	19.7	35.5
A7	3.5 Persons/DU 163 gpd/person 570 gpd/DU	12	3.75 Persons/DU 163 gpd/person 610 gpd/DU	16			11.5	17.3	31.1
A8	3.5 Persons/DU 163 gpd/person 570 gpd/DU	21	3.75 Persons/DU 163 gpd/person 610 gpd/DU	6			10.9	16.3	29.3
A9	3.5 Persons/DU 163 gpd/person 570 gpd/DU	17	3.75 Persons/DU 163 gpd/person 610 gpd/DU	4			8.4	12.6	22.7
A10	3.5 Persons/DU 163 gpd/person 570 gpd/DU	8	3.75 Persons/DU 163 gpd/person 610 gpd/DU	10			7.4	11.1	20.0
A11	3.5 Persons/DU 163 gpd/person 570 gpd/DU	17	3.75 Persons/DU 163 gpd/person 610 gpd/DU	14			12.7	19.0	34.2
A12	3.5 Persons/DU 163 gpd/person 570 gpd/DU	12	3.75 Persons/DU 163 gpd/person 610 gpd/DU	18			12.4	18.6	33.4
A13	3.5 Persons/DU 163 gpd/person 570 gpd/DU	26	3.75 Persons/DU 163 gpd/person 610 gpd/DU	14			16.2	24.3	43.8
SUBTOTAL		**192**		**134**	**33.1**		**132.8**	**199.1**	**358.5**

PROPOSED LAND USE	CONSUMPTION RATE		ACRES	KSF	AVERAGE DAILY FLOW [GPM]	PEAK DAILY FLOW [GPM]	PEAK HOUR DEMAND [GPM]
OPEN SPACE: AGRICULTURAL PRESERVE	0 [1]		14.3				
OPEN SPACE: PARK	0 [1]		5.1				
OPEN SPACE: ROADS, MEDIANS	0 [1]		21.4				
SUBTOTAL		**0**	**40.8**	**0**			
TOTAL		**326**	**73.9**				

FIGURE 5
EAST AREA 1
SUMMARY OF ULTIMATE DOMESTIC WATER LAND USES AND DEMANDS

PROPOSED LAND USE	DETACHED PRODUCT	DU	ATTACHED PRODUCT	DU	ACRES	KSF	AVERAGE DAILY DEMAND [GPM]	MAXIMUM DAILY DEMAND [GPM]	PEAK HOUR DEMAND [GPM]
PLANNING AREA B - FOOTHILL NEIGHBORHOOD									
RESIDENTIAL: NE, NG1-2					66.4				
B1	3.5 Persons/DU 163 gpd/person 570 gpd/DU	20	3.75 Persons/DU 163 gpd/person 610 gpd/DU	0			7.9	11.9	21.4
B2	3.5 Persons/DU 163 gpd/person 570 gpd/DU	19	3.75 Persons/DU 163 gpd/person 610 gpd/DU	0			7.5	11.3	20.3
B3	3.5 Persons/DU 163 gpd/person 570 gpd/DU	11	3.75 Persons/DU 163 gpd/person 610 gpd/DU	0			4.4	6.5	11.8
B4	3.5 Persons/DU 163 gpd/person 570 gpd/DU	21	3.75 Persons/DU 163 gpd/person 610 gpd/DU	0			8.3	12.5	22.4
B5	3.5 Persons/DU 163 gpd/person 570 gpd/DU	29	3.75 Persons/DU 163 gpd/person 610 gpd/DU	0			11.5	17.2	31.0
B6	3.5 Persons/DU 163 gpd/person 570 gpd/DU	29	3.75 Persons/DU 163 gpd/person 610 gpd/DU	0			11.5	17.2	31.0
B7	3.5 Persons/DU 163 gpd/person 570 gpd/DU	25	3.75 Persons/DU 163 gpd/person 610 gpd/DU	4			11.6	17.4	31.3
B8	3.5 Persons/DU 163 gpd/person 570 gpd/DU	13	3.75 Persons/DU 163 gpd/person 610 gpd/DU	4			6.8	10.3	18.5
B9	3.5 Persons/DU 163 gpd/person 570 gpd/DU	17	3.75 Persons/DU 163 gpd/person 610 gpd/DU	1			7.2	10.7	19.3
B10	3.5 Persons/DU 163 gpd/person 570 gpd/DU	12	3.75 Persons/DU 163 gpd/person 610 gpd/DU	1			5.2	7.8	14.0
B11	3.5 Persons/DU 163 gpd/person 570 gpd/DU	15	3.75 Persons/DU 163 gpd/person 610 gpd/DU	3			7.2	10.8	19.5
B12	3.5 Persons/DU 163 gpd/person 570 gpd/DU	14	3.75 Persons/DU 163 gpd/person 610 gpd/DU	3			6.8	10.2	18.4
B13	3.5 Persons/DU 163 gpd/person 570 gpd/DU	19	3.75 Persons/DU 163 gpd/person 610 gpd/DU	2			8.4	12.6	22.6
B14	3.5 Persons/DU 163 gpd/person 570 gpd/DU	19	3.75 Persons/DU 163 gpd/person 610 gpd/DU	5			9.6	14.5	26.0
B15	3.5 Persons/DU 163 gpd/person 570 gpd/DU	20	3.75 Persons/DU 163 gpd/person 610 gpd/DU	6			10.5	15.7	28.2
B16	3.5 Persons/DU 163 gpd/person 570 gpd/DU	16	3.75 Persons/DU 163 gpd/person 610 gpd/DU	5			8.5	12.7	22.8
B17	3.5 Persons/DU 163 gpd/person 570 gpd/DU	20	3.75 Persons/DU 163 gpd/person 610 gpd/DU	6			10.5	15.7	28.2
SUBTOTAL		**319**		**40**	**66.4**		**143.2**	**214.8**	**386.7**

PROPOSED LAND USE	CONSUMPTION RATE		ACRES	KSF	AVERAGE DAILY FLOW [GPM]	PEAK DAILY FLOW [GPM]	PEAK HOUR DEMAND [GPM]
OPEN SPACE: AGRICULTURAL PRESERVE	0 [1]		120.1				
OPEN SPACE: PARKS, GREENWAYS	0 [1]		11.4				
OPEN SPACE: ROADS, MEDIANS	0 [1]		26.0				
SUBTOTAL		**0**	**157.5**	**0**			
TOTAL		**359**	**223.9**				

FIGURE 5
EAST AREA 1
SUMMARY OF ULTIMATE DOMESTIC WATER LAND USES AND DEMANDS

PROPOSED LAND USE	CONSUMPTION RATE		ACRES	KSF	AVERAGE DAILY FLOW [GPM]	PEAK DAILY FLOW [GPM]	PEAK HOUR DEMAND [GPM]
PLANNING AREA C - SANTA PAULA CREEK CIVIC DISTRICT							
OPEN SPACE: SHARED FIELDS & PARKS							
C1							
Park	0 [1]		8.0		0.0	0.0	0.0
Athletic Fields	0 [1]		15.3		0.0	0.0	0.0
C2							
Park	0 [1]		4.0		0.0	0.0	0.0
Athletic Fields	0 [1]		7.9		0.3	0.5	0.0
CIVIC: SCHOOL							
C3							
High School	1.8 AC-FT/YR/AC		8.3	110.4	9.3	13.9	0.0
CIVIC: SHARED FACILITIES							
C4							
Civic Facilities	15 gal/SF/YR		5.6	65.0	1.9	2.8	0.0
CIVIC: COMMUNITY COLLEGE							
C5							
Community College	1.8 AC-FT/YR/AC		11.6	165.0	12.9	19.4	0.0
OPEN SPACE: ROADS, MEDIANS, ETC.	0 [1]		13.1				
SUBTOTAL		**0**	**73.8**	**340.4**	**24.4**	**36.6**	**0.1**
TOTAL		**0**	**73.8**	**340.4**			

FIGURE 5
EAST AREA 1
SUMMARY OF ULTIMATE DOMESTIC WATER LAND USES AND DEMANDS

PROPOSED LAND USE	DETACHED PRODUCT	DU	ATTACHED PRODUCT	DU	ACRES	KSF	AVERAGE DAILY DEMAND [GPM]	MAXIMUM DAILY DEMAND [GPM]	PEAK HOUR DEMAND [GPM]
PLANNING AREA D - HAUN CREEK NEIGHBORHOOD									
RESIDENTIAL: NC1, NG2-3					28.0				
D1	3.5 Persons/DU 163 gpd/person 300 gpd/DU	3	3.75 Persons/DU 163 gpd/person 320 gpd/DU	83			19.1	28.6	51.5
D2	3.5 Persons/DU 163 gpd/person 300 gpd/DU	0	3.75 Persons/DU 163 gpd/person 610 gpd/DU	95			40.2	60.4	108.7
D4	3.5 Persons/DU 163 gpd/person 301 gpd/DU	3	3.75 Persons/DU 163 gpd/person 610 gpd/DU	164			70.1	105.1	189.3
D5	3.5 Persons/DU 163 gpd/person 302 gpd/DU	3	3.75 Persons/DU 163 gpd/person 610 gpd/DU	125			53.6	80.4	144.7
D6	3.5 Persons/DU 163 gpd/person 303 gpd/DU	3	3.75 Persons/DU 163 gpd/person 610 gpd/DU	60			26.0	39.1	70.3
D7	3.5 Persons/DU 163 gpd/person 304 gpd/DU	6	3.75 Persons/DU 163 gpd/person 610 gpd/DU	37			16.9	25.4	45.7
D8	3.5 Persons/DU 163 gpd/person 305 gpd/DU	6	3.75 Persons/DU 163 gpd/person 610 gpd/DU	37			16.9	25.4	45.8
D9	3.5 Persons/DU 163 gpd/person 306 gpd/DU	14	3.75 Persons/DU 163 gpd/person 610 gpd/DU	18			10.6	15.9	28.6
D10	3.5 Persons/DU 163 gpd/person 307 gpd/DU	14	3.75 Persons/DU 163 gpd/person 610 gpd/DU	18			10.6	15.9	28.6
D11	3.5 Persons/DU 163 gpd/person 308 gpd/DU	20	3.75 Persons/DU 163 gpd/person 610 gpd/DU	7			7.2	10.9	19.6
D12	3.5 Persons/DU 163 gpd/person 309 gpd/DU	21	3.75 Persons/DU 163 gpd/person 610 gpd/DU	8			7.9	11.8	21.3
SUBTOTAL		**93**		**652**	**28.0**		**279.3**	**418.9**	**754.0**

PROPOSED LAND USE	CONSUMPTION RATE		ACRES	KSF	AVERAGE DAILY FLOW [GPM]	PEAK DAILY FLOW [GPM]	PEAK HOUR DEMAND [GPM]
CIVIC: SCHOOL							
D3							
School	20gpd/student, 600 students [3]		10.8	35.4	1.0	1.5	2.7
COMMERCIAL: OFFICE/RETAIL & ASSIST. LIV.							
D4						0.0	
Commercial/Civic	15 gal/SF/YR		5.0	75.0	2.1	3.2	5.8
D5						0.0	0.0
Commercial/Civic	15 gal/SF/YR		3.0	75.0	2.1	3.2	5.8
D6						0.0	
Commercial/Civic	15 gal/SF/YR		5.0	75.0	2.1	3.2	5.8
OPEN SPACE: PARK, GREENWAYS	0 [1]		37.3				
OPEN SPACE: ROADS, MEDIANS	0 [1]		21.0				
SUBTOTAL		**0**	**82.1**	**260.40**	**7.4**	**11.1**	**20.1**
TOTAL		**745**	**110.1**				

FIGURE 5
EAST AREA 1
SUMMARY OF ULTIMATE DOMESTIC WATER LAND USES AND DEMANDS

PROPOSED LAND USE	CONSUMPTION RATE		ACRES	KSF	AVERAGE DAILY FLOW [GPM]	PEAK DAILY FLOW [GPM]	PEAK HOUR DEMAND [GPM]
PLANNING AREA E - EAST SANTA PAULA RAILROAD DISTRICT							
WORK-LIGHT INDUSTRIAL/EMPLOY.							
E1							
WORK-LIGHT INDUSTRIAL/EMPLOY.	41.1gpd/KSF [2]		7.3	150.0	4.3	6.4	11.6
COMMERCIAL: OFFICE/RETAIL							
E1							
Commercial: Office/Retail	41.1gpd/KSF [2]		2.4	60.0	1.7	2.6	4.6
OPEN SPACE-ROADS, MEDIANS	0 [1]		2.4				
SUBTOTAL			**12.1**	**210**	**6.0**	**9.0**	**16.2**

PROPOSED LAND USE	DETACHED PRODUCT	DU	ATTACHED PRODUCT	DU	ACRES	KSF	AVERAGE DAILY DEMAND [GPM]	MAXIMUM DAILY DEMAND [GPM]	PEAK HOUR DEMAND [GPM]
WORK/LIVE									
E1									
Residential	3.5 Persons/DU 85 gpd/person 313 gpd/DU	0	3.75 Persons/DU 85 gpd/person 320 gpd/DU	70	7.3		15.6	23.3	42.0
SUBTOTAL		**0**		**70**	**7.3**	**0**	**15.6**	**23.3**	**42.0**
TOTAL				**70**	**19.4**				
GRAND TOTAL				**1500**	**501.1**	**810.8**	**570.8**	**856.2**	**1577.5**

NOTES

[1] Assumed parks are negligible water comsumption

[2] Commercial rate of 41.1gpd/ac derived from Table 3-2 of City of Santa Paula Wastewater Master Plan for Commercial line items in East Area 1 and West Area 2

[3] School generation rate of 20gpd/student derived from RiverPark Sewer study

FIGURE 6
EAST AREA 1
SUMMARY OF DOMESTIC WATER DEMANDS BY NODES
SINGLE ZONE

JUNCTION NO.	AVG. DAY DEMAND (GPM)	MAX. DAY DEMAND (GPM)	PEAK HOUR DEMAND (GPM)
J-14	4.06	6.09	10.95
J-16	8.13	12.20	21.96
J-18	4.37	6.56	11.81
J-20	6.35	9.53	17.15
J-22	6.06	9.08	16.35
J-24	9.77	14.66	26.39
J-26	7.34	11.01	19.83
J-28	5.05	7.57	13.63
J-30	4.66	6.99	12.58
J-32	3.50	5.25	9.45
J-34	8.11	12.17	21.90
J-36	3.10	4.64	8.36
J-38	6.17	9.26	16.66
J-40	7.29	10.94	19.69
J-42	3.88	5.82	10.48
J-44	4.71	7.06	12.71
J-46	8.52	12.78	23.01
J-48	8.23	12.35	22.23
J-50	8.12	12.18	21.92
J-52	5.68	8.52	15.34
J-54	2.41	3.61	6.51
J-56	11.23	16.85	30.33
J-58	3.80	5.69	10.25
J-60	4.98	7.47	13.45
J-64	4.73	7.09	12.76
J-66	2.61	3.92	7.06
J-72	1.81	2.72	4.89
J-74	4.46	6.69	12.04
J-76	7.09	10.63	19.14
J-78	18.25	27.38	49.29
J-80	18.26	27.39	49.31
J-82	19.42	29.13	52.43
J-84	4.77	7.15	12.87
J-86	14.45	21.67	39.01
J-88	18.68	28.02	50.44
J-90	4.24	6.35	11.43
J-92	5.30	7.95	14.32
J-94	5.30	7.95	14.32
J-96	3.78	5.68	10.22
J-106	4.24	6.35	11.44
J-108	18.17	27.25	49.05

FIGURE 6
EAST AREA 1
SUMMARY OF DOMESTIC WATER DEMANDS BY NODES
SINGLE ZONE

JUNCTION NO.	AVG. DAY DEMAND (GPM)	MAX. DAY DEMAND (GPM)	PEAK HOUR DEMAND (GPM)
J-110	13.93	20.90	37.61
J-112	31.04	46.56	83.80
J-114	25.21	37.82	68.08
J-116	6.89	10.33	18.60
J-184	3.56	5.34	9.62
J-186	2.81	4.21	7.58
J-188	5.52	8.28	14.90
J-192	4.82	7.23	13.01
J-194	6.16	9.24	16.64
J-196	8.01	12.02	21.63
J-198	9.55	14.33	25.79
J-204	5.60	8.39	15.11
J-208	4.85	7.27	13.09
J-210	2.04	3.06	5.51
J-212	4.73	7.10	12.78
J-214	8.30	12.45	22.41
J-216	3.09	4.64	8.35
J-218	3.09	4.64	8.35
J-220	7.15	10.72	19.30
J-222	6.26	9.39	16.90
J-224	5.87	8.80	15.85
J-226	4.30	6.45	11.62
J-228	7.04	10.57	19.02
J-230	3.76	5.64	10.15
J-232	4.30	6.45	11.62
J-234	2.59	3.88	6.98
J-236	0.08	0.12	0.00
J-238	0.08	0.12	0.00
J-240	2.78	4.17	0.01
J-242	2.78	4.17	0.01
J-244	4.77	7.15	12.87
J-246	13.76	20.64	27.17
J-248	3.70	5.55	0.01
J-250	5.47	8.20	14.55
J-252	8.71	13.06	14.55
J-254	13.30	19.95	27.17
J-256	17.11	25.66	46.19
J-260	0.00	0.00	0.00
J-266	6.45	9.67	17.41
J-270	5.69	8.53	15.36
J-272	3.16	4.75	8.55
J-274	4.63	6.94	12.49
J-276	1.97	2.96	5.33

FIGURE 7
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
PEAK HOUR CASE STUDY
SINGLE ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J14	**53.79**	450.00	10.95
J16	60.23	435.00	21.96
J18	69.18	414.00	11.81
J20	71.76	408.00	17.15
J22	64.29	425.00	16.35
J24	75.50	399.00	26.39
J26	64.48	424.50	19.83
J28	72.89	405.00	13.63
J30	79.37	390.00	12.58
J32	78.08	393.00	9.45
J34	84.10	379.00	21.90
J36	79.33	390.00	8.36
J38	80.69	387.00	16.66
J40	87.14	372.00	19.69
J42	88.44	369.00	10.48
J44	97.53	348.00	12.71
J46	96.20	351.00	23.01
J48	93.15	358.00	22.23
J50	91.20	362.50	21.92
J52	89.69	366.00	15.34
J54	95.65	352.00	6.51
J56	98.21	346.00	30.33
J58	95.90	351.50	10.25
J60	97.86	347.00	13.45
J64	100.96	340.00	12.76
J66	102.28	337.00	7.06
J72	106.37	327.00	4.89
J74	108.54	322.00	12.04
J76	105.09	330.00	19.14
J78	106.81	326.00	49.29
J80	108.11	323.00	49.31
J82	105.51	329.00	52.43
J84	107.00	325.50	12.87
J86	107.42	324.50	39.01
J88	111.11	316.00	50.44
J90	111.54	315.00	11.43
J92	111.97	314.00	14.32
J94	112.63	312.50	14.32
J96	110.26	318.00	10.22
J106	112.19	313.50	11.44
J108	111.53	315.00	49.05
J110	107.85	323.50	37.61
J112	111.10	316.00	83.80
J114	113.91	309.50	68.08
J116	**116.73**	303.00	18.60
J184	75.78	397.50	9.62
J186	82.93	381.00	7.58
J188	84.66	377.00	14.90
J192	89.23	366.50	13.01
J194	92.29	359.50	16.64
J196	95.73	351.50	21.63
J198	91.82	360.50	25.79

FIGURE 7
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
PEAK HOUR CASE STUDY
SINGLE ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J204	87.70	370.00	15.11
J208	89.43	366.00	13.09
J210	91.60	361.00	5.51
J212	92.90	358.00	12.78
J214	94.63	354.00	22.41
J216	97.03	348.50	8.35
J218	98.11	346.00	8.35
J220	100.73	340.00	19.30
J222	99.41	343.00	16.90
J224	98.10	346.00	15.85
J226	95.50	352.00	11.62
J228	93.11	357.50	19.02
J230	91.60	361.00	10.15
J232	93.98	355.50	11.62
J234	97.23	348.00	6.98
J236	108.06	323.00	0.00
J238	109.36	320.00	0.00
J240	105.04	330.00	0.00
J242	103.96	332.50	0.00
J244	105.47	329.00	12.87
J246	107.63	324.00	27.17
J248	109.80	319.00	0.00
J250	106.98	325.50	14.55
J252	111.74	314.50	14.55
J254	113.91	309.50	27.17
J256	116.29	304.00	46.19
J260	64.61	425.50	0.00
J266	98.75	344.50	17.41
J270	90.77	362.90	15.36
J272	95.73	351.50	8.55
J274	114.92	307.20	12.49
J276	114.15	309.00	5.33
J278	109.83	319.00	10.22
J280	116.34	303.90	19.03

MAX / MIN VALUE

FIGURE 7
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
PEAK HOUR CASE STUDY
SIGNLE ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P13	12	469.00	1.70	0.98	598.54	J260	J14
P15	12	456.97	1.50	0.77	527.05	J16	J18
P17	12	637.47	0.37	0.06	130.65	J18	J20
P19	12	561.41	1.67	0.95	-587.59	J20	J14
P21	12	1282.72	1.16	0.49	410.63	J16	J22
P25	12	925.73	1.09	0.43	-384.59	J24	J18
P27	12	166.70	1.12	0.45	394.28	J22	J26
P29	12	363.72	0.61	0.14	213.35	J26	J24
P33	12	650.46	0.42	0.07	147.46	J28	J30
P35	12	564.77	0.26	0.03	-92.27	J30	J32
P37	12	429.17	0.56	0.13	-197.35	J32	J24
P39	8	583.73	0.13	0.02	21.11	J34	J36
P41	8	529.63	0.62	0.28	-97.18	J36	J38
P43	12	384.24	0.64	0.16	227.16	J30	J42
P45	8	671.75	0.19	0.03	29.76	J42	J40
P47	8	521.61	0.12	0.01	18.99	J40	J34
P49	8	368.79	0.61	0.27	95.63	J32	J40
P51	12	395.02	1.06	0.41	374.20	J24	J34
P53	12	293.06	1.99	1.31	701.09	J20	J38
P55	12	261.82	1.67	0.95	587.25	J38	J52
P57	12	290.59	1.56	0.83	548.87	J52	J54
P59	8	417.32	0.15	0.02	23.04	J52	J50
P61	8	558.37	0.11	0.01	-17.41	J50	J48
P63	8	528.28	0.34	0.09	-52.66	J48	J46
P65	8	652.48	0.30	0.08	-47.64	J46	J44
P67	8	300.00	0.55	0.23	86.71	J40	J46
P69	12	357.68	0.53	0.11	-186.92	J44	J42
P71	12	301.45	0.99	0.36	-350.18	J48	J34
P73	12	265.14	0.98	0.35	344.49	J54	J56
P75	10	580.82	0.76	0.32	-186.77	J56	J58
P77	10	542.26	0.28	0.05	-68.55	J58	J60
P79	12	313.00	1.03	0.39	-363.19	J60	J48
P85	10	431.02	0.49	0.14	-119.51	J64	J66
P95	12	585.11	0.25	0.03	87.05	J74	J72
P97	12	280.01	0.47	0.09	-166.62	J74	J76
P99	12	290.02	0.51	0.10	178.03	J76	J78
P101	12	575.00	1.27	0.57	-446.62	J76	J60
P103	12	386.49	0.16	0.01	56.82	J78	J80
P105	12	248.99	0.02	0.00	7.51	J80	J82
P107	12	311.98	0.69	0.18	242.93	J82	J84
P109	12	154.71	0.56	0.13	197.79	J84	J86
P111	8	456.95	0.05	0.00	8.34	J86	J88
P113	8	290.00	0.14	0.02	-21.85	J88	J90
P115	8	45.00	0.32	0.08	49.55	J90	J92
P117	8	280.01	0.22	0.04	-33.74	J92	J94

FIGURE 7
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
PEAK HOUR CASE STUDY
SIGNLE ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P119	8	280.00	0.40	0.12	-62.29	J94	J96
P121	8	280.00	0.43	0.14	-67.54	J96	J74
P127	8	313.00	0.37	0.11	-58.68	J64	J46
P129	12	430.17	0.36	0.06	-126.57	J66	J44
P143	8	69.00	0.44	0.15	-68.97	J106	J92
P145	8	290.00	0.06	0.00	9.85	J106	J108
P147	8	114.00	0.33	0.09	-51.67	J108	J88
P149	8	515.00	0.46	0.16	-71.92	J88	J78
P151	8	515.00	0.53	0.21	-82.83	J90	J76
P153	8	445.25	0.09	0.01	-13.57	J108	J110
P155	12	491.01	0.28	0.04	99.26	J110	J112
P157	12	452.02	0.09	0.00	-31.37	J112	J114
P159	8	491.01	0.17	0.02	-26.03	J114	J108
P161	12	286.89	0.26	0.03	-92.45	J114	J116
P171	10	651.45	0.04	0.00	-9.62	J184	J186
P173	10	199.72	0.10	0.01	-23.32	J186	J188
P181	10	622.29	0.41	0.10	-99.18	J192	J194
P183	8	334.30	0.52	0.21	82.05	J194	J196
P185	8	483.16	0.20	0.04	31.95	J196	J198
P187	8	338.37	0.30	0.07	-46.95	J198	J192
P197	8	408.05	0.01	0.00	-1.00	J204	J188
P203	8	280.00	0.05	0.00	-7.15	J208	J270
P207	8	283.75	0.15	0.02	-23.84	J210	J212
P209	8	248.55	0.18	0.03	-28.86	J212	J198
P211	8	261.32	0.05	0.00	-7.76	J212	J214
P215	8	351.95	0.18	0.03	-27.69	J216	J218
P221	10	687.25	0.81	0.36	-197.87	J194	J54
P223	10	280.00	0.00	0.00	0.19	J208	J230
P225	8	431.95	0.05	0.00	7.73	J228	J230
P227	8	280.00	0.04	0.00	-5.96	J228	J210
P231	10	280.00	0.01	0.00	-2.24	J230	J232
P233	8	432.29	0.04	0.00	-5.98	J232	J226
P235	8	280.00	0.04	0.00	-5.59	J226	J228
P239	10	325.70	0.03	0.00	-7.88	J232	J234
P241	10	322.06	0.09	0.01	-22.54	J234	J224
P243	8	280.00	0.08	0.01	12.01	J224	J226
P245	10	279.99	0.32	0.06	-77.17	J266	J222
P247	8	280.00	0.08	0.01	-12.67	J222	J216
P249	10	547.93	0.39	0.09	-94.65	J222	J220
P253	10	428.92	0.87	0.41	-213.08	J220	J56
P255	10	1259.50	0.03	0.00	7.68	J234	J236
P257	8	994.05	0.08	0.01	-12.29	J236	J238
P259	8	460.58	0.21	0.04	-32.43	J238	J240
P261	8	753.00	0.08	0.01	-13.25	J240	J222
P263	8	683.53	0.12	0.01	-19.20	J240	J242

FIGURE 7
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
PEAK HOUR CASE STUDY
SIGNLE ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P265	8	188.34	0.15	0.02	23.29	J242	J244
P267	8	744.35	0.27	0.06	-42.49	J242	J220
P269	8	454.85	0.21	0.04	-32.28	J244	J84
P271	8	387.01	0.27	0.06	42.69	J244	J246
P273	8	689.15	0.02	0.00	-2.53	J246	J248
P275	8	49.42	0.13	0.01	-20.14	J248	J238
P277	8	725.00	0.11	0.01	17.60	J248	J252
P279	10	521.35	0.03	0.00	8.47	J252	J254
P281	8	716.70	0.12	0.01	-18.06	J254	J246
P283	10	558.99	0.08	0.01	19.97	J236	J250
P285	10	1035.61	0.02	0.00	5.42	J250	J252
P287	10	548.09	0.00	0.00	-0.65	J254	J256
P289	12	530.42	0.13	0.01	-46.84	J256	J112
P291	12	106.45	0.43	0.08	150.44	J86	J110
P307	18	493.61	1.96	0.80	1558.18	RES9006	J260
P309	12	886.01	0.46	0.09	161.09	J26	J28
P311	12	255.49	**2.72**	**2.35**	959.64	J260	J16
P325	10	280.01	0.21	0.03	-50.39	J224	J266
P333	8	151.62	0.08	0.01	-12.37	J270	J210
P335	8	280.00	0.06	0.00	10.14	J204	J270
P337	8	279.99	0.30	0.07	-47.18	J214	J272
P339	8	280.00	0.04	0.00	-6.67	J272	J216
P341	8	42.39	0.31	0.08	-49.06	J272	J196
P343	8	432.19	0.13	0.02	-20.60	J196	J218
P345	8	367.25	0.36	0.10	-56.64	J218	J220
P349	8	720.30	0.25	0.05	-39.22	J188	J192
P353	8	605.95	0.15	0.02	-24.25	J204	J198
P355	10	884.02	0.03	0.00	-6.12	J208	J186
P357	8	280.01	0.17	0.03	-26.38	J228	J214
P359	12	593.66	0.82	0.25	287.85	J56	J82
P361	10	528.28	0.68	0.26	-165.43	J60	J64
P365	8	560.00	0.06	0.00	-9.37	J214	J266
P367	12	491.00	0.14	0.01	47.68	J106	J116
P369	8	420.85	0.12	0.01	19.03	J114	J280
P371	10	338.28	0.34	0.07	82.16	J72	J278
P373	8	502.06	0.03	0.00	4.98	J278	J96
P375	10	544.68	0.27	0.05	66.96	J278	J276
P377	10	280.92	0.25	0.04	61.63	J276	J274
P379	8	280.00	0.09	0.01	14.23	J94	J274
P381	10	548.29	0.26	0.04	63.37	J274	J116
P383	8	299.23	0.70	0.35	109.93	J36	J50
P385	8	300.00	0.82	0.47	128.46	J50	J58

MAX / MIN VALUE

FIGURE 8
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J250/J252 CASE STUDY
FIRE FLOW AT COMMUNITY COLLEGE
SINGLE ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J14	**50.45**	450.00	6.09
J16	56.40	435.00	12.20
J18	63.89	414.00	6.56
J20	66.25	408.00	9.53
J22	58.07	425.00	9.08
J24	68.71	399.00	14.66
J26	57.94	424.50	11.01
J28	66.06	405.00	7.57
J30	72.32	390.00	6.99
J32	71.09	393.00	5.25
J34	76.50	379.00	12.17
J36	71.55	390.00	4.64
J38	73.42	387.00	9.26
J40	79.67	372.00	10.94
J42	81.11	369.00	5.82
J44	90.00	348.00	7.06
J46	88.41	351.00	12.78
J48	84.95	358.00	12.35
J50	82.78	362.50	12.18
J52	81.17	366.00	8.52
J54	85.59	352.00	3.61
J56	87.65	346.00	16.85
J58	86.74	351.50	5.69
J60	88.99	347.00	7.47
J64	92.96	340.00	7.09
J66	94.64	337.00	3.92
J72	95.45	327.00	2.72
J74	97.71	322.00	6.69
J76	94.38	330.00	10.63
J78	95.89	326.00	27.38
J80	97.09	323.00	27.39
J82	94.43	329.00	29.13
J84	95.36	325.50	7.15
J86	95.73	324.50	21.67
J88	99.59	316.00	28.02
J90	100.11	315.00	6.35
J92	100.52	314.00	7.95
J94	101.31	312.50	7.95
J96	99.20	318.00	5.68
J106	100.61	313.50	6.35
J108	99.93	315.00	27.25
J110	96.10	323.50	20.90
J112	98.94	316.00	46.56
J114	102.11	309.50	37.82
J116	**105.09**	303.00	10.33
J184	62.44	397.50	5.34

FIGURE 8
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J250/J252 CASE STUDY
FIRE FLOW AT COMMUNITY COLLEGE
SINGLE ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J186	69.59	381.00	4.21
J188	71.36	377.00	8.28
J192	76.40	366.50	7.23
J194	80.05	359.50	9.24
J196	82.71	351.50	12.02
J198	78.69	360.50	14.33
J204	74.39	370.00	8.39
J208	75.94	366.00	7.27
J210	78.19	361.00	3.06
J212	79.58	358.00	7.10
J214	81.28	354.00	12.45
J216	83.90	348.50	4.64
J218	85.13	346.00	4.64
J220	88.01	340.00	10.72
J222	86.04	343.00	9.39
J224	84.31	346.00	8.80
J226	81.76	352.00	6.45
J228	79.60	357.50	10.57
J230	77.99	361.00	5.64
J232	80.15	355.50	6.45
J234	83.00	348.00	3.88
J236	87.92	323.00	0.09
J238	91.12	320.00	0.09
J240	89.87	330.00	4.18
J242	89.74	332.50	4.18
J244	91.24	329.00	7.15
J246	90.81	324.00	20.64
J248	91.46	319.00	5.55
J250	82.32	325.50	**2258.17**
J252	88.25	314.50	**2263.03**
J254	96.09	309.50	19.95
J256	102.66	304.00	25.66
J260	63.08	425.50	0.00
J266	85.24	344.50	9.67
J270	77.36	362.90	0.00
J272	82.64	351.50	4.75
J274	103.58	307.20	6.94
J276	102.90	309.00	2.96
J278	98.77	319.00	5.68
J280	104.54	303.90	10.57

MAX / MIN VALUE

FIGURE 8
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J250/J252 CASE STUDY
FIRE FLOW AT COMMUNITY COLLEGE
SINGLE ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P13	12	469.00	5.92	9.90	2,087.11	J260	J14
P15	12	456.97	5.32	8.13	1,876.47	J16	J18
P17	12	637.47	1.58	0.86	558.43	J18	J20
P19	12	561.41	5.90	9.85	-2,081.02	J20	J14
P21	12	1282.72	4.00	4.79	1,410.79	J16	J22
P25	12	925.73	3.72	4.19	-1,311.48	J24	J18
P27	12	166.70	3.98	4.74	1,401.71	J22	J26
P29	12	363.72	2.36	1.80	830.29	J26	J24
P33	12	650.46	1.57	0.85	552.83	J28	J30
P35	12	564.77	0.85	0.27	-298.85	J30	J32
P37	12	429.17	1.89	1.19	-665.93	J32	J24
P39	8	583.73	1.04	0.73	162.38	J34	J36
P41	8	529.63	2.01	2.50	-315.27	J36	J38
P43	12	384.24	2.40	1.85	844.70	J30	J42
P45	8	671.75	0.83	0.48	129.65	J42	J40
P47	8	521.61	0.94	0.61	147.65	J40	J34
P49	8	368.79	2.31	3.22	361.83	J32	J40
P51	12	395.02	4.15	5.12	1,461.19	J24	J34
P53	12	293.06	7.46	15.19	2,629.92	J20	J38
P55	12	261.82	6.54	11.90	2,305.39	J38	J52
P57	12	290.59	6.89	13.12	2,429.39	J52	J54
P59	8	417.32	0.85	0.50	-132.52	J52	J50
P61	8	558.37	1.18	0.93	-185.27	J50	J48
P63	8	528.28	1.71	1.86	-268.65	J48	J46
P65	8	652.48	1.25	1.03	-195.66	J46	J44
P67	8	300.00	2.12	2.76	332.89	J40	J46
P69	12	357.68	2.01	1.34	-709.22	J44	J42
P71	12	301.45	4.07	4.94	-1,434.29	J48	J34
P73	12	265.14	3.93	4.65	1,386.97	J54	J56
P75	10	580.82	3.67	5.86	-898.39	J56	J58
P77	10	542.26	1.60	1.25	-390.51	J58	J60
P79	12	313.00	4.27	5.41	-1,505.32	J60	J48
P85	10	431.02	2.05	2.00	-502.59	J64	J66
P95	12	585.11	1.00	0.37	351.64	J74	J72
P97	12	280.01	1.82	1.11	-640.17	J74	J76
P99	12	290.02	2.34	1.77	823.21	J76	J78
P101	12	575.00	5.25	7.92	-1,849.95	J76	J60
P103	12	386.49	1.30	0.60	458.42	J78	J80
P105	12	248.99	1.22	0.53	431.03	J80	J82
P107	12	311.98	3.81	4.38	1,344.37	J82	J84
P109	12	154.71	1.60	0.87	563.06	J84	J86
P111	8	456.95	1.16	0.89	-180.98	J86	J88
P113	8	290.00	0.97	0.65	-152.68	J88	J90
P115	8	45.00	1.38	1.25	216.93	J90	J92
P117	8	280.01	1.32	1.15	-207.42	J92	J94

FIGURE 8
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J250/J252 CASE STUDY
FIRE FLOW AT COMMUNITY COLLEGE
SINGLE ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P119	8	280.00	1.91	2.28	-299.86	J94	J96
P121	8	280.00	1.80	2.03	-281.84	J96	J74
P127	8	313.00	1.58	1.59	-247.12	J64	J46
P129	12	430.17	1.44	0.72	-506.51	J66	J44
P143	8	69.00	2.66	4.18	-416.4	J106	J92
P145	8	290.00	0.59	0.26	92.38	J106	J108
P147	8	114.00	1.79	2.02	-281.09	J108	J88
P149	8	515.00	2.15	2.83	-337.41	J88	J78
P151	8	515.00	2.40	3.46	-375.95	J90	J76
P153	8	445.25	1.04	0.73	162.47	J108	J110
P155	12	491.01	2.45	1.93	863.93	J110	J112
P157	12	452.02	2.37	1.82	-836.82	J112	J114
P159	8	491.01	1.17	0.92	-183.75	J114	J108
P161	12	286.89	1.99	1.31	-701.46	J114	J116
P171	10	651.45	0.02	0.00	-5.34	J184	J186
P173	10	199.72	0.88	0.41	-214.45	J186	J188
P181	10	622.29	2.22	2.30	-542.67	J192	J194
P183	8	334.30	3.11	5.59	486.9	J194	J196
P185	8	483.16	0.93	0.60	145.51	J196	J198
P187	8	338.37	1.85	2.14	-289.69	J198	J192
P197	8	408.05	0.15	0.02	-23.02	J204	J188
P203	8	280.00	0.97	0.65	-152.01	J208	J270
P207	8	283.75	1.03	0.73	-161.91	J210	J212
P209	8	248.55	1.68	1.79	-263.16	J212	J198
P211	8	261.32	0.60	0.27	94.15	J212	J214
P215	8	351.95	1.18	0.93	-184.79	J216	J218
P221	10	687.25	4.24	7.67	-1,038.81	J194	J54
P223	10	280.00	1.43	1.02	349.64	J208	J230
P225	8	431.95	0.85	0.51	133.22	J228	J230
P227	8	280.00	1.14	0.88	-179.18	J228	J210
P231	10	280.00	1.95	1.82	477.22	J230	J232
P233	8	432.29	0.87	0.53	-135.95	J232	J226
P235	8	280.00	1.68	1.78	-262.93	J226	J228
P239	10	325.70	2.48	2.83	606.72	J232	J234
P241	10	322.06	2.65	3.20	-648.55	J234	J224
P243	8	280.00	0.77	0.42	-120.53	J224	J226
P245	10	279.99	1.61	1.27	-393.21	J266	J222
P247	8	280.00	1.79	2.01	-280.48	J222	J216
P249	10	547.93	2.48	2.83	-606.72	J222	J220
P253	10	428.92	5.42	12.05	-1,326.05	J220	J56
P255	10	1259.50	5.11	10.82	1,251.38	J234	J236
P257	8	994.05	2.73	4.40	-427.81	J236	J238
P259	8	460.58	5.38	15.44	-842.9	J238	J240
P261	8	753.00	3.09	5.54	-484.60	J240	J222
P263	8	683.53	2.31	3.23	-362.48	J240	J242

FIGURE 8
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J250/J252 CASE STUDY
FIRE FLOW AT COMMUNITY COLLEGE
SINGLE ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P265	8	188.34	0.50	0.19	77.69	J242	J244
P267	8	744.35	2.84	4.72	-444.36	J242	J220
P269	8	454.85	4.94	13.19	-774.16	J244	J84
P271	8	387.01	5.39	15.50	844.7	J244	J246
P273	8	689.15	2.95	5.07	461.99	J246	J248
P275	8	49.42	2.65	4.16	-415	J248	J238
P277	8	725.00	5.56	16.42	871.44	J248	J252
P279	10	521.35	8.05	**25.10**	-1,970.66	J252	J254
P281	8	716.70	2.31	3.23	-362.07	J254	J246
P283	10	558.99	6.86	18.66	1,679.11	J236	J250
P285	10	1035.61	2.37	2.60	-579.06	J250	J252
P287	10	548.09	6.65	17.63	-1,628.54	J254	J256
P289	12	530.42	4.69	6.44	-1,654.20	J256	J112
P291	12	106.45	2.05	1.39	722.37	J86	J110
P307	18	493.61	6.79	7.95	5,386.57	RES9006	J260
P309	12	886.01	1.59	0.87	560.4	J26	J28
P311	12	255.49	**9.36**	23.12	3,299.46	J260	J16
P325	10	280.01	2.19	2.26	-536.81	J224	J266
P333	8	151.62	0.13	0.02	20.34	J270	J210
P335	8	280.00	1.10	0.82	172.35	J204	J270
P337	8	279.99	1.91	2.27	-299.1	J214	J272
P339	8	280.00	0.64	0.30	100.33	J272	J216
P341	8	42.39	2.58	3.96	-404.18	J272	J196
P343	8	432.19	0.48	0.17	-74.82	J196	J218
P345	8	367.25	1.69	1.80	-264.25	J218	J220
P349	8	720.30	1.57	1.57	-245.75	J188	J192
P353	8	605.95	1.01	0.69	-157.72	J204	J198
P355	10	884.02	0.84	0.38	-204.9	J208	J186
P357	8	280.01	1.45	1.37	-227.53	J228	J214
P359	12	593.66	2.67	2.27	942.47	J56	J82
P361	10	528.28	3.03	4.12	-742.62	J60	J64
P365	8	560.00	0.98	0.66	153.27	J214	J266
P367	12	491.00	0.90	0.30	317.67	J106	J116
P369	8	420.85	0.07	0.00	10.57	J114	J280
P371	10	338.28	1.43	1.02	348.92	J72	J278
P373	8	502.06	0.15	0.02	23.7	J278	J96
P375	10	544.68	1.31	0.86	319.53	J278	J276
P377	10	280.92	1.29	0.85	316.57	J276	J274
P379	8	280.00	0.54	0.22	84.49	J94	J274
P381	10	548.29	1.61	1.27	394.13	J274	J116
P383	8	299.23	3.02	5.30	473	J36	J50
P385	8	300.00	3.28	6.17	513.57	J50	J58

MAX / MIN VALUE

FIGURE 9
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J14 CASE STUDY
FIRE FLOW AT NORTHERN RESIDENTIAL
SINGLE ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J14	**52.98**	450.00	**1506.09**
J16	59.94	435.00	12.20
J18	68.78	414.00	6.56
J20	71.21	408.00	9.53
J22	64.00	425.00	9.08
J24	75.20	399.00	14.66
J26	64.18	424.50	11.01
J28	72.61	405.00	7.57
J30	79.09	390.00	6.99
J32	77.79	393.00	5.25
J34	83.82	379.00	12.17
J36	79.00	390.00	4.64
J38	80.30	387.00	9.26
J40	86.86	372.00	10.94
J42	88.17	369.00	5.82
J44	97.26	348.00	7.06
J46	95.94	351.00	12.78
J48	92.89	358.00	12.35
J50	90.91	362.50	12.18
J52	89.38	366.00	8.52
J54	95.41	352.00	3.61
J56	98.01	346.00	16.85
J58	95.66	351.50	5.69
J60	97.63	347.00	7.47
J64	100.70	340.00	7.09
J66	102.02	337.00	3.92
J72	106.22	327.00	2.72
J74	108.39	322.00	6.69
J76	104.93	330.00	10.63
J78	106.65	326.00	27.38
J80	107.95	323.00	27.39
J82	105.35	329.00	29.13
J84	106.86	325.50	7.15
J86	107.29	324.50	21.67
J88	110.97	316.00	28.02
J90	111.41	315.00	6.35
J92	111.84	314.00	7.95
J94	112.49	312.50	7.95
J96	110.12	318.00	5.68
J106	112.06	313.50	6.35
J108	111.41	315.00	27.25
J110	107.72	323.50	20.90
J112	110.97	316.00	46.56
J114	113.79	309.50	37.82
J116	**116.60**	303.00	10.33
J184	75.65	397.50	5.34

FIGURE 9
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J14 CASE STUDY
FIRE FLOW AT NORTHERN RESIDENTIAL
SINGLE ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J186	82.80	381.00	4.21
J188	84.53	377.00	8.28
J192	89.09	366.50	7.23
J194	92.13	359.50	9.24
J196	95.59	351.50	12.02
J198	91.69	360.50	14.33
J204	87.57	370.00	8.39
J208	89.30	366.00	7.27
J210	91.47	361.00	3.06
J212	92.77	358.00	7.10
J214	94.50	354.00	12.45
J216	96.89	348.50	4.64
J218	97.97	346.00	4.64
J220	100.58	340.00	10.72
J222	99.27	343.00	9.39
J224	97.97	346.00	8.80
J226	95.37	352.00	6.45
J228	92.98	357.50	10.57
J230	91.47	361.00	5.64
J232	93.85	355.50	6.45
J234	97.10	348.00	3.88
J236	107.93	323.00	0.09
J238	109.23	320.00	0.09
J240	104.90	330.00	4.18
J242	103.82	332.50	4.18
J244	105.34	329.00	7.15
J246	107.50	324.00	20.64
J248	109.67	319.00	5.55
J250	106.85	325.50	8.17
J252	111.62	314.50	13.03
J254	113.78	309.50	19.95
J256	116.17	304.00	25.66
J260	64.40	425.50	0.00
J266	98.62	344.50	9.67
J270	90.64	362.90	8.53
J272	95.59	351.50	4.75
J274	114.79	307.20	6.94
J276	114.01	309.00	2.96
J278	109.68	319.00	5.68
J280	116.21	303.90	10.57

MAX / MIN VALUE

FIGURE 9
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J14 CASE STUDY
FIRE FLOW AT NORTHERN RESIDENTIAL
SINGLE ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P13	12	469.00	**3.62**	**3.98**	1275.08	J260	J14
P15	12	456.97	1.98	1.31	699.49	J16	J18
P17	12	637.47	1.29	0.59	453.64	J18	J20
P19	12	561.41	0.66	0.17	231.01	J20	J14
P21	12	1282.72	1.16	0.48	408.32	J16	J22
P25	12	925.73	0.68	0.18	-239.29	J24	J18
P27	12	166.70	1.13	0.46	399.24	J22	J26
P29	12	363.72	0.69	0.19	243.68	J26	J24
P33	12	650.46	0.39	0.06	136.98	J28	J30
P35	12	564.77	0.16	0.01	-56.65	J30	J32
P37	12	429.17	0.40	0.07	-142.57	J32	J24
P39	8	583.73	0.50	0.19	79.08	J34	J36
P41	8	529.63	0.16	0.02	25.05	J36	J38
P43	12	384.24	0.53	0.11	186.64	J30	J42
P45	8	671.75	0.20	0.03	31.29	J42	J40
P47	8	521.61	0.22	0.04	34.92	J40	J34
P49	8	368.79	0.51	0.20	80.67	J32	J40
P51	12	395.02	0.92	0.32	325.75	J24	J34
P53	12	293.06	0.60	0.14	213.11	J20	J38
P55	12	261.82	0.65	0.17	228.90	J38	J52
P57	12	290.59	0.76	0.22	267.84	J52	J54
P59	8	417.32	0.30	0.08	-47.46	J52	J50
P61	8	558.37	0.40	0.12	-62.36	J50	J48
P63	8	528.28	0.34	0.09	-52.65	J48	J46
P65	8	652.48	0.26	0.06	-41.39	J46	J44
P67	8	300.00	0.42	0.14	66.10	J40	J46
P69	12	357.68	0.42	0.08	-149.52	J44	J42
P71	12	301.45	0.76	0.22	-269.42	J48	J34
P73	12	265.14	0.45	0.08	157.37	J54	J56
P75	10	580.82	0.52	0.16	-126.85	J56	J58
P77	10	542.26	0.33	0.07	-80.44	J58	J60
P79	12	313.00	0.70	0.19	-247.35	J60	J48
P85	10	431.02	0.40	0.10	-97.16	J64	J66
P95	12	585.11	0.15	0.01	54.04	J74	J72
P97	12	280.01	0.29	0.04	-102.83	J74	J76
P99	12	290.02	0.36	0.05	125.77	J76	J78
P101	12	575.00	0.83	0.26	-291.57	J76	J60
P103	12	386.49	0.15	0.01	54.43	J78	J80
P105	12	248.99	0.08	0.00	27.04	J80	J82
P107	12	311.98	0.41	0.07	144.03	J82	J84
P109	12	154.71	0.31	0.04	108.98	J84	J86
P111	8	456.95	0.01	0.00	-1.92	J86	J88
P113	8	290.00	0.10	0.01	-16.38	J88	J90
P115	8	45.00	0.19	0.03	29.62	J90	J92
P117	8	280.01	0.14	0.02	-22.68	J92	J94

FIGURE 9
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J14 CASE STUDY
FIRE FLOW AT NORTHERN RESIDENTIAL
SINGLE ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P119	8	280.00	0.25	0.05	-39.62	J94	J96
P121	8	280.00	0.27	0.06	-42.10	J96	J74
P127	8	313.00	0.27	0.06	-42.06	J64	J46
P129	12	430.17	0.29	0.04	-101.08	J66	J44
P143	8	69.00	0.28	0.07	-44.35	J106	J92
P145	8	290.00	0.05	0.00	8.00	J106	J108
P147	8	114.00	0.19	0.03	-30.40	J108	J88
P149	8	515.00	0.28	0.06	-43.96	J88	J78
P151	8	515.00	0.33	0.09	-52.34	J90	J76
P153	8	445.25	0.03	0.00	-5.34	J108	J110
P155	12	491.01	0.18	0.02	62.99	J110	J112
P157	12	452.02	0.08	0.00	-29.30	J112	J114
P159	8	491.01	0.11	0.01	-16.49	J114	J108
P161	12	286.89	0.17	0.01	-61.19	J114	J116
P171	10	651.45	0.02	0.00	-5.34	J184	J186
P173	10	199.72	0.05	0.00	-12.41	J186	J188
P181	10	622.29	0.22	0.03	-53.66	J192	J194
P183	8	334.30	0.28	0.06	43.96	J194	J196
P185	8	483.16	0.11	0.01	17.79	J196	J198
P187	8	338.37	0.16	0.02	-25.25	J198	J192
P197	8	408.05	0.00	0.00	-0.49	J204	J188
P203	8	280.00	0.02	0.00	-3.61	J208	J270
P207	8	283.75	0.08	0.01	-13.00	J210	J212
P209	8	248.55	0.10	0.01	-15.53	J212	J198
P211	8	261.32	0.03	0.00	-4.58	J212	J214
P215	8	351.95	0.10	0.01	-15.77	J216	J218
P221	10	687.25	0.44	0.11	-106.87	J194	J54
P223	10	280.00	0.00	0.00	-0.80	J208	J230
P225	8	431.95	0.03	0.00	4.16	J228	J230
P227	8	280.00	0.02	0.00	-3.10	J228	J210
P231	10	280.00	0.01	0.00	-2.28	J230	J232
P233	8	432.29	0.02	0.00	-3.23	J232	J226
P235	8	280.00	0.02	0.00	-2.83	J226	J228
P239	10	325.70	0.02	0.00	-5.50	J232	J234
P241	10	322.06	0.05	0.00	-12.09	J234	J224
P243	8	280.00	0.04	0.00	6.85	J224	J226
P245	10	279.99	0.18	0.02	-42.85	J266	J222
P247	8	280.00	0.04	0.00	-6.69	J222	J216
P249	10	547.93	0.22	0.03	-54.23	J222	J220
P253	10	428.92	0.50	0.14	-121.25	J220	J56
P255	10	1259.50	0.01	0.00	2.71	J234	J236
P257	8	994.05	0.03	0.00	-5.37	J236	J238
P259	8	460.58	0.11	0.01	-17.67	J238	J240
P261	8	753.00	0.06	0.00	-8.68	J240	J222
P263	8	683.53	0.08	0.01	-13.17	J240	J242

FIGURE 9
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J14 CASE STUDY
FIRE FLOW AT NORTHERN RESIDENTIAL
SINGLE ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P265	8	188.34	0.04	0.00	6.33	J242	J244
P267	8	744.35	0.15	0.02	-23.68	J242	J220
P269	8	454.85	0.18	0.03	-27.90	J244	J84
P271	8	387.01	0.17	0.03	27.08	J244	J246
P273	8	689.15	0.00	0.00	0.27	J246	J248
P275	8	49.42	0.08	0.01	-12.21	J248	J238
P277	8	725.00	0.04	0.00	6.92	J248	J252
P279	10	521.35	0.03	0.00	-6.29	J252	J254
P281	8	716.70	0.04	0.00	-6.17	J254	J246
P283	10	558.99	0.03	0.00	7.99	J236	J250
P285	10	1035.61	0.00	0.00	-0.18	J250	J252
P287	10	548.09	0.08	0.01	-20.06	J254	J256
P289	12	530.42	0.13	0.01	-45.72	J256	J112
P291	12	106.45	0.25	0.03	89.23	J86	J110
P307	18	493.61	3.02	1.77	2395.10	RES9006	J260
P309	12	886.01	0.41	0.07	144.55	J26	J28
P311	12	255.49	3.18	3.13	1120.02	J260	J16
P325	10	280.01	0.11	0.01	-27.74	J224	J266
P333	8	151.62	0.04	0.00	-6.85	J270	J210
P335	8	280.00	0.03	0.00	5.29	J204	J270
P337	8	279.99	0.17	0.02	-26.05	J214	J272
P339	8	280.00	0.03	0.00	-4.45	J272	J216
P341	8	42.39	0.17	0.03	-26.36	J272	J196
P343	8	432.19	0.08	0.01	-12.21	J196	J218
P345	8	367.25	0.21	0.04	-32.62	J218	J220
P349	8	720.30	0.14	0.02	-21.18	J188	J192
P353	8	605.95	0.08	0.01	-13.19	J204	J198
P355	10	884.02	0.01	0.00	-2.86	J208	J186
P357	8	280.01	0.09	0.01	-14.47	J228	J214
P359	12	593.66	0.41	0.07	146.12	J56	J82
P361	10	528.28	0.54	0.17	-132.13	J60	J64
P365	8	560.00	0.03	0.00	-5.44	J214	J266
P367	12	491.00	0.09	0.00	29.99	J106	J116
P369	8	420.85	0.07	0.00	10.57	J114	J280
P371	10	338.28	0.21	0.03	51.32	J72	J278
P373	8	502.06	0.02	0.00	3.20	J278	J96
P375	10	544.68	0.17	0.02	42.44	J278	J276
P377	10	280.92	0.16	0.02	39.48	J276	J274
P379	8	280.00	0.06	0.00	8.99	J94	J274
P381	10	548.29	0.17	0.02	41.53	J274	J116
P383	8	299.23	0.32	0.08	49.39	J36	J50
P385	8	300.00	0.33	0.09	52.11	J50	J58

MAX / MIN VALUE

FIGURE 10
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J80/J82 CASE STUDY
FIRE FLOW AT ELEMENTARY SCHOOL
SINGLE ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J14	**50.46**	450.00	6.09
J16	56.39	435.00	12.20
J18	63.89	414.00	6.56
J20	66.28	408.00	9.53
J22	58.02	425.00	9.08
J24	68.65	399.00	14.66
J26	57.89	424.50	11.01
J28	65.99	405.00	7.57
J30	72.25	390.00	6.99
J32	71.02	393.00	5.25
J34	76.43	379.00	12.17
J36	71.55	390.00	4.64
J38	73.50	387.00	9.26
J40	79.59	372.00	10.94
J42	81.03	369.00	5.82
J44	89.90	348.00	7.06
J46	88.30	351.00	12.78
J48	84.85	358.00	12.35
J50	82.82	362.50	12.18
J52	81.31	366.00	8.52
J54	85.96	352.00	3.61
J56	87.81	346.00	16.85
J58	86.67	351.50	5.69
J60	88.77	347.00	7.47
J64	92.83	340.00	7.09
J66	94.53	337.00	3.92
J72	94.77	327.00	2.72
J74	96.99	322.00	6.69
J76	93.59	330.00	10.63
J78	94.73	326.00	27.38
J80	95.21	323.00	**2277.39**
J82	92.81	329.00	**2279.13**
J84	94.74	325.50	7.15
J86	95.27	324.50	21.67
J88	99.10	316.00	28.02
J90	99.67	315.00	6.35
J92	100.10	314.00	7.95
J94	100.84	312.50	7.95
J96	98.59	318.00	5.68
J106	100.27	313.50	6.35
J108	99.54	315.00	27.25
J110	95.75	323.50	20.90
J112	99.13	316.00	46.56
J114	101.97	309.50	37.82
J116	**104.82**	303.00	10.33
J184	65.17	397.50	5.34

FIGURE 10
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J80/J82 CASE STUDY
FIRE FLOW AT ELEMENTARY SCHOOL
SINGLE ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J186	72.32	381.00	4.21
J188	74.06	377.00	8.28
J192	78.74	366.50	7.23
J194	81.96	359.50	9.24
J196	85.14	351.50	12.02
J198	81.24	360.50	14.33
J204	77.09	370.00	8.39
J208	78.80	366.00	7.27
J210	80.97	361.00	3.06
J212	82.28	358.00	7.10
J214	84.00	354.00	12.45
J216	86.40	348.50	4.64
J218	87.50	346.00	4.64
J220	90.10	340.00	10.72
J222	88.73	343.00	9.39
J224	87.42	346.00	8.80
J226	84.83	352.00	6.45
J228	82.47	357.50	10.57
J230	80.95	361.00	5.64
J232	83.31	355.50	6.45
J234	86.52	348.00	3.88
J236	96.89	323.00	0.09
J238	98.06	320.00	0.09
J240	93.85	330.00	4.18
J242	92.70	332.50	4.18
J244	93.94	329.00	7.15
J246	96.11	324.00	20.64
J248	98.45	319.00	5.55
J250	95.71	325.50	8.17
J252	100.31	314.50	13.03
J254	102.30	309.50	19.95
J256	104.41	304.00	25.66
J260	63.08	425.50	0.00
J266	88.08	344.50	9.67
J270	80.15	362.90	0.00
J272	85.12	351.50	4.75
J274	103.13	307.20	6.94
J276	102.40	309.00	2.96
J278	98.16	319.00	5.68
J280	104.39	303.90	10.57

MAX / MIN VALUE

FIGURE 10
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J80/J82 CASE STUDY
FIRE FLOW AT ELEMENTARY SCHOOL
SINGLE ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P13	12	469.00	5.90	9.85	2081.00	J260	J14
P15	12	456.97	5.31	8.08	1870.62	J16	J18
P17	12	637.47	1.50	0.78	528.07	J18	J20
P19	12	561.41	5.89	9.79	-2074.91	J20	J14
P21	12	1282.72	4.04	4.87	1422.74	J16	J22
P25	12	925.73	3.79	4.33	-1336.00	J24	J18
P27	12	166.70	4.01	4.81	1413.66	J22	J26
P29	12	363.72	2.36	1.81	833.37	J26	J24
P33	12	650.46	1.59	0.87	561.72	J28	J30
P35	12	564.77	0.88	0.29	-309.91	J30	J32
P37	12	429.17	1.94	1.25	-682.63	J32	J24
P39	8	583.73	0.80	0.45	125.09	J34	J36
P41	8	529.63	2.15	2.81	-336.22	J36	J38
P43	12	384.24	2.45	1.94	864.64	J30	J42
P45	8	671.75	0.82	0.47	128.00	J42	J40
P47	8	521.61	0.89	0.55	139.83	J40	J34
P49	8	368.79	2.35	3.32	367.47	J32	J40
P51	12	395.02	4.18	5.19	1472.07	J24	J34
P53	12	293.06	7.36	14.80	2593.45	J20	J38
P55	12	261.82	6.38	11.36	2247.97	J38	J52
P57	12	290.59	6.34	11.24	2235.21	J52	J54
P59	8	417.32	0.03	0.00	4.24	J52	J50
P61	8	558.37	0.66	0.32	-104.07	J50	J48
P63	8	528.28	1.71	1.84	-267.55	J48	J46
P65	8	652.48	1.27	1.06	-198.66	J46	J44
P67	8	300.00	2.20	2.95	344.70	J40	J46
P69	12	357.68	2.07	1.42	-730.82	J44	J42
P71	12	301.45	4.18	5.20	-1474.65	J48	J34
P73	12	265.14	4.72	6.50	1662.47	J54	J56
P75	10	580.82	3.35	4.94	-819.31	J56	J58
P77	10	542.26	1.11	0.64	-272.19	J58	J60
P79	12	313.00	4.61	6.23	-1625.77	J60	J48
P85	10	431.02	2.13	2.14	-521.19	J64	J66
P95	12	585.11	0.69	0.19	244.89	J74	J72
P97	12	280.01	1.27	0.57	-447.93	J74	J76
P99	12	290.02	3.95	4.68	1392.73	J76	J78
P101	12	575.00	6.02	10.22	-2123.22	J76	J60
P103	12	386.49	4.07	4.95	1434.59	J78	J80
P105	12	248.99	2.39	1.85	-842.80	J80	J82
P107	12	311.98	3.16	3.10	-1114.50	J82	J84
P109	12	154.71	2.09	1.44	-735.62	J84	J86
P111	8	456.95	1.05	0.75	-164.07	J86	J88
P113	8	290.00	1.25	1.04	-196.44	J88	J90
P115	8	45.00	0.44	0.15	69.15	J90	J92
P117	8	280.01	1.04	0.74	-163.11	J92	J94

FIGURE 10
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J80/J82 CASE STUDY
FIRE FLOW AT ELEMENTARY SCHOOL
SINGLE ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P119	8	280.00	1.34	1.17	-209.24	J94	J96
P121	8	280.00	1.25	1.04	-196.35	J96	J74
P127	8	313.00	1.68	1.79	-263.02	J64	J46
P129	12	430.17	1.49	0.77	-525.11	J66	J44
P143	8	69.00	1.43	1.33	-224.30	J106	J92
P145	8	290.00	0.97	0.65	152.13	J106	J108
P147	8	114.00	0.41	0.13	64.89	J108	J88
P149	8	515.00	0.44	0.15	69.24	J88	J78
P151	8	515.00	1.74	1.90	-271.94	J90	J76
P153	8	445.25	0.90	0.57	141.78	J108	J110
P155	12	491.01	1.34	0.63	-472.33	J110	J112
P157	12	452.02	0.49	0.10	-171.51	J112	J114
P159	8	491.01	0.52	0.21	81.79	J114	J108
P161	12	286.89	0.86	0.28	-301.69	J114	J116
P171	10	651.45	0.02	0.00	-5.34	J184	J186
P173	10	199.72	0.36	0.08	-87.57	J186	J188
P181	10	622.29	1.16	0.69	-283.04	J192	J194
P183	8	334.30	1.77	1.96	276.85	J194	J196
P185	8	483.16	0.14	0.02	21.25	J196	J198
P187	8	338.37	1.01	0.70	-158.05	J198	J192
P197	8	408.05	0.14	0.02	-21.91	J204	J188
P203	8	280.00	0.31	0.08	-48.08	J208	J270
P207	8	283.75	0.31	0.08	-48.24	J210	J212
P209	8	248.55	0.69	0.35	-108.58	J212	J198
P211	8	261.32	0.34	0.09	53.24	J212	J214
P215	8	351.95	0.33	0.09	-51.70	J216	J218
P221	10	687.25	2.32	2.52	-569.13	J194	J54
P223	10	280.00	0.49	0.14	118.83	J208	J230
P225	8	431.95	0.22	0.04	34.33	J228	J230
P227	8	280.00	0.43	0.14	-67.02	J228	J210
P231	10	280.00	0.60	0.21	147.53	J230	J232
P233	8	432.29	0.17	0.03	-26.65	J232	J226
P235	8	280.00	0.56	0.23	-87.00	J226	J228
P239	10	325.70	0.69	0.26	167.72	J232	J234
P241	10	322.06	0.62	0.22	-151.50	J234	J224
P243	8	280.00	0.34	0.09	-53.90	J224	J226
P245	10	279.99	0.17	0.02	-41.50	J266	J222
P247	8	280.00	0.79	0.44	-123.08	J222	J216
P249	10	547.93	0.71	0.28	-173.33	J222	J220
P253	10	428.92	1.87	1.68	-457.49	J220	J56
P255	10	1259.50	1.29	0.84	315.35	J234	J236
P257	8	994.05	0.65	0.31	102.41	J236	J238
P259	8	460.58	0.96	0.64	-150.97	J238	J240
P261	8	753.00	1.57	1.57	-245.51	J240	J222
P263	8	683.53	0.58	0.25	90.36	J240	J242

FIGURE 10
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J80/J82 CASE STUDY
FIRE FLOW AT ELEMENTARY SCHOOL
SINGLE ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P265	8	188.34	2.35	3.32	367.43	J242	J244
P267	8	744.35	1.80	2.02	-281.24	J242	J220
P269	8	454.85	2.46	3.63	386.03	J244	J84
P271	8	387.01	0.16	0.02	-25.75	J244	J246
P273	8	689.15	0.92	0.59	-144.83	J246	J248
P275	8	49.42	1.62	1.67	-253.29	J248	J238
P277	8	725.00	0.66	0.31	102.91	J248	J252
P279	10	521.35	1.20	0.74	294.55	J252	J254
P281	8	716.70	0.63	0.29	-98.44	J254	J246
P283	10	558.99	0.87	0.41	212.85	J236	J250
P285	10	1035.61	0.84	0.38	204.68	J250	J252
P287	10	548.09	1.52	1.15	373.04	J254	J256
P289	12	530.42	0.99	0.36	347.38	J256	J112
P291	12	106.45	1.68	0.96	-593.21	J86	J110
P307	18	493.61	6.79	7.95	5386.57	RES9006	J260
P309	12	886.01	1.61	0.89	569.29	J26	J28
P311	12	255.49	**9.38**	**23.20**	3305.57	J260	J16
P325	10	280.01	0.43	0.11	-106.40	J224	J266
P333	8	151.62	0.14	0.02	21.83	J270	J210
P335	8	280.00	0.45	0.15	69.91	J204	J270
P337	8	279.99	0.63	0.29	-98.66	J214	J272
P339	8	280.00	0.49	0.18	76.01	J272	J216
P341	8	42.39	1.15	0.88	-179.43	J272	J196
P343	8	432.19	0.41	0.13	64.15	J196	J218
P345	8	367.25	0.05	0.00	7.81	J218	J220
P349	8	720.30	0.75	0.40	-117.76	J188	J192
P353	8	605.95	0.36	0.10	-56.39	J204	J198
P355	10	884.02	0.32	0.06	-78.02	J208	J186
P357	8	280.01	0.41	0.13	-64.88	J228	J214
P359	12	593.66	5.69	9.21	2007.43	J56	J82
P361	10	528.28	3.17	4.48	-777.12	J60	J64
P365	8	560.00	0.48	0.17	74.57	J214	J266
P367	12	491.00	0.19	0.02	65.82	J106	J116
P369	8	420.85	0.07	0.00	10.57	J114	J280
P371	10	338.28	0.99	0.52	242.17	J72	J278
P373	8	502.06	0.12	0.01	18.57	J278	J96
P375	10	544.68	0.89	0.43	217.92	J278	J276
P377	10	280.92	0.88	0.41	214.96	J276	J274
P379	8	280.00	0.24	0.05	38.18	J94	J274
P381	10	548.29	1.01	0.53	246.20	J274	J116
P383	8	299.23	2.91	4.96	456.66	J36	J50
P385	8	300.00	3.53	7.07	552.80	J50	J58

MAX / MIN VALUE

FIGURE 11
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J184 CASE STUDY
FIRE FLOW AT NORTHWESTERN RESIDENTIAL
SINGLE ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J14	**53.34**	450.00	6.09
J16	59.71	435.00	12.20
J18	68.46	414.00	6.56
J20	71.00	408.00	9.53
J22	63.46	425.00	9.08
J24	74.59	399.00	14.66
J26	63.60	424.50	11.01
J28	71.97	405.00	7.57
J30	78.42	390.00	6.99
J32	77.14	393.00	5.25
J34	83.07	379.00	12.17
J36	78.26	390.00	4.64
J38	79.68	387.00	9.26
J40	86.13	372.00	10.94
J42	87.46	369.00	5.82
J44	96.51	348.00	7.06
J46	95.15	351.00	12.78
J48	92.04	358.00	12.35
J50	90.03	362.50	12.18
J52	88.49	366.00	8.52
J54	94.19	352.00	3.61
J56	96.72	346.00	16.85
J58	94.65	351.50	5.69
J60	96.67	347.00	7.47
J64	99.88	340.00	7.09
J66	101.25	337.00	3.92
J72	104.95	327.00	2.72
J74	107.13	322.00	6.69
J76	103.69	330.00	10.63
J78	105.38	326.00	27.38
J80	106.65	323.00	27.39
J82	104.04	329.00	29.13
J84	105.50	325.50	7.15
J86	105.93	324.50	21.67
J88	109.63	316.00	28.02
J90	110.08	315.00	6.35
J92	110.51	314.00	7.95
J94	111.18	312.50	7.95
J96	108.83	318.00	5.68
J106	110.71	313.50	6.35
J108	110.05	315.00	27.25
J110	106.36	323.50	20.90
J112	109.58	316.00	46.56
J114	112.42	309.50	37.82
J116	**115.26**	303.00	10.33

FIGURE 11
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J184 CASE STUDY
FIRE FLOW AT NORTHWESTERN RESIDENTIAL
SINGLE ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J184	67.17	397.50	**1505.34**
J186	78.62	381.00	4.21
J188	80.80	377.00	8.28
J192	86.60	366.50	7.23
J194	90.06	359.50	9.24
J196	93.41	351.50	12.02
J198	89.20	360.50	14.33
J204	84.65	370.00	8.39
J208	86.43	366.00	7.27
J210	88.87	361.00	3.06
J212	90.28	358.00	7.10
J214	92.13	354.00	12.45
J216	94.81	348.50	4.64
J218	95.93	346.00	4.64
J220	98.81	340.00	10.72
J222	97.23	343.00	9.39
J224	95.66	346.00	8.80
J226	92.93	352.00	6.45
J228	90.49	357.50	10.57
J230	88.86	361.00	5.64
J232	91.40	355.50	6.45
J234	94.79	348.00	3.88
J236	105.97	323.00	0.09
J238	107.42	320.00	0.09
J240	103.07	330.00	4.18
J242	102.09	332.50	4.18
J244	103.67	329.00	7.15
J246	105.81	324.00	20.64
J248	107.87	319.00	5.55
J250	104.95	325.50	8.17
J252	109.84	314.50	13.03
J254	112.12	309.50	19.95
J256	114.70	304.00	25.66
J260	64.40	425.50	0.00
J266	96.39	344.50	9.67
J270	87.85	362.90	8.53
J272	93.41	351.50	4.75
J274	113.47	307.20	6.94
J276	112.70	309.00	2.96
J278	108.40	319.00	5.68
J280	114.85	303.90	10.57

MAX / MIN VALUE

FIGURE 11
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J184 CASE STUDY
FIRE FLOW AT NORTHERNWESTERN RESIDENTIAL
SINGLE ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P13	12	469.00	2.63	2.21	927.78	J260	J14
P15	12	456.97	2.36	1.80	830.27	J16	J18
P17	12	637.47	0.70	0.19	245.74	J18	J20
P19	12	561.41	2.61	2.18	-921.69	J20	J14
P21	12	1282.72	1.77	1.06	624.85	J16	J22
P25	12	925.73	1.64	0.92	-577.98	J24	J18
P27	12	166.70	1.75	1.03	615.77	J22	J26
P29	12	363.72	1.02	0.38	358.34	J26	J24
P33	12	650.46	0.68	0.18	238.84	J28	J30
P35	12	564.77	0.38	0.06	-132.22	J30	J32
P37	12	429.17	0.83	0.26	-293.67	J32	J24
P39	8	583.73	0.47	0.17	73.55	J34	J36
P41	8	529.63	0.86	0.52	-135.50	J36	J38
P43	12	384.24	1.03	0.39	364.08	J30	J42
P45	8	671.75	0.35	0.10	55.48	J42	J40
P47	8	521.61	0.38	0.11	59.63	J40	J34
P49	8	368.79	1.00	0.68	156.19	J32	J40
P51	12	395.02	1.78	1.07	627.99	J24	J34
P53	12	293.06	3.28	3.33	1157.90	J20	J38
P55	12	261.82	2.87	2.60	1013.14	J38	J52
P57	12	290.59	3.05	2.91	1076.78	J52	J54
P59	8	417.32	0.46	0.16	-72.16	J52	J50
P61	8	558.37	0.57	0.24	-89.36	J50	J48
P63	8	528.28	0.70	0.36	-110.39	J48	J46
P65	8	652.48	0.53	0.21	-82.83	J46	J44
P67	8	300.00	0.90	0.56	141.10	J40	J46
P69	12	357.68	0.86	0.28	-302.77	J44	J42
P71	12	301.45	1.71	0.99	-601.90	J48	J34
P73	12	265.14	1.29	0.59	454.42	J54	J56
P75	10	580.82	1.58	1.23	-387.57	J56	J58
P77	10	542.26	0.75	0.31	-183.83	J58	J60
P79	12	313.00	1.73	1.02	-610.58	J60	J48
P85	10	431.02	0.85	0.39	-208.97	J64	J66
P95	12	585.11	0.36	0.05	125.52	J74	J72
P97	12	280.01	0.66	0.17	-231.95	J74	J76
P99	12	290.02	0.99	0.36	348.16	J76	J78
P101	12	575.00	2.05	1.39	-721.92	J76	J60
P103	12	386.49	0.60	0.14	211.76	J78	J80
P105	12	248.99	0.52	0.11	184.37	J80	J82
P107	12	311.98	1.09	0.43	384.83	J82	J84
P109	12	154.71	0.37	0.06	130.12	J84	J86
P111	8	456.95	0.36	0.10	-56.11	J86	J88
P113	8	290.00	0.36	0.11	-57.09	J88	J90
P115	8	45.00	0.43	0.15	67.74	J90	J92
P117	8	280.01	0.44	0.15	-69.44	J92	J94

FIGURE 11
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J184 CASE STUDY
FIRE FLOW AT NORTHERNWESTERN RESIDENTIAL
SINGLE ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P119	8	280.00	0.65	0.31	-102.46	J94	J96
P121	8	280.00	0.64	0.30	-99.74	J96	J74
P127	8	313.00	0.64	0.30	-100.76	J64	J46
P129	12	430.17	0.60	0.14	-212.89	J66	J44
P143	8	69.00	0.82	0.48	-129.22	J106	J92
P145	8	290.00	0.24	0.05	38.21	J106	J108
P147	8	114.00	0.52	0.21	-81.97	J108	J88
P149	8	515.00	0.70	0.35	-109.02	J88	J78
P151	8	515.00	0.84	0.49	-131.18	J90	J76
P153	8	445.25	0.30	0.07	46.98	J108	J110
P155	12	491.01	0.54	0.12	190.64	J110	J112
P157	12	452.02	0.56	0.12	-195.80	J112	J114
P159	8	491.01	0.29	0.07	-45.96	J114	J108
P161	12	286.89	0.56	0.13	-198.22	J114	J116
P171	10	651.45	**6.15**	**15.24**	-1505.34	J184	J186
P173	10	199.72	3.42	5.15	-838.14	J186	J188
P181	10	622.29	1.80	1.57	-441.13	J192	J194
P183	8	334.30	1.07	0.78	168.38	J194	J196
P185	8	483.16	1.53	1.50	239.19	J196	J198
P187	8	338.37	0.17	0.03	-26.31	J198	J192
P197	8	408.05	2.80	4.61	438.83	J204	J188
P203	8	280.00	0.95	0.62	-149.09	J208	J270
P207	8	283.75	1.16	0.90	-182.03	J210	J212
P209	8	248.55	0.01	0.00	1.71	J212	J198
P211	8	261.32	1.22	0.99	-190.84	J212	J214
P215	8	351.95	0.58	0.25	-90.93	J216	J218
P221	10	687.25	2.53	2.94	-618.75	J194	J54
P223	10	280.00	2.16	2.20	-529.59	J208	J230
P225	8	431.95	0.92	0.59	144.03	J228	J230
P227	8	280.00	1.10	0.82	172.99	J228	J210
P231	10	280.00	1.60	1.26	-391.20	J230	J232
P233	8	432.29	0.36	0.10	-56.20	J232	J226
P235	8	280.00	0.85	0.51	133.88	J226	J228
P239	10	325.70	1.39	0.98	-341.45	J232	J234
P241	10	322.06	0.30	0.06	-72.26	J234	J224
P243	8	280.00	1.25	1.04	196.53	J224	J226
P245	10	279.99	1.77	1.52	-433.50	J266	J222
P247	8	280.00	0.57	0.24	89.48	J222	J216
P249	10	547.93	1.55	1.19	-380.38	J222	J220
P253	10	428.92	2.43	2.74	-595.55	J220	J56
P255	10	1259.50	1.12	0.65	-273.06	J234	J236
P257	8	994.05	0.69	0.34	-107.47	J236	J238
P259	8	460.58	0.30	0.08	47.75	J238	J240
P261	8	753.00	0.97	0.65	152.00	J240	J222
P263	8	683.53	0.69	0.35	-108.43	J240	J242

FIGURE 11
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J184 CASE STUDY
FIRE FLOW AT NORTHERNWESTERN RESIDENTIAL
SINGLE ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P265	8	188.34	1.06	0.76	-166.30	J242	J244
P267	8	744.35	0.34	0.09	53.69	J242	J220
P269	8	454.85	1.58	1.60	-247.56	J244	J84
P271	8	387.01	0.47	0.17	74.12	J244	J246
P273	8	689.15	0.70	0.36	110.28	J246	J248
P275	8	49.42	0.99	0.67	155.31	J248	J238
P277	8	725.00	0.32	0.08	-50.58	J248	J252
P279	10	521.35	0.97	0.50	-237.46	J252	J254
P281	8	716.70	0.36	0.10	56.80	J254	J246
P283	10	558.99	0.68	0.26	-165.68	J236	J250
P285	10	1035.61	0.71	0.28	-173.85	J250	J252
P287	10	548.09	1.28	0.84	-314.22	J254	J256
P289	12	530.42	0.96	0.34	-339.88	J256	J112
P291	12	106.45	0.47	0.09	164.56	J86	J110
P307	18	493.61	3.02	1.77	2395.10	RES9006	J260
P309	12	886.01	0.70	0.19	246.41	J26	J28
P311	12	255.49	4.16	5.16	1467.32	J260	J16
P325	10	280.01	1.13	0.67	-277.59	J224	J266
P333	8	151.62	2.25	3.06	-351.96	J270	J210
P335	8	280.00	1.24	1.02	-194.34	J204	J270
P337	8	279.99	1.60	1.63	-250.76	J214	J272
P339	8	280.00	1.12	0.85	-175.77	J272	J216
P341	8	42.39	0.51	0.20	-79.74	J272	J196
P343	8	432.19	1.04	0.73	-162.57	J196	J218
P345	8	367.25	1.65	1.72	-258.14	J218	J220
P349	8	720.30	2.60	4.02	-407.59	J188	J192
P353	8	605.95	1.61	1.66	-252.88	J204	J198
P355	10	884.02	2.74	3.42	671.41	J208	J186
P357	8	280.01	1.24	1.01	-193.71	J228	J214
P359	12	593.66	0.65	0.17	229.59	J56	J82
P361	10	528.28	1.24	0.78	-302.64	J60	J64
P365	8	560.00	0.93	0.60	-146.24	J214	J266
P367	12	491.00	0.24	0.03	84.66	J106	J116
P369	8	420.85	0.07	0.00	10.57	J114	J280
P371	10	338.28	0.50	0.15	122.80	J72	J278
P373	8	502.06	0.05	0.00	8.40	J278	J96
P375	10	544.68	0.44	0.12	108.73	J278	J276
P377	10	280.92	0.43	0.11	105.77	J276	J274
P379	8	280.00	0.16	0.02	25.07	J94	J274
P381	10	548.29	0.51	0.15	123.90	J274	J116
P383	8	299.23	1.30	1.12	204.41	J36	J50
P385	8	300.00	1.34	1.17	209.43	J50	J58

MAX / MIN VALUE

FIGURE 12
EAST AREA 1
SUMMARY OF DOMESTIC WATER STORAGE TANK SIZING
SINGLE ZONE

$V_{(T)} = V_{(RS)} + V_{(FS)} + V_{(ES)}$

where

$V_{(T)}$ = Total Storage Requirement

$V_{(RS)}$ = Regulatory Storage Requirement

$V_{(FS)}$ = Fire Flow Storage Requirement

$V_{(ES)}$ = Emergency Storage Requirement

$V_{(RS)}$ = 14 hours at 1.5 x MDD and 10 hours at 0.3 x MDD

$V_{(RS)}$ = 14h x 1.5 x 856.2 gal/min x 60min/hour +10h x 0.3 x 856.2 gal/min x 60min/hour

$V_{(RS)}$ = 1,232,928 gal

$V_{(FS)}$ = 4 hours at 4,500 gpm

$V_{(FS)}$ = 4H x 4,500gal/min x 60min/hr

$V_{(FS)}$ = 1,080,000 gal

$V_{(ES)}$ = MDD x 8 Hours

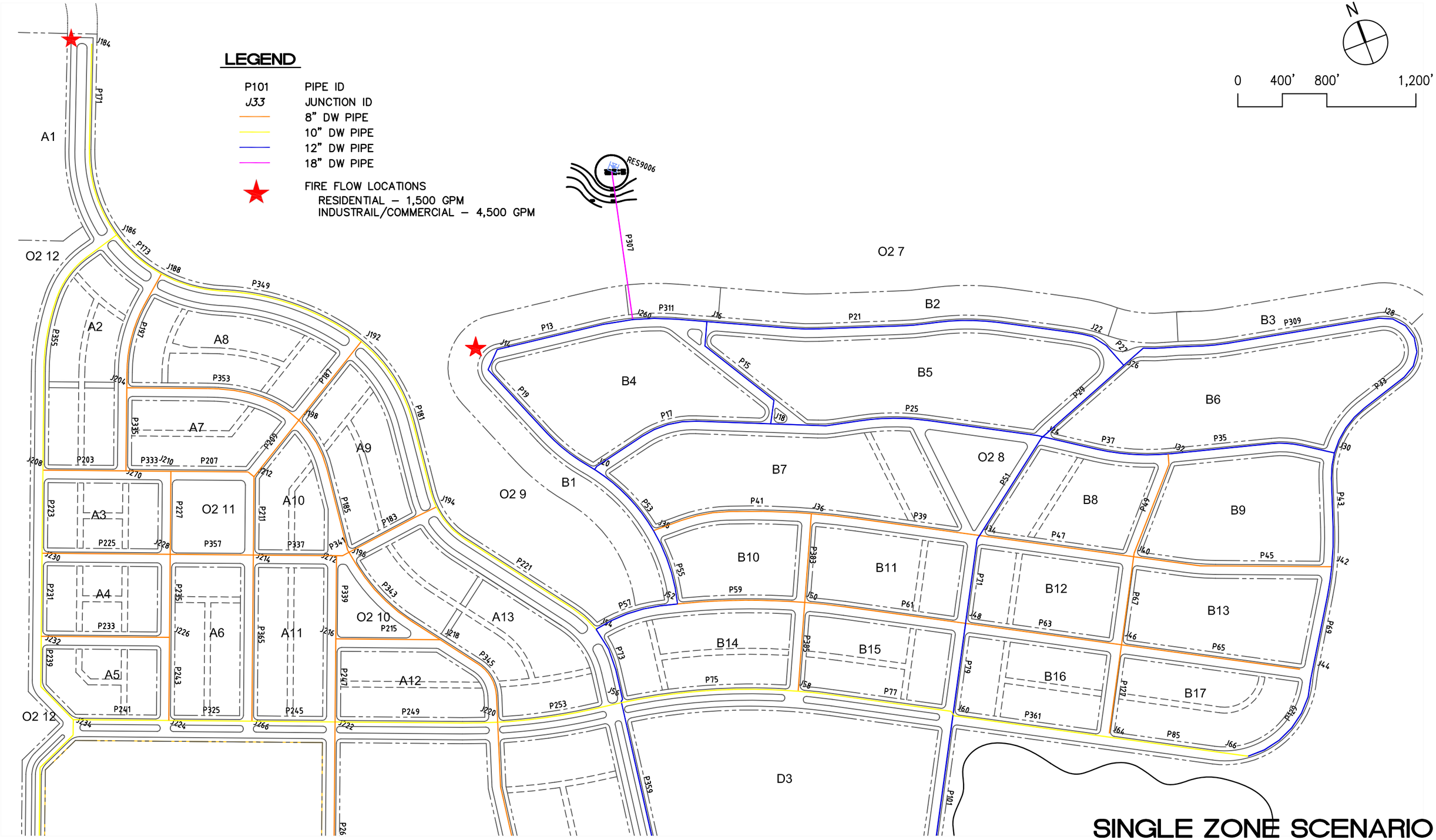
$V_{(ES)}$ = 912.8gal/min x 8h x 60min/hour

$V_{(FS)}$ = 410,976 gal

$V_{(T)}$ = 1,232,928 gal + 1,080,000 gal + 410,976 gal

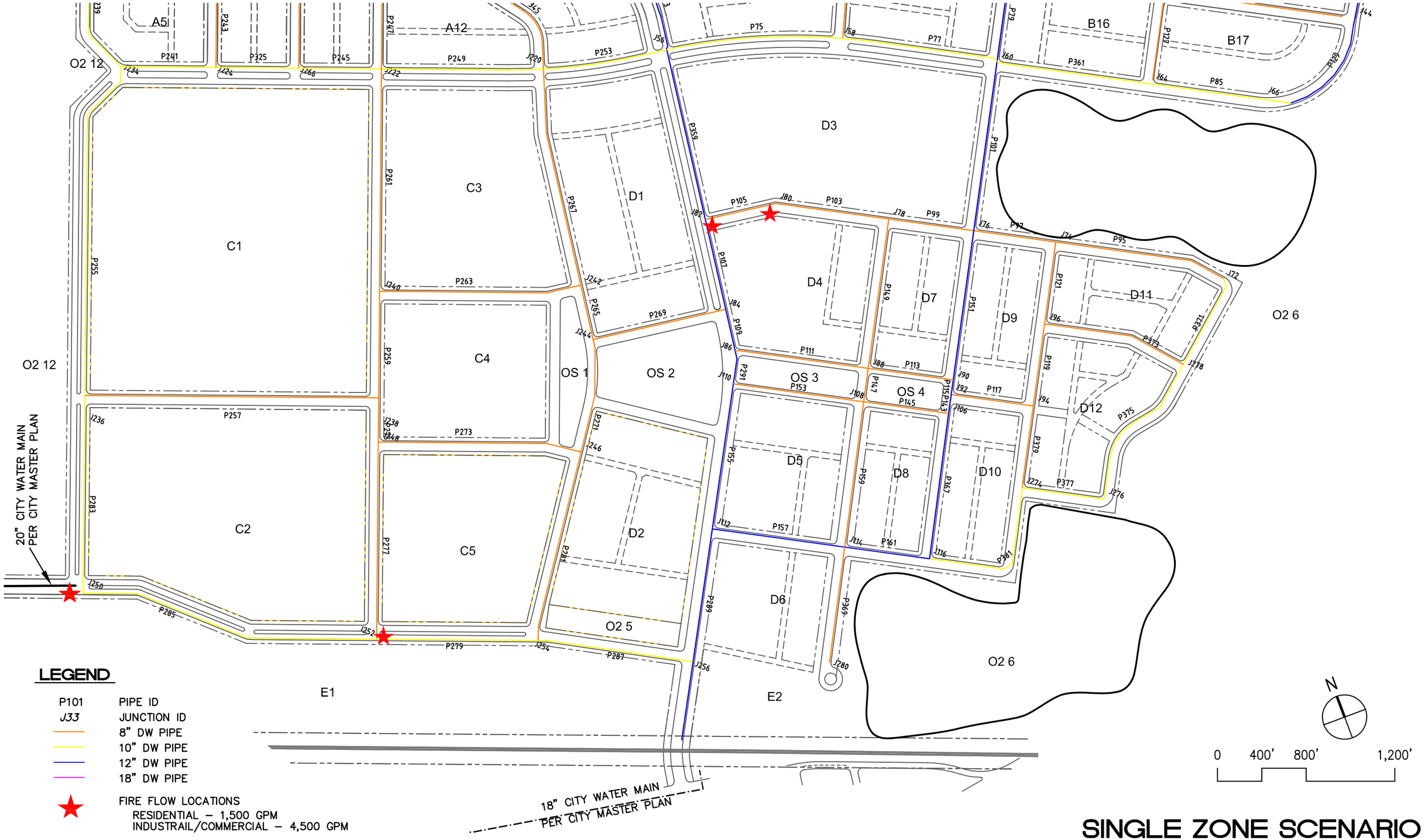
$V_{(T)}$ = 2,723,904 gal *say* ***$V_{(T)}$ = 3.0 MG***

Calculations based on "Potable Water System Master Plan" by Boyle Eng., dated Oct. 2005, pg. 19-20



SINGLE ZONE SCENARIO

EAST AREA 1 DOMESTIC WATER TECHNICAL REPORT
FIGURE 13



SINGLE ZONE SCENARIO

EAST AREA 1 DOMESTIC WATER TECHNICAL REPORT
FIGURE 13

DUAL ZONE SECTION

Objectives

The objective of this study is to provide a blueprint for the design of a dual-zoned domestic water system within the East Area 1 project as well as developing conceptual design parameters for two proposed domestic water storage tanks required to service the East Area 1 project at elevations provided by the city. The East Area 1 project will be designed to meet or exceed the City of Santa Paula's domestic water design criterion as established in the "Potable Water System Master Plan". The design guidelines set forth in this report are consistent with those set forth in the City's "Potable Water System Master Plan". Along with the City's upgrades and future projects, this study demonstrates the benefit of having dual zones. This alternative scenario of dual zones concurs with the existing elevation zones of the City and can strengthen the City's overall water facilities. Having two zones will incur the need for two storage tanks. The proposed storage tanks are placed in the foothills of the Topatopa Mountains north of the EA 1 project. Sizing of these storage facilities and related infrastructure are discussed further in this report.

Procedure

The East Area 1 domestic water system was developed utilizing the following 6 basic design steps:

1. Define Design Parameters

   Design parameters for the domestic water system were developed from the City's "Potable Water System Master Plan" as set forth in Chapter 3 – Design Guidelines. The criterion used in this analysis follows those set forth in Table 3-10 found within Chapter 3. The design parameters used for this report are also referenced on Figure 3. Finished grading elevations are based on Figure 3-8 of the Specific Plan. We also assumed 5' depth to water pipe elevation from finished surface.

2. Define Land Use Types and Locations

   Working in conjunction with the land planning team, the land use types within the Specific Plan were placed geographically throughout the site in accordance with the Specific Plan Regulating Plan (see Figure 5-1). A reasonable mix of multi-family homes and single family homes, along with the appropriate commercial, retail, civic, school, and other Specific Plan uses were spread throughout the site on a block by block basis. The mix of residential units was weighted more towards a multi-family

unit as these generate more water demand. This yields a bit more conservative water system model, appropriate for an early study of the system. Later on in the development cycle, typically at a tentative map stage, a more definitive water system model will be developed and processed. The modeling included herein will provide for an upper boundary (most conservative) analysis should the ultimate development of EA 1 proceed.

3. Assign Domestic Water Consumption Factors

Based on the aforementioned design parameters, specific domestic water consumption rates were applied to each land use based on type of land use. The domestic water consumption rates for each land use can be seen in Figure 5. The consumption rates were then logically spread out to junctions (nodes) within the domestic water system. See Figure 21 for junction node locations. The overall demands at each junction can be seen in Figure 14.

4. Model Domestic Water System

After each individual junction received a domestic water consumption rate, the resultant water demands were logically linked together in a model. Pipes connecting the various junctions were developed based on potential phasing of the project, demand types and locations, and internal system redundancy. Pipe sizes were iterated between peak hour demand (PHD) modeling and maximum day demand plus fire flow (MDD+FF) modeling to achieve consistency of design parameters set forth in this report. The results of these models can be seen in Figure 15 (PHD) and Figures 16-19 (MDD + FF).

5. Prepare Storage Tank Sizes Estimate

After consumption rates were developed for the entire project, maximum day demands were calculated. These demands were then divided between the two zones. From this, maximum day value regulatory storage and emergency storage volumes were calculated. Worst case scenario fire flow storage amounts were then calculated. The summation of these three volumes became the storage tank volume. The results of these calculations can be seen in Figure 20. (Parameters set by City's Potable Water System Master Plan (Oct. 2006), pg. 19-20.)

6. Prepare Summary Graphic

   After demands were logically linked together in a model a resultant water system graphic was prepared. The results of this model can be seen in Figure 21.

Proposed Domestic Water System

The East Area 1 Specific Plan anticipates a macro phasing of the project as seen in Figure 4-1 of the Specific Plan. Keeping this in mind, and taking into consideration the proposed grading of the project (Specific Plan, Fig. 3-8), the following layout of the system is proposed:

Project Backbone Facilities – A looped system in the major north-south road (Hallock Drive) and the major east-west road (Central Boulevard) will serve as the internal backbone domestic water system. These domestic water lines are 10” and 12” diameter facilities. A ring around the outside of the project’s five main phases will complete the project backbone looped system. These domestic water lines are 10” and 12” diameter facilities as well. A quick glance at the Specific Plan’s phasing diagram (Figure 4-1) and the proposed water system (Figure 21 herein) shows that the five major phases have been ringed by backbone domestic water facilities, thus creating pods of development that can occur independent of one another. Additionally, we have proposed pressure reducing valves creating two zones. We have isolated the higher elevation at the northeast of the project as zone 1 and the rest of the project as zone 2.

Project Internal Facilities – Within each of the five major phases are several other domestic water lines. Typically these will be the lines that individual customers will hook up to. The majority of these internal facilities are 8” pipes. A few reaches of internal facilities at the northern end of in the northeast district have been upsized to 12”. This is due to the fact that these pipes carry the majority of the flows for all areas. Line losses and velocities eventually upsized these internal lines.

On-site water sources are discussed in the City’s Potable Water System Master Plan under Sources of Supply, pg. 81. New wells are proposed and layouts can be seen in the Specific Plan on Fig. 3-3 and Master Plan on Plate 3. Water supply is then treated at the city’s softening plant discussed in Section 11 of the Master Plan, pg. 131. The proposed domestic water system for East Area 1 can be seen in Figure 21, herein.

Two Proposed Domestic Water Storage Tanks

Two new domestic water tanks are proposed to service East Area 1. We have preliminarily sized these tanks with parameters set by the 'Potable Water System Master Plan' (Boyle, Oct. 2005) and the demands shown herein on Figure 5. Tank sizing for both of the tanks can be found herein on Figure 20. A preliminary design of the tank was determined by the maximum daily demand and parameter's set by Master Plan, pg. 19-20. We have also determined to bury the tanks for aesthetic reasons at the proposed elevations of 488' and 658', so a reinforced concrete tank will be needed. Design specifications will be determined at a later date.

Conclusions

Based on the modeling prepared by Huitt-Zollars the East Area 1 domestic water system depicted in Figure 21 is in accordance with City of Santa Paula design guidelines. Pressures and line losses fall within acceptable ranges. A summary of maximum and minimum pressures, line losses, and velocities can be seen in the following table. Further, the East Area 1 domestic water system has been designed to contribute to existing neighborhoods with the addition of the proposed storage facilities.

MODELING SUMMARY
(Dual Zone)
EA1 DW Technical Report

SCENARIO	Max. Pressure (psi)	Min. Pressure (psi)	Max. Line Loss (ft/K ft)	Max. Velocity (fps)
PHD (Fig 15)	147.68	26.94	0.12	0.83
MDD + FF (Fig 16) (1)	147.73	26.74	4.60	3.22
MDD + FF (Fig 17) (2)	147.08	26.95	2.59	2.87
MDD + FF (Fig 18) (1)	147.73	26.74	1.46	3.25
MDD + FF (Fig 19) (2)	147.73	26.91	0.75	1.90

(1) Community College or School Fire Flow – 4,500 gpm

(2) Residential Fire Flow – 1,500 gpm

A comparison of City's Potable Water System Master Plan and EA1 Specific Plan can be seen below:

PROJECT COMPARISON

City PWSMP EA 1 Project vs. Specific Plan Project

	SF RESIDENTIAL	MF RESIDENTIAL	COMMERCIAL	SCHOOL	GOLF COURSE
City PWSMP EA 1 Project (1)	742 DU	158 DU	0 SF	10 AC	163.5 AC
Specific Plan EA 1 Project (2)	607 DU	893 DU	435,000 SF(3)	22.4 AC(4)	0 AC
DIFFERENCE	***- 135 DU***	***+735 DU***	***+435,00 SF***	***+12.4 AC***	***-163.5 AC***

(1) From City of Santa Paula "Potable Water System Master Plan", Table 5-7

(2) From East Area 1 Specific Plan, Table 2-1

(3) Including Light Industrial/Employ. SF

(4) Including Community College AC

References

- Boyle Engineering Corporation, September 2005, "City of Santa Paula Wastewater System Master Plan"
- HDR Town Planning, revision date to be determined, "East Area 1 Specific Plan, Santa Paula, California"

List of Preparers

- Rossette A. Sunio, PE RCE 68319, Exp 9/30/07

FIGURE 14
EAST AREA 1
SUMMARY OF DOMESTIC WATER DEMANDS BY NODES
DUAL ZONE

JUNCTION NO.	AVG. DAY DEMAND (GPM)	MAX. DAY DEMAND (GPM)	PEAK HOUR DEMAND (GPM)
J-14	4.06	6.09	10.95
J-16	8.13	12.20	21.96
J-18	4.37	6.56	11.81
J-20	6.35	9.53	17.15
J-22	6.06	9.08	16.35
J-24	9.77	14.66	26.39
J-26	7.34	11.01	19.83
J-28	5.05	7.57	13.63
J-30	4.66	6.99	12.58
J-32	3.50	5.25	9.45
J-34	8.11	12.17	21.90
J-36	3.10	4.64	8.36
J-38	6.17	9.26	16.66
J-40	7.29	10.94	19.69
J-42	3.88	5.82	10.48
J-44	4.71	7.06	12.71
J-46	8.52	12.78	23.01
J-48	8.23	12.35	22.23
J-50	8.12	12.18	21.92
J-52	5.68	8.52	15.34
J-54	2.41	3.61	6.51
J-56	11.23	16.85	30.33
J-58	3.80	5.69	10.25
J-60	4.98	7.47	13.45
J-64	4.73	7.09	12.76
J-66	2.61	3.92	7.06
J-72	1.81	2.72	4.89
J-74	4.46	6.69	12.04
J-76	7.09	10.63	19.14
J-78	18.25	27.38	49.29
J-80	18.26	27.39	49.31
J-82	19.42	29.13	52.43
J-84	4.77	7.15	12.87
J-86	14.45	21.67	39.01
J-88	18.68	28.02	50.44
J-90	4.24	6.35	11.43
J-92	5.30	7.95	14.32
J-94	5.30	7.95	14.32
J-96	3.78	5.68	10.22
J-106	4.24	6.35	11.44

FIGURE 14
EAST AREA 1
SUMMARY OF DOMESTIC WATER DEMANDS BY NODES
DUAL ZONE

JUNCTION NO.	AVG. DAY DEMAND (GPM)	MAX. DAY DEMAND (GPM)	PEAK HOUR DEMAND (GPM)
J-108	18.17	27.25	49.05
J-110	13.93	20.90	37.61
J-112	31.04	46.56	83.80
J-114	25.21	37.82	68.08
J-116	6.89	10.33	18.60
J-184	3.56	5.34	9.62
J-186	2.81	4.21	7.58
J-188	5.52	8.28	14.90
J-192	4.82	7.23	13.01
J-194	6.16	9.24	16.64
J-196	8.01	12.02	21.63
J-198	9.55	14.33	25.79
J-204	5.60	8.39	15.11
J-208	4.85	7.27	13.09
J-210	2.04	3.06	5.51
J-212	4.73	7.10	12.78
J-214	8.30	12.45	22.41
J-216	3.09	4.64	8.35
J-218	3.09	4.64	8.35
J-220	7.15	10.72	19.30
J-222	6.26	9.39	16.90
J-224	5.87	8.80	15.85
J-226	4.30	6.45	11.62
J-228	7.04	10.57	19.02
J-230	3.76	5.64	10.15
J-232	4.30	6.45	11.62
J-234	2.59	3.88	6.98
J-236	0.06	0.09	0.00
J-238	0.06	0.09	0.00
J-240	2.79	4.18	0.01
J-242	2.79	4.18	0.01
J-244	4.77	7.15	12.87
J-246	13.76	20.64	27.17
J-248	3.70	5.55	0.01
J-250	5.45	8.17	14.55
J-252	8.68	13.03	14.55
J-254	13.30	19.95	27.17
J-256	17.11	25.66	46.19
J-260	0.00	0.00	0.00
J-266	6.45	9.67	17.41
J-270	5.69	8.53	15.36
J-272	3.16	4.75	8.55
J-274	4.63	6.94	12.49

FIGURE 14
EAST AREA 1
SUMMARY OF DOMESTIC WATER DEMANDS BY NODES
DUAL ZONE

JUNCTION NO.	AVG. DAY DEMAND (GPM)	MAX. DAY DEMAND (GPM)	PEAK HOUR DEMAND (GPM)
J-276	1.97	2.96	5.33
J-278	3.78	5.68	10.22
J-280	7.05	10.57	19.03
J-282	0.00	0.00	0.00
J-284	0.00	0.00	0.00
J-286	0.00	0.00	0.00

FIGURE 15
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
PEAK HOUR CASE STUDY
DUAL ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J14	98.75	450.00	10.95
J16	105.25	435.00	21.96
J18	114.34	414.00	11.81
J20	116.94	408.00	17.15
J22	109.56	425.00	16.35
J24	120.82	399.00	26.39
J26	109.78	424.50	19.83
J28	118.22	405.00	13.63
J30	124.72	390.00	12.58
J32	123.42	393.00	9.45
J34	129.49	379.00	21.90
J36	124.72	390.00	8.36
J38	126.03	387.00	16.66
J40	132.52	372.00	19.69
J42	133.82	369.00	10.48
J44	142.92	348.00	12.71
J46	141.62	351.00	23.01
J48	138.59	358.00	22.23
J50	136.64	362.50	21.92
J52	135.13	366.00	15.34
J54	67.50	352.00	6.51
J56	70.09	346.00	30.33
J58	141.40	351.50	10.25
J60	143.35	347.00	13.45
J64	146.38	340.00	12.76
J66	**147.68**	337.00	7.06
J72	78.25	327.00	4.89
J74	80.41	322.00	12.04
J76	76.95	330.00	19.14
J78	78.68	326.00	49.29
J80	80.00	323.00	49.31
J82	77.41	329.00	52.43
J84	78.92	325.50	12.87
J86	79.35	324.50	39.01
J88	83.01	316.00	50.44
J90	83.45	315.00	11.43
J92	83.88	314.00	14.32
J94	84.53	312.50	14.32
J96	82.14	318.00	10.22
J106	84.10	313.50	11.44
J108	83.45	315.00	49.05
J110	79.78	323.50	37.61
J112	83.02	316.00	83.80
J114	85.83	309.50	68.08
J116	88.65	303.00	18.60

FIGURE 15
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
PEAK HOUR CASE STUDY
DUAL ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J184	47.71	397.50	9.62
J186	54.86	381.00	7.58
J188	56.60	377.00	14.90
J192	61.15	366.50	13.01
J194	64.20	359.50	16.64
J196	67.66	351.50	21.63
J198	63.75	360.50	25.79
J204	59.63	370.00	15.11
J208	61.36	366.00	13.09
J210	63.53	361.00	5.51
J212	64.83	358.00	12.78
J214	66.56	354.00	22.41
J216	68.95	348.50	8.35
J218	70.04	346.00	8.35
J220	72.66	340.00	19.30
J222	71.34	343.00	16.90
J224	70.03	346.00	15.85
J226	67.43	352.00	11.62
J228	65.04	357.50	19.02
J230	63.53	361.00	10.15
J232	65.91	355.50	11.62
J234	69.16	348.00	6.98
J236	79.99	323.00	0.00
J238	81.30	320.00	0.00
J240	76.96	330.00	0.00
J242	75.88	332.50	0.00
J244	77.40	329.00	12.87
J246	79.56	324.00	27.17
J248	81.73	319.00	0.00
J250	78.91	325.50	14.55
J252	83.67	314.50	14.55
J254	85.84	309.50	27.17
J256	88.22	304.00	46.19
J260	109.38	425.50	0.00
J266	70.68	344.50	17.41
J270	62.70	362.90	15.36
J272	67.65	351.50	8.55
J274	86.82	307.20	12.49
J276	86.04	309.00	5.33
J278	81.71	319.00	10.22
J280	88.25	303.90	19.03
J282	61.49	365.90	0.00
J284	67.54	351.90	0.00
J286	**26.94**	445.80	0.00

MAX / MIN VALUE

FIGURE 15
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
PEAK HOUR CASE STUDY
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P13	12	459.90	0.40	0.07	140.77	J260	J14
P15	12	432.97	0.31	0.04	110.89	J16	J18
P17	12	637.47	0.01	0.00	-4.62	J18	J20
P19	12	541.63	0.37	0.06	129.82	J14	J20
P21	12	1349.24	0.29	0.04	102.30	J16	J22
P25	12	925.73	0.29	0.04	-103.70	J24	J18
P27	12	94.90	0.24	0.03	85.95	J22	J26
P29	12	363.72	0.08	0.00	28.51	J26	J24
P33	12	650.46	0.07	0.00	23.98	J28	J30
P35	12	564.77	0.07	0.00	-24.05	J30	J32
P37	12	429.17	0.14	0.01	-49.14	J32	J24
P39	8	583.73	0.09	0.01	-13.88	J34	J36
P41	8	529.63	0.23	0.04	-35.97	J36	J38
P43	12	384.24	0.10	0.01	35.45	J30	J42
P45	8	671.75	0.01	0.00	1.61	J42	J40
P47	8	521.61	0.07	0.01	-11.26	J40	J34
P49	8	368.79	0.10	0.01	15.64	J32	J40
P51	12	395.02	0.16	0.01	56.68	J24	J34
P53	12	293.06	0.31	0.04	108.05	J20	J38
P55	12	261.82	0.16	0.01	55.42	J38	J52
P57A	12	273.94	0.00	0.00	0.00	J52	V8008
P59	8	417.32	0.26	0.05	40.08	J52	J50
P61	8	558.37	0.09	0.01	13.32	J50	J48
P63	8	528.28	0.06	0.00	9.41	J48	J46
P65	8	652.48	0.02	0.00	-2.62	J46	J44
P67	8	300.00	0.06	0.00	8.82	J40	J46
P69	12	357.68	0.07	0.00	-23.36	J44	J42
P71	12	301.45	0.11	0.01	-37.41	J48	J34
P73	24	241.68	0.68	0.08	960.40	J284	J56
P75A	10	561.34	0.00	0.00	0.00	J58	V8010
P77	10	542.26	0.03	0.00	8.31	J58	J60
P79	12	313.00	0.05	0.00	-19.09	J60	J48
P85	10	431.02	0.00	0.00	-0.97	J64	J66
P95	12	585.11	0.05	0.00	17.62	J74	J72
P97	12	280.01	0.12	0.01	-41.42	J74	J76
P99	12	290.02	0.24	0.03	-85.91	J76	J78
P101A	12	44.00	0.00	0.00	0.00	J60	V8012
P103	12	386.49	0.44	0.08	-155.33	J78	J80
P105	12	248.99	0.58	0.13	-204.64	J80	J82
P107	18	311.98	0.57	0.08	448.96	J82	J84
P109	18	154.71	0.49	0.06	385.82	J84	J86
P111	8	456.95	0.32	0.08	50.36	J86	J88
P113	8	290.00	0.07	0.01	11.59	J88	J90
P115	12	45.00	0.07	0.00	25.51	J90	J92
P117	8	280.01	0.08	0.01	12.46	J92	J94

FIGURE 15
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
PEAK HOUR CASE STUDY
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P119	8	280.00	0.01	0.00	-1.44	J94	J96
P121	8	280.00	0.08	0.01	-11.76	J96	J74
P127	8	313.00	0.01	0.00	2.16	J64	J46
P129	12	430.17	0.02	0.00	-8.03	J66	J44
P143	12	69.00	0.00	0.00	1.27	J106	J92
P145	8	290.00	0.07	0.00	-10.69	J106	J108
P147	8	114.00	0.05	0.00	-8.46	J108	J88
P149	8	515.00	0.13	0.02	-20.13	J88	J78
P151	12	515.00	0.07	0.00	-25.35	J90	J76
P153	8	445.25	0.31	0.08	-48.42	J108	J110
P155	18	491.01	0.27	0.02	210.41	J110	J112
P157	12	452.02	0.36	0.05	126.22	J112	J114
P159	8	491.01	0.02	0.00	2.85	J114	J108
P161	12	286.89	0.10	0.01	36.26	J114	J116
P171	18	651.45	0.01	0.00	-9.62	J184	J186
P173	12	199.72	0.11	0.01	-40.17	J186	J188
P181	12	622.29	0.33	0.05	-115.83	J192	J194
P183	10	334.30	0.34	0.07	82.88	J194	J196
P185	8	483.16	0.20	0.04	32.06	J196	J198
P187	8	338.37	0.20	0.04	-31.84	J198	J192
P197	8	408.05	0.10	0.01	-15.91	J204	J188
P203	8	280.00	0.03	0.00	-4.72	J208	J270
P207	8	283.75	0.11	0.01	-17.65	J210	J212
P209	8	248.55	0.15	0.02	-22.88	J212	J198
P211	8	261.32	0.05	0.00	-7.55	J212	J214
P215	8	351.95	0.18	0.03	-28.68	J216	J218
P221	12	687.25	0.61	0.17	-215.35	J194	J54
P223	10	280.00	0.06	0.00	14.59	J208	J230
P225	8	431.95	0.03	0.00	4.51	J228	J230
P227	8	280.00	0.05	0.00	-8.09	J228	J210
P231	10	280.00	0.04	0.00	8.95	J230	J232
P233	8	432.29	0.02	0.00	-3.57	J232	J226
P235	8	280.00	0.04	0.00	-6.08	J226	J228
P239	10	325.70	0.00	0.00	0.90	J232	J234
P241	10	322.06	0.07	0.00	-17.34	J234	J224
P243	8	280.00	0.06	0.00	9.11	J224	J226
P245	10	279.99	0.27	0.05	-67.25	J266	J222
P247	8	280.00	0.11	0.01	-17.76	J222	J216
P249	10	547.93	0.40	0.10	-98.33	J222	J220
P253	12	428.92	0.64	0.18	-224.05	J220	J56
P255	10	1259.50	0.05	0.00	11.27	J234	J236
P257	8	994.05	0.09	0.01	-14.56	J236	J238
P259	12	460.58	0.15	0.01	-53.79	J238	J240
P261	10	753.00	0.13	0.01	-31.94	J240	J222
P263	10	683.53	0.09	0.01	-21.86	J240	J242

FIGURE 15
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
PEAK HOUR CASE STUDY
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P265	10	188.34	0.11	0.01	26.78	J242	J244
P267	8	744.35	0.31	0.08	-48.65	J242	J220
P269	12	454.85	0.14	0.01	-50.27	J244	J84
P271	12	387.01	0.18	0.02	64.19	J244	J246
P273	12	689.15	0.05	0.00	17.17	J246	J248
P275	12	49.42	0.11	0.01	-39.23	J248	J238
P277	12	725.00	0.16	0.01	56.39	J248	J252
P279	18	521.35	0.07	0.00	53.12	J252	J254
P281	8	716.70	0.13	0.01	-19.85	J254	J246
P283	18	558.99	0.03	0.00	25.83	J236	J250
P285	12	1035.61	0.03	0.00	11.28	J250	J252
P287	18	548.09	0.06	0.00	45.80	J254	J256
P289	18	530.42	0.00	0.00	-0.39	J256	J112
P291	18	106.45	0.37	0.04	296.44	J86	J110
P307	18	991.28	0.47	0.06	375.92	RES9006	J260
P309	12	886.01	0.11	0.01	37.61	J26	J28
P311	12	250.87	0.67	0.17	235.15	J260	J16
P325	10	280.01	0.17	0.02	-42.30	J224	J266
P333	8	151.62	0.03	0.00	-4.05	J270	J210
P335	8	280.00	0.10	0.01	16.03	J204	J270
P337	8	279.99	0.28	0.06	-43.94	J214	J272
P339	8	280.00	0.02	0.00	-2.57	J272	J216
P341	8	42.39	0.32	0.08	-49.92	J272	J196
P343	8	432.19	0.13	0.02	-20.73	J196	J218
P345	8	367.25	0.37	0.11	-57.76	J218	J220
P349	12	720.30	0.20	0.02	-70.97	J188	J192
P353	8	605.95	0.10	0.01	-15.23	J204	J198
P355	10	884.02	0.09	0.01	-22.97	J208	J186
P357	8	280.01	0.14	0.02	-21.52	J228	J214
P359	18	593.66	0.89	0.18	706.03	J56	J82
P361	10	528.28	0.06	0.00	13.95	J60	J64
P365	8	560.00	0.05	0.00	-7.54	J214	J266
P367	12	491.00	0.01	0.00	-2.02	J106	J116
P369	8	420.85	0.12	0.01	19.03	J114	J280
P371	10	338.28	0.05	0.00	12.73	J72	J278
P373	8	502.06	0.00	0.00	-0.10	J278	J96
P375	10	544.68	0.01	0.00	2.61	J278	J276
P377	10	280.92	0.01	0.00	-2.72	J276	J274
P379	8	280.00	0.00	0.00	-0.43	J94	J274
P381	10	548.29	0.06	0.00	-15.64	J274	J116
P383	8	299.23	0.09	0.01	13.72	J36	J50
P385	8	300.00	0.12	0.01	18.57	J50	J58
P387	24	265.82	**0.84**	**0.12**	1182.26	RES9008	J286
P389	24	1303.67	**0.84**	**0.12**	1182.26	J286	J282
P391	24	255.63	**0.84**	**0.12**	1182.26	J282	J284

FIGURE 15
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
PEAK HOUR CASE STUDY
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P393	12	23.46	0.63	0.16	-221.86	J54	J284
P57B	12	16.65	0.00	0.00	0.00	V8008	J54
P75B	10	19.48	0.00	0.00	0.00	V8010	J56
P101B	12	531.00	0.00	0.00	0.00	V8012	J76

MAX / MIN VALUE

FIGURE 16
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J250/J252 CASE STUDY
FIRE FLOW AT COMMUNITY COLLEGE
DUAL ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J14	98.78	450.00	6.09
J16	105.28	435.00	12.20
J18	114.37	414.00	6.56
J20	116.97	408.00	9.53
J22	109.60	425.00	9.08
J24	120.87	399.00	14.66
J26	109.82	424.50	11.01
J28	118.27	405.00	7.57
J30	124.77	390.00	6.99
J32	123.47	393.00	5.25
J34	129.53	379.00	12.17
J36	124.77	390.00	4.64
J38	126.07	387.00	9.26
J40	132.57	372.00	10.94
J42	133.87	369.00	5.82
J44	142.97	348.00	7.06
J46	141.67	351.00	12.78
J48	138.63	358.00	12.35
J50	136.68	362.50	12.18
J52	135.17	366.00	8.52
J54	66.14	352.00	3.61
J56	68.62	346.00	16.85
J58	141.45	351.50	5.69
J60	143.40	347.00	7.47
J64	146.43	340.00	7.09
J66	**147.73**	337.00	3.92
J72	75.63	327.00	2.72
J74	77.80	322.00	6.69
J76	74.35	330.00	10.63
J78	76.15	326.00	27.38
J80	77.62	323.00	27.39
J82	75.14	329.00	29.13
J84	76.36	325.50	7.15
J86	76.72	324.50	21.67
J88	80.37	316.00	28.02
J90	80.80	315.00	6.35
J92	81.23	314.00	7.95
J94	81.88	312.50	7.95
J96	79.51	318.00	5.68
J106	81.44	313.50	6.35
J108	80.78	315.00	27.25
J110	77.10	323.50	20.90
J112	80.13	316.00	46.56
J114	83.07	309.50	37.82
J116	85.94	303.00	10.33
J184	45.55	397.50	5.34

FIGURE 16
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J250/J252 CASE STUDY
FIRE FLOW AT COMMUNITY COLLEGE
DUAL ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J186	52.70	381.00	4.21
J188	54.45	377.00	8.28
J192	59.08	366.50	7.23
J194	62.26	359.50	9.24
J196	65.55	351.50	12.02
J198	61.59	360.50	14.33
J204	57.44	370.00	8.39
J208	59.08	366.00	7.27
J210	61.27	361.00	3.06
J212	62.59	358.00	7.10
J214	64.30	354.00	12.45
J216	66.77	348.50	4.64
J218	67.94	346.00	4.64
J220	70.68	340.00	10.72
J222	68.98	343.00	9.39
J224	67.55	346.00	8.80
J226	64.99	352.00	6.45
J228	62.72	357.50	10.57
J230	61.17	361.00	5.64
J232	63.44	355.50	6.45
J234	66.51	348.00	3.88
J236	74.84	323.00	0.09
J238	77.93	320.00	0.09
J240	73.92	330.00	4.18
J242	73.04	332.50	4.18
J244	74.56	329.00	7.15
J246	76.41	324.00	20.64
J248	78.35	319.00	5.55
J250	73.62	325.50	**2258.17**
J252	79.65	314.50	**2263.03**
J254	82.23	309.50	19.95
J256	84.97	304.00	25.66
J260	109.40	425.50	0.00
J266	68.29	344.50	9.67
J270	60.45	362.90	0.00
J272	65.51	351.50	4.75
J274	84.16	307.20	6.94
J276	83.39	309.00	2.96
J278	79.08	319.00	5.68
J280	85.49	303.90	10.57
J282	60.33	365.90	0.00
J284	66.20	351.90	0.00
J286	**26.74**	445.80	0.00

MAX / MIN VALUE

FIGURE 16
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J250/J252 CASE STUDY
FIRE FLOW AT COMMUNITY COLLEGE
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P13	12	459.90	0.22	0.02	78.20	J260	J14
P15	12	432.97	0.17	0.01	61.60	J16	J18
P17	12	637.47	0.01	0.00	-2.56	J18	J20
P19	12	541.63	0.20	0.02	72.11	J14	J20
P21	12	1349.24	0.16	0.01	56.83	J16	J22
P25	12	925.73	0.16	0.01	-57.60	J24	J18
P27	12	94.90	0.14	0.01	47.75	J22	J26
P29	12	363.72	0.04	0.00	15.84	J26	J24
P33	12	650.46	0.04	0.00	13.32	J28	J30
P35	12	564.77	0.04	0.00	-13.36	J30	J32
P37	12	429.17	0.08	0.00	-27.3	J32	J24
P39	8	583.73	0.05	0.00	-7.71	J34	J36
P41	8	529.63	0.13	0.02	-19.98	J36	J38
P43	12	384.24	0.06	0.00	19.69	J30	J42
P45	8	671.75	0.01	0.00	0.89	J42	J40
P47	8	521.61	0.04	0.00	-6.25	J40	J34
P49	8	368.79	0.06	0.00	8.69	J32	J40
P51	12	395.02	0.09	0.00	31.49	J24	J34
P53	12	293.06	0.17	0.01	60.02	J20	J38
P55	12	261.82	0.09	0.00	30.79	J38	J52
P57A	12	273.94	0.00	0.00	0.00	J52	V8008
P59	8	417.32	0.14	0.02	22.27	J52	J50
P61	8	558.37	0.05	0.00	7.40	J50	J48
P63	8	528.28	0.03	0.00	5.23	J48	J46
P65	8	652.48	0.01	0.00	-1.45	J46	J44
P67	8	300.00	0.03	0.00	4.90	J40	J46
P69	12	357.68	0.04	0.00	-12.98	J44	J42
P71	12	301.45	0.06	0.00	-20.78	J48	J34
P73	24	241.68	3.08	1.31	4,339.96	J284	J56
P75A	10	561.34	0.00	0.00	0.00	J58	V8010
P77	10	542.26	0.02	0.00	4.62	J58	J60
P79	12	313.00	0.03	0.00	-10.60	J60	J48
P85	10	431.02	0.00	0.00	-0.54	J64	J66
P95	12	585.11	0.28	0.04	99.65	J74	J72
P97	12	280.01	0.52	0.11	-184.40	J74	J76
P99	12	290.02	1.27	0.57	-446.33	J76	J78
P101A	12	44.00	0.00	0.00	0.00	J60	V8012
P103	12	386.49	1.72	1.01	-607.42	J78	J80
P105	12	248.99	1.80	1.09	-634.81	J80	J82
P107	18	311.98	3.37	2.17	2,672.91	J82	J84
P109	18	154.71	2.42	1.18	1,922.41	J84	J86
P111	8	456.95	0.42	0.14	66.28	J86	J88
P113	8	290.00	0.29	0.07	44.84	J88	J90
P115	12	45.00	0.82	0.26	289.78	J90	J92

FIGURE 16
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J250/J252 CASE STUDY
FIRE FLOW AT COMMUNITY COLLEGE
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P117	8	280.01	0.06	0.00	-8.95	J92	J94
P119	8	280.00	0.45	0.16	-70.90	J94	J96
P121	8	280.00	0.50	0.19	-78.07	J96	J74
P127	8	313.00	0.01	0.00	1.2	J64	J46
P129	12	430.17	0.01	0.00	-4.46	J66	J44
P143	12	69.00	0.82	0.26	-290.79	J106	J92
P145	8	290.00	0.12	0.01	19.44	J106	J108
P147	8	114.00	0.81	0.46	-127.14	J108	J88
P149	8	515.00	0.85	0.51	-133.71	J88	J78
P151	12	515.00	0.71	0.23	-251.3	J90	J76
P153	8	445.25	0.05	0.00	-8.44	J108	J110
P155	18	491.01	2.28	1.05	1,805.12	J110	J112
P157	12	452.02	1.34	0.63	-470.87	J112	J114
P159	8	491.01	0.82	0.47	-127.77	J114	J108
P161	12	286.89	1.11	0.45	-391.49	J114	J116
P171	18	651.45	0.01	0.00	-5.34	J184	J186
P173	12	199.72	0.56	0.12	-196.71	J186	J188
P181	12	622.29	1.26	0.56	-442.76	J192	J194
P183	10	334.30	1.56	1.20	382.17	J194	J196
P185	8	483.16	0.64	0.30	100.95	J196	J198
P187	8	338.37	0.92	0.59	-144.73	J198	J192
P197	8	408.05	0.55	0.22	-85.8	J204	J188
P203	8	280.00	0.54	0.22	-83.89	J208	J270
P207	8	283.75	0.51	0.20	-79.67	J210	J212
P209	8	248.55	1.07	0.78	-168.22	J212	J198
P211	8	261.32	0.52	0.20	81.45	J212	J214
P215	8	351.95	0.90	0.57	-141.66	J216	J218
P221	12	687.25	2.37	2.10	-834.17	J194	J54
P223	10	280.00	1.08	0.61	263.79	J208	J230
P225	8	431.95	0.47	0.17	73.13	J228	J230
P227	8	280.00	0.85	0.51	-133.26	J228	J210
P231	10	280.00	1.35	0.92	331.28	J230	J232
P233	8	432.29	0.47	0.17	-73.47	J232	J226
P235	8	280.00	1.17	0.92	-183.95	J226	J228
P239	10	325.70	1.63	1.30	398.31	J232	J234
P241	10	322.06	1.60	1.26	-391.97	J234	J224
P243	8	280.00	0.66	0.32	-104.02	J224	J226
P245	10	279.99	0.71	0.28	-173.91	J266	J222
P247	8	280.00	1.52	1.48	-237.44	J222	J216
P249	10	547.93	1.89	1.71	-462.61	J222	J220
P253	12	428.92	2.80	2.87	-986.26	J220	J56
P255	10	1259.50	**3.21**	**4.58**	786.40	J234	J236
P257	8	994.05	2.64	4.14	-414.15	J236	J238
P259	12	460.58	2.25	1.66	-794.53	J238	J240

FIGURE 16
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J250/J252 CASE STUDY
FIRE FLOW AT COMMUNITY COLLEGE
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P261	10	753.00	2.11	2.10	-516.75	J240	J222
P263	10	683.53	1.15	0.69	-281.96	J240	J242
P265	10	188.34	0.19	0.02	46.61	J242	J244
P267	8	744.35	2.12	2.76	-332.75	J242	J220
P269	12	454.85	2.11	1.46	-743.35	J244	J84
P271	12	387.01	2.22	1.87	782.81	J244	J246
P273	12	689.15	1.48	0.76	522.07	J246	J248
P275	12	49.42	1.08	0.42	-380.3	J248	J238
P277	12	725.00	2.54	2.07	896.82	J248	J252
P279	18	521.35	3.06	1.81	-2,423.92	J252	J254
P281	8	716.70	1.53	1.51	-240.11	J254	J246
P283	18	558.99	1.51	0.57	1,200.46	J236	J250
P285	12	1035.61	3.00	2.81	-1,057.71	J250	J252
P287	18	548.09	2.78	1.52	-2,203.77	J254	J256
P289	18	530.42	2.81	1.55	-2,229.43	J256	J112
P291	18	106.45	2.31	1.08	1,834.46	J86	J110
P307	18	991.28	0.26	0.02	208.83	RES9006	J260
P309	12	886.01	0.06	0.00	20.89	J26	J28
P311	12	250.87	0.37	0.06	130.63	J260	J16
P325	10	280.01	1.21	0.75	-296.75	J224	J266
P333	8	151.62	0.36	0.10	56.66	J270	J210
P335	8	280.00	0.90	0.56	140.55	J204	J270
P337	8	279.99	1.26	1.05	-197.9	J214	J272
P339	8	280.00	0.64	0.30	100.42	J272	J216
P341	8	42.39	1.93	2.32	-303.07	J272	J196
P343	8	432.19	0.22	0.04	-33.87	J196	J218
P345	8	367.25	1.15	0.89	-180.17	J218	J220
P349	12	720.30	0.82	0.26	-290.8	J188	J192
P353	8	605.95	0.40	0.13	-63.14	J204	J198
P355	10	884.02	0.76	0.32	-187.16	J208	J186
P357	8	280.01	0.86	0.51	-134.39	J228	J214
P359	18	593.66	4.21	3.28	3,336.85	J56	J82
P361	10	528.28	0.03	0.00	7.75	J60	J64
P365	8	560.00	0.85	0.50	132.51	J214	J266
P367	12	491.00	0.75	0.22	265	J106	J116
P369	8	420.85	0.07	0.00	10.57	J114	J280
P371	10	338.28	0.40	0.09	96.93	J72	J278
P373	8	502.06	0.01	0.00	-1.49	J278	J96
P375	10	544.68	0.38	0.09	92.73	J278	J276
P377	10	280.92	0.37	0.08	89.77	J276	J274
P379	8	280.00	0.34	0.10	54	J94	J274
P381	10	548.29	0.56	0.18	136.83	J274	J116
P383	8	299.23	0.05	0.00	7.62	J36	J50
P385	8	300.00	0.07	0.00	10.31	J50	J58

FIGURE 16
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J250/J252 CASE STUDY
FIRE FLOW AT COMMUNITY COLLEGE
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P387	24	265.82	3.67	1.82	5,177.74	RES9008	J286
P389	24	1303.67	3.67	1.82	5,177.74	J286	J282
P391	24	255.63	3.67	1.82	5,177.74	J282	J284
P393	12	23.46	2.38	1.83	-837.78	J54	J284
P57B	12	16.65	0.00	0.00	0	V8008	J54
P75B	10	19.48	0.00	0.00	0	V8010	J56
P101B	12	531.00	0.00	0.00	0	V8012	J76

MAX / MIN VALUE

FIGURE 17
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J14 CASE STUDY
FIRE FLOW AT NORTHERN RESIDENTIAL
DUAL ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J14	97.87	450.00	**1506.09**
J16	104.74	435.00	12.20
J18	113.73	414.00	6.56
J20	116.23	408.00	9.53
J22	108.97	425.00	9.08
J24	120.22	399.00	14.66
J26	109.18	424.50	11.01
J28	117.63	405.00	7.57
J30	124.12	390.00	6.99
J32	122.82	393.00	5.25
J34	128.88	379.00	12.17
J36	124.08	390.00	4.64
J38	125.34	387.00	9.26
J40	131.91	372.00	10.94
J42	133.21	369.00	5.82
J44	142.31	348.00	7.06
J46	141.01	351.00	12.78
J48	137.97	358.00	12.35
J50	136.00	362.50	12.18
J52	134.44	366.00	8.52
J54	67.56	352.00	3.61
J56	70.16	346.00	16.85
J58	140.78	351.50	5.69
J60	142.74	347.00	7.47
J64	145.77	340.00	7.09
J66	**147.08**	337.00	3.92
J72	78.36	327.00	2.72
J74	80.53	322.00	6.69
J76	77.06	330.00	10.63
J78	78.80	326.00	27.38
J80	80.10	323.00	27.39
J82	77.51	329.00	29.13
J84	79.02	325.50	7.15
J86	79.45	324.50	21.67
J88	83.13	316.00	28.02
J90	83.56	315.00	6.35
J92	83.99	314.00	7.95
J94	84.64	312.50	7.95
J96	82.26	318.00	5.68
J106	84.21	313.50	6.35
J108	83.56	315.00	27.25
J110	79.88	323.50	20.90
J112	83.13	316.00	46.56
J114	85.94	309.50	37.82
J116	88.76	303.00	10.33
J184	47.82	397.50	5.34

FIGURE 17
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J14 CASE STUDY
FIRE FLOW AT NORTHERN RESIDENTIAL
DUAL ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J186	54.97	381.00	4.21
J188	56.70	377.00	8.28
J192	61.25	366.50	7.23
J194	64.29	359.50	9.24
J196	67.75	351.50	12.02
J198	63.85	360.50	14.33
J204	59.73	370.00	8.39
J208	61.47	366.00	7.27
J210	63.63	361.00	3.06
J212	64.93	358.00	7.10
J214	66.67	354.00	12.45
J216	69.05	348.50	4.64
J218	70.14	346.00	4.64
J220	72.74	340.00	10.72
J222	71.44	343.00	9.39
J224	70.13	346.00	8.80
J226	67.53	352.00	6.45
J228	65.15	357.50	10.57
J230	63.63	361.00	5.64
J232	66.02	355.50	6.45
J234	69.27	348.00	3.88
J236	80.10	323.00	0.09
J238	81.40	320.00	0.09
J240	77.07	330.00	4.18
J242	75.98	332.50	4.18
J244	77.50	329.00	7.15
J246	79.67	324.00	20.64
J248	81.83	319.00	5.55
J250	79.02	325.50	8.17
J252	83.78	314.50	13.03
J254	85.95	309.50	19.95
J256	88.33	304.00	25.66
J260	109.00	425.50	0.00
J266	70.78	344.50	9.67
J270	62.81	362.90	8.53
J272	67.75	351.50	4.75
J274	86.94	307.20	6.94
J276	86.16	309.00	2.96
J278	81.83	319.00	5.68
J280	88.37	303.90	10.57
J282	61.54	365.90	0.00
J284	67.60	351.90	0.00
J286	**26.95**	445.80	0.00

MAX / MIN VALUE

FIGURE 17
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J14 CASE STUDY
FIRE FLOW AT NORTHERN RESIDENTIAL
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P13	12	459.90	**2.87**	**2.59**	1011.57	J260	J14
P15	12	432.97	1.28	0.58	449.69	J16	J18
P17	12	637.47	1.02	0.38	358.97	J18	J20
P19	12	541.63	1.40	0.69	-494.52	J14	J20
P21	12	1349.24	0.67	0.17	235.38	J16	J22
P25	12	925.73	0.24	0.03	-84.16	J24	J18
P27	12	94.90	0.64	0.16	226.30	J22	J26
P29	12	363.72	0.39	0.07	138.52	J26	J24
P33	12	650.46	0.20	0.02	69.20	J28	J30
P35	12	564.77	0.06	0.00	-20.49	J30	J32
P37	12	429.17	0.18	0.01	-61.95	J32	J24
P39	8	583.73	0.40	0.12	62.48	J34	J36
P41	8	529.63	0.49	0.18	76.62	J36	J38
P43	12	384.24	0.23	0.03	82.69	J30	J42
P45	8	671.75	0.10	0.01	15.11	J42	J40
P47	8	521.61	0.10	0.01	16.24	J40	J34
P49	8	368.79	0.23	0.05	36.21	J32	J40
P51	12	395.02	0.41	0.07	146.07	J24	J34
P53	12	293.06	0.41	0.07	-145.09	J20	J38
P55	12	261.82	0.22	0.02	-77.73	J38	J52
P57A	12	273.94	0.00	0.00	0.00	J52	V8008
P59	8	417.32	0.55	0.23	-86.25	J52	J50
P61	8	558.37	0.37	0.11	-57.84	J50	J48
P63	8	528.28	0.12	0.01	-19.13	J48	J46
P65	8	652.48	0.11	0.01	-16.93	J46	J44
P67	8	300.00	0.15	0.02	24.14	J40	J46
P69	12	357.68	0.18	0.01	-61.77	J44	J42
P71	12	301.45	0.25	0.03	-87.66	J48	J34
P73	24	241.68	0.40	0.03	558.21	J284	J56
P75A	10	561.34	0.00	0.00	0.00	J58	V8010
P77	10	542.26	0.27	0.05	-65.06	J58	J60
P79	12	313.00	0.10	0.01	-36.60	J60	J48
P85	10	431.02	0.14	0.01	-33.86	J64	J66
P95	12	585.11	0.03	0.00	10.08	J74	J72
P97	12	280.01	0.07	0.00	-23.53	J74	J76
P99	12	290.02	0.14	0.01	-49.50	J76	J78
P101A	12	44.00	0.00	0.00	0.00	J60	V8012
P103	12	386.49	0.25	0.03	-88.70	J78	J80
P105	12	248.99	0.33	0.05	-116.09	J80	J82
P107	18	311.98	0.34	0.03	265.78	J82	J84
P109	18	154.71	0.28	0.02	222.80	J84	J86
P111	8	456.95	0.18	0.03	27.98	J86	J88
P113	8	290.00	0.04	0.00	6.41	J88	J90
P115	12	45.00	0.04	0.00	15.41	J90	J92

FIGURE 17
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J14 CASE STUDY
FIRE FLOW AT NORTHERN RESIDENTIAL
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P117	8	280.01	0.04	0.00	6.71	J92	J94
P119	8	280.00	0.01	0.00	-1.09	J94	J96
P121	8	280.00	0.04	0.00	-6.76	J96	J74
P127	8	313.00	0.06	0.00	-9.16	J64	J46
P129	12	430.17	0.11	0.01	-37.78	J66	J44
P143	12	69.00	0.00	0.00	-0.75	J106	J92
P145	8	290.00	0.04	0.00	-5.73	J106	J108
P147	8	114.00	0.03	0.00	-5.37	J108	J88
P149	8	515.00	0.08	0.01	-11.82	J88	J78
P151	12	515.00	0.04	0.00	-15.35	J90	J76
P153	8	445.25	0.17	0.03	-26.78	J108	J110
P155	18	491.01	0.16	0.01	125.47	J110	J112
P157	12	452.02	0.19	0.02	67.81	J112	J114
P159	8	491.01	0.01	0.00	0.83	J114	J108
P161	12	286.89	0.05	0.00	18.59	J114	J116
P171	18	651.45	0.01	0.00	-5.34	J184	J186
P173	12	199.72	0.07	0.00	-23.41	J186	J188
P181	12	622.29	0.19	0.02	-66.80	J192	J194
P183	10	334.30	0.20	0.03	48.42	J194	J196
P185	8	483.16	0.12	0.01	18.27	J196	J198
P187	8	338.37	0.12	0.01	-18.52	J198	J192
P197	8	408.05	0.06	0.00	-9.35	J204	J188
P203	8	280.00	0.02	0.00	-3.16	J208	J270
P207	8	283.75	0.07	0.00	-10.28	J210	J212
P209	8	248.55	0.09	0.01	-13.65	J212	J198
P211	8	261.32	0.02	0.00	-3.73	J212	J214
P215	8	351.95	0.11	0.01	-16.70	J216	J218
P221	12	687.25	0.35	0.06	-124.45	J194	J54
P223	10	280.00	0.04	0.00	9.76	J208	J230
P225	8	431.95	0.02	0.00	2.93	J228	J230
P227	8	280.00	0.03	0.00	-5.30	J228	J210
P231	10	280.00	0.03	0.00	7.05	J230	J232
P233	8	432.29	0.02	0.00	-2.68	J232	J226
P235	8	280.00	0.03	0.00	-4.32	J226	J228
P239	10	325.70	0.01	0.00	3.28	J232	J234
P241	10	322.06	0.04	0.00	-10.61	J234	J224
P243	8	280.00	0.03	0.00	4.82	J224	J226
P245	10	279.99	0.15	0.02	-37.37	J266	J222
P247	8	280.00	0.08	0.01	-12.00	J222	J216
P249	10	547.93	0.23	0.04	-57.26	J222	J220
P253	12	428.92	0.37	0.07	-130.36	J220	J56
P255	10	1259.50	0.04	0.00	10.01	J234	J236
P257	8	994.05	0.04	0.00	-7.01	J236	J238
P259	12	460.58	0.09	0.00	-31.56	J238	J240

FIGURE 17
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J14 CASE STUDY
FIRE FLOW AT NORTHERN RESIDENTIAL
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P261	10	753.00	0.09	0.01	-22.50	J240	J222
P263	10	683.53	0.05	0.00	-13.24	J240	J242
P265	10	188.34	0.05	0.00	11.83	J242	J244
P267	8	744.35	0.19	0.03	-29.25	J242	J220
P269	12	454.85	0.10	0.01	-35.83	J244	J84
P271	12	387.01	0.11	0.01	40.51	J244	J246
P273	12	689.15	0.03	0.00	9.74	J246	J248
P275	12	49.42	0.07	0.00	-24.46	J248	J238
P277	12	725.00	0.08	0.00	28.65	J248	J252
P279	18	521.35	0.03	0.00	24.39	J252	J254
P281	8	716.70	0.06	0.00	-10.12	J254	J246
P283	18	558.99	0.02	0.00	16.93	J236	J250
P285	12	1035.61	0.02	0.00	8.76	J250	J252
P287	18	548.09	0.02	0.00	14.56	J254	J256
P289	18	530.42	0.01	0.00	-11.10	J256	J112
P291	18	106.45	0.22	0.01	173.15	J86	J110
P307	18	991.28	2.15	0.95	1708.83	RES9006	J260
P309	12	886.01	0.22	0.02	76.77	J26	J28
P311	12	250.87	1.98	1.30	697.27	J260	J16
P325	10	280.01	0.10	0.01	-24.23	J224	J266
P333	8	151.62	0.01	0.00	-1.92	J270	J210
P335	8	280.00	0.06	0.00	9.77	J204	J270
P337	8	279.99	0.16	0.02	-25.23	J214	J272
P339	8	280.00	0.00	0.00	-0.05	J272	J216
P341	8	42.39	0.19	0.03	-29.92	J272	J196
P343	8	432.19	0.08	0.01	-11.80	J196	J218
P345	8	367.25	0.21	0.04	-33.13	J218	J220
P349	12	720.30	0.12	0.01	-41.05	J188	J192
P353	8	605.95	0.06	0.00	-8.81	J204	J198
P355	10	884.02	0.06	0.00	-13.86	J208	J186
P357	8	280.01	0.08	0.01	-12.52	J228	J214
P359	18	593.66	0.52	0.07	411.00	J56	J82
P361	10	528.28	0.15	0.02	-35.93	J60	J64
P365	8	560.00	0.02	0.00	-3.47	J214	J266
P367	12	491.00	0.00	0.00	0.13	J106	J116
P369	8	420.85	0.07	0.00	10.57	J114	J280
P371	10	338.28	0.03	0.00	7.36	J72	J278
P373	8	502.06	0.00	0.00	0.00	J278	J96
P375	10	544.68	0.01	0.00	1.67	J278	J276
P377	10	280.92	0.01	0.00	-1.29	J276	J274
P379	8	280.00	0.00	0.00	-0.15	J94	J274
P381	10	548.29	0.03	0.00	-8.39	J274	J116
P383	8	299.23	0.12	0.01	-18.78	J36	J50
P385	8	300.00	0.38	0.11	-59.37	J50	J58

FIGURE 17
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J14 CASE STUDY
FIRE FLOW AT NORTHERN RESIDENTIAL
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P387	24	265.82	0.49	0.04	686.27	RES9008	J286
P389	24	1303.67	0.49	0.04	686.27	J286	J282
P391	24	255.63	0.49	0.04	686.27	J282	J284
P393	12	23.46	0.36	0.06	-128.06	J54	J284
P57B	12	16.65	0.00	0.00	0.00	V8008	J54
P75B	10	19.48	0.00	0.00	0.00	V8010	J56
P101B	12	531.00	0.00	0.00	0.00	V8012	J76

MAX / MIN VALUE

FIGURE 18
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J80/J82 CASE STUDY
FIRE FLOW AT ELEMENTARY SCHOOL
DUAL ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J14	98.78	450.00	6.09
J16	105.28	435.00	12.20
J18	114.37	414.00	6.56
J20	116.97	408.00	9.53
J22	109.60	425.00	9.08
J24	120.87	399.00	14.66
J26	109.82	424.50	11.01
J28	118.27	405.00	7.57
J30	124.77	390.00	6.99
J32	123.47	393.00	5.25
J34	129.53	379.00	12.17
J36	124.77	390.00	4.64
J38	126.07	387.00	9.26
J40	132.57	372.00	10.94
J42	133.87	369.00	5.82
J44	142.97	348.00	7.06
J46	141.67	351.00	12.78
J48	138.63	358.00	12.35
J50	136.68	362.50	12.18
J52	135.17	366.00	8.52
J54	66.15	352.00	3.61
J56	68.60	346.00	16.85
J58	141.45	351.50	5.69
J60	143.40	347.00	7.47
J64	146.43	340.00	7.09
J66	**147.73**	337.00	3.92
J72	75.39	327.00	2.72
J74	77.54	322.00	6.69
J76	74.06	330.00	10.63
J78	75.70	326.00	27.38
J80	76.79	323.00	**2277.39**
J82	74.84	329.00	**2279.13**
J84	76.35	325.50	7.15
J86	76.78	324.50	21.67
J88	80.26	316.00	28.02
J90	80.65	315.00	6.35
J92	81.09	314.00	7.95
J94	81.72	312.50	7.95
J96	79.30	318.00	5.68
J106	81.32	313.50	6.35
J108	80.71	315.00	27.25
J110	77.21	323.50	20.90
J112	80.46	316.00	46.56
J114	83.14	309.50	37.82
J116	85.90	303.00	10.33
J184	45.99	397.50	5.34

FIGURE 18
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J80/J82 CASE STUDY
FIRE FLOW AT ELEMENTARY SCHOOL
DUAL ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J186	53.14	381.00	4.21
J188	54.88	377.00	8.28
J192	59.47	366.50	7.23
J194	62.57	359.50	9.24
J196	65.94	351.50	12.02
J198	62.02	360.50	14.33
J204	57.89	370.00	8.39
J208	59.59	366.00	7.27
J210	61.76	361.00	3.06
J212	63.07	358.00	7.10
J214	64.79	354.00	12.45
J216	67.20	348.50	4.64
J218	68.32	346.00	4.64
J220	70.95	340.00	10.72
J222	69.49	343.00	9.39
J224	68.18	346.00	8.80
J226	65.60	352.00	6.45
J228	63.26	357.50	10.57
J230	61.73	361.00	5.64
J232	64.08	355.50	6.45
J234	67.29	348.00	3.88
J236	77.61	323.00	0.09
J238	78.87	320.00	0.09
J240	74.61	330.00	4.18
J242	73.51	332.50	4.18
J244	74.94	329.00	7.15
J246	77.11	324.00	20.64
J248	79.30	319.00	5.55
J250	76.52	325.50	8.17
J252	81.19	314.50	13.03
J254	83.33	309.50	19.95
J256	85.69	304.00	25.66
J260	109.40	425.50	0.00
J266	68.84	344.50	9.67
J270	60.94	362.90	0.00
J272	65.92	351.50	4.75
J274	84.02	307.20	6.94
J276	83.23	309.00	2.96
J278	78.87	319.00	5.68
J280	85.56	303.90	10.57
J282	60.33	365.90	0.00
J284	66.20	351.90	0.00
J286	**26.74**	445.80	0.00

MAX / MIN VALUE

FIGURE 18
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J80/J82 CASE STUDY
FIRE FLOW AT ELEMENTARY SCHOOL
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P13	12	459.90	0.22	0.02	78.20	J260	J14
P15	12	432.97	0.17	0.01	61.60	J16	J18
P17	12	637.47	0.01	0.00	-2.56	J18	J20
P19	12	541.63	0.20	0.02	72.11	J14	J20
P21	12	1349.24	0.16	0.01	56.83	J16	J22
P25	12	925.73	0.16	0.01	-57.60	J24	J18
P27	12	94.90	0.14	0.01	47.75	J22	J26
P29	12	363.72	0.04	0.00	15.84	J26	J24
P33	12	650.46	0.04	0.00	13.32	J28	J30
P35	12	564.77	0.04	0.00	-13.36	J30	J32
P37	12	429.17	0.08	0.00	-27.30	J32	J24
P39	8	583.73	0.05	0.00	-7.71	J34	J36
P41	8	529.63	0.13	0.02	-19.98	J36	J38
P43	12	384.24	0.06	0.00	19.69	J30	J42
P45	8	671.75	0.01	0.00	0.89	J42	J40
P47	8	521.61	0.04	0.00	-6.25	J40	J34
P49	8	368.79	0.06	0.00	8.69	J32	J40
P51	12	395.02	0.09	0.00	31.49	J24	J34
P53	12	293.06	0.17	0.01	60.02	J20	J38
P55	12	261.82	0.09	0.00	30.79	J38	J52
P57A	12	273.94	0.00	0.00	0.00	J52	V8008
P59	8	417.32	0.14	0.02	22.27	J52	J50
P61	8	558.37	0.05	0.00	7.40	J50	J48
P63	8	528.28	0.03	0.00	5.23	J48	J46
P65	8	652.48	0.01	0.00	-1.45	J46	J44
P67	8	300.00	0.03	0.00	4.90	J40	J46
P69	12	357.68	0.04	0.00	-12.98	J44	J42
P71	12	301.45	0.06	0.00	-20.78	J48	J34
P73	24	241.68	**3.25**	**1.46**	4588.18	J284	J56
P75A	10	561.34	0.00	0.00	0.00	J58	V8010
P77	10	542.26	0.02	0.00	4.62	J58	J60
P79	12	313.00	0.03	0.00	-10.60	J60	J48
P85	10	431.02	0.00	0.00	-0.54	J64	J66
P95	12	585.11	0.30	0.04	-106.02	J74	J72
P97	12	280.01	0.53	0.11	185.95	J74	J76
P99	12	290.02	1.47	0.75	519.75	J76	J78
P101A	12	44.00	0.00	0.00	0.00	J60	V8012
P103	12	386.49	1.94	1.26	685.08	J78	J80
P105	12	248.99	4.52	6.00	-1592.31	J80	J82
P107	18	311.98	0.05	0.00	41.12	J82	J84
P109	18	154.71	0.57	0.08	453.82	J84	J86
P111	8	456.95	1.26	1.04	196.94	J86	J88
P113	8	290.00	0.64	0.30	100.96	J88	J90
P115	12	45.00	0.71	0.19	-249.82	J90	J92

FIGURE 18
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J80/J82 CASE STUDY
FIRE FLOW AT ELEMENTARY SCHOOL
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P117	8	280.01	0.44	0.15	68.83	J92	J94
P119	8	280.00	0.63	0.29	99.00	J94	J96
P121	8	280.00	0.55	0.23	86.62	J96	J74
P127	8	313.00	0.01	0.00	1.20	J64	J46
P129	12	430.17	0.01	0.00	-4.46	J66	J44
P143	12	69.00	0.93	0.32	326.60	J106	J92
P145	8	290.00	0.72	0.37	-112.99	J106	J108
P147	8	114.00	0.80	0.45	124.75	J108	J88
P149	8	515.00	1.23	1.00	192.71	J88	J78
P151	12	515.00	0.98	0.41	344.43	J90	J76
P153	8	445.25	1.20	0.95	-187.25	J108	J110
P155	18	491.01	0.03	0.00	27.07	J110	J112
P157	12	452.02	1.45	0.73	512.17	J112	J114
P159	8	491.01	0.50	0.19	77.75	J114	J108
P161	12	286.89	1.10	0.43	386.03	J114	J116
P171	18	651.45	0.01	0.00	-5.34	J184	J186
P173	12	199.72	0.35	0.05	-122.79	J186	J188
P181	12	622.29	0.84	0.27	-297.15	J192	J194
P183	10	334.30	1.14	0.67	279.55	J194	J196
P185	8	483.16	0.34	0.09	52.53	J196	J198
P187	8	338.37	0.64	0.30	-100.87	J198	J192
P197	8	408.05	0.37	0.11	-57.98	J204	J188
P203	8	280.00	0.27	0.06	-42.63	J208	J270
P207	8	283.75	0.25	0.05	-39.02	J210	J212
P209	8	248.55	0.67	0.32	-104.41	J212	J198
P211	8	261.32	0.37	0.11	58.30	J212	J214
P215	8	351.95	0.59	0.26	-92.18	J216	J218
P221	12	687.25	1.66	1.09	-585.94	J194	J54
P223	10	280.00	0.61	0.21	148.60	J208	J230
P225	8	431.95	0.20	0.03	31.04	J228	J230
P227	8	280.00	0.50	0.19	-77.58	J228	J210
P231	10	280.00	0.71	0.28	174.00	J230	J232
P233	8	432.29	0.14	0.02	-21.20	J232	J226
P235	8	280.00	0.65	0.31	-101.62	J226	J228
P239	10	325.70	0.77	0.33	188.74	J232	J234
P241	10	322.06	0.60	0.20	-146.55	J234	J224
P243	8	280.00	0.47	0.17	-73.97	J224	J226
P245	10	279.99	0.02	0.00	4.28	J266	J222
P247	8	280.00	1.05	0.75	-164.51	J222	J216
P249	10	547.93	1.14	0.68	-279.77	J222	J220
P253	12	428.92	1.87	1.36	-658.78	J220	J56
P255	10	1259.50	1.35	0.92	331.41	J234	J236
P257	8	994.05	0.34	0.09	53.70	J236	J238
P259	12	460.58	1.00	0.37	-353.60	J238	J240

FIGURE 18
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J80/J82 CASE STUDY
FIRE FLOW AT ELEMENTARY SCHOOL
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P261	10	753.00	1.79	1.56	-439.17	J240	J222
P263	10	683.53	0.33	0.07	81.40	J240	J242
P265	10	188.34	1.50	1.12	366.83	J242	J244
P267	8	744.35	1.85	2.13	-289.62	J242	J220
P269	12	454.85	1.19	0.51	419.86	J244	J84
P271	12	387.01	0.17	0.02	-60.18	J244	J246
P273	12	689.15	0.45	0.08	-157.17	J246	J248
P275	12	49.42	1.16	0.48	-407.21	J248	J238
P277	12	725.00	0.69	0.19	244.49	J248	J252
P279	18	521.35	0.63	0.10	500.91	J252	J254
P281	8	716.70	0.49	0.18	-76.35	J254	J246
P283	18	558.99	0.35	0.04	277.62	J236	J250
P285	12	1035.61	0.76	0.22	269.45	J250	J252
P287	18	548.09	0.70	0.12	557.31	J254	J256
P289	18	530.42	0.67	0.11	531.65	J256	J112
P291	18	106.45	0.30	0.02	235.22	J86	J110
P307	18	991.28	0.26	0.02	208.83	RES9006	J260
P309	12	886.01	0.06	0.00	20.89	J26	J28
P311	12	250.87	0.37	0.06	130.63	J260	J16
P325	10	280.01	0.33	0.07	-81.38	J224	J266
P333	8	151.62	0.27	0.06	41.62	J270	J210
P335	8	280.00	0.54	0.22	84.25	J204	J270
P337	8	279.99	0.73	0.39	-115.13	J214	J272
P339	8	280.00	0.49	0.18	76.97	J272	J216
P341	8	42.39	1.26	1.04	-196.85	J272	J196
P343	8	432.19	0.12	0.01	18.15	J196	J218
P345	8	367.25	0.50	0.19	-78.67	J218	J220
P349	12	720.30	0.54	0.12	-189.05	J188	J192
P353	8	605.95	0.22	0.04	-34.66	J204	J198
P355	10	884.02	0.46	0.13	-113.24	J208	J186
P357	8	280.01	0.42	0.14	-65.65	J228	J214
P359	18	593.66	4.93	4.40	3912.55	J56	J82
P361	10	528.28	0.03	0.00	7.75	J60	J64
P365	8	560.00	0.61	0.27	95.33	J214	J266
P367	12	491.00	0.62	0.15	-219.95	J106	J116
P369	8	420.85	0.07	0.00	10.57	J114	J280
P371	10	338.28	0.44	0.12	-108.74	J72	J278
P373	8	502.06	0.04	0.00	-6.70	J278	J96
P375	10	544.68	0.44	0.12	-107.72	J278	J276
P377	10	280.92	0.45	0.12	-110.68	J276	J274
P379	8	280.00	0.24	0.05	-38.12	J94	J274
P381	10	548.29	0.64	0.23	-155.74	J274	J116
P383	8	299.23	0.05	0.00	7.63	J36	J50
P385	8	300.00	0.07	0.00	10.31	J50	J58

FIGURE 18
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J80/J82 CASE STUDY
FIRE FLOW AT ELEMENTARY SCHOOL
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P387	24	265.82	3.67	1.82	5177.74	RES9008	J286
P389	24	1303.67	3.67	1.82	5177.74	J286	J282
P391	24	255.63	3.67	1.82	5177.74	J282	J284
P393	12	23.46	1.67	0.95	-589.55	J54	J284
P57B	12	16.65	0.00	0.00	0.00	V8008	J54
P75B	10	19.48	0.00	0.00	0.00	V8010	J56
P101B	12	531.00	0.00	0.00	0.00	V8012	J76

MAX / MIN VALUE

FIGURE 19
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J184 CASE STUDY
FIRE FLOW AT NORTHWESTERN RESIDENTIAL
DUAL ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J14	98.78	450.00	6.09
J16	105.28	435.00	12.20
J18	114.37	414.00	6.56
J20	116.97	408.00	9.53
J22	109.60	425.00	9.08
J24	120.87	399.00	14.66
J26	109.82	424.50	11.01
J28	118.27	405.00	7.57
J30	124.77	390.00	6.99
J32	123.47	393.00	5.25
J34	129.53	379.00	12.17
J36	124.77	390.00	4.64
J38	126.07	387.00	9.26
J40	132.57	372.00	10.94
J42	133.87	369.00	5.82
J44	142.97	348.00	7.06
J46	141.67	351.00	12.78
J48	138.63	358.00	12.35
J50	136.68	362.50	12.18
J52	135.17	366.00	8.52
J54	67.29	352.00	3.61
J56	69.88	346.00	16.85
J58	141.45	351.50	5.69
J60	143.40	347.00	7.47
J64	146.43	340.00	7.09
J66	**147.73**	337.00	3.92
J72	78.00	327.00	2.72
J74	80.16	322.00	6.69
J76	76.70	330.00	10.63
J78	78.44	326.00	27.38
J80	79.75	323.00	27.39
J82	77.17	329.00	29.13
J84	78.66	325.50	7.15
J86	79.09	324.50	21.67
J88	82.76	316.00	28.02
J90	83.20	315.00	6.35
J92	83.63	314.00	7.95
J94	84.28	312.50	7.95
J96	81.90	318.00	5.68
J106	83.84	313.50	6.35
J108	83.19	315.00	27.25
J110	79.52	323.50	20.90
J112	82.76	316.00	46.56
J114	85.57	309.50	37.82
J116	88.39	303.00	10.33

FIGURE 19
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J184 CASE STUDY
FIRE FLOW AT NORTHWESTERN RESIDENTIAL
DUAL ZONE

JUNCTION ID NUMBER	JUNCTION PRESSURE (psi)	JUNCTION ELEVATION (ft)	JUNCTION DEMAND (gpm)
J184	45.86	397.50	**1505.34**
J186	53.22	381.00	4.21
J188	55.19	377.00	8.28
J192	60.22	366.50	7.23
J194	63.56	359.50	9.24
J196	67.02	351.50	12.02
J198	62.89	360.50	14.33
J204	58.60	370.00	8.39
J208	60.38	366.00	7.27
J210	62.67	361.00	3.06
J212	64.00	358.00	7.10
J214	65.83	354.00	12.45
J216	68.43	348.50	4.64
J218	69.53	346.00	4.64
J220	72.33	340.00	10.72
J222	70.87	343.00	9.39
J224	69.39	346.00	8.80
J226	66.70	352.00	6.45
J228	64.26	357.50	10.57
J230	62.70	361.00	5.64
J232	65.18	355.50	6.45
J234	68.52	348.00	3.88
J236	79.64	323.00	0.09
J238	80.98	320.00	0.09
J240	76.64	330.00	4.18
J242	75.58	332.50	4.18
J244	77.11	329.00	7.15
J246	79.27	324.00	20.64
J248	81.42	319.00	5.55
J250	78.56	325.50	8.17
J252	83.38	314.50	13.03
J254	85.55	309.50	19.95
J256	87.95	304.00	25.66
J260	109.40	425.50	0.00
J266	70.09	344.50	9.67
J270	61.75	362.90	8.53
J272	67.02	351.50	4.75
J274	86.57	307.20	6.94
J276	85.79	309.00	2.96
J278	81.46	319.00	5.68
J280	88.00	303.90	10.57
J282	61.32	365.90	0.00
J284	67.35	351.90	0.00
J286	**26.91**	445.80	0.00
	MAX / MIN VALUE		

FIGURE 19
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J184 CASE STUDY
FIRE FLOW AT NORTHERNWESTERN RESIDENTIAL
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P13	12	459.90	0.22	0.02	78.20	J260	J14
P15	12	432.97	0.17	0.01	61.60	J16	J18
P17	12	637.47	0.01	0.00	-2.56	J18	J20
P19	12	541.63	0.20	0.02	72.11	J14	J20
P21	12	1349.24	0.16	0.01	56.83	J16	J22
P25	12	925.73	0.16	0.01	-57.60	J24	J18
P27	12	94.90	0.14	0.01	47.75	J22	J26
P29	12	363.72	0.04	0.00	15.84	J26	J24
P33	12	650.46	0.04	0.00	13.32	J28	J30
P35	12	564.77	0.04	0.00	-13.36	J30	J32
P37	12	429.17	0.08	0.00	-27.30	J32	J24
P39	8	583.73	0.05	0.00	-7.71	J34	J36
P41	8	529.63	0.13	0.02	-19.98	J36	J38
P43	12	384.24	0.06	0.00	19.69	J30	J42
P45	8	671.75	0.01	0.00	0.89	J42	J40
P47	8	521.61	0.04	0.00	-6.25	J40	J34
P49	8	368.79	0.06	0.00	8.69	J32	J40
P51	12	395.02	0.09	0.00	31.49	J24	J34
P53	12	293.06	0.17	0.01	60.02	J20	J38
P55	12	261.82	0.09	0.00	30.79	J38	J52
P57A	12	273.94	0.00	0.00	0.00	J52	V8008
P59	8	417.32	0.14	0.02	22.26	J52	J50
P61	8	558.37	0.05	0.00	7.40	J50	J48
P63	8	528.28	0.03	0.00	5.23	J48	J46
P65	8	652.48	0.01	0.00	-1.45	J46	J44
P67	8	300.00	0.03	0.00	4.90	J40	J46
P69	12	357.68	0.04	0.00	-12.98	J44	J42
P71	12	301.45	0.06	0.00	-20.78	J48	J34
P73	24	241.68	1.04	0.17	1461.78	J284	J56
P75A	10	561.34	0.00	0.00	0.00	J58	V8010
P77	10	542.26	0.02	0.00	4.62	J58	J60
P79	12	313.00	0.03	0.00	-10.60	J60	J48
P85	10	431.02	0.00	0.00	-0.54	J64	J66
P95	12	585.11	0.07	0.00	25.58	J74	J72
P97	12	280.01	0.15	0.01	-51.26	J74	J76
P99	12	290.02	0.33	0.05	-117.02	J76	J78
P101A	12	44.00	0.00	0.00	0.00	J60	V8012
P103	12	386.49	0.50	0.10	-176.53	J78	J80
P105	12	248.99	0.58	0.13	-203.92	J80	J82
P107	18	311.98	0.90	0.19	710.90	J82	J84
P109	18	154.71	0.59	0.09	468.72	J84	J86
P111	8	456.95	0.22	0.04	35.22	J86	J88
P113	8	290.00	0.09	0.01	13.65	J88	J90
P115	12	45.00	0.18	0.01	62.43	J90	J92

FIGURE 19
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J184 CASE STUDY
FIRE FLOW AT NORTHERNWESTERN RESIDENTIAL
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P117	8	280.01	0.05	0.00	7.52	J92	J94
P119	8	280.00	0.08	0.01	-12.18	J94	J96
P121	8	280.00	0.12	0.01	-18.98	J96	J74
P127	8	313.00	0.01	0.00	1.20	J64	J46
P129	12	430.17	0.01	0.00	-4.46	J66	J44
P143	12	69.00	0.13	0.01	-46.97	J106	J92
P145	8	290.00	0.05	0.00	-7.41	J106	J108
P147	8	114.00	0.16	0.02	-25.69	J108	J88
P149	8	515.00	0.21	0.04	-32.13	J88	J78
P151	12	515.00	0.16	0.01	-55.14	J90	J76
P153	8	445.25	0.20	0.03	-31.05	J108	J110
P155	18	491.01	0.45	0.05	359.87	J110	J112
P157	12	452.02	0.09	0.00	-31.54	J112	J114
P159	8	491.01	0.14	0.02	-22.08	J114	J108
P161	12	286.89	0.16	0.01	-57.86	J114	J116
P171	18	651.45	**1.90**	**0.75**	-1505.34	J184	J186
P173	12	199.72	2.97	2.75	-1045.57	J186	J188
P181	12	622.29	1.84	1.13	-647.85	J192	J194
P183	10	334.30	0.26	0.04	63.79	J194	J196
P185	8	483.16	1.30	1.12	204.29	J196	J198
P187	8	338.37	0.79	0.45	124.35	J198	J192
P197	8	408.05	1.84	2.12	288.88	J204	J188
P203	8	280.00	0.53	0.21	-82.42	J208	J270
P207	8	283.75	0.56	0.24	-88.44	J210	J212
P209	8	248.55	0.56	0.23	87.14	J212	J198
P211	8	261.32	1.17	0.91	-182.68	J212	J214
P215	8	351.95	0.38	0.11	-58.97	J216	J218
P221	12	687.25	2.04	1.60	-720.88	J194	J54
P223	10	280.00	1.59	1.24	-388.83	J208	J230
P225	8	431.95	0.58	0.25	90.97	J228	J230
P227	8	280.00	0.96	0.63	150.09	J228	J210
P231	10	280.00	1.24	0.79	-303.50	J230	J232
P233	8	432.29	0.20	0.04	-31.72	J232	J226
P235	8	280.00	0.80	0.45	125.60	J226	J228
P239	10	325.70	1.14	0.67	-278.24	J232	J234
P241	10	322.06	0.16	0.02	-38.78	J234	J224
P243	8	280.00	1.05	0.74	163.77	J224	J226
P245	10	279.99	1.48	1.09	-363.08	J266	J222
P247	8	280.00	0.81	0.46	126.91	J222	J216
P249	10	547.93	1.15	0.69	-282.18	J222	J220
P253	12	428.92	1.42	0.82	-500.98	J220	J56
P255	10	1259.50	0.99	0.52	-243.34	J234	J236
P257	8	994.05	0.38	0.11	-59.00	J236	J238
P259	12	460.58	0.36	0.06	127.32	J238	J240

FIGURE 19
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J184 CASE STUDY
FIRE FLOW AT NORTHERNWESTERN RESIDENTIAL
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P261	10	753.00	0.89	0.42	217.19	J240	J222
P263	10	683.53	0.38	0.09	-94.05	J240	J242
P265	10	188.34	0.44	0.12	-108.90	J242	J244
P267	8	744.35	0.07	0.00	10.67	J242	J220
P269	12	454.85	0.67	0.17	-235.03	J244	J84
P271	12	387.01	0.34	0.06	118.98	J244	J246
P273	12	689.15	0.32	0.04	111.67	J246	J248
P275	12	49.42	0.53	0.11	186.40	J248	J238
P277	12	725.00	0.23	0.02	-80.28	J248	J252
P279	18	521.35	0.36	0.03	-285.92	J252	J254
P281	8	716.70	0.09	0.01	13.33	J254	J246
P283	18	558.99	0.23	0.02	-184.43	J236	J250
P285	12	1035.61	0.55	0.12	-192.60	J250	J252
P287	18	548.09	0.40	0.04	-319.20	J254	J256
P289	18	530.42	0.43	0.05	-344.86	J256	J112
P291	18	106.45	0.52	0.07	411.83	J86	J110
P307	18	991.28	0.26	0.02	208.83	RES9006	J260
P309	12	886.01	0.06	0.00	20.89	J26	J28
P311	12	250.87	0.37	0.06	130.63	J260	J16
P325	10	280.01	0.86	0.40	-211.34	J224	J266
P333	8	151.62	1.50	1.46	-235.47	J270	J210
P335	8	280.00	0.92	0.59	-144.52	J204	J270
P337	8	279.99	1.14	0.88	-179.09	J214	J272
P339	8	280.00	1.16	0.90	-181.24	J272	J216
P341	8	42.39	0.02	0.00	-2.60	J272	J196
P343	8	432.19	0.99	0.67	-155.13	J196	J218
P345	8	367.25	1.40	1.27	-218.74	J218	J220
P349	12	720.30	2.17	1.54	-764.97	J188	J192
P353	8	605.95	0.97	0.65	-152.75	J204	J198
P355	10	884.02	1.90	1.72	463.98	J208	J186
P357	8	280.01	0.80	0.46	-126.03	J228	J214
P359	18	593.66	1.19	0.32	943.96	J56	J82
P361	10	528.28	0.03	0.00	7.75	J60	J64
P365	8	560.00	0.91	0.57	-142.06	J214	J266
P367	12	491.00	0.14	0.01	48.03	J106	J116
P369	8	420.85	0.07	0.00	10.57	J114	J280
P371	10	338.28	0.09	0.01	22.86	J72	J278
P373	8	502.06	0.01	0.00	-1.12	J278	J96
P375	10	544.68	0.07	0.00	18.31	J278	J276
P377	10	280.92	0.06	0.00	15.35	J276	J274
P379	8	280.00	0.07	0.01	11.75	J94	J274
P381	10	548.29	0.08	0.01	20.15	J274	J116
P383	8	299.23	0.05	0.00	7.62	J36	J50
P385	8	300.00	0.07	0.00	10.31	J50	J58

FIGURE 19
EAST AREA 1
SUMMARY OF DOMESTIC WATER MODELING
MAX DAY + FIRE FLOW AT J184 CASE STUDY
FIRE FLOW AT NORTHERNWESTERN RESIDENTIAL
DUAL ZONE

PIPE: ID NUMBER	PIPE DIAMETER (inches)	PIPE LENGTH (feet)	PIPE VELOCITY (ft/s)	PIPE HEADLOSS/1000 FT (ft/kft)	PIPE FLOW (gpm)	PIPE RUN: FROM NODE	PIPE RUN: TO NODE
P387	24	265.82	1.55	0.37	2186.27	RES9008	J286
P389	24	1303.67	1.55	0.37	2186.27	J286	J282
P391	24	255.63	1.55	0.37	2186.27	J282	J284
P393	12	23.46	2.06	1.39	-724.48	J54	J284
P57B	12	16.65	0.00	0.00	0.00	V8008	J54
P75B	10	19.48	0.00	0.00	0.00	V8010	J56
P101B	12	531.00	0.00	0.00	0.00	V8012	J76

MAX / MIN VALUE

FIGURE 20
EAST AREA 2
SUMMARY OF DOMESTIC WATER STORAGE TANK SIZING

$V_{(T)} = V_{(RS)} + V_{(FS)} + V_{(ES)}$

where

$V_{(T)}$ = Total Storage Requirement

$V_{(RS)}$ = Regulatory Storage Requirement

$V_{(FS)}$ = Fire Flow Storage Requirement

$V_{(ES)}$ = Emergency Storage Requirement

TANK 1 (ZONE 1, Planning Area B)

$V_{(RS)}$ = 14 hours at 1.5 x MDD and 10 hours at 0.3 x MDD

V(RS) = 14h x 1.5 x 214.8 gal/min x 60min/hour +10h x 0.3 x 214.8 gal/min x 60min/hour

V(RS) = 309,312 gal

$V_{(FS)}$ = 4 hours at 4,500 gpm

$V_{(FS)}$ = 4H x 4,500gal/min x 60min/hr

V(FS) = 1,080,000 gal

$V_{(ES)}$ = MDD x 8 Hours

V(ES) = 214.8 gal/min x 8h x 60min/hour

V(FS) = 103,104 gal

V(T) = 309,312 gal + 1,080,000 gal + 103,104 gal

$V_{(T)}$ = 1,492,416 gal *say* ***$V_{(T)}$ = 2.0 MG***

FIGURE 20
EAST AREA 2
SUMMARY OF DOMESTIC WATER STORAGE TANK SIZING

$V_{(T)} = V_{(RS)} + V_{(FS)} + V_{(ES)}$

where

$V_{(T)}$ = Total Storage Requirement

$V_{(RS)}$ = Regulatory Storage Requirement

$V_{(FS)}$ = Fire Flow Storage Requirement

$V_{(ES)}$ = Emergency Storage Requirement

TANK 2 (ZONE 2, Planning Area C, D and E)

$V_{(RS)}$ = 14 hours at 1.5 x MDD and 10 hours at 0.3 x MDD

V(RS) = 14h x 1.5 x 641.4 gal/min x 60min/hour +10h x 0.3 x 641.4 gal/min x 60min/hour

V(RS) = 923,616 gal

$V_{(FS)}$ = 4 hours at 4,500 gpm

$V_{(FS)}$ = 4H x 4,500gal/min x 60min/hr

V(FS) = 1,080,000 gal

$V_{(ES)}$ = MDD x 8 Hours

V(ES) = 641.4 gal/min x 8h x 60min/hour

V(FS) = 307,872 gal

V(T) = 923,616 gal + 1,080,000 gal + 307,872 gal

$V_{(T)}$ = 2,311,488 gal *say* ***$V_{(T)}$ = 3.0 MG***

Calculations based on "Potable Water System Master Plan" by Boyle Eng., dated Oct. 2005, pg. 19-20

Note: Tank capacity for two tank scenario increases by 2.0 MG due to rounding up to nearest MG.