Mare Island Water Model
Lennar Mare Island

June 3, 2005

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In Association with Chaudhary & Associates

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Introduction

This report presents the results of an analysis of existing and proposed features for the Mare Island Water System. Mare Island was formerly a Navy Shipyard and the existing water system was constructed by the Navy. Ownership of the property was recently transferred from the Navy to the City of Vallejo, and a large part of the island was subsequently transferred from the City to Lennar Mare Island. Following completion of improvements, some parts of the water system will become the properties of the City of Vallejo and Lennar Mare Island, while others will remain with the Navy. This report addresses the water system for the entire island. The purpose of this analysis was to determine the ability of the existing water system to meet post development demands, and to identify improvements required to meet these demands. The analysis includes consideration of both domestic water demands and fire flow requirements.

Improvements recommended herein are upgrades to the existing water system to provide adequate domestic and fire water supply demands, and to meet the requirements and standards of the City of Vallejo. This report was prepared by Korve Engineering, Inc., in association with Chaudhary & Associates. The City of Vallejo Utilities Department Water Division and Fire Department were consulted during report preparation.

The analysis addressed herein includes consideration of existing storage and conveyance facilities, and construction of new conveyance facilities, to provide adequate water supply to meet domestic demands and fire demands. An overall plan for the eventual system at full buildout of the Island is attached as Exhibit A, and a phasing diagram for completing the project in five phases is attached as Exhibit B. The report addresses the WaterCAD model used for analysis of the pipe network; availability of water supply; water demand; piping and appurtenances; results and recommendations; quantities; failure analysis; environmental issues; and phasing.

The analysis presented herein modifies an analysis previously prepared for the *Lennar Mare Island Specific Plan Amendment, April 19, 2001*, and recommendations presented herein are proposed to supersede that plan. The methodology, assumptions, and results of the analysis are presented below.

WaterCAD Model

The water system for the Lennar Mare Island Development and the business park area (North Island, Area 1A) on the north side of the island was prepared using Haestad Methods WaterCAD software. The model was based on a WaterCAD model prepared by LFR Reimer for the *Lennar Mare Island Specific Plan Amendment, April 19, 2001.* This model was subsequently modified to reflect currently proposed development plans. The assumptions and criteria used for the overall model are presented below, followed by descriptions and results for the analysis for the complete water network.

Water Supply

Water supply to Mare Island is provided by two pipelines crossing the Mare Island Strait from the City of Vallejo. These pipelines are a 20 inch diameter submarine pipeline crossing the southern end of Mare Island Strait, and a 14 inch diameter pipeline crossing the Mare Island Causeway. Supply for these two pipelines is by gravity from the City system.

The 20 inch transmission main that crosses the southern end of Mare Island Strait discharges to a 6.2 million gallon tank located at the southern end of the island. The location of the tank is shown on Exhibit A. The WaterCAD model uses the following tank elevations and flow rate:

	NGVD (29) Datum	Navy Datum
Elevation at base	181.75	284.83
Initial water elevation/hydraulic grade	194.34	297.37
Maximum water elevation	214.30	317.33

Outflow rate 4,465.08 gpm
The tank is operating at 65.7% full.

The pipe network analysis was prepared assuming a static operating level in the tank of 194.34 feet NGVD (29). (Elevations used in the WaterCAD model references Navy elevations, which are 103.03 higher than NGVD 29). This corresponds to approximately 3.9 million gallons of storage below the operating level, and 2.3 million gallons above the operating level. The actual operating levels would vary. Using a four-hour run cycle, approximately 1.1 million gallons are required for fire demands, 0.9 million gallons required for equalization, and 1.9 million gallons for domestic demands concurrent with fire flows. Storage above the assumed static operating level appears to be adequate to meet all required demands.

As directed by the City, all water supply considered for this analysis was assumed to be supplied from the storage tank, and no credit from the two supply pipelines was included. This analysis, while somewhat conservative, reflects the potential emergency situation of a major fire on Mare Island concurrent with loss of the supply pipelines.

Water Demand

Water demand was assumed to include a maximum daily domestic demand component and a fire demand component. The maximum daily domestic demand was assumed continuous for all areas, and fire demands were superimposed on this demand as appropriate for the capacity analysis and determination of required sizes of system pipelines. The WaterCAD software was configured to calculate the available discharge and residual pressure at all nodes in the system. The two components of the water demand are addressed below.

Land Use Assumptions

Domestic demand for this model is based on the Lennar Mare Island Amended and Restated Specific Plan, Table 3-2 (Exhibit "L"). The table below shows how the land use assumptions for this analysis compare to other Mare Island planning documents, including the most recent administrative draft of the Mare Island Specific Plan Amendment.

Land Use Type	Lennar Mare Island Amended and Restated Specific Plan July 2003[3]	Infrastrategy Analysis June 2000	Infrastrategy Analysis May 1997 (MIRIS)	Mare Island Specific Plan March 1999[1]	Mare Island Specific Plan Amendment January 2003
Single Family Dwelling Units	**1,021**	1,400[2]	1,479[2]	1,486[2]	1,406[2]
Multiple Family Dwelling Units	**379**[4]				
Additional Beds: Touro University: Army Barracks	 895 55				
Industrial/Warehouse (square feet)	**5,675,000**[5]	6,335,485	5,102,999	4,283,200	5,880,000
Office/Retail (square feet)	**2,126,000**[5]	1,809,458	1,783,142	1,359,100	1,750,000
School, Civic, Public (square feet)	**818,000**[5]	914,330	722,087	177,500	870,000

1 Includes development on island only
2 Numbers originally reflect "Residential Dwelling Units" with no differentiation between "Single" and "Multiple" Dwelling Units, based on previous water demand criteria.
3 Study based on documents received from Chaudhary & Associates and LFR Reimer.
4 Number does not include 55 Dwelling Units (DU) for Army barracks in Area 8 and 895 new DU for Touro University dorms, which are now listed under "Additional Beds", next row down.
5 Non-residential square footage totals 9,047,000 square feet. These numbers reflect reuse areas or parcels that were not categorized in Table 3-2 (listed under "Non-Residential Sq. Ft."), and include the VA Hospital, Navy, VCUSD, Forest Service, US Army Reserve Barracks, US Army Reserve, and Fish & Wildlife Wetlands.

Land use assumptions incorporated into the WaterCAD model are comparable with the latest administrative draft of the Specific Plan Amendment, and in all cases except residential land use are more conservative.

The full land use table for the July 2003 Specific Plan Amendment is attached to this report as Exhibit L.

Domestic Demand Criteria

The domestic component of water demand was based on the total buildout from the Lennar Master Plans and 1,200,000 SF of development on North Island and 750,000 SF at Northern Edge. The following criteria were assumed for the domestic component of the water demand:

1. Average day demand for Single Family dwelling unit is 0.563 gpm/unit.

2. Average day demand for Multiple Family dwelling unit is 0.500 gpm/unit.

3. Average day demand for Commercial, Business, R&D, etc., is 0.625 gpm/10,000 sq. ft.

4. Average day demand for Restaurant is 4.375 gpm/1,000 sq. ft.

5. Average day demand for Parks and Schools is 2.50 gpm/acre

6. The maximum daily flow is 1.6 times the average daily flow.

7. The peak hourly flow is 2.65 times the average daily flow.

Fire Flow Demand Criteria

Fire flow demands normally control the design of water systems. This network was designed to ensure required fire flows at each node while accommodating maximum daily domestic demand.

The original model prepared for the Specific Plan Amendment assumed a fire flow requirement of 4,500 gpm at all nodes. In the model used for this report, the following criteria were used for fire flow demands:

1. Minimum 30 psig residual fire flow pressure at each node (the city requires that no less than 25 psig be available within 1,000 feet of any structure, and that half of that fire flow be available within 300 feet of any structure).

2. Minimum fire flow of 4,500 gpm for nodes in industrial and commercial areas.

3. Minimum fire flow of 2,500 gpm for nodes in residential areas.

It may be possible to reduce the required minimum fire flow to as low as 1,500 gpm for nodes in such areas as golf courses and parks.

We have determined that based on the information currently available our fire flow demands are conservative compared to the requirements of Vallejo's fire marshal.

Water Supply Forecast

Buildout projections for Mare Island are as follows:

Year	Industrial (SF)	Office / R&D (SF)	School / Civic (SF)	Non-LMI (SF)[3]	Parks (SF)	Residential (dwelling units)	Increase in Maximum Daily Domestic Demand (gpm)	Fire Demands (gpm)[4]	Domestic and Fire Demands (Cumulative per year)
Current	2,319,000	150,000	504,232	428,000	8,625,000	460	1,542[6]	4,500	6,042
2004	241,000	126,000	23,768	0	7,667,000	394	1,093	4,500	7,135
2005	300,000	150,000	30,000	0	0	178	190	4,500	7,325
2006	380,000	175,000	30,000	0	0	149	177	4,500	7,503
2007	380,000	225,000	30,000	0	0	158	206	4,500	7,708
2008	400,000	250,000	40,000	0	0	61	124	4,500	7,832
2009	400,000	250,000	40,000	0	0	0	69	4,500	7,900
2010	400,000	250,000	40,000	0	0	0	69	4,500	7,969
2011	425,000	275,000	40,000	0	0	0	74	4,500	8,043
2012	430,000	275,000	40,000	0	0	0	74	4,500	8,117
Subtotal	*5,675,000*	*2,126,000*	*818,000*	*428,000*	*16,290,000*	*1,400*	*3,617*	*4,500*	*8,117*
Army Barracks						55	44	4,500	8,161
Touro University						895	756	4,500	8,917
Totals	5,675,000	2,126,000	818,000	428,000	16,290,000	2,350[1]	4,417	4,500	8,917

1 Residential Units are the original 1,400 plus 55 army barrack units plus 895 university units
2 N/A
3 Mostly Office/R&D square footage
4 Maximum fire demand at any given node, at any given time, is 4,500 gpm.
5 Maximum Daily Domestic and Fire demand totals are cumulative per year. However, fire demands are held constant at 4,500 gpm and do not accumulate over time.
6 This value is not an "increase" because it shows current values (current year only), and irrigation water use.

These projections are based on LNR and Chaudhary & Associates projections and include buildout for a 10-year forecast.

Piping and Appurtenances

The size, materials and locations of existing pipes are based on information from the US Navy. This information has not been field verified. The Hazen Williams pipe roughness coefficient used for existing cast iron pipe was C=80, for new ductile iron pipe was C=110, and for both new and existing PVC pipe was C=120 per Vallejo city standards. Per city standards, new pipe diameters used in the model were restricted to 8", 12", 18", and 20".

Criteria for sizing, layout, and placement of valves and hydrants follow the *City of Vallejo Regulations and Standard Specifications for Public Improvements, August 25, 1992.* The maximum spacing used for fire hydrants was 1,000 feet along the Parkway, and 500 feet within other areas. Valves for isolation of pipeline sections were provided at a maximum spacing of 1,000 feet. Blowoffs will be required at all low points, and at temporary dead ends created by construction staging. It may be possible to use properly located fire hydrant assemblies in lieu of blowoff assemblies. Combination air/vacuum release valves will be required at all high points.

This analysis addresses the required and available capacities of pipelines and appurtenances, and system modifications required to meet demands. Some pipelines in the system may be unsuitable for continued use for other reasons, including locations of the pipelines relative to existing buildings, locations relative to existing and/or future rights-of-way, and condition of the existing facilities. These constraints were not assessed as part of this analysis.

Results and Recommendations

The previously stated criteria were used to create and analyze the water network model for Mare Island. The results of the analysis and recommendations for improvements are summarized below. The locations of improvements are indicated on Exhibit A, a diagram of the model network is included as Exhibit C, a spreadsheet summary of all required new pipes and fittings is included as Exhibit D, and the results of the WaterCAD fire flow analysis are included as Exhibit G.

General Description of Network – Alternative "A"

The complete network includes one 18" line and three 12" lines running from south to north, and a 20" pipe loop on both the north and south sides. Most other pipes, and most crossing pipes, are 8" and 12" pipes. The model requires about 94,993 feet of new pipe and uses about 20,317 feet of existing pipe. About 18% of the final pipe network consists of existing pipe.

The water flow in the network is generally from south to north and from west to east, as elevations on the east side of the island are generally lower than on the west side.

North Island Light Industrial Parcels (Reuse Area 1B)

The Reuse Area 1B Lennar Mare Island Property consists of four large industrial buildings located at the north end of the Island. The new 12" and 20" pipe network on the north side of the island was incorporated into the model for the analysis of fire flows in this area. This 12" and 20" network was shown in the *Infrastructure Plan North Mare Island Business Park, July 25, 2001,* as modified based on the water lines shown in the utility drawings for the *Mare Island North Roadway Improvement Project, May 21, 2002.*

We analyzed fire flows to this area using five alternative improvements to the network:

1. 18" pipe in Azuar Drive between 5th (Kansas) Street and G Street
2. 20" pipe in G Street between Railroad Avenue and Azuar Drive
3. 20" pipe in Club Drive between Sargo and Azuar Drive
4. 18" pipe in Residential Parkway
5. 12" pipe in 3rd (Connolly) Street between Walnut Avenue and Railroad Avenue

Based on the water demand at full buildout, all five of the above improvements would need to be constructed in order to meet fire flow demand at the parcel currently owned by ALCO. If the demand were scaled down to 25% of the full buildout demand, necessary fire flow could be met by constructing Alternatives 1 and 4 only. It may be desirable to stage this construction relative to the buildout of the rest of the island.

Furthermore, the complete model was run with and without full buildout demands to Reuse Area 1B for sensitivity. In either case, there is no difference in pipe size requirements. The results of the WaterCAD fire flow analysis without Reuse Area 1B demands are included as Exhibits I, J, and K.

Pipe and Fitting Quantities

The following chart indicates the total quantity of new PVC pipe required for the water network:

Diameter (inches)	Length (feet)
8	33,965
12	27,708
18	8,236
20	9,454

The following chart indicates the total quantity of new ductile iron pipe required for the water network:

Diameter (inches)	Length (feet)
8	7,288
12	2,724
18	4,337
20	1,281

This quantity may change based on subsurface discoveries prior to and during utility construction.

Size (inches)	Number of Gate Valves	Number of Hydrant Assemblies
8	240	90
12	100	70
18	30	25
20	30	25

Fire Flow Durations

Required fire flow demands were calculated over the duration of 4 hours. The WaterCAD model indicates that both domestic and fire flow demands can be met concurrently for about 11.5 hours.

Preliminary Failure Analysis

Preliminary analysis of this model indicates that its redundancy will allow adequate fire flow at nodes on the north side of the island even when service is interrupted in one of the north-south pipes. Fire flows in the table below were obtained after closing pipe segments on the following streets between A Street and C Street:

Street Name	Fire Flow at J-61 (gpm)	Fire Flow at J-62 (gpm)
Azuar (Cedar)	>4,501	>4,501
Walnut	>4,501	>4,501
Railroad	>4,501	>4,501
Promenade	>4,501	>4,501

Environmental Issues

Exhibits "A" and "B" shows designated IR areas. CH2M Hill has noted that potable water pipes laid in or through these areas may need to be constructed of ductile iron rather than PVC. This change in materials has been taken into account in the WaterCAD model and in the quantities. In addition, CH2M Hill points out that due to the heterogeneity of the subsurface, undocumented Navy operations in these areas, and the movement of contaminants through these areas, new areas of contamination may be discovered during utility construction which will change the quantities listed herein. Water mains in these areas shall be constructed per City's Memo dated March 25, 2002. See Exhibit "M".

In Reuse Area 10, the water mains are in poor condition and are considered non-usable with the exception of the 10-inch and 12-inch mains that were installed in the 1990s. The 10-inch and 12-inch water mains were used for salt water conveyance and are considered non-potable mains. These non-potable water mains are connected to the potable water system on Mare Island by Reduced Pressure back flow devices to provide limited fire protection to this area. The improvement plans to be prepared will replace the existing water mains deemed to be in poor condition, and will attempt to sanitize the 10-inch and 12-inch mains per DHS requirements to allow reuse as potable water mains. Additional fire hydrants will be added for increased fire protection to this area. Phasing of these water improvements will be based on new construction within Reuse Area 10.

Alternative "B"

The WaterCAD model and the resulting analysis in this report have been based on Alternative "A". Alternative "A" currently shows two 12-inch pipelines in Railroad Avenue and in the Promenade. However, if it is not deemed feasible to construct Alternative "A" due to existing conditions, then Alternative "B" shall be constructed. Alternative "B" consists of an 8-inch pipeline in the Promenade and an 18-inch pipeline in Railroad Avenue. Pipes and fittings quantities will change as a result, but are not shown here in this report.

References

California Code of Regulations, Title 22

Mare Island Infrastrategy Analysis, May 1997 and June 2002

Mare Island Specific Plan Amendment, draft, January 2003

Mare Island Specific Plan, March 1999

Meeting with Eric Jansen, Vallejo Utilities Department, January 17, 2003

Meeting with Raymand R. Dandridge, Assistant Fire Chief, City of Vallejo, February 11, 2003

Meeting with Steven T. Moreland, LFR, February 11, 2003

Regulations and Standard Specifications for Public Improvements, City of Vallejo, August 25, 1992

Lennar Mare Island Preliminary Building Area Tabulations, obtained from Steven Thurman of Chaudhary & Associates, October 15, 2003

Development Program by Reuse Area (Table 3-2, 07-29-03 Revision), obtained from Steven Thurman of Chaudhary & Associates, October 15, 2003

Meeting with Steven T. Moreland, LFR, November 3, 2003.

Mare Island Commercial Buildings (10/31/2003), obtained from Steven T. Moreland, LFR, November 3, 2003.

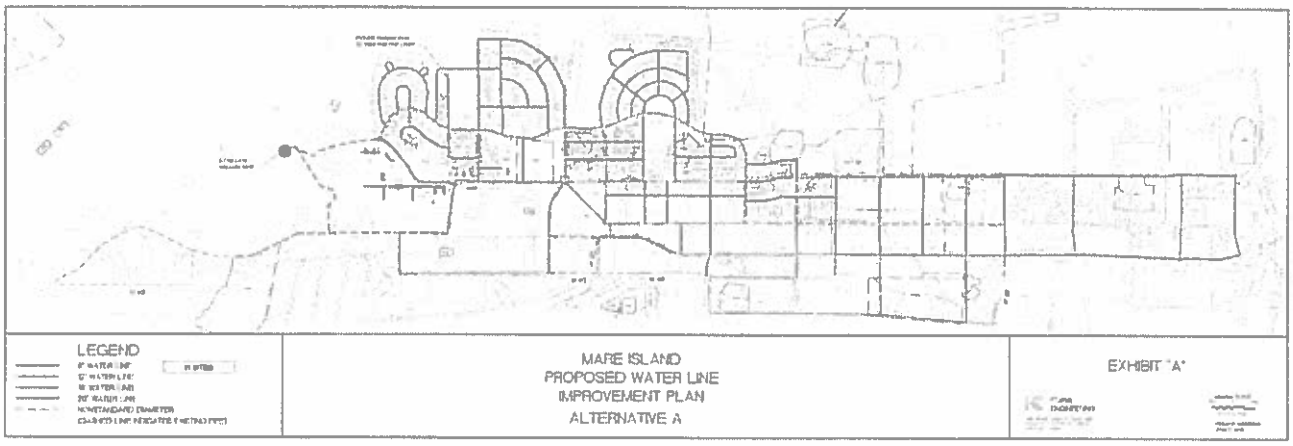
Exhibits

Exhibit A: Pipe Network Diagram
Exhibit B: Pipe Network Phasing Diagram
Exhibit C: WaterCAD Model Diagram
Exhibit D: Pipe Quantity Sheet
Exhibit E: Pipe Report Maximum Daily Flow
Exhibit F: Junction Report Based on Maximum Daily Flow Plus Fire Flow for All Nodes
Exhibit G: Pipe Report Based on Maximum Daily Flow Plus Critical Fire Flow
Exhibit H: Tank Report
Exhibit I: Pipe Report without Reuse Area 1B Demands Maximum Daily Flow
Exhibit J: Junction Report without Reuse Area 1B Demands Based on Maximum Daily Flow Plus Fire Flow for All Nodes
Exhibit K: Pipe Report without Reuse Area 1B Demands Based on Maximum Daily Flow plus Critical Fire Flow
Exhibit L: January 2003 Specific Plan Amendment Land Use Table
Exhibit M: City of Vallejo Reuse of Mare Island Water Mains

Exhibits D, E, F, G, and H were generated from the same WaterCAD model used in the analysis of this report. Exhibit D, "Pipe Quantity Sheet", shows quantities of new pipes required, sorted by pipe size and material. Exhibit E, "Pipe Report", shows detailed information on each pipe used in the model, including open/close status, length, diameter, material, Hazen Williams Coefficient, hydraulic grade, head loss, velocity, and discharge through the pipe. Exhibit F, "Junction Report Based on Maximum Daily Flow Plus Fire Flow for All Nodes", shows detailed information on each node of pipe network, including demand, pressure, elevation, fire flow plus maximum daily flow. Exhibit G, "Pipe Report Based on Maximum Daily Flow Plus Critical Fire Flow" shows detailed information throughout the pipe network based on the combined maximum daily demand and required fire flow demand through each node of the network at any instance of time. Exhibit H, "Tank Report" shows detailed information on the tank as obtained by the Navy. Information includes base elevation, minimum and maximum water elevation, initial hydraulic grade, tank diameter, outflow, and percentage of full capacity. Exhibits I through K are the Pipe Report (Maximum Daily), Junction Report and Pipe Report (with Critical Fire Flow) performed in the model without Reuse Area 1B demands. All other demands are the same.

EXHIBIT A

PIPE NETWORK DIAGRAM



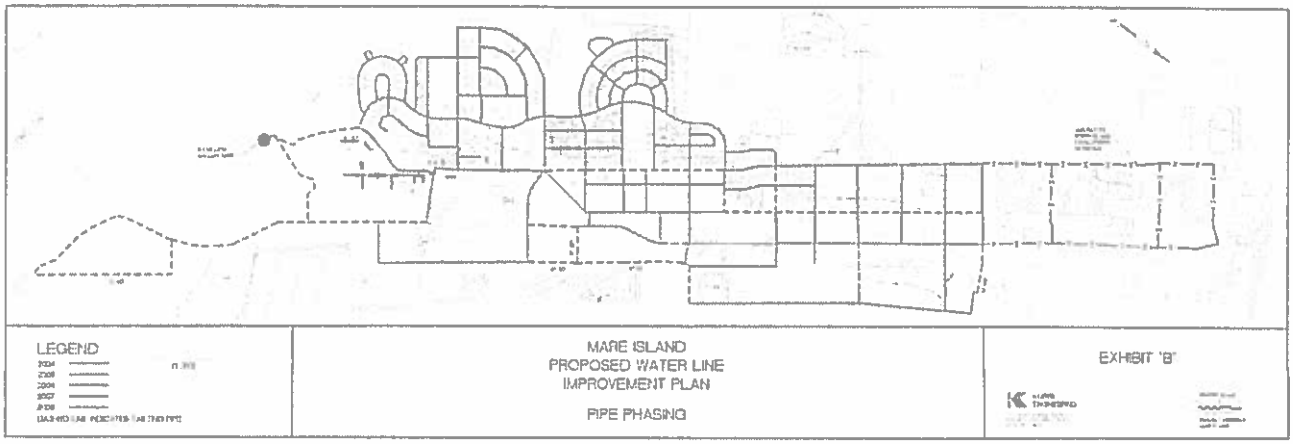
LEGEND

MARE ISLAND
PROPOSED WATER LINE
IMPROVEMENT PLAN
ALTERNATIVE A

EXHIBIT "A"

EXHIBIT B

PIPE NETWORK PHASING DIAGRAM



LEGEND

MARE ISLAND
PROPOSED WATER LINE
IMPROVEMENT PLAN

PIPE PHASING

EXHIBIT "B"

EXHIBIT C

WATERCAD MODEL DIAGRAM

Scenario: Base

EXHIBIT D

PIPE QUANTITY SHEET

Mare Island Water System
New Pipe Quantities

Label	Length (ft)	Diameter (in)	Material
P-66	650	8	Ductile Iron
P-67	439	8	Ductile Iron
P-200	346	8	Ductile Iron
P-253	374	8	Ductile Iron
P-256	502	8	Ductile Iron
P-418	258	8	Ductile Iron
P-419	367	8	Ductile Iron
P-420	547	8	Ductile Iron
P-423	425	8	Ductile Iron
P-425	652	8	Ductile Iron
P-432	688	8	Ductile Iron
P-448	437	8	Ductile Iron
P-476	581	8	Ductile Iron
P-483	1022	8	Ductile Iron
	7288		
P-140	67	8	PVC
P-155	259	8	PVC
P-165	673	8	PVC
P-171	459	8	PVC
P-172	381	8	PVC
P-173	137	8	PVC
P-174	764	8	PVC
P-175	223	8	PVC
P-176	244	8	PVC
P-177	122	8	PVC
P-178	349	8	PVC
P-185	148	8	PVC
P-192	517	8	PVC
P-193	510	8	PVC
P-194	146	8	PVC
P-196	180	8	PVC
P-198	170	8	PVC
P-202	582	8	PVC
P-203	567	8	PVC
P-237	197	8	PVC
P-241	247	8	PVC
P-242	313	8	PVC
P-246	293	8	PVC
P-250	266	8	PVC
P-252	136	8	PVC
P-254	366	8	PVC
P-255	250	8	PVC
P-258	353	8	PVC
P-264	500	8	PVC
P-268	640	8	PVC
P-269	831	8	PVC
P-292	263	8	PVC
P-296	278	8	PVC
P-297	573	8	PVC
P-300	349	8	PVC

Mare Island Water System
New Pipe Quantities

P-302	518	8	PVC
P-303	277	8	PVC
P-304	193	8	PVC
P-306	106	8	PVC
P-310	743	8	PVC
P-312	388	8	PVC
P-315	376	8	PVC
P-316	389	8	PVC
P-331	92	8	PVC
P-332	353	8	PVC
P-333	93	8	PVC
P-336	344	8	PVC
P-337	423	8	PVC
P-338	567	8	PVC
P-339	721	8	PVC
P-359	735	8	PVC
P-360	305	8	PVC
P-361	305	8	PVC
P-364	415	8	PVC
P-366	387	8	PVC
P-368	582	8	PVC
P-369	543	8	PVC
P-370	405	8	PVC
P-371	361	8	PVC
P-372	239	8	PVC
P-373	189	8	PVC
P-374	188	8	PVC
P-375	242	8	PVC
P-376	193	8	PVC
P-377	184	8	PVC
P-378	541	8	PVC
P-379	439	8	PVC
P-380	253	8	PVC
P-381	120	8	PVC
P-382	160	8	PVC
P-383	309	8	PVC
P-384	314	8	PVC
P-401	625	8	PVC
P-402	481	8	PVC
P-405	526	8	PVC
P-406	307	8	PVC
P-409	212	8	PVC
P-410	370	8	PVC
P-411	208	8	PVC
P-412	377	8	PVC
P-413	431	8	PVC
P-414	199	8	PVC
P-415	380	8	PVC
P-416	444	8	PVC
P-434	57	8	PVC
P-435	56	8	PVC
P-436	293	8	PVC

Mare Island Water System
New Pipe Quantities

P-437	407	8	PVC
P-444	373	8	PVC
P-452	409	8	PVC
P-453	147	8	PVC
P-463	408	8	PVC
P-466	860	8	PVC
P-482	646	8	PVC
P-484	404	8	PVC
	33965		
P-363	591	12	Ductile Iron
P-458	592	12	Ductile Iron
P-460	936	12	Ductile Iron
P-72	605	12	Ductile Iron
	2724		
P-7	2481	12	PVC
P-9	583	12	PVC
P-10	2106	12	PVC
P-18	824	12	PVC
P-19	513	12	PVC
P-22	700	12	PVC
P-45	403	12	PVC
P-49	476	12	PVC
P-58	724	12	PVC
P-59	334	12	PVC
P-60	722	12	PVC
P-97	679	12	PVC
P-98	498	12	PVC
P-99	645	12	PVC
P-100	460	12	PVC
P-103	430	12	PVC
P-110	471	12	PVC
P-139	653	12	PVC
P-191	211	12	PVC
P-201	243	12	PVC
P-204	313	12	PVC
P-321	371	12	PVC
P-322	138	12	PVC
P-323	176	12	PVC
P-349	203	12	PVC
P-350	56	12	PVC
P-362	592	12	PVC
P-385	242	12	PVC
P-386	533	12	PVC
P-390	658	12	PVC
P-400	201	12	PVC
P-403	480	12	PVC
P-404	414	12	PVC
P-407	319	12	PVC
P-421	551	12	PVC
P-422	619	12	PVC

Mare Island Water System
New Pipe Quantities

P-438	141	12	PVC
P-440	377	12	PVC
P-445	310	12	PVC
P-447	599	12	PVC
P-450	602	12	PVC
P-451	631	12	PVC
P-456	308	12	PVC
P-457	491	12	PVC
P-459	766	12	PVC
P-462	847	12	PVC
P-467	407	12	PVC
P-468	126	12	PVC
P-469	223	12	PVC
P-470	995	12	PVC
P-471	215	12	PVC
P-477	218	12	PVC
P-478	108	12	PVC
P-479	105	12	PVC
P-480	107	12	PVC
P-481	110	12	PVC
	27708		
P-69	601	18	Ductile Iron
P-229	371	18	Ductile Iron
P-230	303	18	Ductile Iron
P-351	558	18	Ductile Iron
P-352	616	18	Ductile Iron
P-428	619	18	Ductile Iron
P-429	526	18	Ductile Iron
P-475	743	18	Ductile Iron
	4337		
P-4	668	18	PVC
P-14	387	18	PVC
P-36	569	18	PVC
P-53	731	18	PVC
P-158	175	18	PVC
P-163	506	18	PVC
P-167	180	18	PVC
P-169	243	18	PVC
P-170	192	18	PVC
P-234	331	18	PVC
P-314	259	18	PVC
P-324	417	18	PVC
P-326	202	18	PVC
P-327	122	18	PVC
P-328	226	18	PVC
P-329	42	18	PVC
P-330	227	18	PVC
P-441	455	18	PVC
P-442	340	18	PVC
P-455	329	18	PVC

Mare Island Water System
New Pipe Quantities

P-464	237	18	PVC
P-465	184	18	PVC
P-472	201	18	PVC
P-473	498	18	PVC
P-474	515	18	PVC
	8236		
P-87	1281	20	Ductile Iron
	1281		
P-13	652	20	PVC
P-31	1356	20	PVC
P-80	653	20	PVC
P-81	465	20	PVC
P-83	983	20	PVC
P-84	917	20	PVC
P-88	567	20	PVC
P-89	240	20	PVC
P-90	914	20	PVC
P-93	372	20	PVC
P-94	475	20	PVC
P-96	748	20	PVC
P-127	374	20	PVC
P-128	738	20	PVC
	9454		

EXHIBIT E

PIPE REPORT

MAXIMUM DAILY FLOW

Scenario: Base
Max Daily Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-2	FALSE	1,344.00	20	PVC	120	288.63	0.5	1.26	1,236.56
P-3	TRUE	1,507.00	20	PVC	120	297.37	0	0	0
P-4	FALSE	668	18	PVC	120	288.34	0.29	1.18	933.65
P-5	FALSE	616	10	PVC	120	287.64	0.69	1.43	349.7
P-6	FALSE	1,853.00	10	PVC	120	287.57	0.07	0.24	59.65
P-7	FALSE	2,481.00	12	PVC	120	288.34	0.77	0.83	293.81
P-8	FALSE	983	20	PVC	120	289.75	0.62	1.56	1,525.32
P-9	FALSE	583	12	PVC	120	289.76	0.01	0.16	55.99
P-10	FALSE	2,106.00	12	PVC	120	289.85	0.09	0.29	100.55
P-12	FALSE	675	20	PVC	120	290.13	0.38	1.5	1,472.26
P-13	FALSE	652	20	PVC	120	290.47	0.34	1.53	1,503.04
P-14	FALSE	387	18	PVC	120	290.43	0.03	0.5	396.65
P-18	FALSE	824	12	PVC	120	289.9	0.17	0.65	227.41
P-19	FALSE	513	12	PVC	120	289.85	0.05	0.45	156.93
P-20	FALSE	502	10	Cast Iron	80	289.9	0.05	0.27	65.3
P-21	FALSE	691	10	Ductile Iron	110	289.85	0	0.03	7.63
P-22	FALSE	700	12	PVC	120	289.9	0	0.09	30.52
P-23	FALSE	1,175.00	10	Cast Iron	80	289.76	0.09	0.23	57.46
P-29	FALSE	303	10	Cast Iron	80	289.74	0.02	0.23	55.41
P-30	FALSE	1,368.00	20	PVC	120	291.83	5.54	4.56	4,465.08
P-31	FALSE	1,356.00	20	PVC	120	290.47	1.36	2.07	2,023.39
P-36	FALSE	569	18	PVC	120	290.04	0.04	0.44	349.21
P-39	FALSE	512	12	PVC	120	289.96	0.08	0.55	195.09
P-45	FALSE	403	12	PVC	120	289.8	0.04	0.44	154.83
P-49	FALSE	476	12	PVC	120	289.72	0	0.05	18.99
P-53	FALSE	731	18	PVC	120	289.79	0.04	0.43	338.05
P-55	FALSE	404	12	Cast Iron	80	289.78	0.04	0.31	107.68
P-57	FALSE	406	10	Cast Iron	80	289.73	0.04	0.26	62.8
P-58	FALSE	724	12	PVC	120	289.72	0	0.04	14.31
P-59	FALSE	334	12	PVC	120	289.72	0.01	0.21	72.83
P-60	FALSE	722	12	PVC	120	289.68	0.01	0.18	62.27
P-66	FALSE	650	8	Ductile Iron	110	289.71	0.02	0.17	26.8
P-67	FALSE	439	8	Ductile Iron	110	289.7	0.01	0.13	19.76
P-69	FALSE	601	18	Ductile Iron	110	289.71	0.01	0.25	194.66
P-70	FALSE	592	12	Cast Iron	80	289.7	0.01	0.09	31.21
P-72	FALSE	605	12	Ductile Iron	110	289.69	0	0.05	17.04
P-80	FALSE	653	20	PVC	120	289.69	0	0.05	51.83
P-81	FALSE	465	20	PVC	120	289.69	0	0.07	68.47
P-83	FALSE	983	20	PVC	120	289.69	0	0.09	84.68
P-84	FALSE	917	20	PVC	120	289.69	0	0.06	55.47
P-87	FALSE	1,281.00	20	Ductile Iron	110	289.69	0	0.08	79.17
P-88	FALSE	567	20	PVC	120	289.69	0	0.06	60.98
P-89	FALSE	240	20	PVC	120	289.69	0	0.07	66.2
P-90	FALSE	914	20	PVC	120	289.69	0	0.06	60.98
P-93	FALSE	372	20	PVC	120	289.69	0	0.05	46.03
P-94	FALSE	475	20	PVC	120	289.69	0	0.05	46.03
P-96	FALSE	748	20	PVC	120	289.69	0	0.03	30.32

Scenario: Base
Max Daily Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-97	FALSE	679	12	PVC	120	289.69	0	0.04	14.96
P-98	FALSE	498	12	PVC	120	289.69	0	0.04	14.96
P-99	FALSE	645	12	PVC	120	289.69	0	0.02	5.51
P-100	FALSE	460	12	PVC	120	289.69	0	0.02	5.51
P-103	FALSE	430	12	PVC	120	289.74	0.02	0.26	90.26
P-109	FALSE	527	10	Cast iron	80	289.67	0.05	0.27	65.24
P-110	FALSE	471	12	PVC	120	289.67	0	0.05	15.91
P-112	FALSE	309	12	Cast iron	80	289.69	0.01	0.12	43.26
P-113	FALSE	543	12	Cast iron	80	289.69	0.01	0.11	38.76
P-124	FALSE	351	20	Cast iron	80	289.69	0	0.02	21.46
P-125	FALSE	394	14	Cast iron	80	289.69	0	0.04	20.49
P-127	FALSE	374	20	PVC	120	289.69	0	0.05	46.03
P-128	FALSE	738	20	PVC	120	289.69	0	0.05	46.03
P-139	FALSE	653	12	PVC	120	289.93	0	0.03	11.51
P-140	FALSE	67	8	PVC	120	289.96	0.01	0.36	56.95
P-155	FALSE	259	8	PVC	120	289.93	0	0.01	1.18
P-158	FALSE	175	18	PVC	120	289.96	0.02	0.54	431.99
P-163	FALSE	506	18	PVC	120	290.05	0.12	0.91	719.36
P-165	FALSE	673	8	PVC	120	289.93	0	0.08	12
P-167	FALSE	180	18	PVC	120	289.91	0.01	0.45	357.65
P-169	FALSE	243	18	PVC	120	290.01	0.04	0.71	565.88
P-170	FALSE	192	18	PVC	120	289.98	0.03	0.63	496.47
P-171	FALSE	459	8	PVC	120	289.93	0.01	0.17	26.6
P-172	FALSE	381	8	PVC	120	289.93	0	0.08	12.87
P-173	FALSE	137	8	PVC	120	289.94	0.01	0.33	52.22
P-174	FALSE	764	8	PVC	120	290.05	0.1	0.41	64.62
P-175	FALSE	223	8	PVC	120	289.93	0	0.15	23.55
P-176	FALSE	244	8	PVC	120	289.95	0.02	0.27	42.86
P-177	FALSE	122	8	PVC	120	289.95	0.01	0.29	45.44
P-178	FALSE	349	8	PVC	120	289.93	0	0.01	1.36
P-185	FALSE	148	8	PVC	120	289.88	0.01	0.23	36.49
P-191	FALSE	211	12	PVC	120	290.04	0	0.17	60.15
P-192	FALSE	517	8	PVC	120	290.04	0.05	0.36	55.76
P-193	FALSE	510	8	PVC	120	290.04	0.05	0.37	57.25
P-194	FALSE	146	8	PVC	120	289.87	0	0.1	15.69
P-196	FALSE	180	8	PVC	120	289.87	0.01	0.22	34.11
P-198	FALSE	170	8	PVC	120	289.86	0	0.14	22.6
P-200	FALSE	346	8	Ductile Iron	110	289.9	0	0.08	13.05
P-201	FALSE	243	12	PVC	120	290.04	0	0.12	41.05
P-202	FALSE	582	8	PVC	120	290.09	0.05	0.32	49.66
P-203	FALSE	567	8	PVC	120	290.07	0.03	0.26	41.4
P-204	FALSE	313	12	PVC	120	290.04	0	0.04	15.19
P-229	FALSE	371	18	Ductile Iron	110	289.88	0.03	0.47	372.74
P-230	FALSE	303	18	Ductile Iron	110	289.86	0.02	0.41	324.75
P-234	FALSE	331	18	PVC	120	289.83	0.01	0.35	276.13
P-237	FALSE	197	8	PVC	120	290.09	0.08	0.65	101.54
P-241	FALSE	247	8	PVC	120	290.07	0.02	0.26	40.38

Scenario: Base
Max Daily Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-242	FALSE	313	8	PVC	120	290.08	0	0.08	12.54
P-246	FALSE	293	8	PVC	120	289.96	0.02	0.3	46.34
P-248	FALSE	506	12	PVC	120	289.86	0.04	0.37	131.14
P-249	FALSE	474	12	PVC	120	289.83	0.03	0.35	122.03
P-250	FALSE	266	8	PVC	120	289.87	0	0.01	2.22
P-252	FALSE	136	8	PVC	120	289.89	0.01	0.28	43.66
P-253	FALSE	374	8	Ductile Iron	110	289.87	0.02	0.21	32.15
P-254	FALSE	366	8	PVC	120	289.99	0.03	0.28	43.65
P-255	FALSE	250	8	PVC	120	289.99	0	0.01	2.09
P-256	FALSE	502	8	Ductile Iron	110	289.9	0.03	0.24	36.83
P-258	FALSE	353	8	PVC	120	290.5	0	0.08	12.78
P-264	FALSE	500	8	PVC	120	290.17	0.03	0.27	42.5
P-268	FALSE	640	8	PVC	120	290.37	0.03	0.22	34.06
P-269	FALSE	831	8	PVC	120	291.32	0.11	0.4	63.18
P-292	FALSE	263	8	PVC	120	290.37	0	0.02	3.84
P-296	FALSE	278	8	PVC	120	290.3	0.06	0.56	87.2
P-297	FALSE	573	8	PVC	120	291.13	0.07	0.39	61.42
P-300	FALSE	349	8	PVC	120	290.56	0.09	0.6	94.28
P-302	FALSE	518	8	PVC	120	290.47	0	0.07	11.2
P-303	FALSE	277	8	PVC	120	289.93	0	0.04	5.69
P-304	FALSE	193	8	PVC	120	289.93	0	0.08	13.22
P-306	FALSE	106	8	PVC	120	290.3	0	0.05	7.27
P-310	FALSE	743	8	PVC	120	290.47	0.1	0.42	65.72
P-312	FALSE	388	8	PVC	120	290.37	0.05	0.42	65.04
P-314	FALSE	259	18	PVC	120	290.17	0.08	1.02	807.11
P-315	FALSE	376	8	PVC	120	290.25	0.05	0.43	68.02
P-316	FALSE	389	8	PVC	120	290.42	0.03	0.29	44.78
P-321	FALSE	371	12	PVC	120	290.56	0.01	0.16	56.82
P-322	FALSE	138	12	PVC	120	290.5	0.06	1	352.45
P-323	FALSE	176	12	PVC	120	290.43	0.07	0.93	327.77
P-324	FALSE	417	18	PVC	120	290.76	0.2	1.36	1,080.23
P-326	FALSE	202	18	PVC	120	291.21	0.15	1.72	1,360.68
P-327	FALSE	122	18	PVC	120	291.32	0.11	1.89	1,502.38
P-328	FALSE	226	18	PVC	120	291.53	0.21	1.99	1,577.47
P-329	FALSE	42	18	PVC	120	291.58	0.05	2.16	1,710.32
P-330	FALSE	227	18	PVC	120	291.83	0.25	2.17	1,722.22
P-331	FALSE	92	8	PVC	120	291.14	0.01	0.31	48.13
P-332	FALSE	353	8	PVC	120	291.22	0.08	0.54	85.23
P-333	FALSE	93	8	PVC	120	291.23	0.01	0.41	63.63
P-336	FALSE	344	8	PVC	120	291.35	0.12	0.7	109.04
P-337	FALSE	423	8	PVC	120	291.53	0.18	0.77	120.94
P-338	FALSE	567	8	PVC	120	290.29	0.09	0.46	71.61
P-339	FALSE	721	8	PVC	120	290.37	0.08	0.37	57.65
P-347	FALSE	557	12	Cast iron	80	289.72	0.02	0.16	56.83
P-348	FALSE	623	12	Cast iron	80	289.71	0.02	0.15	51.89
P-349	FALSE	203	12	PVC	120	289.83	0	0.14	48.6
P-350	FALSE	56	12	PVC	120	289.83	0	0.22	79.11

Scenario: Base
Max Daily Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-351	FALSE	558	18	Ductile Iron	110	289.76	0.03	0.4	320.27
P-352	FALSE	616	18	Ductile Iron	110	289.73	0.03	0.34	269.11
P-354	FALSE	195	12	Cast Iron	80	289.99	0.05	0.46	163
P-357	FALSE	257	8	PVC	120	289.77	0.02	0.28	43.18
P-358	FALSE	377	8	PVC	120	289.74	0.03	0.29	45.1
P-359	FALSE	735	8	PVC	120	289.77	0.06	0.3	47.48
P-360	FALSE	305	8	PVC	120	291.14	0.01	0.16	25.2
P-361	FALSE	305	8	PVC	120	291.23	0.01	0.21	33.51
P-362	FALSE	592	12	PVC	120	289.68	0	0.07	24.28
P-363	FALSE	591	12	Ductile Iron	110	289.69	0	0.09	33.3
P-364	FALSE	415	8	PVC	120	289.93	0	0.1	15.83
P-366	FALSE	387	8	PVC	120	289.93	0.01	0.12	19.19
P-368	FALSE	582	8	PVC	120	289.95	0.02	0.18	28.74
P-369	FALSE	543	8	PVC	120	290.01	0.06	0.37	57.9
P-370	FALSE	405	8	PVC	120	289.95	0.02	0.22	33.89
P-371	FALSE	361	8	PVC	120	289.98	0.03	0.34	52.97
P-372	FALSE	239	8	PVC	120	289.93	0	0.08	12.38
P-373	FALSE	189	8	PVC	120	289.93	0	0.07	10.99
P-374	FALSE	188	8	PVC	120	289.93	0	0.05	7.8
P-375	FALSE	242	8	PVC	120	289.95	0	0.1	16.31
P-376	FALSE	193	8	PVC	120	289.95	0	0.01	1.35
P-377	FALSE	184	8	PVC	120	289.95	0	0.06	8.93
P-378	FALSE	541	8	PVC	120	290.3	0.06	0.38	59.6
P-379	FALSE	439	8	PVC	120	290.3	0	0.03	4.63
P-380	FALSE	253	8	PVC	120	290.3	0.02	0.27	43.06
P-381	FALSE	120	8	PVC	120	290.39	0	0.01	1.19
P-382	FALSE	160	8	PVC	120	290.37	0.03	0.48	75.34
P-383	FALSE	309	8	PVC	120	290.39	0.07	0.56	88.44
P-384	FALSE	314	8	PVC	120	290.47	0.05	0.45	71.18
P-385	FALSE	242	12	PVC	120	290.74	0.02	0.46	162.68
P-386	FALSE	533	12	PVC	120	290.56	0.18	0.87	308.04
P-390	FALSE	658	12	PVC	120	289.99	0.08	0.52	184.48
P-391	FALSE	315	12	Cast Iron	80	289.82	0	0.06	20.13
P-392	FALSE	315	12	Cast Iron	80	289.78	0.04	0.33	116.45
P-394	FALSE	316	12	PVC	120	289.92	0.05	0.52	181.82
P-395	FALSE	128	12	PVC	120	289.9	0.02	0.42	149.79
P-400	FALSE	201	12	PVC	120	289.89	0.02	0.5	174.52
P-401	FALSE	625	8	PVC	120	289.86	0.05	0.32	50.54
P-402	FALSE	481	8	PVC	120	289.83	0.03	0.27	42.02
P-403	FALSE	480	12	PVC	120	289.84	0.02	0.28	99.6
P-404	FALSE	414	12	PVC	120	289.87	0.03	0.36	126.19
P-405	FALSE	526	8	PVC	120	289.94	0.05	0.33	52.46
P-406	FALSE	307	8	PVC	120	289.91	0.03	0.37	58.22
P-407	FALSE	319	12	PVC	120	289.92	0.02	0.4	141.23
P-409	FALSE	212	8	PVC	120	289.94	0.02	0.34	52.92
P-410	FALSE	370	8	PVC	120	289.92	0.03	0.29	45.57
P-411	FALSE	208	8	PVC	120	289.91	0.01	0.19	30.23

Scenario: Base
Max Daily Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-412	FALSE	377	8	PVC	120	289.89	0.02	0.23	36.22
P-413	FALSE	431	8	PVC	120	289.84	0.03	0.29	45.08
P-414	FALSE	199	8	PVC	120	289.86	0.01	0.18	27.87
P-415	FALSE	380	8	PVC	120	289.84	0.01	0.21	32.52
P-416	FALSE	444	8	PVC	120	289.8	0.04	0.35	54.52
P-418	FALSE	258	8	Ductile Iron	110	289.75	0.01	0.19	30.01
P-419	FALSE	367	8	Ductile Iron	110	289.72	0.02	0.24	38.27
P-420	FALSE	547	8	Ductile Iron	110	289.77	0.02	0.21	33.15
P-421	FALSE	551	12	PVC	120	289.71	0.01	0.2	69.1
P-422	FALSE	619	12	PVC	120	289.7	0.01	0.2	71.03
P-423	FALSE	425	8	Ductile Iron	110	289.71	0.01	0.15	23.58
P-425	FALSE	652	8	Ductile Iron	110	289.7	0.01	0.13	20.6
P-428	FALSE	619	18	Ductile Iron	110	289.7	0.01	0.21	164.43
P-429	FALSE	526	18	Ductile Iron	100	289.7	0.01	0.17	136.51
P-430	FALSE	644	12	Cast Iron	80	289.7	0.01	0.08	27.75
P-431	FALSE	555	12	Cast Iron	80	289.69	0	0.05	16.64
P-432	FALSE	688	8	Ductile Iron	110	289.7	0.01	0.09	14.54
P-434	FALSE	57	8	PVC	120	289.74	0	0.11	16.45
P-435	FALSE	56	8	PVC	120	289.72	0.01	0.6	93.83
P-436	FALSE	293	8	PVC	120	289.74	0.07	0.55	86.01
P-437	FALSE	407	8	PVC	120	290.45	0.03	0.32	50.55
P-438	FALSE	141	12	PVC	120	289.97	0.02	0.52	184.48
P-440	FALSE	377	12	PVC	120	289.97	0.02	0.31	110.49
P-441	FALSE	455	18	PVC	120	289.93	0.04	0.51	407.18
P-442	FALSE	340	18	PVC	120	289.85	0.02	0.39	313.24
P-444	FALSE	373	8	PVC	120	289.69	0.03	0.31	48.61
P-445	FALSE	310	12	PVC	120	289.71	0	0.03	12.27
P-447	FALSE	599	12	PVC	120	289.7	0	0.08	28.89
P-448	FALSE	437	8	Ductile Iron	110	289.7	0	0.09	14.42
P-450	FALSE	602	12	PVC	120	289.69	0	0.02	8.46
P-451	FALSE	631	12	PVC	120	289.7	0	0.1	35.07
P-452	FALSE	409	8	PVC	120	289.69	0	0.08	12.27
P-453	FALSE	147	8	PVC	120	289.68	0.01	0.28	44.06
P-455	FALSE	329	18	PVC	120	290.56	0.11	1.13	892.73
P-456	FALSE	308	12	PVC	120	289.78	0.01	0.29	101.93
P-457	FALSE	491	12	PVC	120	289.8	0.03	0.32	112.5
P-458	FALSE	592	12	Ductile Iron	110	289.69	0	0.09	33.04
P-459	FALSE	766	12	PVC	120	289.69	0	0.06	20.49
P-460	FALSE	936	12	Ductile Iron	110	289.69	0	0.07	23.88
P-462	FALSE	847	12	PVC	120	290.74	0.02	0.2	71.68
P-463	FALSE	408	8	PVC	120	290.47	0.27	0.99	154.87
P-464	FALSE	237	18	PVC	120	290.92	0.16	1.67	1,327.01
P-465	FALSE	184	18	PVC	120	291.06	0.14	1.78	1,410.19
P-466	FALSE	860	8	PVC	120	290.92	0.18	0.53	83.18
P-467	FALSE	407	12	PVC	120	289.94	0.02	0.28	98.65
P-468	FALSE	126	12	PVC	120	289.97	0.04	0.83	292.46
P-469	FALSE	223	12	PVC	120	289.9	0.01	0.2	69.57

Scenario: Base
Max Daily Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-470	FALSE	995	12	PVC	120	289.84	0.06	0.35	124.24
P-471	FALSE	215	12	PVC	120	289.9	0.03	0.55	193.81
P-472	FALSE	201	18	PVC	120	290.38	0.07	1.05	829.02
P-473	FALSE	498	18	PVC	120	290.25	0.14	0.97	770.81
P-474	FALSE	515	18	PVC	120	290.31	0.12	0.91	720.53
P-475	FALSE	743	18	Ductile Iron	110	290.08	0.23	0.98	778.73
P-476	FALSE	581	8	Ductile Iron	110	290.31	0.07	0.37	58.2
P-477	FALSE	218	12	PVC	120	291.21	0.03	0.55	192.98
P-478	FALSE	108	12	PVC	120	291.18	0	0.07	23.81
P-479	FALSE	105	12	PVC	120	291.18	0	0.03	11.91
P-480	FALSE	107	12	PVC	120	291.18	0	0	0
P-481	FALSE	110	12	PVC	120	291.18	0	0	0
P-482	FALSE	646	8	PVC	120	291.18	0.45	1	157.26
P-483	FALSE	1,022.00	8	Ductile Iron	110	289.85	0.06	0.24	36.91
P-484	FALSE	404	8	PVC	120	289.88	0	0.06	9.29

EXHIBIT F

JUNCTION REPORT BASED ON MAXIMUM DAILY FLOW PLUS FIRE FLOW FOR ALL NODES

Scenario: Base
Max Daily Flow Plus Fire Flow For All Nodes
Junction Report

Label	Demand (Calculated) (gpm)	Pressure (psi)	Elevation (ft)	Fire Flow Upper Limit (gpm)	Max Day Flow (gpm)
J-1	288.76	81.83	100	4,501.00	288.76
J-2	302.91	70.8	125	4,501.00	302.91
J-3	290.14	70.67	125	4,501.00	290.14
J-4	290.05	76.86	110	4,501.00	290.05
J-5	353.46	76.83	110	4,501.00	353.46
J-6	2.93	76.69	112.5	4,501.00	2.93
J-7	44.56	77.34	111	4,501.00	44.56
J-8	48.75	76.73	112.5	4,501.00	48.75
J-9	30.78	76.85	112.5	4,501.00	30.78
J-10	123.7	71.59	125	4,501.00	123.7
J-11	3.89	73.74	120	4,501.00	3.89
J-12	5.1	82.24	100	4,501.00	5.1
J-13	15.48	76.95	112	4,501.00	15.48
J-14	39.95	76.97	112	4,501.00	39.95
J-15	34.79	76.97	112	4,501.00	34.79
J-16	2.04	75.61	115	4,501.00	2.04
J-17	14.49	71.32	125	4,501.00	14.49
J-20	38.96	73.44	120	4,501.00	38.96
J-21	719.47	46.22	185	4,501.00	719.47
J-23	28.71	70.16	128	2,501.00	28.71
J-24	6.31	67.08	135	2,501.00	6.31
J-25	11.51	73.53	120	2,501.00	11.51
J-26	6.69	69.21	130	2,501.00	6.69
J-27	11.51	73.49	120	2,501.00	11.51
J-28	11.51	69.15	130	2,501.00	11.51
J-29	10.83	71.3	125	4,501.00	10.83
J-30	78.18	76.87	112	4,501.00	78.18
J-31	9.6	73.43	120	4,501.00	9.6
J-32	4.68	82.08	100	4,501.00	4.68
J-33	8.77	73.46	120	4,501.00	8.77
J-34	39.12	71.29	125	4,501.00	39.12
J-35	11.51	73.46	120	2,501.00	11.51
J-36	5.69	71.28	125	4,501.00	5.69
J-37	11.12	82.09	100	4,501.00	11.12
J-38	38.53	73.43	120	4,501.00	38.53
J-39	6.07	76.87	112	4,501.00	6.07
J-40	47.64	75.6	115	4,501.00	47.64
J-41	27.72	74.72	117	4,501.00	27.72
J-42	18.64	74.72	117	4,501.00	18.64
J-43	22.5	76.88	112	4,501.00	22.5
J-44	9.64	73.43	120	4,501.00	9.64
J-45	9.64	73.42	120	4,501.00	9.64
J-47	16	76.88	112	4,501.00	16
J-48	0	76.88	112	4,501.00	0
J-49	0	76.88	112	4,501.00	0
J-50	0	76.88	112	4,501.00	0

Scenario: Base
Max Daily Flow Plus Fire Flow For All Nodes
Junction Report

Label	Demand (Calculated) (gpm)	Pressure (psi)	Elevation (ft)	Fire Flow Upper Limit (gpm)	Max Day Flow (gpm)
J-51	0	76.88	112	4,501.00	0
J-52	0	79.04	107	4,501.00	0
J-53	0	79.04	107	4,501.00	0
J-55	12.97	79.04	107	4,501.00	12.97
J-56	0	79.04	107	4,501.00	0
J-57	50.84	79.47	106	4,501.00	50.84
J-58	0	79.04	107	4,501.00	0
J-60	0	79.04	107	4,501.00	0
J-61	0	79.04	107	4,501.00	0
J-62	76.34	79.91	105	4,501.00	76.34
J-63	0	79.04	107	4,501.00	0
J-64	0	79.04	107	4,501.00	0
J-69	49.34	76.87	112	4,501.00	49.34
J-70	4.5	75.15	116	4,501.00	4.5
J-73	0	77.01	112	4,501.00	0
J-74	0.97	76.88	112	4,501.00	0.97
J-75	0	79.04	107	4,501.00	0
J-81	11.51	76.13	114	2,501.00	11.51
J-82	11.51	74.81	117	2,501.00	11.51
J-83	11.51	75.71	115	2,501.00	11.51
J-84	11.51	75.68	115	2,501.00	11.51
J-85	11.51	77.41	111	2,501.00	11.51
J-86	11.51	76.12	114	2,501.00	11.51
J-87	11.51	76.11	114	2,501.00	11.51
J-88	11.51	75.72	115	2,501.00	11.51
J-90	28.71	74.87	117	2,501.00	28.71
J-91	28.71	73.53	120	2,501.00	28.71
J-92	11.51	76.12	114	2,501.00	11.51
J-93	11.51	76.98	112	2,501.00	11.51
J-94	28.71	76.12	114	2,501.00	28.71
J-95	11.51	76.55	113	2,501.00	11.51
J-96	11.51	76.12	114	2,501.00	11.51
J-108	11.51	75.68	115	2,501.00	11.51
J-109	11.51	71.77	124	2,501.00	11.51
J-110	0.21	73.05	121	2,501.00	0.21
J-111	11.51	69.22	130	2,501.00	11.51
J-112	11.51	69.24	130	2,501.00	11.51
J-113	11.51	74.8	117	2,501.00	11.51
J-114	11.51	73.06	121	2,501.00	11.51
J-115	11.51	69.26	130	2,501.00	11.51
J-116	11.51	70.46	127	2,501.00	11.51
J-118	11.51	70.97	126	2,501.00	11.51
J-121	6.22	69.61	129	2,501.00	6.22
J-122	11.51	69.26	130	2,501.00	11.51
J-124	11.51	73.06	121	2,501.00	11.51
J-125	11.51	70.04	128	2,501.00	11.51

Scenario: Base
Max Daily Flow Plus Fire Flow For All Nodes
Junction Report

Label	Demand (Calculated) (gpm)	Pressure (psi)	Elevation (ft)	Fire Flow Upper Limit (gpm)	Max Day Flow (gpm)
J-129	3.83	69.17	130	2,501.00	3.83
J-131	5.61	69.18	130	2,501.00	5.61
J-132	11.51	69.22	130	2,501.00	11.51
J-150	29.11	73.64	120	2,501.00	29.11
J-151	36.41	66.87	136	2,501.00	36.41
J-152	12.41	60.47	151	2,501.00	12.41
J-153	12.41	69.03	131	2,501.00	12.41
J-154	11.91	70.68	127	2,501.00	11.91
J-155	11.91	72.82	122	2,501.00	11.91
J-156	11.91	58.87	155	2,501.00	11.91
J-157	11.91	52.58	170	2,501.00	11.91
J-158	11.91	54.16	166	2,501.00	11.91
J-159	11.91	52.6	170	2,501.00	11.91
J-161	11.91	63.7	144	2,501.00	11.91
J-162	11.91	69.43	130	2,501.00	11.91
J-163	11.91	71.17	126	2,501.00	11.91
J-164	12.78	72.04	124	2,501.00	12.78
J-165	11.91	56.77	160	2,501.00	11.91
J-166	11.91	55.08	164	2,501.00	11.91
J-167	11.91	64.09	143	2,501.00	11.91
J-170	11.91	72.84	122	2,501.00	11.91
J-171	11.91	66.8	136	2,501.00	11.91
J-172	11.91	69.82	129	2,501.00	11.91
J-175	11.91	67.7	134	2,501.00	11.91
J-176	11.91	72.82	122	2,501.00	11.91
J-203	11.91	69.84	129	2,501.00	11.91
J-204	31.72	69.33	130	2,501.00	31.72
J-205	13.16	67.69	134	2,501.00	13.16
J-206	11.91	64.09	143	2,501.00	11.91
J-207	11.91	63.69	144	2,501.00	11.91
J-208	11.91	48.1	180	2,501.00	11.91
J-209	11.91	54.67	165	2,501.00	11.91
J-210	29.11	73.68	120	2,501.00	29.11
J-212	11.51	70.02	128	2,501.00	11.51
J-214	19.64	74.3	118	4,501.00	19.64
J-216	11.51	70.01	128	2,501.00	11.51
J-223	21.15	75.61	115	4,501.00	21.15
J-224	0.04	68.79	131	4,501.00	0.04
J-225	12.41	74.32	118	2,501.00	12.41
J-226	9.02	76.87	112	4,501.00	9.02
J-227	11.51	76.55	113	2,501.00	11.51
J-228	11.51	76.12	114	2,501.00	11.51
J-229	11.51	74.39	118	2,501.00	11.51
J-230	11.51	75.26	116	2,501.00	11.51
J-231	11.91	73.68	120	2,501.00	11.91
J-232	11.91	68.53	132	2,501.00	11.91

Scenario: Base
Max Daily Flow Plus Fire Flow For All Nodes
Junction Report

Label	Demand (Calculated) (gpm)	Pressure (psi)	Elevation (ft)	Fire Flow Upper Limit (gpm)	Max Day Flow (gpm)
J-233	11.91	62.62	146	2,501.00	11.91
J-234	11.91	51.13	173	2,501.00	11.91
J-235	3.27	70.88	126	4,501.00	3.27
J-236	1.8	69.19	130	2,501.00	1.8
J-237	1.69	69.62	129	4,501.00	1.69
J-238	2.93	72.21	123	4,501.00	2.93
J-239	3.24	70.9	126	4,501.00	3.24
J-240	3.87	70.03	128	4,501.00	3.87
J-241	4.59	70.89	126	4,501.00	4.59
J-242	1.6	69.2	130	4,501.00	1.6
J-243	2.99	73.52	120	4,501.00	2.99
J-245	24.89	75.17	116	4,501.00	24.89
J-246	9.38	80.35	104	4,501.00	9.38
J-247	13.38	75.59	115	4,501.00	13.38
J-248	13.38	75.58	115	4,501.00	13.38
J-249	8.64	73.44	120	4,501.00	8.64
J-250	2.52	77	112	4,501.00	2.52
J-252	12.27	79.05	107	4,501.00	12.27
J-253	4.55	76.45	113	4,501.00	4.55
J-254	8.24	75.58	115	4,501.00	8.24
J-255	0	78.39	110	4,501.00	0
J-256	14.99	76.45	113	4,501.00	14.99
J-257	0	78.2	110	4,501.00	0
J-258	10.58	77.78	110	4,501.00	10.58
J-259	11.33	76.88	112	4,501.00	11.33
J-260	0	78.28	110	4,501.00	0
J-261	0	77.85	110	4,501.00	0
J-262	0	77.84	110	4,501.00	0
J-263	0	78.04	110	4,501.00	0
J-264	0	78.01	110	4,501.00	0
J-265	0	78.39	110	4,501.00	0

EXHIBIT G

PIPE REPORT BASED ON MAXIMUM DAILY FLOW PLUS CRITICAL FIRE FLOW

Scenario: Base
Max Daily Flow Plus Critical Fire Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-2	FALSE	1,344.00	20	PVC	120	268.89	0.5	1.26	1,236.56
P-3	TRUE	1,507.00	20	PVC	120	297.37	0	0	0
P-4	FALSE	668	18	PVC	120	268.6	0.29	1.18	933.65
P-5	FALSE	616	10	PVC	120	267.91	0.69	1.43	349.7
P-6	FALSE	1,853.00	10	PVC	120	267.84	0.07	0.24	59.65
P-7	FALSE	2,481.00	12	PVC	120	268.6	0.77	0.83	293.81
P-8	FALSE	983	20	PVC	120	270.02	0.62	1.56	1,525.32
P-9	FALSE	583	12	PVC	120	269.15	0.87	1.83	645.51
P-10	FALSE	2,106.00	12	PVC	120	266.73	2.41	1.7	600.95
P-12	FALSE	675	20	PVC	120	270.8	0.78	2.22	2,173.76
P-13	FALSE	652	20	PVC	120	271.49	0.69	2.25	2,204.54
P-14	FALSE	387	18	PVC	120	270.76	0.72	2.53	2,008.80
P-18	FALSE	824	12	PVC	120	266.66	0.58	1.23	433.71
P-19	FALSE	513	12	PVC	120	266.73	0.08	0.54	191.73
P-20	FALSE	502	10	Cast iron	80	265.89	0.06	0.29	69.89
P-21	FALSE	691	10	Ductile Iron	110	266.73	0.9	1.47	360.47
P-22	FALSE	700	12	PVC	120	266.66	0.76	1.66	585.48
P-23	FALSE	1,175.00	10	Cast iron	80	262.32	3.52	1.69	414.88
P-29	FALSE	303	10	Cast iron	80	261.39	0.92	1.69	412.84
P-30	FALSE	1,368.00	20	PVC	120	277.15	20.22	9.16	8,965.08
P-31	FALSE	1,356.00	20	PVC	120	271.49	5.66	4.43	4,337.03
P-36	FALSE	569	18	PVC	120	266.73	0.51	1.83	1,449.09
P-39	FALSE	512	12	PVC	120	265.59	1.14	2.36	833.68
P-45	FALSE	403	12	PVC	120	262.72	1.05	2.54	894.28
P-49	FALSE	476	12	PVC	120	260.08	0.27	1.12	395.99
P-53	FALSE	731	18	PVC	120	260.62	1.77	3.16	2,508.26
P-55	FALSE	404	12	Cast iron	80	261.17	1.31	1.96	690.83
P-57	FALSE	406	10	Cast iron	80	259.71	2.09	2.28	558.3
P-58	FALSE	724	12	PVC	120	259.71	0.37	1.11	391.31
P-59	FALSE	334	12	PVC	120	259.71	0	0.01	4.79
P-60	FALSE	722	12	PVC	120	258.16	0.23	0.85	299.93
P-66	FALSE	650	8	Ductile Iron	110	256.82	0.22	0.61	95.78
P-67	FALSE	439	8	Ductile Iron	110	256.65	0.17	0.66	103.35
P-69	FALSE	601	18	Ductile Iron	110	255.37	1.68	3.15	2,496.80
P-70	FALSE	592	12	Cast iron	80	255.32	1.5	1.72	606.1
P-72	FALSE	605	12	Ductile Iron	110	255.16	1.31	2.16	760.13
P-80	FALSE	653	20	PVC	120	252.08	0	0.06	62.42
P-81	FALSE	465	20	PVC	120	252.01	0.07	0.71	696.74
P-83	FALSE	983	20	PVC	120	250.86	1.22	2.39	2,342.02
P-84	FALSE	917	20	PVC	120	250.88	1.13	2.35	2,298.12
P-87	FALSE	1,281.00	20	Ductile Iron	110	248.97	1.89	2.45	2,401.94
P-88	FALSE	567	20	PVC	120	250.24	0.64	2.29	2,238.20
P-89	FALSE	240	20	PVC	120	248.64	0.33	2.44	2,388.98
P-90	FALSE	914	20	PVC	120	249.2	1.03	2.29	2,238.20
P-93	FALSE	372	20	PVC	120	248.88	0.32	1.92	1,877.55
P-94	FALSE	475	20	PVC	120	248.47	0.42	1.92	1,877.55

Scenario: Base
Max Daily Flow Plus Critical Fire Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-96	FALSE	748	20	PVC	120	248.64	1.28	2.76	2,698.79
P-97	FALSE	679	12	PVC	120	248.97	0.33	1.02	360.65
P-98	FALSE	498	12	PVC	120	249.2	0.24	1.02	360.65
P-99	FALSE	645	12	PVC	120	250.87	0.01	0.17	59.92
P-100	FALSE	460	12	PVC	120	250.88	0.01	0.17	59.92
P-103	FALSE	430	12	PVC	120	259.86	0.16	0.88	310.34
P-109	FALSE	527	10	Cast iron	80	258.64	1.71	1.75	427.45
P-110	FALSE	471	12	PVC	120	258.39	0.25	1.07	378.11
P-112	FALSE	309	12	Cast iron	80	256.58	0.07	0.45	158.85
P-113	FALSE	543	12	Cast iron	80	256.47	0.11	0.44	154.35
P-124	FALSE	351	20	Cast iron	80	252.1	0.09	0.64	624.94
P-125	FALSE	394	14	Cast iron	80	252.65	0.55	1.3	625.92
P-127	FALSE	374	20	PVC	120	248.05	0.41	1.92	1,877.55
P-128	FALSE	738	20	PVC	120	247.36	0.7	1.92	1,877.55
P-139	FALSE	653	12	PVC	120	265.69	0	0.03	11.51
P-140	FALSE	67	8	PVC	120	265.64	0.01	0.41	63.93
P-155	FALSE	259	8	PVC	120	265.28	0.26	1.23	192.48
P-158	FALSE	175	18	PVC	120	265.64	0.27	2.26	1,796.24
P-163	FALSE	506	18	PVC	120	266.73	1.2	3.1	2,457.35
P-165	FALSE	673	8	PVC	120	265.69	0.19	0.62	97.89
P-167	FALSE	180	18	PVC	120	264.71	0.3	2.4	1,901.09
P-169	FALSE	243	18	PVC	120	266.24	0.49	2.71	2,152.06
P-170	FALSE	192	18	PVC	120	265.9	0.34	2.47	1,956.42
P-171	FALSE	459	8	PVC	120	265.28	0.57	1.38	215.92
P-172	FALSE	381	8	PVC	120	265.49	0.05	0.42	66.35
P-173	FALSE	137	8	PVC	120	265.76	0.07	0.88	138.11
P-174	FALSE	764	8	PVC	120	266.73	0.97	1.4	218.71
P-175	FALSE	223	8	PVC	120	265.46	0.19	1.12	175.39
P-176	FALSE	244	8	PVC	120	265.62	0.15	0.95	148.28
P-177	FALSE	122	8	PVC	120	265.63	0.01	0.33	52.42
P-178	FALSE	349	8	PVC	120	265.41	0.03	0.35	54.84
P-185	FALSE	148	8	PVC	120	263.9	0.03	0.49	76.68
P-191	FALSE	211	12	PVC	120	266.73	0	0.16	57.87
P-192	FALSE	517	8	PVC	120	266.73	0.66	1.4	219.79
P-193	FALSE	510	8	PVC	120	266.73	0.66	1.41	220.95
P-194	FALSE	146	8	PVC	120	263.9	0.01	0.27	42.63
P-196	FALSE	180	8	PVC	120	263.66	0.23	1.41	221.57
P-198	FALSE	170	8	PVC	120	263.46	0.2	1.34	210.06
P-200	FALSE	346	8	Ductile Iron	110	264.42	0	0.02	2.76
P-201	FALSE	243	12	PVC	120	266.73	0	0.04	13.96
P-202	FALSE	582	8	PVC	120	267.29	0.56	1.2	188.55
P-203	FALSE	567	8	PVC	120	267.18	0.45	1.09	170.12
P-204	FALSE	313	12	PVC	120	266.73	0	0.13	47.22
P-229	FALSE	371	18	Ductile Iron	110	263.93	0.78	2.65	2,105.50
P-230	FALSE	303	18	Ductile Iron	110	263.33	0.6	2.54	2,017.31
P-234	FALSE	331	18	PVC	120	262.39	0.44	2.19	1,738.35

Scenario: Base
Max Daily Flow Plus Critical Fire Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-237	FALSE	197	8	PVC	120	267.29	0.64	1.99	311.25
P-241	FALSE	247	8	PVC	120	267.18	0.11	0.71	111.18
P-242	FALSE	313	8	PVC	120	267.23	0.06	0.45	70.45
P-246	FALSE	293	8	PVC	120	265.59	0.47	1.43	224.04
P-248	FALSE	506	12	PVC	120	263.46	0.95	2.09	736.6
P-249	FALSE	474	12	PVC	120	262.39	1.08	2.3	809.48
P-250	FALSE	266	8	PVC	120	263.9	0	0.07	11.04
P-252	FALSE	136	8	PVC	120	264.28	0.13	1.22	190.92
P-253	FALSE	374	8	Ductile Iron	110	263.9	0.39	1.15	179.41
P-254	FALSE	366	8	PVC	120	266.07	0.43	1.24	193.69
P-255	FALSE	250	8	PVC	120	266.06	0	0.1	15.76
P-256	FALSE	502	8	Ductile Iron	110	264.42	0.6	1.24	194.38
P-258	FALSE	353	8	PVC	120	270.91	0	0.08	12.78
P-264	FALSE	500	8	PVC	120	267.92	0.6	1.36	212.29
P-268	FALSE	640	8	PVC	120	269.89	0.19	0.64	100.18
P-269	FALSE	831	8	PVC	120	274.77	0.5	0.93	146.36
P-292	FALSE	263	8	PVC	120	269.92	0	0.05	7.98
P-296	FALSE	278	8	PVC	120	269.43	0.46	1.62	253.46
P-297	FALSE	573	8	PVC	120	274.1	0.54	1.19	186.51
P-300	FALSE	349	8	PVC	120	271	0.5	1.48	232.64
P-302	FALSE	518	8	PVC	120	270.51	0.01	0.16	25.51
P-303	FALSE	277	8	PVC	120	265.28	0.12	0.79	124.32
P-304	FALSE	193	8	PVC	120	265.28	0.01	0.18	28.6
P-306	FALSE	106	8	PVC	120	269.43	0.01	0.27	42.24
P-310	FALSE	743	8	PVC	120	270.49	0.57	1.07	167.09
P-312	FALSE	388	8	PVC	120	269.89	0.29	1.05	165.18
P-314	FALSE	259	18	PVC	120	267.92	0.73	3.26	2,585.02
P-315	FALSE	376	8	PVC	120	268.65	0.77	1.81	283.79
P-316	FALSE	389	8	PVC	120	270.18	0.1	0.59	93.1
P-321	FALSE	371	12	PVC	120	271.04	0.04	0.49	172.54
P-322	FALSE	138	12	PVC	120	270.91	0.13	1.54	541.12
P-323	FALSE	176	12	PVC	120	270.76	0.15	1.47	516.43
P-324	FALSE	417	18	PVC	120	272.02	1.02	3.31	2,625.77
P-326	FALSE	202	18	PVC	120	274.27	0.71	4.04	3,203.37
P-327	FALSE	122	18	PVC	120	274.77	0.5	4.39	3,480.46
P-328	FALSE	226	18	PVC	120	275.78	1.01	4.59	3,638.73
P-329	FALSE	42	18	PVC	120	275.99	0.21	4.91	3,896.67
P-330	FALSE	227	18	PVC	120	277.15	1.16	4.93	3,908.58
P-331	FALSE	92	8	PVC	120	274.14	0.04	0.83	130.23
P-332	FALSE	353	8	PVC	120	274.56	0.42	1.34	210.32
P-333	FALSE	93	8	PVC	120	274.62	0.06	0.93	145.57
P-336	FALSE	344	8	PVC	120	275.11	0.5	1.49	234.13
P-337	FALSE	423	8	PVC	120	275.78	0.67	1.57	246.03
P-338	FALSE	567	8	PVC	120	269.39	0.86	1.54	241.4
P-339	FALSE	721	8	PVC	120	269.92	0.53	1.04	163.16
P-347	FALSE	557	12	Cast Iron	80	258.57	1.29	1.64	578.56

Scenario: Base
Max Daily Flow Plus Critical Fire Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-348	FALSE	623	12	Cast iron	80	256.82	1.75	1.82	641.39
P-349	FALSE	203	12	PVC	120	262.38	0	0.08	28.06
P-350	FALSE	56	12	PVC	120	262.34	0.05	0.85	298.27
P-351	FALSE	558	18	Ductile Iron	110	258.94	1.67	3.26	2,588.93
P-352	FALSE	616	18	Ductile Iron	110	257.04	1.9	3.33	2,640.22
P-354	FALSE	195	12	Cast iron	80	266.24	0.49	1.59	561.89
P-357	FALSE	257	8	PVC	120	260.35	0.27	1.12	175.07
P-358	FALSE	377	8	PVC	120	259.86	0.49	1.3	203.76
P-359	FALSE	735	8	PVC	120	260.35	1.99	2.1	329.06
P-360	FALSE	305	8	PVC	120	274.14	0.04	0.44	68.18
P-361	FALSE	305	8	PVC	120	274.62	0.06	0.49	76.66
P-362	FALSE	592	12	PVC	120	257.37	0.79	1.81	637.3
P-363	FALSE	591	12	Ductile Iron	110	256.47	0.9	1.78	628.28
P-364	FALSE	415	8	PVC	120	265.49	0.08	0.52	80.98
P-366	FALSE	387	8	PVC	120	265.47	0.19	0.84	131.71
P-368	FALSE	582	8	PVC	120	265.74	0.25	0.78	121.63
P-369	FALSE	543	8	PVC	120	266.24	0.5	1.18	184.14
P-370	FALSE	405	8	PVC	120	265.68	0.2	0.85	132.68
P-371	FALSE	361	8	PVC	120	265.9	0.22	0.95	148.66
P-372	FALSE	239	8	PVC	120	265.49	0	0.13	20.03
P-373	FALSE	189	8	PVC	120	265.47	0.02	0.31	49.17
P-374	FALSE	188	8	PVC	120	265.46	0.01	0.25	38.62
P-375	FALSE	242	8	PVC	120	265.74	0.02	0.33	51.89
P-376	FALSE	193	8	PVC	120	265.68	0.06	0.66	102.89
P-377	FALSE	184	8	PVC	120	265.62	0.06	0.69	107.37
P-378	FALSE	541	8	PVC	120	269.48	0.45	1.11	173.39
P-379	FALSE	439	8	PVC	120	269.43	0.04	0.35	54.15
P-380	FALSE	253	8	PVC	120	269.48	0.09	0.69	107.34
P-381	FALSE	120	8	PVC	120	270.08	0	0.12	18.98
P-382	FALSE	160	8	PVC	120	269.92	0.16	1.23	193.28
P-383	FALSE	309	8	PVC	120	270.08	0.41	1.43	224.17
P-384	FALSE	314	8	PVC	120	270.51	0.32	1.25	195.23
P-385	FALSE	242	12	PVC	120	271.91	0.11	1.03	362.14
P-386	FALSE	533	12	PVC	120	271.04	0.87	2.06	726.07
P-390	FALSE	658	12	PVC	120	266.31	0.92	1.9	671.2
P-391	FALSE	315	12	Cast iron	80	262.34	0.01	0.12	42.3
P-392	FALSE	315	12	Cast iron	80	261.17	1.17	1.98	699.61
P-394	FALSE	316	12	PVC	120	264.75	0.85	2.43	856.64
P-395	FALSE	128	12	PVC	120	264.42	0.33	2.11	744.97
P-400	FALSE	201	12	PVC	120	264.51	0.53	2.67	942.38
P-401	FALSE	625	8	PVC	120	263.36	1.31	1.83	287.17
P-402	FALSE	481	8	PVC	120	262.38	0.98	1.8	281.72
P-403	FALSE	480	12	PVC	120	263.16	0.82	2.11	745.18
P-404	FALSE	414	12	PVC	120	263.98	0.82	2.29	807.19
P-405	FALSE	526	8	PVC	120	265.38	0.86	1.6	251.07
P-406	FALSE	307	8	PVC	120	264.67	0.7	1.92	301.13
P-407	FALSE	319	12	PVC	120	265.16	0.65	2.34	823.18

Scenario: Base
Max Daily Flow Plus Critical Fire Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-409	FALSE	212	8	PVC	120	265.38	0.22	1.24	194.39
P-410	FALSE	370	8	PVC	120	265.16	0.21	0.91	142.74
P-411	FALSE	208	8	PVC	120	264.67	0.07	0.7	109.86
P-412	FALSE	377	8	PVC	120	264.51	0.16	0.78	122.13
P-413	FALSE	431	8	PVC	120	263.77	0.21	0.84	131.94
P-414	FALSE	199	8	PVC	120	263.36	0.1	0.85	133.35
P-415	FALSE	380	8	PVC	120	263.16	0.2	0.86	134.93
P-416	FALSE	444	8	PVC	120	262.72	0.44	1.23	192.35
P-418	FALSE	258	8	Ductile Iron	110	258.99	0.05	0.46	72.44
P-419	FALSE	367	8	Ductile Iron	110	258.57	0.42	1.22	190.64
P-420	FALSE	547	8	Ductile Iron	110	260.35	1.36	1.84	287.97
P-421	FALSE	551	12	PVC	120	258.4	1.31	2.45	862.32
P-422	FALSE	619	12	PVC	120	256.65	1.75	2.69	948.83
P-423	FALSE	425	8	Ductile Iron	110	258.4	0.17	0.69	108.17
P-425	FALSE	652	8	Ductile Iron	110	255.32	0.05	0.28	43.74
P-428	FALSE	619	18	Ductile Iron	110	253.71	1.65	3.08	2,443.42
P-429	FALSE	526	18	Ductile Iron	100	252.08	1.63	3.03	2,404.44
P-430	FALSE	644	12	Cast Iron	80	253.69	1.62	1.68	592.08
P-431	FALSE	555	12	Cast Iron	80	252.08	1.61	1.8	634.32
P-432	FALSE	688	8	Ductile Iron	110	253.69	0.02	0.16	25.6
P-434	FALSE	57	8	PVC	120	261.2	0.2	2.39	373.88
P-435	FALSE	56	8	PVC	120	260.35	0.85	5.32	833.03
P-436	FALSE	293	8	PVC	120	261.2	1.52	2.99	467.8
P-437	FALSE	407	8	PVC	120	270.25	0.07	0.48	74.96
P-438	FALSE	141	12	PVC	120	266.11	0.2	1.9	671.2
P-440	FALSE	377	12	PVC	120	266.11	0.13	0.88	310.78
P-441	FALSE	455	18	PVC	120	265.02	0.62	2.41	1,914.50
P-442	FALSE	340	18	PVC	120	262.82	0.5	2.53	2,005.80
P-444	FALSE	373	8	PVC	120	258.59	1.12	2.22	347.99
P-445	FALSE	310	12	PVC	120	258.4	0	0.03	12.27
P-447	FALSE	599	12	PVC	120	256.65	1.37	2.48	874.7
P-448	FALSE	437	8	Ductile Iron	110	255.28	0.04	0.31	48.12
P-450	FALSE	602	12	PVC	120	253.7	1.69	2.77	976.44
P-451	FALSE	631	12	PVC	120	255.28	1.57	2.59	914.58
P-452	FALSE	409	8	PVC	120	253.7	0.01	0.19	30.03
P-453	FALSE	147	8	PVC	120	258.16	0.43	2.19	343.44
P-455	FALSE	329	18	PVC	120	271	0.75	3.19	2,529.26
P-456	FALSE	308	12	PVC	120	262.14	0.35	1.69	597.43
P-457	FALSE	491	12	PVC	120	262.72	0.57	1.72	608.01
P-458	FALSE	592	12	Ductile Iron	110	253.76	1.41	2.11	744.13
P-459	FALSE	766	12	PVC	120	252.65	1.1	1.78	625.92
P-460	FALSE	936	12	Ductile Iron	110	253.76	0.05	0.3	106.88
P-462	FALSE	847	12	PVC	120	271.92	0.1	0.5	177.71
P-463	FALSE	408	8	PVC	120	270.49	1.42	2.41	377.66
P-464	FALSE	237	18	PVC	120	272.84	0.82	4.01	3,178.02
P-465	FALSE	184	18	PVC	120	273.56	0.72	4.26	3,377.97
P-466	FALSE	860	8	PVC	120	272.84	0.92	1.28	199.95

Scenario: Base
Max Daily Flow Plus Critical Fire Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-467	FALSE	407	12	PVC	120	265.76	0.59	1.94	683.43
P-468	FALSE	126	12	PVC	120	266.11	0.36	2.78	979.45
P-469	FALSE	223	12	PVC	120	265.69	0.2	1.36	480.8
P-470	FALSE	995	12	PVC	120	263.77	1.92	2.2	776.83
P-471	FALSE	215	12	PVC	120	265.69	0.07	0.84	296.02
P-472	FALSE	201	18	PVC	120	269.72	0.53	3.08	2,441.14
P-473	FALSE	498	18	PVC	120	268.65	1.07	2.94	2,332.95
P-474	FALSE	515	18	PVC	120	269.49	1.27	3.18	2,521.34
P-475	FALSE	743	18	Ductile Iron	110	267.23	2.25	3.32	2,629.54
P-476	FALSE	581	8	Ductile Iron	110	269.49	0.24	0.69	108.2
P-477	FALSE	218	12	PVC	120	274.27	0.12	1.17	411.55
P-478	FALSE	108	12	PVC	120	274.14	0	0.07	23.81
P-479	FALSE	105	12	PVC	120	274.14	0	0.03	11.91
P-480	FALSE	107	12	PVC	120	274.14	0	0	0
P-481	FALSE	110	12	PVC	120	274.14	0	0	0
P-482	FALSE	646	8	PVC	120	274.14	2.23	2.4	375.83
P-483	FALSE	1,022.00	8	Ductile Iron	110	262.82	2.21	1.71	267.25
P-484	FALSE	404	8	PVC	120	263.9	0.01	0.14	22.55

EXHIBIT H

TANK REPORT

Scenario: Base
Max Daily Flow
Tank Report

Label	Base Elevation (ft)	Initial HGL (ft)	Maximum Elevation (ft)	Inactive Volume (gal)	Tank Diameter (ft)	Outflow (gpm)	Calculated Hydraulic Grade (ft)	Calculated Percent Full (%)
T-1	284.83	297.37	317.33	6,199,854.40	181.5	4,465.08	297.37	65.7

EXHIBIT I

PIPE REPORT WITHOUT REUSE AREA 1B DEMANDS

MAXIMUM DAILY FLOW

Scenario: Base
Max Daily Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-2	FALSE	1,344.00	20	PVC	120	289.02	0.5	1.26	1,236.56
P-3	TRUE	1,507.00	20	PVC	120	297.37	0	0	0
P-4	FALSE	668	18	PVC	120	288.73	0.29	1.18	933.65
P-5	FALSE	616	10	PVC	120	288.03	0.69	1.43	349.7
P-6	FALSE	1,853.00	10	PVC	120	287.96	0.07	0.24	59.65
P-7	FALSE	2,481.00	12	PVC	120	288.73	0.77	0.83	293.81
P-8	FALSE	983	20	PVC	120	290.14	0.62	1.56	1,525.32
P-9	FALSE	583	12	PVC	120	290.16	0.02	0.22	76.84
P-10	FALSE	2,106.00	12	PVC	120	290.28	0.12	0.34	121.4
P-12	FALSE	675	20	PVC	120	290.51	0.37	1.48	1,451.41
P-13	FALSE	652	20	PVC	120	290.84	0.33	1.51	1,482.19
P-14	FALSE	387	18	PVC	120	290.81	0.03	0.44	350.96
P-18	FALSE	824	12	PVC	120	290.34	0.16	0.62	217.74
P-19	FALSE	513	12	PVC	120	290.28	0.06	0.46	161.36
P-20	FALSE	502	10	Cast iron	80	290.34	0.05	0.28	67.62
P-21	FALSE	691	10	Ductile Iron	110	290.28	0	0.04	8.79
P-22	FALSE	700	12	PVC	120	290.34	0	0.05	16.43
P-23	FALSE	1,175.00	10	Cast iron	80	290.23	0.05	0.18	43.35
P-29	FALSE	303	10	Cast iron	80	290.22	0.01	0.17	41.3
P-30	FALSE	1,368.00	20	PVC	120	292.12	5.25	4.43	4,337.90
P-31	FALSE	1,356.00	20	PVC	120	290.84	1.28	2	1,956.85
P-36	FALSE	569	18	PVC	120	290.47	0.03	0.4	320.22
P-39	FALSE	512	12	PVC	120	290.4	0.06	0.51	178.16
P-45	FALSE	403	12	PVC	120	290.27	0.03	0.38	133.49
P-49	FALSE	476	12	PVC	120	290.21	0	0.01	1.93
P-53	FALSE	731	18	PVC	120	290.27	0.03	0.35	280.26
P-55	FALSE	404	12	Cast iron	80	290.26	0.03	0.26	91.18
P-57	FALSE	406	10	Cast iron	80	290.22	0.02	0.2	47.83
P-58	FALSE	724	12	PVC	120	290.21	0	0.01	2.75
P-59	FALSE	334	12	PVC	120	290.21	0.01	0.23	81.45
P-60	FALSE	722	12	PVC	120	290.18	0.02	0.2	69.55
P-66	FALSE	650	8	Ductile Iron	110	290.22	0.02	0.15	23.15
P-67	FALSE	439	8	Ductile Iron	110	290.21	0.01	0.1	15.74
P-69	FALSE	601	18	Ductile Iron	110	290.22	0.01	0.17	138.33
P-70	FALSE	592	12	Cast iron	80	290.21	0	0.04	13.11
P-72	FALSE	605	12	Ductile Iron	110	290.2	0	0.09	31.76
P-80	FALSE	653	20	PVC	120	290.21	0	0.05	52.48
P-81	FALSE	465	20	PVC	120	290.21	0	0.05	45.04
P-83	FALSE	983	20	PVC	120	290.21	0	0.03	33.45
P-84	FALSE	917	20	PVC	120	290.21	0	0.02	20.48
P-87	FALSE	1,281.00	20	Ductile Iron	110	290.21	0	0.02	24.43
P-88	FALSE	567	20	PVC	120	290.21	0	0.01	11.46
P-89	FALSE	240	20	PVC	120	290.21	0	0.01	11.46
P-90	FALSE	914	20	PVC	120	290.21	0	0.01	11.46
P-93	FALSE	372	20	PVC	120	290.21	0	0.01	7.64
P-94	FALSE	475	20	PVC	120	290.21	0	0.01	7.64

Scenario: Base
Max Daily Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-96	FALSE	748	20	PVC	120	290.21	0	0.01	7.64
P-97	FALSE	679	12	PVC	120	290.21	0	0.01	3.82
P-98	FALSE	498	12	PVC	120	290.21	0	0.01	3.82
P-99	FALSE	645	12	PVC	120	290.21	0	0.03	9.02
P-100	FALSE	460	12	PVC	120	290.21	0	0.03	9.02
P-103	FALSE	430	12	PVC	120	290.23	0.01	0.24	83.73
P-109	FALSE	527	10	Cast iron	80	290.17	0.04	0.24	57.96
P-110	FALSE	471	12	PVC	120	290.17	0	0.02	8.63
P-112	FALSE	309	12	Cast iron	80	290.2	0.01	0.13	44.26
P-113	FALSE	543	12	Cast iron	80	290.19	0.01	0.11	39.76
P-124	FALSE	351	20	Cast iron	80	290.21	0	0.03	33.45
P-125	FALSE	394	14	Cast iron	80	290.21	0	0.07	32.47
P-127	FALSE	374	20	PVC	120	290.21	0	0.01	7.64
P-128	FALSE	738	20	PVC	120	290.21	0	0.01	7.64
P-139	FALSE	653	12	PVC	120	290.37	0	0.03	11.51
P-140	FALSE	67	8	PVC	120	290.4	0.01	0.35	55.34
P-155	FALSE	259	8	PVC	120	290.37	0	0.05	8.54
P-158	FALSE	175	18	PVC	120	290.4	0.02	0.5	396.22
P-163	FALSE	506	18	PVC	120	290.48	0.11	0.85	671.96
P-165	FALSE	673	8	PVC	120	290.37	0	0.06	8.95
P-167	FALSE	180	18	PVC	120	290.36	0.01	0.4	316.14
P-169	FALSE	243	18	PVC	120	290.44	0.03	0.66	523.33
P-170	FALSE	192	18	PVC	120	290.42	0.02	0.58	457.72
P-171	FALSE	459	8	PVC	120	290.37	0.01	0.14	21.28
P-172	FALSE	381	8	PVC	120	290.37	0	0.06	10.04
P-173	FALSE	137	8	PVC	120	290.39	0.01	0.31	49.17
P-174	FALSE	764	8	PVC	120	290.48	0.09	0.39	60.35
P-175	FALSE	223	8	PVC	120	290.38	0	0.12	18.51
P-176	FALSE	244	8	PVC	120	290.39	0.01	0.25	38.84
P-177	FALSE	122	8	PVC	120	290.4	0.01	0.28	43.84
P-178	FALSE	349	8	PVC	120	290.37	0	0.01	1.47
P-185	FALSE	148	8	PVC	120	290.33	0.01	0.22	34.98
P-191	FALSE	211	12	PVC	120	290.47	0	0.17	59.58
P-192	FALSE	517	8	PVC	120	290.47	0.04	0.33	51.36
P-193	FALSE	510	8	PVC	120	290.47	0.05	0.34	52.91
P-194	FALSE	146	8	PVC	120	290.33	0	0.09	14.66
P-196	FALSE	180	8	PVC	120	290.33	0.01	0.18	28.61
P-198	FALSE	170	8	PVC	120	290.32	0	0.11	17.1
P-200	FALSE	346	8	Ductile Iron	110	290.35	0	0.08	13.1
P-201	FALSE	243	12	PVC	120	290.47	0	0.12	41.07
P-202	FALSE	582	8	PVC	120	290.51	0.04	0.29	45.9
P-203	FALSE	567	8	PVC	120	290.5	0.03	0.24	37.95
P-204	FALSE	313	12	PVC	120	290.47	0	0.05	16.15
P-229	FALSE	371	18	Ductile Iron	110	290.34	0.02	0.41	325.91
P-230	FALSE	303	18	Ductile Iron	110	290.32	0.02	0.35	279.42
P-234	FALSE	331	18	PVC	120	290.3	0.01	0.3	236.87

Scenario: Base
Max Daily Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-237	FALSE	197	8	PVC	120	290.51	0.07	0.61	95.75
P-241	FALSE	247	8	PVC	120	290.5	0.01	0.24	38.34
P-242	FALSE	313	8	PVC	120	290.5	0	0.07	11.12
P-246	FALSE	293	8	PVC	120	290.4	0.02	0.27	41.65
P-248	FALSE	506	12	PVC	120	290.32	0.03	0.33	115.11
P-249	FALSE	474	12	PVC	120	290.3	0.02	0.29	103.2
P-250	FALSE	266	8	PVC	120	290.33	0	0.02	2.69
P-252	FALSE	136	8	PVC	120	290.34	0.01	0.25	39.67
P-253	FALSE	374	8	Ductile Iron	110	290.33	0.01	0.18	28.16
P-254	FALSE	366	8	PVC	120	290.43	0.02	0.25	39.6
P-255	FALSE	250	8	PVC	120	290.42	0	0.01	1.8
P-256	FALSE	502	8	Ductile Iron	110	290.35	0.02	0.21	32.79
P-258	FALSE	353	8	PVC	120	290.87	0	0.08	12.78
P-264	FALSE	500	8	PVC	120	290.58	0.02	0.24	37.74
P-268	FALSE	640	8	PVC	120	290.76	0.02	0.21	32.23
P-269	FALSE	831	8	PVC	120	291.64	0.1	0.39	60.88
P-292	FALSE	263	8	PVC	120	290.76	0	0.02	3.69
P-296	FALSE	278	8	PVC	120	290.7	0.06	0.53	82.55
P-297	FALSE	573	8	PVC	120	291.47	0.06	0.37	57.89
P-300	FALSE	349	8	PVC	120	290.94	0.09	0.58	90.52
P-302	FALSE	518	8	PVC	120	290.85	0	0.07	10.78
P-303	FALSE	277	8	PVC	120	290.37	0	0	0.68
P-304	FALSE	193	8	PVC	120	290.37	0	0.1	15.55
P-306	FALSE	106	8	PVC	120	290.7	0	0.06	8.74
P-310	FALSE	743	8	PVC	120	290.85	0.09	0.4	62.89
P-312	FALSE	388	8	PVC	120	290.76	0.05	0.4	62.23
P-314	FALSE	259	18	PVC	120	290.58	0.07	0.96	758.68
P-315	FALSE	376	8	PVC	120	290.66	0.05	0.4	61.91
P-316	FALSE	389	8	PVC	120	290.81	0.02	0.28	43.3
P-321	FALSE	371	12	PVC	120	290.93	0.01	0.18	61.9
P-322	FALSE	138	12	PVC	120	290.88	0.06	0.98	346.19
P-323	FALSE	176	12	PVC	120	290.81	0.06	0.91	321.51
P-324	FALSE	417	18	PVC	120	291.12	0.18	1.31	1,037.09
P-326	FALSE	202	18	PVC	120	291.54	0.14	1.65	1,309.61
P-327	FALSE	122	18	PVC	120	291.64	0.1	1.83	1,447.57
P-328	FALSE	226	18	PVC	120	291.84	0.2	1.92	1,520.35
P-329	FALSE	42	18	PVC	120	291.88	0.04	2.08	1,649.67
P-330	FALSE	227	18	PVC	120	292.12	0.24	2.09	1,661.58
P-331	FALSE	92	8	PVC	120	291.47	0.01	0.29	45.81
P-332	FALSE	353	8	PVC	120	291.55	0.07	0.52	81.7
P-333	FALSE	93	8	PVC	120	291.56	0.01	0.39	61.32
P-336	FALSE	344	8	PVC	120	291.67	0.11	0.67	105.51
P-337	FALSE	423	8	PVC	120	291.84	0.17	0.75	117.42
P-338	FALSE	567	8	PVC	120	290.69	0.08	0.43	66.84
P-339	FALSE	721	8	PVC	120	290.76	0.07	0.35	54.67
P-347	FALSE	557	12	Cast Iron	80	290.22	0.01	0.12	41.55

Scenario: Base
Max Daily Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-348	FALSE	623	12	Cast iron	80	290.22	0.01	0.09	33.43
P-349	FALSE	203	12	PVC	120	290.3	0	0.14	48.31
P-350	FALSE	56	12	PVC	120	290.3	0	0.21	72.5
P-351	FALSE	558	18	Ductile Iron	110	290.25	0.02	0.33	260.32
P-352	FALSE	616	18	Ductile Iron	110	290.23	0.02	0.26	209.12
P-354	FALSE	195	12	Cast iron	80	290.43	0.04	0.43	151.91
P-357	FALSE	257	8	PVC	120	290.26	0.02	0.25	39.26
P-358	FALSE	377	8	PVC	120	290.23	0.02	0.25	39.79
P-359	FALSE	735	8	PVC	120	290.26	0.04	0.26	39.97
P-360	FALSE	305	8	PVC	120	291.47	0.01	0.15	23.98
P-361	FALSE	305	8	PVC	120	291.56	0.01	0.21	32.29
P-362	FALSE	592	12	PVC	120	290.19	0	0.11	40
P-363	FALSE	591	12	Ductile Iron	110	290.19	0.01	0.14	49.02
P-364	FALSE	415	8	PVC	120	290.37	0	0.09	13.66
P-366	FALSE	387	8	PVC	120	290.38	0	0.11	16.57
P-368	FALSE	582	8	PVC	120	290.39	0.01	0.17	26.28
P-369	FALSE	543	8	PVC	120	290.44	0.05	0.35	54.09
P-370	FALSE	405	8	PVC	120	290.39	0.01	0.2	30.75
P-371	FALSE	361	8	PVC	120	290.42	0.03	0.32	49.89
P-372	FALSE	239	8	PVC	120	290.37	0	0.08	12.59
P-373	FALSE	189	8	PVC	120	290.38	0	0.07	11.49
P-374	FALSE	188	8	PVC	120	290.38	0	0.06	8.82
P-375	FALSE	242	8	PVC	120	290.39	0	0.11	17.53
P-376	FALSE	193	8	PVC	120	290.39	0	0.01	1.22
P-377	FALSE	184	8	PVC	120	290.39	0	0.04	6.51
P-378	FALSE	541	8	PVC	120	290.7	0.06	0.36	56.35
P-379	FALSE	439	8	PVC	120	290.7	0	0.02	3.16
P-380	FALSE	253	8	PVC	120	290.7	0.01	0.26	41.28
P-381	FALSE	120	8	PVC	120	290.78	0	0.01	0.84
P-382	FALSE	160	8	PVC	120	290.76	0.03	0.46	71.95
P-383	FALSE	309	8	PVC	120	290.78	0.07	0.54	84.69
P-384	FALSE	314	8	PVC	120	290.85	0.05	0.43	67.83
P-385	FALSE	242	12	PVC	120	291.1	0.02	0.45	157.4
P-386	FALSE	533	12	PVC	120	290.93	0.17	0.84	296.7
P-390	FALSE	658	12	PVC	120	290.43	0.07	0.49	171.4
P-391	FALSE	315	12	Cast iron	80	290.29	0	0.06	21.02
P-392	FALSE	315	12	Cast iron	80	290.26	0.03	0.28	99.95
P-394	FALSE	316	12	PVC	120	290.37	0.04	0.46	163.89
P-395	FALSE	128	12	PVC	120	290.35	0.01	0.38	133.82
P-400	FALSE	201	12	PVC	120	290.35	0.02	0.44	153.7
P-401	FALSE	625	8	PVC	120	290.32	0.04	0.28	44.29
P-402	FALSE	481	8	PVC	120	290.3	0.02	0.23	35.7
P-403	FALSE	480	12	PVC	120	290.31	0.01	0.23	82.21
P-404	FALSE	414	12	PVC	120	290.33	0.02	0.31	107.55
P-405	FALSE	526	8	PVC	120	290.39	0.04	0.3	47.26
P-406	FALSE	307	8	PVC	120	290.36	0.03	0.33	51.81
P-407	FALSE	319	12	PVC	120	290.36	0.02	0.35	122.53

Scenario: Base
Max Daily Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-409	FALSE	212	8	PVC	120	290.39	0.02	0.31	49.22
P-410	FALSE	370	8	PVC	120	290.36	0.02	0.27	43.07
P-411	FALSE	208	8	PVC	120	290.36	0.01	0.18	28.27
P-412	FALSE	377	8	PVC	120	290.35	0.02	0.22	34.1
P-413	FALSE	431	8	PVC	120	290.3	0.03	0.27	42.91
P-414	FALSE	199	8	PVC	120	290.32	0	0.16	25.18
P-415	FALSE	380	8	PVC	120	290.31	0.01	0.19	29.91
P-416	FALSE	444	8	PVC	120	290.27	0.04	0.32	50.66
P-418	FALSE	258	8	Ductile Iron	110	290.24	0.01	0.19	30.05
P-419	FALSE	367	8	Ductile Iron	110	290.22	0.02	0.21	32.19
P-420	FALSE	547	8	Ductile Iron	110	290.26	0.02	0.17	27.03
P-421	FALSE	551	12	PVC	120	290.21	0	0.11	38.98
P-422	FALSE	619	12	PVC	120	290.21	0	0.11	38.01
P-423	FALSE	425	8	Ductile Iron	110	290.21	0.01	0.13	20.68
P-425	FALSE	652	8	Ductile Iron	110	290.21	0.01	0.11	17.71
P-428	FALSE	619	18	Ductile Iron	110	290.22	0.01	0.14	110.98
P-429	FALSE	526	18	Ductile Iron	100	290.21	0	0.11	85.93
P-430	FALSE	644	12	Cast Iron	80	290.21	0	0.02	7.9
P-431	FALSE	555	12	Cast Iron	80	290.21	0	0.02	7.44
P-432	FALSE	688	8	Ductile Iron	110	290.21	0	0.07	11.67
P-434	FALSE	57	8	PVC	120	290.22	0	0.01	2.35
P-435	FALSE	56	8	PVC	120	290.21	0.01	0.44	69.49
P-436	FALSE	293	8	PVC	120	290.22	0.05	0.48	75.78
P-437	FALSE	407	8	PVC	120	290.84	0.03	0.32	49.6
P-438	FALSE	141	12	PVC	120	290.41	0.02	0.49	171.4
P-440	FALSE	377	12	PVC	120	290.41	0.02	0.3	104.61
P-441	FALSE	455	18	PVC	120	290.37	0.03	0.47	368.97
P-442	FALSE	340	18	PVC	120	290.31	0.01	0.34	267.91
P-444	FALSE	373	8	PVC	120	290.19	0.02	0.26	40.18
P-445	FALSE	310	12	PVC	120	290.21	0	0.03	12.27
P-447	FALSE	599	12	PVC	120	290.21	0	0.03	9.15
P-448	FALSE	437	8	Ductile Iron	110	290.21	0	0.08	13.29
P-450	FALSE	602	12	PVC	120	290.21	0	0.09	32.08
P-451	FALSE	631	12	PVC	120	290.21	0	0.01	4.1
P-452	FALSE	409	8	PVC	120	290.21	0	0.09	13.63
P-453	FALSE	147	8	PVC	120	290.18	0.01	0.23	35.62
P-455	FALSE	329	18	PVC	120	290.94	0.1	1.07	848.26
P-456	FALSE	308	12	PVC	120	290.25	0.01	0.25	86.96
P-457	FALSE	491	12	PVC	120	290.27	0.02	0.28	97.53
P-458	FALSE	592	12	Ductile Iron	110	290.21	0.01	0.14	47.76
P-459	FALSE	766	12	PVC	120	290.21	0	0.09	32.47
P-460	FALSE	936	12	Ductile Iron	110	290.21	0	0.08	26.62
P-462	FALSE	847	12	PVC	120	291.1	0.02	0.2	68.76
P-463	FALSE	408	8	PVC	120	290.85	0.25	0.95	148.7
P-464	FALSE	237	18	PVC	120	291.27	0.15	1.61	1,275.65
P-465	FALSE	184	18	PVC	120	291.4	0.13	1.71	1,355.60
P-466	FALSE	860	8	PVC	120	291.27	0.17	0.51	79.94

Scenario: Base
Max Daily Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-467	FALSE	407	12	PVC	120	290.38	0.01	0.23	82.45
P-468	FALSE	126	12	PVC	120	290.41	0.03	0.78	273.49
P-469	FALSE	223	12	PVC	120	290.35	0.01	0.24	85.97
P-470	FALSE	995	12	PVC	120	290.3	0.05	0.3	105.06
P-471	FALSE	215	12	PVC	120	290.35	0.03	0.54	191.04
P-472	FALSE	201	18	PVC	120	290.78	0.06	0.99	785.5
P-473	FALSE	498	18	PVC	120	290.66	0.12	0.92	728.5
P-474	FALSE	515	18	PVC	120	290.71	0.11	0.84	668.58
P-475	FALSE	743	18	Ductile Iron	110	290.5	0.21	0.91	725.59
P-476	FALSE	581	8	Ductile Iron	110	290.71	0.07	0.36	57.01
P-477	FALSE	218	12	PVC	120	291.54	0.03	0.53	186.93
P-478	FALSE	108	12	PVC	120	291.51	0	0.07	23.81
P-479	FALSE	105	12	PVC	120	291.51	0	0.03	11.91
P-480	FALSE	107	12	PVC	120	291.51	0	0	0
P-481	FALSE	110	12	PVC	120	291.51	0	0	0
P-482	FALSE	646	8	PVC	120	291.51	0.41	0.97	151.21
P-483	FALSE	1,022.00	8	Ductile Iron	110	290.31	0.04	0.2	30.83
P-484	FALSE	404	8	PVC	120	290.33	0	0.06	8.82

EXHIBIT J

JUNCTION REPORT WITHOUT REUSE AREA 1B DEMANDS

BASED ON MAXIMUM DAILY FLOW PLUS FIRE FLOW FOR ALL NODES

Scenario: Base
Max Daily Flow Plus Fire Flow For All Nodes
Junction Report

Label	Demand (Calculated) (gpm)	Pressure (psi)	Elevation (ft)	Fire Flow Upper Limit (gpm)	Max Day Flow (gpm)
J-1	288.76	82	100	4,501.00	288.76
J-2	302.91	70.96	125	4,501.00	302.91
J-3	290.14	70.84	125	4,501.00	290.14
J-4	290.05	77.03	110	4,501.00	290.05
J-5	353.46	77	110	4,501.00	353.46
J-6	2.93	76.86	112.5	4,501.00	2.93
J-7	44.56	77.51	111	4,501.00	44.56
J-8	48.75	76.92	112.5	4,501.00	48.75
J-9	30.78	77.02	112.5	4,501.00	30.78
J-10	123.7	71.75	125	4,501.00	123.7
J-11	3.89	73.9	120	4,501.00	3.89
J-12	5.1	82.42	100	4,501.00	5.1
J-13	15.48	77.14	112	4,501.00	15.48
J-14	39.95	77.16	112	4,501.00	39.95
J-15	34.79	77.16	112	4,501.00	34.79
J-16	2.04	75.81	115	4,501.00	2.04
J-17	14.49	71.52	125	4,501.00	14.49
J-20	38.96	73.65	120	4,501.00	38.96
J-21	719.47	46.35	185	4,501.00	719.47
J-23	28.71	70.34	128	2,501.00	28.71
J-24	6.31	67.26	135	2,501.00	6.31
J-25	11.51	73.73	120	2,501.00	11.51
J-26	6.69	69.4	130	2,501.00	6.69
J-27	11.51	73.69	120	2,501.00	11.51
J-28	11.51	69.35	130	2,501.00	11.51
J-29	10.83	71.5	125	4,501.00	10.83
J-30	78.18	77.08	112	4,501.00	78.18
J-31	9.6	73.64	120	4,501.00	9.6
J-32	4.68	82.29	100	4,501.00	4.68
J-33	8.77	73.66	120	4,501.00	8.77
J-34	39.12	71.49	125	4,501.00	39.12
J-35	11.51	73.67	120	2,501.00	11.51
J-36	5.69	71.49	125	4,501.00	5.69
J-37	11.12	82.3	100	4,501.00	11.12
J-38	38.53	73.64	120	4,501.00	38.53
J-39	6.07	77.09	112	4,501.00	6.07
J-40	47.64	75.81	115	4,501.00	47.64
J-41	27.72	74.94	117	4,501.00	27.72
J-42	18.64	74.94	117	4,501.00	18.64
J-43	22.5	77.1	112	4,501.00	22.5
J-44	9.64	73.65	120	4,501.00	9.64
J-45	9.64	73.64	120	4,501.00	9.64
J-47	16	77.1	112	4,501.00	16
J-48	0	77.11	112	4,501.00	0
J-49	0	77.1	112	4,501.00	0
J-50	0	77.1	112	4,501.00	0

Scenario: Base
Max Daily Flow Plus Fire Flow For All Nodes
Junction Report

Label	Demand (Calculated) (gpm)	Pressure (psi)	Elevation (ft)	Fire Flow Upper Limit (gpm)	Max Day Flow (gpm)
J-51	0	77.1	112	4,501.00	0
J-52	0	79.27	107	4,501.00	0
J-53	0	79.27	107	4,501.00	0
J-55	12.97	79.27	107	4,501.00	12.97
J-56	0	79.27	107	4,501.00	0
J-57	0	79.7	106	4,501.00	0
J-58	0	79.27	107	4,501.00	0
J-60	0	79.27	107	4,501.00	0
J-61	0	79.27	107	4,501.00	0
J-62	0	80.13	105	4,501.00	0
J-63	0	79.27	107	4,501.00	0
J-64	0	79.27	107	4,501.00	0
J-69	49.34	77.08	112	4,501.00	49.34
J-70	4.5	75.37	116	4,501.00	4.5
J-73	0	77.2	112	4,501.00	0
J-74	0.97	77.1	112	4,501.00	0.97
J-75	0	79.27	107	4,501.00	0
J-81	11.51	76.32	114	2,501.00	11.51
J-82	11.51	75.01	117	2,501.00	11.51
J-83	11.51	75.9	115	2,501.00	11.51
J-84	11.51	75.88	115	2,501.00	11.51
J-85	11.51	77.61	111	2,501.00	11.51
J-86	11.51	76.31	114	2,501.00	11.51
J-87	11.51	76.31	114	2,501.00	11.51
J-88	11.51	75.9	115	2,501.00	11.51
J-90	28.71	75.05	117	2,501.00	28.71
J-91	28.71	73.72	120	2,501.00	28.71
J-92	11.51	76.31	114	2,501.00	11.51
J-93	11.51	77.17	112	2,501.00	11.51
J-94	28.71	76.31	114	2,501.00	28.71
J-95	11.51	76.74	113	2,501.00	11.51
J-96	11.51	76.31	114	2,501.00	11.51
J-108	11.51	75.87	115	2,501.00	11.51
J-109	11.51	71.96	124	2,501.00	11.51
J-110	0.21	73.25	121	2,501.00	0.21
J-111	11.51	69.41	130	2,501.00	11.51
J-112	11.51	69.43	130	2,501.00	11.51
J-113	11.51	75	117	2,501.00	11.51
J-114	11.51	73.26	121	2,501.00	11.51
J-115	11.51	69.44	130	2,501.00	11.51
J-116	11.51	70.66	127	2,501.00	11.51
J-118	11.51	71.16	126	2,501.00	11.51
J-121	6.22	69.81	129	2,501.00	6.22
J-122	11.51	69.45	130	2,501.00	11.51
J-124	11.51	73.26	121	2,501.00	11.51
J-125	11.51	70.24	128	2,501.00	11.51

Scenario: Base
Max Daily Flow Plus Fire Flow For All Nodes
Junction Report

Label	Demand (Calculated) (gpm)	Pressure (psi)	Elevation (ft)	Fire Flow Upper Limit (gpm)	Max Day Flow (gpm)
J-129	3.83	69.36	130	2,501.00	3.83
J-131	5.61	69.38	130	2,501.00	5.61
J-132	11.51	69.41	130	2,501.00	11.51
J-150	29.11	73.81	120	2,501.00	29.11
J-151	36.41	67.03	136	2,501.00	36.41
J-152	12.41	60.62	151	2,501.00	12.41
J-153	12.41	69.2	131	2,501.00	12.41
J-154	11.91	70.85	127	2,501.00	11.91
J-155	11.91	72.99	122	2,501.00	11.91
J-156	11.91	59.02	155	2,501.00	11.91
J-157	11.91	52.71	170	2,501.00	11.91
J-158	11.91	54.3	166	2,501.00	11.91
J-159	11.91	52.73	170	2,501.00	11.91
J-161	11.91	63.84	144	2,501.00	11.91
J-162	11.91	69.59	130	2,501.00	11.91
J-163	11.91	71.33	126	2,501.00	11.91
J-164	12.78	72.2	124	2,501.00	12.78
J-165	11.91	56.91	160	2,501.00	11.91
J-166	11.91	55.22	164	2,501.00	11.91
J-167	11.91	64.23	143	2,501.00	11.91
J-170	11.91	73.01	122	2,501.00	11.91
J-171	11.91	66.97	136	2,501.00	11.91
J-172	11.91	69.99	129	2,501.00	11.91
J-175	11.91	67.86	134	2,501.00	11.91
J-176	11.91	72.99	122	2,501.00	11.91
J-203	11.91	70.01	129	2,501.00	11.91
J-204	31.72	69.51	130	2,501.00	31.72
J-205	13.16	67.86	134	2,501.00	13.16
J-206	11.91	64.24	143	2,501.00	11.91
J-207	11.91	63.84	144	2,501.00	11.91
J-208	11.91	48.25	180	2,501.00	11.91
J-209	11.91	54.8	165	2,501.00	11.91
J-210	29.11	73.85	120	2,501.00	29.11
J-212	11.51	70.22	128	2,501.00	11.51
J-214	19.64	74.51	118	4,501.00	19.64
J-216	11.51	70.22	128	2,501.00	11.51
J-223	21.15	75.82	115	4,501.00	21.15
J-224	0.04	68.98	131	4,501.00	0.04
J-225	12.41	74.53	118	2,501.00	12.41
J-226	9.02	77.09	112	4,501.00	9.02
J-227	11.51	76.74	113	2,501.00	11.51
J-228	11.51	76.31	114	2,501.00	11.51
J-229	11.51	74.58	118	2,501.00	11.51
J-230	11.51	75.45	116	2,501.00	11.51
J-231	11.91	73.85	120	2,501.00	11.91
J-232	11.91	68.7	132	2,501.00	11.91

Scenario: Base
Max Daily Flow Plus Fire Flow For All Nodes
Junction Report

Label	Demand (Calculated) (gpm)	Pressure (psi)	Elevation (ft)	Fire Flow Upper Limit (gpm)	Max Day Flow (gpm)
J-233	11.91	62.78	146	2,501.00	11.91
J-234	11.91	51.27	173	2,501.00	11.91
J-235	3.27	71.08	126	4,501.00	3.27
J-236	1.8	69.38	130	2,501.00	1.8
J-237	1.69	69.81	129	4,501.00	1.69
J-238	2.93	72.4	123	4,501.00	2.93
J-239	3.24	71.1	126	4,501.00	3.24
J-240	3.87	70.23	128	4,501.00	3.87
J-241	4.59	71.09	126	4,501.00	4.59
J-242	1.6	69.39	130	4,501.00	1.6
J-243	2.99	73.71	120	4,501.00	2.99
J-245	24.89	75.38	116	4,501.00	24.89
J-246	9.38	80.57	104	4,501.00	9.38
J-247	13.38	75.81	115	4,501.00	13.38
J-248	13.38	75.81	115	4,501.00	13.38
J-249	8.64	73.65	120	4,501.00	8.64
J-250	2.52	77.19	112	4,501.00	2.52
J-252	12.27	79.27	107	4,501.00	12.27
J-253	4.55	76.66	113	4,501.00	4.55
J-254	8.24	75.81	115	4,501.00	8.24
J-255	0	78.53	110	4,501.00	0
J-256	14.99	76.67	113	4,501.00	14.99
J-257	0	78.35	110	4,501.00	0
J-258	10.58	77.99	110	4,501.00	10.58
J-259	11.33	77.1	112	4,501.00	11.33
J-260	0	78.43	110	4,501.00	0
J-261	0	78.04	110	4,501.00	0
J-262	0	78.03	110	4,501.00	0
J-263	0	78.21	110	4,501.00	0
J-264	0	78.18	110	4,501.00	0
J-265	0	78.53	110	4,501.00	0

EXHIBIT K

PIPE REPORT WITHOUT REUSE AREA 1B DEMANDS

BASED ON MAXIMUM DAILY FLOW PLUS CRITICAL FIRE FLOW

Scenario: Base
Max Daily Flow Plus Critical Fire Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-2	FALSE	1,344.00	20	PVC	120	269.6	0.5	1.26	1,236.56
P-3	TRUE	1,507.00	20	PVC	120	297.37	0	0	0
P-4	FALSE	668	18	PVC	120	269.31	0.29	1.18	933.65
P-5	FALSE	616	10	PVC	120	268.61	0.69	1.43	349.7
P-6	FALSE	1,853.00	10	PVC	120	268.54	0.07	0.24	59.65
P-7	FALSE	2,481.00	12	PVC	120	269.31	0.77	0.83	293.81
P-8	FALSE	983	20	PVC	120	270.72	0.62	1.56	1,525.32
P-9	FALSE	583	12	PVC	120	269.89	0.83	1.78	629.04
P-10	FALSE	2,106.00	12	PVC	120	267.6	2.29	1.66	584.48
P-12	FALSE	675	20	PVC	120	271.49	0.77	2.2	2,157.29
P-13	FALSE	652	20	PVC	120	272.17	0.68	2.23	2,188.07
P-14	FALSE	387	18	PVC	120	271.48	0.69	2.47	1,960.89
P-18	FALSE	824	12	PVC	120	267.53	0.56	1.21	425.5
P-19	FALSE	513	12	PVC	120	267.6	0.07	0.52	185.03
P-20	FALSE	502	10	Cast iron	80	266.8	0.05	0.27	67.19
P-21	FALSE	691	10	Ductile Iron	110	267.6	0.86	1.43	350.7
P-22	FALSE	700	12	PVC	120	267.53	0.73	1.62	570.58
P-23	FALSE	1,175.00	10	Cast iron	80	263.42	3.33	1.64	402.4
P-29	FALSE	303	10	Cast iron	80	262.55	0.87	1.64	400.36
P-30	FALSE	1,368.00	20	PVC	120	277.68	19.69	9.03	8,837.90
P-31	FALSE	1,356.00	20	PVC	120	272.17	5.5	4.36	4,272.66
P-36	FALSE	569	18	PVC	120	267.6	0.49	1.79	1,419.37
P-39	FALSE	512	12	PVC	120	266.51	1.09	2.31	815.47
P-45	FALSE	403	12	PVC	120	263.79	0.99	2.46	868.05
P-49	FALSE	476	12	PVC	120	261.32	0.26	1.1	388.11
P-53	FALSE	731	18	PVC	120	261.71	1.72	3.11	2,468.02
P-55	FALSE	404	12	Cast iron	80	262.31	1.22	1.89	665.19
P-57	FALSE	406	10	Cast iron	80	260.96	1.96	2.2	539.44
P-58	FALSE	724	12	PVC	120	260.96	0.36	1.09	383.44
P-59	FALSE	334	12	PVC	120	260.96	0	0.06	20.97
P-60	FALSE	722	12	PVC	120	259.6	0.2	0.79	277.94
P-66	FALSE	650	8	Ductile Iron	110	258.19	0.01	0.14	21.56
P-67	FALSE	439	8	Ductile Iron	110	258.19	0	0.08	12.61
P-69	FALSE	601	18	Ductile Iron	110	256.36	1.82	3.29	2,609.72
P-70	FALSE	592	12	Cast iron	80	256.89	1.3	1.59	561.03
P-72	FALSE	605	12	Ductile Iron	110	257.18	0.95	1.81	639.69
P-80	FALSE	653	20	PVC	120	255.15	0.2	1.04	1,016.95
P-81	FALSE	465	20	PVC	120	255.21	0.06	0.66	642.45
P-83	FALSE	983	20	PVC	120	255.01	0.06	0.48	473
P-84	FALSE	917	20	PVC	120	255.15	0.06	0.5	485.97
P-87	FALSE	1,281.00	20	Ductile Iron	110	255.05	0.04	0.31	301.45
P-88	FALSE	567	20	PVC	120	255.13	0.02	0.32	314.41
P-89	FALSE	240	20	PVC	120	255.06	0.01	0.32	314.41
P-90	FALSE	914	20	PVC	120	255.11	0.03	0.32	314.41
P-93	FALSE	372	20	PVC	120	255.1	0.01	0.23	220.99
P-94	FALSE	475	20	PVC	120	255.09	0.01	0.23	220.99

Scenario: Base
Max Daily Flow Plus Critical Fire Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-96	FALSE	748	20	PVC	120	255.06	0.01	0.23	220.99
P-97	FALSE	679	12	PVC	120	255.09	0.03	0.27	93.42
P-98	FALSE	498	12	PVC	120	255.11	0.02	0.27	93.42
P-99	FALSE	645	12	PVC	120	255.09	0.08	0.49	171.56
P-100	FALSE	460	12	PVC	120	255.15	0.06	0.49	171.56
P-103	FALSE	430	12	PVC	120	261.08	0.13	0.79	279.12
P-109	FALSE	527	10	Cast iron	80	260.02	1.55	1.66	405.45
P-110	FALSE	471	12	PVC	120	259.8	0.23	1.01	356.12
P-112	FALSE	309	12	Cast iron	80	258.17	0.02	0.24	84.46
P-113	FALSE	543	12	Cast iron	80	258.13	0.03	0.23	79.96
P-124	FALSE	351	20	Cast iron	80	255.26	0.05	0.46	453.77
P-125	FALSE	394	14	Cast iron	80	255.57	0.3	0.95	454.74
P-127	FALSE	374	20	PVC	120	255.09	0.01	0.23	220.99
P-128	FALSE	738	20	PVC	120	255.07	0.01	0.23	220.99
P-139	FALSE	653	12	PVC	120	266.59	0	0.03	11.51
P-140	FALSE	67	8	PVC	120	266.55	0.01	0.41	64.13
P-155	FALSE	259	8	PVC	120	266.2	0.25	1.2	187.7
P-158	FALSE	175	18	PVC	120	266.55	0.26	2.22	1,759.65
P-163	FALSE	506	18	PVC	120	267.6	1.15	3.04	2,407.23
P-165	FALSE	673	8	PVC	120	266.59	0.18	0.61	95.65
P-167	FALSE	180	18	PVC	120	265.66	0.29	2.35	1,860.61
P-169	FALSE	243	18	PVC	120	267.13	0.47	2.66	2,109.58
P-170	FALSE	192	18	PVC	120	266.8	0.32	2.42	1,917.27
P-171	FALSE	459	8	PVC	120	266.21	0.54	1.35	210.92
P-172	FALSE	381	8	PVC	120	266.41	0.05	0.41	65.01
P-173	FALSE	137	8	PVC	120	266.66	0.07	0.87	135.87
P-174	FALSE	764	8	PVC	120	267.6	0.94	1.37	214.62
P-175	FALSE	223	8	PVC	120	266.38	0.18	1.09	171.55
P-176	FALSE	244	8	PVC	120	266.53	0.15	0.93	145.72
P-177	FALSE	122	8	PVC	120	266.54	0.01	0.34	52.62
P-178	FALSE	349	8	PVC	120	266.32	0.03	0.34	53.5
P-185	FALSE	148	8	PVC	120	264.89	0.03	0.48	74.57
P-191	FALSE	211	12	PVC	120	267.6	0	0.15	54.32
P-192	FALSE	517	8	PVC	120	267.6	0.64	1.37	215.26
P-193	FALSE	510	8	PVC	120	267.6	0.63	1.38	216.41
P-194	FALSE	146	8	PVC	120	264.88	0.01	0.26	41.18
P-196	FALSE	180	8	PVC	120	264.65	0.22	1.38	216.06
P-198	FALSE	170	8	PVC	120	264.46	0.19	1.31	204.55
P-200	FALSE	346	8	Ductile Iron	110	265.38	0	0.03	4.19
P-201	FALSE	243	12	PVC	120	267.6	0	0.03	11.05
P-202	FALSE	582	8	PVC	120	268.14	0.54	1.18	184.64
P-203	FALSE	567	8	PVC	120	268.03	0.43	1.06	166.6
P-204	FALSE	313	12	PVC	120	267.6	0	0.14	49.11
P-229	FALSE	371	18	Ductile Iron	110	264.91	0.75	2.6	2,060.02
P-230	FALSE	303	18	Ductile Iron	110	264.33	0.58	2.49	1,973.94
P-234	FALSE	331	18	PVC	120	263.43	0.42	2.14	1,699.63

Scenario: Base
Max Daily Flow Plus Critical Fire Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-237	FALSE	197	8	PVC	120	268.14	0.61	1.95	304.98
P-241	FALSE	247	8	PVC	120	268.03	0.11	0.69	108.83
P-242	FALSE	313	8	PVC	120	268.09	0.08	0.44	69.28
P-246	FALSE	293	8	PVC	120	266.51	0.45	1.4	218.69
P-248	FALSE	506	12	PVC	120	264.46	0.92	2.04	720.81
P-249	FALSE	474	12	PVC	120	263.43	1.04	2.25	793.26
P-250	FALSE	266	8	PVC	120	264.88	0	0.07	10.38
P-252	FALSE	136	8	PVC	120	265.25	0.13	1.2	187.52
P-253	FALSE	374	8	Ductile Iron	110	264.88	0.37	1.12	176.01
P-254	FALSE	366	8	PVC	120	266.96	0.42	1.21	189.95
P-255	FALSE	250	8	PVC	120	266.96	0	0.1	14.95
P-256	FALSE	502	8	Ductile Iron	110	265.38	0.57	1.21	189.55
P-258	FALSE	353	8	PVC	120	271.63	0	0.08	12.78
P-264	FALSE	500	8	PVC	120	268.75	0.58	1.32	207.4
P-268	FALSE	640	8	PVC	120	270.64	0.18	0.63	98.27
P-269	FALSE	831	8	PVC	120	275.37	0.49	0.92	143.97
P-292	FALSE	263	8	PVC	120	270.67	0	0.05	7.88
P-296	FALSE	278	8	PVC	120	270.2	0.45	1.59	248.66
P-297	FALSE	573	8	PVC	120	274.72	0.52	1.17	182.94
P-300	FALSE	349	8	PVC	120	271.72	0.48	1.46	228.61
P-302	FALSE	518	8	PVC	120	271.24	0.01	0.16	25.1
P-303	FALSE	277	8	PVC	120	266.21	0.12	0.77	121.29
P-304	FALSE	193	8	PVC	120	266.2	0.01	0.18	27.66
P-306	FALSE	106	8	PVC	120	270.2	0.01	0.26	40.85
P-310	FALSE	743	8	PVC	120	271.23	0.55	1.05	164.16
P-312	FALSE	388	8	PVC	120	270.64	0.28	1.04	162.3
P-314	FALSE	259	18	PVC	120	268.75	0.7	3.19	2,533.52
P-315	FALSE	376	8	PVC	120	269.45	0.74	1.77	277.61
P-316	FALSE	389	8	PVC	120	270.93	0.1	0.59	91.76
P-321	FALSE	371	12	PVC	120	271.76	0.04	0.47	165.67
P-322	FALSE	138	12	PVC	120	271.63	0.13	1.52	536.27
P-323	FALSE	176	12	PVC	120	271.48	0.15	1.45	511.58
P-324	FALSE	417	18	PVC	120	272.7	0.98	3.25	2,581.13
P-326	FALSE	202	18	PVC	120	274.88	0.69	3.97	3,150.40
P-327	FALSE	122	18	PVC	120	275.37	0.49	4.32	3,423.62
P-328	FALSE	226	18	PVC	120	276.35	0.98	4.51	3,579.50
P-329	FALSE	42	18	PVC	120	276.55	0.21	4.83	3,833.87
P-330	FALSE	227	18	PVC	120	277.68	1.12	4.85	3,845.77
P-331	FALSE	92	8	PVC	120	274.76	0.04	0.82	127.89
P-332	FALSE	353	8	PVC	120	275.16	0.4	1.32	206.75
P-333	FALSE	93	8	PVC	120	275.22	0.05	0.91	143.23
P-336	FALSE	344	8	PVC	120	275.7	0.48	1.47	230.56
P-337	FALSE	423	8	PVC	120	276.35	0.65	1.55	242.46
P-338	FALSE	567	8	PVC	120	270.16	0.83	1.51	236.5
P-339	FALSE	721	8	PVC	120	270.67	0.51	1.02	160.14
P-347	FALSE	557	12	Cast iron	80	259.85	1.24	1.6	564.54

Scenario: Base
Max Daily Flow Plus Critical Fire Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-348	FALSE	623	12	Cast iron	80	258.19	1.66	1.77	622.92
P-349	FALSE	203	12	PVC	120	263.43	0	0.04	13.36
P-350	FALSE	56	12	PVC	120	263.39	0.04	0.79	278.27
P-351	FALSE	558	18	Ductile Iron	110	260.07	1.64	3.23	2,559.25
P-352	FALSE	616	18	Ductile Iron	110	258.18	1.9	3.32	2,635.81
P-354	FALSE	195	12	Cast iron	80	267.13	0.47	1.56	548.49
P-357	FALSE	257	8	PVC	120	261.49	0.22	1.02	159.86
P-358	FALSE	377	8	PVC	120	261.08	0.4	1.18	184.16
P-359	FALSE	735	8	PVC	120	261.49	1.9	2.05	321.15
P-360	FALSE	305	8	PVC	120	274.76	0.04	0.43	66.95
P-361	FALSE	305	8	PVC	120	275.22	0.05	0.48	75.42
P-362	FALSE	592	12	PVC	120	258.91	0.69	1.68	591.25
P-363	FALSE	591	12	Ductile Iron	110	258.13	0.78	1.65	582.23
P-364	FALSE	415	8	PVC	120	266.4	0.08	0.51	79.29
P-366	FALSE	387	8	PVC	120	266.39	0.18	0.82	128.8
P-368	FALSE	582	8	PVC	120	266.64	0.24	0.76	119.19
P-369	FALSE	543	8	PVC	120	267.13	0.48	1.15	180.8
P-370	FALSE	405	8	PVC	120	266.59	0.2	0.83	130.14
P-371	FALSE	361	8	PVC	120	266.8	0.22	0.93	146.11
P-372	FALSE	239	8	PVC	120	266.4	0	0.12	19.13
P-373	FALSE	189	8	PVC	120	266.39	0.01	0.3	47.52
P-374	FALSE	188	8	PVC	120	266.38	0.01	0.24	37.35
P-375	FALSE	242	8	PVC	120	266.64	0.02	0.32	50.04
P-376	FALSE	193	8	PVC	120	266.59	0.06	0.64	100.14
P-377	FALSE	184	8	PVC	120	266.53	0.06	0.67	104.61
P-378	FALSE	541	8	PVC	120	270.24	0.43	1.09	170.14
P-379	FALSE	439	8	PVC	120	270.2	0.04	0.34	52.76
P-380	FALSE	253	8	PVC	120	270.24	0.08	0.67	105.47
P-381	FALSE	120	8	PVC	120	270.83	0	0.12	18.41
P-382	FALSE	160	8	PVC	120	270.67	0.16	1.21	189.92
P-383	FALSE	309	8	PVC	120	270.83	0.4	1.41	220.24
P-384	FALSE	314	8	PVC	120	271.24	0.31	1.22	191.6
P-385	FALSE	242	12	PVC	120	272.6	0.11	1.01	356.69
P-386	FALSE	533	12	PVC	120	271.76	0.84	2.03	714.35
P-390	FALSE	658	12	PVC	120	267.2	0.89	1.86	655.96
P-391	FALSE	315	12	Cast iron	80	263.4	0.01	0.15	54.39
P-392	FALSE	315	12	Cast iron	80	262.31	1.09	1.91	673.96
P-394	FALSE	316	12	PVC	120	265.7	0.81	2.38	838.23
P-395	FALSE	128	12	PVC	120	265.38	0.32	2.07	730.6
P-400	FALSE	201	12	PVC	120	265.48	0.5	2.61	918.66
P-401	FALSE	625	8	PVC	120	264.37	1.26	1.79	280.97
P-402	FALSE	481	8	PVC	120	263.43	0.94	1.76	276.42
P-403	FALSE	480	12	PVC	120	264.19	0.79	2.08	731.62
P-404	FALSE	414	12	PVC	120	264.97	0.79	2.24	789.6
P-405	FALSE	526	8	PVC	120	266.31	0.83	1.57	245.58
P-406	FALSE	307	8	PVC	120	265.63	0.68	1.88	294.53
P-407	FALSE	319	12	PVC	120	266.1	0.63	2.28	803.9

Scenario: Base
Max Daily Flow Plus Critical Fire Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-409	FALSE	212	8	PVC	120	266.31	0.21	1.21	189.24
P-410	FALSE	370	8	PVC	120	266.1	0.2	0.89	138.7
P-411	FALSE	208	8	PVC	120	265.63	0.07	0.68	105.82
P-412	FALSE	377	8	PVC	120	265.48	0.15	0.75	117.69
P-413	FALSE	431	8	PVC	120	264.78	0.2	0.8	125.82
P-414	FALSE	199	8	PVC	120	264.37	0.09	0.82	128.27
P-415	FALSE	380	8	PVC	120	264.19	0.18	0.82	128.95
P-416	FALSE	444	8	PVC	120	263.79	0.4	1.16	182.33
P-418	FALSE	258	8	Ductile Iron	110	260.16	0.09	0.62	97.71
P-419	FALSE	367	8	Ductile Iron	110	259.85	0.31	1.03	161.85
P-420	FALSE	547	8	Ductile Iron	110	261.49	1.33	1.82	284.44
P-421	FALSE	551	12	PVC	120	259.74	1.22	2.35	828.41
P-422	FALSE	619	12	PVC	120	258.19	1.55	2.53	890.58
P-423	FALSE	425	8	Ductile Iron	110	259.74	0.11	0.54	83.83
P-425	FALSE	652	8	Ductile Iron	110	256.89	0.53	1.01	157.58
P-428	FALSE	619	18	Ductile Iron	110	254.28	2.07	3.48	2,757.67
P-429	FALSE	526	18	Ductile Iron	100	254.95	0.67	1.88	1,489.95
P-430	FALSE	644	12	Cast Iron	80	255.76	1.13	1.38	487.37
P-431	FALSE	555	12	Cast Iron	80	255.15	0.6	1.06	374.5
P-432	FALSE	688	8	Ductile Iron	110	255.76	1.47	1.7	265.76
P-434	FALSE	57	8	PVC	120	262.37	0.18	2.31	361.4
P-435	FALSE	56	8	PVC	120	261.58	0.79	5.13	803.16
P-436	FALSE	293	8	PVC	120	262.37	1.42	2.87	450.4
P-437	FALSE	407	8	PVC	120	271	0.07	0.47	74.37
P-438	FALSE	141	12	PVC	120	267.01	0.19	1.86	655.96
P-440	FALSE	377	12	PVC	120	267.01	0.12	0.86	302.86
P-441	FALSE	455	18	PVC	120	265.95	0.59	2.36	1,873.97
P-442	FALSE	340	18	PVC	120	263.85	0.48	2.47	1,962.43
P-444	FALSE	373	8	PVC	120	259.98	0.98	2.07	323.94
P-445	FALSE	310	12	PVC	120	259.74	0	0.03	12.27
P-447	FALSE	599	12	PVC	120	258.19	1.17	2.27	800.1
P-448	FALSE	437	8	Ductile Iron	110	257.02	0.14	0.6	93.57
P-450	FALSE	602	12	PVC	120	256.07	0.85	1.91	674.65
P-451	FALSE	631	12	PVC	120	257.02	0.95	1.98	698.29
P-452	FALSE	409	8	PVC	120	256.07	0.31	1.06	166.27
P-453	FALSE	147	8	PVC	120	259.6	0.38	2.04	319.39
P-455	FALSE	329	18	PVC	120	271.72	0.72	3.13	2,481.79
P-456	FALSE	308	12	PVC	120	263.24	0.33	1.64	578.57
P-457	FALSE	491	12	PVC	120	263.79	0.54	1.67	589.15
P-458	FALSE	592	12	Ductile Iron	110	256.17	1.01	1.77	623.69
P-459	FALSE	766	12	PVC	120	255.57	0.61	1.29	454.74
P-460	FALSE	936	12	Ductile Iron	110	256.17	0.11	0.45	157.62
P-462	FALSE	847	12	PVC	120	272.61	0.1	0.5	174.62
P-463	FALSE	408	8	PVC	120	271.23	1.38	2.37	371.21
P-464	FALSE	237	18	PVC	120	273.5	0.8	3.94	3,124.85
P-465	FALSE	184	18	PVC	120	274.19	0.69	4.19	3,321.43
P-466	FALSE	860	8	PVC	120	273.5	0.9	1.25	196.59

Scenario: Base
Max Daily Flow Plus Critical Fire Flow
Pipe Report

Label	Closed?	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)	Discharge (gpm)
P-467	FALSE	407	12	PVC	120	266.67	0.57	1.9	668.19
P-468	FALSE	126	12	PVC	120	267.01	0.34	2.71	956.3
P-469	FALSE	223	12	PVC	120	266.61	0.19	1.33	468.61
P-470	FALSE	995	12	PVC	120	264.78	1.83	2.15	756.72
P-471	FALSE	215	12	PVC	120	266.61	0.06	0.82	288.11
P-472	FALSE	201	18	PVC	120	270.48	0.51	3.02	2,394.26
P-473	FALSE	498	18	PVC	120	269.45	1.03	2.88	2,287.63
P-474	FALSE	515	18	PVC	120	270.26	1.23	3.11	2,468.58
P-475	FALSE	743	18	Ductile Iron	110	268.09	2.17	3.25	2,575.21
P-476	FALSE	581	8	Ductile Iron	110	270.26	0.23	0.68	106.63
P-477	FALSE	218	12	PVC	120	274.88	0.12	1.15	405.28
P-478	FALSE	108	12	PVC	120	274.76	0	0.07	23.81
P-479	FALSE	105	12	PVC	120	274.76	0	0.03	11.91
P-480	FALSE	107	12	PVC	120	274.76	0	0	0
P-481	FALSE	110	12	PVC	120	274.76	0	0	0
P-482	FALSE	646	8	PVC	120	274.76	2.17	2.36	369.56
P-483	FALSE	1,022.00	8	Ductile Iron	110	263.85	2.14	1.68	262.59
P-484	FALSE	404	8	PVC	120	264.89	0.01	0.14	21.89

EXHIBIT L

JULY 2003
SPECIFIC PLAN AMENDMENT
LAND USE TABLE

TABLE 3-2: DEVELOPMENT PROGRAM BY REUSE AREA

Reuse Area/Parcel	Acreage	Acreage			Non Residential Land Use						Program Totals	
					Mixed Use				Heavy Industrial Sq. Ft.	Educational Civic Sq. Ft.	Non-Residential Sq. Ft.	Residential Du
		Fed./Army Trsfr.	Cons. Esmt.	Dev. Rec.	Office/R&D Sq. Ft.	Light Industrial Sq. Ft.	Retail Sq. Ft.	Warehouse Sq. Ft.				
Master Developer Areas												
1B	37				25,000	175,000		320,000	180,000		700,000	
2A	48				285,000	100,000	50,000			135,000	570,000	100
2B	34				335,000	165,000					500,000	
3A	35			2	320,000	160,000	10,000	110,000			600,000	
3B	72			3	364,000	690,000	5,000	215,000		15,000	1,289,000	129
4	52			10	120,000	50,000	70,000			70,000	310,000	47
5	143			14	60,000	515,000	15,000		1,290,000		1,880,000	
6	123			25			7,000			22,000	29,000	610
7	26			26								
8	105				20,000			385,000		15,000	420,000	514
9	51	11			35,000					545,000	580,000	
10A	69		9			370,000			130,000		500,000	
Main Gate	2											
Rail Road Spur	24											
Master Developer Area Totals	821	11	9	80	1,564,000	2,225,000	157,000	1,030,000	1,600,000	802,000	7,378,000	1,400
Non Master Developer Area												
1A*	155		29	1	54,000		348,000	370,000	450,000	16,000	1,238,000	
3B (VA Hospital)											61,000	
6 (Navy VCUSD)											81,000	
9 (Forest Service)											120,000	
9 (US Army Reserve Barracks)											55,000	
10B (U.S. Army Reserve)	24										91,000	
11 Golf course	172			172			3,000				3,000	
12 (Regional Park)	188	1	11	176								
12 (US Coast Guard Com Tower)	12	12										
13 (Open Space/Rec)	92			92								
Wetlands	2,865	162	32								20,000	
Wetlands (Fish & Wildlife)												
Dredge Areas	922											
Non Master Developer Area Totals	4,430	175	72	441	54,000	0	351,000	370,000	450,000	16,000	1,669,000	0
PROGRAM TOTALS	5,251	186	81	521	1,618,000	2,225,000	508,000	1,400,000	2,050,000	818,000	9,047,000	1,400

*1A Retail is 320,000 Service Commerical and 28,000 Retail

07-29-03 Revision

EXHIBIT M

CITY OF VALLEJO
REUSE OF MARE ISLAND
WATER MAINS

CITY OF VALLEJO
UTILITIES DEPARTMENT
WATER DIVISION

MARCH 25, 2002

TO: Gary Leach, City Engineer

THRU: Exequiel Ganding Jr., Water Superintendent

FROM: Eric Jansen, Senior Civil Engineer

SUBJECT: Reuse of Mare Island roadways and utilities

The Water Division's response on the water system issues raised in Bill Moore's memo dated 2/27/02;

1. Water mains on private property

Water Division prefers that all water mains shall be within public right of ways in streets in the travel lanes, however an existing water main can remain if the following conditions are adhered to:

(1) a minimum clearance of 10 feet from the centerline of the water main to the nearest obstruction (building, building foundation, trees etc);
(2) depth of cover is 42-inches minimum and 52-inches maximum;
(3) the water main is accessible, including vehicle traffic, at all times (no fences, no material storage over water facilities or on the easement, etc).
(4) if water meters and backflow devices are connected to a water main that is on private property they shall be located within the easement for the water main and shall be accessible, including vehicle traffic, at all times (no fences, no material storage over water facilities, etc), and the meter and back flow device shall be placed next to a paved driveway or private road in a landscaped area);
(5) in case of repair or replacement of the water main, water meter, and back flow device by the city all surface restoration, other than asphalt pavement, shall be at the expense of the property owner.

2. Water mains in Environmental Contaminated/Installation Restoration (IR) sites

Water mains shall not be installed or remain in IR sites, however the water main can be installed or remain in an IR site if the following mitigations are done;

Case A. Water services to be connected to the water main

(1) widen trench for new installation or excavation for existing water main so that there is a minimum of 4-feet on either side and 1-foot under the water main and backfill with 100% Class 2 Aggregate Base.
(2) install a barrier in the trench between the trench walls and the new backfill material to keep the new backfill material from being contaminated.
(3) water main pipe material shall be ductile iron.
(4) minimum cover of the water main shall be 42-inch.

Case B. No water services to be connected to the water main

(1) encase the water main in a concrete encasement the entire length of the water main in the IR site.
(2) water main pipe material shall be ductile iron.
(3) minimum cover of the water main shall be 42-inches

3. Relocation of existing 20-inch water main in G Street

Water Division was informed that this comment refers to the existing 20-inch water main in G Street. Minimum cover to the existing 20-inch water main to the new finished grade shall be 42-inches and if the 20-inch water main is relocated to a new location it shall only be in the street right of way and be set a distance 8-feet from face of curb.

4. Depth of cover of same utility lines

If the comment pertain to water lines, water lines existing and proposed should have at least 42-inches of cover and a maximum 52-inches of cover unless it interferes with a sewer or storm drain line.

CC Mark Akaba, Utilities Director
Ex Ganding, Water Superintendent
Franz Nestlerode, Deputy Water Superintendent
John Cerini, AMS

Computer File EFJ02012.DOC