MARE ISLAND WATER MODEL

April 4, 2003

Korve Engineering

Mare Island Water Model
Lennar Mare Island

April 4, 2003

Prepared by Korve Engineering, Inc.
In Association with Chaudhary & Associates

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Korve Engineering

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, the water system will become the property of the City of Vallejo. 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 Department of Public Works 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 four 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 verifies and modifies an analysis previously prepared for the *Lennar Mare Island Specific Plan Amendment, April 19, 2001*, and recommendations presented herein are proposed as amendments to that plan. The methodology, assumptions, and results of the analysis are presented below.

WaterCAD Model

The water system for the Mare Island Development and the former Legacy area 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 5.7 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 tankelevations and flow rate:

Elevation at base	181.96
Minimum water elevation	188.16
Initial water elevation/hydraulic grade	194.16
Maximum water elevation	213.16
Outflow rate	2,484.32 gpm

Elevations are NGVD 29; the model uses elevations supplied by the Navy, which are 103.03 feet higher. Tank capacity and elevation information is subject to revision based on decisions made by the Vallejo Water Department.

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.

The pipe network analysis was prepared assuming a static operating level in the tank of 194.16 feet. This corresponds to approximately 2.9 million gallons of storage below the operating level, and 2.8 million gallons above the operating level. The actual operating levels would vary from the full tank at 5.7 million gallons, and a minimum assumed operating level at 2.3 million gallons. The City Water Department has indicated that the dead storage in the tank is approximately 2.3 million gallons. Approximately 1.4 million gallons are required for fire demands, and 0.9 million gallons are required for equalization, leaving approximately 1.1 million gallons available to meet domestic demands concurrent with fire flows. This storage appears to be adequate to meet all required demands. The actual amount of storage available from the tank is subject to a policy decision from the City of Vallejo, and is subject to revision.

The assumptions used for water supply are consistent with the model previously prepared for the Specific Plan Amendment.

Water Demand

Water demand was assumed to include a domestic demand component and a fire demand component. The 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 June 2000 Infrastrategy Analysis prepared by LFR. 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	Infrastrategy Analysis June 2000	Infrastrategy Analysis May 1997 (MIRIS)	Mare Island Specific Plan March 1999*	Mare Island Specific Plan Amendment January 2003
Residential (dwelling units)	**1,400**	1,479	1,486	1,406
Industrial/Warehouse (square feet)	**6,335,485**	5,102,999	4,283,200	5,880,000
Office/Retail (square feet)	**1,809,458**	1,783,142	1,359,100	1,750,000
School, Civic, Public (square feet)	**914,330**	722,087	177,500	870,000

* Includes development on island only

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 January 2003 Specific Plan Amendment is attached to this report as Exhibit H.

Domestic Demand Criteria

The domestic component of water demand was based on the total buildout from the Lennar and Legacy Master Plans. The following criteria were assumed for the domestic component of the water demand:

1. Average water demand is 152 gallons per capita per day.
2. Average population density is 2.77 persons per dwelling unit in residential areas.
3. Average population density is 15 persons per acre in commercial and industrial areas
4. The peak hourly flow is 1.6 times the average daily flow.
5. Nonresidential classifications include a demand factor per square foot of built area, a demand factor per acre for irrigation, and a demand factor per person or employee.

These demand criteria are subject to revision based on decisions made by the Vallejo Water Department.

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 peak 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 would 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.

Piping and Appurtenances

The size, materials and locations of existing pipes is 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=100, 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. Gate 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 addressed 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 conditions 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 for 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

The complete network includes four 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" pipe. The model requires about 87,000 feet of new pipe and uses about 33,000 feet of existing pipe. About 27% 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.

ALCO Property (Reuse Area 1B)

The Reuse Area 1B Alco Property consists of four large industrial buildings located at the north end of the Island. The new 16" 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 16" 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 six alternative improvements to the network:

1. 12" pipe in Azuar Drive between 5th Street and G Street
2. 20" pipe in G Street between Railroad Avenue and Azuar Drive
3. 12" pipe in 5th Street between Azuar and existing 12" pipe in 5th Street
4. 16" pipe in Club Drive between Sargo and Azuar Drive
5. 12" pipe in Residential Parkway
6. 12" pipe in 3rd Street between Walnut Avenue and Railroad Avenue

Based on the water demand at full buildout, all six of the above alternatives would need to be constructed in order to meet fire flow demand at the ALCO property. If the demand were scaled down to 25% of the full buildout demand, necessary fire flow could be met by constructing Alternatives 1 and 5 only. It may be desirable to stage this construction relative to the buildout of the rest of the island.

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	41,304
12	29,512
18	3,482
20	8,802

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

Diameter (inches)	Length (feet)
12	2,920
20	1,281

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

Pipes were sized and gate valves and hydrant assemblies are assumed to be located every 500 feet, in accordance with the *City of Vallejo Regulations and Standard Specifications for Public Improvements, August 25, 1992*, and with Title 22 of the *California Code of Regulations*. The following chart shows the number of isolation gate valves and fire hydrant assemblies required.

Size (inches)	Number of Gate Valves	Number of Hydrant Assemblies
8	238	90
12	94	70
18	7	10
20	26	20

Fire Flow Durations

Required fire flow durations vary from two to six hours. The WaterCAD model indicates that both domestic and fire flow demands can be met concurrently for about 7.4 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-77 (gpm)	Fire Flow at J-79 (gpm)
Azuar	4,227.37	4,264.10
Walnut	4,496.62	>4,501
Railroad	4,401.81	4,442.70
Promenade	4,370.46	4,410.36

Environmental Issues

Exhibit A shows designated IR areas. CH2M Hill has recommended that potable water pipes laid in or through these areas 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.

References Consulted

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 Water 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

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
Exhibit F: Junction report
Exhibit G: Fire flow report
Exhibit H: January 2003 Specific Plan Amendment land use table

EXHIBIT A

PIPE NETWORK DIAGRAM

(ON SEPARATE SHEET)

MARE ISLAND PROPOSED WATER LINE PHASING PLAN

LEGEND

- FALL 2003
- FALL 2004
- FALL 2005
- FALL 2006
- AREA NOT COVERED IN SPECIFIC PLAN

OTHER PIPES ARE EXISTING

GRAPHIC SCALE
400 0 200 400
SCALE IN FEET

Korve Engineering
155 GRAND AVENUE, SUITE 400
OAKLAND, CALIFORNIA 94612
(510) 763-2929

PROJECT #802095X0
APRIL 4, 2003

EXHIBIT B

PIPE NETWORK PHASING DIAGRAM

(ON SEPARATE SHEET)

MARE ISLAND PROPOSED WATER LINE PHASING PLAN

LEGEND

- FALL 2003
- FALL 2004
- FALL 2005
- FALL 2006
- AREA NOT COVERED IN SPECIFIC PLAN

OTHER PIPES ARE EXISTING

Korve Engineering
155 GRAND AVENUE, SUITE 400
OAKLAND, CALIFORNIA 94612
(510) 763-2929

GRAPHIC SCALE
400 0 200 400
SCALE IN FEET

PROJECT #802095X0
APRIL 4, 2003

EXHIBIT C

WATERCAD MODEL DIAGRAM

Scenario: Base

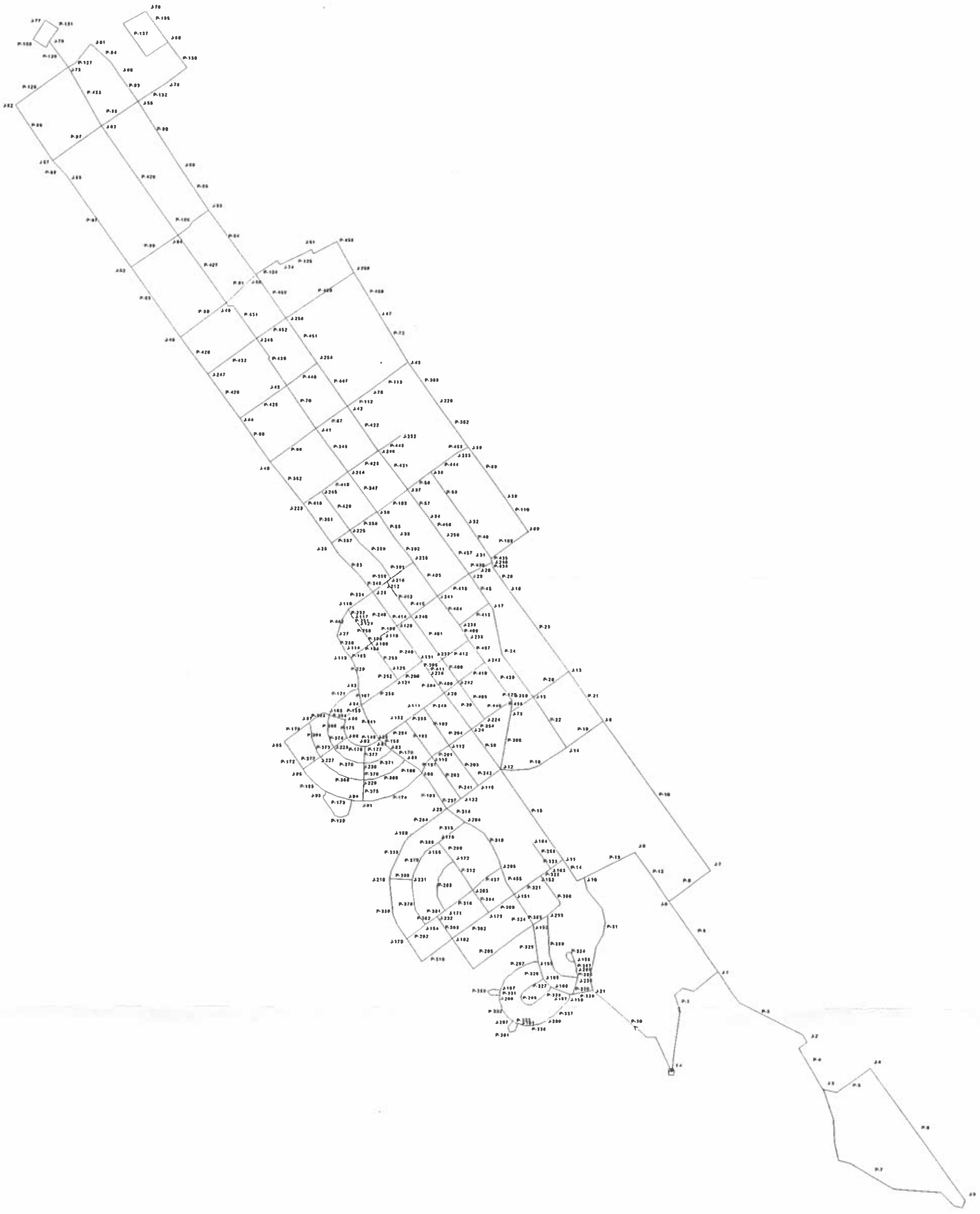

EXHIBIT D

PIPE QUANTITY SHEET

Mare Island Water System
New Pipe Quantities

Pipe Number	Length (ft)	Diameter (in)	Material
67	439	8	PVC
140	67	8	PVC
155	259	8	PVC
165	673	8	PVC
171	459	8	PVC
172	381	8	PVC
173	137	8	PVC
174	764	8	PVC
175	223	8	PVC
176	244	8	PVC
177	122	8	PVC
178	349	8	PVC
191	211	8	PVC
192	517	8	PVC
193	510	8	PVC
200	346	8	PVC
201	243	8	PVC
202	582	8	PVC
203	567	8	PVC
204	313	8	PVC
232	105	8	PVC
250	266	8	PVC
251	102	8	PVC
252	136	8	PVC
253	374	8	PVC
256	502	8	PVC
258	353	8	PVC
264	500	8	PVC
265	1,256	8	PVC
268	640	8	PVC
269	831	8	PVC
292	263	8	PVC
296	278	8	PVC
297	573	8	PVC
300	349	8	PVC
302	518	8	PVC
303	277	8	PVC
304	193	8	PVC
306	106	8	PVC
310	743	8	PVC
312	388	8	PVC
315	376	8	PVC
316	389	8	PVC
331	92	8	PVC
332	353	8	PVC
333	93	8	PVC
336	344	8	PVC
337	423	8	PVC

Mare Island Water System
New Pipe Quantities

Pipe Number	Length (ft)	Diameter (in)	Material
338	567	8	PVC
339	721	8	PVC
359	735	8	PVC
360	305	8	PVC
361	305	8	PVC
364	415	8	PVC
366	387	8	PVC
368	582	8	PVC
369	543	8	PVC
370	405	8	PVC
371	361	8	PVC
372	239	8	PVC
373	189	8	PVC
374	188	8	PVC
375	242	8	PVC
376	193	8	PVC
377	184	8	PVC
378	541	8	PVC
379	439	8	PVC
380	253	8	PVC
381	120	8	PVC
382	160	8	PVC
383	309	8	PVC
384	314	8	PVC
385	194	8	PVC
386	581	8	PVC
389	917	8	PVC
390	658	8	PVC
400	201	8	PVC
401	625	8	PVC
402	481	8	PVC
403	480	8	PVC
404	414	8	PVC
405	526	8	PVC
406	307	8	PVC
407	319	8	PVC
409	212	8	PVC
410	370	8	PVC
411	208	8	PVC
412	377	8	PVC
413	431	8	PVC
414	199	8	PVC
415	380	8	PVC
416	444	8	PVC
418	258	8	PVC
419	367	8	PVC
420	547	8	PVC
423	425	8	PVC

Mare Island Water System
New Pipe Quantities

Pipe Number	Length (ft)	Diameter (in)	Material
425	652	8	PVC
432	688	8	PVC
436	293	8	PVC
437	407	8	PVC
438	141	8	PVC
439	533	8	PVC
440	377	8	PVC
444	373	8	PVC
448	437	8	PVC
452	409	8	PVC
453	147	8	PVC
	41,304		
69	601	12	Ductile Iron
351	558	12	Ductile Iron
352	616	12	Ductile Iron
428	619	12	Ductile Iron
429	526	12	Ductile Iron
	2,920		
9	583	12	PVC
10	2,106	12	PVC
18	824	12	PVC
19	513	12	PVC
24	1,218	12	PVC
49	476	12	PVC
53	731	12	PVC
58	724	12	PVC
59	334	12	PVC
72	605	12	PVC
79	1,358	12	PVC
97	679	12	PVC
98	498	12	PVC
99	645	12	PVC
100	460	12	PVC
103	430	12	PVC
130	512	12	PVC
131	360	12	PVC
139	653	12	PVC
158	175	12	PVC
163	506	12	PVC
167	180	12	PVC
169	243	12	PVC
170	192	12	PVC
229	371	12	PVC
230	303	12	PVC
234	331	12	PVC
237	197	12	PVC

Mare Island Water System
New Pipe Quantities

Pipe Number	Length (ft)	Diameter (in)	Material
241	247	12	PVC
314	259	12	PVC
319	698	12	PVC
324	417	12	PVC
325	420	12	PVC
326	202	12	PVC
327	122	12	PVC
328	226	12	PVC
329	42	12	PVC
330	227	12	PVC
334	441	12	PVC
349	203	12	PVC
363	591	12	PVC
387	105	12	PVC
388	193	12	PVC
421	551	12	PVC
422	619	12	PVC
426	1,524	12	PVC
427	959	12	PVC
433	755	12	PVC
434	57	12	PVC
435	56	12	PVC
441	455	12	PVC
442	340	12	PVC
445	310	12	PVC
447	599	12	PVC
450	602	12	PVC
451	631	12	PVC
455	329	12	PVC
456	308	12	PVC
457	491	12	PVC
addl pipe	326	12	PVC
	29,512		
129	367	18	PVC
132	394	18	PVC
135	438	18	PVC
136	648	18	PVC
137	1,042	18	PVC
454	593	18	PVC
	3,482		

Mare Island Water System
New Pipe Quantities

Pipe Number	Length (ft)	Diameter (in)	Material
87	1,281	20	Ductile Iron
31	1,356	20	PVC
80	653	20	PVC
81	465	20	PVC
83	983	20	PVC
84	917	20	PVC
88	567	20	PVC
89	240	20	PVC
90	914	20	PVC
93	372	20	PVC
94	475	20	PVC
96	748	20	PVC
127	374	20	PVC
128	738	20	PVC
	8,802		

EXHIBIT E

PIPE REPORT

Scenario: Base
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-2	1,344.00	20	PVC	120.0	294.10	0.01	0.18
P-3	1,507.00	20	PVC	120.0	297.20	0.00	0.00
P-4	668.00	18	PVC	120.0	294.10	0.01	0.17
P-5	616.00	10	PVC	120.0	294.08	0.02	0.20
P-6	1,853.00	10	PVC	120.0	294.08	0.00	0.02
P-7	2,481.00	12	PVC	120.0	294.10	0.02	0.11
P-8	983.00	20	PVC	120.0	294.15	0.03	0.31
P-9	583.00	12	PVC	120.0	293.52	0.62	1.53
P-10	2,106.00	12	PVC	120.0	291.74	1.79	1.45
P-12	675.00	20	PVC	120.0	294.30	0.15	0.93
P-13	652.00	20	PVC	120.0	294.45	0.15	0.99
P-14	387.00	12	Cast iron	80.0	293.55	0.91	1.61
P-15	1,258.00	12	Cast iron	80.0	291.65	1.90	1.31
P-18	824.00	12	PVC	120.0	291.60	0.05	0.33
P-19	513.00	12	PVC	120.0	291.74	0.14	0.74
P-20	502.00	10	Cast iron	80.0	291.31	0.00	0.07
P-21	691.00	10	Ductile Iron	100.0	291.74	0.43	0.90
P-22	700.00	12	PVC	120.0	291.60	0.29	0.99
P-23	1,175.00	10	Cast iron	80.0	290.61	0.70	0.71
P-24	1,218.00	12	PVC	120.0	290.79	0.51	0.98
P-29	303.00	10	Cast iron	80.0	290.49	0.12	0.55
P-30	1,368.00	20	PVC	120.0	295.34	1.86	2.54
P-31	1,356.00	20	PVC	120.0	294.45	0.88	1.64
P-36	569.00	12	Cast iron	80.0	291.35	0.30	0.74
P-39	512.00	12	Cast iron	80.0	291.18	0.17	0.57
P-45	403.00	12	PVC	120.0	290.65	0.15	0.88
P-49	476.00	12	PVC	120.0	290.43	0.04	0.43
P-53	731.00	12	PVC	120.0	290.50	0.25	0.87
P-55	404.00	12	Cast iron	80.0	290.50	0.11	0.53
P-57	406.00	12	PVC	120.0	290.38	0.09	0.70
P-58	724.00	12	PVC	120.0	290.38	0.05	0.36
P-59	334.00	12	PVC	120.0	290.38	0.00	0.07
P-60	722.00	10	Cast iron	80.0	290.32	0.12	0.35
P-66	650.00	8	PVC	120.0	290.09	0.00	0.00
P-67	439.00	8	PVC	120.0	290.08	0.00	0.06
P-69	601.00	12	Ductile Iron	100.0	289.99	0.12	0.54
P-70	592.00	12	Cast iron	80.0	289.98	0.10	0.40
P-72	605.00	12	PVC	120.0	289.97	0.08	0.52
P-80	653.00	20	PVC	120.0	289.80	0.00	0.06
P-81	465.00	20	PVC	120.0	289.80	0.00	0.02
P-83	983.00	20	PVC	120.0	289.79	0.01	0.21
P-84	917.00	20	PVC	120.0	289.79	0.02	0.24
P-87	1,281.00	20	Ductile Iron	100.0	289.78	0.01	0.15
P-88	567.00	20	PVC	120.0	289.78	0.01	0.19
P-89	240.00	20	PVC	120.0	289.78	0.00	0.11
P-90	914.00	20	PVC	120.0	289.78	0.01	0.14
P-93	372.00	20	PVC	120.0	289.78	0.00	0.07
P-94	475.00	20	PVC	120.0	289.78	0.00	0.04
P-96	748.00	20	PVC	120.0	289.78	0.00	0.05
P-97	679.00	12	PVC	120.0	289.78	0.00	0.02

Scenario: Base
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-98	498.00	12	PVC	120.0	289.78	0.00	0.05
P-99	645.00	12	PVC	120.0	289.79	0.00	0.07
P-100	460.00	12	PVC	120.0	289.79	0.00	0.01
P-103	430.00	12	PVC	120.0	290.39	0.00	0.11
P-109	527.00	12	PVC	120.0	290.45	0.02	0.27
P-110	471.00	12	PVC	120.0	290.43	0.02	0.27
P-112	309.00	12	Cast iron	80.0	290.07	0.01	0.18
P-113	543.00	12	Cast iron	80.0	290.05	0.02	0.18
P-120	309.00	12	Cast iron	80.0	291.31	0.01	0.14
P-124	351.00	20	Cast iron	80.0	289.81	0.00	0.10
P-125	394.00	14	Cast iron	80.0	289.82	0.02	0.20
P-127	374.00	20	PVC	120.0	289.78	0.00	0.01
P-128	738.00	20	PVC	120.0	289.78	0.00	0.02
P-129	367.00	18	PVC	120.0	289.78	0.00	0.00
P-130	512.00	12	PVC	120.0	289.78	0.00	0.00
P-131	360.00	12	PVC	120.0	289.78	0.00	0.00
P-132	394.00	18	PVC	120.0	289.78	0.00	0.00
P-135	438.00	18	PVC	120.0	289.78	0.00	0.00
P-136	648.00	18	PVC	120.0	289.78	0.00	0.00
P-137	1,042.00	18	PVC	120.0	289.78	0.00	0.00
P-139	653.00	12	PVC	120.0	291.28	0.00	0.00
P-140	67.00	8	PVC	120.0	291.22	0.00	0.16
P-155	259.00	8	PVC	120.0	291.19	0.05	0.53
P-158	175.00	12	PVC	120.0	291.22	0.05	0.73
P-163	506.00	12	PVC	120.0	291.46	0.37	1.30
P-165	673.00	8	PVC	120.0	291.28	0.04	0.28
P-167	180.00	12	PVC	120.0	291.10	0.04	0.64
P-169	243.00	12	PVC	120.0	291.34	0.12	1.02
P-170	192.00	12	PVC	120.0	291.27	0.07	0.84
P-171	459.00	8	PVC	120.0	291.19	0.09	0.52
P-172	381.00	8	PVC	120.0	291.24	0.01	0.15
P-173	137.00	8	PVC	120.0	291.29	0.01	0.28
P-174	764.00	8	PVC	120.0	291.46	0.17	0.55
P-175	223.00	8	PVC	120.0	291.22	0.03	0.40
P-176	244.00	8	PVC	120.0	291.23	0.01	0.21
P-177	122.00	8	PVC	120.0	291.23	0.00	0.16
P-178	349.00	8	PVC	120.0	291.22	0.01	0.15
P-185	148.00	8	PVC	120.0	290.95	0.02	0.42
P-191	211.00	8	PVC	120.0	291.46	0.00	0.07
P-192	517.00	8	PVC	120.0	291.43	0.09	0.48
P-193	510.00	8	PVC	120.0	291.46	0.11	0.53
P-194	146.00	8	PVC	120.0	290.93	0.02	0.42
P-196	180.00	8	PVC	120.0	290.90	0.03	0.44
P-198	170.00	8	PVC	120.0	290.88	0.03	0.44
P-200	346.00	8	PVC	120.0	291.02	0.00	0.06
P-201	243.00	8	PVC	120.0	291.43	0.02	0.33
P-202	582.00	8	PVC	120.0	291.71	0.26	0.79
P-203	567.00	8	PVC	120.0	291.66	0.23	0.75
P-204	313.00	8	PVC	120.0	291.35	0.08	0.61
P-229	371.00	12	PVC	120.0	290.97	0.13	0.87

Scenario: Base
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-230	303.00	12	PVC	120.0	290.90	0.07	0.68
P-232	105.00	8	PVC	120.0	290.85	0.02	0.47
P-234	331.00	12	PVC	120.0	290.75	0.10	0.79
P-237	197.00	12	PVC	120.0	291.71	0.11	0.94
P-241	247.00	12	PVC	120.0	291.66	0.05	0.59
P-242	313.00	12	PVC	120.0	291.65	0.01	0.25
P-246	293.00	8	Cast iron	80.0	291.18	0.16	0.57
P-248	506.00	12	Cast iron	80.0	290.88	0.14	0.52
P-249	474.00	12	Cast iron	80.0	290.75	0.13	0.51
P-250	266.00	8	PVC	120.0	290.88	0.05	0.47
P-251	102.00	8	PVC	120.0	290.87	0.02	0.47
P-252	136.00	8	PVC	120.0	291.00	0.03	0.49
P-253	374.00	8	PVC	120.0	290.93	0.07	0.49
P-254	366.00	8	Cast iron	80.0	291.35	0.12	0.44
P-255	250.00	8	Cast iron	80.0	291.34	0.00	0.09
P-256	502.00	8	PVC	120.0	291.02	0.11	0.55
P-258	353.00	8	PVC	120.0	293.54	0.00	0.00
P-264	500.00	8	PVC	120.0	291.82	0.37	1.05
P-265	1,256.00	8	PVC	120.0	292.99	0.75	0.93
P-268	640.00	8	PVC	120.0	292.81	0.07	0.36
P-269	831.00	8	PVC	120.0	294.57	0.09	0.38
P-292	263.00	8	PVC	120.0	292.82	0.00	0.06
P-296	278.00	8	PVC	120.0	292.63	0.18	0.97
P-297	573.00	8	PVC	120.0	294.45	0.16	0.62
P-300	349.00	8	PVC	120.0	293.29	0.26	1.04
P-302	518.00	8	PVC	120.0	293.03	0.04	0.33
P-303	277.00	8	PVC	120.0	291.19	0.03	0.34
P-304	193.00	8	PVC	120.0	291.19	0.00	0.13
P-306	106.00	8	PVC	120.0	292.64	0.00	0.22
P-310	743.00	8	PVC	120.0	292.99	0.17	0.55
P-312	388.00	8	PVC	120.0	292.81	0.11	0.61
P-314	259.00	12	PVC	120.0	291.82	0.46	2.04
P-315	376.00	8	PVC	120.0	292.28	0.35	1.19
P-316	389.00	8	PVC	120.0	292.92	0.04	0.36
P-319	698.00	12	PVC	120.0	292.28	0.66	1.51
P-321	371.00	8	PVC	120.0	293.53	0.25	0.98
P-322	138.00	8	PVC	120.0	293.54	0.01	0.21
P-323	176.00	8	PVC	120.0	293.55	0.01	0.21
P-324	417.00	12	PVC	120.0	293.74	0.45	1.65
P-325	420.00	12	PVC	120.0	294.28	0.55	1.83
P-326	202.00	12	PVC	120.0	294.48	0.19	1.55
P-327	122.00	12	PVC	120.0	294.57	0.09	1.38
P-328	226.00	12	PVC	120.0	294.79	0.22	1.55
P-329	42.00	12	PVC	120.0	294.84	0.05	1.83
P-330	227.00	12	PVC	120.0	295.34	0.49	2.41
P-331	92.00	8	PVC	120.0	294.46	0.01	0.41
P-332	353.00	8	PVC	120.0	294.56	0.10	0.62
P-333	93.00	8	PVC	120.0	294.57	0.01	0.41
P-334	441.00	12	PVC	120.0	294.81	0.00	0.00
P-336	344.00	8	PVC	120.0	294.67	0.10	0.62

Scenario: Base
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-337	423.00	8	PVC	120.0	294.79	0.12	0.62
P-338	567.00	8	PVC	120.0	292.62	0.42	1.05
P-339	721.00	8	PVC	120.0	292.82	0.20	0.62
P-347	557.00	12	Cast Iron	80.0	290.28	0.10	0.42
P-348	623.00	12	Cast Iron	80.0	290.09	0.20	0.56
P-349	203.00	12	PVC	120.0	290.73	0.02	0.40
P-350	56.00	12	Cast Iron	80.0	290.69	0.04	0.66
P-351	558.00	12	Ductile Iron	100.0	290.33	0.17	0.69
P-352	616.00	12	Ductile Iron	100.0	290.10	0.22	0.75
P-354	195.00	12	Cast Iron	80.0	291.32	0.03	0.38
P-357	257.00	8	Cast Iron	80.0	290.46	0.04	0.27
P-358	377.00	8	Cast Iron	80.0	290.39	0.08	0.34
P-359	735.00	8	PVC	120.0	290.46	0.22	0.64
P-360	305.00	8	PVC	120.0	294.46	0.01	0.21
P-361	305.00	8	PVC	120.0	294.57	0.01	0.21
P-362	592.00	10	Cast Iron	80.0	290.09	0.22	0.55
P-363	591.00	12	PVC	120.0	290.05	0.04	0.38
P-364	415.00	8	PVC	120.0	291.23	0.01	0.19
P-366	387.00	8	PVC	120.0	291.22	0.03	0.31
P-368	582.00	8	PVC	120.0	291.27	0.04	0.29
P-369	543.00	8	PVC	120.0	291.34	0.07	0.40
P-370	405.00	8	PVC	120.0	291.25	0.02	0.27
P-371	361.00	8	PVC	120.0	291.27	0.02	0.27
P-372	239.00	8	PVC	120.0	291.23	0.00	0.12
P-373	189.00	8	PVC	120.0	291.22	0.01	0.22
P-374	188.00	8	PVC	120.0	291.22	0.01	0.18
P-375	242.00	8	PVC	120.0	291.27	0.01	0.27
P-376	193.00	8	PVC	120.0	291.25	0.02	0.38
P-377	184.00	8	PVC	120.0	291.23	0.02	0.38
P-378	541.00	8	PVC	120.0	292.65	0.17	0.65
P-379	439.00	8	PVC	120.0	292.64	0.02	0.22
P-380	253.00	8	PVC	120.0	292.65	0.04	0.43
P-381	120.00	8	PVC	120.0	292.88	0.00	0.01
P-382	160.00	8	PVC	120.0	292.82	0.06	0.71
P-383	309.00	8	PVC	120.0	292.88	0.11	0.70
P-384	314.00	8	PVC	120.0	293.03	0.11	0.71
P-385	194.00	8	PVC	120.0	293.78	0.04	0.54
P-386	581.00	8	PVC	120.0	293.53	0.25	0.77
P-387	105.00	12	PVC	120.0	294.81	0.00	0.00
P-388	193.00	12	PVC	120.0	294.84	0.03	0.58
P-389	917.00	8	PVC	120.0	294.81	1.03	1.31
P-390	658.00	8	PVC	120.0	291.31	0.34	0.85
P-391	315.00	12	Cast Iron	80.0	290.64	0.05	0.37
P-392	315.00	12	Cast Iron	80.0	290.50	0.14	0.63
P-394	316.00	12	Cast Iron	80.0	291.06	0.12	0.61
P-395	128.00	12	Cast Iron	80.0	291.02	0.04	0.50
P-400	201.00	8	PVC	120.0	291.02	0.16	1.07
P-401	625.00	8	PVC	120.0	290.85	0.21	0.67
P-402	481.00	8	PVC	120.0	290.73	0.12	0.58
P-403	480.00	8	PVC	120.0	290.76	0.12	0.58

Scenario: Base
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-404	414.00	8	PVC	120.0	290.87	0.11	0.60
P-405	526.00	8	PVC	120.0	291.17	0.15	0.62
P-406	307.00	8	PVC	120.0	291.05	0.12	0.73
P-407	319.00	8	PVC	120.0	291.16	0.14	0.77
P-409	212.00	8	PVC	120.0	291.17	0.01	0.29
P-410	370.00	8	PVC	120.0	291.16	0.01	0.18
P-411	208.00	8	PVC	120.0	291.05	0.01	0.24
P-412	377.00	8	PVC	120.0	291.02	0.03	0.30
P-413	431.00	8	PVC	120.0	290.79	0.07	0.48
P-414	199.00	8	PVC	120.0	290.85	0.03	0.47
P-415	380.00	8	PVC	120.0	290.76	0.09	0.56
P-416	444.00	8	PVC	120.0	290.65	0.11	0.58
P-418	258.00	8	PVC	120.0	290.33	0.00	0.15
P-419	367.00	8	PVC	120.0	290.28	0.05	0.42
P-420	547.00	8	PVC	120.0	290.46	0.13	0.57
P-421	551.00	12	PVC	150.0	290.28	0.11	0.78
P-422	619.00	12	PVC	120.0	290.08	0.19	0.82
P-423	425.00	8	PVC	120.0	290.28	0.00	0.11
P-425	652.00	8	PVC	120.0	289.98	0.00	0.03
P-426	1,524.00	12	PVC	120.0	289.79	0.01	0.12
P-427	959.00	12	PVC	120.0	289.80	0.02	0.17
P-428	619.00	12	Ductile Iron	100.0	289.89	0.09	0.47
P-429	526.00	12	Ductile Iron	100.0	289.80	0.09	0.49
P-430	644.00	12	Cast Iron	80.0	289.89	0.09	0.36
P-431	555.00	12	Cast Iron	80.0	289.80	0.09	0.38
P-432	688.00	8	PVC	120.0	289.89	0.00	0.04
P-433	755.00	12	PVC	120.0	289.78	0.00	0.03
P-434	57.00	12	PVC	120.0	290.49	0.00	0.36
P-435	56.00	12	PVC	120.0	290.47	0.01	0.75
P-436	293.00	8	PVC	120.0	290.49	0.16	0.88
P-437	407.00	8	PVC	120.0	292.94	0.02	0.27
P-438	141.00	8	PVC	120.0	291.30	0.01	0.36
P-439	533.00	8	PVC	120.0	291.30	0.14	0.60
P-440	377.00	8	PVC	120.0	291.30	0.02	0.24
P-441	455.00	12	PVC	120.0	291.14	0.09	0.65
P-442	340.00	12	PVC	120.0	290.85	0.05	0.58
P-444	373.00	8	PVC	120.0	290.33	0.05	0.41
P-445	310.00	12	PVC	120.0	290.28	0.00	0.00
P-447	599.00	12	PVC	120.0	290.08	0.10	0.59
P-448	437.00	8	PVC	120.0	289.99	0.00	0.07
P-450	602.00	12	PVC	120.0	289.90	0.09	0.57
P-451	631.00	12	PVC	120.0	289.99	0.09	0.56
P-452	409.00	8	PVC	120.0	289.90	0.00	0.08
P-453	147.00	8	PVC	120.0	290.32	0.02	0.41
P-455	329.00	12	PVC	120.0	293.29	0.35	1.63
P-456	308.00	12	PVC	120.0	290.54	0.07	0.70
P-457	491.00	12	PVC	120.0	290.65	0.11	0.70
P-458	592.00	12	PVC	120.0	289.90	0.07	0.46
P-459	766.00	12	PVC	120.0	289.82	0.07	0.41
P-460	936.00	12	PVC	120.0	289.90	0.00	0.05

EXHIBIT F

JUNCTION REPORT

Scenario: Base
Fire Flow Analysis
Junction Report

Label	Demand (Calculated) (gpm)	Pressure (psi)	Elevation (ft)	Fire Flow Upper Limit (gpm)	Base Flow (gpm)
J-12	40.4	82.92	100.00	4,501.00	40.35
J-37	33.9	82.37	100.00	4,501.00	33.92
J-1	126.9	83.99	100.00	4,501.00	126.95
J-32	24.4	82.39	100.00	4,501.00	24.39
J-246	0.0	80.59	104.00	4,501.00	0.00
J-62	62.7	79.94	105.00	4,501.00	62.67
J-57	60.8	79.51	106.00	4,501.00	60.84
J-75	0.0	79.08	107.00	4,501.00	0.00
J-79	0.0	79.08	107.00	4,501.00	0.00
J-80	0.0	79.08	107.00	4,501.00	0.00
J-78	0.0	79.08	107.00	4,501.00	0.00
J-76	0.0	79.08	107.00	4,501.00	0.00
J-77	0.0	79.08	107.00	4,501.00	0.00
J-63	54.8	79.08	107.00	4,501.00	54.76
J-53	59.6	79.08	107.00	4,501.00	59.63
J-52	26.0	79.08	107.00	4,501.00	25.97
J-56	47.9	79.08	107.00	4,501.00	47.94
J-55	39.8	79.08	107.00	4,501.00	39.82
J-61	26.0	79.08	107.00	4,501.00	26.00
J-64	40.6	79.08	107.00	4,501.00	40.58
J-58	44.9	79.08	107.00	4,501.00	44.90
J-60	37.5	79.08	107.00	4,501.00	37.49
J-252	0.0	79.30	107.00	4,501.00	0.00
J-4	44.8	79.64	110.00	4,501.00	44.76
J-5	44.7	79.64	110.00	4,501.00	44.73
J-258	0.0	78.11	110.00	4,501.00	0.00
J-7	29.4	78.97	111.00	4,501.00	29.44
J-85	0.0	77.98	111.00	2,501.00	0.00
J-47	21.9	77.00	112.00	4,501.00	21.87
J-250	0.0	77.57	112.00	4,501.00	0.00
J-43	15.1	77.03	112.00	4,501.00	15.11
J-48	24.6	76.93	112.00	4,501.00	24.58
J-51	47.3	76.94	112.00	4,501.00	47.35
J-259	0.0	76.97	112.00	4,501.00	0.00
J-49	38.7	76.93	112.00	4,501.00	38.74
J-50	41.9	76.93	112.00	4,501.00	41.91
J-39	14.9	77.15	112.00	4,501.00	14.90
J-15	70.0	77.58	112.00	4,501.00	69.96
J-74	0.0	76.93	112.00	4,501.00	0.00
J-73	29.4	77.58	112.00	4,501.00	29.44
J-93	0.0	77.56	112.00	2,501.00	0.00
J-30	9.3	77.20	112.00	4,501.00	9.26
J-226	0.0	77.05	112.00	4,501.00	0.00
J-14	29.4	77.70	112.00	4,501.00	29.44
J-69	0.0	77.21	112.00	4,501.00	0.00
J-13	29.4	77.58	112.00	4,501.00	29.44
J-9	62.6	78.66	112.50	4,501.00	62.55
J-8	29.4	77.55	112.50	4,501.00	29.44
J-6	62.6	78.59	112.50	4,501.00	62.55
J-253	0.0	76.72	113.00	4,501.00	0.00
J-95	0.0	77.11	113.00	2,501.00	0.00

Scenario: Base
Fire Flow Analysis
Junction Report

Label	Demand (Calculated) (gpm)	Pressure (psi)	Elevation (ft)	Fire Flow Upper Limit (gpm)	Base Flow (gpm)
J-227	0.0	77.11	113.00	2,501.00	0.00
J-256	0.0	76.53	113.00	4,501.00	0.00
J-94	0.0	76.70	114.00	2,501.00	0.00
J-81	0.0	76.68	114.00	2,501.00	0.00
J-92	0.0	76.68	114.00	2,501.00	0.00
J-96	0.0	76.67	114.00	2,501.00	0.00
J-87	0.0	76.67	114.00	2,501.00	0.00
J-86	0.0	76.66	114.00	2,501.00	0.00
J-228	0.0	76.68	114.00	2,501.00	0.00
J-223	0.0	75.86	115.00	4,501.00	0.00
J-16	38.9	75.98	115.00	4,501.00	38.89
J-108	0.0	76.23	115.00	2,501.00	0.00
J-83	0.0	76.26	115.00	2,501.00	0.00
J-88	0.0	76.29	115.00	2,501.00	0.00
J-84	0.0	76.21	115.00	2,501.00	0.00
J-40	74.4	75.76	115.00	4,501.00	74.37
J-248	0.0	75.67	115.00	4,501.00	0.00
J-254	0.0	75.71	115.00	4,501.00	0.00
J-247	0.0	75.67	115.00	4,501.00	0.00
J-230	0.0	75.82	116.00	2,501.00	0.00
J-245	0.0	75.43	116.00	4,501.00	0.00
J-70	0.0	75.31	116.00	4,501.00	0.00
J-82	0.0	75.32	117.00	2,501.00	0.00
J-113	0.0	75.27	117.00	2,501.00	0.00
J-41	46.8	74.89	117.00	4,501.00	46.82
J-42	27.4	74.88	117.00	4,501.00	27.42
J-90	0.0	75.48	117.00	2,501.00	0.00
J-214	0.0	74.54	118.00	4,501.00	0.00
J-225	0.0	74.62	118.00	2,501.00	0.00
J-229	0.0	74.97	118.00	2,501.00	0.00
J-25	122.9	74.08	120.00	2,501.00	122.89
J-243	0.0	74.05	120.00	4,501.00	0.00
J-150	0.0	74.50	120.00	2,501.00	0.00
J-20	7.3	73.76	120.00	4,501.00	7.32
J-45	30.7	73.54	120.00	4,501.00	30.66
J-210	0.0	74.68	120.00	2,501.00	0.00
J-44	19.4	73.54	120.00	4,501.00	19.39
J-31	18.9	73.76	120.00	4,501.00	18.89
J-33	35.4	73.77	120.00	4,501.00	35.37
J-11	72.9	75.09	120.00	4,501.00	72.86
J-91	0.0	74.11	120.00	2,501.00	0.00
J-27	35.6	73.94	120.00	2,501.00	35.57
J-231	0.0	74.70	120.00	2,501.00	0.00
J-38	39.3	73.72	120.00	4,501.00	39.26
J-35	20.3	73.77	120.00	2,501.00	20.33
J-249	0.0	73.76	120.00	4,501.00	0.00
J-110	0.0	73.49	121.00	2,501.00	0.00
J-117	0.0	73.49	121.00	2,501.00	0.00
J-114	0.0	73.53	121.00	2,501.00	0.00
J-124	0.0	73.50	121.00	2,501.00	0.00
J-170	0.0	73.91	122.00	2,501.00	0.00

Scenario: Base
Fire Flow Analysis
Junction Report

Label	Demand (Calculated) (gpm)	Pressure (psi)	Elevation (ft)	Fire Flow Upper Limit (gpm)	Base Flow (gpm)
J-176	0.0	73.82	122.00	2,501.00	0.00
J-155	0.0	73.83	122.00	2,501.00	0.00
J-238	0.0	72.70	123.00	4,501.00	0.00
J-109	0.0	72.22	124.00	2,501.00	0.00
J-164	0.0	73.35	124.00	2,501.00	0.00
J-29	17.1	71.67	125.00	4,501.00	17.11
J-17	108.8	71.73	125.00	4,501.00	108.77
J-10	62.6	73.31	125.00	4,501.00	62.55
J-3	44.8	73.16	125.00	4,501.00	44.76
J-2	44.7	73.16	125.00	4,501.00	44.73
J-34	0.0	71.59	125.00	4,501.00	0.00
J-36	53.2	71.55	125.00	4,501.00	53.18
J-118	0.0	71.58	126.00	2,501.00	0.00
J-235	0.0	71.23	126.00	4,501.00	0.00
J-163	0.0	72.49	126.00	2,501.00	0.00
J-239	0.0	71.33	126.00	4,501.00	0.00
J-241	0.0	71.28	126.00	4,501.00	0.00
J-116	0.0	70.91	127.00	2,501.00	0.00
J-154	0.0	71.74	127.00	2,501.00	0.00
J-216	0.0	70.39	128.00	2,501.00	0.00
J-23	94.5	70.88	128.00	2,501.00	94.51
J-125	0.0	70.52	128.00	2,501.00	0.00
J-240	0.0	70.46	128.00	4,501.00	0.00
J-212	0.0	70.40	128.00	2,501.00	0.00
J-203	0.0	70.92	129.00	2,501.00	0.00
J-121	0.0	70.10	129.00	2,501.00	0.00
J-237	0.0	70.11	129.00	4,501.00	0.00
J-172	0.0	70.87	129.00	2,501.00	0.00
J-132	0.0	69.81	130.00	2,501.00	0.00
J-122	0.0	69.97	130.00	2,501.00	0.00
J-111	0.0	69.81	130.00	2,501.00	0.00
J-236	0.0	69.68	130.00	2,501.00	0.00
J-115	0.0	69.94	130.00	2,501.00	0.00
J-129	0.0	69.60	130.00	2,501.00	0.00
J-204	0.0	70.21	130.00	2,501.00	0.00
J-26	30.2	69.74	130.00	2,501.00	30.17
J-28	13.2	69.55	130.00	2,501.00	13.21
J-242	0.0	69.73	130.00	4,501.00	0.00
J-162	0.0	70.52	130.00	2,501.00	0.00
J-112	0.0	69.84	130.00	2,501.00	0.00
J-131	0.0	69.67	130.00	2,501.00	0.00
J-224	0.0	69.36	131.00	4,501.00	0.00
J-153	0.0	70.32	131.00	2,501.00	0.00
J-232	0.0	69.60	132.00	2,501.00	0.00
J-205	0.0	68.77	134.00	2,501.00	0.00
J-175	0.0	68.81	134.00	2,501.00	0.00
J-24	20.5	67.64	135.00	2,501.00	20.49
J-151	0.0	68.05	136.00	2,501.00	0.00
J-171	0.0	67.87	136.00	2,501.00	0.00
J-206	0.0	65.53	143.00	2,501.00	0.00
J-167	0.0	65.52	143.00	2,501.00	0.00

Scenario: Base
Fire Flow Analysis
Junction Report

Label	Demand (Calculated) (gpm)	Pressure (psi)	Elevation (ft)	Fire Flow Upper Limit (gpm)	Base Flow (gpm)
J-207	0.0	65.14	144.00	2,501.00	0.00
J-161	0.0	65.14	144.00	2,501.00	0.00
J-233	0.0	63.94	146.00	2,501.00	0.00
J-152	0.0	61.76	151.00	2,501.00	0.00
J-156	0.0	60.26	155.00	2,501.00	0.00
J-165	0.0	58.18	160.00	2,501.00	0.00
J-166	0.0	56.49	164.00	2,501.00	0.00
J-209	0.0	56.10	165.00	2,501.00	0.00
J-158	0.0	55.73	166.00	2,501.00	0.00
J-157	0.0	53.99	170.00	2,501.00	0.00
J-159	0.0	54.01	170.00	2,501.00	0.00
J-234	0.0	52.70	173.00	2,501.00	0.00
J-208	0.0	49.67	180.00	2,501.00	0.00
J-21	33.1	47.74	185.00	2,501.00	33.12

EXHIBIT G

FIRE FLOW REPORT

Scenario: Base
Fire Flow Analysis
Fire Flow Report

Label	Elevation (ft)	Satisfies Fire Flow Constraints?	Base Flow (gpm)	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)
J-1	100.00	true	126.95	4,500.00	4,501.00	30.00	71.99
J-2	125.00	true	44.73	4,500.00	4,501.00	30.00	58.32
J-3	125.00	true	44.76	4,500.00	4,501.00	30.00	55.79
J-4	110.00	true	44.76	4,500.00	4,501.00	30.00	44.65
J-5	110.00	true	44.73	4,500.00	4,501.00	30.00	40.48
J-6	112.50	true	62.55	4,500.00	4,501.00	30.00	68.57
J-7	111.00	true	29.44	4,500.00	4,501.00	30.00	62.10
J-8	112.50	true	29.44	4,500.00	4,501.00	30.00	57.01
J-9	112.50	true	62.55	4,500.00	4,501.00	30.00	69.71
J-10	125.00	true	62.55	4,500.00	4,501.00	30.00	65.55
J-11	120.00	true	72.86	4,500.00	4,501.00	30.00	61.32
J-12	100.00	true	40.35	4,500.00	4,501.00	30.00	64.53
J-13	112.00	true	29.44	4,500.00	4,501.00	30.00	48.95
J-14	112.00	true	29.44	4,500.00	4,501.00	30.00	57.46
J-15	112.00	true	69.96	4,500.00	4,501.00	30.00	56.72
J-16	115.00	true	38.89	4,500.00	4,501.00	30.00	35.52
J-17	125.00	true	108.77	4,500.00	4,501.00	30.00	47.52
J-20	120.00	true	7.32	4,500.00	4,501.00	30.00	44.19
J-21	185.00	true	33.12	2,500.00	2,501.00	30.00	45.64
J-23	128.00	true	94.51	2,500.00	2,501.00	30.00	63.27
J-24	135.00	true	20.49	2,500.00	2,501.00	30.00	58.45
J-25	120.00	true	122.89	2,500.00	2,501.00	30.00	64.91
J-26	130.00	true	30.17	2,500.00	2,501.00	30.00	60.06
J-27	120.00	true	35.57	2,500.00	2,501.00	30.00	63.26
J-28	130.00	true	13.21	2,500.00	2,501.00	30.00	59.05
J-29	125.00	true	17.11	4,500.00	4,501.00	30.00	46.44
J-30	112.00	true	9.26	4,500.00	4,501.00	30.00	38.60
J-31	120.00	true	18.89	4,500.00	4,501.00	30.00	44.83
J-32	100.00	true	24.39	4,500.00	4,501.00	30.00	51.97
J-33	120.00	true	35.37	4,500.00	4,501.00	30.00	43.63
J-34	125.00	true	0.00	4,500.00	4,501.00	30.00	43.50
J-35	120.00	true	20.33	2,500.00	2,501.00	30.00	61.76
J-36	125.00	true	53.18	4,500.00	4,501.00	30.00	44.75
J-37	100.00	true	33.92	4,500.00	4,501.00	30.00	56.14
J-38	120.00	true	39.26	4,500.00	4,501.00	30.00	45.72
J-39	112.00	true	14.90	4,500.00	4,501.00	30.00	39.64
J-40	115.00	true	74.37	4,500.00	4,501.00	30.00	41.45
J-41	117.00	true	46.82	4,500.00	4,501.00	30.00	42.02
J-42	117.00	true	27.42	4,500.00	4,501.00	30.00	44.43
J-43	112.00	true	15.11	4,500.00	4,501.00	30.00	42.09
J-44	120.00	true	19.39	4,500.00	4,501.00	30.00	38.77
J-45	120.00	true	30.66	4,500.00	4,501.00	30.00	40.05
J-47	112.00	true	21.87	4,500.00	4,501.00	30.00	40.64
J-48	112.00	true	24.58	4,500.00	4,501.00	30.00	42.61
J-49	112.00	true	38.74	4,500.00	4,501.00	30.00	42.95
J-50	112.00	true	41.91	4,500.00	4,501.00	30.00	43.06
J-51	112.00	true	47.35	4,500.00	4,501.00	30.00	40.32
J-52	107.00	true	25.97	4,500.00	4,501.00	30.00	44.25
J-53	107.00	true	59.63	4,500.00	4,501.00	30.00	44.73
J-55	107.00	true	39.82	4,500.00	4,501.00	30.00	43.69

Scenario: Base
Fire Flow Analysis
Fire Flow Report

Label	Elevation (ft)	Satisfies Fire Flow Constraints?	Base Flow (gpm)	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)
J-56	107.00	true	47.94	4,500.00	4,501.00	30.00	44.21
J-57	106.00	true	60.84	4,500.00	4,501.00	30.00	44.35
J-58	107.00	true	44.90	4,500.00	4,501.00	30.00	43.86
J-60	107.00	true	37.49	4,500.00	4,501.00	30.00	43.58
J-61	107.00	true	26.00	4,500.00	4,501.00	30.00	43.32
J-62	105.00	true	62.67	4,500.00	4,501.00	30.00	44.58
J-63	107.00	true	54.76	4,500.00	4,501.00	30.00	43.17
J-64	107.00	true	40.58	4,500.00	4,501.00	30.00	43.65
J-69	112.00	true	0.00	4,500.00	4,501.00	30.00	42.11
J-70	116.00	true	0.00	4,500.00	4,501.00	30.00	39.38
J-73	112.00	true	29.44	4,500.00	4,501.00	30.00	54.06
J-74	112.00	true	0.00	4,500.00	4,501.00	30.00	41.88
J-75	107.00	true	0.00	4,500.00	4,501.00	30.00	43.02
J-76	107.00	true	0.00	4,500.00	4,501.00	30.00	41.42
J-77	107.00	true	0.00	4,500.00	4,501.00	30.00	38.10
J-78	107.00	true	0.00	4,500.00	4,501.00	30.00	42.09
J-79	107.00	true	0.00	4,500.00	4,501.00	30.00	38.81
J-80	107.00	true	0.00	4,500.00	4,501.00	30.00	39.51
J-81	114.00	true	0.00	2,500.00	2,501.00	30.00	65.61
J-82	117.00	true	0.00	2,500.00	2,501.00	30.00	65.16
J-83	115.00	true	0.00	2,500.00	2,501.00	30.00	66.50
J-84	115.00	true	0.00	2,500.00	2,501.00	30.00	66.25
J-85	111.00	true	0.00	2,500.00	2,501.00	30.00	60.76
J-86	114.00	true	0.00	2,500.00	2,501.00	30.00	65.17
J-87	114.00	true	0.00	2,500.00	2,501.00	30.00	63.11
J-88	115.00	true	0.00	2,500.00	2,501.00	30.00	66.73
J-90	117.00	true	0.00	2,500.00	2,501.00	30.00	66.43
J-91	120.00	true	0.00	2,500.00	2,501.00	30.00	61.06
J-92	114.00	true	0.00	2,500.00	2,501.00	30.00	65.52
J-93	112.00	true	0.00	2,500.00	2,501.00	30.00	57.60
J-94	114.00	true	0.00	2,500.00	2,501.00	30.00	61.27
J-95	113.00	true	0.00	2,500.00	2,501.00	30.00	63.04
J-96	114.00	true	0.00	2,500.00	2,501.00	30.00	65.06
J-108	115.00	true	0.00	2,500.00	2,501.00	30.00	64.85
J-109	124.00	true	0.00	2,500.00	2,501.00	30.00	60.90
J-110	121.00	true	0.00	2,500.00	2,501.00	30.00	62.75
J-111	130.00	true	0.00	2,500.00	2,501.00	30.00	56.84
J-112	130.00	true	0.00	2,500.00	2,501.00	30.00	59.89
J-113	117.00	true	0.00	2,500.00	2,501.00	30.00	64.76
J-114	121.00	true	0.00	2,500.00	2,501.00	30.00	61.21
J-115	130.00	true	0.00	2,500.00	2,501.00	30.00	61.39
J-116	127.00	true	0.00	2,500.00	2,501.00	30.00	58.26
J-117	121.00	true	0.00	2,500.00	2,501.00	30.00	60.73
J-118	126.00	true	0.00	2,500.00	2,501.00	30.00	61.80
J-121	129.00	true	0.00	2,500.00	2,501.00	30.00	57.62
J-122	130.00	true	0.00	2,500.00	2,501.00	30.00	61.55
J-124	121.00	true	0.00	2,500.00	2,501.00	30.00	59.98
J-125	128.00	true	0.00	2,500.00	2,501.00	30.00	56.58
J-129	130.00	true	0.00	2,500.00	2,501.00	30.00	59.04
J-131	130.00	true	0.00	2,500.00	2,501.00	30.00	59.19

Scenario: Base
Fire Flow Analysis
Fire Flow Report

Label	Elevation (ft)	Satisfies Fire Flow Constraints?	Base Flow (gpm)	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)
J-132	130.00	true	0.00	2,500.00	2,501.00	30.00	56.63
J-150	120.00	true	0.00	2,500.00	2,501.00	30.00	59.01
J-151	136.00	true	0.00	2,500.00	2,501.00	30.00	61.55
J-152	151.00	true	0.00	2,500.00	2,501.00	30.00	55.90
J-153	131.00	true	0.00	2,500.00	2,501.00	30.00	62.55
J-154	127.00	true	0.00	2,500.00	2,501.00	30.00	60.97
J-155	122.00	true	0.00	2,500.00	2,501.00	30.00	61.93
J-156	155.00	true	0.00	2,500.00	2,501.00	30.00	54.91
J-157	170.00	true	0.00	2,500.00	2,501.00	30.00	49.82
J-158	166.00	true	0.00	2,500.00	2,501.00	30.00	47.01
J-159	170.00	true	0.00	2,500.00	2,501.00	30.00	50.09
J-161	144.00	true	0.00	2,500.00	2,501.00	30.00	48.80
J-162	130.00	true	0.00	2,500.00	2,501.00	30.00	60.66
J-163	126.00	true	0.00	2,500.00	2,501.00	30.00	64.31
J-164	124.00	true	0.00	2,500.00	2,501.00	30.00	47.50
J-165	160.00	true	0.00	2,500.00	2,501.00	30.00	53.09
J-166	164.00	true	0.00	2,500.00	2,501.00	30.00	51.60
J-167	143.00	true	0.00	2,500.00	2,501.00	30.00	50.07
J-170	122.00	true	0.00	2,500.00	2,501.00	30.00	61.73
J-171	136.00	true	0.00	2,500.00	2,501.00	30.00	57.69
J-172	129.00	true	0.00	2,500.00	2,501.00	30.00	60.15
J-175	134.00	true	0.00	2,500.00	2,501.00	30.00	59.32
J-176	122.00	true	0.00	2,500.00	2,501.00	30.00	63.56
J-203	129.00	true	0.00	2,500.00	2,501.00	30.00	61.94
J-204	130.00	true	0.00	2,500.00	2,501.00	30.00	62.43
J-205	134.00	true	0.00	2,500.00	2,501.00	30.00	61.62
J-206	143.00	true	0.00	2,500.00	2,501.00	30.00	49.78
J-207	144.00	true	0.00	2,500.00	2,501.00	30.00	48.68
J-208	180.00	true	0.00	2,500.00	2,501.00	30.00	44.02
J-209	165.00	true	0.00	2,500.00	2,501.00	30.00	42.36
J-210	120.00	true	0.00	2,500.00	2,501.00	30.00	62.41
J-212	128.00	true	0.00	2,500.00	2,501.00	30.00	59.42
J-214	118.00	true	0.00	4,500.00	4,501.00	30.00	45.01
J-216	128.00	true	0.00	2,500.00	2,501.00	30.00	59.07
J-223	115.00	true	0.00	4,500.00	4,501.00	30.00	45.20
J-224	131.00	true	0.00	4,500.00	4,501.00	30.00	45.20
J-225	118.00	true	0.00	2,500.00	2,501.00	30.00	61.06
J-226	112.00	true	0.00	4,500.00	4,501.00	30.00	38.18
J-227	113.00	true	0.00	2,500.00	2,501.00	30.00	65.16
J-228	114.00	true	0.00	2,500.00	2,501.00	30.00	65.40
J-229	118.00	true	0.00	2,500.00	2,501.00	30.00	63.77
J-230	116.00	true	0.00	2,500.00	2,501.00	30.00	64.98
J-231	120.00	true	0.00	2,500.00	2,501.00	30.00	63.04
J-232	132.00	true	0.00	2,500.00	2,501.00	30.00	59.73
J-233	146.00	true	0.00	2,500.00	2,501.00	30.00	56.31
J-234	173.00	true	0.00	2,500.00	2,501.00	30.00	47.77
J-235	126.00	true	0.00	4,500.00	4,501.00	30.00	43.06
J-236	130.00	true	0.00	2,500.00	2,501.00	30.00	59.47
J-237	129.00	true	0.00	4,500.00	4,501.00	30.00	44.77
J-238	123.00	true	0.00	4,500.00	4,501.00	30.00	44.26

Scenario: Base
Fire Flow Analysis
Fire Flow Report

Label	Elevation (ft)	Satisfies Fire Flow Constraints?	Base Flow (gpm)	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)
J-239	126.00	true	0.00	4,500.00	4,501.00	30.00	42.20
J-240	128.00	true	0.00	4,500.00	4,501.00	30.00	43.95
J-241	126.00	true	0.00	4,500.00	4,501.00	30.00	43.72
J-242	130.00	true	0.00	4,500.00	4,501.00	30.00	44.94
J-243	120.00	true	0.00	4,500.00	4,501.00	30.00	44.70
J-245	116.00	true	0.00	4,500.00	4,501.00	30.00	41.72
J-246	104.00	true	0.00	4,500.00	4,501.00	30.00	51.78
J-247	115.00	true	0.00	4,500.00	4,501.00	30.00	40.05
J-248	115.00	true	0.00	4,500.00	4,501.00	30.00	40.41
J-249	120.00	true	0.00	4,500.00	4,501.00	30.00	44.69
J-250	112.00	true	0.00	4,500.00	4,501.00	30.00	51.38
J-252	107.00	true	0.00	4,500.00	4,501.00	30.00	44.09
J-253	113.00	true	0.00	4,500.00	4,501.00	30.00	36.14
J-254	115.00	true	0.00	4,500.00	4,501.00	30.00	42.75
J-256	113.00	true	0.00	4,500.00	4,501.00	30.00	43.05
J-258	110.00	true	0.00	4,500.00	4,501.00	30.00	50.07
J-259	112.00	true	0.00	4,500.00	4,501.00	30.00	41.94

EXHIBIT H

JANUARY 2003
SPECIFIC PLAN AMENDMENT
LAND USE TABLE

TABLE 3-2: DEVELOPMENT PROGRAM BY REUSE AREA

Parcel	Acreage	Acreage				Non Residential Land Use						Program Tools	
						Mixed Use				Heavy	Educational	Non-	Residential
		Fed.	Army	Cons.	Dev.	Office/R&D	Light Industrial	Retail	Warehouse	Industrial	Civic	Residential	
		Trsfr.	Res.	Esmt.	Rec.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Du
Master Developer	**Total**												
Reuse Areas													
1B	37								320,000	180,000		500,000	
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	425,000	690,000	5,000	215,000		15,000	1,350,000	129
4	52				10	120,000	50,000	70,000			70,000	310,000	47
5	143				0	60,000	515,000	15,000		1,290,000		1,880,000	
6	123				14						90,000	90,000	610
7	26				26							0	
8	105				11	20,000			385,000		15,000	420,000	514
9	51	8	3			35,000					545,000	580,000	
10A	69			9			370,000			130,000		500,000	
M.Dev. Reuse Area													
Sub-Totals	795	8	3	9	66	1,600,000	2,050,000	150,000	1,030,000	1,600,000	870,000	7,300,000	1,400
Main Gate	2												
Rail Road Spur	24												
M.Dev. Specific Plan													
Area Sub-Totals	821	8	3	9	66	1,600,000	2,050,000	150,000	1,030,000	1,600,000	870,000	7,300,000	1,400
Addn. Developer/Users													
Reuse Areas													
1A	152			29			1,200,000					1,200,000	
10B (U.S. Army Reserve)	24		24										
11 Golf course	184			11	173								
12 (Regional Park)	172				172								6
13 (Open Space/Rec)	92				92								
Reuse Areas Sub-totals	1,445	8	27	49	503		6,030,000			1,600,000	870,000	8,500,000	1,406
Wetlands	2,856	162											
Dredge Areas	922												
S.P. Area Totals	**5,223**	**170**	**27**	**49**	**503**		**6,030,000**			**1,600,000**	**870,000**	**8,500,000**	**1,406**