

THE PROMENADE PHASE II

WATER STUDY ADDENDUM REPORT

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CMX Project No. 6380

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THE PROMENADE PHASE II WATER STUDY ADDENDUM REPORT

I. INTRODUCTION

The purpose of this addendum report is to update the Water Master Report prepared by CMX Group in January 13, 1999 in accordance with the latest site layout in the northwest portion of the property (Phase II). Onsite water will be public and part of the City of Scottsdale water system. It will be located within a 12-foot wide easement.

The report presents the results of the domestic water master study for the Promenade, including the latest Phase II site layout. Prediction of the water demands was based on the City of Scottsdale design requirements and criteria. The project's water distribution system will be connected to the existing 8-inch and 12-inch water mains in Paradise Lane and an 8-inch water main in 76th Street.

II. METHODOLOGY AND CRITERIA

Prediction of the water demands was performed based on the same design criteria used in the Master Study. For the Visitors' center, 0.16 gallon per day per square foot of gross area was used. For the offices, it was assumed 100 square feet of gross area per employee and 20 gallons per person per day.

The domestic water distribution system was modeled using the WaterCAD Program Version 4.1.1 which was developed by Haestad Methods, Inc.

III. WATER DEMANDS

A spreadsheet was prepared for estimating the quantity of water demand for the entire Promenade site. Table 1 summarizes the demand type for each junction node in the distribution network, water consumption rate and water demand for various flow conditions.

Average Day Demand was estimated to be 651 gallons per minute. Maximum Day Demand was 1,303 gpm and Peak Hour Demand was 2,280 gpm.

IV. SYSTEM ANALYSIS AND RESULTS

Four computer models were prepared for different system demand scenarios: (1) Model 1 – Average Day Demand; (2) Model 2 – Maximum Day Demand; Model 3 – Peak Hour Demand; and (4) Model 4 – Maximum Day Demand plus 1,500 gpm Fire Flow at Junction Node 43 (highest elevation).

Fire flow tests were performed at the fire hydrants on Paradise Lane. The static pressure was found to be 65 psig and the residual pressure was at 50 psig for a discharge flow of 2,248.5 gpm (see Appendix A). The data was used in the models to simulate the static source for the water distribution system. A fire was

assumed for Model 4 at Junction Node 43 that has the highest ground elevation and also most distant from the supply source. Buildings A and B will be 4 story buildings. The first floor is retail space and the upper floors are office space. To obtain the residual pressure on the fourth floor, Pipes No. 58 and 59 (3" copper service lines) and Junction Nos. 46 and 47 (approx. 45 feet high) were added in the model. The head loss to push water through a 3-inch meter at each of the service lines was also included in the analysis.

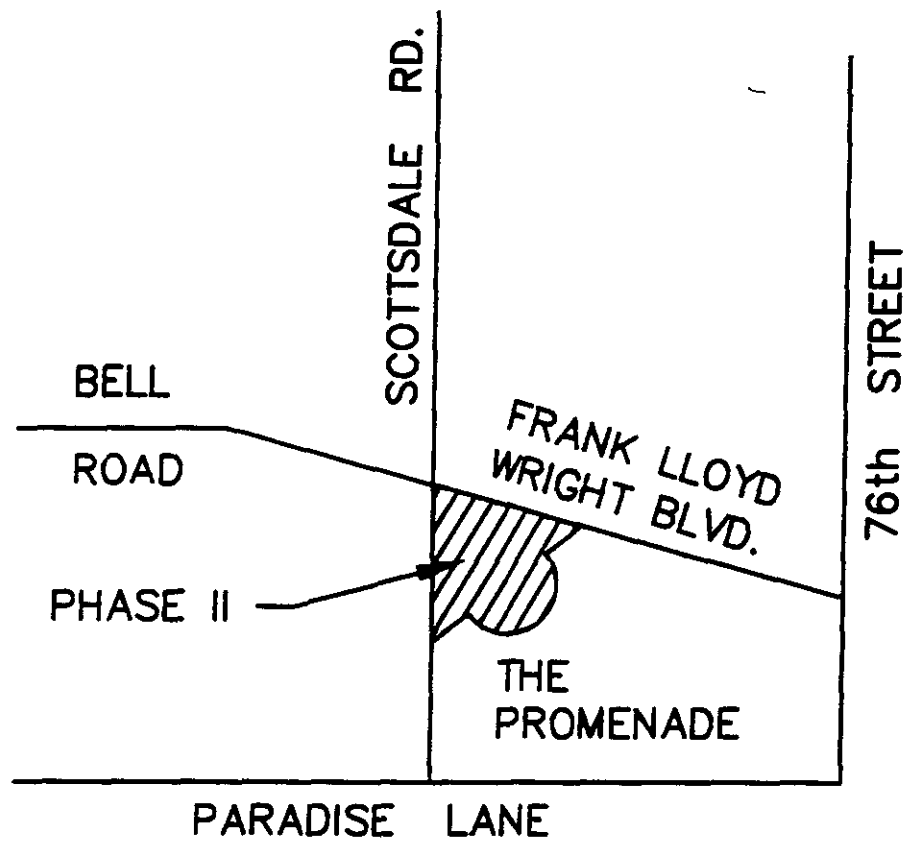
*Bldg > 1 story will require
Booster pumps*

The results indicate that minimum residual pressure in the system will not be met for all flow conditions. Table 2 summarizes the maximum and minimum residual pressures in the network system for each flow condition. Exhibit B shows the configuration of the proposed water distribution system. The printouts for these water models are included in Appendices B through E.

V. CONCLUSIONS

The proposed water distribution system in Phase II consists of 12-inch water lines. The residual pressure at the top of the 4-story buildings will be less than the required 40 psig during the Average Day, Maximum Day and Peak Hour conditions. During fire condition, the residual pressure at the fire location Junction 43 is approximately 32 psig while the pressure at the top of the 4-story buildings is approximately 12 psig. Therefore, a booster pump installed for each of the 4-story buildings is recommended.

Fire hydrants and line valves will be installed for the proposed water line in accordance with the City's requirements. The maximum spacing between hydrants is generally 700 feet while the maximum spacing for line valves is 500 feet. All buildings will be installed with automatic sprinkler system.



VICINITY MAP

N.T.S.

FIGURE 1

EXHIBIT A

WATER PLAN

TABLE 1

WATER DEMAND ANALYSIS

TABLE 1 WATER DEMAND ANALYSIS
THE PROMENADE PHASE II
CMX GROUP, INC. AS OF NOVEMBER 7, 2001 (FILE: PROMW.DOC)
PROJECT NO. 6380

NODE NO.	DEMAND TYPE	SERVICE AREA (SF)	UNIT	AVERAGE DEMAND (GPD/UNIT)	AVERAGE DEMAND (SF/SEAT)	WATER DEMANDS		
						AVG. DEMAND (GPM)	MAX. DAY DEMAND (GPM)	PEAK HR. DEMAND (GPM)
1	NONE	-	N.A.	N.A.	N.A.	0.00	0.00	0.00
2	NONE	-	N.A.	N.A.	N.A.	0.00	0.00	0.00
3	RETAIL	73,753	SF	0.9	N.A.	46.10	92.19	161.33
4	RETAIL	66,485	SF	0.9	N.A.	41.55	83.11	145.44
5	RETAIL/SHOP	62,335	SF	0.9	N.A.	38.96	77.92	136.36
6	NONE	-	N.A.	N.A.	N.A.	0.00	0.00	0.00
7	NONE	-	N.A.	N.A.	N.A.	0.00	0.00	0.00
8	RETAIL	13,000	SF	0.9	N.A.	8.13	16.25	28.44
	RESTAURANT	8,000	SEAT	40	40	5.56	11.11	19.44
9	RESTAURANT	4,500	SEAT	40	40	3.13	6.25	10.94
10	RESTAURANT	8,000	SEAT	40	40	5.56	11.11	19.44
11	RESTAURANT	8,000	SEAT	40	40	5.56	11.11	19.44
12	RESTAURANT	8,000	SEAT	40	40	5.56	11.11	19.44
13	RETAIL	30,480	SF	0.9	N.A.	19.05	38.10	66.68
14	NONE	-	N.A.	N.A.	N.A.	0.00	0.00	0.00
15	RETAIL	73,753	SF	0.9	N.A.	46.10	92.19	161.33
16	NONE	-	N.A.	N.A.	N.A.	0.00	0.00	0.00
17	RETAIL	66,485	SF	0.9	N.A.	41.55	83.11	145.44
18	NONE	-	N.A.	N.A.	N.A.	0.00	0.00	0.00
19	RETAIL	44,950	SF	0.9	N.A.	28.09	56.19	98.33
20	NONE	-	N.A.	N.A.	N.A.	0.00	0.00	0.00
21	RESTAURANT	18,000	SEAT	40	40	12.50	25.00	43.75
	RETAIL	24,000	SF	0.9	N.A.	15.00	30.00	52.50
22	NONE	-	N.A.	N.A.	N.A.	0.00	0.00	0.00
23	RETAIL	24,000	SF	0.9	N.A.	15.00	30.00	52.50
24	RETAIL	44,950	SF	0.9	N.A.	28.09	56.19	98.33
25	RETAIL	57,495	SF	0.9	N.A.	35.93	71.87	125.77
26	RETAIL	8,000	SF	0.9	N.A.	5.00	10.00	17.50
27	RETAIL	8,000	SF	0.9	N.A.	5.00	10.00	17.50
28	RETAIL	102,100	SF	0.9	N.A.	63.81	127.63	223.34
29	RESTAURANT	2,400	SEAT	40	40	1.67	3.33	5.83
	RETAIL	10,400	SF	0.9	N.A.	6.50	13.00	22.75
30	RESTAURANT	2,400	SEAT	40	40	1.67	3.33	5.83
	RETAIL	10,400	SF	0.9	N.A.	6.50	13.00	22.75
31	RETAIL	61,800	SF	0.9	N.A.	38.63	77.25	135.19
32	RETAIL	8,000	SF	0.9	N.A.	5.00	10.00	17.50
33	RETAIL	8,000	SF	0.9	N.A.	5.00	10.00	17.50
39	BLDG B - RETAIL	36,100	SF	0.9	N.A.	22.56	45.13	78.97
	OFFICE	108,300	SF	0.2	N.A.	15.04	30.08	52.65
40	NONE	-	N.A.	N.A.	N.A.	0.00	0.00	0.00
42	BLDG A - RETAIL	36,100	SF	0.9	N.A.	22.56	45.13	78.97
	OFFICE	108,300	SF	0.2	N.A.	15.04	30.08	52.65
43	VISITOR CTR	9,201	SF	0.16	N.A.	1.02	2.04	3.58
	RESTAURANT	13,500	SEAT	40	40	9.38	18.75	32.81
	RESTAURANT	8,000	SEAT	40	40	5.56	11.11	19.44
44	NONE	-	N.A.	N.A.	N.A.	0.00	0.00	0.00
45	RETAIL	20,200	SF	0.9	N.A.	12.63	25.25	44.19
	RESTAURANT	10,800	SF	40	40	7.50	15.00	26.25
101	NONE	-	N.A.	N.A.	N.A.	0.00	0.00	0.00
102	NONE	-	N.A.	N.A.	N.A.	0.00	0.00	0.00
103	NONE	-	N.A.	N.A.	N.A.	0.00	0.00	0.00
104	NONE	-	N.A.	N.A.	N.A.	0.00	0.00	0.00
105	NONE	-	N.A.	N.A.	N.A.	0.00	0.00	0.00
TOTAL		1,208,187				651.46	1,302.92	2,280.10

ASSUMPTIONS:

Maximum Day Demand = 2.0 x Average Day Demand

Peak Hour Demand = 3.5 x Average Day Demand

Minimum Hour Demand = 0.25 x Average Day Demand

SOURCE: Flow demands are based on City of Scottsdale and/or other major cities' design criteria.

TABLE 2

SUMMARY RESIDUAL PRESSURE FOR VARIOUS FLOW CONDITIONS

TABLE 2: SUMMARY OF RESIDUAL PRESSURES FOR VARIOUS FLOW CONDITIONS
CMX GROUP, INC. AS OF NOV 09, 2001 (FILE: PROMWS.XLS)

MODEL NO.	FLOW CONDITION	FLOW DEMAND (GPM)	STATIC HEAD AT SOURCE (FT) *	MAX. RESIDUAL PRESSURE (PSI)	MIN. RESIDUAL PRESSURE (PSI)
1	Average Day Flow	651	1,640.53	64.29 @ J20	38.38 @ J47
2	Max. Day Flow	1,303	1,631.29	59.89 @ J20	33.47 @ J47
3	Peak Hour Flow	2,280	1,608.19	48.87 @ J20	21.16 @ J47
4	Max. Day plus Fire ** Flow of 1,500 gpm @ Jct 43	2,803 (Including 1,500 gpm fire flow at Jct No. 43)	1,592.02	41.67 @ J40	12.12 @ J47 (fire location @ J43 with 31.64 psi)

* RESIDUAL PRESSURE WAS OBTAINED FROM THE FIRE FLOW TEST CURVE (SEE APPENDIX A) CORRESPONDING TO FLOW DEMAND.
HYDRAULIC GRADE = ELEVATION @ SUPPLY (R1 @ 1,495 FT) + RESIDUAL PRESSURE X 2.31 (FT).

** THE MINIMUM RESIDUAL PRESSURE AT FIRE LOCATION IS 20 PSI WITH A FIRE FLOW OF 1,500 GPM.

*Need pump
to boost
pressure > 40psi
pump size: 1 hp.*

APPENDIX A

FIRE FLOW TEST DATA

MASTER WATER PLAN NOTES:

1. ALL PUBLIC WATER AND PRIVATE SEWER MAINS TO BE INSTALLED WITH PHASE 1.
2. WATER, FIRE AND SEWER SERVICE LINES TO MAJOR 1-12 AND SHOPS A-E TO BE INSTALLED WITH PHASE 1.
3. WATER, FIRE AND SEWER STUB-OUTS FOR PADS 1-16 TO BE INSTALLED WITH PHASE 1.
4. ON-SITE PUBLIC WATER WILL BE LOCATED WITHIN A 12 FOOT FIRE WATER LINE EASEMENT.
5. MINIMUM SEPARATION BETWEEN WATER AND SEWER MAINS SHALL BE 18 FEET.
6. WELL SITE TO BE RELOCATED PER CONSTRUCTION DRAINAGE BY BROWN & CALDWELL.

NORTH



N.E.S.

LEGEND:

- PROPOSED WATERLINE
- ① ANCHOR NODE NUMBER
- P2 PIPE NUMBER

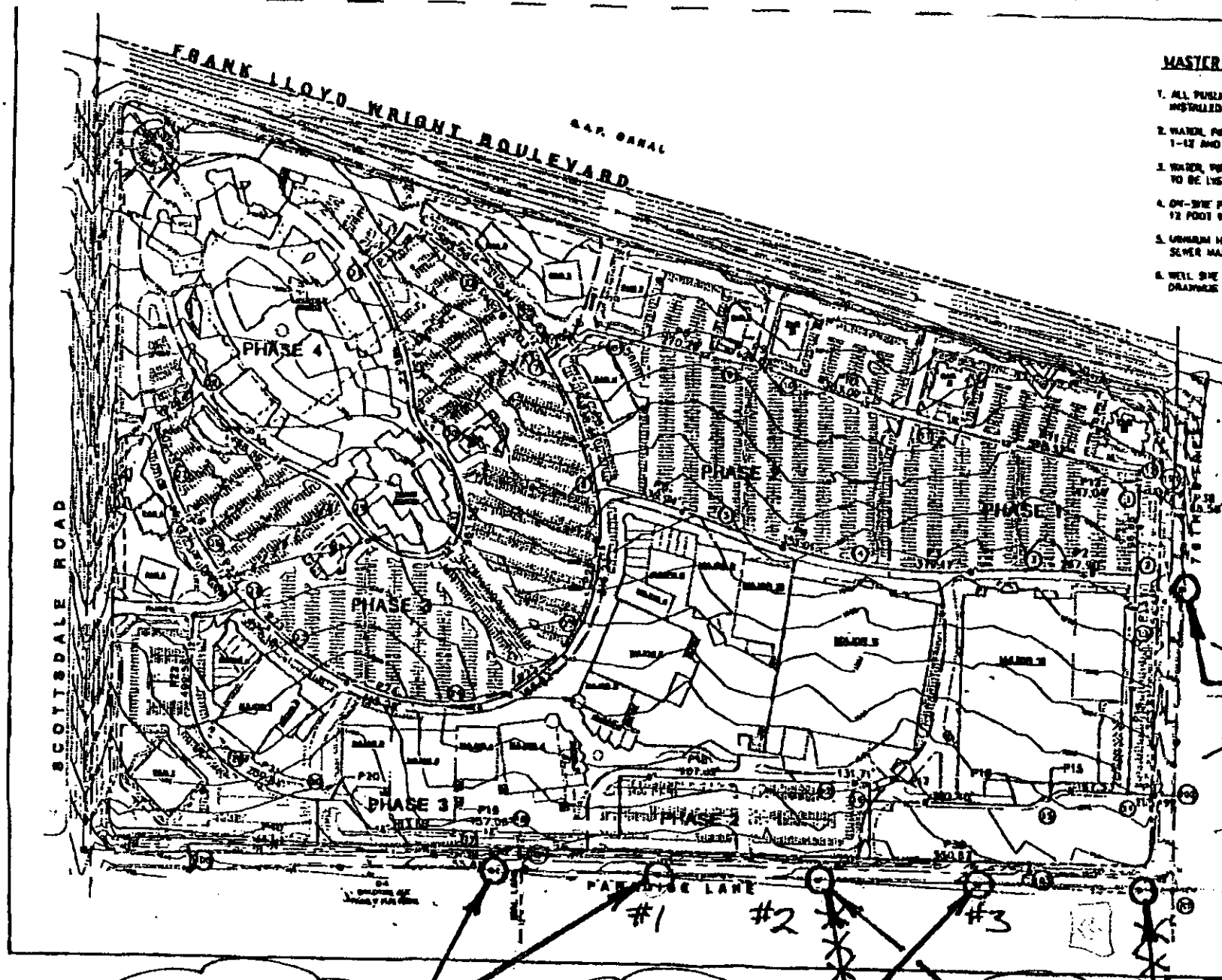
~~MEASURE
RESIDUAL~~

EXHIBIT "B"

MASTER WATER PLAN



CMOL GROUP INC.
1515 E. MISSOURI, #115
PHOENIX, AZ 85014
PH (602) 279-8438



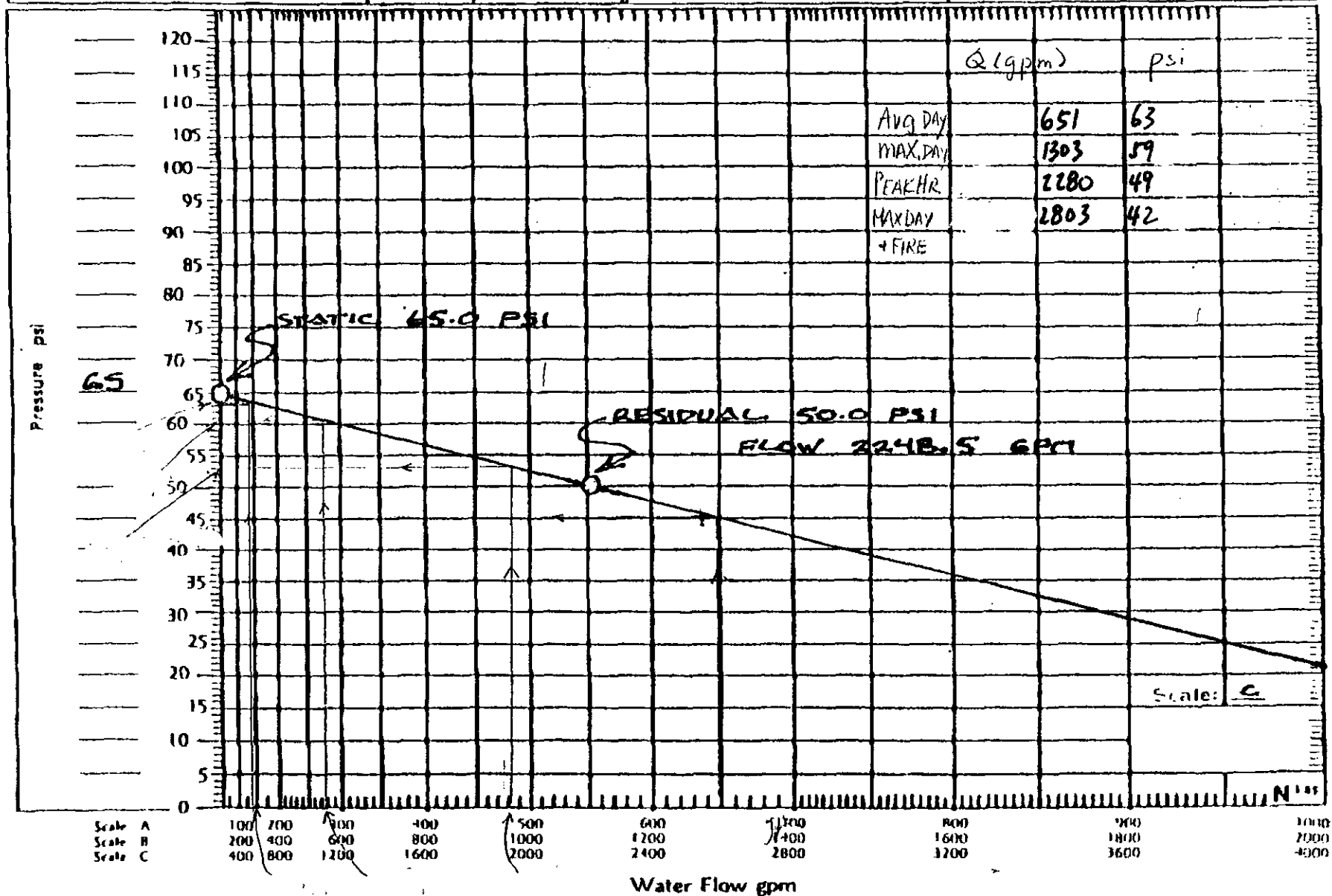
FLOW TEST
THIS HYDRANT

MEASURE
RESIDUAL

FLOW TEST
THIS HYDRANT

WATER FLOW TEST SUMMARY SHEET (Flow Tests performed by PCI System)

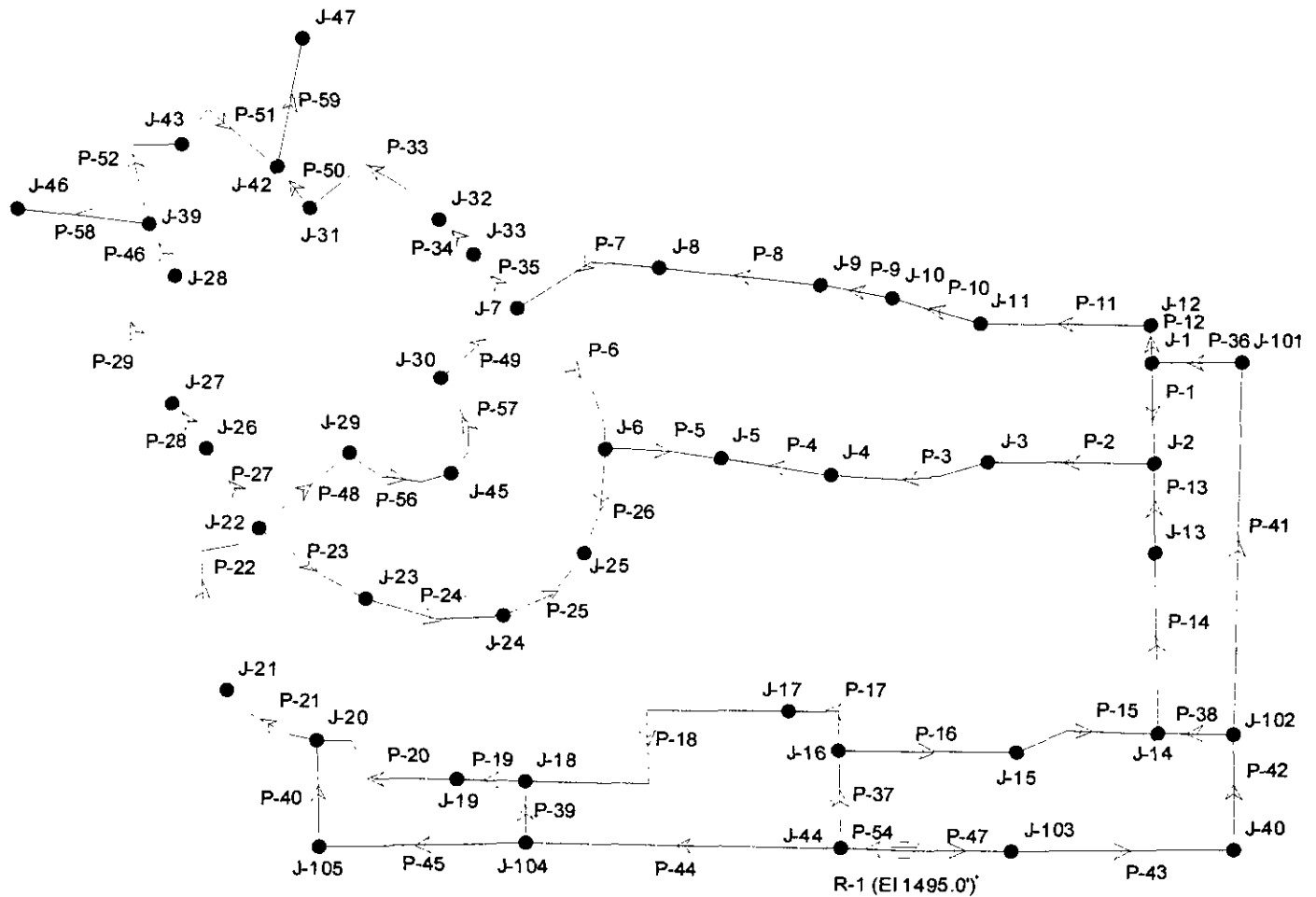
Hydrant No.	Outlet I.D. inches	Pilot Press. psi	Flow gpm	Residual psi	Date: 1-2-99	Time: 1:40	Cont. No. 900007
1	2 1/2"	40.0	1061.6	—	Cont. Name: CMX FLOW TEST		
2	2 1/2"	50.0	1186.9	—	Address: 76TH ST. & PARADISE LN		
3	2 1/2"	—	—	50	SCOTTSDALE, AZ		
Total Flow			2248.5		Static Press: 65.0 psi		
					Flow @ 20 psi (gpm)		



APPENDIX B

MODEL 1 – AVERAGE DAY DEMAND

Scenario: Average Day Demand



Scenario Summary Report

Scenario: Average Day Demand

Scenario Summary			
Physical Alternative	Base-Physical		
Demand Alternative	Demand-Average Day Demand		
Initial Settings Alternative	Base-Initial Settings		
Operational Alternative	Base-Operational		
Age Alternative	Base-Age Alternative		
Constituent Alternative	Base-Constituent		
Trace Alternative	Base-Trace Alternative		
Fire Flow Alternative	Base-Fire Flow		
Cost Alternative	Base-Cost		
User Data Alternative	Base-User Data		
Hydraulic Analysis Summary			
Analysis	Steady State		
Friction Method	Hazen-Williams Formula		
Accuracy	0.001000		
Trials	40		
Quality Analysis Summary			
Analysis	Constituent	Maximum Pipe Segments	100
Quality Time Step	N/A hr	Minimum Pipe Travel Time	0.10 hr
Calibration			
Demand Operation	Multiply	Roughness Operation	<None>
Demand	1.00	Roughness	0.00

Created: 11/06/01 04:51:57 PM

=====
Scenario: Average Day Demand
=====

Steady State Hydraulic Summary

Iteration Summary

Balanced Trials = 6, Accuracy = 0.000003

Flow Summary

Flow Supplied 651.48 gpm
Flow Demanded 651.48 gpm
Flow Stored 0.00 gpm

Boundary Summary

R-1 (El 1495.0' Reservoir: Emptying

=====
Message Summaries
=====

(no messages)
=====

Completed: 11/09/2001 02:00:40 PM
=====

Scenario: Average Day Demand
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Zone	Inflow (gpm)	Calculated Hydraulic Grade (ft)
R-1 (El 1495.0')	1,640.53	ZONE 3W	-651.48	1,640.53

Scenario: Average Day Demand
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Demand (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated H. G. (ft)	Pressure (psi)
J-1	1,504.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,640.12	58.86
J-2	1,502.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,640.12	59.51
J-3	1,501.50	ZONE 3W	Demand	46.10	Fixed	46.10	1,640.01	59.90
J-4	1,501.50	ZONE 3W	Demand	41.55	Fixed	41.55	1,639.95	59.87
J-5	1,501.50	ZONE 3W	Demand	38.96	Fixed	38.96	1,639.93	59.86
J-6	1,502.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,639.93	59.43
J-7	1,506.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,639.94	57.70
J-8	1,506.00	ZONE 3W	Demand	13.69	Fixed	13.69	1,639.95	57.92
J-9	1,505.50	ZONE 3W	Demand	3.13	Fixed	3.13	1,639.97	58.15
J-10	1,506.00	ZONE 3W	Demand	5.56	Fixed	5.56	1,639.99	57.94
J-11	1,505.50	ZONE 3W	Demand	5.56	Fixed	5.56	1,640.04	58.18
J-12	1,504.50	ZONE 3W	Demand	5.56	Fixed	5.56	1,640.11	58.64
J-13	1,501.00	ZONE 3W	Demand	19.05	Fixed	19.05	1,640.16	60.18
J-14	1,498.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,640.29	61.53
J-15	1,497.00	ZONE 3W	Demand	46.10	Fixed	46.10	1,640.30	61.97
J-16	1,495.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,640.36	62.64
J-17	1,506.50	ZONE 3W	Demand	41.55	Fixed	41.55	1,640.34	57.87
J-18	1,493.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,640.21	63.44
J-19	1,494.00	ZONE 3W	Demand	28.09	Fixed	28.09	1,640.20	63.22
J-20	1,491.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,640.17	64.29
J-21	1,493.50	ZONE 3W	Demand	27.50	Fixed	27.50	1,640.09	63.39
J-22	1,498.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,639.97	61.17
J-23	1,495.50	ZONE 3W	Demand	15.00	Fixed	15.00	1,639.95	62.47
J-24	1,496.50	ZONE 3W	Demand	28.09	Fixed	28.09	1,639.93	62.02
J-25	1,499.00	ZONE 3W	Demand	35.93	Fixed	35.93	1,639.93	60.94
J-26	1,499.50	ZONE 3W	Demand	5.00	Fixed	5.00	1,639.96	60.74
J-27	1,499.50	ZONE 3W	Demand	5.00	Fixed	5.00	1,639.95	60.74
J-28	1,500.50	ZONE 3W	Demand	63.81	Fixed	63.81	1,639.93	60.30
J-29	1,499.50	ZONE 3W	Demand	8.17	Fixed	8.17	1,639.96	60.74
J-30	1,504.00	ZONE 3W	Demand	8.17	Fixed	8.17	1,639.94	58.79
J-31	1,506.00	ZONE 3W	Demand	38.63	Fixed	38.63	1,639.93	57.92
J-32	1,506.50	ZONE 3W	Demand	5.00	Fixed	5.00	1,639.94	57.70
J-33	1,506.50	ZONE 3W	Demand	5.00	Fixed	5.00	1,639.94	57.70
J-39	1,501.50	ZONE 3W	Demand	22.56	Fixed	22.56	1,639.93	59.86
J-40	1,495.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,640.48	62.91
J-42	1,506.00	ZONE 3W	Demand	22.56	Fixed	22.56	1,639.93	57.92
J-43	1,506.00	ZONE 3W	Demand	15.96	Fixed	15.96	1,639.93	57.92
J-44	1,494.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,640.39	63.30
J-45	1,498.50	ZONE 3W	Demand	20.12	Fixed	20.12	1,639.95	61.17
J-46	1,546.50	ZONE 3W	Demand	15.04	Fixed	15.04	1,639.75	40.32
J-47	1,551.00	ZONE 3W	Demand	15.04	Fixed	15.04	1,639.75	38.38
J-101	1,505.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,640.15	58.44
J-102	1,497.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,640.31	61.97
J-103	1,495.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,640.52	62.93
J-104	1,492.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,640.22	64.09
J-105	1,491.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,640.18	64.29

← highest

← lowest

Scenario: Average Day Demand
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen- Williams C	Discharge (gpm)	U.S. H.G. (ft)	D.S. H.G. (ft)	Head/loss Gradient (ft/1000ft)	Velocity (ft/s)
P-1	197.00	8	Ductile Iron	130.0	22.51	1,640.12	1,640.12	0.02	0.14
P-2	268.00	8	Ductile Iron	130.0	124.71	1,640.12	1,640.01	0.39	0.80
P-3	379.00	8	Ductile Iron	130.0	78.61	1,640.01	1,639.95	0.17	0.50
P-4	361.00	8	Ductile Iron	130.0	37.06	1,639.95	1,639.93	0.04	0.24
P-5	337.00	8	Ductile Iron	130.0	-1.90	1,639.93	1,639.93	0.00	0.01
P-6	338.00	8	Ductile Iron	130.0	-25.64	1,639.93	1,639.94	0.02	0.16
P-7	122.00	8	Ductile Iron	130.0	-45.20	1,639.94	1,639.95	0.06	0.29
P-8	270.00	8	Ductile Iron	130.0	-58.89	1,639.95	1,639.97	0.10	0.38
P-9	127.00	8	Ductile Iron	130.0	-62.02	1,639.97	1,639.99	0.11	0.40
P-10	383.00	8	Ductile Iron	130.0	-67.58	1,639.99	1,640.04	0.13	0.43
P-11	519.00	8	Ductile Iron	130.0	-73.14	1,640.04	1,640.11	0.15	0.47
P-12	47.00	8	Ductile Iron	130.0	-78.70	1,640.11	1,640.12	0.17	0.50
P-13	154.00	8	Ductile Iron	130.0	-102.20	1,640.12	1,640.16	0.27	0.65
P-14	364.00	8	Ductile Iron	130.0	-121.25	1,640.16	1,640.29	0.37	0.77
P-15	168.00	8	Ductile Iron	130.0	-33.81	1,640.29	1,640.30	0.03	0.22
P-16	382.00	8	Ductile Iron	130.0	-79.91	1,640.30	1,640.36	0.17	0.51
P-17	89.00	8	Ductile Iron	130.0	111.23	1,640.36	1,640.34	0.32	0.71
P-18	907.00	8	Ductile Iron	130.0	69.68	1,640.34	1,640.21	0.13	0.44
P-19	157.00	12	Ductile Iron	130.0	181.38	1,640.21	1,640.20	0.11	0.51
P-20	363.00	12	Ductile Iron	130.0	153.29	1,640.20	1,640.17	0.08	0.43
P-21	260.00	12	Ductile Iron	130.0	313.29	1,640.17	1,640.09	0.30	0.89
P-22	499.00	12	Ductile Iron	130.0	285.79	1,640.09	1,639.97	0.25	0.81
P-23	175.00	8	Ductile Iron	130.0	55.28	1,639.97	1,639.95	0.09	0.35
P-24	389.00	8	Ductile Iron	130.0	40.28	1,639.95	1,639.93	0.05	0.26
P-25	316.00	8	Ductile Iron	130.0	12.19	1,639.93	1,639.93	0.01	0.08
P-26	150.00	8	Ductile Iron	130.0	-23.74	1,639.93	1,639.93	0.02	0.15
P-27	150.00	12	Ductile Iron	130.0	137.48	1,639.97	1,639.96	0.07	0.39
P-28	67.00	12	Ductile Iron	130.0	132.48	1,639.96	1,639.95	0.06	0.38
P-29	350.00	12	Ductile Iron	130.0	127.48	1,639.95	1,639.93	0.06	0.36
P-33	400.00	12	Ductile Iron	130.0	-66.12	1,639.93	1,639.94	0.02	0.19
P-34	105.00	12	Ductile Iron	130.0	-71.12	1,639.94	1,639.94	0.02	0.20
P-35	65.00	12	Ductile Iron	130.0	-76.12	1,639.94	1,639.94	0.02	0.22
P-36	110.00	8	Ductile Iron	130.0	-101.21	1,640.12	1,640.15	0.27	0.65
P-37	210.00	12	Ductile Iron	130.0	-191.14	1,640.36	1,640.39	0.12	0.54
P-38	111.00	8	Ductile Iron	130.0	-87.44	1,640.29	1,640.31	0.20	0.56
P-39	95.00	12	Ductile Iron	130.0	-111.70	1,640.21	1,640.22	0.04	0.32
P-40	155.00	12	Ductile Iron	130.0	-160.00	1,640.17	1,640.18	0.09	0.45
P-41	720.00	8	Asbestos Ce	140.0	-101.21	1,640.15	1,640.31	0.23	0.65
P-42	230.00	8	Asbestos Ce	140.0	-188.64	1,640.31	1,640.48	0.73	1.20
P-43	345.00	12	Asbestos Ce	140.0	-188.64	1,640.48	1,640.52	0.10	0.54
P-44	850.00	12	Asbestos Ce	140.0	271.70	1,640.39	1,640.22	0.20	0.77
P-45	490.00	12	Asbestos Ce	140.0	160.00	1,640.22	1,640.18	0.07	0.45
P-46	85.00	12	Ductile Iron	130.0	63.67	1,639.93	1,639.93	0.02	0.18
P-47	120.00	12	Asbestos Ce	140.0	-188.64	1,640.52	1,640.53	0.10	0.54
P-48	196.00	12	Ductile Iron	130.0	-93.03	1,639.96	1,639.97	0.03	0.26
P-49	187.00	12	Ductile Iron	130.0	-56.57	1,639.94	1,639.94	0.01	0.16
P-50	85.00	12	Ductile Iron	130.0	27.49	1,639.93	1,639.93	2.87e-3	0.08
P-51	432.00	12	Ductile Iron	130.0	-10.11	1,639.93	1,639.93	2.83e-4	0.03
P-52	375.00	12	Ductile Iron	130.0	26.07	1,639.93	1,639.93	3.26e-3	0.07
P-54	265.00	12	Asbestos Ce	140.0	462.84	1,640.53	1,640.39	0.53	1.31
P-56	405.00	12	Ductile Iron	130.0	84.86	1,639.96	1,639.95	0.03	0.24

Scenario: Average Day Demand
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen- Williams C	Discharge (gpm)	U.S. H.G. (ft)	D.S. H. G. (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-57	405.00	12	Ductile Iron	130.0	64.74	1,639.95	1,639.94	0.02	0.18
P-58	45.00	3	Copper	135.0	15.04	1,639.93	1,639.75	4.08	0.68
P-59	45.00	3	Copper	135.0	15.04	1,639.93	1,639.75	4.08	0.68

APPENDIX C

MODEL 2 – MAXIMUM DAY DEMAND

Scenario Summary Report

Scenario: Max Day Demand

Scenario Summary			
Physical Alternative	Base-Physical		
Demand Alternative	Demand-Max Day Demand		
Initial Settings Alternative	Base-Initial Settings		
Operational Alternative	Base-Operational		
Age Alternative	Base-Age Alternative		
Constituent Alternative	Base-Constituent		
Trace Alternative	Base-Trace Alternative		
Fire Flow Alternative	Base-Fire Flow		
Cost Alternative	Base-Cost		
User Data Alternative	Base-User Data		
Hydraulic Analysis Summary			
Analysis	Steady State		
Friction Method	Hazen-Williams Formula		
Accuracy	0.001000		
Trials	40		
Quality Analysis Summary			
Analysis	Constituent	Maximum Pipe Segments	100
Quality Time Step	N/A hr	Minimum Pipe Travel Time	0.10 hr
Calibration			
Demand Operation	Multiply	Roughness Operation	<None>
Demand	1.00	Roughness	0.00

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Scenario: Max Day Demand
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Steady State Hydraulic Summary

Iteration Summary

Balanced Trials = 5, Accuracy = 0.000084

Flow Summary

Flow Supplied 1,302.96 gpm

Flow Demanded 1,302.96 gpm

Flow Stored 0.00 gpm

Boundary Summary

R-1 (El 1495.0' Reservoir: Emptying

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Message Summaries
=====

(no messages)

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Scenario: Max Day Demand
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Zone	Inflow (gpm)	Calculated Hydraulic Grade (ft)
R-1 (EI 1495.0')	1,631.29	ZONE 3W	-1,302.96	1,631.29

Scenario: Max Day Demand
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Demand (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated H. G. (ft)	Pressure (psi)
J-1	1,504.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,629.81	54.40
J-2	1,502.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,629.79	55.05
J-3	1,501.50	ZONE 3W	Demand	92.20	Fixed	92.20	1,629.42	55.32
J-4	1,501.50	ZONE 3W	Demand	83.10	Fixed	83.10	1,629.19	55.22
J-5	1,501.50	ZONE 3W	Demand	77.92	Fixed	77.92	1,629.14	55.19
J-6	1,502.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,629.14	54.76
J-7	1,506.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,629.16	53.04
J-8	1,506.00	ZONE 3W	Demand	27.38	Fixed	27.38	1,629.19	53.27
J-9	1,505.50	ZONE 3W	Demand	6.26	Fixed	6.26	1,629.28	53.53
J-10	1,506.00	ZONE 3W	Demand	11.12	Fixed	11.12	1,629.33	53.33
J-11	1,505.50	ZONE 3W	Demand	11.12	Fixed	11.12	1,629.51	53.62
J-12	1,504.50	ZONE 3W	Demand	11.12	Fixed	11.12	1,629.78	54.17
J-13	1,501.00	ZONE 3W	Demand	38.10	Fixed	38.10	1,629.94	55.76
J-14	1,498.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,630.43	57.27
J-15	1,497.00	ZONE 3W	Demand	92.20	Fixed	92.20	1,630.45	57.71
J-16	1,495.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,630.69	58.46
J-17	1,506.50	ZONE 3W	Demand	83.10	Fixed	83.10	1,630.59	53.66
J-18	1,493.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,630.15	59.09
J-19	1,494.00	ZONE 3W	Demand	56.18	Fixed	56.18	1,630.09	58.85
J-20	1,491.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,629.99	59.89
J-21	1,493.50	ZONE 3W	Demand	55.00	Fixed	55.00	1,629.71	58.90
J-22	1,498.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,629.26	56.54
J-23	1,495.50	ZONE 3W	Demand	30.00	Fixed	30.00	1,629.20	57.82
J-24	1,496.50	ZONE 3W	Demand	56.18	Fixed	56.18	1,629.13	57.35
J-25	1,499.00	ZONE 3W	Demand	71.86	Fixed	71.86	1,629.13	56.27
J-26	1,499.50	ZONE 3W	Demand	10.00	Fixed	10.00	1,629.22	56.10
J-27	1,499.50	ZONE 3W	Demand	10.00	Fixed	10.00	1,629.21	56.09
J-28	1,500.50	ZONE 3W	Demand	127.62	Fixed	127.62	1,629.13	55.63
J-29	1,499.50	ZONE 3W	Demand	16.34	Fixed	16.34	1,629.23	56.10
J-30	1,504.00	ZONE 3W	Demand	16.34	Fixed	16.34	1,629.17	54.13
J-31	1,506.00	ZONE 3W	Demand	77.26	Fixed	77.26	1,629.13	53.24
J-32	1,506.50	ZONE 3W	Demand	10.00	Fixed	10.00	1,629.15	53.04
J-33	1,506.50	ZONE 3W	Demand	10.00	Fixed	10.00	1,629.16	53.04
J-39	1,501.50	ZONE 3W	Demand	45.12	Fixed	45.12	1,629.13	55.19
J-40	1,495.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,631.12	58.86
J-42	1,506.00	ZONE 3W	Demand	45.12	Fixed	45.12	1,629.12	53.24
J-43	1,506.00	ZONE 3W	Demand	31.92	Fixed	31.92	1,629.13	53.24
J-44	1,494.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,630.78	59.15
J-45	1,498.50	ZONE 3W	Demand	40.24	Fixed	40.24	1,629.19	56.52
J-46	1,546.50	ZONE 3W	Demand	30.08	Fixed	30.08	1,628.41	35.42
J-47	1,551.00	ZONE 3W	Demand	30.08	Fixed	30.08	1,628.41	33.47
J-101	1,505.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,629.91	54.02
J-102	1,497.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,630.51	57.74
J-103	1,495.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,631.25	58.92
J-104	1,492.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,630.17	59.75
J-105	1,491.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,630.03	59.91

← highest

← lowest

Scenario: Max Day Demand

Steady State Analysis

Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen- Williams C	Discharge (gpm)	U.S. H.G. (ft)	D.S. H.G. (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-1	197.00	8	Ductile Iron	130.0	45.02	1,629.81	1,629.79	0.06	0.29
P-2	268.00	8	Ductile Iron	130.0	249.41	1,629.79	1,629.42	1.41	1.59
P-3	379.00	8	Ductile Iron	130.0	157.21	1,629.42	1,629.19	0.60	1.00
P-4	361.00	8	Ductile Iron	130.0	74.11	1,629.19	1,629.14	0.15	0.47
P-5	337.00	8	Ductile Iron	130.0	-3.81	1,629.14	1,629.14	7.24e-4	0.02
P-6	338.00	8	Ductile Iron	130.0	-51.28	1,629.14	1,629.16	0.08	0.33
P-7	122.00	8	Ductile Iron	130.0	-90.39	1,629.16	1,629.19	0.22	0.58
P-8	270.00	8	Ductile Iron	130.0	-117.77	1,629.19	1,629.28	0.35	0.75
P-9	127.00	8	Ductile Iron	130.0	-124.03	1,629.28	1,629.33	0.39	0.79
P-10	383.00	8	Ductile Iron	130.0	-135.15	1,629.33	1,629.51	0.45	0.86
P-11	519.00	8	Ductile Iron	130.0	-146.27	1,629.51	1,629.78	0.52	0.93
P-12	47.00	8	Ductile Iron	130.0	-157.39	1,629.78	1,629.81	0.60	1.00
P-13	154.00	8	Ductile Iron	130.0	-204.40	1,629.79	1,629.94	0.97	1.30
P-14	364.00	8	Ductile Iron	130.0	-242.50	1,629.94	1,630.43	1.34	1.55
P-15	168.00	8	Ductile Iron	130.0	-67.62	1,630.43	1,630.45	0.13	0.43
P-16	382.00	8	Ductile Iron	130.0	-159.82	1,630.45	1,630.69	0.62	1.02
P-17	89.00	8	Ductile Iron	130.0	222.46	1,630.69	1,630.59	1.14	1.42
P-18	907.00	8	Ductile Iron	130.0	139.36	1,630.59	1,630.15	0.48	0.89
P-19	157.00	12	Ductile Iron	130.0	362.76	1,630.15	1,630.09	0.39	1.03
P-20	363.00	12	Ductile Iron	130.0	306.58	1,630.09	1,629.99	0.29	0.87
P-21	260.00	12	Ductile Iron	130.0	626.57	1,629.99	1,629.71	1.07	1.78
P-22	499.00	12	Ductile Iron	130.0	571.57	1,629.71	1,629.26	0.91	1.62
P-23	175.00	8	Ductile Iron	130.0	110.56	1,629.26	1,629.20	0.31	0.71
P-24	389.00	8	Ductile Iron	130.0	80.56	1,629.20	1,629.13	0.17	0.51
P-25	316.00	8	Ductile Iron	130.0	24.38	1,629.13	1,629.13	0.02	0.16
P-26	150.00	8	Ductile Iron	130.0	-47.48	1,629.13	1,629.14	0.07	0.30
P-27	150.00	12	Ductile Iron	130.0	274.96	1,629.26	1,629.22	0.23	0.78
P-28	67.00	12	Ductile Iron	130.0	264.96	1,629.22	1,629.21	0.22	0.75
P-29	350.00	12	Ductile Iron	130.0	254.96	1,629.21	1,629.13	0.20	0.72
P-33	400.00	12	Ductile Iron	130.0	-132.24	1,629.13	1,629.15	0.06	0.38
P-34	105.00	12	Ductile Iron	130.0	-142.24	1,629.15	1,629.16	0.07	0.40
P-35	65.00	12	Ductile Iron	130.0	-152.24	1,629.16	1,629.16	0.08	0.43
P-36	110.00	8	Ductile Iron	130.0	-202.41	1,629.81	1,629.91	0.96	1.29
P-37	210.00	12	Ductile Iron	130.0	-382.28	1,630.69	1,630.78	0.43	1.08
P-38	111.00	8	Ductile Iron	130.0	-174.88	1,630.43	1,630.51	0.73	1.12
P-39	95.00	12	Ductile Iron	130.0	-223.40	1,630.15	1,630.17	0.16	0.63
P-40	155.00	12	Ductile Iron	130.0	-319.99	1,629.99	1,630.03	0.31	0.91
P-41	720.00	8	Asbestos Ce	140.0	-202.41	1,629.91	1,630.51	0.83	1.29
P-42	230.00	8	Asbestos Ce	140.0	-377.29	1,630.51	1,631.12	2.64	2.41
P-43	345.00	12	Asbestos Ce	140.0	-377.29	1,631.12	1,631.25	0.37	1.07
P-44	850.00	12	Asbestos Ce	140.0	543.40	1,630.78	1,630.17	0.72	1.54
P-45	490.00	12	Asbestos Ce	140.0	319.99	1,630.17	1,630.03	0.27	0.91
P-46	85.00	12	Ductile Iron	130.0	127.34	1,629.13	1,629.13	0.06	0.36
P-47	120.00	12	Asbestos Ce	140.0	-377.29	1,631.25	1,631.29	0.37	1.07
P-48	196.00	12	Ductile Iron	130.0	-186.05	1,629.23	1,629.26	0.11	0.53
P-49	187.00	12	Ductile Iron	130.0	-113.13	1,629.16	1,629.17	0.05	0.32
P-50	85.00	12	Ductile Iron	130.0	54.98	1,629.13	1,629.12	0.01	0.16
P-51	432.00	12	Ductile Iron	130.0	-20.22	1,629.12	1,629.13	1.98e-3	0.06
P-52	375.00	12	Ductile Iron	130.0	52.14	1,629.13	1,629.13	0.01	0.15
P-54	265.00	12	Asbestos Ce	140.0	925.67	1,631.29	1,630.78	1.93	2.63
P-56	405.00	12	Ductile Iron	130.0	169.71	1,629.23	1,629.19	0.10	0.48

Scenario: Max Day Demand
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen- Williams C	Discharge (gpm)	U.S. H.G. (ft)	D.S. H. G. (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-57	405.00	12	Ductile Iron	130.0	129.47	1,629.19	1,629.17	0.06	0.37
P-58	45.00	3	Copper	135.0	30.08	1,629.13	1,628.41	15.97	1.37
P-59	45.00	3	Copper	135.0	30.08	1,629.12	1,628.41	15.97	1.37

APPENDIX D

MODEL 3 – PEAK HOUR DEMAND

* peak hour demand for restaurants varies greatly
1.0 gpd/sf is acceptable but recommend you
increase PP (depending upon type of facility) from
4 to 6 instead of 3.5.

Scenario Summary Report

Scenario: Peak Hour Demand

Scenario Summary			
Physical Alternative	Base-Physical		
Demand Alternative	Demand-Peak Hour Demand		
Initial Settings Alternative	Base-Initial Settings		
Operational Alternative	Base-Operational		
Age Alternative	Base-Age Alternative		
Constituent Alternative	Base-Constituent		
Trace Alternative	Base-Trace Alternative		
Fire Flow Alternative	Base-Fire Flow		
Cost Alternative	Base-Cost		
User Data Alternative	Base-User Data		
Hydraulic Analysis Summary			
Analysis	Steady State		
Friction Method	Hazen-Williams Formula		
Accuracy	0.001000		
Trials	40		
Quality Analysis Summary			
Analysis	Constituent	Maximum Pipe Segments	100
Quality Time Step	N/A hr	Minimum Pipe Travel Time	0.10 hr
Calibration			
Demand Operation	Multiply	Roughness Operation	<None>
Demand	1.00	Roughness	0.00

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Scenario: Peak Hour Demand
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Steady State Hydraulic Summary

Iteration Summary

Balanced Trials = 5, Accuracy = 0.000027

Flow Summary

Flow Supplied 2,280.18 gpm

Flow Demanded 2,280.18 gpm

Flow Stored 0.00 gpm

Boundary Summary

R-1 (El 1495.0' Reservoir: Emptying

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Message Summaries
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(no messages)
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Completed: 11/09/2001 02:05:30 PM
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Scenario: Peak Hour Demand
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Zone	Inflow (gpm)	Calculated Hydraulic Grade (ft)
R-1 (El 1495.0')	1,608.19	ZONE 3W	-2,280.18	1,608.19

Scenario: Peak Hour Demand
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Demand (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated H. G. (ft)	Pressure (psi)
J-1	1,504.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,604.01	43.25
J-2	1,502.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,603.98	43.88
J-3	1,501.50	ZONE 3W	Demand	161.35	Fixed	161.35	1,602.92	43.86
J-4	1,501.50	ZONE 3W	Demand	145.42	Fixed	145.43	1,602.28	43.58
J-5	1,501.50	ZONE 3W	Demand	136.36	Fixed	136.36	1,602.12	43.51
J-6	1,502.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,602.13	43.08
J-7	1,506.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,602.20	41.38
J-8	1,506.00	ZONE 3W	Demand	47.92	Fixed	47.92	1,602.27	41.63
J-9	1,505.50	ZONE 3W	Demand	10.96	Fixed	10.95	1,602.54	41.96
J-10	1,506.00	ZONE 3W	Demand	19.46	Fixed	19.46	1,602.68	41.81
J-11	1,505.50	ZONE 3W	Demand	19.46	Fixed	19.46	1,603.17	42.23
J-12	1,504.50	ZONE 3W	Demand	19.46	Fixed	19.46	1,603.93	43.00
J-13	1,501.00	ZONE 3W	Demand	66.67	Fixed	66.68	1,604.40	44.71
J-14	1,498.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,605.77	46.60
J-15	1,497.00	ZONE 3W	Demand	161.35	Fixed	161.35	1,605.83	47.06
J-16	1,495.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,606.50	48.00
J-17	1,506.50	ZONE 3W	Demand	145.42	Fixed	145.43	1,606.21	43.12
J-18	1,493.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,604.99	48.21
J-19	1,494.00	ZONE 3W	Demand	98.32	Fixed	98.32	1,604.81	47.92
J-20	1,491.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,604.52	48.87
J-21	1,493.50	ZONE 3W	Demand	96.25	Fixed	96.25	1,603.73	47.67
J-22	1,498.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,602.46	44.96
J-23	1,495.50	ZONE 3W	Demand	52.50	Fixed	52.50	1,602.31	46.19
J-24	1,496.50	ZONE 3W	Demand	98.32	Fixed	98.32	1,602.11	45.67
J-25	1,499.00	ZONE 3W	Demand	125.75	Fixed	125.75	1,602.10	44.58
J-26	1,499.50	ZONE 3W	Demand	17.50	Fixed	17.50	1,602.36	44.48
J-27	1,499.50	ZONE 3W	Demand	17.50	Fixed	17.50	1,602.32	44.46
J-28	1,500.50	ZONE 3W	Demand	223.34	Fixed	223.34	1,602.12	43.94
J-29	1,499.50	ZONE 3W	Demand	28.59	Fixed	28.59	1,602.40	44.50
J-30	1,504.00	ZONE 3W	Demand	28.59	Fixed	28.59	1,602.22	42.47
J-31	1,506.00	ZONE 3W	Demand	135.21	Fixed	135.21	1,602.09	41.55
J-32	1,506.50	ZONE 3W	Demand	17.50	Fixed	17.50	1,602.16	41.37
J-33	1,506.50	ZONE 3W	Demand	17.50	Fixed	17.50	1,602.18	41.38
J-39	1,501.50	ZONE 3W	Demand	78.96	Fixed	78.96	1,602.11	43.51
J-40	1,495.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,607.71	48.74
J-42	1,506.00	ZONE 3W	Demand	78.96	Fixed	78.96	1,602.09	41.55
J-43	1,506.00	ZONE 3W	Demand	55.86	Fixed	55.86	1,602.09	41.55
J-44	1,494.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,606.75	48.76
J-45	1,498.50	ZONE 3W	Demand	70.42	Fixed	70.42	1,602.29	44.88
J-46	1,546.50	ZONE 3W	Demand	52.64	Fixed	52.64	1,599.94	23.11
J-47	1,551.00	ZONE 3W	Demand	52.64	Fixed	52.64	1,599.92	21.16
J-101	1,505.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,604.31	42.94
J-102	1,497.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,606.00	47.14
J-103	1,495.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,608.07	48.89
J-104	1,492.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,605.03	48.88
J-105	1,491.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,604.66	48.93

← highest

← lowest

Scenario: Peak Hour Demand
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen- Williams C	Discharge (gpm)	U.S. H.G. (ft)	D.S. H. G. (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-1	197.00	8	Ductile Iron	130.0	78.78	1,604.01	1,603.98	0.17	0.50
P-2	268.00	8	Ductile Iron	130.0	436.47	1,603.98	1,602.92	3.97	2.79
P-3	379.00	8	Ductile Iron	130.0	275.12	1,602.92	1,602.28	1.69	1.76
P-4	361.00	8	Ductile Iron	130.0	129.70	1,602.28	1,602.12	0.42	0.83
P-5	337.00	8	Ductile Iron	130.0	-6.66	1,602.12	1,602.13	1.81e-3	0.04
P-6	338.00	8	Ductile Iron	130.0	-89.75	1,602.13	1,602.20	0.21	0.57
P-7	122.00	8	Ductile Iron	130.0	-158.19	1,602.20	1,602.27	0.61	1.01
P-8	270.00	8	Ductile Iron	130.0	-206.11	1,602.27	1,602.54	0.99	1.32
P-9	127.00	8	Ductile Iron	130.0	-217.06	1,602.54	1,602.68	1.09	1.39
P-10	383.00	8	Ductile Iron	130.0	-236.52	1,602.68	1,603.17	1.28	1.51
P-11	519.00	8	Ductile Iron	130.0	-255.98	1,603.17	1,603.93	1.48	1.63
P-12	47.00	8	Ductile Iron	130.0	-275.44	1,603.93	1,604.01	1.69	1.76
P-13	154.00	8	Ductile Iron	130.0	-357.69	1,603.98	1,604.40	2.74	2.28
P-14	364.00	8	Ductile Iron	130.0	-424.37	1,604.40	1,605.77	3.76	2.71
P-15	168.00	8	Ductile Iron	130.0	-118.34	1,605.77	1,605.83	0.35	0.76
P-16	382.00	8	Ductile Iron	130.0	-279.69	1,605.83	1,606.50	1.74	1.79
P-17	89.00	8	Ductile Iron	130.0	389.30	1,606.50	1,606.21	3.21	2.48
P-18	907.00	8	Ductile Iron	130.0	243.87	1,606.21	1,604.99	1.35	1.56
P-19	157.00	12	Ductile Iron	130.0	634.83	1,604.99	1,604.81	1.10	1.80
P-20	363.00	12	Ductile Iron	130.0	536.51	1,604.81	1,604.52	0.81	1.52
P-21	260.00	12	Ductile Iron	130.0	1,096.50	1,604.52	1,603.73	3.03	3.11
P-22	499.00	12	Ductile Iron	130.0	1,000.25	1,603.73	1,602.46	2.55	2.84
P-23	175.00	8	Ductile Iron	130.0	193.48	1,602.46	1,602.31	0.88	1.23
P-24	389.00	8	Ductile Iron	130.0	140.98	1,602.31	1,602.11	0.49	0.90
P-25	316.00	8	Ductile Iron	130.0	42.67	1,602.11	1,602.10	0.05	0.27
P-26	150.00	8	Ductile Iron	130.0	-83.09	1,602.10	1,602.13	0.18	0.53
P-27	150.00	12	Ductile Iron	130.0	481.17	1,602.46	1,602.36	0.66	1.36
P-28	67.00	12	Ductile Iron	130.0	463.67	1,602.36	1,602.32	0.61	1.32
P-29	350.00	12	Ductile Iron	130.0	446.17	1,602.32	1,602.12	0.57	1.27
P-33	400.00	12	Ductile Iron	130.0	-231.43	1,602.09	1,602.16	0.17	0.66
P-34	105.00	12	Ductile Iron	130.0	-248.93	1,602.16	1,602.18	0.20	0.71
P-35	65.00	12	Ductile Iron	130.0	-266.43	1,602.18	1,602.20	0.22	0.76
P-36	110.00	8	Ductile Iron	130.0	-354.22	1,604.01	1,604.31	2.69	2.26
P-37	210.00	12	Ductile Iron	130.0	-668.98	1,606.50	1,606.75	1.21	1.90
P-38	111.00	8	Ductile Iron	130.0	-306.03	1,605.77	1,606.00	2.06	1.95
P-39	95.00	12	Ductile Iron	130.0	-390.95	1,604.99	1,605.03	0.45	1.11
P-40	155.00	12	Ductile Iron	130.0	-559.99	1,604.52	1,604.66	0.87	1.59
P-41	720.00	8	Asbestos Ce	140.0	-354.22	1,604.31	1,606.00	2.35	2.26
P-42	230.00	8	Asbestos Ce	140.0	-660.25	1,606.00	1,607.71	7.44	4.21
P-43	345.00	12	Asbestos Ce	140.0	-660.25	1,607.71	1,608.07	1.03	1.87
P-44	850.00	12	Asbestos Ce	140.0	950.94	1,606.75	1,605.03	2.03	2.70
P-45	490.00	12	Asbestos Ce	140.0	559.99	1,605.03	1,604.66	0.76	1.59
P-46	85.00	12	Ductile Iron	130.0	222.84	1,602.12	1,602.11	0.16	0.63
P-47	120.00	12	Asbestos Ce	140.0	-660.25	1,608.07	1,608.19	1.03	1.87
P-48	196.00	12	Ductile Iron	130.0	-325.59	1,602.40	1,602.46	0.32	0.92
P-49	187.00	12	Ductile Iron	130.0	-197.98	1,602.20	1,602.22	0.13	0.56
P-50	85.00	12	Ductile Iron	130.0	96.22	1,602.09	1,602.09	0.03	0.27
P-51	432.00	12	Ductile Iron	130.0	-35.38	1,602.09	1,602.09	0.01	0.10
P-52	375.00	12	Ductile Iron	130.0	91.24	1,602.11	1,602.09	0.03	0.26
P-54	265.00	12	Asbestos Ce	140.0	1,619.93	1,608.19	1,606.75	5.43	4.60
P-56	405.00	12	Ductile Iron	130.0	297.00	1,602.40	1,602.29	0.27	0.84

Scenario: Peak Hour Demand
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen- Williams C	Discharge (gpm)	U.S. H.G. (ft)	D.S. H. G. (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-57	405.00	12	Ductile Iron	130.0	226.58	1,602.29	1,602.22	0.16	0.64
P-58	45.00	3	Copper	135.0	52.64	1,602.11	1,599.94	48.16	2.39
P-59	45.00	3	Copper	135.0	52.64	1,602.09	1,599.92	48.16	2.39

APPENDIX E

MODEL 4 – MAXIMUM DAY + FIRE FLOW

Add Note on plan —
Prior to Acceptance of system, A Fire hydrant flow test
shall be performed to verify the minimum system pressure
of 30 psi is being ~~met~~ met.

Scenario Summary Report

Scenario: Max Day +1,500 gpm Fire Flow at Jct J43

Scenario Summary			
Physical Alternative	Base-Physical		
Demand Alternative	Demand-Max Day Demand		
Initial Settings Alternative	Base-Initial Settings		
Operational Alternative	Base-Operational		
Age Alternative	Base-Age Alternative		
Constituent Alternative	Base-Constituent		
Trace Alternative	Base-Trace Alternative		
Fire Flow Alternative	Fire Flow-Max Day +1,500 gpm Fire Flow at Jct J45		
Cost Alternative	Base-Cost		
User Data Alternative	Base-User Data		
Hydraulic Analysis Summary			
Analysis	Steady State		
Friction Method	Hazen-Williams Formula		
Accuracy	0.001000		
Trials	40		
Quality Analysis Summary			
Analysis	Constituent	Maximum Pipe Segments	100
Quality Time Step	N/A hr	Minimum Pipe Travel Time	0.10 hr
Calibration			
Demand Operation	Multiply	Roughness Operation	<None>
Demand	1.00	Roughness	0.00

Created: 11/09/01 03:42:07 PM

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Scenario: Max Day +1,500 gpm Fire Flow at Jct J43
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Steady State Hydraulic Summary

Iteration Summary
Balanced Trials = 4, Accuracy = 0.000465

Flow Summary
Flow Supplied 2,802.96 gpm
Flow Demanded 2,802.96 gpm
Flow Stored 0.00 gpm

Boundary Summary
R-1 (El 1495.0' Reservoir: Emptying

=====
Message Summaries
=====

(no messages)

=====
Completed: 11/09/2001 03:45:25 PM
=====

Scenario: Max Day +1,500 gpm Fire Flow at Jct J43

Steady State Analysis

Junction Report

Label	Elevation (ft)	Zone	Type	Demand (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated H. G. (ft)	Pressure (psi)
J-1	1,504.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,585.88	35.41
J-2	1,502.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,585.87	36.05
J-3	1,501.50	ZONE 3W	Demand	92.20	Fixed	92.20	1,584.38	35.84
J-4	1,501.50	ZONE 3W	Demand	83.10	Fixed	83.10	1,582.90	35.20
J-5	1,501.50	ZONE 3W	Demand	77.92	Fixed	77.92	1,581.95	34.79
J-6	1,502.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,581.40	34.12
J-7	1,506.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,581.04	32.23
J-8	1,506.00	ZONE 3W	Demand	27.38	Fixed	27.38	1,581.36	32.59
J-9	1,505.50	ZONE 3W	Demand	6.26	Fixed	6.26	1,582.19	33.16
J-10	1,506.00	ZONE 3W	Demand	11.12	Fixed	11.12	1,582.60	33.12
J-11	1,505.50	ZONE 3W	Demand	11.12	Fixed	11.12	1,583.88	33.89
J-12	1,504.50	ZONE 3W	Demand	11.12	Fixed	11.12	1,585.70	35.11
J-13	1,501.00	ZONE 3W	Demand	38.10	Fixed	38.10	1,586.64	37.03
J-14	1,498.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,588.72	39.23
J-15	1,497.00	ZONE 3W	Demand	92.20	Fixed	92.20	1,588.87	39.73
J-16	1,495.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,589.57	40.68
J-17	1,506.50	ZONE 3W	Demand	83.10	Fixed	83.10	1,589.21	35.77
J-18	1,493.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,586.77	40.33
J-19	1,494.00	ZONE 3W	Demand	56.18	Fixed	56.18	1,586.47	39.99
J-20	1,491.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,585.86	40.81
J-21	1,493.50	ZONE 3W	Demand	55.00	Fixed	55.00	1,584.30	39.27
J-22	1,498.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,581.49	35.89
J-23	1,495.50	ZONE 3W	Demand	30.00	Fixed	30.00	1,581.45	37.17
J-24	1,496.50	ZONE 3W	Demand	56.18	Fixed	56.18	1,581.39	36.71
J-25	1,499.00	ZONE 3W	Demand	71.86	Fixed	71.86	1,581.39	35.63
J-26	1,499.50	ZONE 3W	Demand	10.00	Fixed	10.00	1,581.09	35.28
J-27	1,499.50	ZONE 3W	Demand	10.00	Fixed	10.00	1,580.91	35.20
J-28	1,500.50	ZONE 3W	Demand	127.62	Fixed	127.62	1,579.99	34.37
J-29	1,499.50	ZONE 3W	Demand	16.34	Fixed	16.34	1,581.40	35.42
J-30	1,504.00	ZONE 3W	Demand	16.34	Fixed	16.34	1,581.09	33.34
J-31	1,506.00	ZONE 3W	Demand	77.26	Fixed	77.26	1,579.90	31.96
J-32	1,506.50	ZONE 3W	Demand	10.00	Fixed	10.00	1,580.69	32.08
J-33	1,506.50	ZONE 3W	Demand	10.00	Fixed	10.00	1,580.90	32.17
J-39	1,501.50	ZONE 3W	Demand	45.12	Fixed	45.12	1,579.81	33.86
J-40	1,495.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,591.36	41.67
J-42	1,506.00	ZONE 3W	Demand	45.12	Fixed	45.12	1,579.76	31.90
J-43	1,506.00	ZONE 3W	Demand	1,531.92	Fixed	1,531.92	1,579.16	31.64
J-44	1,494.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,589.86	41.45
J-45	1,498.50	ZONE 3W	Demand	40.24	Fixed	40.24	1,581.23	35.78
J-46	1,546.50	ZONE 3W	Demand	30.08	Fixed	30.08	1,579.09	14.09
J-47	1,551.00	ZONE 3W	Demand	30.08	Fixed	30.08	1,579.04	12.12
J-101	1,505.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,586.34	35.17
J-102	1,497.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,588.99	39.78
J-103	1,495.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,591.85	41.88
J-104	1,492.00	ZONE 3W	Demand	0.00	Fixed	0.00	1,586.83	41.01
J-105	1,491.50	ZONE 3W	Demand	0.00	Fixed	0.00	1,586.12	40.92

← highest (onsite)
← Fire Location
← lowest

Scenario: Max Day +1,500 gpm Fire Flow at Jct J43

Steady State Analysis

Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Discharge (gpm)	U.S. H.G. (ft)	D.S. H.G. (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-1	197.00	8	Ductile Iron	130.0	30.96	1,585.88	1,585.87	0.03	0.20
P-2	268.00	8	Ductile Iron	130.0	524.49	1,585.87	1,584.38	5.57	3.35
P-3	379.00	8	Ductile Iron	130.0	432.29	1,584.38	1,582.90	3.90	2.76
P-4	361.00	8	Ductile Iron	130.0	349.19	1,582.90	1,581.95	2.62	2.23
P-5	337.00	8	Ductile Iron	130.0	271.27	1,581.95	1,581.40	1.64	1.73
P-6	338.00	8	Ductile Iron	130.0	215.98	1,581.40	1,581.04	1.08	1.38
P-7	122.00	8	Ductile Iron	130.0	-353.26	1,581.04	1,581.36	2.68	2.25
P-8	270.00	8	Ductile Iron	130.0	-380.64	1,581.36	1,582.19	3.08	2.43
P-9	127.00	8	Ductile Iron	130.0	-386.90	1,582.19	1,582.60	3.17	2.47
P-10	383.00	8	Ductile Iron	130.0	-398.02	1,582.60	1,583.88	3.34	2.54
P-11	519.00	8	Ductile Iron	130.0	-409.14	1,583.88	1,585.70	3.52	2.61
P-12	47.00	8	Ductile Iron	130.0	-420.26	1,585.70	1,585.88	3.70	2.68
P-13	154.00	8	Ductile Iron	130.0	-493.53	1,585.87	1,586.64	4.98	3.15
P-14	364.00	8	Ductile Iron	130.0	-531.63	1,586.64	1,588.72	5.71	3.39
P-15	168.00	8	Ductile Iron	130.0	-195.58	1,588.72	1,588.87	0.90	1.25
P-16	382.00	8	Ductile Iron	130.0	-287.78	1,588.87	1,589.57	1.84	1.84
P-17	89.00	8	Ductile Iron	130.0	437.51	1,589.57	1,589.21	3.98	2.79
P-18	907.00	8	Ductile Iron	130.0	354.41	1,589.21	1,586.77	2.70	2.26
P-19	157.00	12	Ductile Iron	130.0	850.97	1,586.77	1,586.47	1.89	2.41
P-20	363.00	12	Ductile Iron	130.0	794.79	1,586.47	1,585.86	1.67	2.25
P-21	260.00	12	Ductile Iron	130.0	1,588.63	1,585.86	1,584.30	6.01	4.51
P-22	499.00	12	Ductile Iron	130.0	1,533.63	1,584.30	1,581.49	5.63	4.35
P-23	175.00	8	Ductile Iron	130.0	102.75	1,581.49	1,581.45	0.27	0.66
P-24	389.00	8	Ductile Iron	130.0	72.75	1,581.45	1,581.39	0.14	0.46
P-25	316.00	8	Ductile Iron	130.0	16.57	1,581.39	1,581.39	0.01	0.11
P-26	150.00	8	Ductile Iron	130.0	-55.29	1,581.39	1,581.40	0.09	0.35
P-27	150.00	12	Ductile Iron	130.0	1,036.09	1,581.49	1,581.09	2.72	2.94
P-28	67.00	12	Ductile Iron	130.0	1,026.09	1,581.09	1,580.91	2.68	2.91
P-29	350.00	12	Ductile Iron	130.0	1,016.09	1,580.91	1,579.99	2.63	2.88
P-33	400.00	12	Ductile Iron	130.0	-871.11	1,579.90	1,580.69	1.98	2.47
P-34	105.00	12	Ductile Iron	130.0	-881.11	1,580.69	1,580.90	2.02	2.50
P-35	65.00	12	Ductile Iron	130.0	-891.11	1,580.90	1,581.04	2.06	2.53
P-36	110.00	8	Ductile Iron	130.0	-451.22	1,585.88	1,586.34	4.22	2.88
P-37	210.00	12	Ductile Iron	130.0	-725.30	1,589.57	1,589.86	1.41	2.06
P-38	111.00	8	Ductile Iron	130.0	-336.04	1,588.72	1,588.99	2.44	2.14
P-39	95.00	12	Ductile Iron	130.0	-496.56	1,586.77	1,586.83	0.70	1.41
P-40	155.00	12	Ductile Iron	130.0	-793.84	1,585.86	1,586.12	1.66	2.25
P-41	720.00	8	Asbestos Ce	140.0	-451.22	1,586.34	1,588.99	3.68	2.88
P-42	230.00	8	Asbestos Ce	140.0	-787.26	1,588.99	1,591.36	10.30	5.02
P-43	345.00	12	Asbestos Ce	140.0	-787.26	1,591.36	1,591.85	1.43	2.23
P-44	850.00	12	Asbestos Ce	140.0	1,290.40	1,589.86	1,586.83	3.57	3.66
P-45	490.00	12	Asbestos Ce	140.0	793.84	1,586.83	1,586.12	1.45	2.25
P-46	85.00	12	Ductile Iron	130.0	888.47	1,579.99	1,579.81	2.05	2.52
P-47	120.00	12	Asbestos Ce	140.0	-787.26	1,591.85	1,592.02	1.43	2.23
P-48	196.00	12	Ductile Iron	130.0	-394.79	1,581.40	1,581.49	0.46	1.12
P-49	187.00	12	Ductile Iron	130.0	-321.87	1,581.04	1,581.09	0.31	0.91
P-50	85.00	12	Ductile Iron	130.0	793.85	1,579.90	1,579.76	1.66	2.25
P-51	432.00	12	Ductile Iron	130.0	718.65	1,579.76	1,579.16	1.38	2.04
P-52	375.00	12	Ductile Iron	130.0	813.27	1,579.81	1,579.16	1.74	2.31
P-54	265.00	12	Asbestos Ce	140.0	2,015.70	1,592.02	1,589.86	8.14	5.72
P-56	405.00	12	Ductile Iron	130.0	378.45	1,581.40	1,581.23	0.42	1.07

Scenario: Max Day +1,500 gpm Fire Flow at Jct J43
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen- Williams C	Discharge (gpm)	U.S. H.G. (ft)	D.S. H. G. (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-57	405.00	12	Ductile Iron	130.0	338.21	1,581.23	1,581.09	0.34	0.96
P-58	45.00	3	Copper	135.0	30.08	1,579.81	1,579.09	15.98	1.37
P-59	45.00	3	Copper	135.0	30.08	1,579.76	1,579.04	15.98	1.37

Scenario: Max Day +1,500 gpm Fire Flow at Jct J43
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Zone	Inflow (gpm)	Calculated Hydraulic Grade (ft)
R-1 (El 1495.0')	1,592.02	ZONE 3W	-2,802.96	1,592.02

APPENDIX F

MISCELLANEOUS

PROJECT The Promenade
 SUBJECT Water System Analysis
 CLIENT PROJECT NUMBER _____ CMX PROJECT NUMBER _____
 SHEET _____ OF _____ BY SID DATE 12/23/98

CMX Group Inc.
 1515 East Missouri
 Suite 115
 Phoenix, AZ 85014
 ☎ 602.279.8436
 FAX 602.265.1191



Calculated Minor Loss Coefficient (Km) For Flow Through Water meter

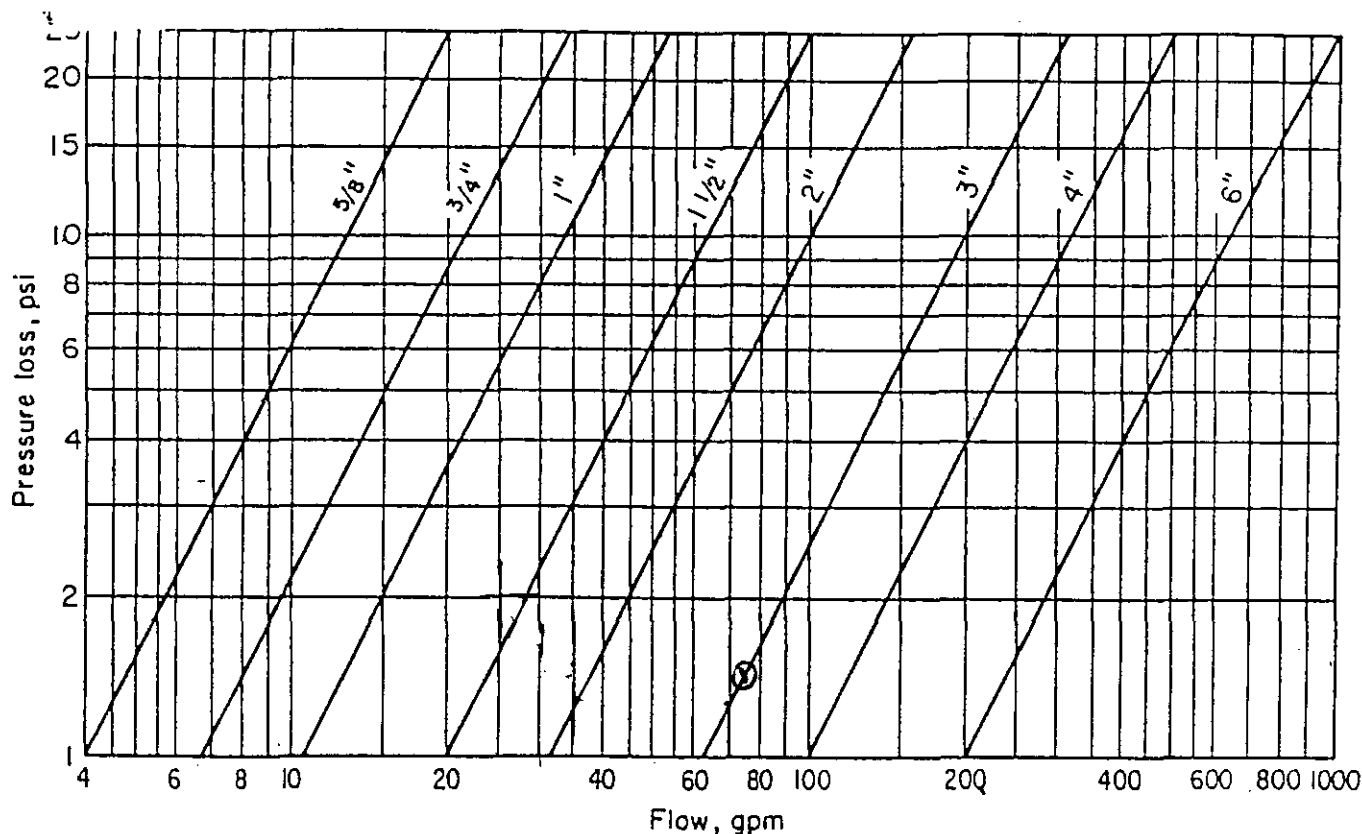


FIG. 6. Pressure loss in flow through meters.

From Piping Handbook, Crocker & King, 5th Ed., 1967,

1. Assume Max Flow = 75 GPM for Sprinkler demand or Domestic Demand.
2. Assume 3" Service Line.

$$V = Q/A = (75/448.8) / (\pi d^2/4) = \frac{4 \times 75 / 448.8}{\pi (3/12)^2} = 3.40 \text{ FPS}$$

$$H_V = V^2/2g = 0.18$$

$$\text{From FIG 6, @ 75 GPM, } P = 1.5 \text{ PSI} = 3.47 \text{ Ft.} = H_m$$

$$H_m = K_m (H_V) ; K_m = H_m / H_V = 19.25 \text{ (Use 20.0)}$$

PROJECT Promenade - Water Demands (Revision to the NW area)
SUBJECT _____
CLIENT PROJECT NUMBER _____ CMX PROJECT NUMBER 5739
SHEET 1 OF 3 BY Kam DATE 11/1/01

CMX Group Inc
1515 East Missouri
Suite 115
Phoenix, AZ 85014
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The design criteria used in the January 13, 1999 "The Promenade Domestic Water Study Report" are applied in the following water demand estimates:

1) Visitor Center (not in the previous study)

Use 0.160 gpd/sf of gross area

Gross area = 9,201 sf

Average Day demand = $9,201 \times 0.160 \text{ gpd} = 1,472 \text{ gpd}$ (or 1.02 gpm)

Maximum Day Demand = $2.0 \times \text{Average Day Demand} = 2 \times 1.02 = 2.04 \text{ gpm}$

Peak Hour Demand = $3.5 \times \text{Average Day Demand} = 3.5 \times 1.02 = 3.57 \text{ gpm}$

2) Restaurant Building 13

Use 40 gpd per seat and 40 square feet per seat or 1.0 gpd/sf

Building area = 13,500 sf

Average Day Demand = $1.0 \times 13,500 \text{ gpd} = 13,500 \text{ gpd}$ (or 9.38 gpm)

Maximum Day Demand = $2.0 \times 9.38 = 18.76 \text{ gpm}$

Peak Hour Demand = $3.5 \times 9.38 = 32.83 \text{ gpm}$

3) Restaurant Building 14

Building area = 8,000 sf

Average Day Demand = $1.0 \times 8,000 = 8,000 \text{ gpd}$ (or 5.56 gpm)

Max. Day Demand = $2.0 \times 5.56 = 11.12 \text{ gpm}$

Peak Hour Demand = $3.5 \times 5.56 = 19.46 \text{ gpm}$

4) Buildings D & G

Total building area for each = 12,000 sf

of which Retail space = 10,400 sf

Restaurant space = 2,400 sf

PROJECT The Promenade - Water Demands (Northwest Portion Only)
SUBJECT _____
CLIENT PROJECT NUMBER _____ CMX PROJECT NUMBER 5739
SHEET 2 OF 3 BY KAM DATE 11/1/01

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1515 East Missouri
Suite 115
Phoenix, AZ 85014
☎ 602.279.8436
FAX 602.265.1191



4) Cont.

Use 40 gpd per seat and 40 square feet per seat or 1.0 gpd/sf for restaurant &

Use 0.90 gpd/sf for Retail

$$\text{Average Day Demand} = 2,400 \times 1.0 + 10,400 \times 0.9 = 11,760 \text{ gpd (or } 8.17 \text{ gpm)}$$

$$\text{Max. Day Demand} = 2.0 \times 8.17 = 16.34 \text{ gpm}$$

$$\text{Peak Hour Demand} = 3.5 \times 8.17 = 28.60 \text{ gpm}$$

5) Buildings E and F

Total building area for each = 15,500 sf

of which Retail space = 10,100 sf

Restaurant space = 5400 sf

$$\text{Average Day Demand} = 5400 \times 1.0 + 10,100 \times 0.9 = 14,490 \text{ gpd (or } 10.06 \text{ gpm)}$$

$$\text{Max. Day Demand} = 2.0 \times 10.06 = 20.12 \text{ gpm}$$

$$\text{Peak Hour Demand} = 3.5 \times 10.06 = 35.21 \text{ gpm}$$

6) Office Buildings A & B

Each 4 story building has 36,100 sf. per floor.

Retail space = 36,100 sf

Office space = $3 \times 36,100 \text{ sf} = 108,300 \text{ sf}$

Use 0.90 gpd/sf for retail

Use 100 sf of gross area per employee & 20 gpd/person for office

$$\text{Average Day Demand} = 36,100 \times 0.90 + 108,300 \times \frac{1}{100} \times 20 = 54,150 \text{ gpd (or } 37.60 \text{ gpm)}$$

$$\text{Max Day Demand} = 2.0 \times 37.60 = 75.20 \text{ gpm}$$

$$\text{Peak Hour Demand} = 3.5 \times 37.60 = 131.60 \text{ gpm}$$

PROJECT The Promenade - Water Demands (Northwest Portion Only)
SUBJECT _____
CLIENT PROJECT NUMBER _____ CMX PROJECT NUMBER 5739
SHEET 3 OF 3 BY Kam DATE 11/1/01

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Total average day demand for the NW. area = $1472 + 13,500 + 8000 + 2 \times 11760$
 $+ 2 \times 14490 + 2 \times 54,150 = 183,772 \text{ (gpd)}$

MEMORANDUM



Note: Design Criteria used in the previous Master Study will over-ride ^{some of} the following assumptions.

DATE: October 16, 2001
 TO: George Swarsted, CMX
 FROM: Jeff Snedden
 SUBJECT: Water and Sewer flow information requested for the Promenade:
 BVA #:201-036

Flows based on the following assumptions:

For offices, 100 square feet of gross area per employee; 20 gallons per person, per day. *20 gpd/sf*

For restaurants, dining area is 75% of total gross building area; 15 square feet per patron; 70 gallons per seat, per day. *4.67 gpd/sf*

For retail, sales area is 75% of total gross building area; .216 gallons per day, per square foot of retail sales area.

For Visitors' Center, .160 gallons per day per square foot of gross area.

Buildings:

Visitors' Center

9,201 s.f. x .160 gallons per day = 1,474 gpd

Restaurant Buildings

(2) buildings, (1) @ 8,000 s.f. and (1) @ 13,500 s.f.

$(8,000 \times .75) / 15 = 400$ persons; 400×70 gallons per day = 28,000 gpd

$(13,500 \times .75) / 15 = 675$ persons; 675×70 gallons per day = 47,250 gpd

File/New/General/Memo Template

Promenade Water and Sewer flow information

Page 2

Retail Buildings D, E, F & G

(4) buildings, (2) @ 12,800 s.f. each and (2) @ 15,500 each; portion of buildings to be restaurants as indicated.

- ✓ Building D: 10,400 sq. ft. of retail space; 2400 sq. ft. of restaurant space
 $(10,400 \times .75) \times .216 = 1,685 \text{ gpd}$
 $(2,400 \times .75) / 15 = 120 \text{ persons}; 120 \times 70 \text{ gallons per day} = 8,400 \text{ gpd}$
 Total flow for Building D: $1,685 + 8,400 = 10,085 \text{ gpd}$ (EACH, D & G)
- ✓ Building E: 10,100 sq. ft. of retail space; 5,400 sq. ft. of restaurant space
 $(10,100 \times .75) \times .216 = 1,636 \text{ gpd}$
 $(5,400 \times .75) / 15 = 270 \text{ persons}; 270 \times 70 \text{ gallons per day} = 18,900 \text{ gpd}$
 Total flow for Building E: $1,636 + 18,900 = 20,536 \text{ gpd}$ (EACH, E & F)
- ~~Building F: 13,100 sq. ft. of retail space; 2400 sq. ft. of restaurant space~~
 ~~$(13,100 \times .75) \times .216 = 2,122 \text{ gpd}$~~
 ~~$(2,400 \times .75) / 15 = 120 \text{ persons}; 120 \times 70 \text{ gallons per day} = 8,400 \text{ gpd}$~~
~~Total flow for Building F: $2,122 + 8,400 = 10,522 \text{ gpd}$~~
- ~~Building G: 7,400 sq. ft. of retail space; 5,400 sq. ft. of restaurant space~~
 ~~$(7,400 \times .75) \times .216 = 1,199 \text{ gpd}$~~
 ~~$(5,400 \times .75) / 15 = 270 \text{ persons}; 270 \times 70 \text{ gallons per day} = 18,900 \text{ gpd}$~~
~~Total flow for Building G: $1,199 + 18,900 = 21,735 \text{ gpd}$~~

Office Buildings

(2) 4 story buildings, 36,100 s.f. per floor; first floor is retail space, upper floors are office space.

First floor: $(36,100 \times .75) \times .216 = 5848 \text{ gpd}$

2nd 3rd & 4th floors: $3 (36,100 / 100) = 1083 \text{ persons} \times 20 \text{ gpd} = 21,660 \text{ gpd}$

$5848 + 21,660 = 27,508 \text{ gpd per building} \times 2 \text{ buildings} = 55,016 \text{ gpd}$

Promenade Water and Sewer flow information

Page 3

Totals

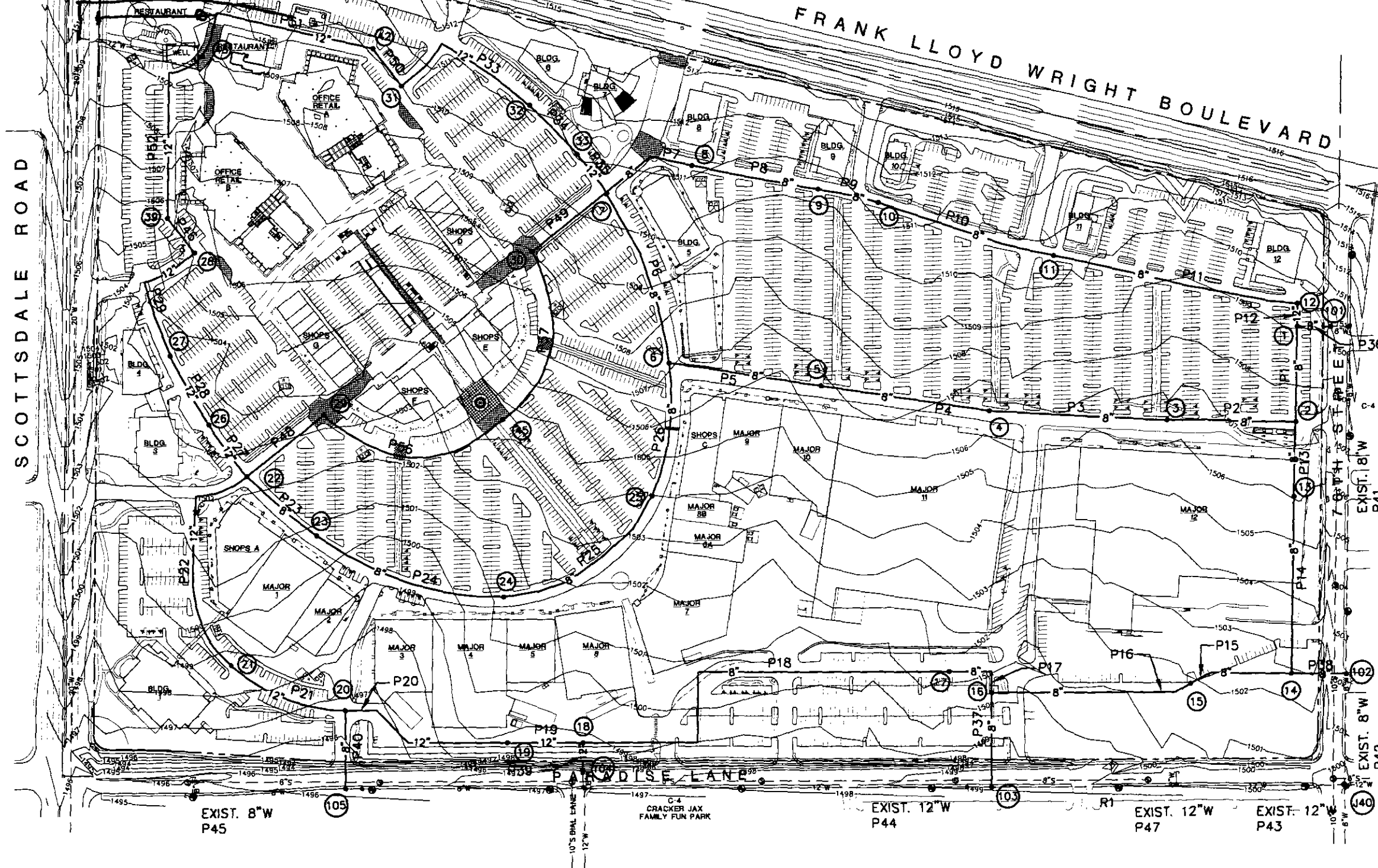
Vistors' Center:	1,474 gpd	
Restaurant Bldg. (8,000 s.f.)	28,000 gpd	
Restaurant Bldg. (13,500 s.f.):	47,250 gpd	
Retail Building D:	10,085 gpd	
Retail Building E:	20,536 gpd	
Retail Building F:	10,522 gpd	20,536
Retail Building G:	21,735 gpd	10,085
Office Building A:	21,660 gpd	27,508
Office Building B:	21,660 gpd	27,508
Total gallons per day:	106,198 gpd	192,982

Total Retail Area: 113,200 s.f.
 Total Office Area: 216,600 s.f.
 Total Restaurant Area: 37,100 s.f.
 VISITORS CENTER: 9201 s.f.

MASTER WATER PLAN NOTES:

1. ON-SITE PUBLIC WATER WILL BE LOCATED WITHIN A 12 FOOT WIDE WATER LINE EASEMENT.
2. MINIMUM HORIZONTAL SEPARATION BETWEEN WATER AND SEWER MAINS SHALL BE 10 FEET.
3. WELL SITE TO BE RELOCATED PER CONSTRUCTION DRAWINGS BY BROWN & CALDWELL.

Show new well plumbing in 20' wide easement and in same restat. extend a full stop off internal loop to C.A.P. CANAL property line.



NORTH



N.T.S.

LEGEND:

- PROPOSED WATERLINE
- ⑪ JUNCTION NODE NUMBER
- P3 PIPE NUMBER

The Promenade
Phase II

EXHIBIT "A" WATER PLAN



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