HYDRAULIC CALCULATIONS

ACE FIRE PROTECTION SYSTEMS, INC.
23220 Maple Valley Hwy. SE
Suite 3-D
Maple Valley, WA. 98038

Date 11/07/06
Job: PETRIERE

Job PETRIE RESIDENCE
3315 97TH AVE SE, MERCER ISLAND, WA

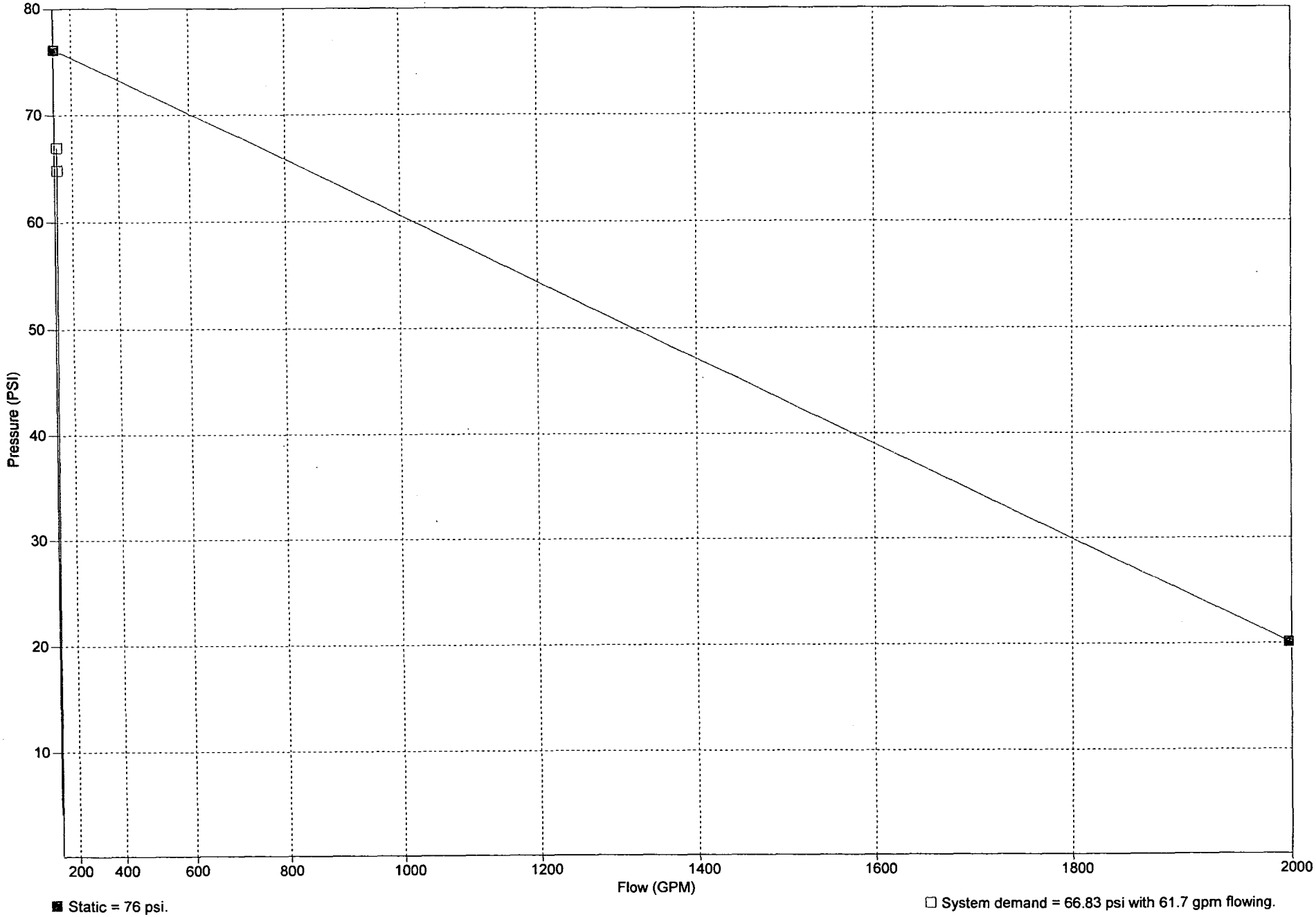
Authority having Jurisdiction	CITY OF MERCER ISLAND
Occupancy	LIGHT/RESIDENTIAL
Density	0.05 gpm/sq.ft.
Coverage per Sprinkler	16 X 16
Number of Sprinklers Calculated:	4 heads

System type	Wet
Water Supply	76.00 psi Static, 20.00 psi Residual @ 1997.0 gpm
Demand	64.72 psi @ 61.7 gpm @ B.O.R.
	66.83 psi @ 61.7 gpm @ Supply
	75.91 psi available @ 61.7 gpm
	Demand is below curve by 9.08 psi

Sprinklers _ _ TYCO LFII 1/2" 155 DEG K=4.9 FLAT CONC.

BACKFLOW IS AN AMES MODEL 2000B

Water Availability Curve



■ Static = 76 psi.
■ Residual = 20 psi at a flow of 1997 gpm.

□ System demand = 66.83 psi with 61.7 gpm flowing.

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Raw data previous to any calculations

No.	Code	Diam	Length	Kfac1	Kfac2	Press	Elev	Hose	HW	Vel	Fittings
1	DR1	1.109	0.5	4.9		7.00	-0.50	0.0	150		321PE
3	BL1	1.109	6.8	DR1		0.00	0.00	0.0	150		323PE,1PTR
4	BL1	1.109	7.3	DR1		0.00	0.00	0.0	150		322PTR
5	BL1	1.109	16.2	DR1		0.00	0.00	0.0	150		322PE,2PTR
6	BL1	1.400	25.9	DR1		0.00	0.00	0.0	150		321PTR,1PT
8	CM	1.400	37.0	BL1		0.00	0.00	0.0	150		324PT,6PTR
10	BU	1.602	57.6	CM		0.00	20.00	0.0	150		326PT,4PE,5PTR
12	RI	1.650	10.0	BU	-3.5	0.00	8.00	0.0	120		321BKF,2E
14	UG	1.739	120.0	RI	-2	0.00	-17.00	0.0	150		321MTR,2E

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Pipe No	Flow (gpm)	Dia (inch)	Fitting and Dev	Length (ft)	Fr Loss (psi/ft)	Press (psi)	Hyd Ref	Vel (fps)	Notes
Drop 1									C = 150
=======				A 0.5		PT 7.00	1		
	13.0=4.90(7.00)^.5			F 7.0		PE -0.22			(EL= -0.50 ft)
1	13.0	1.11	1PE	T 7.5	0.02945	PF 0.22		4.31	
						PT 7.00	3		Bl Jct
	K-factor for drop 1 = 13.0/(7.00)^.5 = 4.91								
	at Hyd Ref Pts 3 4 5 6								
Branchline No. 1									C = 150
==========				A 6.8		PT 7.00	3		DR1
	13.0=4.91(7.00)^.5			F 22.0		PE 0.00			
3	13.0	1.11	3PE 1PTR	T 28.8	0.02960	PF 0.85		4.32	
				A 7.3		PT 7.86	4		DR1
	13.8=4.91(7.86)^.5			F 2.0		PE 0.00			
4	26.8	1.11	2PTR	T 9.3	0.11263	PF 1.05		8.89	
				A 16.2		PT 8.90	5		DR1
	14.7=4.91(8.90)^.5			F 16.0		PE 0.00			
5	41.4	1.11	2PE 2PTR	T 32.2	0.25263	PF 8.13		13.76	
				A 25.9		PT 17.04	6		DR1
	20.3=4.91(17.04)^.5			F 7.0		PE 0.00			
6	61.7	1.40	1PTR 1PT	T 32.9	0.16973	PF 5.58		12.86	
						PT 22.62	8		Cross main Jct
	K-factor for branchline no. 1 = 61.7/(22.62)^.5 = 12.97								
Cross main									C = 150
==========				A 37.0		PT 22.62	8		BL1
	61.7=12.97(22.62)^.5			F 30.0		PE 0.00			
8	61.7	1.40	4PT 6PTR	T 67.0	0.16973	PF 11.37		12.86	
						PT 33.99	10		Bulk Jct
	K-factor for Cross main = 61.7/(33.99)^.5 = 10.58								
Bulk									C = 150
====				A 57.6		PT 33.99	10		CM
	61.7=10.58(33.99)^.5			F 89.0		PE 8.66			(EL= 20.00 ft)
10	61.7	1.60	6PT 4PE 5PTR	T 146.6	0.08804	PF 12.91		9.82	
						PT 55.56	12		
	K-factor for Bulk = 61.7/(55.56)^.5 = 8.28								

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Pipe No	Flow (gpm)	Dia (inch)	Fitting and Dev	Length (ft)	Fr Loss (psi/ft)		Press (psi)	Hyd Ref	Vel (fps)	Notes
Riser										C = 120
=====				A 10.0		PT	55.56	12		Top of Riser
				F 9.0		PE	3.46			(EL= 8.00 ft)
12	61.7	1.65	1BKF 2E	T 19.0	0.11522	PF	5.69		9.26	1BKF = 3.50#
						PT	64.72	14		B.O.R.
Under ground										C = 150
==========				A 120.0		PT	64.72	14		B.O.R.
				F 6.5		PE	-7.36			(EL=-17.00 ft)
14	61.7	1.74	1MTR 2E	T 126.5	0.05904	PF	9.47		8.33	1MTR = 2.00#
						PT	66.82	15		Supply Jct

K-factor for Riser = 61.7/(64.72)^.5 = 7.67

Available flow at 66.82 psi is 751.4 gpm which is 689.7 gpm from curve.

Supply pressure available with 61.7 gpm flowing is 75.91 psi,

thus system requirement is 9.08 psi below supply curve. (12.0%)