WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE PROTECTION SPRINKLER SYSTEMS

Andrew J. Prokash
6245-0815-A Level 1
Gary Prokash Plumbing and Fire Sprinkle
GARYPP115K5

Signature Date Expires 12/31/16

A-PEX DESIGN SERVICES INC.

A-PEX Design Services, Inc.-EP
10731 47th Place West
Mukilteo, WA 98275
425-493-9680
sales@a-pexdesignservices.com

Job Name	:	MARKET STREET LOT A - One Head Calculation (H.8)
Drawing	:	
Location	:	1932 MARKET ST KIRKLAND WA 98033
Remote Area	:	
Contract	:	151230-02
Data File	:	151230-02 Market Street Lot A.wx1

HYDRAULIC DESIGN INFORMATION SHEET

Name - MARKET STREET LOT A Date - 12-30-2015
Location - KIRKLAND WA 98033
Building - System No. -
Contractor - GARY PROKASH PLUMBING Contract No. - 151230-02
Calculated By - KAREN BABB Drawing No. -
Construction: (X) Combustible ( ) Non-Combustible Ceiling Height
OCCUPANCY - RESIDENTIAL

S Type of Calculation: ( )NFPA 13 Residential ( )NFPA 13R (X)NFPA 13D
Y Number of Sprinklers Flowing: (X)1 ( )2 ( )4 ( )
S ( )Other
T ( )Specific Ruling Made by Date
E
M Listed Flow at Start Point - 17 Gpm System Type
Listed Pres. at Start Point - 12.03Psi (X) Wet ( ) Dry
D MAXIMUM LISTED SPACING 18 x 18 ( ) Deluge ( ) PreAction
E Domestic Flow Added - 0 Gpm Sprinkler or Nozzle
S Additional Flow Added - Gpm Make RELIABLE Model LL-RFC49
I Elevation at Highest Outlet - 124 Feet Size 3/8 K-Factor 4.9
G Note: Temperature Rating 155
N

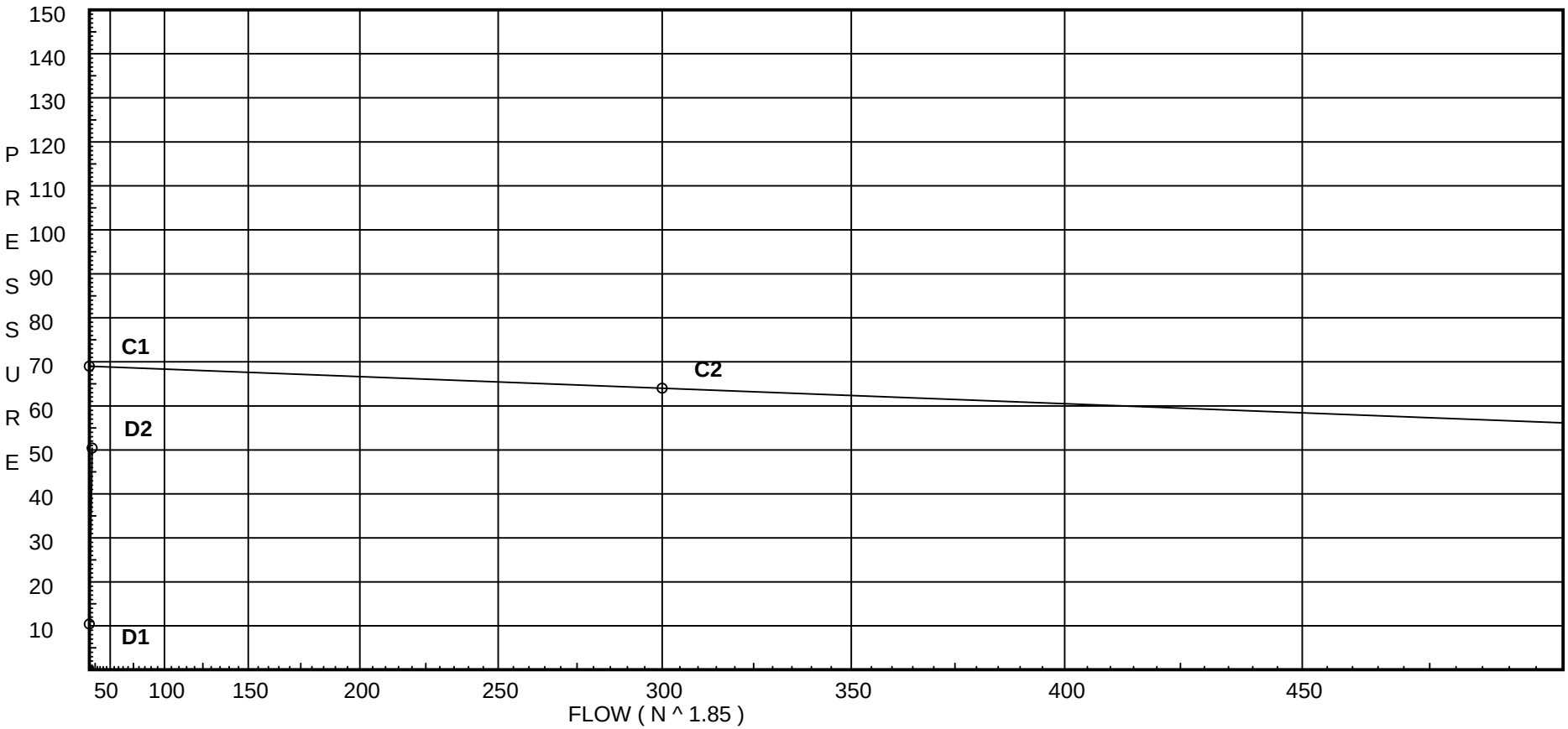
Calculation Gpm Required 17 Psi Required 50.41 At Ref Pt STR
Summary C-Factor Used: Overhead 150 Underground 150

W Water Flow Test: Pump Data: Tank or Reservoir:
A Date of Test - Rated Cap. Cap.
T Time of Test - @ Psi Elev.
E Static (Psi) - 69 Elev.
R Residual (Psi) - 64 Other Well
Flow (Gpm) - 300 Proof Flow Gpm
S Elevation - 100

P Location:
P
L Source of Information:
Y

City Water Supply:
- C1 - Static Pressure : 69
- C2 - Residual Pressure: 64
- C2 - Residual Flow : 300

Demand:
- D1 - Elevation : 10.394
- D2 - System Flow : 16.995
- D2 - System Pressure : 50.410
- Hose (Demand) : _____
- D3 - System Demand : 16.995
- Safety Margin : 18.565



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
C	Roll Groove Coupling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
E	90' Standard Elbow	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
G	Generic Gate Valve	1	1	1	1	1	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
T	90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Utb *	Aquapex Tee - Branch	2	17	14	9	12	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utr *	Aquapex Tee - Run	1	2	2	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
STR	69.0	64	300.0	68.975	17.0	50.41

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
H.8	124.0	4.9	12.03	17.0	
H.7	124.0		12.91		
T.38	124.0		13.17		
T.40	116.0		17.51		
T.42	108.0		21.51		
T.36	108.0		22.46		
S.1	104.0		25.06		
CPL	100.0		37.64		
MTR	100.0		38.24		
STR	100.0		50.41		
H.1	124.0		12.84		
T.41	124.0		13.28		
T.39	116.0		17.38		
H.10	116.0		17.43		
T.43	116.0		17.44		
T.44	108.0		21.36		
H.12	108.0		21.4		
H.5	108.0		21.59		
T.35	108.0		21.66		
H.6	124.0		13.2		
T.37	124.0		13.23		
H.9	124.0		13.33		
T.46	124.0		13.48		
H.18	124.0		13.52		
T.50	124.0		13.68		
T.45	116.0		17.38		
H.13	116.0		17.42		
H.4	116.0		17.49		
T.34	116.0		17.52		
T.33	116.0		17.52		
H.11	124.0		13.34		
T.48	124.0		13.48		
H.17	124.0		13.51		
H.24	124.0		13.65		
T.58	124.0		13.68		
T.52	116.0		17.31		
T.60	116.0		17.34		
T.62	116.0		17.35		
H.27	116.0		17.38		
H.19	116.0		17.41		
T.47	124.0		13.48		
H.16	124.0		13.48		

NODE ANALYSIS (cont.)

Node Tag	***Elevation***	***Node Type***	***Pressure at Node***	***Discharge at Node***	***Notes***
H.15	124.0		13.48		
H.23	124.0		13.68		
T.56	124.0		13.69		
H.29	124.0		13.7		
T.61	124.0		13.71		
T.59	116.0		17.32		
H.26	116.0		17.35		
T.54	116.0		17.4		
T.57	108.0		21.28		
T.53	108.0		21.34		
H.20	108.0		21.4		
H.32	124.0		13.69		
H.31	124.0		13.7		
H.22	116.0		17.31		
H.30	116.0		17.34		
H.14	116.0		17.38		
T.49	116.0		17.39		
H.21	116.0		17.39		
H.2	116.0		17.42		
H.3	116.0		17.49		
H.25	108.0		21.3		
T.55	108.0		21.34		
H.28	108.0		21.35		
T.51	108.0		21.36		

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
H.8	9.07	0.862	Utr	2.0	15.000	12.030		K Factor = 4.90
to		150.0		0.0	2.000	0.0		
H.7	9.07	0.0519		0.0	17.000	0.883		Vel = 4.99
H.7	0.0	0.862		0.0	5.000	12.913		
to		150.0		0.0	0.0	0.0		
T.38	9.07	0.0518		0.0	5.000	0.259		Vel = 4.99
T.38	-3.59	0.862	2Utb	34.0	15.000	13.172		
to		150.0		0.0	28.000	3.465		
T.40	5.48	0.0204		0.0	43.000	0.877		Vel = 3.01
T.40	-0.48	0.862	Utb	17.0	17.000	17.514		
to		150.0		0.0	14.000	3.465		
T.42	5.0	0.0173		0.0	31.000	0.535		Vel = 2.75
T.42	2.80	0.862	Utr	2.0	8.000	21.514		
to		150.0	Utb	17.0	16.000	0.0		
T.36	7.8	0.0392		0.0	24.000	0.941		Vel = 4.29
T.36	9.20	1.244	T	3.443	28.000	22.455		
to		150.0		0.0	3.443	1.732		
S.1	17.0	0.0278		0.0	31.443	0.873		Vel = 4.49
S.1	0.0	1.244	E	1.721	25.000	25.060		
to		150.0	T	3.443	5.594	11.732		* * Fixed Loss = 10
CPL	17.0	0.0278	G	0.43	30.594	0.851		Vel = 4.49
CPL	0.0	1.629	2E	4.738	75.000	37.643		
to		150.0	C	0.474	5.212	0.0		
MTR	17.0	0.0075		0.0	80.212	0.599		Vel = 2.62
MTR	0.0	1.025	2E	5.4	25.000	38.242		
to		150.0		0.0	5.400	10.000		* * Fixed Loss = 10
STR	17.0	0.0713		0.0	30.400	2.168		Vel = 6.61
	0.0							
	17.00					50.410		K Factor = 2.39
H.8	7.92	0.862	Utr	2.0	18.000	12.030		
to		150.0		0.0	2.000	0.0		
H.1	7.92	0.0404		0.0	20.000	0.808		Vel = 4.35
H.1	0.0	0.862	Utr	2.0	9.000	12.838		
to		150.0		0.0	2.000	0.0		
T.41	7.92	0.0404		0.0	11.000	0.444		Vel = 4.35
T.41	-3.43	0.862	2Utb	34.0	17.000	13.282		
to		150.0		0.0	28.000	3.465		
T.39	4.49	0.0141		0.0	45.000	0.636		Vel = 2.47
T.39	-2.46	0.862	Utr	2.0	12.000	17.383		
to		150.0		0.0	2.000	0.0		
H.10	2.03	0.0032		0.0	14.000	0.045		Vel = 1.12
H.10	0.0	0.862	Utr	2.0	3.000	17.428		
to		150.0		0.0	2.000	0.0		
T.43	2.03	0.0032		0.0	5.000	0.016		Vel = 1.12
T.43	1.67	0.862	2Utb	34.0	18.000	17.444		
to		150.0		0.0	28.000	3.465		
T.44	3.7	0.0098		0.0	46.000	0.453		Vel = 2.03
T.44	0.65	0.862	Utr	2.0	1.000	21.362		
to		150.0		0.0	2.000	0.0		
H.12	4.35	0.0133		0.0	3.000	0.040		Vel = 2.39

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
H.12	0.0	0.862	Utr	2.0	12.000	21.402		
to		150.0		0.0	2.000	0.0		
H.5	4.35	0.0134		0.0	14.000	0.187		Vel = 2.39
H.5	0.0	0.862	Utr	2.0	3.000	21.589		
to		150.0		0.0	2.000	0.0		
T.35	4.35	0.0134		0.0	5.000	0.067		Vel = 2.39
T.35	4.85	0.862	Utb	17.0	1.000	21.656		
to		150.0		0.0	14.000	0.0		
T.36	9.2	0.0533		0.0	15.000	0.799		Vel = 5.06
	0.0							
	9.20					22.455		K Factor = 1.94
T.38	3.60	0.862	Utr	2.0	1.000	13.172		
to		150.0		0.0	2.000	0.0		
H.6	3.6	0.0093		0.0	3.000	0.028		Vel = 1.98
H.6	0.0	0.862	Utr	2.0	1.000	13.200		
to		150.0		0.0	2.000	0.0		
T.37	3.6	0.0093		0.0	3.000	0.028		Vel = 1.98
T.37	0.0	0.862	Utr	2.0	9.000	13.228		
to		150.0		0.0	2.000	0.0		
H.9	3.6	0.0095		0.0	11.000	0.104		Vel = 1.98
H.9	0.0	0.862	Utr	2.0	14.000	13.332		
to		150.0		0.0	2.000	0.0		
T.46	3.6	0.0094		0.0	16.000	0.150		Vel = 1.98
T.46	0.16	0.862	Utr	2.0	2.000	13.482		
to		150.0		0.0	2.000	0.0		
H.18	3.76	0.0100		0.0	4.000	0.040		Vel = 2.07
H.18	0.0	0.862	Utr	2.0	13.000	13.522		
to		150.0		0.0	2.000	0.0		
T.50	3.76	0.0102		0.0	15.000	0.153		Vel = 2.07
T.50	-1.00	0.862	2Utb	34.0	13.000	13.675		
to		150.0		0.0	28.000	3.465		
T.45	2.76	0.0057		0.0	41.000	0.235		Vel = 1.52
T.45	-0.85	0.862		0.0	15.000	17.375		
to		150.0		0.0	0.0	0.0		
H.13	1.91	0.0029		0.0	15.000	0.044		Vel = 1.05
H.13	0.0	0.862	Utr	2.0	23.000	17.419		
to		150.0		0.0	2.000	0.0		
H.4	1.91	0.0029		0.0	25.000	0.073		Vel = 1.05
H.4	0.0	0.862	Utr	2.0	7.000	17.492		
to		150.0		0.0	2.000	0.0		
T.34	1.91	0.0029		0.0	9.000	0.026		Vel = 1.05
T.34	0.47	0.862		0.0	1.000	17.518		
to		150.0		0.0	0.0	0.0		
T.33	2.38	0.0050		0.0	1.000	0.005		Vel = 1.31
T.33	2.47	0.862	2Utb	34.0	13.000	17.523		
to		150.0		0.0	28.000	3.465		
T.35	4.85	0.0163		0.0	41.000	0.668		Vel = 2.67
	0.0							

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
	4.85					21.656		K Factor = 1.04
T.41	3.43	0.862	Utr	2.0	5.000	13.282		
to		150.0		0.0	2.000	0.0		
H.11	3.43	0.0086		0.0	7.000	0.060		Vel = 1.89
H.11	0.0	0.862	Utr	2.0	14.000	13.342		
to		150.0		0.0	2.000	0.0		
T.48	3.43	0.0086		0.0	16.000	0.138		Vel = 1.89
T.48	-0.16	0.862	Utr	2.0	2.000	13.480		
to		150.0		0.0	2.000	0.0		
H.17	3.27	0.0078		0.0	4.000	0.031		Vel = 1.80
H.17	0.0	0.862	Utr	2.0	16.000	13.511		
to		150.0		0.0	2.000	0.0		
H.24	3.27	0.0078		0.0	18.000	0.141		Vel = 1.80
H.24	0.0	0.862	Utr	2.0	1.000	13.652		
to		150.0		0.0	2.000	0.0		
T.58	3.27	0.0080		0.0	3.000	0.024		Vel = 1.80
T.58	-1.12	0.862	2Utb	34.0	19.000	13.676		
to		150.0		0.0	28.000	3.465		
T.52	2.15	0.0036		0.0	47.000	0.170		Vel = 1.18
T.52	-0.48	0.862	Utr	2.0	12.000	17.311		
to		150.0		0.0	2.000	0.0		
T.60	1.67	0.0022		0.0	14.000	0.031		Vel = 0.92
T.60	-0.31	0.862		0.0	3.000	17.342		
to		150.0		0.0	0.0	0.0		
T.62	1.36	0.0017		0.0	3.000	0.005		Vel = 0.75
T.62	0.31	0.862	Utr	2.0	12.000	17.347		
to		150.0		0.0	2.000	0.0		
H.27	1.67	0.0023		0.0	14.000	0.032		Vel = 0.92
H.27	0.0	0.862	Utr	2.0	13.000	17.379		
to		150.0		0.0	2.000	0.0		
H.19	1.67	0.0023		0.0	15.000	0.034		Vel = 0.92
H.19	0.0	0.862	Utr	2.0	12.000	17.413		
to		150.0		0.0	2.000	0.0		
T.43	1.67	0.0022		0.0	14.000	0.031		Vel = 0.92
	0.0							
	1.67					17.444		K Factor = 0.40
T.48	0.16	0.862	Utb	17.0	5.000	13.480		
to		150.0		0.0	14.000	0.0		
T.47	0.16	0.0		0.0	19.000	0.0		Vel = 0.09
T.47	0.0	0.862	Utr	2.0	9.000	13.480		
to		150.0		0.0	2.000	0.0		
H.16	0.16	0.0001		0.0	11.000	0.001		Vel = 0.09
H.16	0.0	0.862	Utr	2.0	9.000	13.481		
to		150.0		0.0	2.000	0.0		
H.15	0.16	0.0		0.0	11.000	0.0		Vel = 0.09
H.15	0.0	0.862	Utb	17.0	11.000	13.481		
to		150.0		0.0	14.000	0.0		
T.46	0.16	0.0		0.0	25.000	0.001		Vel = 0.09

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
	0.0							
	0.16					13.482		K Factor = 0.04
T.50	1.00	0.862	Utr	2.0	7.000	13.675		
to		150.0		0.0	2.000	0.0		
H.23	1.0	0.0009		0.0	9.000	0.008		Vel = 0.55
H.23	0.0	0.862	Utr	2.0	9.000	13.683		
to		150.0		0.0	2.000	0.0		
T.56	1.0	0.0009		0.0	11.000	0.010		Vel = 0.55
T.56	0.0	0.862	Utr	2.0	9.000	13.693		
to		150.0		0.0	2.000	0.0		
H.29	1.0	0.0009		0.0	11.000	0.010		Vel = 0.55
H.29	0.0	0.862	Utr	2.0	8.000	13.703		
to		150.0		0.0	2.000	0.0		
T.61	1.0	0.0009		0.0	10.000	0.009		Vel = 0.55
T.61	1.12	0.862	2Utb	34.0	12.000	13.712		
to		150.0		0.0	28.000	3.465		
T.59	2.12	0.0035		0.0	40.000	0.141		Vel = 1.17
T.59	0.48	0.862		0.0	6.000	17.318		
to		150.0		0.0	0.0	0.0		
H.26	2.6	0.0050		0.0	6.000	0.030		Vel = 1.43
H.26	0.0	0.862	Utr	2.0	7.000	17.348		
to		150.0		0.0	2.000	0.0		
T.54	2.6	0.0052		0.0	9.000	0.047		Vel = 1.43
T.54	0.85	0.862	2Utb	34.0	21.000	17.395		
to		150.0		0.0	28.000	3.465		
T.57	3.45	0.0087		0.0	49.000	0.424		Vel = 1.90
T.57	-1.52	0.862	Utr	2.0	4.000	21.284		
to		150.0	Utb	17.0	16.000	0.0		
T.53	1.93	0.0030		0.0	20.000	0.060		Vel = 1.06
T.53	0.86	0.862	Utr	2.0	8.000	21.344		
to		150.0		0.0	2.000	0.0		
H.20	2.79	0.0058		0.0	10.000	0.058		Vel = 1.53
H.20	0.0	0.862	Utr	2.0	17.000	21.402		
to		150.0		0.0	2.000	0.0		
T.42	2.79	0.0059		0.0	19.000	0.112		Vel = 1.53
	0.0							
	2.79					21.514		K Factor = 0.60
T.58	1.12	0.862	Utr	2.0	10.000	13.676		
to		150.0		0.0	2.000	0.0		
H.32	1.12	0.0011		0.0	12.000	0.013		Vel = 0.62
H.32	0.0	0.862		0.0	14.000	13.689		
to		150.0		0.0	0.0	0.0		
H.31	1.12	0.0011		0.0	14.000	0.015		Vel = 0.62
H.31	0.0	0.862	Utr	2.0	5.000	13.704		
to		150.0		0.0	2.000	0.0		
T.61	1.12	0.0011		0.0	7.000	0.008		Vel = 0.62
	0.0							
	1.12					13.712		K Factor = 0.30

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
T.52	0.48	0.862	Utr	2.0	7.000	17.311		
to		150.0		0.0	2.000	0.0		
H.22	0.48	0.0002		0.0	9.000	0.002		Vel = 0.26
H.22	0.0	0.862	Utr	2.0	19.000	17.313		
to		150.0		0.0	2.000	0.0		
T.59	0.48	0.0002		0.0	21.000	0.005		Vel = 0.26
	0.0							
	0.48					17.318		K Factor = 0.12
T.60	0.31	0.862	Utb	17.0	8.000	17.342		
to		150.0	Utr	2.0	16.000	0.0		
H.30	0.31	0.0001		0.0	24.000	0.003		Vel = 0.17
H.30	0.0	0.862	Utb	17.0	8.000	17.345		
to		150.0		0.0	14.000	0.0		
T.62	0.31	0.0001		0.0	22.000	0.002		Vel = 0.17
	0.0							
	0.31					17.347		K Factor = 0.07
T.45	0.85	0.862	Utr	2.0	1.000	17.375		
to		150.0		0.0	2.000	0.0		
H.14	0.85	0.0007		0.0	3.000	0.002		Vel = 0.47
H.14	0.0	0.862	Utr	2.0	12.000	17.377		
to		150.0		0.0	2.000	0.0		
T.49	0.85	0.0006		0.0	14.000	0.009		Vel = 0.47
T.49	0.0	0.862	Utr	2.0	3.000	17.386		
to		150.0		0.0	2.000	0.0		
H.21	0.85	0.0008		0.0	5.000	0.004		Vel = 0.47
H.21	0.0	0.862	Utr	2.0	6.000	17.390		
to		150.0		0.0	2.000	0.0		
T.54	0.85	0.0006		0.0	8.000	0.005		Vel = 0.47
	0.0							
	0.85					17.395		K Factor = 0.20
T.39	2.46	0.862	Utr	2.0	5.000	17.383		
to		150.0		0.0	2.000	0.0		
H.2	2.46	0.0047		0.0	7.000	0.033		Vel = 1.35
H.2	0.0	0.862	Utr	2.0	14.000	17.416		
to		150.0		0.0	2.000	0.0		
H.3	2.46	0.0046		0.0	16.000	0.074		Vel = 1.35
H.3	0.0	0.862	Utr	2.0	5.000	17.490		
to		150.0		0.0	2.000	0.0		
T.33	2.46	0.0047		0.0	7.000	0.033		Vel = 1.35
	0.0							
	2.46					17.523		K Factor = 0.59
T.40	0.47	0.862	Utr	2.0	4.000	17.514		
to		150.0	Utb	17.0	16.000	0.0		
T.34	0.47	0.0002		0.0	20.000	0.004		Vel = 0.26
	0.0							
	0.47					17.518		K Factor = 0.11
T.57	1.51	0.862		0.0	6.000	21.284		
to		150.0		0.0	0.0	0.0		
H.25	1.51	0.0018		0.0	6.000	0.011		Vel = 0.83

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
H.25	0.0	0.862	Utb	17.0	8.000	21.295		
to		150.0	Utr	2.0	16.000	0.0		
T.55	1.51	0.0019		0.0	24.000	0.046		Vel = 0.83
T.55	-0.85	0.862		0.0	20.000	21.341		
to		150.0		0.0	0.0	0.0		
H.28	0.66	0.0004		0.0	20.000	0.008		Vel = 0.36
H.28	0.0	0.862	Utr	2.0	13.000	21.349		
to		150.0		0.0	2.000	0.0		
T.51	0.66	0.0004		0.0	15.000	0.006		Vel = 0.36
T.51	0.0	0.862	Utr	2.0	17.000	21.355		
to		150.0		0.0	2.000	0.0		
T.44	0.66	0.0004		0.0	19.000	0.007		Vel = 0.36
	0.0							
	0.66					21.362		K Factor = 0.14
T.55	0.86	0.862	Utr	2.0	2.000	21.341		
to		150.0		0.0	2.000	0.0		
T.53	0.86	0.0008		0.0	4.000	0.003		Vel = 0.47
	0.0							
	0.86					21.344		K Factor = 0.19

WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE PROTECTION SPRINKLER SYSTEMS

Andrew J. Prokash
6245-0815-A Level 1
Gary Prokash Plumbing and Fire Sprinkle
GARYPPI15K5

Signature Date Expires 12/31/16

A-PEX DESIGN SERVICES INC.

A-PEX Design Services, Inc.-EP
10731 47th Place West
Mukilteo, WA 98275
425-493-9680
sales@a-pexdesignservices.com

Job Name	:	MARKET STREET LOT A - Two Head Calculation (H.32 & H.24)
Drawing	:	
Location	:	1932 MARKET ST KIRKLAND WA 98033
Remote Area	:	
Contract	:	151230-02
Data File	:	151230-02 Market Street Lot A.wx2

HYDRAULIC DESIGN INFORMATION SHEET

Name - MARKET STREET LOT A Date - 12-30-2015
Location - KIRKLAND WA 98033
Building - System No. -
Contractor - GARY PROKASH PLUMBING Contract No. - 151230-02
Calculated By - KAREN BABB Drawing No. -
Construction: (X) Combustible ( ) Non-Combustible Ceiling Height
OCCUPANCY - RESIDENTIAL

S Type of Calculation: ( )NFPA 13 Residential ( )NFPA 13R (X)NFPA 13D
Y Number of Sprinklers Flowing: ( )1 (X)2 ( )4 ( )
S ( )Other
T ( )Specific Ruling Made by Date
E
M Listed Flow at Start Point - 13 Gpm System Type
Listed Pres. at Start Point - 7.04 Psi (X) Wet ( ) Dry
D MAXIMUM LISTED SPACING 16 x 16 ( ) Deluge ( ) PreAction
E Domestic Flow Added - 0 Gpm Sprinkler or Nozzle
S Additional Flow Added - Gpm Make RELIABLE Model LL-RFC49
I Elevation at Highest Outlet - 124 Feet Size 3/8 K-Factor 4.9
G Note: Temperature Rating 155
N

Calculation Gpm Required 26.0816 Psi Required 53.52 At Ref Pt STR
Summary C-Factor Used: Overhead 150 Underground 150

W Water Flow Test: Pump Data: Tank or Reservoir:
A Date of Test - Rated Cap. Cap.
T Time of Test - @ Psi Elev.
E Static (Psi) - 69 Elev.
R Residual (Psi) - 64 Other Well
Flow (Gpm) - 300 Proof Flow Gpm
S Elevation - 100

P Location:
P
L Source of Information:
Y

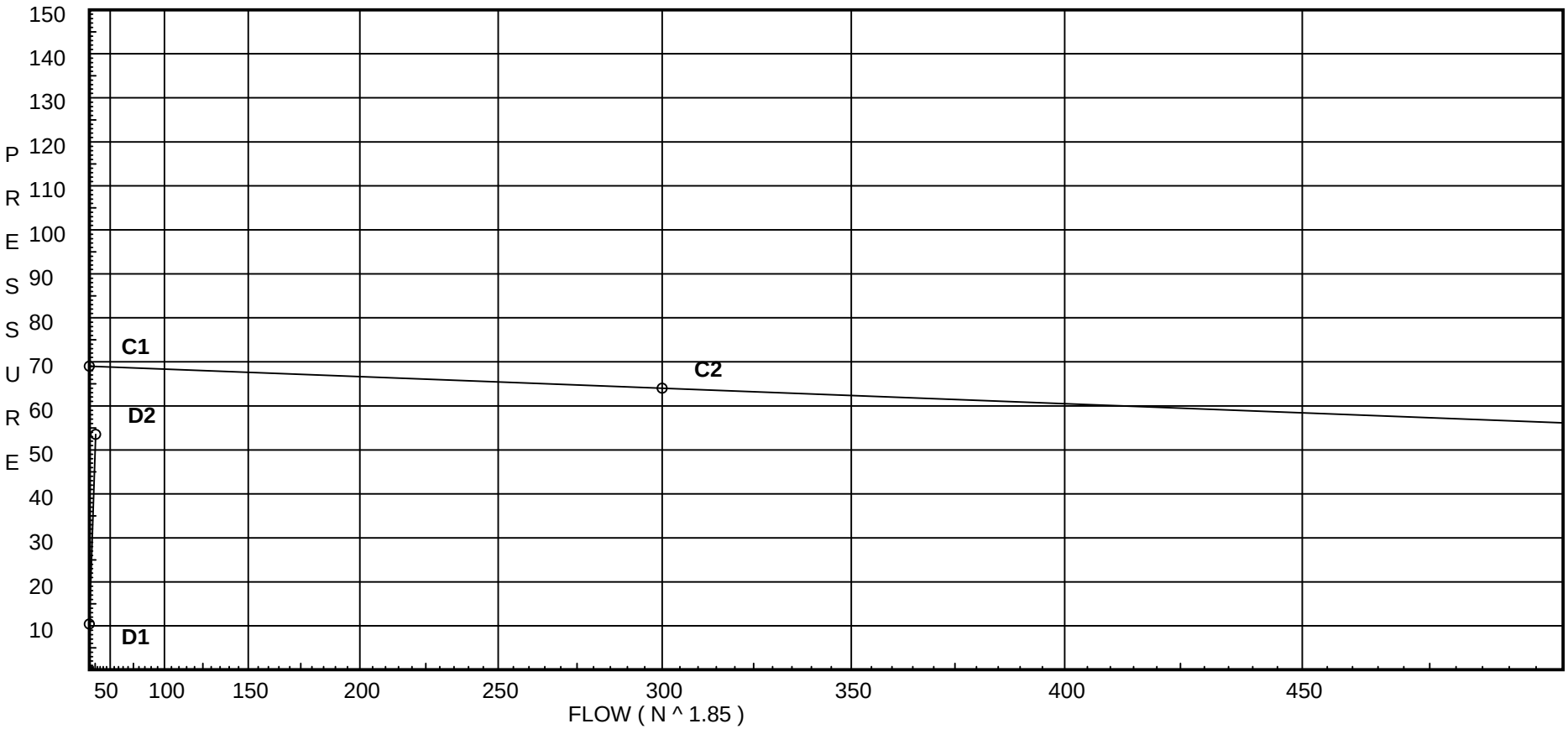
Water Supply Curve C

City Water Supply:

C1 - Static Pressure	: 69
C2 - Residual Pressure:	64
C2 - Residual Flow	: 300

Demand:

D1 - Elevation	: 10.394
D2 - System Flow	: 26.082
D2 - System Pressure	: 53.515
Hose (Demand)	: _____
D3 - System Demand	: 26.082
Safety Margin	: 15.431



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
C	Roll Groove Coupling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
E	90' Standard Elbow	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
G	Generic Gate Valve	1	1	1	1	1	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
T	90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Utb *	Aquapex Tee - Branch	2	17	14	9	12	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utr *	Aquapex Tee - Run	1	2	2	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
STR	69.0	64	300.0	68.945	26.08	53.515

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
H.32	124.0	4.9	7.04	13.0	
H.31	124.0		7.82		
T.61	124.0		8.2		
T.59	116.0		12.28		
H.26	116.0		12.47		
T.54	116.0		12.74		
T.57	108.0		17.42		
T.53	108.0		17.59		
H.20	108.0		17.75		
T.42	108.0		18.06		
T.36	108.0		20.13		
S.1	104.0		23.79		
CPL	100.0		37.4		
MTR	100.0		38.73		
STR	100.0		53.52		
T.58	124.0		7.15		
T.52	116.0		12.18		
T.60	116.0		12.42		
T.62	116.0		12.45		
H.27	116.0		12.69		
H.19	116.0		12.95		
T.43	116.0		13.19		
T.44	108.0		17.66		
H.12	108.0		17.76		
H.5	108.0		18.2		
T.35	108.0		18.36		
H.24	124.0	4.9	7.13	13.08	
H.17	124.0		8.16		
T.48	124.0		8.38		
H.11	124.0		8.84		
T.41	124.0		9.03		
T.39	116.0		13.18		
H.2	116.0		13.26		
H.3	116.0		13.44		
T.33	116.0		13.52		
H.29	124.0		8.36		
T.56	124.0		8.52		
H.23	124.0		8.69		
T.50	124.0		8.83		
T.45	116.0		12.76		
H.13	116.0		12.99		
H.4	116.0		13.38		

NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
T.34	116.0		13.52		
T.40	116.0		13.56		
T.47	124.0		8.52		
H.16	124.0		8.59		
H.15	124.0		8.67		
T.46	124.0		8.84		
H.9	124.0		9.0		
T.37	124.0		9.12		
H.6	124.0		9.15		
T.38	124.0		9.18		
H.22	116.0		12.21		
H.18	124.0		8.84		
H.30	116.0		12.44		
H.1	124.0		9.06		
H.8	124.0		9.12		
H.7	124.0		9.16		
H.21	116.0		12.75		
T.49	116.0		12.75		
H.14	116.0		12.76		
H.10	116.0		13.19		
H.25	108.0		17.46		
T.55	108.0		17.59		
H.28	108.0		17.61		
T.51	108.0		17.64		

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
H.32	9.40	0.862		0.0	14.000	7.040		K Factor = 4.90
to		150.0		0.0	0.0	0.0		
H.31	9.4	0.0554		0.0	14.000	0.775		Vel = 5.17
H.31	0.0	0.862	Utr	2.0	5.000	7.815		
to		150.0		0.0	2.000	0.0		
T.61	9.4	0.0554		0.0	7.000	0.388		Vel = 5.17
T.61	-4.70	0.862	2Utb	34.0	12.000	8.203		
to		150.0		0.0	28.000	3.465		
T.59	4.7	0.0154		0.0	40.000	0.615		Vel = 2.58
T.59	2.13	0.862		0.0	6.000	12.283		
to		150.0		0.0	0.0	0.0		
H.26	6.83	0.0307		0.0	6.000	0.184		Vel = 3.75
H.26	0.0	0.862	Utr	2.0	7.000	12.467		
to		150.0		0.0	2.000	0.0		
T.54	6.83	0.0308		0.0	9.000	0.277		Vel = 3.75
T.54	-0.74	0.862	2Utb	34.0	21.000	12.744		
to		150.0		0.0	28.000	3.465		
T.57	6.09	0.0248		0.0	49.000	1.215		Vel = 3.35
T.57	-2.68	0.862	Utr	2.0	4.000	17.424		
to		150.0	Utb	17.0	16.000	0.0		
T.53	3.41	0.0085		0.0	20.000	0.170		Vel = 1.87
T.53	1.39	0.862	Utr	2.0	8.000	17.594		
to		150.0		0.0	2.000	0.0		
H.20	4.8	0.0159		0.0	10.000	0.159		Vel = 2.64
H.20	0.0	0.862	Utr	2.0	17.000	17.753		
to		150.0		0.0	2.000	0.0		
T.42	4.8	0.0160		0.0	19.000	0.304		Vel = 2.64
T.42	7.15	0.862	Utr	2.0	8.000	18.057		
to		150.0	Utb	17.0	16.000	0.0		
T.36	11.95	0.0864		0.0	24.000	2.074		Vel = 6.57
T.36	14.13	1.244	T	3.443	28.000	20.131		
to		150.0		0.0	3.443	1.732		
S.1	26.08	0.0614		0.0	31.443	1.930		Vel = 6.88
S.1	0.0	1.244	E	1.721	25.000	23.793		
to		150.0	T	3.443	5.594	11.732		* * Fixed Loss = 10
CPL	26.08	0.0614	G	0.43	30.594	1.877		Vel = 6.88
CPL	0.0	1.629	2E	4.738	75.000	37.402		
to		150.0	C	0.474	5.212	0.0		
MTR	26.08	0.0165		0.0	80.212	1.324		Vel = 4.01
MTR	0.0	1.025	2E	5.4	25.000	38.726		
to		150.0		0.0	5.400	10.000		* * Fixed Loss = 10
STR	26.08	0.1575		0.0	30.400	4.789		Vel = 10.14
	0.0							
	26.08					53.515		K Factor = 3.57
H.32	3.61	0.862	Utr	2.0	10.000	7.040		
to		150.0		0.0	2.000	0.0		
T.58	3.61	0.0094		0.0	12.000	0.113		Vel = 1.98
T.58	3.51	0.862	2Utb	34.0	19.000	7.153		
to		150.0		0.0	28.000	3.465		
T.52	7.12	0.0332		0.0	47.000	1.559		Vel = 3.91

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
T.52	-2.13	0.862	Utr	2.0	12.000	12.177		
to		150.0		0.0	2.000	0.0		
T.60	4.99	0.0172		0.0	14.000	0.241		Vel = 2.74
T.60	-0.92	0.862		0.0	3.000	12.418		
to		150.0		0.0	0.0	0.0		
T.62	4.07	0.0117		0.0	3.000	0.035		Vel = 2.24
T.62	0.92	0.862	Utr	2.0	12.000	12.453		
to		150.0		0.0	2.000	0.0		
H.27	4.99	0.0172		0.0	14.000	0.241		Vel = 2.74
H.27	0.0	0.862	Utr	2.0	13.000	12.694		
to		150.0		0.0	2.000	0.0		
H.19	4.99	0.0172		0.0	15.000	0.258		Vel = 2.74
H.19	0.0	0.862	Utr	2.0	12.000	12.952		
to		150.0		0.0	2.000	0.0		
T.43	4.99	0.0172		0.0	14.000	0.241		Vel = 2.74
T.43	0.69	0.862	2Utb	34.0	18.000	13.193		
to		150.0		0.0	28.000	3.465		
T.44	5.68	0.0218		0.0	46.000	1.005		Vel = 3.12
T.44	1.29	0.862	Utr	2.0	1.000	17.663		
to		150.0		0.0	2.000	0.0		
H.12	6.97	0.0317		0.0	3.000	0.095		Vel = 3.83
H.12	0.0	0.862	Utr	2.0	12.000	17.758		
to		150.0		0.0	2.000	0.0		
H.5	6.97	0.0319		0.0	14.000	0.446		Vel = 3.83
H.5	0.0	0.862	Utr	2.0	3.000	18.204		
to		150.0		0.0	2.000	0.0		
T.35	6.97	0.0320		0.0	5.000	0.160		Vel = 3.83
T.35	7.16	0.862	Utb	17.0	1.000	18.364		
to		150.0		0.0	14.000	0.0		
T.36	14.13	0.1178		0.0	15.000	1.767		Vel = 7.77
	0.0							
	14.13					20.131		K Factor = 3.15
T.58	-3.52	0.862	Utr	2.0	1.000	7.153		
to		150.0		0.0	2.000	0.0		
H.24	-3.52	-0.0090		0.0	3.000	-0.027		Vel = 1.94
H.24	13.08	0.862	Utr	2.0	16.000	7.126		K Factor = 4.90
to		150.0		0.0	2.000	0.0		
H.17	9.56	0.0572		0.0	18.000	1.030		Vel = 5.26
H.17	0.0	0.862	Utr	2.0	2.000	8.156		
to		150.0		0.0	2.000	0.0		
T.48	9.56	0.0572		0.0	4.000	0.229		Vel = 5.26
T.48	-3.04	0.862	Utr	2.0	14.000	8.385		
to		150.0		0.0	2.000	0.0		
H.11	6.52	0.0282		0.0	16.000	0.451		Vel = 3.58
H.11	0.0	0.862	Utr	2.0	5.000	8.836		
to		150.0		0.0	2.000	0.0		
T.41	6.52	0.0281		0.0	7.000	0.197		Vel = 3.58
T.41	-1.84	0.862	2Utb	34.0	17.000	9.033		
to		150.0		0.0	28.000	3.465		
T.39	4.68	0.0152		0.0	45.000	0.686		Vel = 2.57

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
T.39	-0.69	0.862	Utr	2.0	5.000	13.184		
to		150.0		0.0	2.000	0.0		
H.2	3.99	0.0114		0.0	7.000	0.080		Vel = 2.19
H.2	0.0	0.862	Utr	2.0	14.000	13.264		
to		150.0		0.0	2.000	0.0		
H.3	3.99	0.0113		0.0	16.000	0.181		Vel = 2.19
H.3	0.0	0.862	Utr	2.0	5.000	13.445		
to		150.0		0.0	2.000	0.0		
T.33	3.99	0.0114		0.0	7.000	0.080		Vel = 2.19
T.33	3.17	0.862	2Utb	34.0	13.000	13.525		
to		150.0		0.0	28.000	3.465		
T.35	7.16	0.0335		0.0	41.000	1.374		Vel = 3.94
	0.0							
	7.16					18.364		K Factor = 1.67
T.61	4.69	0.862	Utr	2.0	8.000	8.203		
to		150.0		0.0	2.000	0.0		
H.29	4.69	0.0153		0.0	10.000	0.153		Vel = 2.58
H.29	0.0	0.862	Utr	2.0	9.000	8.356		
to		150.0		0.0	2.000	0.0		
T.56	4.69	0.0154		0.0	11.000	0.169		Vel = 2.58
T.56	0.0	0.862	Utr	2.0	9.000	8.525		
to		150.0		0.0	2.000	0.0		
H.23	4.69	0.0153		0.0	11.000	0.168		Vel = 2.58
H.23	0.0	0.862	Utr	2.0	7.000	8.693		
to		150.0		0.0	2.000	0.0		
T.50	4.69	0.0153		0.0	9.000	0.138		Vel = 2.58
T.50	-0.71	0.862	2Utb	34.0	13.000	8.831		
to		150.0		0.0	28.000	3.465		
T.45	3.98	0.0113		0.0	41.000	0.463		Vel = 2.19
T.45	0.74	0.862		0.0	15.000	12.759		
to		150.0		0.0	0.0	0.0		
H.13	4.72	0.0155		0.0	15.000	0.232		Vel = 2.59
H.13	0.0	0.862	Utr	2.0	23.000	12.991		
to		150.0		0.0	2.000	0.0		
H.4	4.72	0.0155		0.0	25.000	0.387		Vel = 2.59
H.4	0.0	0.862	Utr	2.0	7.000	13.378		
to		150.0		0.0	2.000	0.0		
T.34	4.72	0.0156		0.0	9.000	0.140		Vel = 2.59
T.34	-3.17	0.862	Utr	2.0	4.000	13.518		
to		150.0	Utb	17.0	16.000	0.0		
T.40	1.55	0.0020		0.0	20.000	0.039		Vel = 0.85
T.40	5.60	0.862	Utb	17.0	17.000	13.557		
to		150.0		0.0	14.000	3.465		
T.42	7.15	0.0334		0.0	31.000	1.035		Vel = 3.93
	0.0							
	7.15					18.057		K Factor = 1.68
T.48	3.05	0.862	Utb	17.0	5.000	8.385		
to		150.0		0.0	14.000	0.0		
T.47	3.05	0.0069		0.0	19.000	0.131		Vel = 1.68

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
T.47	0.0	0.862	Utr	2.0	9.000	8.516		
to		150.0		0.0	2.000	0.0		
H.16	3.05	0.0069		0.0	11.000	0.076		Vel = 1.68
H.16	0.0	0.862	Utr	2.0	9.000	8.592		
to		150.0		0.0	2.000	0.0		
H.15	3.05	0.0069		0.0	11.000	0.076		Vel = 1.68
H.15	0.0	0.862	Utb	17.0	11.000	8.668		
to		150.0		0.0	14.000	0.0		
T.46	3.05	0.0069		0.0	25.000	0.172		Vel = 1.68
T.46	0.71	0.862	Utr	2.0	14.000	8.840		
to		150.0		0.0	2.000	0.0		
H.9	3.76	0.0102		0.0	16.000	0.164		Vel = 2.07
H.9	0.0	0.862	Utr	2.0	9.000	9.004		
to		150.0		0.0	2.000	0.0		
T.37	3.76	0.0102		0.0	11.000	0.112		Vel = 2.07
T.37	0.0	0.862	Utr	2.0	1.000	9.116		
to		150.0		0.0	2.000	0.0		
H.6	3.76	0.0100		0.0	3.000	0.030		Vel = 2.07
H.6	0.0	0.862	Utr	2.0	1.000	9.146		
to		150.0		0.0	2.000	0.0		
T.38	3.76	0.0103		0.0	3.000	0.031		Vel = 2.07
T.38	1.84	0.862	2Utb	34.0	15.000	9.177		
to		150.0		0.0	28.000	3.465		
T.40	5.6	0.0213		0.0	43.000	0.915		Vel = 3.08
	0.0							
	5.60					13.557		K Factor = 1.52
T.52	2.13	0.862	Utr	2.0	7.000	12.177		
to		150.0		0.0	2.000	0.0		
H.22	2.13	0.0036		0.0	9.000	0.032		Vel = 1.17
H.22	0.0	0.862	Utr	2.0	19.000	12.209		
to		150.0		0.0	2.000	0.0		
T.59	2.13	0.0035		0.0	21.000	0.074		Vel = 1.17
	0.0							
	2.13					12.283		K Factor = 0.61
T.50	0.72	0.862	Utr	2.0	13.000	8.831		
to		150.0		0.0	2.000	0.0		
H.18	0.72	0.0005		0.0	15.000	0.008		Vel = 0.40
H.18	0.0	0.862	Utr	2.0	2.000	8.839		
to		150.0		0.0	2.000	0.0		
T.46	0.72	0.0002		0.0	4.000	0.001		Vel = 0.40
	0.0							
	0.72					8.840		K Factor = 0.24
T.60	0.93	0.862	Utb	17.0	8.000	12.418		
to		150.0	Utr	2.0	16.000	0.0		
H.30	0.93	0.0007		0.0	24.000	0.018		Vel = 0.51
H.30	0.0	0.862	Utb	17.0	8.000	12.436		
to		150.0		0.0	14.000	0.0		
T.62	0.93	0.0008		0.0	22.000	0.017		Vel = 0.51

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
	0.0							
	0.93					12.453		K Factor = 0.26
T.41	1.84	0.862	Utr	2.0	9.000	9.033		
to		150.0		0.0	2.000	0.0		
H.1	1.84	0.0027		0.0	11.000	0.030		Vel = 1.01
H.1	0.0	0.862	Utr	2.0	18.000	9.063		
to		150.0		0.0	2.000	0.0		
H.8	1.84	0.0027		0.0	20.000	0.054		Vel = 1.01
H.8	0.0	0.862	Utr	2.0	15.000	9.117		
to		150.0		0.0	2.000	0.0		
H.7	1.84	0.0027		0.0	17.000	0.046		Vel = 1.01
H.7	0.0	0.862		0.0	5.000	9.163		
to		150.0		0.0	0.0	0.0		
T.38	1.84	0.0028		0.0	5.000	0.014		Vel = 1.01
	0.0							
	1.84					9.177		K Factor = 0.61
T.54	0.74	0.862	Utr	2.0	6.000	12.744		
to		150.0		0.0	2.000	0.0		
H.21	0.74	0.0005		0.0	8.000	0.004		Vel = 0.41
H.21	0.0	0.862	Utr	2.0	3.000	12.748		
to		150.0		0.0	2.000	0.0		
T.49	0.74	0.0004		0.0	5.000	0.002		Vel = 0.41
T.49	0.0	0.862	Utr	2.0	12.000	12.750		
to		150.0		0.0	2.000	0.0		
H.14	0.74	0.0005		0.0	14.000	0.007		Vel = 0.41
H.14	0.0	0.862	Utr	2.0	1.000	12.757		
to		150.0		0.0	2.000	0.0		
T.45	0.74	0.0007		0.0	3.000	0.002		Vel = 0.41
	0.0							
	0.74					12.759		K Factor = 0.21
T.39	0.69	0.862	Utr	2.0	12.000	13.184		
to		150.0		0.0	2.000	0.0		
H.10	0.69	0.0004		0.0	14.000	0.006		Vel = 0.38
H.10	0.0	0.862	Utr	2.0	3.000	13.190		
to		150.0		0.0	2.000	0.0		
T.43	0.69	0.0006		0.0	5.000	0.003		Vel = 0.38
	0.0							
	0.69					13.193		K Factor = 0.19
T.34	3.17	0.862		0.0	1.000	13.518		
to		150.0		0.0	0.0	0.0		
T.33	3.17	0.0070		0.0	1.000	0.007		Vel = 1.74
	0.0							
	3.17					13.525		K Factor = 0.86
T.57	2.68	0.862		0.0	6.000	17.424		
to		150.0		0.0	0.0	0.0		
H.25	2.68	0.0053		0.0	6.000	0.032		Vel = 1.47
H.25	0.0	0.862	Utb	17.0	8.000	17.456		
to		150.0	Utr	2.0	16.000	0.0		
T.55	2.68	0.0055		0.0	24.000	0.131		Vel = 1.47

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
T.55	-1.39	0.862		0.0	20.000	17.587		
to		150.0		0.0	0.0	0.0		
H.28	1.29	0.0014		0.0	20.000	0.028		Vel = 0.71
H.28	0.0	0.862	Utr	2.0	13.000	17.615		
to		150.0		0.0	2.000	0.0		
T.51	1.29	0.0014		0.0	15.000	0.021		Vel = 0.71
T.51	0.0	0.862	Utr	2.0	17.000	17.636		
to		150.0		0.0	2.000	0.0		
T.44	1.29	0.0014		0.0	19.000	0.027		Vel = 0.71
	0.0							
	1.29					17.663		K Factor = 0.31
T.55	1.39	0.862	Utr	2.0	2.000	17.587		
to		150.0		0.0	2.000	0.0		
T.53	1.39	0.0018		0.0	4.000	0.007		Vel = 0.76
	0.0							
	1.39					17.594		K Factor = 0.33