Hydraulic Calculations

for

Project Name: Centeris UPS & Battery Rms
Location: 1023 39th Ave SE, Puyallup. WA 98374,
Drawing Name: Centeris v2 Calculation Date: 4/7/2024

Design

Remote Area Number:	1
Remote Area Location:	Battery Rm
Occupancy Classification:	Extra Hazard Group I
Density	0.30gpm/ft²
Area of Application:	2500ft² (Actual 1488ft²)
Coverage per Sprinkler:	95ft²
Type of sprinklers calculated:	Upright
No. of sprinklers calculated:	20
No. of nozzles calculated:	0

In-rack Demand: N/A gpm at Node: N/A
Hose Streams: 500.00 at Node: 1 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 1: 1094.22 @ 51.788 (Safety Margin = 20.933)
Type of System: Dbl. Interlock Pre-Action
Volume of Dry/PreAction/Antifreeze/OtherAgent 317.64gal

WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE SPRINKLER SYSTEMS
Expires DEC 31,24
Matthew William Kunkle
4960-0322-C LEVEL 3
Columbia Fire, LLC
COLUMFL795NJ
Signature
04/08/2024
Date

Name of Contractor: Columbia Fire
Address: 111 S Findlay St, Seattle, WA 98108
Phone Number: (206) 232-8569
Name of designer: Luke Thompson
Authority Having Jurisdiction: City of Puyallyup

Notes:

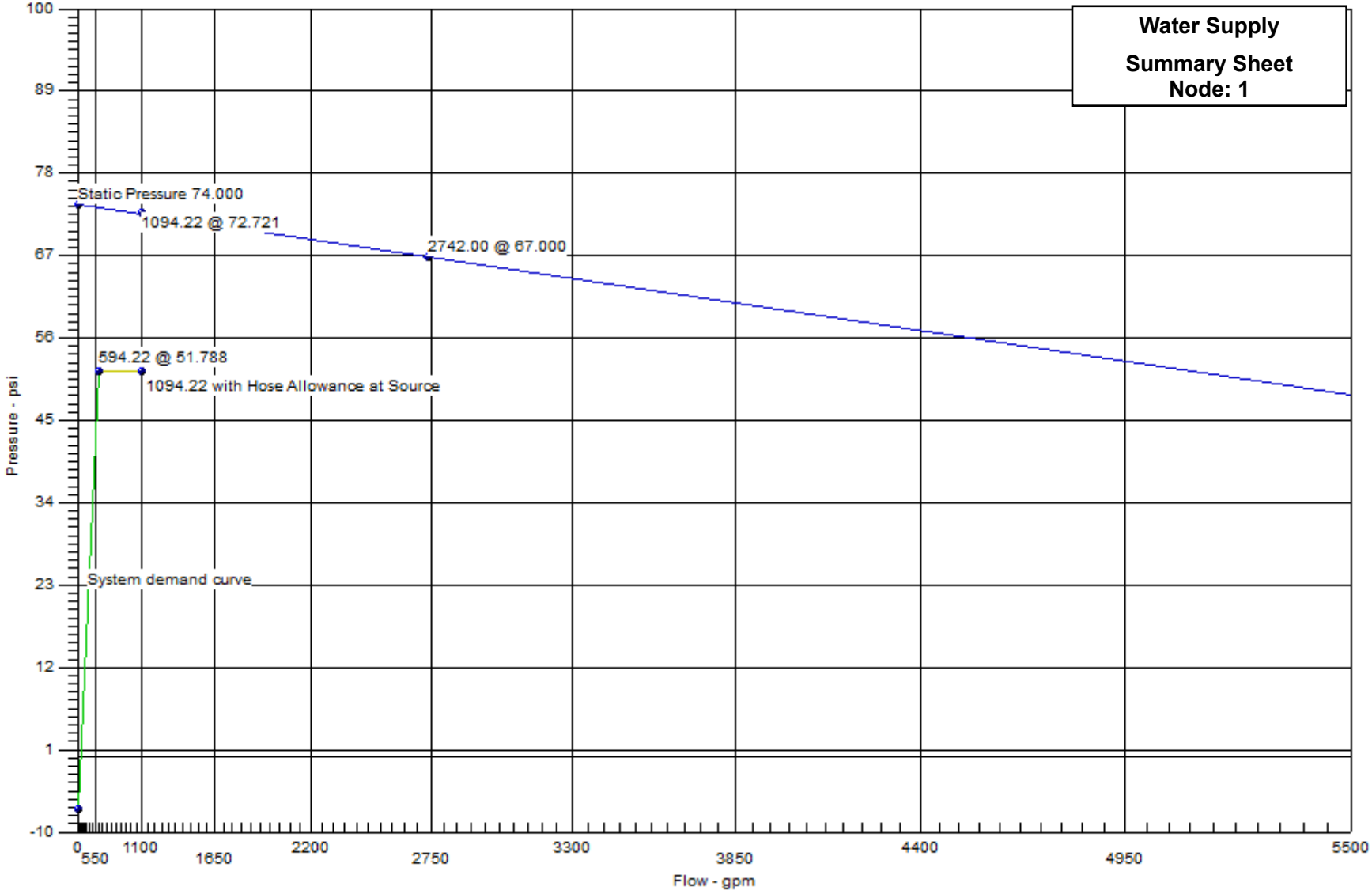
Automatic peaking results Left: N/A Right: N/A

Hydraulic Graph

Job Name: Centeris UPS & Battery Rms
Remote Area Number: 1

$N^{1.85}$

Date: 4/7/2024



Summary Of Outflowing Devices

Job Number: 1
Report Description: Extra Hazard Group I (1)

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	833	29.22	27.07	8	13.342		
Sprinkler	834	29.35	27.07	8	13.463		
Sprinkler	835	29.78	27.07	8	13.858		
Sprinkler	836	30.66	27.07	8	14.684		
Sprinkler	837	32.10	27.07	8	16.103		
Sprinkler	854	28.74	28.50	8	12.905		
Sprinkler	855	28.87	28.50	8	13.023		
Sprinkler	856	29.29	28.50	8	13.407		
Sprinkler	857	30.15	28.50	8	14.208		
Sprinkler	858	31.58	28.50	8	15.585		
Sprinkler	**879**	**28.50**	**28.50**	**8**	**12.691**		
Sprinkler	880	28.63	28.50	8	12.808		
Sprinkler	881	29.05	28.50	8	13.186		
Sprinkler	882	29.91	28.50	8	13.975		
Sprinkler	883	31.32	28.50	8	15.332		
Sprinkler	902	28.43	27.07	8	12.629		
Sprinkler	903	28.56	27.07	8	12.746		
Sprinkler	904	28.98	27.07	8	13.122		
Sprinkler	905	29.83	27.07	8	13.907		
Sprinkler	906	31.25	27.07	8	15.258		

Most Demanding Sprinkler Data

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
879	9'-5	8	28.50	2	(See Notes)	9'-6	100	12.691	• • • • • Route 1 • • • • • Sprinkler
880	9'-4½		28.50	2.1570		9'-6	0.010489	0.017 0.100	
880	9'-4½	8	28.63	2	(See Notes)	9'-6	100	12.808	Sprinkler
881	9'-4		57.13	2.1570		9'-6	0.037975	0.017 0.361	
881	9'-4	8	29.05	2	(See Notes)	9'-6	100	13.186	Sprinkler
882	9'-3½		86.18	2.1570		9'-6	0.081246	0.017 0.772	
882	9'-3½	8	29.91	2	(See Notes)	9'-6	100	13.975	Sprinkler
883	9'-3		116.09	2.1570		9'-6	0.140975	0.017 1.339	
883	9'-3	8	31.32	2	(See Notes)	3'-8½	100	15.332	Sprinkler,
618	9'-3		147.41	2.1570		8'-9½ 12'-6	0.219318	0.007 2.740	PO(8'-9½)
618	9'-3		147.05	4		10'-0	100	18.078	Flow (q) from Route 3
568	9'-3		294.46	4.2600		10'-0	0.028683	0.009 0.287	
568	9'-3		148.64	4		9'-9	100	18.374	Flow (q) from Route 2
573	9'-2½		443.10	4.2600		9'-9	0.061087	0.009 0.596	
573	9'-2½		151.12	4	(See Notes)	272'-1	100	18.978	Flow (q) from Route 4
52	10'-6		594.22	4.2600		84'-6 356'-7	0.105127	-0.560 37.486	2T(18'-9½), 5E(9'-4½)
52	10'-6			6	(See Notes)	6'-11½	100	55.905	
58	3'-7		594.22	6.3570		38'-11 45'-10	0.014966	3.009 0.686	E(12'-6½), DPV(26'-4½)
58	3'-7			6	(See Notes)	9'-6	120	59.600	
204	1'-1½		594.22	6.3570		67'-11 77'-5	0.010681	1.057 0.827	BV(12'-7), E(17'-7), T(37'-8½)
204	1'-1½			8	(See Notes)	4'-1½	120	61.483	
12	-3'-0		594.22	8.2490		21'-1½ 25'-3	0.003003	1.788 0.076	E(21'-1½)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes (Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.)
12	-3'-0			8	(See Notes)	127'-8	140	63.347	
24	-3'-0		594.22	8.3900		134'-0½ 261'-8½	0.002079	 0.544	GV(6'-9½), 2E(30'-6½), PIV(6'-9½), BFP, T(59'-4½)
24	-3'-0			12	(See Notes)	994'-9½	140	63.892	
8	28'-0		293.18	12.4600		337'-5½ 1332'-3	0.000082	-13.438 0.109	3T(98'-3½), 2EE(21'-3½)
8	28'-0		301.04	6	(See Notes)	42'-0	140	50.562	Flow (q) from Route 5
1	26'-0		594.22	6.2800		 42'-0	0.008522	0.867 0.358	Water Supply
			500.00					51.788	Hose Allowance At Source
1			1094.22						Total(Pt) Route 1
854	9'-5	8	28.74	2	(See Notes)	9'-6	100	12.905	• • • • • **Route 2** • • • • • Sprinkler
855	9'-4½		28.74	2.1570		 9'-6	0.010653	0.017 0.101	
855	9'-4½	8	28.87	2	(See Notes)	9'-6	100	13.023	Sprinkler
856	9'-4		57.61	2.1570		 9'-6	0.038566	0.017 0.366	
856	9'-4	8	29.29	2	(See Notes)	9'-6	100	13.407	Sprinkler
857	9'-3½		86.90	2.1570		 9'-6	0.082507	0.017 0.784	
857	9'-3½	8	30.15	2	(See Notes)	9'-6	100	14.208	Sprinkler
858	9'-3		117.06	2.1570		 9'-6	0.143159	0.017 1.360	
858	9'-3	8	31.58	2	(See Notes)	3'-8½	100	15.585	Sprinkler,
568	9'-3		148.64	2.1570		8'-9½ 12'-6	0.222706	0.007 2.782	PO(8'-9½)
								18.374	Total(Pt) Route 2
902	9'-5½	8	28.43	2	(See Notes)	9'-6	100	12.629	• • • • • **Route 3** • • • • • Sprinkler
903	9'-5		28.43	2.1570		 9'-6	0.010442	0.017 0.099	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
903	9'-5	8	28.56	2	(See Notes)	9'-6	100	12.746	Sprinkler
904	9'-4½		56.99	2.1570		9'-6	0.037803	0.017 0.359	
904	9'-4½	8	28.98	2	(See Notes)	9'-6	100	13.122	Sprinkler
905	9'-4		85.97	2.1570		9'-6	0.080878	0.017 0.768	
905	9'-4	8	29.83	2	(See Notes)	9'-6	100	13.907	Sprinkler
906	9'-3½		115.80	2.1570		9'-6	0.140338	0.017 1.333	
906	9'-3½	8	31.25	2	(See Notes)	3'-8½ 8'-9½	100	15.258 0.007	Sprinkler, PO(8'-9½)
658	9'-3½		147.05	2.1570		12'-6	0.218330	2.727	
658	9'-3½			4		9'-9	100	17.992	
618	9'-3		147.05	4.2600		9'-9	0.007939	0.009 0.077	
								18.078	Total(Pt) Route 3
833	9'-4½	8	29.22	2	(See Notes)	9'-6	100	13.342	• • • • • **Route 4** • • • • • Sprinkler
834	9'-4		29.22	2.1570		9'-6	0.010986	0.017 0.104	
834	9'-4	8	29.35	2	(See Notes)	9'-6	100	13.463	Sprinkler
835	9'-3½		58.58	2.1570		9'-6	0.039770	0.017 0.378	
835	9'-3½	8	29.78	2	(See Notes)	9'-6	100	13.858	Sprinkler
836	9'-3		88.36	2.1570		9'-6	0.085081	0.017 0.808	
836	9'-3	8	30.66	2	(See Notes)	9'-6	100	14.684	Sprinkler
837	9'-2½		119.01	2.1570		9'-6	0.147616	0.017 1.402	
837	9'-2½	8	32.10	2	(See Notes)	3'-8½ 8'-9½	100	16.103 0.007	Sprinkler, PO(8'-9½)
573	9'-2½		151.12	2.1570		12'-6	0.229620	2.868	
								18.978	Total(Pt) Route 4

Job Name: Centeris UPS & Battery Rms
Remote Area Number: 1

Date: 4/7/2024

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
24	-3'-0		293.18	12	(See Notes)	1083'-5½	140	63.892	• • • • • **Route 5** • • • • •
						185'-1½	0.000086	-13.438	Flow (q) from Route 1
8	28'-0		301.04	12.4600		1268'-7		0.109	2EE(21'-3½), E(44'-3), T(98'-3½)
								50.562	Total(Pt) Route 5

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

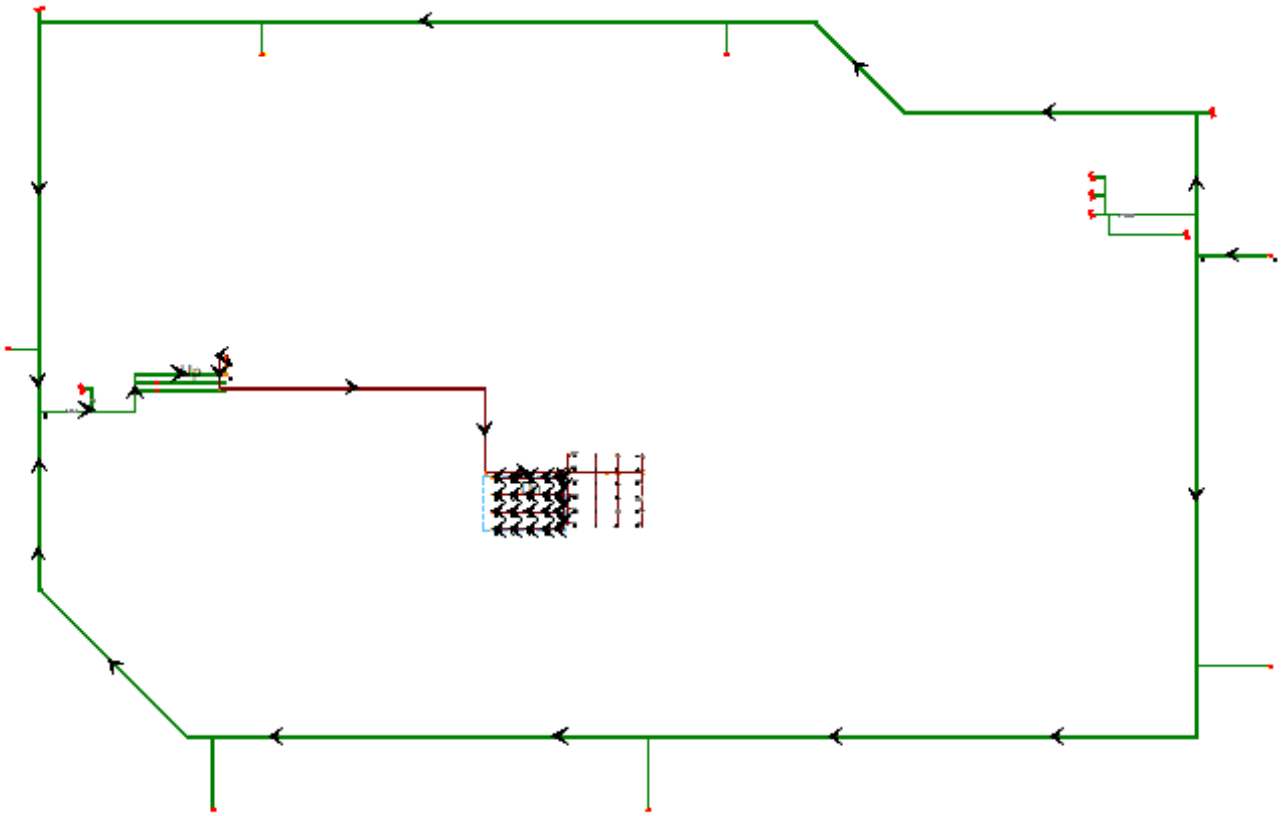
(Actual Inside Diameter / Schedule 40 Steel Pipe Inside Diameter) 4.87 = Factor

C Value Multiplier

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51

Fittings Legend

ALV	Alarm Valve	AngV	Angle Valve	b	Bushing
BalV	Ball Valve	BFP	Backflow Preventer	BV	Butterfly Valve
C	Cross Flow Turn 90°	cplg	Coupling	Cr	Cross Run
CV	Check Valve	DelV	Deluge Valve	DPV	Dry Pipe Valve
E	90° Elbow	EE	45° Elbow	Ee1	11¼° Elbow
Ee2	22½° Elbow	f	Flow Device	fd	Flex Drop
FDC	Fire Department Connection	fE	90° FireLock(TM) Elbow	fEE	45° FireLock(TM) Elbow
flg	Flange	FN	Floating Node	fT	FireLock(TM) Tee
g	Gauge	GloV	Globe Valve	GV	Gate Valve
Ho	Hose	Hose	Hose	HV	Hose Valve
Hyd	Hydrant	LtE	Long Turn Elbow	mecT	Mechanical Tee
Noz	Nozzle	P1	Pump In	P2	Pump Out
PIV	Post Indicating Valve	PO	Pipe Outlet	PrV	Pressure Relief Valve
PRV	Pressure Reducing Valve	red	Reducer/Adapter	S	Supply
sCV	Swing Check Valve	SFx	Seismic Flex	Spr	Sprinkler
St	Strainer	T	Tee Flow Turn 90°	Tr	Tee Run
U	Union	WirF	Wirsbo	WMV	Water Meter Valve
Z	Cap				



Hydraulic Calculations

for

Project Name: Centeris UPS & Battery Rms
Location: 1023 39th Ave SE, Puyallup. WA 98374,
Drawing Name: Centeris v2 Calculation Date: 4/8/2024

Design

Remote Area Number:	2
Remote Area Location:	UPS Rm
Occupancy Classification:	Ordinary Group II
Density	0.20gpm/ft²
Area of Application:	1500ft² (Actual 2003ft²)
Coverage per Sprinkler:	122ft²
Type of sprinklers calculated:	Pendent
No. of sprinklers calculated:	21
No. of nozzles calculated:	0

WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE SPRINKLER SYSTEMS
Expires DEC 31,24
Matthew William Kunkle
4960-0322-C LEVEL 3
Columbia Fire, LLC
COLUMFL795NJ
Signature
04/08/2024
Date

In-rack Demand: N/A gpm at Node: N/A
Hose Streams: 250.00 at Node: 2 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 2: 771.58 @ 47.749 (Safety Margin = 25.580)
Type of System: Dbl. Interlock Pre-Action
Volume of Dry/PreAction/Antifreeze/OtherAgent 338.51gal

Name of Contractor: Columbia Fire
Address: 111 S Findlay St, Seattle, WA 98108
Phone Number: (206) 232-8569
Name of designer: Luke Thompson
Authority Having Jurisdiction: City of Puyallyup

Notes:

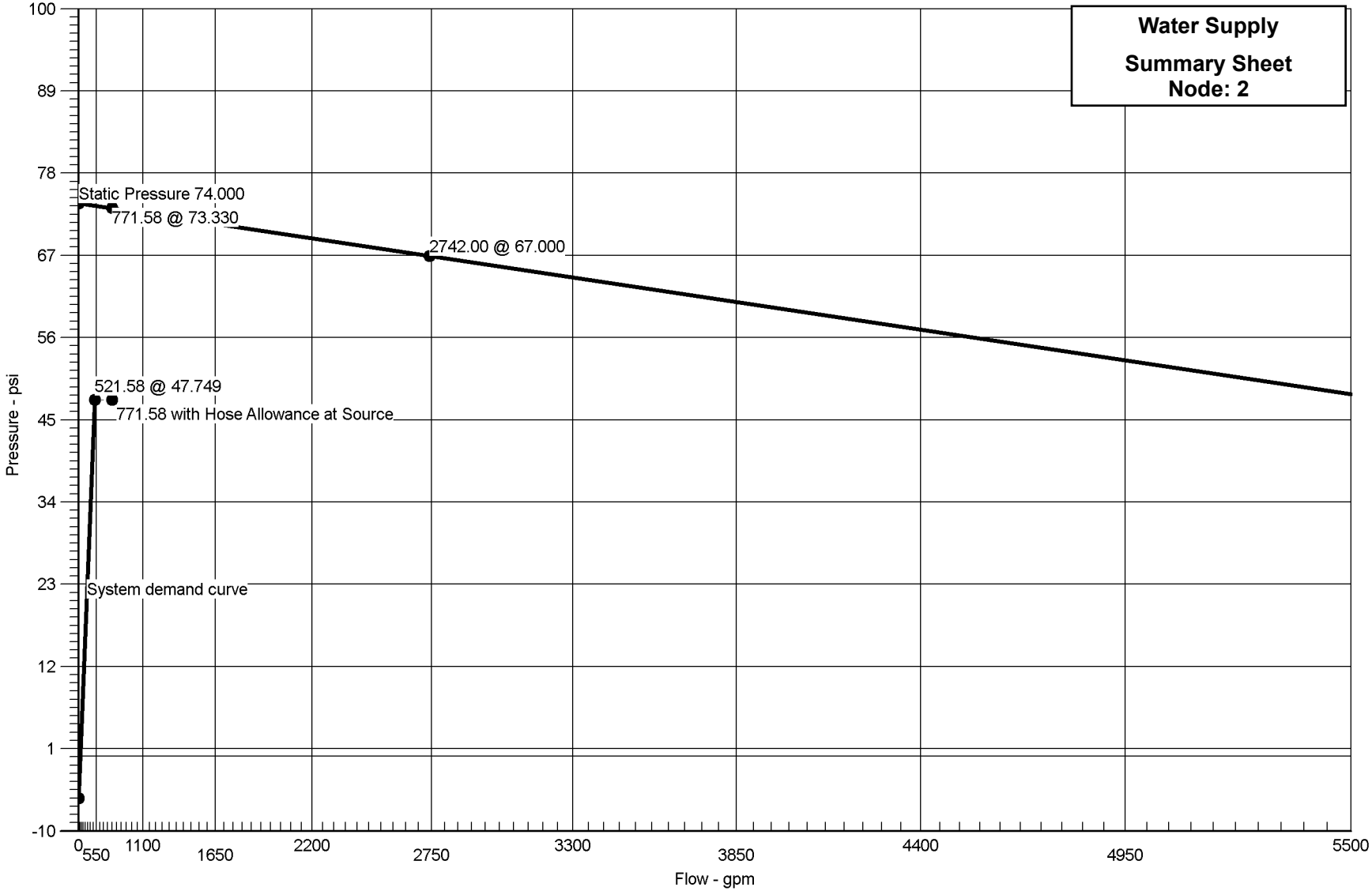
Automatic peaking results Left: N/A Right: N/A

Hydraulic Graph

Job Name: Centeris UPS & Battery Rms
Remote Area Number: 2

N 1.85

Date: 4/8/2024



Summary Of Outflowing Devices

Job Number: 1
Report Description: Ordinary Group II (2)

Device	Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler 814	27.15	24.30	8	11.514		
Sprinkler 815	**24.30**	**24.30**	**8**	**9.226**		
Sprinkler 816	24.44	24.30	8	9.335		
Sprinkler 830	27.20	21.60	8	11.557		
Sprinkler 831	24.34	21.60	8	9.255		
Sprinkler 832	24.49	21.60	8	9.368		
Sprinkler 839	26.29	21.60	8	10.799		
Sprinkler 840	23.57	21.60	8	8.678		
Sprinkler 841	23.71	21.60	8	8.784		
Sprinkler 859	26.61	16.80	8	11.063		
Sprinkler 860	25.92	21.60	8	10.500		
Sprinkler 861	23.26	21.60	8	8.452		
Sprinkler 862	23.40	21.60	8	8.553		
Sprinkler 875	26.44	16.80	8	10.920		
Sprinkler 876	25.75	21.60	8	10.360		
Sprinkler 877	23.11	21.60	8	8.344		
Sprinkler 878	23.25	21.60	8	8.447		
Sprinkler 886	26.39	16.80	8	10.883		
Sprinkler 887	25.70	21.60	8	10.322		
Sprinkler 888	23.07	21.60	8	8.315		
Sprinkler 889	23.21	21.60	8	8.417		

Most Demanding Sprinkler Data

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
815	13'-0	8	24.30	1	(See Notes)	2'-11	120	9.226	• • • • • **Route 1** • • • • •
512	18'-5½		24.30	1.0490		46'-0 48'-11	0.186573	-2.359 9.127	Sprinkler, 3E(2'-0), PO(5'-0), fd(35'-0)
512	18'-5½			2		8'-0	100	15.994	
534	18'-5½		24.30	2.1570		8'-0	0.007810	-0.006 0.062	
534	18'-5½		24.34	2	(See Notes)	1'-9	100	16.051	Flow (q) from Route 11
567	18'-5½		48.64	2.1570		8'-9½ 10'-6½	0.028196	-0.001 0.297	T(8'-9½)
567	18'-5½		93.00	2	(See Notes)	3'-4½	100	16.347	Flow (q) from Route 3
566	15'-1½		141.64	2.0670		7'-1½ 10'-6	0.250681	1.460 2.631	PO(7'-1½)
566	15'-1½		142.50	4		12'-1	100	20.438	Flow (q) from Route 2
563	15'-1		284.14	4.2600		12'-1	0.026849	0.009 0.325	
563	15'-1		54.34 + 103.66	4		16'-0	100	20.771	Flow (q) from Route 13 and 14
561	15'-0½		442.14	4.2600		16'-0	0.060842	0.014 0.972	
561	15'-0½		79.44	4	(See Notes)	272'-3	100	21.758	Flow (q) from Route 18
81	10'-6		521.58	4.2600		75'-1½ 347'-4	0.082595	1.974 28.689	6E(9'-4½), T(18'-9½)
81	10'-6			6	(See Notes)	6'-11½	100	52.420	
87	3'-7		521.58	6.3570		38'-11 45'-10	0.011758	3.009 0.539	E(12'-6½), DPV(26'-4½)
87	3'-7			6	(See Notes)	9'-10½	120	55.969	
204	1'-1½		521.58	6.3570		67'-11 77'-9½	0.008392	1.057 0.653	BV(12'-7), E(17'-7), T(37'-8½)
204	1'-1½			8	(See Notes)	4'-1½	120	57.678	
12	-3'-0		521.58	8.2490		21'-1½ 25'-3	0.002359	1.788 0.060	E(21'-1½)
12	-3'-0			8	(See Notes)	127'-8	140	59.526	
44	-3'-0		521.58	8.3900		134'-0½ 261'-8½	0.001634	 0.427	GV(6'-9½), 2E(30'-6½), PIV(6'-9½), BFP, T(59'-4½)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
44	-3'-0			12	(See Notes)	994'-9½	140	59.953	
27	28'-0		257.34	12.4600		337'-5½	0.000064	-13.438	3T(98'-3½), 2EE(21'-3½)
						1332'-3		0.086	
27	28'-0		264.24	6	(See Notes)	42'-0	140	46.601	Flow (q) from Route 22
2	26'-0		521.58	6.2800			0.006695	0.867	Water Supply
						42'-0		0.281	
			250.00					47.749	Hose Allowance At Source
2			771.58						Total(Pt) Route 1
816	13'-0	8	24.44	1	(See Notes)	2'-11	120	9.335	• • • • • **Route 2** • • • • •
505	17'-1½		24.44	1.0490		46'-0	0.188606	-1.774	Sprinkler,
						48'-11		9.226	3E(2'-0), PO(5'-0), fd(35'-0)
505	17'-1½			2		8'-0	100	16.788	
537	17'-1½		24.44	2.1570			0.007895	-0.006	
						8'-0		0.063	
537	17'-1½		24.49	2	(See Notes)	1'-9	100	16.845	Flow (q) from Route 12
569	17'-1½		48.93	2.1570		8'-9½	0.028509	-0.001	T(8'-9½)
						10'-6½		0.301	
569	17'-1½		93.57	2	(See Notes)	2'-0	100	17.144	Flow (q) from Route 5
570	15'-1½		142.50	2.0670		7'-1½	0.253491	0.863	PO(7'-1½)
						9'-1½		2.312	
570	15'-1½			4		14'-4	100	20.319	
566	15'-1½		142.50	4.2600			0.007489	0.012	
						14'-4		0.107	
								20.438	Total(Pt) Route 2
888	13'-0	8	23.07	1	(See Notes)	2'-11½	120	8.315	• • • • • **Route 3** • • • • •
674	18'-6½		23.07	1.0490		46'-0	0.169466	-2.389	Sprinkler,
						48'-11½		8.297	3E(2'-0), PO(5'-0), fd(35'-0)
674	18'-6½			2		8'-0	100	14.223	
646	18'-6		23.07	2.1570			0.007094	0.006	
						8'-0		0.057	
646	18'-6		23.11	2		8'-0	100	14.286	Flow (q) from Route 4
616	18'-6		46.18	2.1570			0.025614	0.006	
						8'-0		0.205	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
616	18'-6		23.26	2		8'-0	100	14.497	Flow (q) from Route 7
								0.006	
591	18'-6		69.44	2.1570		8'-0	0.054476	0.436	
591	18'-6		23.57	2	(See Notes)	6'-3	100	14.939	Flow (q) from Route 9
						8'-9½		0.005	T(8'-9½)
567	18'-5½		93.00	2.1570		15'-0	0.093540	1.404	
								16.347	Total(Pt) Route 3
877	13'-0	8	23.11	1	(See Notes)	2'-11½	120	8.344	• • • • • **Route 4** • • • • •
						46'-0		-2.383	Sprinkler,
646	18'-6		23.11	1.0490		48'-11½	0.169999	8.325	3E(2'-0), PO(5'-0), fd(35'-0)
								14.286	Total(Pt) Route 4
889	13'-0	8	23.21	1	(See Notes)	2'-11	120	8.417	• • • • • **Route 5** • • • • •
						46'-0		-1.804	Sprinkler,
677	17'-2		23.21	1.0490		48'-11	0.171377	8.384	3E(2'-0), PO(5'-0), fd(35'-0)
677	17'-2			2		8'-0	100	14.997	
								0.006	
649	17'-2		23.21	2.1570		8'-0	0.007174	0.057	
649	17'-2		23.25	2		8'-0	100	15.060	Flow (q) from Route 6
								0.006	
621	17'-2		46.46	2.1570		8'-0	0.025905	0.207	
621	17'-2		23.40	2		8'-0	100	15.273	Flow (q) from Route 8
								0.006	
594	17'-1½		69.86	2.1570		8'-0	0.055089	0.441	
594	17'-1½		23.71	2	(See Notes)	6'-3	100	15.720	Flow (q) from Route 10
						8'-9½		0.005	T(8'-9½)
569	17'-1½		93.57	2.1570		15'-0	0.094594	1.420	
								17.144	Total(Pt) Route 5
878	13'-0	8	23.25	1	(See Notes)	2'-11	120	8.447	• • • • • **Route 6** • • • • •
						46'-0		-1.798	Sprinkler,
649	17'-2		23.25	1.0490		48'-11	0.171939	8.411	3E(2'-0), PO(5'-0), fd(35'-0)
								15.060	Total(Pt) Route 6

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
861	13'-0	8	23.26	1	(See Notes)	2'-11½	120	8.452	• • • • • **Route 7** • • • • •
						46'-0	0.172038	-2.377	Sprinkler,
616	18'-6		23.26	1.0490		48'-11½		8.422	3E(2'-0), PO(5'-0), fd(35'-0)
								14.497	Total(Pt) Route 7
862	13'-0	8	23.40	1	(See Notes)	2'-11	120	8.553	• • • • • **Route 8** • • • • •
						46'-0	0.173943	-1.792	Sprinkler,
621	17'-2		23.40	1.0490		48'-11		8.512	3E(2'-0), PO(5'-0), fd(35'-0)
								15.273	Total(Pt) Route 8
840	13'-0	8	23.57	1	(See Notes)	2'-11½	120	8.678	• • • • • **Route 9** • • • • •
						46'-0	0.176294	-2.371	Sprinkler,
591	18'-6		23.57	1.0490		48'-11½		8.631	3E(2'-0), PO(5'-0), fd(35'-0)
								14.939	Total(Pt) Route 9
841	13'-0	8	23.71	1	(See Notes)	2'-11	120	8.784	• • • • • **Route 10** • • • • •
						46'-0	0.178285	-1.786	Sprinkler,
594	17'-1½		23.71	1.0490		48'-11		8.722	3E(2'-0), PO(5'-0), fd(35'-0)
								15.720	Total(Pt) Route 10
831	13'-0	8	24.34	1	(See Notes)	2'-11½	120	9.255	• • • • • **Route 11** • • • • •
						46'-0	0.187107	-2.365	Sprinkler,
534	18'-5½		24.34	1.0490		48'-11½		9.161	3E(2'-0), PO(5'-0), fd(35'-0)
								16.051	Total(Pt) Route 11
832	13'-0	8	24.49	1	(See Notes)	2'-11	120	9.368	• • • • • **Route 12** • • • • •
						46'-0	0.189223	-1.780	Sprinkler,
537	17'-1½		24.49	1.0490		48'-11		9.257	3E(2'-0), PO(5'-0), fd(35'-0)
								16.845	Total(Pt) Route 12
814	13'-0	8	27.15	1	(See Notes)	0'-5	120	11.514	• • • • • **Route 13** • • • • •
						42'-0	0.228996	-0.891	Sprinkler,
508	15'-1		27.15	1.0490		42'-5		9.714	E(2'-0), PO(5'-0), fd(35'-0)
508	15'-1			2		8'-0	100	20.337	
							0.009586	-0.006	
543	15'-1		27.15	2.1570		8'-0		0.077	
543	15'-1		27.20	2	(See Notes)	1'-9	100	20.408	Flow (q) from Route 21
						8'-9½	0.034618	-0.001	
563	15'-1		54.34	2.1570		10'-6½		0.365	PO(8'-9½)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) Fitting / Total	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
								20.771	Total(Pt) Route 13
887	13'-0	8	25.70	1	(See Notes)	0'-5	120	10.322	• • • • • **Route 14** • • • • • Sprinkler,
680	15'-1½		25.70	1.0490		42'-0	0.206973	-0.920	E(2'-0), PO(5'-0), fd(35'-0)
						42'-5		8.779	
680	15'-1½			2		8'-0	100	18.180	
652	15'-1½		25.70	2.1570		8'-0	0.008664	0.006 0.069	
652	15'-1½		25.75	2		8'-0	100	18.256	Flow (q) from Route 15
624	15'-1½		51.45	2.1570		8'-0	0.031288	0.006 0.250	
624	15'-1½		25.92	2		8'-0	100	18.512	Flow (q) from Route 16
597	15'-1		77.38	2.1570		8'-0	0.066559	0.006 0.532	
597	15'-1		26.29	2	(See Notes)	6'-3	100	19.050	Flow (q) from Route 17
563	15'-1		103.66	2.1570		8'-9½ 15'-0	0.114342	0.005 1.716	PO(8'-9½)
								20.771	Total(Pt) Route 14
876	13'-0	8	25.75	1	(See Notes)	0'-5	120	10.360	• • • • • **Route 15** • • • • • Sprinkler,
652	15'-1½		25.75	1.0490		42'-0 42'-5	0.207689	-0.915 8.810	E(2'-0), PO(5'-0), fd(35'-0)
								18.256	Total(Pt) Route 15
860	13'-0	8	25.92	1	(See Notes)	0'-5	120	10.500	• • • • • **Route 16** • • • • • Sprinkler,
624	15'-1½		25.92	1.0490		42'-0 42'-5	0.210286	-0.909 8.920	E(2'-0), PO(5'-0), fd(35'-0)
								18.512	Total(Pt) Route 16
839	13'-0	8	26.29	1	(See Notes)	0'-5	120	10.799	• • • • • **Route 17** • • • • • Sprinkler,
597	15'-1		26.29	1.0490		42'-0 42'-5	0.215806	-0.903 9.154	E(2'-0), PO(5'-0), fd(35'-0)
								19.050	Total(Pt) Route 17
886	13'-0	8	26.39	1	(See Notes)	1'-6½	120	10.883	• • • • • **Route 18** • • • • • Sprinkler,
668	15'-1		26.39	1.0490		44'-0 45'-6½	0.217361	-0.903 9.899	2E(2'-0), PO(5'-0), fd(35'-0)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
668	15'-1			2		8'-0	100	19.879	
								0.006	
638	15'-1		26.39	2.1570		8'-0	0.009099	0.073	
638	15'-1		26.44	2		8'-0	100	19.958	Flow (q) from Route 19
								0.006	
612	15'-1		52.83	2.1570		8'-0	0.032854	0.263	
612	15'-1		26.61	2	(See Notes)	13'-0½	100	20.227	Flow (q) from Route 20
						8'-9½		0.008	
561	15'-0½		79.44	2.1570		21'-9½	0.069875	1.524	PO(8'-9½)
								21.758	Total(Pt) Route 18
875	13'-0	8	26.44	1	(See Notes)	1'-7	120	10.920	• • • • • **Route 19** • • • • •
						44'-0		-0.897	Sprinkler,
638	15'-1		26.44	1.0490		45'-7	0.218046	9.935	2E(2'-0), PO(5'-0), fd(35'-0)
								19.958	Total(Pt) Route 19
859	13'-0	8	26.61	1	(See Notes)	1'-7	120	11.063	• • • • • **Route 20** • • • • •
						44'-0		-0.891	Sprinkler,
612	15'-1		26.61	1.0490		45'-7	0.220681	10.055	2E(2'-0), PO(5'-0), fd(35'-0)
								20.227	Total(Pt) Route 20
830	13'-0	8	27.20	1	(See Notes)	0'-5	120	11.557	• • • • • **Route 21** • • • • •
						42'-0		-0.897	Sprinkler,
543	15'-1		27.20	1.0490		42'-5	0.229789	9.747	E(2'-0), PO(5'-0), fd(35'-0)
								20.408	Total(Pt) Route 21
44	-3'-0		257.34	12	(See Notes)	1083'-5½	140	59.953	• • • • • **Route 22** • • • • •
						185'-1½		-13.438	Flow (q) from Route 1
27	28'-0		264.24	12.4600		1268'-7	0.000068	0.086	2EE(21'-3½), E(44'-3), T(98'-3½)
								46.601	Total(Pt) Route 22

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

(Actual Inside Diameter / Schedule 40 Steel Pipe Inside Diameter) 4.87 = Factor

C Value Multiplier

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51

Fittings Legend

ALV	Alarm Valve	AngV	Angle Valve	b	Bushing
BalV	Ball Valve	BFP	Backflow Preventer	BV	Butterfly Valve
C	Cross Flow Turn 90°	cplg	Coupling	Cr	Cross Run
CV	Check Valve	DelV	Deluge Valve	DPV	Dry Pipe Valve
E	90° Elbow	EE	45° Elbow	Ee1	11¼° Elbow
Ee2	22½° Elbow	f	Flow Device	fd	Flex Drop
FDC	Fire Department Connection	fE	90° FireLock(TM) Elbow	fEE	45° FireLock(TM) Elbow
flg	Flange	FN	Floating Node	fT	FireLock(TM) Tee
g	Gauge	GloV	Globe Valve	GV	Gate Valve
Ho	Hose	Hose	Hose	HV	Hose Valve
Hyd	Hydrant	LtE	Long Turn Elbow	mecT	Mechanical Tee
Noz	Nozzle	P1	Pump In	P2	Pump Out
PIV	Post Indicating Valve	PO	Pipe Outlet	PrV	Pressure Relief Valve
PRV	Pressure Reducing Valve	red	Reducer/Adapter	S	Supply
sCV	Swing Check Valve	SFx	Seismic Flex	Spr	Sprinkler
St	Strainer	T	Tee Flow Turn 90°	Tr	Tee Run
U	Union	WirF	Wirsbo	WMV	Water Meter Valve
Z	Cap				

Flow Diagram (Current View)