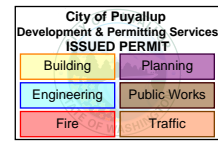


# Hydraulic Calculations

for



Project Name: RED DOT OFFICE TI  
 Location: 2504 EAST MAIN AVE, PUYALLUP, WA 98372,  
 Drawing Name: 4699 - Red Dot Office TI

Calculation Date: 7/11/2022

## Design

Remote Area Number: #1  
 Remote Area Location: Level 1 Open Office  
 Occupancy Classification: Light Hazard  
 Commodity Classification: N/A

Density 0.10gpm/ft<sup>2</sup>  
 Area of Application: 1500ft<sup>2</sup> (Actual 1396ft<sup>2</sup>)  
 Coverage per Sprinkler: 400ft<sup>2</sup>  
 Type of sprinklers calculated: Pendent  
 No. of sprinklers calculated: 5  
 No. of nozzles calculated: 0



In-rack Demand: N/A gpm at Node: N/A  
 Hose Streams: 0.0 gpm at Node: 328 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):  
 from Pump at Node: 328: 0.00 @ 0.000 (Safety Margin = 125.000)  
 from Pump at Node: 117: 214.23 @ 65.344 (Safety Margin = 59.110)

Type of System: Wet  
 Volume of Dry/PreAction/Antifreeze/OtherAgent N/A

Name of Contractor: FIRE SPRINKLERS INC.  
 Address: 1524 45TH ST E, SUMNER, WA 98390  
 Phone Number: 253-826-0099  
 Name of designer: CCS  
 Authority Having Jurisdiction: PUYALLUP

## Notes:

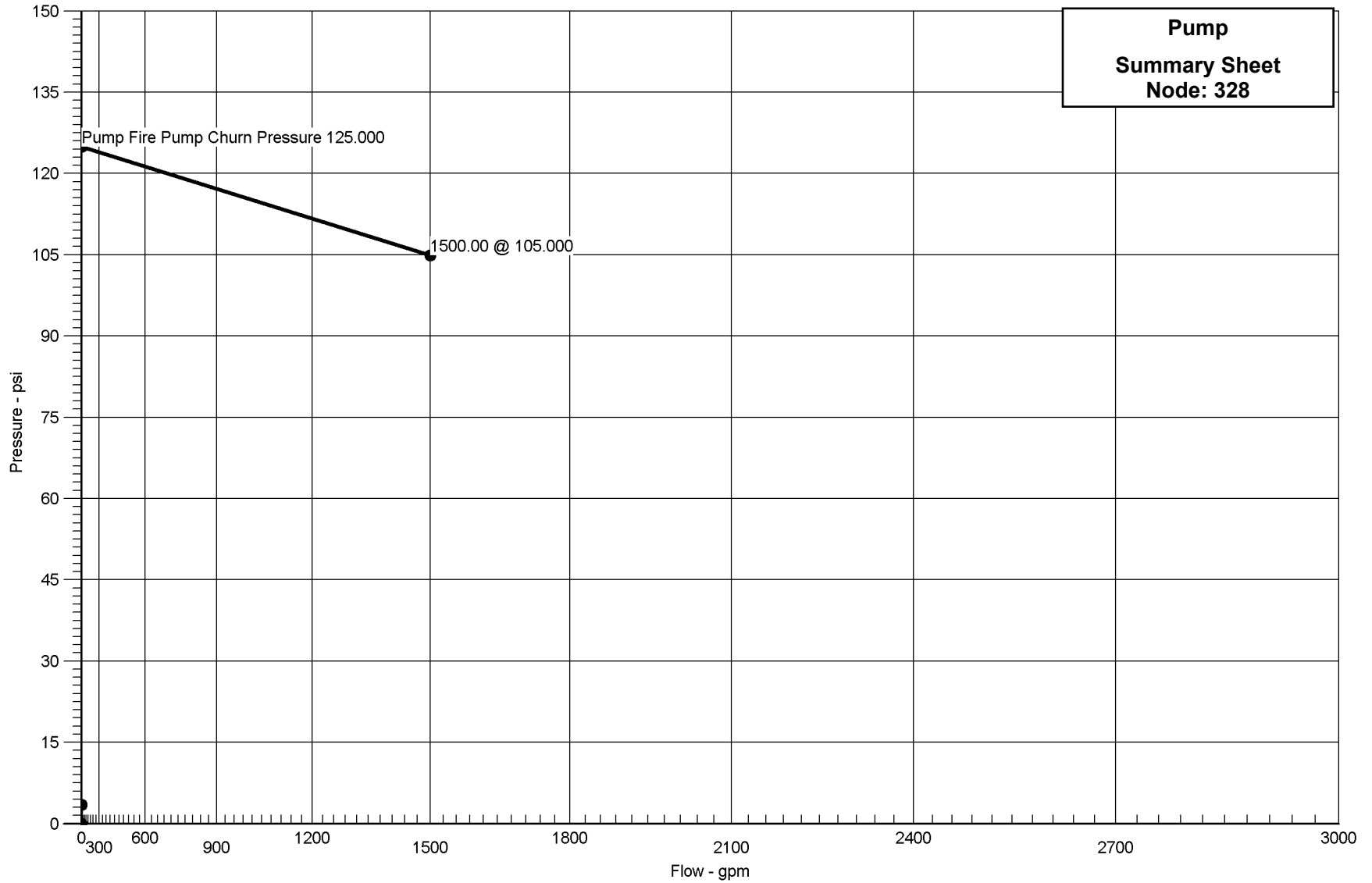
Automatic peaking results Left: 62.521 Right: N/A

# Hydraulic Graph

Job Name: RED DOT OFFICE TI  
Remote Area Number: #1

N 1.85

Date: 7/11/2022



**Pump Rating: 1500.00 @ 105.000**

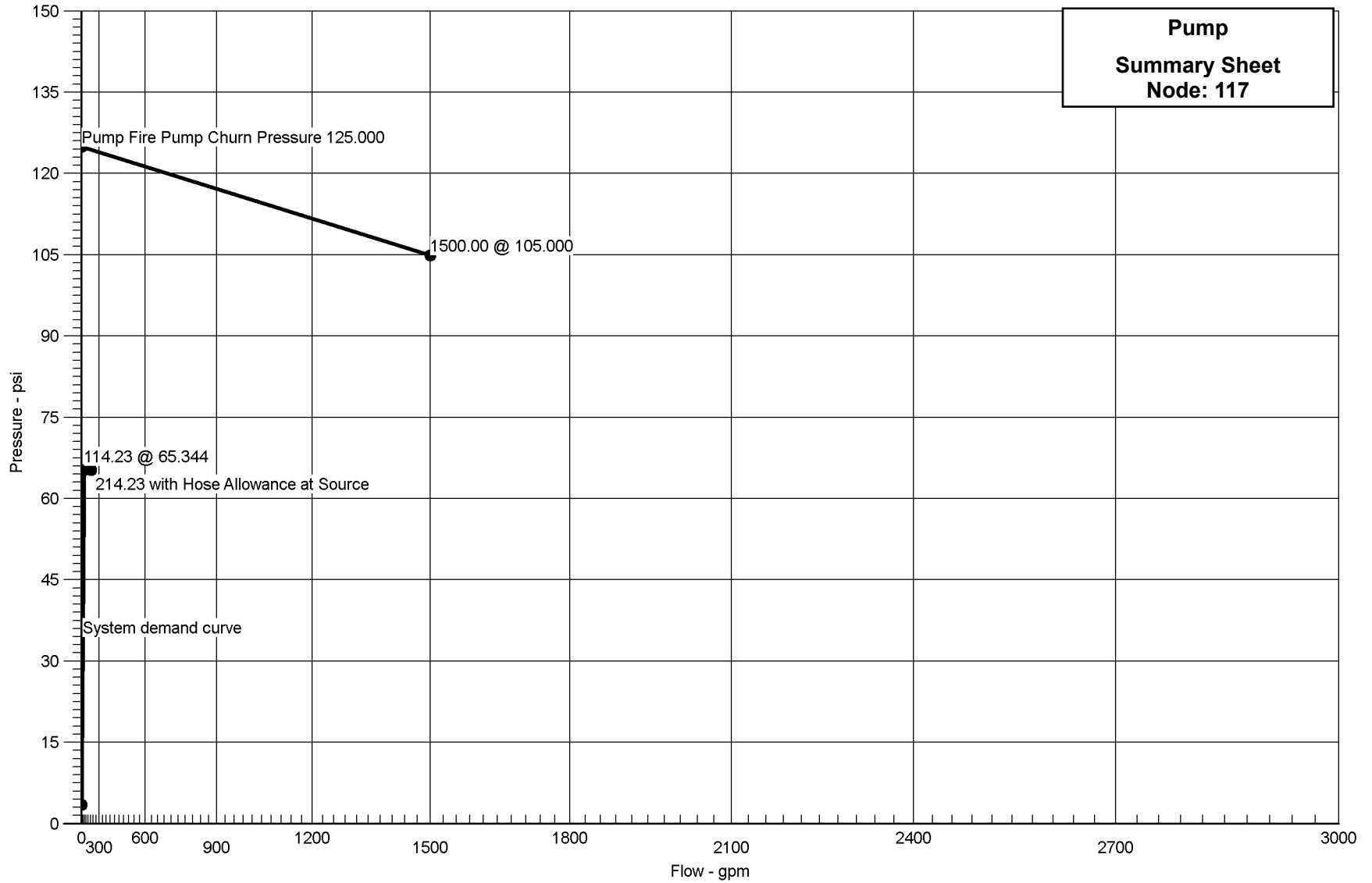
**Supply: Static:**  
**Residual:**  
**Flowing:**

# Hydraulic Graph

Job Name: RED DOT OFFICE TI  
Remote Area Number: #1

N 1.85

Date: 7/11/2022



**Pump Rating: 1500.00 @ 105.000**

**Supply: Static:**  
**Residual:**  
**Flowing:**



# Summary Of Outflowing Devices

Job Number: 4699

Report Description: Light Hazard (#1)

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)	Density (gpm/ft <sup>2</sup> )	
⇒ Sprinkler	1001	40.00	40.00	11.2	12.755	N/A	
Sprinkler	1002	40.52	40.00	11.2	13.092	N/A	
Sprinkler	1003	42.65	40.00	11.2	14.501	N/A	
Sprinkler	1004	43.27	40.00	11.2	14.925	N/A	
Sprinkler	1005	47.79	40.00	11.2	18.208	N/A	

⇒ Most Demanding Sprinkler Data

Supply Analysis							
Node	Name	Static (psi)	Residual (psi)	@ Flow (gpm)	Available (psi)	@ Total Demand (gpm)	Required Pressure (psi)
	Elevation + Static Pressure						

Pump Analysis						
Node	Churn (psi)	Residual (psi)	@ Flow (gpm)	Available (psi)	@ Total Demand (gpm)	Required Pressure (psi)
328	125.000	105.000	1500.00	125.000	0.00	0.000
117	125.000	105.000	1500.00	124.454	214.23	65.344

Node Analysis					
Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
1001	10'-0	Sprinkler	12.755	40.00	Density: N/A
1002	10'-0	Sprinkler	13.092	40.52	Density: N/A
1003	10'-0	Sprinkler	14.501	42.65	Density: N/A
1004	10'-0	Sprinkler	14.925	43.27	Density: N/A
1005	10'-0	Sprinkler	18.208	47.79	Density: N/A
101	13'-0		28.108		
102	13'-0		28.851		
103	13'-0		34.396		
104	13'-0		35.607		
105	13'-0		37.929		
106	34'-5½		42.227		
107	34'-5½		43.321		
108	34'-5½		46.796		
109	34'-5½		49.841		
110	31'-7½		51.807		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
111	32'-1½		51.605		
112	32'-7½		51.403		
113	33'-1½		51.203		
114	33'-7		51.004		
115	1'-9½		65.292		
116	1'-9½		65.344		
117	1'-9½	P2	65.344		(-124.519)
119	13'-0		28.520		
120	13'-0		29.356		
121	13'-0		35.817		
122	31'-10		51.680		
123	32'-4		51.478		
124	33'-3		51.072		
125	33'-9		50.867		
126	32'-9½		51.275		

Pipe Information									
Node 1	Elev 1 (Foot)	K-Factor	Flow added this step (q)	Nominal ID	Fittings & Devices	Length (Foot)	C Factor	Total(Pt)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
Node 2	Elev 2 (Foot)		Total Flow (Q)	Actual ID	Equiv. Length (Foot)	Fitting (Foot)	Pf Friction Loss Per Unit (psi)	Elev(Pe)	
						Total (Foot)		Friction(Pf)	
1001	10'-0	11.2	40.00	1	(See Notes)	2'-6	120	12.755	***** Route 1 ***** Sprinkler, 2E(2'-0), PO(5'-0), fd(24'-0)
101	13'-0		40.00	1.0490		33'-0	0.469124	-1.301	
						35'-6		16.654	
101	13'-0			1½		18'-0	120	28.108	
102	13'-0		40.00	1.7280		18'-0	0.041269	0.743	
102	13'-0		40.52	1½	(See Notes)	25'-6½	120	28.851	Flow (q) from Route 2 PO(11'-3½)
103	13'-0		80.52	1.7280		11'-3½	0.150585		
						36'-10		5.545	
103	13'-0			2		23'-8½	120	34.396	
104	13'-0		80.52	2.1570		23'-8½	0.051141	1.212	
104	13'-0		85.92	2		11'-10	120	35.607	Flow (q) from Route 3
105	13'-0		166.44	2.1570		11'-10	0.195950	2.321	
105	13'-0		47.79	2	(See Notes)	40'-0½	120	37.929	Flow (q) from Route 5 fE(3'-6)
106	34'-5½		214.23	2.1570		3'-6	0.312571	-9.307	
						43'-6½		13.606	
106	34'-5½			2	(See Notes)	0'-0	120	42.227	fE(3'-6)
107	34'-5½		214.23	2.1570		3'-6	0.312571	1.094	
						3'-6			
107	34'-5½			2	(See Notes)	7'-7½	120	43.321	fE(3'-6)
108	34'-5½		214.23	2.1570		3'-6	0.312571		
						11'-1½		3.475	
108	34'-5½			3	(See Notes)	23'-6	120	46.796	PO(20'-2), mecT(9'-0) PO(20'-2)
109	34'-5½		214.23	3.2600		49'-4	0.041824		
						72'-9½		3.045	
109	34'-5½			3	(See Notes)	2'-10	120	49.841	PO(20'-2)
110	31'-7½		184.87	3.2600		20'-2	0.031842	1.233	
						23'-0		0.733	
110	31'-7½			6		10'-0	120	51.807	
111	32'-1½		184.87	6.3570		10'-0	0.001232	-0.214	
								0.012	

## Pipe Information

Node 1	Elev 1 (Foot)	K-Factor	Flow added this step (q)	Nominal ID	Fittings & Devices	Length (Foot)	C Factor	Total(Pt)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.	
										Node 2
111	32'-1½		5.98	6		10'-0	120	51.605		
112	32'-7½		190.85	6.3570		10'-0	0.001306	-0.214		
								0.013		
112	32'-7½		6.87	6		10'-0	120	51.403	Flow (q) from Route 9	
113	33'-1½		197.72	6.3570		10'-0	0.001395	-0.214		
								0.014		
113	33'-1½		7.79	6		10'-0	120	51.203	Flow (q) from Route 7	
114	33'-7		205.51	6.3570		10'-0	0.001498	-0.214		
								0.015		
114	33'-7		8.73	6	(See Notes)	167'-5	120	51.004	Flow (q) from Route 8 5E(17'-7), EE(8'-9½), PO(37'-8½)	
115	1'-9½		214.23	6.3570		134'-6½	0.001618	13.800		
						301'-11½		0.489		
115	1'-9½			8	(See Notes)	19'-6	120	65.292	2E(21'-1½), CV(52'-10)	
116	1'-9½		214.23	8.2490		95'-1½	0.000455			
						114'-7½		0.052		
116	1'-9½			6		0'-0	120	65.344		
117	1'-9½		214.23	6.0650		0'-0	0.002034	0.000		
117			214.23		Pump			65.344	Rating: 105.000 @ 1500.00	
118										Fire Pump Churn Pressure: 125.000
			100.00					65.344	Hose Allowance At Source	
117			214.23						Total(Pt) Route 1	
1002	10'-0	11.2	40.52	1	(See Notes)	2'-6	120	13.092	***** Route 2 ***** Sprinkler, 2E(2'-0), PO(5'-0), fd(24'-0)	
102	13'-0		40.52	1.0490		33'-0	0.480566	-1.301		
						35'-6		17.060		
								28.851	Total(Pt) Route 2	
1003	10'-0	11.2	42.65	1	(See Notes)	0'-0	120	14.501	***** Route 3 ***** Sprinkler, PO(5'-0), fd(24'-0)	
119	13'-0		42.65	1.0490		29'-0	0.528242	-1.301		
						29'-0		15.319		



## Pipe Information

Node 1	Elev 1 (Foot)	K-Factor	Flow added this step (q)	Nominal ID	Fittings & Devices	Length (Foot)	C Factor	Total(Pt)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.	
										Node 2
119	13'-0			1½		18'-0	120	28.520		
120	13'-0		42.65	1.7280		18'-0	0.046470	0.836		
120	13'-0		43.27	1½	(See Notes)	25'-6½	120	29.356		
104	13'-0		85.92	1.7280		11'-3½	0.169776	6.251		
								35.607	Total(Pt) Route 3	
1004	10'-0	11.2	43.27	1	(See Notes)	0'-0	120	14.925		
						29'-0	0.542489	-1.301		
120	13'-0		43.27	1.0490		29'-0		15.732		
								29.356	Total(Pt) Route 4	
1005	10'-0	11.2	47.79	1	(See Notes)	0'-0	120	18.208		
						29'-0	0.652040	-1.301		
121	13'-0		47.79	1.0490		29'-0		18.909		
121	13'-0			1½	(See Notes)	25'-6½	120	35.817		
						11'-3½	0.057360			
105	13'-0		47.79	1.7280		36'-10		2.112		
								37.929	Total(Pt) Route 5	
122	31'-10		29.36	4		10'-0	120	51.680		
							0.000288	-0.205		
123	32'-4		29.36	4.2600		10'-0		0.003		
123	32'-4			3	(See Notes)	607'-2½	120	51.478		
						80'-7½	0.000056	0.088		
111	32'-1½		5.98	3.2600		687'-10		0.038		
								51.605	Total(Pt) Route 6	
124	33'-3		16.52	3	(See Notes)	607'-2	120	51.072		
						80'-7½	0.000091	0.069		
113	33'-1½		7.79	3.2600		687'-9½		0.062		
								51.203	Total(Pt) Route 7	
124	33'-3		16.52	4		10'-0	120	51.072		
							0.000030	-0.205		
125	33'-9		8.73	4.2600		10'-0		0.000		

## Pipe Information

Node 1	Elev 1 (Foot)	K-Factor	Flow added this step (q)	Nominal ID	Fittings & Devices	Length (Foot)	C Factor	Total(Pt)	Notes  Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
		Friction(Pf)							
125	33'-9				3	(See Notes)	607'-1½	120	
114	33'-7		8.73	3.2600		80'-7½	0.000112	0.059	
						687'-9		0.077	
								51.004	Total(Pt) Route 8
123	32'-4		5.98	4		10'-0	120	51.478	***** Route 9 ***** Flow (q) from Route 6
126	32'-9½		23.38	4.2600			0.000189	-0.205	
						10'-0		0.002	
126	32'-9½			3	(See Notes)	607'-2	120	51.275	PO(20'-2)  3PO(20'-2)
112	32'-7½		6.87	3.2600		80'-7½	0.000072	0.078	
						687'-9½		0.050	
								51.403	Total(Pt) Route 9
109	34'-5½			3	(See Notes)	604'-4½	120	49.841	***** Route 10 ***** PO(20'-2)  2PO(20'-2)
122	31'-10		29.36	3.2600		60'-5½	0.001058	1.135	
						664'-10		0.704	
								51.680	Total(Pt) Route 10
126	32'-9½		6.87	4		10'-0	120	51.275	***** Route 11 ***** Flow (q) from Route 9
124	33'-3		16.52	4.2600			0.000099	-0.205	
						10'-0		0.001	
								51.072	Total(Pt) Route 11

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

**C Value Multiplier**

$$\left( \frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}} \right)^{4.87} = \text{Factor}$$

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		