

# Fire Sprinkler Hydraulic Calculations

For

**Walmart #06958**

**Cameron, NC**

**Out To Permit**

**January 8, 2025**

**2450001270**



01/07/2025





# HENDERSON ENGINEERS

Henderson Engineers  
8345 Lenexa Dr, Suite #300  
Lenexa, KS 66214  
(913) 742 - 5000

Job Name : Walmart  
Building : 06958 Cameron, NC  
Location : Pickup Storage  
System :  
Contract :  
Data File : 06958 CANC - System 5 - RA A - UL12022002 - 12@15.WXF

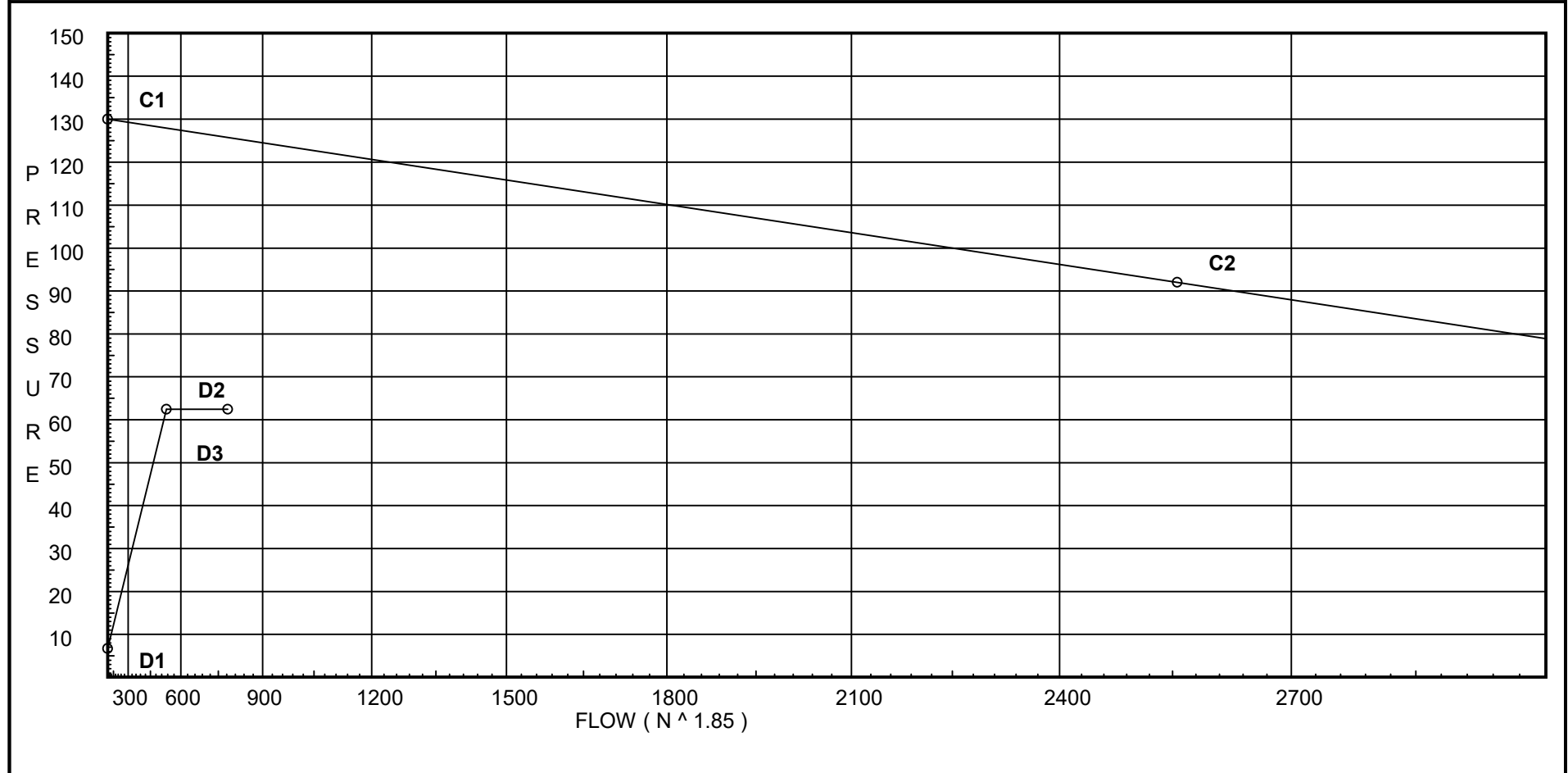
# Water Supply Curve

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City Water Supply:  
C1 - Static Pressure : 130  
C2 - Residual Pressure: 92  
C2 - Residual Flow : 2556

Demand:  
D1 - Elevation : 6.709  
D2 - System Flow : 533.903  
D2 - System Pressure : 62.449  
Hose ( Demand ) : 250  
D3 - System Demand : 783.903  
Safety Margin : 63.284



# Fittings Used Summary

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## Fitting Legend

Abbrev.	Name	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12	14	16	18	20	24
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Zcj	Colt C500 Horz OSY	Fitting generates a Fixed Loss Based on Flow																			

## Units Summary

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

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with \*. The fittings marked with a \* show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a \* will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

**SUPPLY ANALYSIS**

<b>Node at Source</b>	<b>Static Pressure</b>	<b>Residual Pressure</b>	<b>Flow</b>	<b>Available Pressure</b>	<b>Total Demand</b>	<b>Required Pressure</b>
SRC	130.0	92	2556.0	125.732	783.9	62.449

**NODE ANALYSIS**

<b>Node Tag</b>	<b>Elevation</b>	<b>Node Type</b>	<b>Pressure at Node</b>	<b>Discharge at Node</b>	<b>Notes</b>
5A05	15.49	11.2	15.0	43.38	0.1 20
5A06	15.49	11.2	15.17	43.62	0.1 20
5A07	15.49	11.2	15.78	44.49	0.1 20
5A08	15.49	11.2	17.09	46.3	0.1 20
T52	15.49		29.51		
52	14.3		33.01		
53	14.51		33.19		
54	14.76		38.18		
55	15.07		38.68		
56	15.33		38.96		
57	15.62		40.51		
58	15.89		40.59		
59	16.19		40.61		
510	16.48		40.59		
511	16.78		40.52		
512	17.08		40.42		
513	17.37		40.3		
523	17.37		42.09		
524	17.83		42.28		
TR5	6.53		48.2		
BR5	3.58		50.63	100.0	
FLG	1.52		51.81		
SRC	0.0		62.45	150.0	
5A01	15.27	11.2	15.01	43.39	0.1 20
5A02	15.27	11.2	15.18	43.64	0.1 20
5A03	15.27	11.2	15.79	44.5	0.1 20
5A04	15.27	11.2	17.1	46.31	0.1 20
T51	15.27		29.53		
51	14.09		33.03		
5A09	15.71	11.2	15.08	43.5	0.1 20
5A10	15.71	11.2	15.25	43.74	0.1 20
5A11	15.71	11.2	15.87	44.61	0.1 20
5A12	15.71	11.2	17.18	46.42	0.1 20
T53	15.71		29.67		
514	14.76		42.81		
515	15.07		42.68		
516	15.33		42.57		
517	15.62		42.47		
518	15.89		42.38		
519	16.19		42.3		
520	16.48		42.23		
521	16.78		42.17		

# Flow Summary - NFPA

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## *NODE ANALYSIS (cont.)*

<i><b>Node Tag</b></i>	<i><b>Elevation</b></i>	<i><b>Node Type</b></i>	<i><b>Pressure at Node</b></i>	<i><b>Discharge at Node</b></i>	<i><b>Notes</b></i>
522	17.08		42.12		

# Final Calculations : Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
5A05 to 5A06	15.49 15.49	11.20	43.38	2			10.340	120	15.000 0.0			
			43.38	2.157			10.340	0.0162	0.168	Vel =	3.81	
5A06 to 5A07	15.49 15.49	11.20	43.62	2			10.330	120	15.168 0.0			
			87.0	2.157			10.330	0.0591	0.610	Vel =	7.64	
5A07 to 5A08	15.49 15.49	11.20	44.49	2			10.330	120	15.778 0.0			
			131.49	2.157			10.330	0.1267	1.309	Vel =	11.54	
5A08 to T52	15.49 15.49	11.20	46.29	2	T	12.307	43.820 12.307	120	17.087 0.0			
			177.78	2.157			56.127	0.2214	12.424	Vel =	15.61	
T52 to 52	15.49 14.3		0.0	2	T	12.307	1.190 12.307	120	29.511 0.515			
			177.78	2.157			13.497	0.2214	2.988	Vel =	15.61	
52 to 53	14.3 14.51		177.85	4			9.250	120	33.014 -0.091			
			355.63	4.26			9.250	0.0290	0.268	Vel =	8.01	
53 to 54	14.51 14.76		178.27	4	5E	65.835	17.050 65.835	120	33.191 -0.108			
			533.9	4.26			82.885	0.0616	5.102	Vel =	12.02	
54 to 55	14.76 15.07		-80.43	4			13.920	120	38.185 -0.134			
			453.47	4.26			13.920	0.0455	0.633	Vel =	10.21	
55 to 56	15.07 15.33		-74.31	4			11.750	120	38.684 -0.113			
			379.16	4.26			11.750	0.0327	0.384	Vel =	8.53	
56 to 57	15.33 15.62		-70.47	4	2E	26.334	48.740 26.334	120	38.955 -0.126			
			308.69	4.26			75.074	0.0224	1.678	Vel =	6.95	
57 to 58	15.62 15.89		-46.99	4			12.000	120	40.507 -0.117			
			261.7	4.26			12.000	0.0164	0.197	Vel =	5.89	
58 to 59	15.89 16.19		-44.78	4			13.250	120	40.587 -0.130			
			216.92	4.26			13.250	0.0116	0.154	Vel =	4.88	
59 to 510	16.19 16.48		-43.28	4			13.250	120	40.611 -0.126			
			173.64	4.26			13.250	0.0078	0.103	Vel =	3.91	
510 to 511	16.48 16.78		-42.64	4			13.260	120	40.588 -0.130			
			131.0	4.26			13.260	0.0045	0.060	Vel =	2.95	
511 to 512	16.78 17.08		-42.75	4			13.250	120	40.518 -0.130			
			88.25	4.26			13.250	0.0023	0.030	Vel =	1.99	
512 to 513	17.08 17.37		-43.51	4			13.250	120	40.418 -0.126			
			44.74	4.26			13.250	0.0006	0.008	Vel =	1.01	
513 to 523	17.37 17.37		0.0	2.5	2T	32.948	242.830 32.948	120	40.300 0.0			
			44.74	2.635			275.778	0.0065	1.794	Vel =	2.63	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
523 to 524	17.37 17.83		489.16 533.9	6 6.357	E	17.603	26.190 17.603 43.793	120 0.0088	42.094 -0.199 0.384			Vel = 5.40
524 to TR5	17.83 6.53		0.0 533.9	8 8.249	5E	105.706	311.833 105.706 417.539	120 0.0025	42.279 4.894 1.029			Vel = 3.21
TR5 to BR5	6.53 3.58		0.0 533.9	8 8.249	T G Fsp	41.108 4.698 0.0	13.583 45.806 59.389	120 0.0025	48.202 2.278 0.146		** Fixed Loss = 1	Vel = 3.21
BR5 to FLG	3.58 1.52	H100	100.00 633.9	8 8.249	S E G	52.853 21.141 4.698	7.270 78.692 85.962	120 0.0034	50.626 0.892 0.291			Vel = 3.81
FLG to SRC	1.52 0		0.0 633.9	8 8.27	5E 2T Zcj	142.34 110.709 0.0	473.980 253.049 727.029	140 0.0025	51.809 8.813 1.827		** Fixed Loss = 8.154	Vel = 3.79
SRC			150.00 783.90						62.449		Qa = 150.00 K Factor = 99.20	
5A01 to 5A02	15.27 15.27	11.20	43.39 43.39	2 2.157			10.340 10.340	120 0.0163	15.011 0.0 0.169			Vel = 3.81
5A02 to 5A03	15.27 15.27	11.20	43.64 87.03	2 2.157			10.330 10.330	120 0.0591	15.180 0.0 0.610			Vel = 7.64
5A03 to 5A04	15.27 15.27	11.20	44.50 131.53	2 2.157			10.330 10.330	120 0.1267	15.790 0.0 1.309			Vel = 11.55
5A04 to T51	15.27 15.27	11.20	46.32 177.85	2 2.157	T	12.307	43.820 12.307 56.127	120 0.2215	17.099 0.0 12.433			Vel = 15.62
T51 to 51	15.27 14.09		0.0 177.85	2 2.157	T	12.307	1.180 12.307 13.487	120 0.2215	29.532 0.511 2.987			Vel = 15.62
51 to 52	14.09 14.3		0.0 177.85	4 4.26			9.250 9.250	120 0.0081	33.030 -0.091 0.075			Vel = 4.00
52			0.0 177.85						33.014		K Factor = 30.95	
5A09 to 5A10	15.71 15.71	11.20	43.50 43.5	2 2.157			10.330 10.330	120 0.0164	15.084 0.0 0.169			Vel = 3.82
5A10 to 5A11	15.71 15.71	11.20	43.74 87.24	2 2.157			10.330 10.330	120 0.0592	15.253 0.0 0.612			Vel = 7.66
5A11 to 5A12	15.71 15.71	11.20	44.61 131.85	2 2.157			10.330 10.330	120 0.1274	15.865 0.0 1.316			Vel = 11.58
5A12 to T53	15.71 15.71	11.20	46.42 178.27	2 2.157	T	12.307	43.810 12.307 56.117	120 0.2225	17.181 0.0 12.485			Vel = 15.65



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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
T53 to 53	15.71 14.51		0.0 178.27	2	T 12.307	1.200 12.307 13.507	120 0.2225	29.666 0.520 3.005			Vel = 15.65
53			0.0 178.27					33.191			K Factor = 30.94
54 to 514	14.76 14.76		80.43 80.43	2.5	2T 32.948	207.090 32.948 240.038	120 0.0193	38.185 0.0 4.621			Vel = 4.73
514 to 515	14.76 15.07		0.0 80.43	6	6 6.357	13.920 13.920	120 0.0003	42.806 -0.134 0.004			Vel = 0.81
515 to 516	15.07 15.33		74.31 154.74	6	6 6.357	11.750 11.750	120 0.0009	42.676 -0.113 0.010			Vel = 1.56
516 to 517	15.33 15.62		70.47 225.21	6	6 6.357	13.000 13.000	120 0.0018	42.573 -0.126 0.024			Vel = 2.28
517 to 518	15.62 15.89		46.99 272.2	6	6 6.357	12.000 12.000	120 0.0025	42.471 -0.117 0.030			Vel = 2.75
518 to 519	15.89 16.19		44.78 316.98	6	6 6.357	13.250 13.250	120 0.0033	42.384 -0.130 0.044			Vel = 3.20
519 to 520	16.19 16.48		43.28 360.26	6	6 6.357	13.250 13.250	120 0.0043	42.298 -0.126 0.057			Vel = 3.64
520 to 521	16.48 16.78		42.64 402.9	6	6 6.357	13.260 13.260	120 0.0052	42.229 -0.130 0.069			Vel = 4.07
521 to 522	16.78 17.08		42.76 445.66	6	6 6.357	13.250 13.250	120 0.0063	42.168 -0.130 0.083			Vel = 4.50
522 to 523	17.08 17.37		43.50 489.16	6	6 6.357	13.250 13.250	120 0.0075	42.121 -0.126 0.099			Vel = 4.94
523			0.0 489.16					42.094			K Factor = 75.39
55 to 515	15.07 15.07		74.31 74.31	2.5	2T 32.948	207.090 32.948 240.038	120 0.0166	38.684 0.0 3.992			Vel = 4.37
515			0.0 74.31					42.676			K Factor = 11.38
56 to 516	15.33 15.33		70.47 70.47	2.5	2T 32.948	207.090 32.948 240.038	120 0.0151	38.955 0.0 3.618			Vel = 4.15
516			0.0 70.47					42.573			K Factor = 10.80
57 to 517	15.62 15.62		46.99 46.99	2.5	2T 32.948	242.830 32.948 275.778	120 0.0071	40.507 0.0 1.964			Vel = 2.76

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
517			0.0 46.99						42.471		K Factor = 7.21	
58 to 518	15.89 15.89		44.78	2.5	2T	32.948	242.830 32.948	120	40.587 0.0			
			44.78	2.635			275.778	0.0065	1.797		Vel = 2.63	
518			0.0 44.78						42.384		K Factor = 6.88	
59 to 519	16.19 16.19		43.28	2.5	2T	32.948	242.830 32.948	120	40.611 0.0			
			43.28	2.635			275.778	0.0061	1.687		Vel = 2.55	
519			0.0 43.28						42.298		K Factor = 6.65	
510 to 520	16.48 16.48		42.64	2.5	2T	32.948	242.830 32.948	120	40.588 0.0			
			42.64	2.635			275.778	0.0060	1.641		Vel = 2.51	
520			0.0 42.64						42.229		K Factor = 6.56	
511 to 521	16.78 16.78		42.76	2.5	2T	32.948	242.830 32.948	120	40.518 0.0			
			42.76	2.635			275.778	0.0060	1.650		Vel = 2.52	
521			0.0 42.76						42.168		K Factor = 6.58	
512 to 522	17.08 17.08		43.51	2.5	2T	32.948	242.830 32.948	120	40.418 0.0			
			43.51	2.635			275.778	0.0062	1.703		Vel = 2.56	
522			0.0 43.51						42.121		K Factor = 6.70	