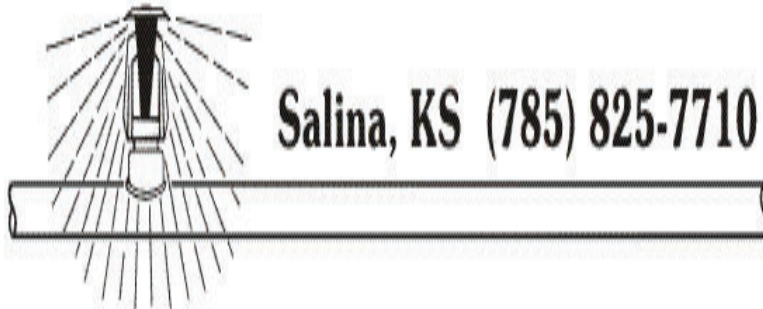


BAMFORD FIRE SPRINKLER CO., INC.



Salina, KS (785) 825-7710

Shawnee Mission, KS (913) 432-6688

Manhattan, KS (785) 532-9161

Bamford Fire Sprinkler
5134 Merriam Dr.
Shawnee Mission, KS 66203
913 432-6688

5-29-2025



Job Name : Butler Supply
Drawing :
Location : 2736 NE McBaine Dr - Lee's Summit MO
Remote Area : 1
Contract : 25M-3568
Data File : M3568-BUTLERSUPPLY-CALC-AREA1-2025.05.28.wxtmp

HYDRAULIC CALCULATIONS
for

JOB NAME Butler Supply
Location 2736 NE McBaine Dr - Lee's Summit MO
Drawing #
Contract # 25M-3568
Date 5-28-2025

DESIGN

Remote area # 1
Remote area location Outside Sales 105
Occupancy classification Light Hazard
Density 0.10 - Gpm/SqFt
Area of application 900 - SqFt
Coverage/sprinkler see notes - SqFt
Type of sprinkler calculated K5.6 SC & K11.2 EC QR
Sprinklers calculated 7
In-rack demand N.A. - GPM
Hose streams 100 - GPM
Total water required (including hose streams) 287 - GPM @ 58.8 - Psi
Type of system Wet
Volume of system (dry or pre-action) N.A. - Gal

WATER SUPPLY INFORMATION

Test date 5-27-2025
Location Hyd # 014-053
Source of info Lee's Summit Water Utilities

CONTRACTOR INFO Bamford Fire Sprinkler
Address 5134 Merriam Dr. / Shawnee Mission, KS 66203
Phone # 913 432-6688
Name of designer FEK
Authority having jurisdiction

NOTES:

Standard coverage (SC) sprinks protect less than 225 sf.
Extended coverage (EC) sprinks cover 18'x18' max
Min flow for K11.2 EC sprink (18'x18') is 33 gpm.

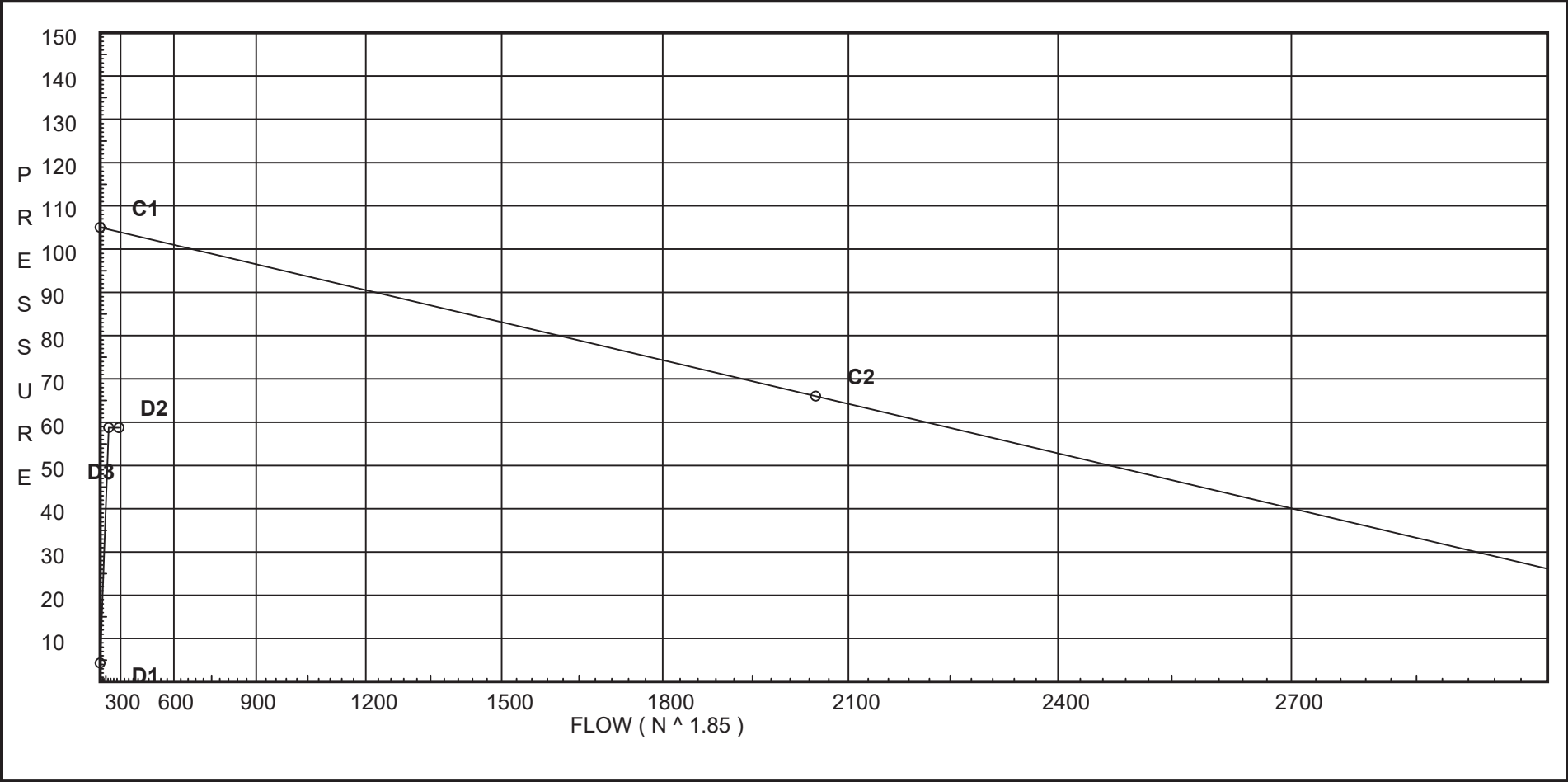
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Water Supply Curve

Bamford Fire Sprinkler
Butler Supply

City Water Supply:
C1 - Static Pressure : 105
C2 - Residual Pressure: 66
C2 - Residual Flow : 2050

Demand:
D1 - Elevation : 4.331
D2 - System Flow : 186.8
D2 - System Pressure : 58.751
Hose (Demand) : 100
D3 - System Demand : 286.8
Safety Margin : 45.223



Fittings Used Summary

Bamford Fire Sprinkler
Butler Supply

Fitting Legend																					
Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
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
G	NFPA 13 Gate Valve	0	0	0	0	1	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
Zdc	Deringer 20 DC Vert	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.

Flow Summary - NFPA

Bamford Fire Sprinkler
Butler Supply

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Date 5-28-2025

SUPPLY ANALYSIS

<i>Node at Source</i>	<i>Static Pressure</i>	<i>Residual Pressure</i>	<i>Flow</i>	<i>Available Pressure</i>	<i>Total Demand</i>	<i>Required Pressure</i>
POC	105.0	66	2050.0	103.975	286.8	58.751

NODE ANALYSIS

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>	<i>Notes</i>	
DP04	9.0	5.6	7.0	14.82	0.1	148
EQ04	10.0		8.36			
DP07	9.0	5.6	7.0	14.82	0.1	148
EQ07	9.54		8.52			
DP08	9.0	11.2	8.68	33.0	0.1	330
EQ08	10.0		16.79			
1	10.0		40.67			
101	10.0		40.67			
102	10.0		40.67			
103	10.0		40.67			
104	10.0		40.94			
105	10.0		40.99			
106	10.0		41.19			
107	10.0		42.07			
108	10.0		42.36			
109	10.0		44.04			
110	10.0		44.55			
111	25.64		44.44			
201	25.71		44.55			
202	25.91		44.52			
203	26.12		44.46			
204	26.33		44.39			
205	26.53		44.31			
206	26.74		44.22			
207	26.95		44.13			
208	27.15		44.04			
209	27.36		43.95			
210	27.56		43.84	100.0		
211	29.98		42.89			
212	29.98		43.31			
213	27.56		44.45			
214	25.79		45.54			
TOR	25.64		45.67			
BOR	1.0		58.23			
POC	0.0		58.75			
2	10.0		40.67			
112	10.0		40.67			
113	10.0		40.67			
3	10.0		40.67			
4	10.0	5.12	24.94	25.59		K=K @ EQ04
114	10.0		26.24			
115	10.0		26.5			

Flow Summary - NFPA

Bamford Fire Sprinkler
Butler Supply

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NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
116	10.0		27.08		
117	10.0		29.1		
118	10.0		32.13		
119	10.0		34.52		
5	10.0	5.12	25.18	25.72	K=K @ EQ04
6	10.0	5.12	25.69	25.97	K=K @ EQ04
7	10.0		29.1		
8	10.0		32.13		
9	10.0		34.52		
10	10.0		40.94		
11	10.0		40.99		
120	10.0		40.99		
12	9.54	5.07	15.84	20.2	K=K @ EQ07
121	9.54		16.68		
122	9.54		16.84		
123	10.0		18.87		
124	10.0		22.55		
13	9.54	5.07	15.89	20.23	K=K @ EQ07
14	10.0	8.05	16.79	33.0	K=K @ EQ08
15	10.0	8.05	20.09	36.1	K=K @ EQ08
16	10.0		42.07		
17	10.0		42.36		
125	10.0		42.36		
18	10.0		44.04		
126	10.0		44.04		
19	10.0		44.55		
127	10.0		44.55		
215	28.12		43.63		
216	28.12		43.74		
217	27.99		43.85		
218	28.12		43.79		
219	28.12		44.05		
220	27.99		44.14		
221	25.57		45.22		
222	25.74		45.15		
223	25.91		45.08		
224	26.12		44.99		
225	26.33		44.9		
226	26.53		44.82		
227	26.74		44.74		
228	26.95		44.66		
229	27.15		44.59		
230	27.36		44.52		
231	28.15		44.07		
232	28.33		43.56		
233	28.33		43.94		
234	28.54		43.49		
235	28.54		43.86		
236	28.74		43.43		
237	28.74		43.78		
238	28.95		43.34		

Flow Summary - NFPA

Bamford Fire Sprinkler
Butler Supply

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NODE ANALYSIS (cont.)

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>	<i>Notes</i>
239	28.95		43.69		
240	29.15		43.26		
241	29.15		43.61		
242	29.36		43.17		
243	29.36		43.53		
244	29.57		43.08		
245	29.57		43.45		
246	29.77		42.99		
247	29.77		43.38		

Final Calculations : Hazen-Williams

Bamford Fire Sprinkler
Butler Supply

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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	*****
DP04 to EQ04	9 10	5.60	14.82 14.82	1 1.049	E Eq	2.0 21.0	1.000 23.000 24.000	120 0.0747	7.000 -0.433 1.793	Vel = 5.50		
EQ04			0.0 14.82						8.360	K Factor = 5.13		
DP07 to EQ07	9 9.54	5.60	14.82 14.82	1 1.049	E Eq	2.0 21.0	0.540 23.000 23.540	120 0.0747	7.000 -0.234 1.759	Vel = 5.50		
EQ07			0.0 14.82						8.525	K Factor = 5.08		
DP08 to EQ08	9 10	11.20	33.00 33.0	1 1.049	E Eq	2.0 23.0	1.000 25.000 26.000	120 0.3287	8.681 -0.433 8.545	Vel = 12.25		
EQ08			0.0 33.00						16.793	K Factor = 8.05		
1 to 101	10 10		0.0 0.0	1 1.049	T	5.0	1.000 5.000 6.000	120 0	40.667 0.0 0.0	Vel = 0		
101 to 102	10 10		0.0 0.0	2 2.203			1.500 1.500	120 0	40.667 0.0 0.0	Vel = 0		
102 to 103	10 10		0.0 0.0	2 2.203			2.170 2.170	120 0	40.667 0.0 0.0	Vel = 0		
103 to 104	10 10		77.28 77.28	2 2.203			6.330 6.330	120 0.0428	40.667 0.0 0.271	Vel = 6.50		
104 to 105	10 10		0.0 77.28	2 2.203			1.330 1.330	120 0.0429	40.938 0.0 0.057	Vel = 6.50		
105 to 106	10 10		0.0 77.28	2 2.203			4.670 4.670	120 0.0426	40.995 0.0 0.199	Vel = 6.50		
106 to 107	10 10		109.52 186.8	2 2.203			4.000 4.000	120 0.2190	41.194 0.0 0.876	Vel = 15.72		
107 to 108	10 10		0.0 186.8	2 2.203			1.330 1.330	120 0.2188	42.070 0.0 0.291	Vel = 15.72		
108 to 109	10 10		0.0 186.8	2 2.203			7.670 7.670	120 0.2189	42.361 0.0 1.679	Vel = 15.72		
109 to 110	10 10		0.0 186.8	2 2.203			2.330 2.330	120 0.2189	44.040 0.0 0.510	Vel = 15.72		
110 to 111	10 25.64		0.0 186.8	2 2.203	2E	13.639	16.800 13.639 30.439	120 0.2189	44.550 -6.774 6.663	Vel = 15.72		

Final Calculations : Hazen-Williams

Bamford Fire Sprinkler
Butler Supply

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
111 to 201	25.64 25.71		0.0 186.8	4 4.26	E 13.167	3.130 13.167 16.297	120 0.0088	44.439 -0.030 0.143		Vel = 4.20	
201 to 202	25.71 25.91		-49.29 137.51	4 4.26		10.000 10.000	120 0.0051	44.552 -0.087 0.051		Vel = 3.10	
202 to 203	25.91 26.12		-26.79 110.72	4 4.26		10.000 10.000	120 0.0033	44.516 -0.091 0.033		Vel = 2.49	
203 to 204	26.12 26.33		-25.98 84.74	4 4.26		10.000 10.000	120 0.0021	44.458 -0.091 0.021		Vel = 1.91	
204 to 205	26.33 26.53		-25.54 59.2	4 4.26		10.000 10.000	120 0.0011	44.388 -0.087 0.011		Vel = 1.33	
205 to 206	26.53 26.74		-25.43 33.77	4 4.26		10.000 10.000	120 0.0004	44.312 -0.091 0.004		Vel = 0.76	
206 to 207	26.74 26.950		-25.56 8.21	4 4.26		10.000 10.000	120 0	44.225 -0.091 0.0		Vel = 0.18	
207 to 208	26.950 27.15		-25.86 -17.65	4 4.26	2E 26.334	15.000 26.334 41.334	120 -0.0001	44.134 -0.087 -0.004		Vel = 0.40	
208 to 209	27.15 27.36		-26.70 -44.35	4 4.26		10.000 10.000	120 -0.0006	44.043 -0.091 -0.006		Vel = 1.00	
209 to 210	27.36 27.56		-27.34 -71.69	4 4.26		10.000 10.000	120 -0.0015	43.946 -0.087 -0.015		Vel = 1.61	
210 to 211	27.56 29.98	H100	100.00 28.31	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0028	43.844 -1.048 0.098		Vel = 1.67	
211 to 212	29.98 29.98		0.0 28.31	2.5 2.635		147.420 147.420	120 0.0028	42.894 0.0 0.412		Vel = 1.67	
212 to 213	29.98 27.56		0.0 28.31	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0028	43.306 1.048 0.098		Vel = 1.67	
213 to 214	27.56 25.79		258.49 286.8	6 6.357	E 17.603	96.600 17.603 114.203	120 0.0028	44.452 0.767 0.317		Vel = 2.90	
214 to TOR	25.79 25.64		0.0 286.8	8 8.249	2E 42.282	48.210 42.282 90.492	120 0.0008	45.536 0.065 0.071		Vel = 1.72	
TOR to BOR	25.64 1		0.0 286.8	8 8.249	B Zdc 0.0 S 52.853	24.640 66.947 91.587	120 0.0008	45.672 12.485 0.071	** Fixed Loss = 1.813	Vel = 1.72	

Final Calculations : Hazen-Williams

Bamford Fire Sprinkler
Butler Supply

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
BOR to POC	1 0		0.0 286.8	8 8.27	E G T	28.468 6.326 55.354	66.000 90.148 156.148	140 0.0006	58.228 0.433 0.090	Vel = 1.71	
POC			0.0 286.80						58.751	K Factor = 37.42	
2 to 112	10 10		0.0 0.0	1 1.049	T	5.0 5.000 6.500	1.500 5.000 6.500	120 0	40.667 0.0 0.0	Vel = 0	
112 to 113	10 10		0.0 0.0	1.25 1.53		6.000 6.000	6.000	120 0	40.667 0.0 0.0	Vel = 0	
113 to 102	10 10		0.0 0.0	1.25 1.53	T	9.917 9.917 18.917	9.000 9.917 18.917	120 0	40.667 0.0 0.0	Vel = 0	
102			0.0 0.0						40.667	K Factor = 0	
3 to 113	10 10		0.0 0.0	1 1.049	T	5.0 5.000 6.500	1.500 5.000 6.500	120 0	40.667 0.0 0.0	Vel = 0	
113			0.0 0.0						40.667	K Factor = 0	
4 to 114	10 10	5.12	25.59 25.59	1 1.049	T	5.0 5.000 6.330	1.330 5.000 6.330	120 0.2054	24.942 0.0 1.300	K = K @ EQ04 Vel = 9.50	
114 to 115	10 10		0.0 25.59	1.25 1.53		7.750 7.750	7.750	120 0.0326	26.242 0.0 0.253	Vel = 4.47	
115 to 116	10 10		25.72 51.31	1.25 1.53		4.920 4.920	4.920	120 0.1183	26.495 0.0 0.582	Vel = 8.95	
116 to 117	10 10		25.97 77.28	1.25 1.53		8.000 8.000	8.000	120 0.2525	27.077 0.0 2.020	Vel = 13.49	
117 to 118	10 10		0.0 77.28	1.25 1.53		12.000 12.000	12.000	120 0.2524	29.097 0.0 3.029	Vel = 13.49	
118 to 119	10 10		0.0 77.28	1.25 1.53		9.500 9.500	9.500	120 0.2524	32.126 0.0 2.398	Vel = 13.49	
119 to 103	10 10		0.0 77.28	1.25 1.53	T	9.917 9.917 24.337	14.420 9.917 24.337	120 0.2524	34.524 0.0 6.143	Vel = 13.49	
103			0.0 77.28						40.667	K Factor = 12.12	
5 to 115	10 10	5.12	25.72 25.72	1 1.049	T	5.0 5.000 6.330	1.330 5.000 6.330	120 0.2071	25.184 0.0 1.311	K = K @ EQ04 Vel = 9.55	
			0.0								

Final Calculations : Hazen-Williams

Bamford Fire Sprinkler
Butler Supply

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Date 5-28-2025

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
115			25.72					26.495		K Factor = 5.00	
6 to 116	10 10	5.12	25.97	1	T 5.0	1.580 5.000 6.580	120	25.689 0.0		K = K @ EQ04	
			25.97	1.049			0.2109	1.388		Vel = 9.64	
116			0.0 25.97					27.077		K Factor = 4.99	
7 to 117	10 10		0.0	1	T 5.0	1.580 5.000 6.580	120	29.097 0.0			
			0.0	1.049			0	0.0		Vel = 0	
117			0.0 0.0					29.097		K Factor = 0	
8 to 118	10 10		0.0	1	T 5.0	1.580 5.000 6.580	120	32.126 0.0			
			0.0	1.049			0	0.0		Vel = 0	
118			0.0 0.0					32.126		K Factor = 0	
9 to 119	10 10		0.0	1	T 5.0	1.830 5.000 6.830	120	34.524 0.0			
			0.0	1.049			0	0.0		Vel = 0	
119			0.0 0.0					34.524		K Factor = 0	
10 to 104	10 10		0.0	1	T 5.0	1.000 5.000 6.000	120	40.938 0.0			
			0.0	1.049			0	0.0		Vel = 0	
104			0.0 0.0					40.938		K Factor = 0	
11 to 120	10 10		0.0	1	E 2.0	1.330 2.000 3.330	120	40.995 0.0			
			0.0	1.049			0	0.0		Vel = 0	
120 to 105	10 10		0.0	1	T 5.0	9.000 5.000 14.000	120	40.995 0.0			
			0.0	1.049			0	0.0		Vel = 0	
105			0.0 0.0					40.995		K Factor = 0	
12 to 121	9.54 9.54	5.07	20.20	1	T 5.0	1.330 5.000 6.330	120	15.841 0.0		K = K @ EQ07	
			20.2	1.049			0.1325	0.839		Vel = 7.50	
121 to 122	9.54 9.54		0.0	1.25		7.580 7.580	120	16.680 0.0			
			20.2	1.53			0.0211	0.160		Vel = 3.52	
122 to 123	9.54 10		20.22	1.25	3E 14.876	14.460 14.876 29.336	120	16.840 -0.199			
			40.42	1.53			0.0761	2.232		Vel = 7.05	
123 to 124	10 10		33.00	1.25		16.000	120	18.873 0.0			
			73.42	1.53			0.2296	3.674		Vel = 12.81	
124 to 106	10 10		36.10	1.25	T 9.917	28.840 9.917 38.757	120	22.547 0.0			
			109.52	1.53			0.4811	18.647		Vel = 19.11	

Final Calculations : Hazen-Williams

Bamford Fire Sprinkler
Butler Supply

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Date 5-28-2025

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
106			0.0 109.52					41.194		K Factor = 17.06	
13 to 122	9.54 9.54	5.07	20.23 20.23	1 1.049	T 5.0	2.170 5.000 7.170	120 0.1329	15.887 0.0 0.953		K = K @ EQ07 Vel = 7.51	
122			0.0 20.23					16.840		K Factor = 4.93	
14 to 123	10 10	8.05	33.00 33.0	1 1.049	T 5.0	1.330 5.000 6.330	120 0.3286	16.793 0.0 2.080		K = K @ EQ08 Vel = 12.25	
123			0.0 33.00					18.873		K Factor = 7.60	
15 to 124	10 10	8.05	36.10 36.1	1 1.049	T 5.0	1.330 5.000 6.330	120 0.3878	20.092 0.0 2.455		K = K @ EQ08 Vel = 13.40	
124			0.0 36.10					22.547		K Factor = 7.60	
16 to 107	10 10		0.0 0.0	1 1.049	T 5.0	1.000 5.000 6.000	120 0	42.070 0.0 0.0		Vel = 0	
107			0.0 0.0					42.070		K Factor = 0	
17 to 125	10 10		0.0 0.0	1 1.049	E 2.0	1.330 2.000 3.330	120 0	42.361 0.0 0.0		Vel = 0	
125 to 108	10 10		0.0 0.0	1 1.049	T 5.0	9.000 5.000 14.000	120 0	42.361 0.0 0.0		Vel = 0	
108			0.0 0.0					42.361		K Factor = 0	
18 to 126	10 10		0.0 0.0	1 1.049	T 5.0	1.000 5.000 6.000	120 0	44.040 0.0 0.0		Vel = 0	
126 to 109	10 10		0.0 0.0	1.25 1.53	T 9.917	1.000 9.917 10.917	120 0	44.040 0.0 0.0		Vel = 0	
109			0.0 0.0					44.040		K Factor = 0	
19 to 127	10 10		0.0 0.0	1 1.049	E 2.0	1.330 2.000 3.330	120 0	44.550 0.0 0.0		Vel = 0	
127 to 110	10 10		0.0 0.0	1.25 1.53	T 9.917	9.000 9.917 18.917	120 0	44.550 0.0 0.0		Vel = 0	
110			0.0 0.0					44.550		K Factor = 0	
201 to 215	25.71 28.12		49.29 49.29	3 3.26	2T 40.319	2.420 40.319 42.739	120 0.0028	44.552 -1.044 0.119		Vel = 1.89	

Final Calculations : Hazen-Williams

Bamford Fire Sprinkler
Butler Supply

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
215 to 216	28.12 28.12		0.0 49.29	3 3.26	T	20.159 20.159 40.659	120 0.0028	43.627 0.0 0.112		Vel = 1.89	
216 to 217	28.12 27.99		-25.58 23.71	3 3.26	2E	18.815 53.080 18.815 71.895	120 0.0007	43.739 0.056 0.051		Vel = 0.91	
217 to 218	27.99 28.12		0.0 23.71	3 3.26		6.580 6.580	120 0.0008	43.846 -0.056 0.005		Vel = 0.91	
218 to 219	28.12 28.12		25.58 49.29	3 3.26	2T	40.319 52.830 40.319 93.149	120 0.0028	43.795 0.0 0.257		Vel = 1.89	
219 to 220	28.12 27.99		-25.05 24.24	3 3.26	E	9.408 39.160 9.408 48.568	120 0.0007	44.052 0.056 0.036		Vel = 0.93	
220 to 221	27.99 25.57		0.0 24.24	3 3.26	2T	40.319 2.420 40.319 42.739	120 0.0007	44.144 1.048 0.032		Vel = 0.93	
221 to 222	25.57 25.74		0.0 24.24	6 6.357		8.000 8.000	120 0.0001	45.224 -0.074 0.001		Vel = 0.25	
222 to 223	25.74 25.91		25.05 49.29	6 6.357		8.590 8.590	120 0.0001	45.151 -0.074 0.001		Vel = 0.50	
223 to 224	25.91 26.12		26.79 76.08	6 6.357		10.000 10.000	120 0.0002	45.078 -0.091 0.002		Vel = 0.77	
224 to 225	26.12 26.33		25.98 102.06	6 6.357		10.000 10.000	120 0.0005	44.989 -0.091 0.005		Vel = 1.03	
225 to 226	26.33 26.53		25.54 127.6	6 6.357		10.000 10.000	120 0.0006	44.903 -0.087 0.006		Vel = 1.29	
226 to 227	26.53 26.74		25.43 153.03	6 6.357		10.000 10.000	120 0.0009	44.822 -0.091 0.009		Vel = 1.55	
227 to 228	26.74 26.95		25.56 178.59	6 6.357		10.000 10.000	120 0.0011	44.740 -0.091 0.011		Vel = 1.81	
228 to 229	26.95 27.15		25.86 204.45	6 6.357		10.000 10.000	120 0.0016	44.660 -0.087 0.016		Vel = 2.07	
229 to 230	27.15 27.36		26.69 231.14	6 6.357		10.000 10.000	120 0.0018	44.589 -0.091 0.018		Vel = 2.34	
230 to 213	27.36 27.56		27.35 258.49	6 6.357		9.910 9.910	120 0.0023	44.516 -0.087 0.023		Vel = 2.61	

Final Calculations : Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
213			0.0 258.49					44.452		K Factor = 38.77	
216 to 218	28.12 28.12		25.58 25.58	3 3.26	2E 18.815	49.340 18.815 68.155	120 0.0008	43.739 0.0 0.056		Vel = 0.98	
218			0.0 25.58					43.795		K Factor = 3.87	
219 to 231	28.12 28.15		25.06 25.06	3 3.26	E 9.408	34.000 9.408 43.408	120 0.0008	44.052 -0.013 0.034		Vel = 0.96	
231 to 222	28.15 25.74		0.0 25.06	3 3.26	2T 40.319	2.420 40.319 42.739	120 0.0008	44.073 1.044 0.034		Vel = 0.96	
222			0.0 25.06					45.151		K Factor = 3.73	
202 to 232	25.91 28.33		26.79 26.79	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0025	44.516 -1.048 0.089		Vel = 1.58	
232 to 233	28.33 28.33		0.0 26.79	2.5 2.635		152.420 152.420	120 0.0025	43.557 0.0 0.384		Vel = 1.58	
233 to 223	28.33 25.91		0.0 26.79	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0025	43.941 1.048 0.089		Vel = 1.58	
223			0.0 26.79					45.078		K Factor = 3.99	
203 to 234	26.12 28.54		25.98 25.98	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0024	44.458 -1.048 0.084		Vel = 1.53	
234 to 235	28.54 28.54		0.0 25.98	2.5 2.635		152.420 152.420	120 0.0024	43.494 0.0 0.363		Vel = 1.53	
235 to 224	28.54 26.12		0.0 25.98	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0024	43.857 1.048 0.084		Vel = 1.53	
224			0.0 25.98					44.989		K Factor = 3.87	
204 to 236	26.33 28.74		25.54 25.54	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0023	44.388 -1.044 0.082		Vel = 1.50	
236 to 237	28.74 28.74		0.0 25.54	2.5 2.635		152.420 152.420	120 0.0023	43.426 0.0 0.351		Vel = 1.50	
237 to 225	28.74 26.33		0.0 25.54	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0023	43.777 1.044 0.082		Vel = 1.50	
225			0.0 25.54					44.903		K Factor = 3.81	

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	*****
205 to 238	26.53 28.95		25.43 25.43	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0023	44.312 -1.048 0.081		Vel = 1.50	
238 to 239	28.95 28.95		0.0 25.43	2.5 2.635		152.420 152.420	120 0.0023	43.345 0.0 0.348		Vel = 1.50	
239 to 226	28.95 26.53		0.0 25.43	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0023	43.693 1.048 0.081		Vel = 1.50	
226			0.0 25.43					44.822		K Factor = 3.80	
206 to 240	26.74 29.15		25.56 25.56	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0023	44.225 -1.044 0.081		Vel = 1.50	
240 to 241	29.15 29.15		0.0 25.56	2.5 2.635		152.420 152.420	120 0.0023	43.262 0.0 0.352		Vel = 1.50	
241 to 227	29.15 26.74		0.0 25.56	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0023	43.614 1.044 0.082		Vel = 1.50	
227			0.0 25.56					44.740		K Factor = 3.82	
207 to 242	26.95 29.36		25.86 25.86	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0024	44.134 -1.044 0.084		Vel = 1.52	
242 to 243	29.36 29.36		0.0 25.86	2.5 2.635		152.420 152.420	120 0.0024	43.174 0.0 0.359		Vel = 1.52	
243 to 228	29.36 26.95		0.0 25.86	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0023	43.533 1.044 0.083		Vel = 1.52	
228			0.0 25.86					44.660		K Factor = 3.87	
208 to 244	27.15 29.57		26.70 26.7	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0025	44.043 -1.048 0.088		Vel = 1.57	
244 to 245	29.57 29.57		0.0 26.7	2.5 2.635		147.420 147.420	120 0.0025	43.083 0.0 0.369		Vel = 1.57	
245 to 229	29.57 27.15		0.0 26.7	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0025	43.452 1.048 0.089		Vel = 1.57	
229			0.0 26.70					44.589		K Factor = 4.00	
209 to 246	27.36 29.77		27.35 27.35	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0026	43.946 -1.044 0.092		Vel = 1.61	
246 to 247	29.77 29.77		0.0 27.35	2.5 2.635		147.420 147.420	120 0.0026	42.994 0.0 0.386		Vel = 1.61	

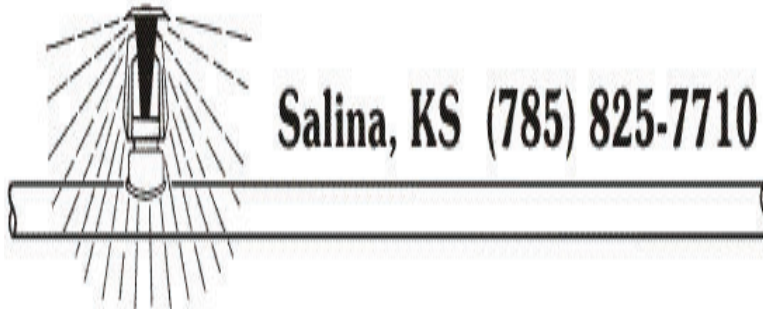
Final Calculations : Hazen-Williams

Bamford Fire Sprinkler
Butler Supply

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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	*****
247 to 230	29.77 27.36		0.0 27.35	2.5 2.635	2T	32.948	2.420 32.948 35.368	120 0.0026	43.380 1.044 0.092		Vel = 1.61	
230			0.0 27.35						44.516		K Factor = 4.10	

BAMFORD FIRE SPRINKLER CO., INC.



Salina, KS (785) 825-7710

Shawnee Mission, KS (913) 432-6688

Manhattan, KS (785) 532-9161

Bamford Fire Sprinkler
5134 Merriam Dr.
Shawnee Mission, KS 66203
913 432-6688

Job Name : Butler Supply
Drawing :
Location : 2736 NE McBaine Dr - Lee's Summit MO
Remote Area : 2
Contract : 25M-3568
Data File : M3568-BUTLERSUPPLY-CALC-AREA2-2025.05.28.wxtmp

HYDRAULIC CALCULATIONS
for

JOB NAME Butler Supply
Location 2736 NE McBaine Dr - Lee's Summit MO
Drawing #
Contract # 25M-3568
Date 5-28-2025

DESIGN

Remote area # 2
Remote area location Sales Counter 101
Occupancy classification Ordinary Gp II Hazard
Density 0.20 - Gpm/SqFt
Area of application 900 - SqFt
Coverage/sprinkler see notes - SqFt
Type of sprinkler calculated K5.6 SC QR
Sprinklers calculated 10
In-rack demand N.A. - GPM
Hose streams 250 - GPM
Total water required (including hose streams) 503 - GPM @ 50.4 - Psi
Type of system Wet
Volume of system (dry or pre-action) N.A. - Gal

WATER SUPPLY INFORMATION

Test date 5-27-2025
Location Hyd # 014-053
Source of info Lee's Summit Water Utilities

CONTRACTOR INFO Bamford Fire Sprinkler
Address 5134 Merriam Dr. / Shawnee Mission, KS 66203
Phone # 913 432-6688
Name of designer FEK
Authority having jurisdiction City of Lee's Summit, MO

NOTES:

Sprinks in Sales Counter protect less than 130 sf.
Sprink in Inside Sales coves less than 225 sf

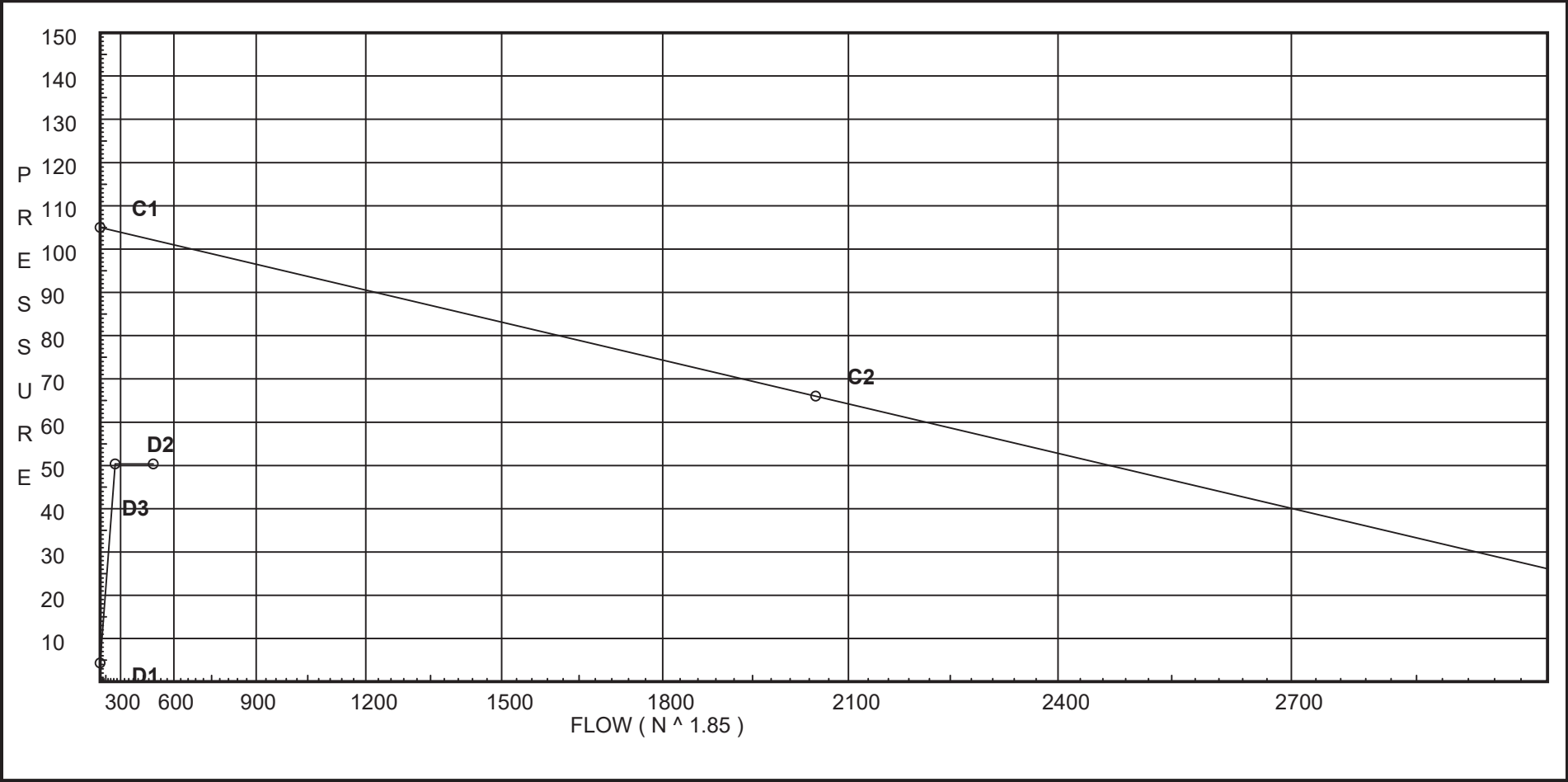
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Water Supply Curve

Bamford Fire Sprinkler
Butler Supply

City Water Supply:
C1 - Static Pressure : 105
C2 - Residual Pressure: 66
C2 - Residual Flow : 2050

Demand:
D1 - Elevation : 4.331
D2 - System Flow : 253.328
D2 - System Pressure : 50.350
Hose (Demand) : 250
D3 - System Demand : 503.328
Safety Margin : 51.748



Fittings Used Summary

Bamford Fire Sprinkler
Butler Supply

Fitting Legend																					
Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
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
G	NFPA 13 Gate Valve	0	0	0	0	1	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
Zdc	Deringer 20 DC Vert	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.

Flow Summary - NFPA

Bamford Fire Sprinkler
Butler Supply

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SUPPLY ANALYSIS

<i>Node at Source</i>	<i>Static Pressure</i>	<i>Residual Pressure</i>	<i>Flow</i>	<i>Available Pressure</i>	<i>Total Demand</i>	<i>Required Pressure</i>
POC	105.0	66	2050.0	102.098	503.33	50.35

NODE ANALYSIS

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>	<i>Notes</i>	
DP01	9.0	5.6	19.3	24.6	0.2	123
EQ01	10.0		23.44			
DP02	9.0	5.6	9.0	16.8	0.2	84
EQ02	10.0		10.83			
DP03	9.0	5.6	12.76	20.0	0.2	100
EQ03	10.0		15.45			
DP05	9.0	5.6	9.99	17.7	0.1	177
EQ05	10.0		12.05			
DP06	9.0	5.6	18.98	24.4	0.2	122
EQ06	10.0		23.06			
1	10.0	5.08	24.48	25.14	K=K @ EQ01	
101	10.0		25.67			
102	10.0		25.68			
103	10.0		25.76			
104	10.0		26.19			
105	10.0		26.32			
106	10.0		26.99			
107	10.0		27.55			
108	10.0		27.81			
109	10.0		29.7			
110	10.0		30.43			
111	25.64		35.36			
201	25.71		35.58			
202	25.91		35.59			
203	26.12		35.56			
204	26.33		35.51			
205	26.53		35.45			
206	26.74		35.37			
207	26.95		35.28			
208	27.15		35.19			
209	27.36		35.1			
210	27.56		35.0	100.0		
211	29.98		34.09			
212	29.98		34.67			
213	27.56		35.86			
214	25.79		37.09			
TOR	25.64		37.26			
BOR	1.0		49.78			
POC	0.0		50.35	150.0		
2	10.0	5.11	22.31	24.11	K=K @ EQ02	
112	10.0		23.51			
113	10.0		23.68			

Flow Summary - NFPA

Bamford Fire Sprinkler
Butler Supply

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NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
3	10.0	5.09	22.49	24.13	K=K @ EQ03
4	10.0		25.01		
114	10.0		25.01		
115	10.0		25.01		
116	10.0		25.01		
117	10.0		25.01		
118	10.0		25.01		
119	10.0		25.01		
5	10.0		25.01		
6	10.0		25.01		
7	10.0		25.01		
8	10.0		25.01		
9	10.0	5.1	23.69	24.82	K=K @ EQ05
10	10.0	5.08	24.97	25.39	K=K @ EQ01
11	10.0	5.08	23.06	24.4	K=K @ EQ06
120	10.0		23.69		
12	9.54		27.19		
121	9.54		27.19		
122	9.54		27.19		
123	10.0		26.99		
124	10.0		26.99		
13	9.54		27.19		
14	10.0		26.99		
15	10.0		26.99		
16	10.0	5.08	26.28	26.05	K=K @ EQ01
17	10.0	5.08	24.38	25.09	K=K @ EQ06
125	10.0		25.04		
18	10.0	5.08	27.96	26.87	K=K @ EQ01
126	10.0		29.31		
19	10.0	5.08	28.95	27.34	K=K @ EQ06
127	10.0		29.73		
215	28.12		34.72		
216	28.12		34.89		
217	27.99		35.03		
218	28.12		34.98		
219	28.12		35.38		
220	27.99		35.49		
221	25.57		36.59		
222	25.74		36.51		
223	25.91		36.44		
224	26.12		36.35		
225	26.33		36.27		
226	26.53		36.19		
227	26.74		36.11		
228	26.95		36.04		
229	27.15		35.98		
230	27.36		35.91		
231	28.15		35.42		
232	28.33		34.67		
233	28.33		35.26		
234	28.54		34.64		

Flow Summary - NFPA

Bamford Fire Sprinkler
Butler Supply

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NODE ANALYSIS (cont.)

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>	<i>Notes</i>
235	28.54		35.18		
236	28.74		34.59		
237	28.74		35.1		
238	28.95		34.52		
239	28.95		35.03		
240	29.15		34.44		
241	29.15		34.95		
242	29.36		34.36		
243	29.36		34.88		
244	29.57		34.27		
245	29.57		34.8		
246	29.77		34.19		
247	29.77		34.74		

Final Calculations : Hazen-Williams

Bamford Fire Sprinkler
Butler Supply

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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	*****
DP01 to EQ01	9 10	5.60	24.60 24.6	1 1.049	E Eq	2.0 21.0	1.000 23.000 24.000	120 0.1909	19.297 -0.433 4.581		Vel = 9.13	
EQ01			0.0 24.60						23.445		K Factor = 5.08	
DP02 to EQ02	9 10	5.60	16.80 16.8	1 1.049	E Eq	2.0 21.0	1.000 23.000 24.000	120 0.0942	9.000 -0.433 2.262		Vel = 6.24	
EQ02			0.0 16.80						10.829		K Factor = 5.11	
DP03 to EQ03	9 10	5.60	20.00 20.0	1 1.049	E Eq	2.0 21.0	1.000 23.000 24.000	120 0.1301	12.755 -0.433 3.123		Vel = 7.42	
EQ03			0.0 20.00						15.445		K Factor = 5.09	
DP05 to EQ05	9 10	5.60	17.70 17.7	1 1.049	E Eq	2.0 21.0	1.000 23.000 24.000	120 0.1038	9.990 -0.433 2.491		Vel = 6.57	
EQ05			0.0 17.70						12.048		K Factor = 5.10	
DP06 to EQ06	9 10	5.60	24.40 24.4	1 1.049	E Eq	2.0 21.0	1.000 23.000 24.000	120 0.1880	18.985 -0.433 4.512		Vel = 9.06	
EQ06			0.0 24.40						23.064		K Factor = 5.08	
1 to 101	10 10	5.08	25.14 25.14	1 1.049	T	5.0	1.000 5.000 6.000	120 0.1987	24.480 0.0 1.192		K = K @ EQ01 Vel = 9.33	
101 to 102	10 10		0.0 25.14	2 2.203			1.500 1.500	120 0.0053	25.672 0.0 0.008		Vel = 2.12	
102 to 103	10 10		48.24 73.38	2 2.203			2.170 2.170	120 0.0387	25.680 0.0 0.084		Vel = 6.18	
103 to 104	10 10		24.82 98.2	2 2.203			6.330 6.330	120 0.0667	25.764 0.0 0.422		Vel = 8.27	
104 to 105	10 10		25.39 123.59	2 2.203			1.330 1.330	120 0.1023	26.186 0.0 0.136		Vel = 10.40	
105 to 106	10 10		24.40 147.99	2 2.203			4.670 4.670	120 0.1422	26.322 0.0 0.664		Vel = 12.46	
106 to 107	10 10		0.0 147.99	2 2.203			4.000 4.000	120 0.1422	26.986 0.0 0.569		Vel = 12.46	
107 to 108	10 10		26.05 174.04	2 2.203			1.330 1.330	120 0.1917	27.555 0.0 0.255		Vel = 14.65	

Final Calculations : Hazen-Williams

Bamford Fire Sprinkler
Butler Supply

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
108 to 109	10 10		25.08 199.12	2 2.203			7.670 7.670	120 0.2464	27.810 0.0 1.890		Vel = 16.76	
109 to 110	10 10		26.87 225.99	2 2.203			2.330 2.330	120 0.3112	29.700 0.0 0.725		Vel = 19.02	
110 to 111	10 25.64		27.34 253.33	2 2.203	2E	13.639	16.800 13.639 30.439	120 0.3846	30.425 -6.774 11.707		Vel = 21.32	
111 to 201	25.64 25.71		0.0 253.33	4 4.26	E	13.167	3.130 13.167 16.297	120 0.0155	35.358 -0.030 0.252		Vel = 5.70	
201 to 202	25.71 25.91		-62.40 190.93	4 4.26			10.000 10.000	120 0.0092	35.580 -0.087 0.092		Vel = 4.30	
202 to 203	25.91 26.12		-33.61 157.32	4 4.26			10.000 10.000	120 0.0064	35.585 -0.091 0.064		Vel = 3.54	
203 to 204	26.12 26.33		-32.30 125.02	4 4.26			10.000 10.000	120 0.0042	35.558 -0.091 0.042		Vel = 2.81	
204 to 205	26.33 26.53		-31.51 93.51	4 4.26			10.000 10.000	120 0.0025	35.509 -0.087 0.025		Vel = 2.10	
205 to 206	26.53 26.74		-31.17 62.34	4 4.26			10.000 10.000	120 0.0012	35.447 -0.091 0.012		Vel = 1.40	
206 to 207	26.74 26.950		-31.20 31.14	4 4.26			10.000 10.000	120 0.0003	35.368 -0.091 0.003		Vel = 0.70	
207 to 208	26.950 27.15		-31.52 -0.38	4 4.26	2E	26.334	15.000 26.334 41.334	120 0	35.280 -0.087 0.001		Vel = 0.01	
208 to 209	27.15 27.36		-32.41 -32.79	4 4.26			10.000 10.000	120 -0.0004	35.194 -0.091 -0.004		Vel = 0.74	
209 to 210	27.36 27.56		-33.10 -65.89	4 4.26			10.000 10.000	120 -0.0012	35.099 -0.087 -0.012		Vel = 1.48	
210 to 211	27.56 29.98	H100	100.00 34.11	2.5 2.635	2T	32.948	2.420 32.948 35.368	120 0.0039	35.000 -1.048 0.139		Vel = 2.01	
211 to 212	29.98 29.98		0.0 34.11	2.5 2.635			147.420 147.420	120 0.0039	34.091 0.0 0.580		Vel = 2.01	
212 to 213	29.98 27.56		0.0 34.11	2.5 2.635	2T	32.948	2.420 32.948 35.368	120 0.0040	34.671 1.048 0.140		Vel = 2.01	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
213 to 214	27.56 25.79		319.22 353.33	6 6.357	E	17.603 17.603 114.203	120 0.0041	35.859 0.767 0.466		Vel = 3.57	
214 to TOR	25.79 25.64		0.0 353.33	8 8.249	2E	42.282 42.282 90.492	120 0.0011	37.092 0.065 0.103		Vel = 2.12	
TOR to BOR	25.64 1		0.0 353.33	8 8.249	B Zdc S	14.094 0.0 52.853	120 0.0012	37.260 12.418 0.106		* * Fixed Loss = 1.747 Vel = 2.12	
BOR to POC	1 0		0.0 353.33	8 8.27	E G T	28.468 6.326 55.354	140 0.0009	49.784 0.433 0.133		Vel = 2.11	
POC			150.00 503.33					50.350		Qa = 150.00 K Factor = 70.93	
2 to 112	10 10	5.11	24.11 24.11	1 1.049	T	5.0 1.500 5.000 6.500	120 0.1840	22.311 0.0 1.196		K = K @ EQ02 Vel = 8.95	
112 to 113	10 10		0.0 24.11	1.25 1.53		6.000 6.000	120 0.0292	23.507 0.0 0.175		Vel = 4.21	
113 to 102	10 10		24.14 48.25	1.25 1.53	T	9.917 9.000 9.917 18.917	120 0.1056	23.682 0.0 1.998		Vel = 8.42	
102			0.0 48.25					25.680		K Factor = 9.52	
3 to 113	10 10	5.09	24.13 24.13	1 1.049	T	5.0 1.500 5.000 6.500	120 0.1842	22.485 0.0 1.197		K = K @ EQ03 Vel = 8.96	
113			0.0 24.13					23.682		K Factor = 4.96	
4 to 114	10 10		0.0 0.0	1 1.049	T	5.0 1.330 5.000 6.330	120 0	25.013 0.0 0.0		Vel = 0	
114 to 115	10 10		0.0 0.0	1.25 1.53		7.750 7.750	120 0	25.013 0.0 0.0		Vel = 0	
115 to 116	10 10		0.0 0.0	1.25 1.53		4.920 4.920	120 0	25.013 0.0 0.0		Vel = 0	
116 to 117	10 10		0.0 0.0	1.25 1.53		8.000 8.000	120 0	25.013 0.0 0.0		Vel = 0	
117 to 118	10 10		0.0 0.0	1.25 1.53		12.000 12.000	120 0	25.013 0.0 0.0		Vel = 0	
118 to 119	10 10		0.0 0.0	1.25 1.53		9.500 9.500	120 0	25.013 0.0 0.0		Vel = 0	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
119 to 103	10 10		24.82 24.82	1.25 1.53	T	9.917	14.420 9.917 24.337	120 0.0309	25.013 0.0 0.751	Vel = 4.33	
103			0.0 24.82						25.764	K Factor = 4.89	
5 to 115	10 10		0.0 0.0	1 1.049	T	5.0	1.330 5.000 6.330	120 0	25.013 0.0 0.0	Vel = 0	
115			0.0 0.0						25.013	K Factor = 0	
6 to 116	10 10		0.0 0.0	1 1.049	T	5.0	1.580 5.000 6.580	120 0	25.013 0.0 0.0	Vel = 0	
116			0.0 0.0						25.013	K Factor = 0	
7 to 117	10 10		0.0 0.0	1 1.049	T	5.0	1.580 5.000 6.580	120 0	25.013 0.0 0.0	Vel = 0	
117			0.0 0.0						25.013	K Factor = 0	
8 to 118	10 10		0.0 0.0	1 1.049	T	5.0	1.580 5.000 6.580	120 0	25.013 0.0 0.0	Vel = 0	
118			0.0 0.0						25.013	K Factor = 0	
9 to 119	10 10	5.1	24.82 24.82	1 1.049	T	5.0	1.830 5.000 6.830	120 0.1940	23.688 0.0 1.325	K = K @ EQ05 Vel = 9.21	
119			0.0 24.82						25.013	K Factor = 4.96	
10 to 104	10 10	5.08	25.39 25.39	1 1.049	T	5.0	1.000 5.000 6.000	120 0.2023	24.972 0.0 1.214	K = K @ EQ01 Vel = 9.43	
104			0.0 25.39						26.186	K Factor = 4.96	
11 to 120	10 10	5.08	24.40 24.4	1 1.049	E	2.0	1.330 2.000 3.330	120 0.1880	23.064 0.0 0.626	K = K @ EQ06 Vel = 9.06	
120 to 105	10 10		0.0 24.4	1 1.049	T	5.0	9.000 5.000 14.000	120 0.1880	23.690 0.0 2.632	Vel = 9.06	
105			0.0 24.40						26.322	K Factor = 4.76	
12 to 121	9.54 9.54		0.0 0.0	1 1.049	T	5.0	1.330 5.000 6.330	120 0	27.185 0.0 0.0	Vel = 0	
121 to 122	9.54 9.54		0.0 0.0	1.25 1.53			7.580 7.580	120 0	27.185 0.0 0.0	Vel = 0	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
122 to 123	9.54 10		0.0 0.0	1.25 1.53	3E 14.876	14.460 14.876 29.336	120 0	27.185 -0.199 0.0			Vel = 0
123 to 124	10 10		0.0 0.0	1.25 1.53		16.000 16.000	120 0	26.986 0.0 0.0			Vel = 0
124 to 106	10 10		0.0 0.0	1.25 1.53	T 9.917	28.840 9.917 38.757	120 0	26.986 0.0 0.0			Vel = 0
106			0.0 0.0					26.986		K Factor = 0	
13 to 122	9.54 9.54		0.0 0.0	1 1.049	T 5.0	2.170 5.000 7.170	120 0	27.185 0.0 0.0			Vel = 0
122			0.0 0.0					27.185		K Factor = 0	
14 to 123	10 10		0.0 0.0	1 1.049	T 5.0	1.330 5.000 6.330	120 0	26.986 0.0 0.0			Vel = 0
123			0.0 0.0					26.986		K Factor = 0	
15 to 124	10 10		0.0 0.0	1 1.049	T 5.0	1.330 5.000 6.330	120 0	26.986 0.0 0.0			Vel = 0
124			0.0 0.0					26.986		K Factor = 0	
16 to 107	10 10	5.08	26.05 26.05	1 1.049	T 5.0	1.000 5.000 6.000	120 0.2122	26.282 0.0 1.273		K = K @ EQ01	Vel = 9.67
107			0.0 26.05					27.555		K Factor = 4.96	
17 to 125	10 10	5.08	25.09 25.09	1 1.049	E 2.0	1.330 2.000 3.330	120 0.1979	24.381 0.0 0.659		K = K @ EQ06	Vel = 9.31
125 to 108	10 10		0.0 25.09	1 1.049	T 5.0	9.000 5.000 14.000	120 0.1979	25.040 0.0 2.770			Vel = 9.31
108			0.0 25.09					27.810		K Factor = 4.76	
18 to 126	10 10	5.08	26.87 26.87	1 1.049	T 5.0	1.000 5.000 6.000	120 0.2247	27.962 0.0 1.348		K = K @ EQ01	Vel = 9.97
126 to 109	10 10		0.0 26.87	1.25 1.53	T 9.917	1.000 9.917 10.917	120 0.0357	29.310 0.0 0.390			Vel = 4.69
109			0.0 26.87					29.700		K Factor = 4.93	
19 to 127	10 10	5.08	27.34 27.34	1 1.049	E 2.0	1.330 2.000 3.330	120 0.2321	28.954 0.0 0.773		K = K @ EQ06	Vel = 10.15

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127 to 110	10 10		0.0 27.34	1.25 1.53	T	9.917	9.000 9.917 18.917	120 0.0 0.0369	29.727 0.0 0.698	Vel = 4.77	
110			0.0 27.34						30.425	K Factor = 4.96	
201 to 215	25.71 28.12		62.40 62.4	3 3.26	2T	40.319	2.420 40.319 42.739	120 -1.044 0.0043	35.580 0.183	Vel = 2.40	
215 to 216	28.12 28.12		0.0 62.4	3 3.26	T	20.159	20.500 20.159 40.659	120 0.0 0.0043	34.719 0.0 0.173	Vel = 2.40	
216 to 217	28.12 27.99		-32.39 30.01	3 3.26	2E	18.815	53.080 18.815 71.895	120 0.056 0.0011	34.892 0.080	Vel = 1.15	
217 to 218	27.99 28.12		0.0 30.01	3 3.26			6.580 6.580	120 -0.056 0.0011	35.028 0.007	Vel = 1.15	
218 to 219	28.12 28.12		32.39 62.4	3 3.26	2T	40.319	52.830 40.319 93.149	120 0.0 0.0043	34.979 0.0 0.397	Vel = 2.40	
219 to 220	28.12 27.99		-31.72 30.68	3 3.26	E	9.408	39.160 9.408 48.568	120 0.056 0.0012	35.376 0.057	Vel = 1.18	
220 to 221	27.99 25.57		0.0 30.68	3 3.26	2T	40.319	2.420 40.319 42.739	120 1.048 0.0011	35.489 0.049	Vel = 1.18	
221 to 222	25.57 25.74		0.0 30.68	6 6.357			8.000 8.000	120 0	36.586 0.0	Vel = 0.31	
222 to 223	25.74 25.91		31.72 62.4	6 6.357			8.590 8.590	120 0.0002	36.512 0.002	Vel = 0.63	
223 to 224	25.91 26.12		33.61 96.01	6 6.357			10.000 10.000	120 0.0004	36.440 0.004	Vel = 0.97	
224 to 225	26.12 26.33		32.30 128.31	6 6.357			10.000 10.000	120 0.0006	36.353 0.006	Vel = 1.30	
225 to 226	26.33 26.53		31.51 159.82	6 6.357			10.000 10.000	120 0.0010	36.268 0.010	Vel = 1.62	
226 to 227	26.53 26.74		31.17 190.99	6 6.357			10.000 10.000	120 0.0013	36.191 0.013	Vel = 1.93	
227 to 228	26.74 26.95		31.20 222.19	6 6.357			10.000 10.000	120 0.0018	36.113 0.018	Vel = 2.25	
228 to 229	26.95 27.15		31.52 253.71	6 6.357			10.000 10.000	120 0.0022	36.040 0.022	Vel = 2.56	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
229 to 230	27.15 27.36		32.41 286.12	6 6.357		10.000 10.000	120 0.0028	35.975 -0.091 0.028		Vel = 2.89	
230 to 213	27.36 27.56		33.10 319.22	6 6.357		9.910 9.910	120 0.0034	35.912 -0.087 0.034		Vel = 3.23	
213			0.0 319.22					35.859		K Factor = 53.31	
216 to 218	28.12 28.12		32.39 32.39	3 3.26	2E 18.815	49.340 18.815 68.155	120 0.0013	34.892 0.0 0.087		Vel = 1.24	
218			0.0 32.39					34.979		K Factor = 5.48	
219 to 231	28.12 28.15		31.72 31.72	3 3.26	E 9.408	34.000 9.408 43.408	120 0.0012	35.376 -0.013 0.053		Vel = 1.22	
231 to 222	28.15 25.74		0.0 31.72	3 3.26	2T 40.319	2.420 40.319 42.739	120 0.0012	35.416 1.044 0.052		Vel = 1.22	
222			0.0 31.72					36.512		K Factor = 5.25	
202 to 232	25.91 28.33		33.61 33.61	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0038	35.585 -1.048 0.136		Vel = 1.98	
232 to 233	28.33 28.33		0.0 33.61	2.5 2.635		152.420 152.420	120 0.0038	34.673 0.0 0.584		Vel = 1.98	
233 to 223	28.33 25.91		0.0 33.61	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0038	35.257 1.048 0.135		Vel = 1.98	
223			0.0 33.61					36.440		K Factor = 5.57	
203 to 234	26.12 28.54		32.30 32.3	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0036	35.558 -1.048 0.126		Vel = 1.90	
234 to 235	28.54 28.54		0.0 32.3	2.5 2.635		152.420 152.420	120 0.0036	34.636 0.0 0.543		Vel = 1.90	
235 to 224	28.54 26.12		0.0 32.3	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0036	35.179 1.048 0.126		Vel = 1.90	
224			0.0 32.30					36.353		K Factor = 5.36	
204 to 236	26.33 28.74		31.51 31.51	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0034	35.509 -1.044 0.121		Vel = 1.85	
236 to 237	28.74 28.74		0.0 31.51	2.5 2.635		152.420 152.420	120 0.0034	34.586 0.0 0.518		Vel = 1.85	

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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	*****
237 to 225	28.74 26.33		0.0 31.51	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0034	35.104 1.044 0.120	Vel =	1.85	
225			0.0 31.51					36.268	K Factor =	5.23	
205 to 238	26.53 28.95		31.17 31.17	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0033	35.447 -1.048 0.118	Vel =	1.83	
238 to 239	28.95 28.95		0.0 31.17	2.5 2.635		152.420 152.420	120 0.0033	34.517 0.0 0.508	Vel =	1.83	
239 to 226	28.95 26.53		0.0 31.17	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0033	35.025 1.048 0.118	Vel =	1.83	
226			0.0 31.17					36.191	K Factor =	5.18	
206 to 240	26.74 29.15		31.20 31.2	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0033	35.368 -1.044 0.118	Vel =	1.84	
240 to 241	29.15 29.15		0.0 31.2	2.5 2.635		152.420 152.420	120 0.0033	34.442 0.0 0.509	Vel =	1.84	
241 to 227	29.15 26.74		0.0 31.2	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0033	34.951 1.044 0.118	Vel =	1.84	
227			0.0 31.20					36.113	K Factor =	5.19	
207 to 242	26.95 29.36		31.52 31.52	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0034	35.280 -1.044 0.121	Vel =	1.85	
242 to 243	29.36 29.36		0.0 31.52	2.5 2.635		152.420 152.420	120 0.0034	34.357 0.0 0.518	Vel =	1.85	
243 to 228	29.36 26.95		0.0 31.52	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0034	34.875 1.044 0.121	Vel =	1.85	
228			0.0 31.52					36.040	K Factor =	5.25	
208 to 244	27.15 29.57		32.41 32.41	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0036	35.194 -1.048 0.126	Vel =	1.91	
244 to 245	29.57 29.57		0.0 32.41	2.5 2.635		147.420 147.420	120 0.0036	34.272 0.0 0.528	Vel =	1.91	
245 to 229	29.57 27.15		0.0 32.41	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0036	34.800 1.048 0.127	Vel =	1.91	
			0.0								

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
229			32.41					35.975		K Factor = 5.40	
209 to 246	27.36 29.77		33.10 33.1	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0037	35.099 -1.044 0.132		Vel = 1.95	
246 to 247	29.77 29.77		0.0 33.1	2.5 2.635		147.420 147.420	120 0.0037	34.187 0.0 0.549		Vel = 1.95	
247 to 230	29.77 27.36		0.0 33.1	2.5 2.635	2T 32.948	2.420 32.948 35.368	120 0.0037	34.736 1.044 0.132		Vel = 1.95	
230			0.0 33.10					35.912		K Factor = 5.52	