

# ADVANTAGE

**FIRE PROTECTION SYSTEMS INC.**

*"We are your Advantage"*

404B N.W. 11th Street  
Blue Springs, MO. 64015  
Tel. (816) 224-3400



Advantage Fire Protection  
404B NW 11th Street  
Blue Springs, MO 64015  
816-224-3400

Job Name : CARRIER  
Drawing : 644 NE MAGUIRE BLVD  
Location : LEE'S SUMMIT, MISSOURI  
Remote Area : AREA 1  
Contract : J-2499  
Data File : AREA 1.WXF

Hydraulic Design Information Sheet

Name - CARRIER ENTERPRISES Date - 2/2/26  
 Location - LEE'S SUMMIT, MISSOURI  
 Building - 644 NE MAGUIRE BLVD System No. - AREA 1  
 Contractor - Contract No. - J-2499  
 Calculated By - Drawing No. - 1  
 Construction: ( ) Combustible (X) Non-Combustible Ceiling Height - 28-0  
 Occupancy - WAREHOUSE

S (X) NFPA 13 ( ) Lt. Haz. Ord.Haz.Gp. ( ) 1 ( ) 2 ( ) 3 ( ) Ex.Haz.  
 Y ( ) NFPA 231 ( ) NFPA 231C ( ) Figure Curve  
 S Other STORAGE PER NFPA 13 17.2.3.1 12) 25.2K @ 15 PSI  
 T Specific Ruling Made By Date

M	Area of Sprinkler Operation	- 12 HEADS	System Type	Sprinkler/Nozzle
	Density	-	(X) Wet	Make VICTAULIC
D	Area Per Sprinkler	- 100	( ) Dry	Model ESFR
E	Elevation at Highest Outlet	- 127.042	( ) Deluge	Size 1
S	Hose Allowance - Inside	-	( ) Preaction	K-Factor 25.2
I	Rack Sprinkler Allowance	-	( ) Other	Temp.Rat.165°
G	Hose Allowance - Outside	- 250		

N Note

Calculation Flow Required - 1196.18 Press Required - 77.056 TEST  
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test -		Cap. -
T	Time of Test -	Rated Cap.-	Elev.-
E	Static Press - 105	@ Press -	
R	Residual Press - 76	Elev. -	Well
S	Flow - 2300		Proof Flow
U	Elevation - 95		

P Location -

L Source of Information -

C	Commodity	Class	Location
O	Storage Ht.	Area	Aisle W.
M	Storage Method:	Solid Piled %	Palletized % Rack
M	( ) Single Row	( ) Conven. Pallet	( ) Auto. Storage ( ) Encap.
S	( ) Double Row	( ) Slave Pallet	( ) Solid Shelf ( ) Non
T	( ) Mult. Row		( ) Open Shelf

R	K	Flue Spacing	Clearance:Storage to Ceiling
A		Longitudinal	Transverse

E Horizontal Barriers Provided:

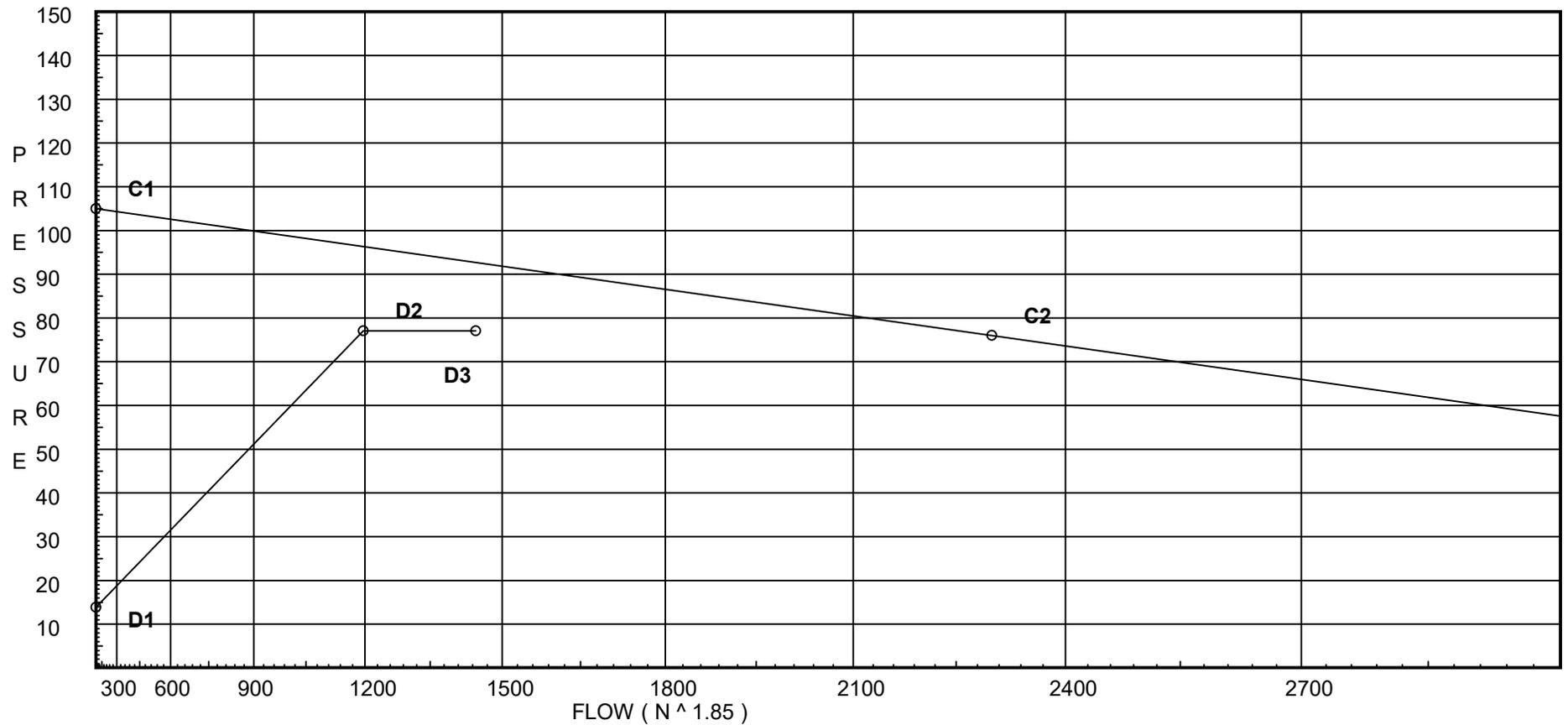
# Water Supply Curve

Advantage Fire Protection  
CARRIER

Page 2  
Date 2/2/26

City Water Supply:  
C1 - Static Pressure : 105  
C2 - Residual Pressure: 76  
C2 - Residual Flow : 2300

Demand:  
D1 - Elevation : 13.877  
D2 - System Flow : 1196.19  
D2 - System Pressure : 77.056  
Hose ( Demand ) : 250  
D3 - System Demand : 1446.19  
Safety Margin : 15.652



# Fittings Used Summary

Advantage Fire Protection  
CARRIER

Page 3  
Date 2/2/26

## 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
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
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
V	90' Ell Firelock #001	0	0	0	0	0	3.5	4.3	5	0	6.8	8.5	10	13	4.5	5.1	0	0	0	0	0
X	90'Tee-BranchFirelock002	0	0	0	0	0	8.5	10.8	13	0	16	21	25	33	9.3	11	0	0	0	0	0
Zwd	Watts 709DCDA	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>
TEST	105.0	76	2300.0	92.708	1446.19	77.056

**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>	
1	127.042	25.2	15.0	97.6	0.001	0.001
2	126.708	25.2	15.22	98.31	0.001	0.001
3	126.375	25.2	15.66	99.71	0.001	0.001
4	125.875	25.2	16.54	102.48	0.001	0.001
13	124.75		22.42			
5	127.042	25.2	15.01	97.62	0.001	0.001
6	126.708	25.2	15.24	98.36	0.001	0.001
7	126.375	25.2	15.69	99.82	0.001	0.001
8	125.875	25.2	16.57	102.58	0.001	0.001
14	124.75		22.46			
9	127.042	25.2	15.11	97.95	0.001	0.001
10	126.708	25.2	15.34	98.69	0.001	0.001
11	126.375	25.2	15.79	100.15	0.001	0.001
12	125.875	25.2	16.68	102.92	0.001	0.001
15	124.75		22.6			
A1	121.708		26.76			
A2	121.708		26.8			
A3	121.708		26.96			
A4	121.708		30.18			
A5	121.708		41.56			
TOR1	121.708		44.51			
BOR1	101.0		57.8			
UG1	95.0		75.24	250.0		
TEST	95.0		77.06			

# Final Calculations : Hazen-Williams

Advantage Fire Protection  
CARRIER

Page 5  
Date 2/2/26

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	*****
1 to 2	127.042 126.708	25.20	97.60 97.6	3 3.316			8.292 8.292	120 0.0089	15.000 0.145 0.074		Vel = 3.63	
2 to 3	126.708 126.375	25.20	98.31 195.91	3 3.316			9.000 9.000	120 0.0327	15.219 0.144 0.294		Vel = 7.28	
3 to 4	126.375 125.875	25.20	99.71 295.62	3 3.316			9.500 9.500	120 0.0698	15.657 0.217 0.663		Vel = 10.98	
4 to 13	125.875 124.750	25.20	102.48 398.1	3 3.316	X	18.982	25.583 18.982 44.565	120 0.1211	16.537 0.487 5.398		Vel = 14.79	
13 to A1	124.750 121.708		0.0 398.1	3 3.316	T	21.903	3.000 21.903 24.903	120 0.1212	22.422 1.317 3.017		Vel = 14.79	
A1			0.0 398.10						26.756		K Factor = 76.96	
5 to 6	127.042 126.708	25.20	97.62 97.62	3 3.316			9.500 9.500	120 0.0089	15.006 0.145 0.085		Vel = 3.63	
6 to 7	126.708 126.375	25.20	98.36 195.98	3 3.316			9.500 9.500	120 0.0326	15.236 0.144 0.310		Vel = 7.28	
7 to 8	126.375 125.875	25.20	99.82 295.8	3 3.316			9.500 9.500	120 0.0699	15.690 0.217 0.664		Vel = 10.99	
8 to 14	125.875 124.750	25.20	102.58 398.38	3 3.316	X	18.982	25.583 18.982 44.565	120 0.1213	16.571 0.487 5.405		Vel = 14.80	
14 to A2	124.750 121.708		0.0 398.38	3 3.316	T	21.903	3.000 21.903 24.903	120 0.1213	22.463 1.317 3.021		Vel = 14.80	
A2			0.0 398.38						26.801		K Factor = 76.95	
9 to 10	127.042 126.708	25.20	97.95 97.95	3 3.316			9.500 9.500	120 0.0091	15.107 0.145 0.086		Vel = 3.64	
10 to 11	126.708 126.375	25.20	98.69 196.64	3 3.316			9.500 9.500	120 0.0328	15.338 0.144 0.312		Vel = 7.31	
11 to 12	126.375 125.875	25.20	100.15 296.79	3 3.316			9.500 9.500	120 0.0703	15.794 0.217 0.668		Vel = 11.03	
12 to 15	125.875 124.750	25.20	102.92 399.71	3 3.316	X	18.982	25.583 18.982 44.565	120 0.1220	16.679 0.487 5.439		Vel = 14.85	
15 to A3	124.750 121.708		0.0 399.71	3 3.316	T	21.903	3.000 21.903 24.903	120 0.1221	22.605 1.317 3.040		Vel = 14.85	

# Final Calculations : Hazen-Williams

Advantage Fire Protection  
CARRIER

Page 6  
Date 2/2/26

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	*****
			0.0									
A3			399.71						26.962		K Factor = 76.98	
A1	121.708		398.10	6			9.000	120	26.756			
to									0.0			
A2	121.708		398.1	6.395			9.000	0.0050	0.045		Vel = 3.98	
A2	121.708		398.38	6			9.000	120	26.801			
to									0.0			
A3	121.708		796.48	6.395			9.000	0.0179	0.161		Vel = 7.96	
A3	121.708		399.71	6			85.000	120	26.962			
to									0.0			
A4	121.708		1196.19	6.395			85.000	0.0378	3.217		Vel = 11.95	
A4	121.708		0.0	6	5V	64.718	236.000	120	30.179			
to							64.718		0.0			
A5	121.708		1196.19	6.395			300.718	0.0379	11.384		Vel = 11.95	
A5	121.708		0.0	6	2V	25.887	52.000	120	41.563			
to							25.887		0.0			
TOR1	121.708		1196.19	6.395			77.887	0.0379	2.949		Vel = 11.95	
TOR1	121.708		0.0	6	B	12.944	21.000	120	44.512			
to					S	41.42	93.195		8.969			
BOR1	101		1196.19	6.395	T	38.831	114.195	0.0379	4.323		Vel = 11.95	
BOR1	101		0.0	6	Zwd	0.0	80.000	140	57.804			
to					G	4.304	47.341		13.087		** Fixed Loss = 10.488	
UG1	95		1196.19	6.16	T	43.037	127.341	0.0342	4.349		Vel = 12.88	
UG1	95	H250	250.00	12	T	93.767	1000.000	140	75.240			
to					G	9.377	103.144		0.0			
TEST	95		1446.19	12.34			1103.144	0.0016	1.816		Vel = 3.88	
			0.0									
TEST			1446.19						77.056		K Factor = 164.75	

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2/2/26

Advantage Fire Protection  
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Blue Springs, MO 64015  
816-224-3400

Job Name : CARRIER  
Drawing : 644 NE MAGUIRE BLVD  
Location : LEE'S SUMMIT, MISSOURI  
Remote Area : AREA 2  
Contract : J-2499  
Data File : AREA 2.WXF

Hydraulic Design Information Sheet

Name - CARRIER ENTERPRISES Date - 2/2/26  
 Location - LEE'S SUMMIT, MISSOURI  
 Building - 644 NE MAGUIRE BLVD System No. - AREA 2  
 Contractor - Contract No. - J-2499  
 Calculated By - Drawing No. - 1  
 Construction: ( ) Combustible (X) Non-Combustible Ceiling Height - 9-0  
 Occupancy - OFFICE

S (X) NFPA 13 (X) Lt. Haz. Ord.Haz.Gp. ( ) 1 ( ) 2 ( ) 3 ( ) Ex.Haz.  
 Y ( ) NFPA 231 ( ) NFPA 231C ( ) Figure Curve  
 S Other AREA REDUCED PER NFPA 13  
 T Specific Ruling Made By Date

M	Area of Sprinkler Operation - 1250	System Type	Sprinkler/Nozzle
	Density - .1	(X) Wet	Make VIKING
D	Area Per Sprinkler - 400	( ) Dry	Model EC/QREC
E	Elevation at Highest Outlet - 109	( ) Deluge	Size 3/4"
S	Hose Allowance - Inside -	( ) Preaction	K-Factor 11.2
I	Rack Sprinkler Allowance -	( ) Other	Temp.Rat.200°
G	Hose Allowance - Outside - 100		

N Note

Calculation Flow Required - 216.570 Press Required - 82.253 TEST  
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test -		Cap. -
T	Time of Test -	Rated Cap.-	Elev.-
E	Static Press - 105	@ Press -	
R	Residual Press - 76	Elev. -	Well
S	Flow - 2300		Proof Flow
U	Elevation - 95		

P Location -

L Source of Information -

C	Commodity	Class	Location
O	Storage Ht.	Area	Aisle W.
M	Storage Method:	%	Palletized % Rack
	( ) Single Row	( ) Conven. Pallet	( ) Auto. Storage ( ) Encap.
S	( ) Double Row	( ) Slave Pallet	( ) Solid Shelf ( ) Non
T	( ) Mult. Row		( ) Open Shelf

R K Flue Spacing Clearance:Storage to Ceiling  
 A Longitudinal Transverse

E Horizontal Barriers Provided:

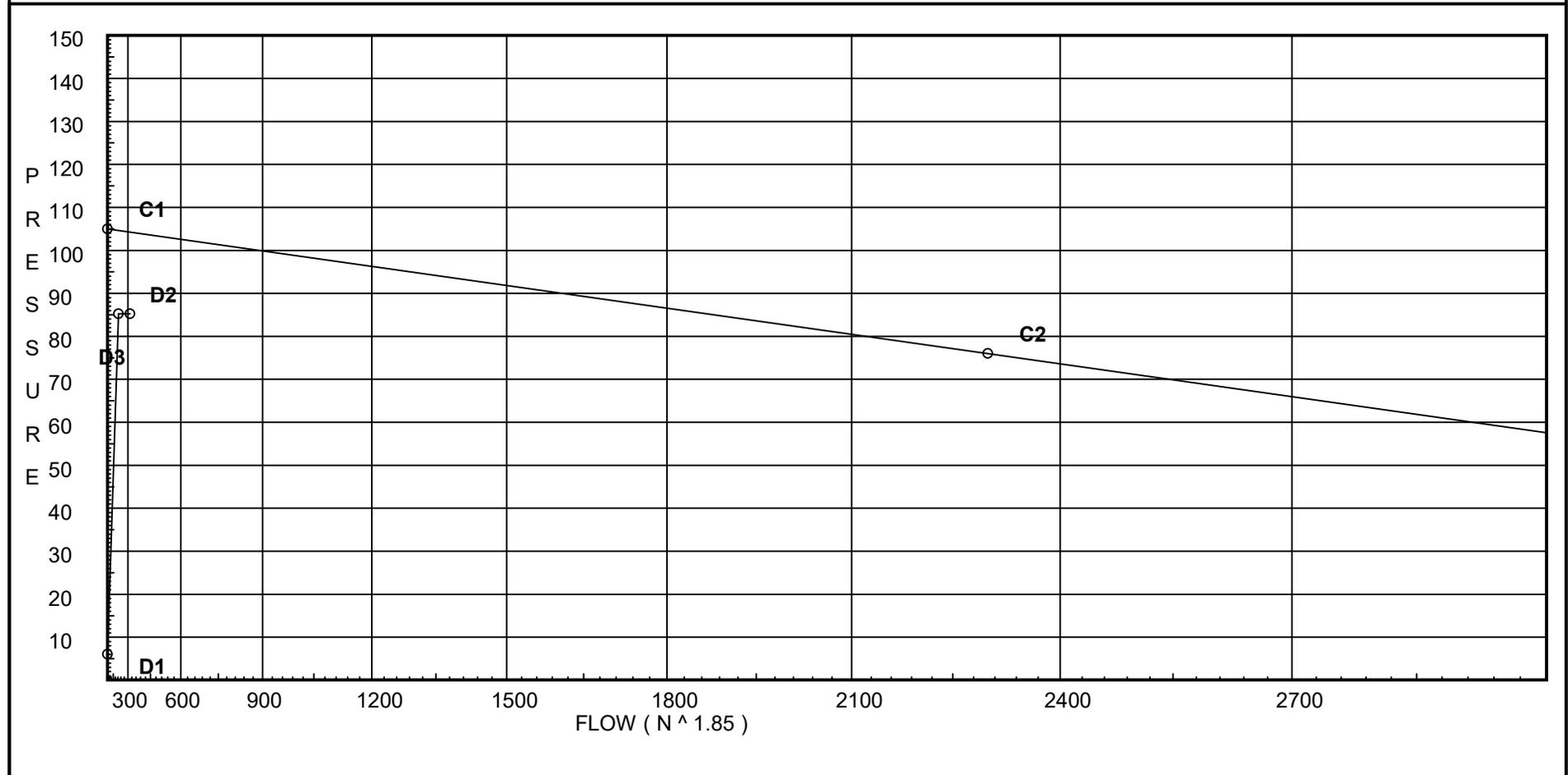
# Water Supply Curve

Advantage Fire Protection  
CARRIER

Page 2  
Date 2/2/26

City Water Supply:  
C1 - Static Pressure : 105  
C2 - Residual Pressure: 76  
C2 - Residual Flow : 2300

Demand:  
D1 - Elevation : 6.063  
D2 - System Flow : 216.57  
D2 - System Pressure : 85.253  
Hose ( Demand ) : 100  
D3 - System Demand : 316.57  
Safety Margin : 19.007



# Fittings Used Summary

Advantage Fire Protection  
CARRIER

Page 3  
Date 2/2/26

## 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
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	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
V	90' Ell Firelock #001	0	0	0	0	0	3.5	4.3	5	0	6.8	8.5	10	13	4.5	5.1	0	0	0	0	0
X	90'Tee-BranchFirelock002	0	0	0	0	0	8.5	10.8	13	0	16	21	25	33	9.3	11	0	0	0	0	0
Zwd	Watts 709DCDA	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**

<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>
TEST	105.0	76	2300.0	104.26	316.57	85.253

**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>
D101	109.0	11.2	12.8	40.07	0.1 400
D102	109.0	11.2	13.64	41.36	0.1 400
101	109.667		31.81		
102	109.667		33.81		
D103	109.0	11.2	13.77	41.56	0.1 400
D104	109.0	11.2	14.67	42.89	0.1 400
103	109.667		34.12		
104	109.667		36.26		
D106	109.0	11.2	20.49	50.69	0.1 400
105	109.667		50.01		
106	109.667		50.01		
B1	109.667		38.84		
B2	109.667		41.64		
B3	109.667		52.1		
B4	109.667		59.59		
B5	125.5		61.71		
A4	121.708		65.51		
A5	121.708		66.0		
TOR1	121.708		66.12		
BOR1	101.0		75.27		
UG1	95.0		85.14	100.0	
TEST	95.0		85.25		

# Final Calculations : Hazen-Williams

Advantage Fire Protection  
CARRIER

Page 5  
Date 2/2/26

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	*****
D101 to 101	109 109.667	11.20	40.07 40.07	1 1.049	T	5.0	36.000 5.000 41.000	120 0.4707	12.800 -0.289 19.297		Vel = 14.88	
101			0.0 40.07						31.808		K Factor = 7.10	
D102 to 102	109 109.667	11.20	41.36 41.36	1 1.049	T	5.0	36.000 5.000 41.000	120 0.4990	13.636 -0.289 20.459		Vel = 15.35	
102			0.0 41.36						33.806		K Factor = 7.11	
101 to 102	109.667 109.667		40.07 40.07	1.25 1.442			20.000 20.000	120 0.0999	31.808 0.0 1.998		Vel = 7.87	
102 to B1	109.667 109.667		41.36 81.43	1.25 1.442	T	7.432	6.125 7.432 13.557	120 0.3711	33.806 0.0 5.031		Vel = 16.00	
B1			0.0 81.43						38.837		K Factor = 13.07	
D103 to 103	109 109.667	11.20	41.56 41.56	1 1.049	T	5.0	36.000 5.000 41.000	120 0.5035	13.768 -0.289 20.644		Vel = 15.43	
103			0.0 41.56						34.123		K Factor = 7.11	
D104 to 104	109 109.667	11.20	42.89 42.89	1 1.049	T	5.0	36.000 5.000 41.000	120 0.5338	14.665 -0.289 21.885		Vel = 15.92	
104			0.0 42.89						36.261		K Factor = 7.12	
103 to 104	109.667 109.667		41.56 41.56	1.25 1.442			20.000 20.000	120 0.1069	34.123 0.0 2.138		Vel = 8.16	
104 to B2	109.667 109.667		42.89 84.45	1.25 1.442	T	7.432	6.125 7.432 13.557	120 0.3969	36.261 0.0 5.381		Vel = 16.59	
B2			0.0 84.45						41.642		K Factor = 13.09	
D106 to 106	109 109.667	11.20	50.69 50.69	1 1.049	T	5.0	36.000 5.000 41.000	120 0.7271	20.486 -0.289 29.813		Vel = 18.82	
106			0.0 50.69						50.010		K Factor = 7.17	
105 to 106	109.667 109.667		0.0 0.0	1.25 1.442			20.000 20.000	120 0	50.010 0.0 0.0		Vel = 0	
106 to B3	109.667 109.667		50.69 50.69	1.25 1.442	T	7.432	6.125 7.432 13.557	120 0.1545	50.010 0.0 2.094		Vel = 9.96	

# Final Calculations : Hazen-Williams

Advantage Fire Protection  
CARRIER

Page 6  
Date 2/2/26

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	*****
			0.0 50.69					52.104		K Factor = 7.02	
B1 to B2	109.667 109.667		81.43	1.5		16.000	120	38.837 0.0		Vel = 11.76	
B2 to B3	109.667 109.667		84.45	1.5		16.000	120	41.642 0.0		Vel = 23.95	
B3 to B4	109.667 109.667		50.69	1.5	E 4.95	2.042 4.950 6.992	120	52.104 0.0		Vel = 31.27	
B4 to B5	109.667 125.500		0.0	2	T 12.307	15.833 12.307 28.140	120	59.591 -6.857		Vel = 19.01	
B5 to A4	125.500 121.708		0.0	3	V 6.72 X 17.471	26.500 24.191 50.691	120	61.708 1.642		Vel = 8.32	
A4			0.0 216.57					65.513		K Factor = 26.76	
A4 to A5	121.708 121.708		216.57	6	5V 64.718	236.000 64.718 300.718	120	65.513 0.0		Vel = 2.16	
A5 to TOR1	121.708 121.708		0.0	6	2V 25.887	52.000 25.887 77.887	120	65.996 0.0		Vel = 2.16	
TOR1 to BOR1	121.708 101		0.0	6	B 12.944 S 41.42 T 38.831	21.000 93.195 114.195	120	66.120 8.969		Vel = 2.16	
BOR1 to UG1	101 95		0.0	6	Zwd 0.0 G 4.304 T 43.037	80.000 47.341 127.341	140	75.272 9.687		** Fixed Loss = 7.089 Vel = 2.33	
UG1 to TEST	95 95	H100	100.00	12	T 93.767 G 9.377	1000.000 103.144 1103.144	140	85.144 0.0		Vel = 0.85	
TEST			0.0 316.57					85.253		K Factor = 34.29	