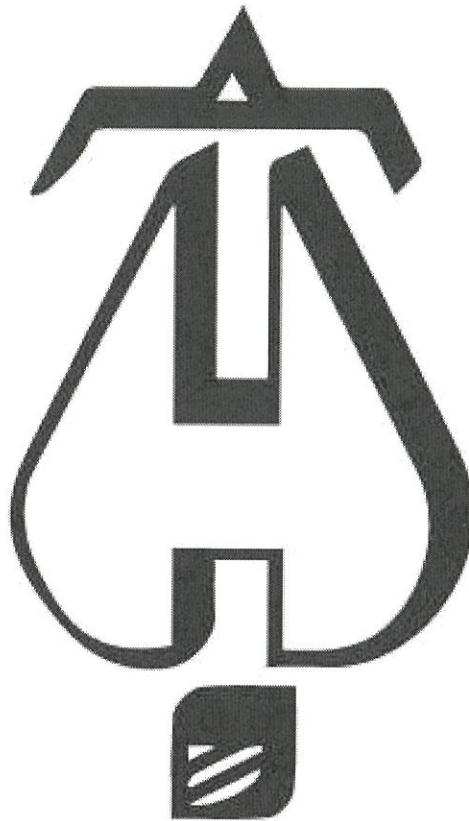




Hydraulic Calculations by HydraCALC

Hydratec Incorporated
64 Haverhill Road
Route 111
Windham, NH 03087
603-434-0502

Job Name : BLDG B ALT K25 SYS 16
Drawing : HIGH PILED STORAGE
Location : NY312 & PUGSLEY RD, BREWSTER, NY 10509
Remote Area : SYSTEM 16
Contract : 5031092
Data File : Lincoln Equities - BLDG B ALTERNATE SYS 16 K25 8.23.23.WXF



Hydraulic Design Information Sheet

Name - BLDG B ALT K25 SYS 16 Date - 8.23.23
Location - NY312 & PUGSLEY RD, BREWSTER, NY 10509
Building - HIGH PILED STORAGE System No. - SYSTEM 16
Contractor - SA COMUNALE Contract No. - 5031092
Calculated By - JUSTIN BEOUGHER Drawing No. - PG.19
Construction: () Combustible (X) Non-Combustible Ceiling Height - 45'-6
Occupancy - ESFR

S (X) NFPA 13 () Lt. Haz. Ord.Haz.Gp. () 1 () 2 () 3 () Ex.Haz.
Y () Figure Curve

S Other

T Specific Ruling

Made By

Date

M	Number of ESFR Sprinklers	- 12	System Type	Sprinkler/Nozzle
	End Head Pressure (PSI)	- 45	(X) Wet	Make TYCO
D	ESFR K-Factor	- 25.2	() Dry	Model K25
E	Elevation at Highest Outlet	- 43'-10 1/2	() Deluge	Size 1"
S	Hose Allowance - Inside	- 100	() Preaction	K-Factor 22.4
I	Rack Sprinkler Allowance	- NA	() Other	Temp.Rat.165
G	Hose Allowance - Outside	- 150		

N Note

Calculation Flow Required - 2291.00 Press Required - 139.837
Summary C-Factor Used: 120 Overhead 150 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test -		Cap. -
T	Time of Test -	Rated Cap.- 2000	Elev.-
E	Static Press -	@ Press - 149	
R	Residual Press -	Elev. - 2	Well
	Flow -		Proof Flow
S	Elevation -		

U Location - PUMP

P WATER STORAGE TANK

L Source of Information -

Y

C	Commodity GROUP A	CARTONED UNEXP.	Class 1-4	Location
O	Storage Ht. 40 FT		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	

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

E Horizontal Barriers Provided:

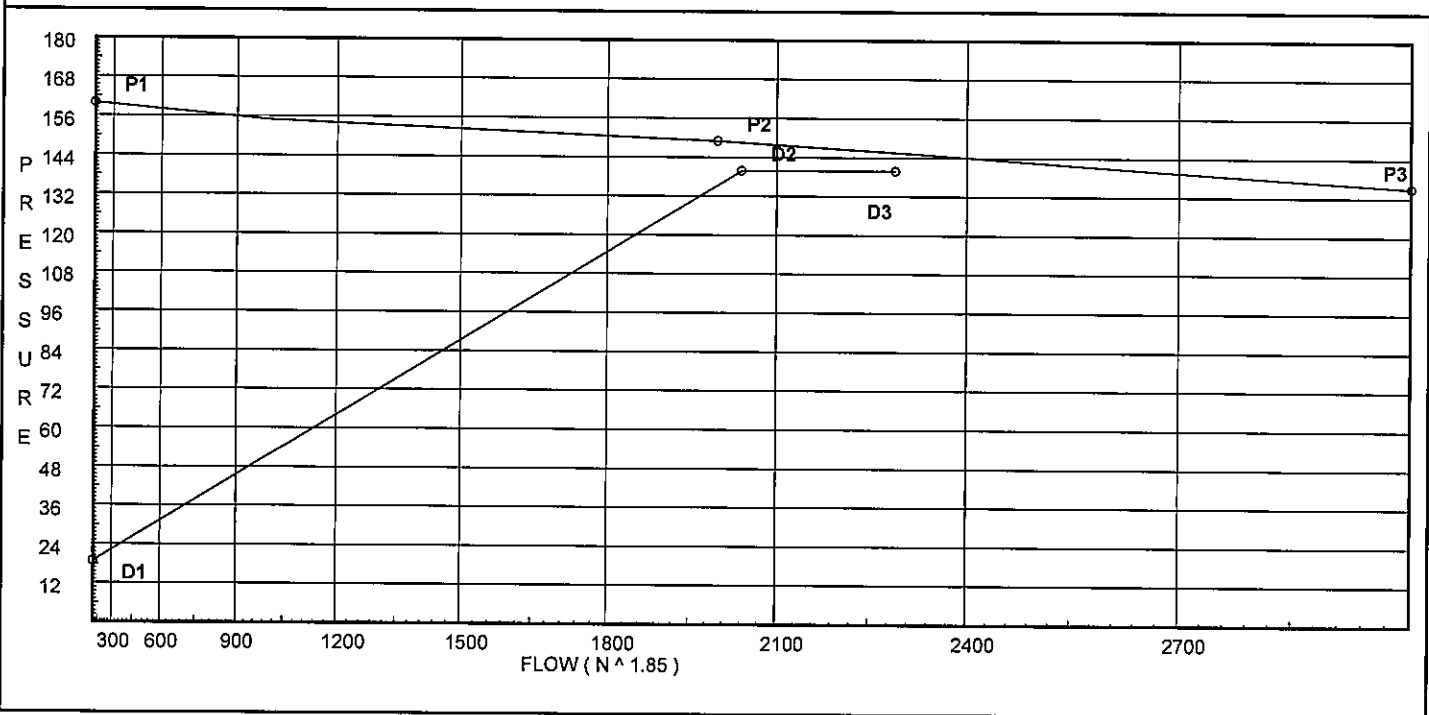
Water Supply Curve C

Hydratec Incorporated
BLDG B ALT K25 SYS 16

Page 2
Date 8.23.23

Pump Data:
P1 - Pump Churn Pressure : 160
P2 - Pump Rated Pressure : 149
P2 - Pump Rated Flow : 2000
P3 - Pump Pressure @ Max Flow : 135
P3 - Pump Max Flow : 3000

Demand:
D1 - Elevation : 18.840
D2 - System Flow : 2041
D2 - System Pressure : 139.837
Hose (Demand) : 250
D3 - System Demand : 2291
Safety Margin : 5.696



Fittings Used Summary

Hydratec Incorporated
BLDG B ALT K25 SYS 16

Page 3
Date 8.23.23

Fitting Legend		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
Abbrev.	Name																				
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
F	NFPA 13 45° Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
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
L	NFPA 13 Long Turn Elbow	0.5	1	2	2	2	3	4	5	5	6	8	9	13	16	18	24	27	30	34	40
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-Branch Firelock 002	0	0	0	0	0	8.5	10.8	13	0	16	21	25	33	9.3	11	0	0	0	0	0

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

Hydratec Incorporated
BLDG B ALT K25 SYS 16

Page 4
Date 8.23.23

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>
PO	See Information on Pump Curve			145.533	2291.0	139.837

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>
R13	45.5		63.71		
1	45.5	25.2	45.73	170.42	
2	45.5	25.2	45.0	169.05	
3	45.5	25.2	45.0	169.05	
4	45.5	25.2	45.79	170.53	
R14	45.5		63.91		
5	45.5	25.2	45.83	170.6	
6	45.5	25.2	45.09	169.22	
7	45.5	25.2	45.09	169.22	
8	45.5	25.2	45.88	170.69	
R15	45.5		64.62		
9	45.5	25.2	46.19	171.26	
10	45.5	25.2	45.43	169.85	
11	45.5	25.2	45.43	169.85	
12	45.5	25.2	46.2	171.28	
R16	45.5		76.43		
R17	45.5		77.84		
R18	45.5		79.01		
R19	45.5		79.98		
R20	45.5		80.79		
R21	45.5		81.46		
R22	45.5		82.01		
R23	45.5		82.45		
R24	45.5		82.81		
R25	45.5		83.08		
R26	45.5		83.29		
R27	45.5		83.43		
R28	45.5		83.56		
13	45.5		72.46		
14	45.5		72.71		
15	45.5		73.6		
16	45.5		75.5		
17	45.5		77.06		
18	45.5		78.35		
19	45.5		79.41		
20	45.5		80.27		
21	45.5		80.97		
22	45.5		81.51		
23	45.5		81.93		

Flow Summary - NFPA

Hydratec Incorporated
BLDG B ALT K25 SYS 16

Page 5
Date 8.23.23

NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
24	45.5		82.25		
25	45.5		82.46		
26	45.5		82.57		
27	45.5		82.62		
28	45.5		82.62		
29	45.5		82.62		
30	45.5		82.65		
31	45.5		82.75		
32	45.5		83.0		
33	45.5		83.3		
34	45.5		83.64		
35	45.5		84.03		
36	45.5		84.47		
37	45.5		84.95		
38	45.5		85.48		
39	45.5		86.1		
40	45.5		86.77		
41	45.5		87.5		
42	45.5		88.3		
43	45.5		89.17		
44	45.5		90.12		
FMJ	45.5		91.86		
TR2	45.5		100.81		
BR2	2.0		123.01	100.0	
FLG	2.0		123.55		
UG7	-5.0		131.92		
UG8	-5.0		131.18		
UG9	-5.0		130.44	150.0	
UG10	-5.0		129.67		
UG11	-5.0		134.29		
NL	-5.0		134.95		
UG12	-5.0		136.49		
UG13	-5.0		136.09		
UG14	-5.0		135.39		
UG15	-5.0		133.89		
UG16	-5.0		132.82		
UG6	-5.0		141.1		
PUMP	2.0		138.49		
PO	2.0		139.84		

Final Calculations : Hazen-Williams

Hydratec Incorporated
BLDG B ALT K25 SYS 16

Page 6
Date 8.23.23

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftns Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
R13 to 1	45.500 45.500		-335.93 -335.93	2.5 2.635		0.0 0.0 0.0	66.333 0.0 66.333	120 -0.2710	63.709 0.0 -17.977		Vel = 19.76	
1 to 2	45.500 45.500	25.20	170.42 -165.51	2.5 2.635		0.0 0.0 0.0	10.000 0.0 10.000	120 -0.0732	45.732 0.0 -0.732		Vel = 9.74	
2 to 3	45.500 45.500	25.20	169.04 3.53	2.5 2.635		0.0 0.0 0.0	10.000 0.0 10.000	120 0.0001	45.000 0.0 0.001		Vel = 0.21	
3 to 4	45.500 45.500	25.20	169.05 172.58	2.5 2.635		0.0 0.0 0.0	10.000 0.0 10.000	120 0.0790	45.001 0.0 0.790		Vel = 10.15	
4 to R29	45.500 45.500	25.20	170.53 343.11	2.5 2.635		0.0 0.0 0.0	98.291 0.0 98.291	120 0.2818	45.791 0.0 27.702		Vel = 20.19	
R29			0.0 343.11						73.493		K Factor = 40.02	
R14 to 5	45.500 45.500		-336.93 -336.93	2.5 2.635		0.0 0.0 0.0	66.333 0.0 66.333	120 -0.2725	63.907 0.0 -18.077		Vel = 19.82	
5 to 6	45.500 45.500	25.20	170.60 -166.33	2.5 2.635		0.0 0.0 0.0	10.000 0.0 10.000	120 -0.0738	45.830 0.0 -0.738		Vel = 9.79	
6 to 7	45.500 45.500	25.20	169.22 2.89	2.5 2.635		0.0 0.0 0.0	10.000 0.0 10.000	120 0	45.092 0.0 0.0		Vel = 0.17	
7 to 8	45.500 45.500	25.20	169.22 172.11	2.5 2.635		0.0 0.0 0.0	10.000 0.0 10.000	120 0.0786	45.092 0.0 0.786		Vel = 10.13	
8 to R30	45.500 45.500	25.20	170.69 342.8	2.5 2.635		0.0 0.0 0.0	98.291 0.0 98.291	120 0.2814	45.878 0.0 27.656		Vel = 20.17	
R30			0.0 342.80						73.534		K Factor = 39.98	
R15 to 9	45.500 45.500		-340.51 -340.51	2.5 2.635		0.0 0.0 0.0	66.333 0.0 66.333	120 -0.2779	64.622 0.0 -18.433		Vel = 20.03	
9 to 10	45.500 45.500	25.20	171.27 -169.24	2.5 2.635		0.0 0.0 0.0	10.000 0.0 10.000	120 -0.0763	46.189 0.0 -0.763		Vel = 9.96	
10 to 11	45.500 45.500	25.20	169.84 0.6	2.5 2.635		0.0 0.0 0.0	10.000 0.0 10.000	120 0	45.426 0.0 0.0		Vel = 0.04	
11 to 12	45.500 45.500	25.20	169.85 170.45	2.5 2.635		0.0 0.0 0.0	10.000 0.0 10.000	120 0.0773	45.426 0.0 0.773		Vel = 10.03	
12 to R31	45.500 45.500	25.20	171.28 341.73	2.5 2.635		0.0 0.0 0.0	98.291 0.0 98.291	120 0.2798	46.199 0.0 27.497		Vel = 20.11	

Final Calculations : Hazen-Williams

Hydratec Incorporated
BLDG B ALT K25 SYS 16

Page 7
Date 8.23.23

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftns Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
R31			0.0 341.73						73.696		K Factor = 39.81	
R16 to R32	45.500 45.500		100.26 100.26	2.5 2.635		0.0 0.0	194.625 0.0	120 0.0289	76.430 0.0		Vel = 5.90	
R32			0.0 100.26						82.064		K Factor = 11.07	
R17 to R33	45.500 45.500		90.72 90.72	2.5 2.635		0.0 0.0	194.625 0.0	120 0.0241	77.837 0.0		Vel = 5.34	
R33			0.0 90.72						82.518		K Factor = 9.99	
R18 to R34	45.500 45.500		83.01 83.01	2.5 2.635		0.0 0.0	194.625 0.0	120 0.0204	79.008 0.0		Vel = 4.88	
R34			0.0 83.01						82.980		K Factor = 9.11	
R19 to R35	45.500 45.500		77.17 77.17	2.5 2.635		0.0 0.0	194.625 0.0	120 0.0178	79.983 0.0		Vel = 4.54	
R35			0.0 77.17						83.455		K Factor = 8.45	
R20 to R36	45.500 45.500		73.25 73.25	2.5 2.635		0.0 0.0	194.625 0.0	120 0.0162	80.794 0.0		Vel = 4.31	
R36			0.0 73.25						83.945		K Factor = 7.99	
R21 to R37	45.500 45.500		71.23 71.23	2.5 2.635		0.0 0.0	194.625 0.0	120 0.0154	81.462 0.0		Vel = 4.19	
R37			0.0 71.23						84.455		K Factor = 7.75	
R22 to R38	45.500 45.500		71.07 71.07	2.5 2.635		0.0 0.0	194.625 0.0	120 0.0153	82.008 0.0		Vel = 4.18	
R38			0.0 71.07						84.988		K Factor = 7.71	
R23 to R39	45.500 45.500		72.97 72.97	2.5 2.635		0.0 0.0	194.625 0.0	120 0.0161	82.449 0.0		Vel = 4.29	
R39			0.0 72.97						85.578		K Factor = 7.89	
R24 to R40	45.500 45.500		76.24 76.24	2.5 2.635		0.0 0.0	194.625 0.0	120 0.0174	82.811 0.0		Vel = 4.49	
			0.0									

Final Calculations : Hazen-Williams

Hydratec Incorporated
BLDG B ALT K25 SYS 16

Page 8
Date 8.23.23

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftns Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
R40			76.24						86.205		K Factor = 8.21	
R25 to R41	45.500 45.500		80.88 80.88	2.5 2.635		0.0 0.0	194.625 0.0	120	83.085 0.0			
						0.0	194.625	0.0194	3.785		Vel = 4.76	
R41			0.0 80.88						86.870		K Factor = 8.68	
R26 to R42	45.500 45.500		86.61 86.61	2.5 2.635		0.0 0.0	194.625 0.0	120	83.286 0.0			
						0.0	194.625	0.0221	4.296		Vel = 5.10	
R42			0.0 86.61						87.582		K Factor = 9.25	
R27 to R43	45.500 45.500		93.15 93.15	2.5 2.635		0.0 0.0	194.625 0.0	120	83.434 0.0			
						0.0	194.625	0.0253	4.916		Vel = 5.48	
R43			0.0 93.15						88.350		K Factor = 9.91	
R28 to R44	45.500 45.500		100.23 100.23	2.5 2.635		0.0 0.0	194.625 0.0	120	83.556 0.0			
						0.0	194.625	0.0289	5.630		Vel = 5.90	
R44			0.0 100.23						89.186		K Factor = 10.61	
13 to R13	45.500 45.500		-335.93 -335.93	2.5 2.635	X T	14.827 16.474	1.000 31.301	120	72.464 0.0			
						0.0	32.301	-0.2710	-8.755		Vel = 19.76	
R13			0.0 -335.93						63.709		K Factor = -42.09	
14 to R14	45.500 45.500		-336.93 -336.93	2.5 2.635	X T	14.827 16.474	1.000 31.301	120	72.710 0.0			
						0.0	32.301	-0.2725	-8.803		Vel = 19.82	
R14			0.0 -336.93						63.907		K Factor = -42.15	
15 to R15	45.500 45.500		-340.51 -340.51	2.5 2.635	X T	14.827 16.474	1.000 31.301	120	73.599 0.0			
						0.0	32.301	-0.2779	-8.977		Vel = 20.03	
R15			0.0 -340.51						64.622		K Factor = -42.36	
16 to R16	45.500 45.500		100.26 100.26	2.5 2.635	X T	14.827 16.474	1.000 31.301	120	75.496 0.0			
						0.0	32.301	0.0289	0.934		Vel = 5.90	
R16			0.0 100.26						76.430		K Factor = 11.47	
17 to R17	45.500 45.500		90.72 90.72	2.5 2.635	X T	14.827 16.474	1.000 31.301	120	77.060 0.0			
						0.0	32.301	0.0241	0.777		Vel = 5.34	
R17			0.0 90.72						77.837		K Factor = 10.28	

Final Calculations : Hazen-Williams

Hydratec Incorporated
BLDG B ALT K25 SYS 16

Page 9
Date 8.23.23

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	*****
18 to R18	45.500 45.500		83.01 83.01	2.5 2.635	X T	14.827 16.474 0.0	1.000 31.301 32.301	120 0.0204	78.349 0.0 0.659		Vel = 4.88	
R18			0.0 83.01						79.008		K Factor = 9.34	
19 to R19	45.500 45.500		77.17 77.17	2.5 2.635	X T	14.827 16.474 0.0	1.000 31.301 32.301	120 0.0178	79.407 0.0 0.576		Vel = 4.54	
R19			0.0 77.17						79.983		K Factor = 8.63	
20 to R20	45.500 45.500		73.25 73.25	2.5 2.635	X T	14.827 16.474 0.0	1.000 31.301 32.301	120 0.0162	80.271 0.0 0.523		Vel = 4.31	
R20			0.0 73.25						80.794		K Factor = 8.15	
21 to R21	45.500 45.500		71.23 71.23	2.5 2.635	X T	14.827 16.474 0.0	1.000 31.301 32.301	120 0.0154	80.966 0.0 0.496		Vel = 4.19	
R21			0.0 71.23						81.462		K Factor = 7.89	
22 to R22	45.500 45.500		71.07 71.07	2.5 2.635	X T	14.827 16.474 0.0	1.000 31.301 32.301	120 0.0153	81.513 0.0 0.495		Vel = 4.18	
R22			0.0 71.07						82.008		K Factor = 7.85	
23 to R23	45.500 45.500		72.97 72.97	2.5 2.635	X T	14.827 16.474 0.0	1.000 31.301 32.301	120 0.0161	81.930 0.0 0.519		Vel = 4.29	
R23			0.0 72.97						82.449		K Factor = 8.04	
24 to R24	45.500 45.500		76.24 76.24	2.5 2.635	X T	14.827 16.474 0.0	1.000 31.301 32.301	120 0.0174	82.248 0.0 0.563		Vel = 4.49	
R24			0.0 76.24						82.811		K Factor = 8.38	
25 to R25	45.500 45.500		80.88 80.88	2.5 2.635	X T	14.827 16.474 0.0	1.000 31.301 32.301	120 0.0195	82.456 0.0 0.629		Vel = 4.76	
R25			0.0 80.88						83.085		K Factor = 8.87	
26 to R26	45.500 45.500		86.61 86.61	2.5 2.635	X T	14.827 16.474 0.0	1.000 31.301 32.301	120 0.0221	82.572 0.0 0.714		Vel = 5.10	
R26			0.0 86.61						83.286		K Factor = 9.49	
27 to R27	45.500 45.500		93.15 93.15	2.5 2.635	X T	14.827 16.474 0.0	1.000 31.301 32.301	120 0.0253	82.618 0.0 0.816		Vel = 5.48	

Final Calculations : Hazen-Williams

Hydratec Incorporated
BLDG B ALT K25 SYS 16

Page 10
Date 8.23.23

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	*****
R27			0.0 93.15						83.434		K Factor = 10.20	
28 to R28	45.500 45.500		100.23 100.23	2.5 2.635	X T	14.827 16.474 0.0	1.000 31.301 32.301	120 0.0289	82.622 0.0 0.934		Vel = 5.90	
R28			0.0 100.23						83.556		K Factor = 10.97	
29 to R29	45.500 45.500		-343.11 -343.11	2.5 2.635	X T	14.827 16.474 0.0	1.083 31.301 32.384	120 -0.2818	82.620 0.0 -9.127		Vel = 20.19	
R29			0.0 -343.11						73.493		K Factor = -40.02	
30 to R30	45.500 45.500		-342.80 -342.8	2.5 2.635	X T	14.827 16.474 0.0	1.083 31.301 32.384	120 -0.2813	82.645 0.0 -9.111		Vel = 20.17	
R30			0.0 -342.80						73.534		K Factor = -39.98	
31 to R31	45.500 45.500		-341.73 -341.73	2.5 2.635	X T	14.827 16.474 0.0	1.083 31.301 32.384	120 -0.2797	82.755 0.0 -9.059		Vel = 20.11	
R31			0.0 -341.73						73.696		K Factor = -39.81	
32 to R32	45.500 45.500		-100.26 -100.26	2.5 2.635	X T	14.827 16.474 0.0	1.083 31.301 32.384	120 -0.0289	83.001 0.0 -0.937		Vel = 5.90	
R32			0.0 -100.26						82.064		K Factor = -11.07	
33 to R33	45.500 45.500		-90.72 -90.72	2.5 2.635	X T	14.827 16.474 0.0	1.083 31.301 32.384	120 -0.0241	83.297 0.0 -0.779		Vel = 5.34	
R33			0.0 -90.72						82.518		K Factor = -9.99	
34 to R34	45.500 45.500		-83.01 -83.01	2.5 2.635	X T	14.827 16.474 0.0	1.083 31.301 32.384	120 -0.0204	83.641 0.0 -0.661		Vel = 4.88	
R34			0.0 -83.01						82.980		K Factor = -9.11	
35 to R35	45.500 45.500		-77.17 -77.17	2.5 2.635	X T	14.827 16.474 0.0	1.083 31.301 32.384	120 -0.0178	84.032 0.0 -0.577		Vel = 4.54	
R35			0.0 -77.17						83.455		K Factor = -8.45	
36 to R36	45.500 45.500		-73.25 -73.25	2.5 2.635	X T	14.827 16.474 0.0	1.083 31.301 32.384	120 -0.0162	84.470 0.0 -0.525		Vel = 4.31	
			0.0									

Final Calculations : Hazen-Williams

Hydratec Incorporated
BLDG B ALT K25 SYS 16

Page 11
Date 8.23.23

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 *****
R36			-73.25						83.945	K Factor = -7.99
37 to R37	45.500 45.500		-71.23 -71.23	2.5 2.635	X T	14.827 16.474 0.0	1.083 31.301 32.384	120 -0.0154	84.953 0.0 -0.498	Vel = 4.19
R37			0.0 -71.23						84.455	K Factor = -7.75
38 to R38	45.500 45.500		-71.07 -71.07	2.5 2.635	X T	14.827 16.474 0.0	1.083 31.301 32.384	120 -0.0153	85.484 0.0 -0.496	Vel = 4.18
R38			0.0 -71.07						84.988	K Factor = -7.71
39 to R39	45.500 45.500		-72.97 -72.97	2.5 2.635	X T	14.827 16.474 0.0	1.083 31.301 32.384	120 -0.0161	86.099 0.0 -0.521	Vel = 4.29
R39			0.0 -72.97						85.578	K Factor = -7.89
40 to R40	45.500 45.500		-76.24 -76.24	2.5 2.635	X T	14.827 16.474 0.0	1.083 31.301 32.384	120 -0.0174	86.770 0.0 -0.565	Vel = 4.49
R40			0.0 -76.24						86.205	K Factor = -8.21
41 to R41	45.500 45.500		-80.88 -80.88	2.5 2.635	X T	14.827 16.474 0.0	1.083 31.301 32.384	120 -0.0195	87.500 0.0 -0.630	Vel = 4.76
R41			0.0 -80.88						86.870	K Factor = -8.68
42 to R42	45.500 45.500		-86.61 -86.61	2.5 2.635	X T	14.827 16.474 0.0	1.083 31.301 32.384	120 -0.0221	88.297 0.0 -0.715	Vel = 5.10
R42			0.0 -86.61						87.582	K Factor = -9.25
43 to R43	45.500 45.500		-93.15 -93.15	2.5 2.635	X T	14.827 16.474 0.0	1.083 31.301 32.384	120 -0.0253	89.168 0.0 -0.818	Vel = 5.48
R43			0.0 -93.15						88.350	K Factor = -9.91
44 to R44	45.500 45.500		-100.23 -100.23	2.5 2.635	X T	14.827 16.474 0.0	1.083 31.301 32.384	120 -0.0289	90.122 0.0 -0.936	Vel = 5.90
R44			0.0 -100.23						89.186	K Factor = -10.61
13 to 14	45.500 45.500		335.93 335.93	4 4.26		0.0 0.0 0.0	9.417 0.0 9.417	120 0.0261	72.464 0.0 0.246	Vel = 7.56
14 to 15	45.500 45.500		336.93 672.86	4 4.26		0.0 0.0 0.0	9.417 0.0 9.417	120 0.0944	72.710 0.0 0.889	Vel = 15.15

Final Calculations : Hazen-Williams

Hydratec Incorporated
BLDG B ALT K25 SYS 16

Page 12
Date 8.23.23

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftns Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
15 to 16	45.500 45.500		340.50 1013.36	4 4.26		0.0 0.0 0.0	9.417 0.0 9.417	120 0.2014	73.599 0.0 1.897		Vel = 22.81	
16 to 17	45.500 45.500		-100.26 913.1	4 4.26		0.0 0.0 0.0	9.417 0.0 9.417	120 0.1661	75.496 0.0 1.564		Vel = 20.55	
17 to 18	45.500 45.500		-90.72 822.38	4 4.26		0.0 0.0 0.0	9.417 0.0 9.417	120 0.1369	77.060 0.0 1.289		Vel = 18.51	
18 to 19	45.500 45.500		-83.00 739.38	4 4.26		0.0 0.0 0.0	9.417 0.0 9.417	120 0.1124	78.349 0.0 1.058		Vel = 16.64	
19 to 20	45.500 45.500		-77.18 662.2	4 4.26		0.0 0.0 0.0	9.417 0.0 9.417	120 0.0917	79.407 0.0 0.864		Vel = 14.91	
20 to 21	45.500 45.500		-73.25 588.95	4 4.26		0.0 0.0 0.0	9.417 0.0 9.417	120 0.0738	80.271 0.0 0.695		Vel = 13.26	
21 to 22	45.500 45.500		-71.23 517.72	4 4.26		0.0 0.0 0.0	9.417 0.0 9.417	120 0.0581	80.966 0.0 0.547		Vel = 11.65	
22 to 23	45.500 45.500		-71.07 446.65	4 4.26		0.0 0.0 0.0	9.417 0.0 9.417	120 0.0443	81.513 0.0 0.417		Vel = 10.05	
23 to 24	45.500 45.500		-72.96 373.69	4 4.26		0.0 0.0 0.0	10.000 0.0 10.000	120 0.0318	81.930 0.0 0.318		Vel = 8.41	
24 to 25	45.500 45.500		-76.24 297.45	4 4.26		0.0 0.0 0.0	10.000 0.0 10.000	120 0.0208	82.248 0.0 0.208		Vel = 6.70	
25 to 26	45.500 45.500		-80.88 216.57	4 4.26		0.0 0.0 0.0	10.000 0.0 10.000	120 0.0116	82.456 0.0 0.116		Vel = 4.87	
26 to 27	45.500 45.500		-86.61 129.96	4 4.26		0.0 0.0 0.0	10.000 0.0 10.000	120 0.0046	82.572 0.0 0.046		Vel = 2.93	
27 to 28	45.500 45.500		-93.15 36.81	4 4.26		0.0 0.0 0.0	10.000 0.0 10.000	120 0.0004	82.618 0.0 0.004		Vel = 0.83	
28			0.0 36.81						82.622		K Factor = 4.05	
28 to 29	45.500 45.500		-63.41 -63.41	6 6.357		0.0 0.0 0.0	9.417 0.0 9.417	120 -0.0002	82.622 0.0 -0.002		Vel = 0.64	
29 to 30	45.500 45.500		343.10 279.69	6 6.357		0.0 0.0 0.0	9.417 0.0 9.417	120 0.0027	82.620 0.0 0.025		Vel = 2.83	

Final Calculations : Hazen-Williams

Hydratec Incorporated
BLDG B ALT K25 SYS 16

Page 13
Date 8.23.23

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	*****
30 to 31	45.500 45.500		342.80 622.49	6 6.357	0.0 0.0 0.0	9.417 0.0 9.417	120 0.0117	82.645 0.0 0.110		Vel = 6.29	
31 to 32	45.500 45.500		341.73 964.22	6 6.357	0.0 0.0 0.0	9.417 0.0 9.417	120 0.0261	82.755 0.0 0.246		Vel = 9.75	
32 to 33	45.500 45.500		100.26 1064.48	6 6.357	0.0 0.0 0.0	9.417 0.0 9.417	120 0.0314	83.001 0.0 0.296		Vel = 10.76	
33 to 34	45.500 45.500		90.72 1155.2	6 6.357	0.0 0.0 0.0	9.417 0.0 9.417	120 0.0365	83.297 0.0 0.344		Vel = 11.68	
34 to 35	45.500 45.500		83.01 1238.21	6 6.357	0.0 0.0 0.0	9.417 0.0 9.417	120 0.0415	83.641 0.0 0.391		Vel = 12.52	
35 to 36	45.500 45.500		77.17 1315.38	6 6.357	0.0 0.0 0.0	9.417 0.0 9.417	120 0.0465	84.032 0.0 0.438		Vel = 13.30	
36 to 37	45.500 45.500		73.25 1388.63	6 6.357	0.0 0.0 0.0	9.417 0.0 9.417	120 0.0513	84.470 0.0 0.483		Vel = 14.04	
37 to 38	45.500 45.500		71.23 1459.86	6 6.357	0.0 0.0 0.0	9.417 0.0 9.417	120 0.0564	84.953 0.0 0.531		Vel = 14.76	
38 to 39	45.500 45.500		71.07 1530.93	6 6.357	0.0 0.0 0.0	10.000 0.0 10.000	120 0.0615	85.484 0.0 0.615		Vel = 15.48	
39 to 40	45.500 45.500		72.97 1603.9	6 6.357	0.0 0.0 0.0	10.000 0.0 10.000	120 0.0671	86.099 0.0 0.671		Vel = 16.21	
40 to 41	45.500 45.500		76.24 1680.14	6 6.357	0.0 0.0 0.0	10.000 0.0 10.000	120 0.0730	86.770 0.0 0.730		Vel = 16.98	
41 to 42	45.500 45.500		80.87 1761.01	6 6.357	0.0 0.0 0.0	10.000 0.0 10.000	120 0.0797	87.500 0.0 0.797		Vel = 17.80	
42 to 43	45.500 45.500		86.61 1847.62	6 6.357	0.0 0.0 0.0	10.000 0.0 10.000	120 0.0871	88.297 0.0 0.871		Vel = 18.68	
43 to 44	45.500 45.500		93.15 1940.77	6 6.357	0.0 0.0 0.0	10.000 0.0 10.000	120 0.0954	89.168 0.0 0.954		Vel = 19.62	
44 to FMJ	45.500 45.500		100.23 2041.0	6 6.357	V 0.0 0.0	12.573 4.000 12.573 16.573	120 0.1047	90.122 0.0 1.736		Vel = 20.63	
FMJ			0.0 2041.00					91.858		K Factor = 212.95	

Final Calculations : Hazen-Williams

Hydratec Incorporated
BLDG B ALT K25 SYS 16

Page 14
Date 8.23.23

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	*****
FMJ to TR2	45.500 45.500		2041.00 2041.0	6 6.357	2V	25.147 0.0	60.375 25.147	120 0.1047	91.858 0.0			
TR2 to BR2	45.500 2		0.0 2041.0	8 8.249	T	41.108 0.0	38.875 41.108	120 0.0294	100.814 19.840	Vel = 20.63		
BR2 to FLG	2 2	H100	100.00 2141.0	8 7.98	L	19.632 0.0	2.000 19.632	150 0.0251	123.008 0.0			
FLG to UG10	2 -5		0.0 2141.0	8 7.98	L T	19.632 52.855	51.125 72.487	150 0.0250	123.550 3.032	Vel = 13.73		
UG10			0.0 2141.00									
UG7 to UG8	-5 -5		-469.00 -469.0	8 7.98	G	6.041 0.0	483.333 6.040	150 -0.0015	131.915 0.0			
UG8 to UG9	-5 -5		0.0 -469.0	8 7.98	G	6.041 0.0	486.000 6.040	150 -0.0015	131.178 0.0	Vel = 3.01		
UG9 to UG10	-5 -5	H150	150.00 -319.0	8 7.98	6F 2G	81.548 12.081	937.542 93.630	150 -0.0007	130.436 0.0			
UG10 to UG11	-5 -5		2140.99 1821.99	8 7.98	G	6.041 0.0	242.917 6.040	150 0.0186	129.674 0.0	Vel = 2.05		
UG11 to NL	-5 -5		0.0 1821.99	12 11.65	G	8.05 0.0	213.250 8.049	150 0.0029	134.295 0.0	Vel = 11.69		
NL to UG12	-5 -5		0.0 1821.99	12 11.65	2F	34.882 0.0	489.875 34.883	150 0.0029	134.946 0.0	Vel = 5.48		
UG12 to UG13	-5 -5		-2290.99 -469.0	8 7.98	F G	13.591 6.041	245.208 19.632	150 -0.0015	136.489 0.0	Vel = 5.48		
UG13 to UG14	-5 -5		0.0 -469.0	8 7.98	G	6.041 0.0	457.500 6.040	150 -0.0015	136.089 0.0	Vel = 3.01		
UG14 to UG15	-5 -5		0.0 -469.0	8 7.98	2F G	27.183 6.041	960.000 33.222	150 -0.0015	135.390 0.0	Vel = 3.01		
UG15 to UG16	-5 -5		0.0 -469.0	8 7.98	4F G	54.365 6.041	648.583 60.405	150 -0.0015	133.893 0.0	Vel = 3.01		
UG16 to UG7	-5 -5		0.0 -469.0	8 7.98	G	6.041 0.0	596.667 6.040	150 -0.0015	132.824 0.0	Vel = 3.01		

Final Calculations : Hazen-Williams

Hydratec Incorporated
BLDG B ALT K25 SYS 16

Page 15
Date 8.23.23

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	*****
UG7			0.0 -469.00						131.915		K Factor = -40.83	
UG12 to UG6	-5 -5		2291.00 2291.0	12 11.65	6F 3G T	104.647 24.149 80.498	817.042 209.294 1026.336	150 0.0045	136.489 0.0 4.610		Vel = 6.90	
UG6 to PUMP	-5 2		0.0 2291.0	12 11.65	2L	48.299 0.0 0.0	45.500 48.298 93.798	150 0.0045	141.099 -3.032 0.421		Vel = 6.90	
PUMP to PO	2 2		0.0 2291.0	10 10.42	2V S B	10.89 66.551 22.99	15.000 100.431 115.431	120 0.0117	138.488 0.0 1.349		Vel = 8.62	
PO			0.0 2291.00						139.837		K Factor = 193.74	