Hydraulic Overview

Job Number: 9898535
Report Description: Light Hazard

Job

Job Number: 9898535	Design Engineer: JOHN SOMMER
Job Name: GOOD SAMARITAN HOSPITAL - ER DOOR TI	Phone:	FAX:
Address 1: 401 15TH AVE SE	State Certification/License Number: MCKINCL942DW
Address 2: PUYALLUP, WA 98372	AHJ: CITY OF PUYALLUP
Address 3:	Job Site/Building:

System

Density: 0.10gpm/ft²	Area of Application: 1500ft² (Actual 394ft²)
Most Demanding Sprinkler Data: 5.6 K-Factor 14.82 at 7.000	Hose Streams: 100.00
Coverage Per Sprinkler: 120ft²	Number Of Sprinklers Calculated: 5 CORRIDOR CALC
System Pressure Demand: 18.801	System Flow Demand: 76.22
Total Demand: 176.22 @ 18.801	Pressure Result: +171.979 (90.1%)

Supplies

Node	Name	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
1	Water Supply	400.00	100.00	193.470	181.210

Check Point Gauges

Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)

WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE PROTECTION SPRINKLER SYSTEMS

Rory C. Leckband
3514-0419-C Level 3
McKinstry Company, L.L.C.
MCKINCL942DW

Digitally signed by Rory C. Leckband
DN: C=US, E=RoryL@Mckinstry.com, O="McKinstry Co., LLC", OU=Fire Protection, CN=Rory.C. Leckband
Location: 5005 3RD AVE S, SEATTLE, WA 98134
Reason: I have reviewed this document
Contact Info: (206) 552-3180
Date: 2022.08.26 16:32:19-07'00'

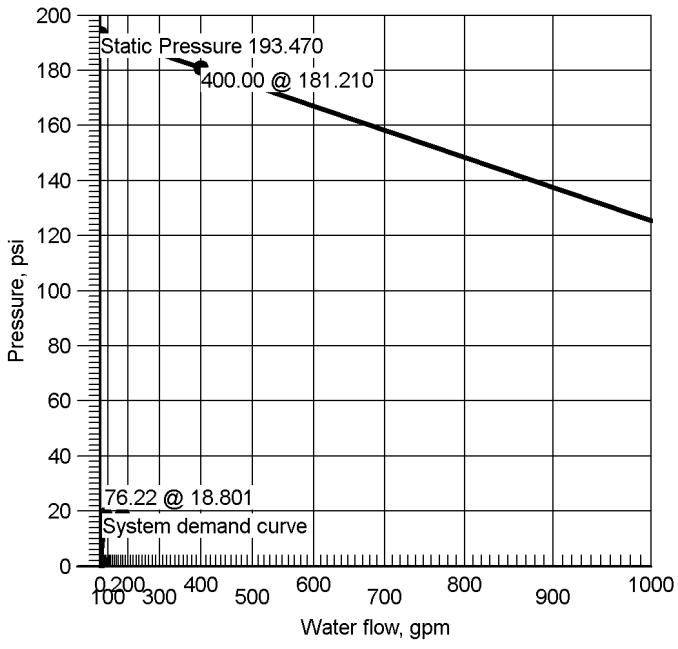
Signature Date

Expires 12/31/21

City of Puyallup
Development & Permitting Services
ISSUED PERMIT

Building	Planning
Engineering	Public Works
Fire	Traffic

Water Supply at Node 1 (400.00, 0.00, 193.470, 181.210)



Job Number: 9898535
Report Description: Hose Valve Pressures

Gauge	Flow(gpm)	Inlet Static Pressure(psi)	Inlet Residual Pressure(psi)	Elevation(Foot)
System 1-1	400	193.47	181.21	134'-2
System 1-2	400	186.96	174.31	149'-2
System 1-3	400	179.59	166.63	166'-2
System 1-4	400	172.66	159.11	182'-2
System 1-5	400	163.99	150.13	202'-2
System 1-6	400	157.49	143.55	217'-2
System 1-7	400	150.987	136.97	232'-2
System 1-8	400	144.484	130.39	247'-2
System 2-A	400	199.39	184.5	120'-0
System 2-1	400	193.54	178.44	134'-0
System 2-2	400	187.04	171.54	149'-0
System 2-3	400	179.66	163.89	166'-0
System 2-4	400	172.73	156.68	182'-0
System 2-5	400	164.06	147.7	202'-0
System 2-6	400	157.56	141.12	217'-0
System 2-7	400	151.06	134.54	232'-0
System 2-8	400	144.55	127.96	247'-0

Hydraulic Summary

Job

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Job Name: GOOD SAMARITAN HOSPITAL - ER DOOR TI	State Certification/License Number:
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Address 2: PUYALLUP, WA 98372	Job Site/Building: CITY OF PUYALLUP
Address 3:	Drawing Name:

System

Most Demanding Sprinkler Data: 5.6 K-Factor 14.82 at 7.000

Hose Allowance At Source: 100.00

Additional Hose Supplies

Node	Flow(gpm)

Total Hose Streams: 100.00

System Flow Demand	Total Water Required (Including Hose Allowance)
76.22	176.22

Maximum Pressure Unbalance In Loops: 0.000

Maximum Velocity Above Ground: 11.59 between nodes 5 and 40

Maximum Velocity Under Ground	

Volume capacity of Wet Pipes	Volume capacity of Dry Pipes
27.10gal	

Remote Area(s)

Occupancy	Job Suffix
Light Hazard	

Density	Area of Application
0.10gpm/ft²	1500ft² (Actual 394ft²)

Number Of Sprinklers Calculated	Number Of Nozzles Calculated	Coverage Per Sprinkler
5	0	120ft²

AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area

Supplies

Node	Name	Hose Flow (gpm)	Static (psi)	Residual (psi)	@	Flow (gpm)	Available (psi)	@	Total Demand (gpm)	Required (psi)	Safety Margin (psi)
1	Water Supply	100.00	193.470	181.210		400.00	190.779		176.22	18.801	171.979

Contractor

	Contractor Number	Contact Name	Contact Title

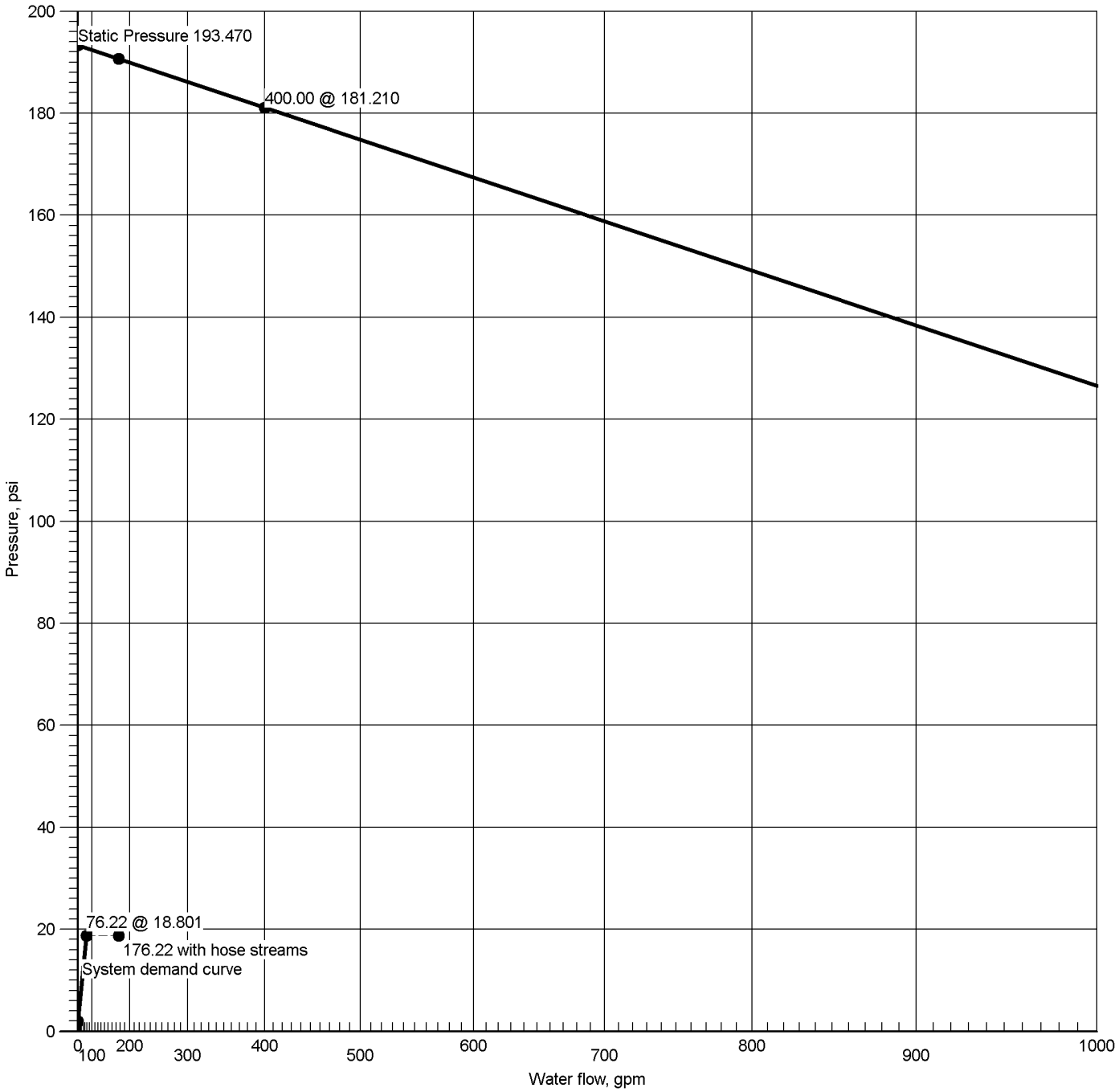
Name of Contractor:	Phone	Extension

Address 1	FAX

Address 2	E-mail

Address 3	Web-Site

Water Supply at Node 1



Hydraulic Graph
Water Supply at Node 1

Static: Pressure
193.470

Residual: Pressure
181.210 @ 400.00

Available Pressure at System Demand
190.779 @ 176.22

Required Pressure at System Demand
18.801 @ 76.22

Required Pressure at System Demand (Including Hose Allowance at Source)
18.801 @ 176.22

Summary Of Outflowing Devices

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Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	**101**	**14.82**	**12.00**	**5.6**	**7.000**		
Sprinkler	102	14.82	12.00	5.6	7.000		
Sprinkler	103	15.73	12.00	5.6	7.893		
Sprinkler	104	15.48	12.00	5.6	7.642		
Sprinkler	105	15.38	12.00	5.6	7.541		

Most Demanding Sprinkler Data

Node Analysis

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Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
1	135'-0	S	18.801	76.22	
101	139'-9	Spr(-7.000), fd(22'-0)	7.000	14.82	
102	139'-9	Spr(-7.000), fd(22'-0)	7.000	14.82	
103	139'-9	Spr(-7.893), fd(22'-0)	7.893	15.73	
104	139'-9	Spr(-7.642), fd(22'-0)	7.642	15.48	
105	139'-9	Spr(-7.541), fd(22'-0)	7.541	15.38	
5	143'-9½	PO(8'-8½)	12.955		
18	136'-8		17.602		
22	137'-9		17.114		
39	140'-6	T(5'-0)	8.692		
40	143'-9½	T(5'-0)	9.498		
44	143'-9½	T(5'-0)	8.836		
47	143'-9½	T(5'-0)	8.506		
50	143'-9½	T(5'-0)	8.373		

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
• • • • • Route 1 • • • • •								
DY	1.0490	14.82	5.50	120		0.074703	0'-0	Pf 2.017
102	139'-9	14.82	5.6	7.000		Sprinkler,	27'-0	Pe -0.325
39	140'-6			8.692		T(5'-0), fd(22'-0)	27'-0	Pv
BL	1.0490	29.63	11.00	120		0.269306	3'-3½	Pf 2.233
39	140'-6	14.82		8.692		Flow (q) from Route 2	5'-0	Pe -1.427
40	143'-9½			9.498		T(5'-0)	8'-3½	Pv
BL	1.6390	76.22	11.59	120		0.176003	10'-11	Pf 3.457
40	143'-9½	46.59		9.498		Flow (q) from Route 3	8'-8½	Pe
5	143'-9½			12.955		PO(8'-8½)	19'-7½	Pv
CM	2.7030	76.22	4.26	120		0.015397	56'-0½	Pf 1.540
5	143'-9½			12.955			44'-0	Pe 2.619
22	137'-9			17.114		2PO(18'-8), fE(6'-8)	100'-0	Pv
MS	2.6350	76.22	4.48	120		0.017431	1'-1	Pf 0.019
22	137'-9			17.114				Pe 0.470
18	136'-8			17.602		2f(-0.000)	1'-1	Pv
BL	2.7030	76.22	4.26	120		0.015397	2'-11	Pf 0.476
18	136'-8			17.602			27'-11½	Pe 0.723
1	135'-0			18.801		3E(9'-4), S	30'-11	Pv
		100.00				Hose Allowance At Source		
1		176.22						
• • • • • Route 2 • • • • •								
DY	1.0490	14.82	5.50	120		0.074703	0'-0	Pf 2.017
101	139'-9	14.82	5.6	7.000		Sprinkler,	27'-0	Pe -0.325
39	140'-6			8.692		T(5'-0), fd(22'-0)	27'-0	Pv
• • • • • Route 3 • • • • •								
BL	1.0490	15.38	5.71	120		0.080027	3'-3½	Pf 2.584
105	139'-9	15.38	5.6	7.541		Sprinkler,	29'-0	Pe -1.752
50	143'-9½			8.373		E(2'-0), T(5'-0), fd(22'-0)	32'-3½	Pv
BL	1.6390	15.38	2.34	120		0.009108	14'-7½	Pf 0.133
50	143'-9½			8.373				Pe
47	143'-9½			8.506			14'-7½	Pv
BL	1.6390	30.86	4.69	120		0.033037	10'-0	Pf 0.330
47	143'-9½	15.48		8.506		Flow (q) from Route 4		Pe
44	143'-9½			8.836			10'-0	Pv
BL	1.6390	46.59	7.08	120		0.070798	9'-4	Pf 0.661
44	143'-9½	15.73		8.836		Flow (q) from Route 5		Pe
40	143'-9½			9.498			9'-4	Pv
• • • • • Route 4 • • • • •								
BL	1.0490	15.48	5.75	120		0.081019	3'-3½	Pf 2.616
104	139'-9	15.48	5.6	7.642		Sprinkler,	29'-0	Pe -1.752
47	143'-9½			8.506		E(2'-0), T(5'-0), fd(22'-0)	32'-3½	Pv
• • • • • Route 5 • • • • •								
BL	1.0490	15.73	5.84	120		0.083477	3'-3½	Pf 2.696
103	139'-9	15.73	5.6	7.893		Sprinkler,	29'-0	Pe -1.752
44	143'-9½			8.836		E(2'-0), T(5'-0), fd(22'-0)	32'-3½	Pv

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

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

C Value Multiplier

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51

Pipe Type	Diameter	Flow	Velocity	HWC		Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend

AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

Units Legend

Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend

ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	Ball Valve
BFP	Backflow Preventer
BV	Butterfly Valve
C	Cross Flow Turn 90°
cplg	Coupling
Cr	Cross Run
CV	Check Valve
DelV	Deluge Valve
DPV	Dry Pipe Valve
E	90° Elbow
EE	45° Elbow
Ee1	11¼° Elbow
Ee2	22½° Elbow
f	Flow Device
fd	Flex Drop
FDC	Fire Department Connection
fE	90° FireLock(TM) Elbow
fEE	45° FireLock(TM) Elbow
flg	Flange
FN	Floating Node
fT	FireLock(TM) Tee
g	Gauge
GloV	Globe Valve
GV	Gate Valve
Ho	Hose
Hose	Hose
HV	Hose Valve
Hyd	Hydrant
LtE	Long Turn Elbow
mecT	Mechanical Tee
Noz	Nozzle
P1	Pump In
P2	Pump Out
PIV	Post Indicating Valve
PO	Pipe Outlet
PRV	Pressure Reducing Valve
PrV	Pressure Relief Valve
red	Reducer/Adapter
S	Supply
sCV	Swing Check Valve
Spr	Sprinkler
St	Strainer
T	Tee Flow Turn 90°
Tr	Tee Run
U	Union
WirF	Wirsbo
WMV	Water Meter Valve
Z	Cap