Hydraulic Calculations

for

Project Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING
Location: 1601 39th AVE SE, Puyallup, WA 98374,
Drawing Name: 22-3688 PeirceSTEM-L20-R031-Plans Calculation Date: 4/21/2023

Design

Remote Area Number:	1
Remote Area Location:	BOILER ROOM
Occupancy Classification:	Ordinary Group I
Commodity Classification:	N/A
Density	0.15gpm/ft²
Area of Application:	1500ft² (Actual 922ft²)
Coverage per Sprinkler:	99ft²
Type of sprinklers calculated:	Upright
No. of sprinklers calculated:	19
No. of nozzles calculated:	0

In-rack Demand: N/A gpm at Node: N/A
Hose Streams: 250.00 at Node: 1 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 1: 563.54 @ 43.557 (Safety Margin = 16.016)
Type of System: WET
Volume of Dry/PreAction/Antifreeze/OtherAgent N/A

Name of Contractor: SHINN FIRE PROTECTION
Address: 18802 80TH AVE S, KENT WA98032
Phone Number: 425-204-3945
Name of designer: Ben Bernard
Authority Having Jurisdiction: CITY OF PUYALLUP

Notes:

Automatic peaking results Left: N/A Right: 43.557

FPET NICET #106245 LEVEL IV,MSME

WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE PROTECTION SPRINKLER SYSTEMS

Hussein A. A. Huballa
8321-1119-C Level 3
Shinn Mechanical, Inc.
SHINNMI060QP

Signature

05/16/2023 Date

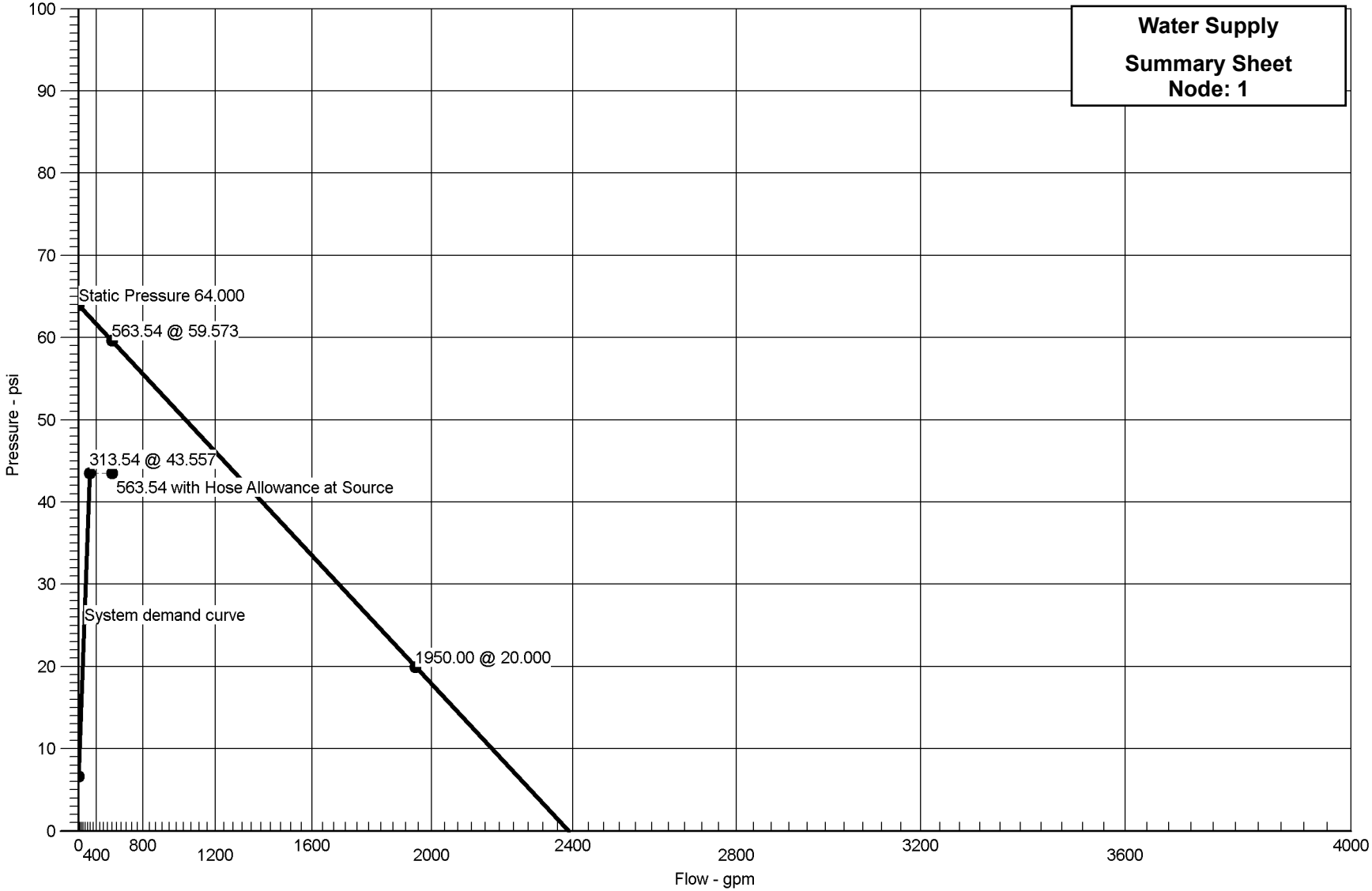
Expires DEC 31, 23

Hydraulic Graph

Job Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING **N** $^{1.85}$

Remote Area Number: 1

Date: 4/21/2023



Summary Of Outflowing Devices

Job Number: 22-3688
Report Description: Ordinary Group I (1)

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	1000	22.33	14.85	5.6	15.895		
Sprinkler	1001	21.11	14.85	5.6	14.208		
Sprinkler	1002	15.73	14.85	5.6	7.886		
Sprinkler	1003	15.82	14.85	5.6	7.979		
Sprinkler	1004	15.35	14.85	5.6	7.512		
Sprinkler	1005	15.44	14.85	5.6	7.602		
Sprinkler	1006	15.14	14.85	5.6	7.312		
Sprinkler	1007	19.79	14.85	5.6	12.483		
Sprinkler	1008	15.23	14.85	5.6	7.393		
Sprinkler	1009	20.01	14.85	5.6	12.771		
Sprinkler	1010	16.15	14.85	5.6	8.316		
Sprinkler	1011	14.87	14.85	5.6	7.051		
Sprinkler	1012	14.96	14.85	5.6	7.135		
Sprinkler	1013	15.76	14.85	5.6	7.924		
Sprinkler	**1014**	**14.85**	**14.85**	**5.6**	**7.032**		
Sprinkler	1015	14.94	14.85	5.6	7.115		
Sprinkler	1016	15.55	14.85	5.6	7.711		
Sprinkler	1017	15.27	14.85	5.6	7.439		
Sprinkler	1018	15.25	14.85	5.6	7.416		

Most Demanding Sprinkler Data

Supply Analysis

Node	Name	Static (psi)	Residual (psi) @ Flow (gpm)		Available (psi) @ Total Demand (gpm)		Required Pressure (psi)
1	Water Supply	64.000	20.000	1950.00	59.573	563.54	43.557

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
1	-15'-0	Supply	43.557	313.54	
1000	0'-5	Sprinkler	15.895	22.33	
1001	0'-5	Sprinkler	14.208	21.11	
1002	0'-4½	Sprinkler	7.886	15.73	
1003	0'-4½	Sprinkler	7.979	15.82	
1004	0'-4	Sprinkler	7.512	15.35	
1005	0'-4	Sprinkler	7.602	15.44	
1006	0'-4	Sprinkler	7.312	15.14	
1007	0'-2½	Sprinkler	12.483	19.79	
1008	0'-4	Sprinkler	7.393	15.23	
1009	0'-4½	Sprinkler	12.771	20.01	
1010	0'-4½	Sprinkler	8.316	16.15	
1011	0'-3½	Sprinkler	7.051	14.87	
1012	0'-3½	Sprinkler	7.135	14.96	
1013	0'-4	Sprinkler	7.924	15.76	
1014	0'-3½	Sprinkler	7.032	14.85	
1015	0'-3½	Sprinkler	7.115	14.94	
1016	0'-4	Sprinkler	7.711	15.55	
1017	0'-3½	Sprinkler	7.439	15.27	

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
1018	0'-3½	Sprinkler	7.416	15.25	
2	-15'-0		43.417		
3	-15'-0		41.389		
6	-15'-0		39.579		
7	-8'-9½		36.503		
100	-7'-0		35.723		
101	-4'-9½		25.221		
102	-1'-5		18.459		
103	-1'-4		16.554		
104	-1'-3		14.898		
105	-1'-3		14.669		
106	-0'-3		9.750		
107	-0'-3½		9.306		
108	-0'-3½		8.959		
109	-0'-4		8.757		

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
1014	0'-3½	5.6	14.85	1½	(See Notes)	9'-0	120	7.032	• • • • • **Route 1** • • • • • Sprinkler
1015	0'-3½		14.85	1.6100		9'-0	0.009313	-0.001 0.084	
1015	0'-3½	5.6	14.94	1½	(See Notes)	8'-11½	120	7.115	Sprinkler
1018	0'-3½		29.79	1.6100		8'-11½	0.033757	-0.001 0.303	
1018	0'-3½	5.6	15.25	1½	(See Notes)	2'-5 12'-0	120 0.072531	7.416 0.271	Sprinkler, E(4'-0), PO(8'-0)
110	-0'-4		45.04	1.6100		14'-5		1.046	
110	-0'-4			2½		4'-6½	120	8.733	
109	-0'-4		45.04	2.6350		4'-6½	0.006585	-0.006 0.030	
109	-0'-4		45.10	2½		9'-0	120	8.757	Flow (q) from Route 2
108	-0'-3½		90.14	2.6350		9'-0	0.023771	-0.012 0.214	
108	-0'-3½		45.92	2½		7'-0	120	8.959	Flow (q) from Route 3
107	-0'-3½		136.06	2.6350		7'-0	0.050915	-0.009 0.356	
107	-0'-3½		46.55	2½		5'-1½	120	9.306	Flow (q) from Route 4
106	-0'-3		182.61	2.6350		5'-1½	0.087757	-0.007 0.450	
106	-0'-3		47.69	2½	(See Notes)	8'-7½	120	9.750	Flow (q) from Route 5
105	-1'-3		230.31	2.6350		24'-8½ 33'-4	0.134808	0.428 4.491	3E(8'-3)
105	-1'-3		19.79	2½		1'-5	120	14.669	Flow (q) from Route 6
104	-1'-3		250.09	2.6350		1'-5	0.157012	0.005 0.224	
104	-1'-3		20.01	2½		8'-11½	120	14.898	Flow (q) from Route 7
103	-1'-4		270.10	2.6350		8'-11½	0.181042	0.031 1.625	
103	-1'-4		21.11	2½		9'-0	120	16.554	Flow (q) from Route 8
102	-1'-5		291.21	2.6350		9'-0	0.208083	0.031 1.874	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
102	-1'-5		22.33	2½	(See Notes)	5'-8½	120	18.459	Flow (q) from Route 9
101	-4'-9½		313.54	2.6350		16'-5½ 22'-2½	0.238554	1.468 5.294	2E(8'-3)
101	-4'-9½			3	(See Notes)	40'-7	120	25.221	
100	-7'-0		313.54	3.2600		36'-8½ 77'-3½	0.084610	0.964 9.538	f(-3.000), CV(7'-1½), E(9'-5), PO(20'-2)
100	-7'-0			6		1'-9½	120	35.723	
7	-8'-9½		313.54	6.3570		 1'-9½	0.003273	0.774 0.006	
7	-8'-9½			6	(See Notes)	86'-3½	140	36.503	
6	-15'-0		313.54	6.3400		69'-4 155'-7½	0.002493	2.688 0.388	3E(23'-1½)
6	-15'-0			6	(See Notes)	4'-1½	140	39.579	
3	-15'-0		313.54	6.3400		 4'-1½	0.002493	 1.811	BFP(-1.738)
3	-15'-0			6	(See Notes)	11'-2½	140	41.389	
2	-15'-0		313.54	6.3400		 11'-2½	0.002493	 2.028	PIV(-2.000)
2	-15'-0			6	(See Notes)	21'-7	140	43.417	
1	-15'-0		313.54	6.3400		34'-8 56'-3	0.002493	 0.140	E(23'-1½), EE(11'-6½), S
			250.00					43.557	Hose Allowance At Source
1			563.54						Total(Pt) Route 1
1011	0'-3½	5.6	14.87	1½	(See Notes)	9'-0	120	7.051	• • • • • **Route 2** • • • • • Sprinkler
1012	0'-3½		14.87	1.6100		 9'-0	0.009337	0.000 0.084	
1012	0'-3½	5.6	14.96	1½	(See Notes)	8'-11½	120	7.135	Sprinkler
1017	0'-3½		29.83	1.6100		 8'-11½	0.033844	0.000 0.304	
1017	0'-3½	5.6	15.27	1½	(See Notes)	2'-5	120	7.439	Sprinkler,
109	-0'-4		45.10	1.6100		12'-0 14'-5	0.072725	0.270 1.048	E(4'-0), PO(8'-0)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
								8.757	Total(Pt) Route 2
1006	0'-4	5.6	15.14	1½	(See Notes)	8'-0	120	7.312	• • • • • **Route 3** • • • • • Sprinkler
1008	0'-4		15.14	1.6100		8'-0	0.009656	0.004 0.077	
1008	0'-4	5.6	15.23	1½	(See Notes)	8'-11½	120	7.393	Sprinkler
1016	0'-4		30.37	1.6100		8'-11½	0.034987	0.004 0.314	
1016	0'-4	5.6	15.55	1½	(See Notes)	1'-0	120	7.711	Sprinkler,
108	-0'-3½		45.92	1.6100		12'-0 13'-0	0.075180	0.271 0.977	E(4'-0), PO(8'-0)
								8.959	Total(Pt) Route 3
1004	0'-4	5.6	15.35	1½	(See Notes)	9'-0	120	7.512	• • • • • **Route 4** • • • • • Sprinkler
1005	0'-4		15.35	1.6100		9'-0	0.009900	0.000 0.089	
1005	0'-4	5.6	15.44	1½	(See Notes)	8'-11½	120	7.602	Sprinkler
1013	0'-4		30.79	1.6100		8'-11½	0.035887	0.000 0.322	
1013	0'-4	5.6	15.76	1½	(See Notes)	2'-5	120	7.924	Sprinkler,
107	-0'-3½		46.55	1.6100		12'-0 14'-5	0.077109	0.271 1.112	E(4'-0), PO(8'-0)
								9.306	Total(Pt) Route 4
1002	0'-4½	5.6	15.73	1½	(See Notes)	9'-0	120	7.886	• • • • • **Route 5** • • • • • Sprinkler
1003	0'-4½		15.73	1.6100		9'-0	0.010355	0.000 0.093	
1003	0'-4½	5.6	15.82	1½	(See Notes)	8'-11½	120	7.979	Sprinkler
1010	0'-4½		31.54	1.6100		8'-11½	0.037534	0.000 0.337	
1010	0'-4½	5.6	16.15	1½	(See Notes)	2'-5	120	8.316	Sprinkler,
106	-0'-3		47.69	1.6100		12'-0 14'-5	0.080642	0.271 1.163	E(4'-0), PO(8'-0)
								9.750	Total(Pt) Route 5

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
1007	0'-2½	5.6	19.79	1	(See Notes)	3'-2½	120	12.483	• • • • • **Route 6** • • • • •
105	-1'-3		19.79	1.0490		9'-0 12'-2½	0.127557	0.627 1.560	Sprinkler, 2E(2'-0), PO(5'-0)
								14.669	Total(Pt) Route 6
1009	0'-4½	5.6	20.01	1	(See Notes)	3'-10½	120	12.771	• • • • • **Route 7** • • • • •
104	-1'-3		20.01	1.0490		7'-0 10'-10½	0.130278	0.710 1.417	Sprinkler, E(2'-0), PO(5'-0)
								14.898	Total(Pt) Route 7
1001	0'-5	5.6	21.11	1	(See Notes)	4'-0	120	14.208	• • • • • **Route 8** • • • • •
103	-1'-4		21.11	1.0490		7'-0 11'-0	0.143787	0.764 1.582	Sprinkler, E(2'-0), PO(5'-0)
								16.554	Total(Pt) Route 8
1000	0'-5	5.6	22.33	1	(See Notes)	4'-1	120	15.895	• • • • • **Route 9** • • • • •
102	-1'-5		22.33	1.0490		7'-0 11'-1	0.159511	0.797 1.767	Sprinkler, E(2'-0), PO(5'-0)
								18.459	Total(Pt) Route 9

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

(Actual Inside Diameter / Schedule 40 Steel Pipe Inside Diameter) 4.87 = Factor

C Value Multiplier

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

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 Relief Valve
PRV	Pressure Reducing Valve	red	Reducer/Adapter	S	Supply
sCV	Swing Check Valve	SFx	Seismic Flex	Spr	Sprinkler
St	Strainer	T	Tee Flow Turn 90°	Tr	Tee Run
U	Union	WirF	Wirsbo	WMV	Water Meter Valve
Z	Cap				

Hydraulic Calculations

for

Project Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING
Location: 1601 39th AVE SE, Puyallup, WA 98374,
Drawing Name: 22-3688 PeirceSTEM-L21-R041-Plans Calculation Date: 5/16/2023

Design

Remote Area Number:	2
Remote Area Location:	FAB LAB
Occupancy Classification:	Ordinary Group II
Commodity Classification:	N/A
Density	0.20gpm/ft²
Area of Application:	1500ft² (Actual 1027ft²)
Coverage per Sprinkler:	100ft²
Type of sprinklers calculated:	Upright, Pendent
No. of sprinklers calculated:	15
No. of nozzles calculated:	0

In-rack Demand: N/A gpm at Node: N/A
Hose Streams: 250.00 at Node: 1 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 1: 637.25 @ 47.625 (Safety Margin = 10.818)
Type of System: WET
Volume of Dry/PreAction/Antifreeze/OtherAgent N/A

Name of Contractor: SHINN FIRE PROTECTION
Address: 18802 80TH AVE S, KENT WA98032
Phone Number: 425-204-3945
Name of designer: Ben Bernard
Authority Having Jurisdiction: CITY OF PUYALLUP

Notes:

Automatic peaking results Left: N/A Right: N/A

FPET NICET #106245 LEVEL IV,MSME

WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE PROTECTION SPRINKLER SYSTEMS

Hussein A. A. Huballa
8321-1119-C Level 3
Shinn Mechanical, Inc.
SHINNMI060QP

Signature

05/16/2023 Date

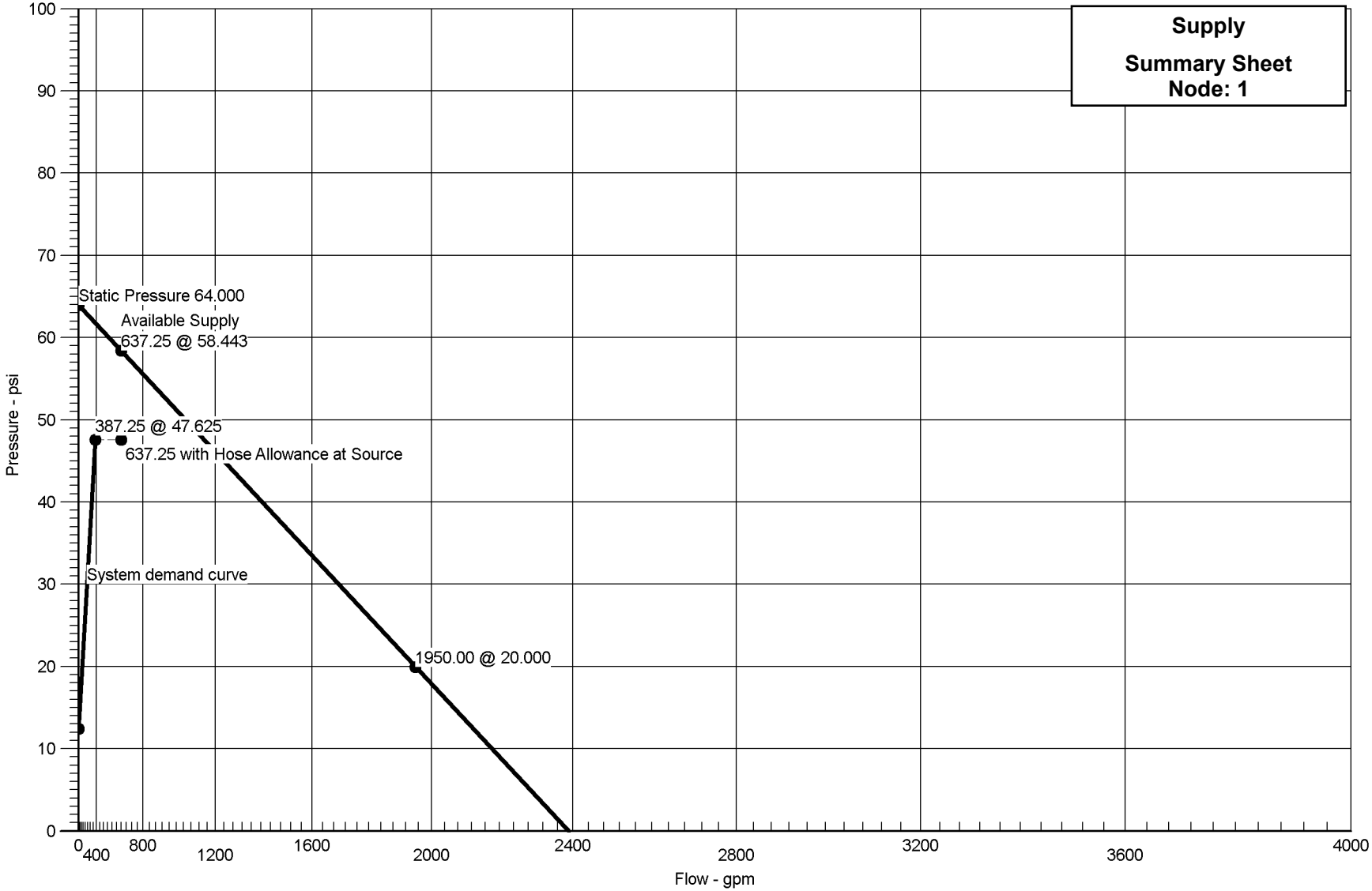
Expires DEC 31, 23

Hydraulic Graph

Job Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING **N** 1.85

Remote Area Number: 2

Date: 5/16/2023



Summary Of Outflowing Devices

Job Number: 22-3688
Report Description: Ordinary Group II (2)

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	2600	27.07	20.00	5.6	23.370		
Sprinkler	2601	27.10	20.00	5.6	23.421		
Sprinkler	2602	26.00	20.00	5.6	21.554		
Sprinkler	2603	26.36	20.00	5.6	22.156		
Sprinkler	2604	25.55	20.00	5.6	20.809		
Sprinkler	2605	25.45	20.00	5.6	20.657		
Sprinkler	2606	25.42	20.00	5.6	20.599		
Sprinkler	2607	24.92	20.00	5.6	19.801		
Sprinkler	2608	24.59	20.00	5.6	19.286		
Sprinkler	2609	25.62	20.00	5.6	20.925		
Sprinkler	2610	24.45	20.00	5.6	19.063		
Sprinkler	2611	25.86	20.00	5.6	21.329		
Sprinkler	2612	26.70	26.00	5.6	22.733		
Sprinkler	2613	26.16	26.00	5.6	21.824		
Sprinkler	**2614**	**26.00**	**26.00**	**5.6**	**21.556**		

Most Demanding Sprinkler Data

Supply Analysis

Node	Name	Static (psi)	Residual (psi) @ Flow (gpm)		Available (psi) @ Total Demand (gpm)		Required Pressure (psi)
1	Water Supply	64.000	20.000	1950.00	58.443	637.25	47.625

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
1	-15'-0	Supply	47.625	387.25	
2600	13'-9½	Sprinkler	23.370	27.07	
2601	13'-9½	Sprinkler	23.421	27.10	
2602	13'-9½	Sprinkler	21.554	26.00	
2603	13'-9½	Sprinkler	22.156	26.36	
2604	13'-9½	Sprinkler	20.809	25.55	
2605	13'-9	Sprinkler	20.657	25.45	
2606	13'-9½	Sprinkler	20.599	25.42	
2607	13'-9½	Sprinkler	19.801	24.92	
2608	13'-9½	Sprinkler	19.286	24.59	
2609	13'-9½	Sprinkler	20.925	25.62	
2610	13'-9½	Sprinkler	19.063	24.45	
2611	13'-9½	Sprinkler	21.329	25.86	
2612	8'-7½	Sprinkler	22.733	26.70	
2613	8'-7½	Sprinkler	21.824	26.16	
2614	8'-7½	Sprinkler	21.556	26.00	
2	-15'-0		47.417		
3	-15'-0		45.376		
6	-15'-0		43.393		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
7	-8'-9½		40.132		
8	2'-6½		35.030		
200	11'-5		27.428		
201	12'-2		27.057		
202	13'-2		26.233		
203	13'-2		26.339		
204	11'-5		26.740		
205	12'-0		25.684		
206	12'-0		26.314		
207	12'-0		25.738		
208	12'-0		24.395		
209	12'-0		23.757		
210	12'-0		22.966		
211	12'-0		22.791		
212	12'-0		26.278		
213	12'-0		22.742		
214	12'-0		23.706		
215	12'-0		24.146		
216	12'-0		22.236		
217	12'-0		21.349		
218	12'-0		21.269		
219	12'-0		21.112		
220	12'-0		23.089		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
221	12'-0		26.264		
222	12'-0		21.004		
223	12'-0		21.895		
224	12'-0		21.938		
225	12'-0		20.728		

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
2614	8'-7½	5.6	26.00	1	(See Notes)	1'-0	120	21.556	• • • • • **Route 1** • • • • •
225	12'-0		26.00	1.0490		2'-0 3'-0	0.211435	-1.462 0.634	Sprinkler, E(2'-0), fd
225	12'-0			1½	(See Notes)	2'-7	120	20.728	
219	12'-0		26.00	1.6100		12'-0 14'-7	0.026249	0.383	E(4'-0), PO(8'-0)
219	12'-0		24.45	2		7'-3½	120	21.112	Flow (q) from Route 4
218	12'-0		50.45	2.1570		7'-3½	0.021533	0.157	
218	12'-0		26.16	2		1'-8½	120	21.269	Flow (q) from Route 2
217	12'-0		76.61	2.1570		1'-8½	0.046639	0.080	
217	12'-0		24.59	2		7'-0	120	21.349	Flow (q) from Route 5
223	12'-0		101.20	2.1570		7'-0	0.078059	0.546	
223	12'-0		24.92	2		2'-11	120	21.895	Flow (q) from Route 6
216	12'-0		126.12	2.1570		2'-11	0.117294	0.340	
216	12'-0		26.70	2		5'-1	120	22.236	Flow (q) from Route 3
220	12'-0		152.82	2.1570		5'-1	0.167324	0.853	
220	12'-0		25.62	2		2'-9	120	23.089	Flow (q) from Route 10
214	12'-0		178.44	2.1570		2'-9	0.222878	0.617	
214	12'-0			2½		5'-3	120	23.706	
215	12'-0		178.44	2.6350		5'-3	0.084085	0.440	
215	12'-0		25.86	2½	(See Notes)	3'-1½	120	24.146	Flow (q) from Route 11
221	12'-0		204.30	2.6350		16'-5½ 19'-7½	0.108010	2.118	PO(16'-5½)
221	12'-0			6		9'-0	120	26.264	
212	12'-0		204.30	6.3570		9'-0	0.001482	0.013	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes (Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.)
212	12'-0		128.77	6		10'-0	120	26.278	Flow (q) from Route 7
206	12'-0		333.08	6.3570		10'-0	0.003660	0.037	
206	12'-0		54.17	6	(See Notes)	18'-3	120	26.314	Flow (q) from Route 14
204	11'-5		387.25	6.3570		17'-7 35'-10½	0.004837	0.253 0.173	2EE(8'-9½)
204	11'-5			6	(See Notes)	135'-10	120	26.740	
200	11'-5		371.65	6.3570		17'-7 153'-5½	0.004483	0.000 0.688	E(17'-7)
200	11'-5		15.60	6	(See Notes)	30'-1	120	27.428	Flow (q) from Route 16
8	2'-6½		387.25	6.3570		125'-4½ 155'-5½	0.004837	3.849 3.752	3E(17'-7), f(-0.000), f(-3.000), CV(17'-2½), BV(17'-7), PO(37'-8½)
8	2'-6½			6	(See Notes)	21'-0½	120	35.030	
7	-8'-9½		387.25	6.3570		17'-7 38'-7½	0.004837	4.915 0.187	E(17'-7)
7	-8'-9½			6	(See Notes)	86'-3½	140	40.132	
6	-15'-0		387.25	6.3400		69'-4 155'-7½	0.003685	2.688 0.573	3E(23'-1½)
6	-15'-0			6	(See Notes)	4'-1½	140	43.393	
3	-15'-0		387.25	6.3400		4'-1½	0.003685	1.983	BFP(-1.810)
3	-15'-0			6	(See Notes)	11'-2½	140	45.376	
2	-15'-0		387.25	6.3400		11'-2½	0.003685	2.041	PIV(-2.000)
2	-15'-0			6	(See Notes)	21'-7	140	47.417	
1	-15'-0		387.25	6.3400		34'-8 56'-3	0.003685	0.207	E(23'-1½), EE(11'-6½), S
			250.00					47.625	Hose Allowance At Source
1			637.25						Total(Pt) Route 1
2613	8'-7½	5.6	26.16	1	(See Notes)	1'-0	120	21.824	• • • • • **Route 2** • • • • • Sprinkler,
222	12'-0		26.16	1.0490		2'-0 3'-0	0.213869	-1.462 0.642	E(2'-0), fd

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
222	12'-0			1½	(See Notes)	1'-11½	120	21.004	
						8'-0			
218	12'-0		26.16	1.6100		9'-11½	0.026551	0.265	PO(8'-0)
								21.269	Total(Pt) Route 2
2612	8'-7½	5.6	26.70	1	(See Notes)	1'-0	120	22.733	• • • • • **Route 3** • • • • •
						2'-0		-1.462	Sprinkler,
224	12'-0		26.70	1.0490		3'-0	0.222096	0.666	E(2'-0), fd
224	12'-0			1½	(See Notes)	2'-9½	120	21.938	
						8'-0			
216	12'-0		26.70	1.6100		10'-9½	0.027572	0.298	PO(8'-0)
								22.236	Total(Pt) Route 3
2610	13'-9½	5.6	24.45	1	(See Notes)	1'-9½	120	19.063	• • • • • **Route 4** • • • • •
						5'-0		0.770	Sprinkler,
219	12'-0		24.45	1.0490		6'-9½	0.188712	1.279	PO(5'-0)
								21.112	Total(Pt) Route 4
2608	13'-9½	5.6	24.59	1	(See Notes)	1'-9½	120	19.286	• • • • • **Route 5** • • • • •
						5'-0		0.770	Sprinkler,
217	12'-0		24.59	1.0490		6'-9½	0.190758	1.293	PO(5'-0)
								21.349	Total(Pt) Route 5
2607	13'-9½	5.6	24.92	1	(See Notes)	1'-9½	120	19.801	• • • • • **Route 6** • • • • •
						5'-0		0.770	Sprinkler,
223	12'-0		24.92	1.0490		6'-9½	0.195461	1.324	PO(5'-0)
								21.895	Total(Pt) Route 6
2606	13'-9½	5.6	25.42	1	(See Notes)	1'-9½	120	20.599	• • • • • **Route 7** • • • • •
						5'-0		0.770	Sprinkler,
213	12'-0		25.42	1.0490		6'-9½	0.202734	1.374	PO(5'-0)
213	12'-0			2		8'-0	120	22.742	
211	12'-0		25.42	2.1570		8'-0	0.006057	0.049	
211	12'-0		25.45	2		8'-0	120	22.791	Flow (q) from Route 8
210	12'-0		50.87	2.1570		8'-0	0.021864	0.175	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
210	12'-0		25.55	2	(See Notes)	7'-2½	120	22.966	Flow (q) from Route 9
209	12'-0		76.41	2.1570		9'-10 17'-0½	0.046416	0.000 0.791	4EE(2'-5½)
209	12'-0		26.00	2		8'-0	120	23.757	Flow (q) from Route 12
208	12'-0		102.41	2.1570		8'-0	0.079791	0.638	
208	12'-0		26.36	2	(See Notes)	3'-1½	120	24.395	Flow (q) from Route 13
212	12'-0		128.77	2.1570		12'-3½ 15'-5½	0.121890	1.882	PO(12'-3½)
								26.278	Total(Pt) Route 7
2605	13'-9	5.6	25.45	1	(See Notes)	1'-9	120	20.657	• • • • • **Route 8** • • • • •
211	12'-0		25.45	1.0490		5'-0 6'-9	0.203264	0.761 1.373	Sprinkler, PO(5'-0)
								22.791	Total(Pt) Route 8
2604	13'-9½	5.6	25.55	1	(See Notes)	1'-9½	120	20.809	• • • • • **Route 9** • • • • •
210	12'-0		25.55	1.0490		5'-0 6'-9½	0.204649	0.770 1.387	Sprinkler, PO(5'-0)
								22.966	Total(Pt) Route 9
2609	13'-9½	5.6	25.62	1	(See Notes)	1'-9½	120	20.925	• • • • • **Route 10** • • • • •
220	12'-0		25.62	1.0490		5'-0 6'-9½	0.205704	0.770 1.394	Sprinkler, PO(5'-0)
								23.089	Total(Pt) Route 10
2611	13'-9½	5.6	25.86	1	(See Notes)	2'-9½	120	21.329	• • • • • **Route 11** • • • • •
215	12'-0		25.86	1.0490		7'-0 9'-9½	0.209375	0.770 2.047	Sprinkler, E(2'-0), PO(5'-0)
								24.146	Total(Pt) Route 11
2602	13'-9½	5.6	26.00	1	(See Notes)	1'-9½	120	21.554	• • • • • **Route 12** • • • • •
209	12'-0		26.00	1.0490		5'-0 6'-9½	0.211418	0.770 1.433	Sprinkler, PO(5'-0)
								23.757	Total(Pt) Route 12
2603	13'-9½	5.6	26.36	1	(See Notes)	1'-9½	120	22.156	• • • • • **Route 13** • • • • •
208	12'-0		26.36	1.0490		5'-0 6'-9½	0.216869	0.770 1.470	Sprinkler, PO(5'-0)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
								24.395	Total(Pt) Route 13
2600	13'-9½	5.6	27.07	1	(See Notes)	1'-9½	120	23.370	• • • • • **Route 14** • • • • • Sprinkler,
205	12'-0		27.07	1.0490		5'-0	0.227842	0.770	PO(5'-0)
						6'-9½		1.544	
205	12'-0			2		8'-0	120	25.684	
207	12'-0		27.07	2.1570		8'-0	0.006807	0.054	
207	12'-0		27.10	2	(See Notes)	11'-1½	120	25.738	Flow (q) from Route 15
206	12'-0		54.17	2.1570		12'-3½ 23'-5½	0.024564	0.576	PO(12'-3½)
								26.314	Total(Pt) Route 14
2601	13'-9½	5.6	27.10	1	(See Notes)	1'-9½	120	23.421	• • • • • **Route 15** • • • • • Sprinkler,
207	12'-0		27.10	1.0490		5'-0	0.228304	0.770	PO(5'-0)
						6'-9½		1.547	
								25.738	Total(Pt) Route 15
201	12'-2		15.60	3	(See Notes)	81'-7½	120	27.057	• • • • • **Route 16** • • • • • Flow (q) from Route 17
200	11'-5		15.60	3.2600		60'-5½	0.000328	0.325	3E(9'-5), EE(4'-0½), 2Ee1(4'-0½), PO(20'-2)
						142'-1½		0.047	
								27.428	Total(Pt) Route 16
202	13'-2			2	(See Notes)	24'-8½	120	26.233	• • • • • **Route 17** • • • • •
203	13'-2		15.60	2.1570		18'-5½ 43'-2	0.002455	0.106	3E(6'-2)
203	13'-2			2½	(See Notes)	173'-9½	120	26.339	
201	12'-2		15.60	2.6350		140'-0½ 313'-10	0.000926	0.427 0.291	3PO(16'-5½), 11E(8'-3)
								27.057	Total(Pt) Route 17
204	11'-5			2½	(See Notes)	128'-2½	120	26.740	• • • • • **Route 18** • • • • • PO(16'-5½)
202	13'-2		15.60	2.6350		135'-11 264'-1½	0.000926	-0.752 0.245	EE(4'-1½), 6E(8'-3), T(16'-5½), 3PO(16'-5½)
								26.233	Total(Pt) Route 18

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

(Actual Inside Diameter / Schedule 40 Steel Pipe Inside Diameter) 4.87 = Factor

C Value Multiplier

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

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 Relief Valve
PRV	Pressure Reducing Valve	red	Reducer/Adapter	S	Supply
sCV	Swing Check Valve	SFx	Seismic Flex	Spr	Sprinkler
St	Strainer	T	Tee Flow Turn 90°	Tr	Tee Run
U	Union	WirF	Wirsbo	WMV	Water Meter Valve
Z	Cap				

Hydraulic Calculations

for

Project Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING
Location: 1601 39th AVE SE, Puyallup, WA 98374,
Drawing Name: 22-3688 PeirceSTEM-L21-R041-Plans Calculation Date: 5/15/2023

Design

Remote Area Number:	3
Remote Area Location:	Closely spaced heads @ Floor Opening
Occupancy Classification:	Light Hazard
Commodity Classification:	N/A
Density	0.10gpm/ft²
Area of Application:	1500ft² (Actual 1099ft²)
Coverage per Sprinkler:	100ft²
Type of sprinklers calculated:	Upright, Pendent
No. of sprinklers calculated:	22
No. of nozzles calculated:	0

In-rack Demand: N/A gpm at Node: N/A
Hose Streams: 100.00 at Node: 1 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 1: 508.62 @ 48.425 (Safety Margin = 11.913)
Type of System: Wet
Volume of Dry/PreAction/Antifreeze/OtherAgent N/A

Name of Contractor: SHINN FIRE PROTECTION
Address: 18802 80TH AVE S, KENT WA98032
Phone Number: 425-204-3945
Name of designer: Ben Bernard
Authority Having Jurisdiction: CITY OF PUYALLUP

Notes:

Automatic peaking results Left: N/A Right: N/A

FPET NICET #106245 LEVEL IV,MSME

WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE PROTECTION SPRINKLER SYSTEMS

Hussein A. A. Huballa
8321-1119-C Level 3
Shinn Mechanical, Inc.
SHINNMI060QP

Signature

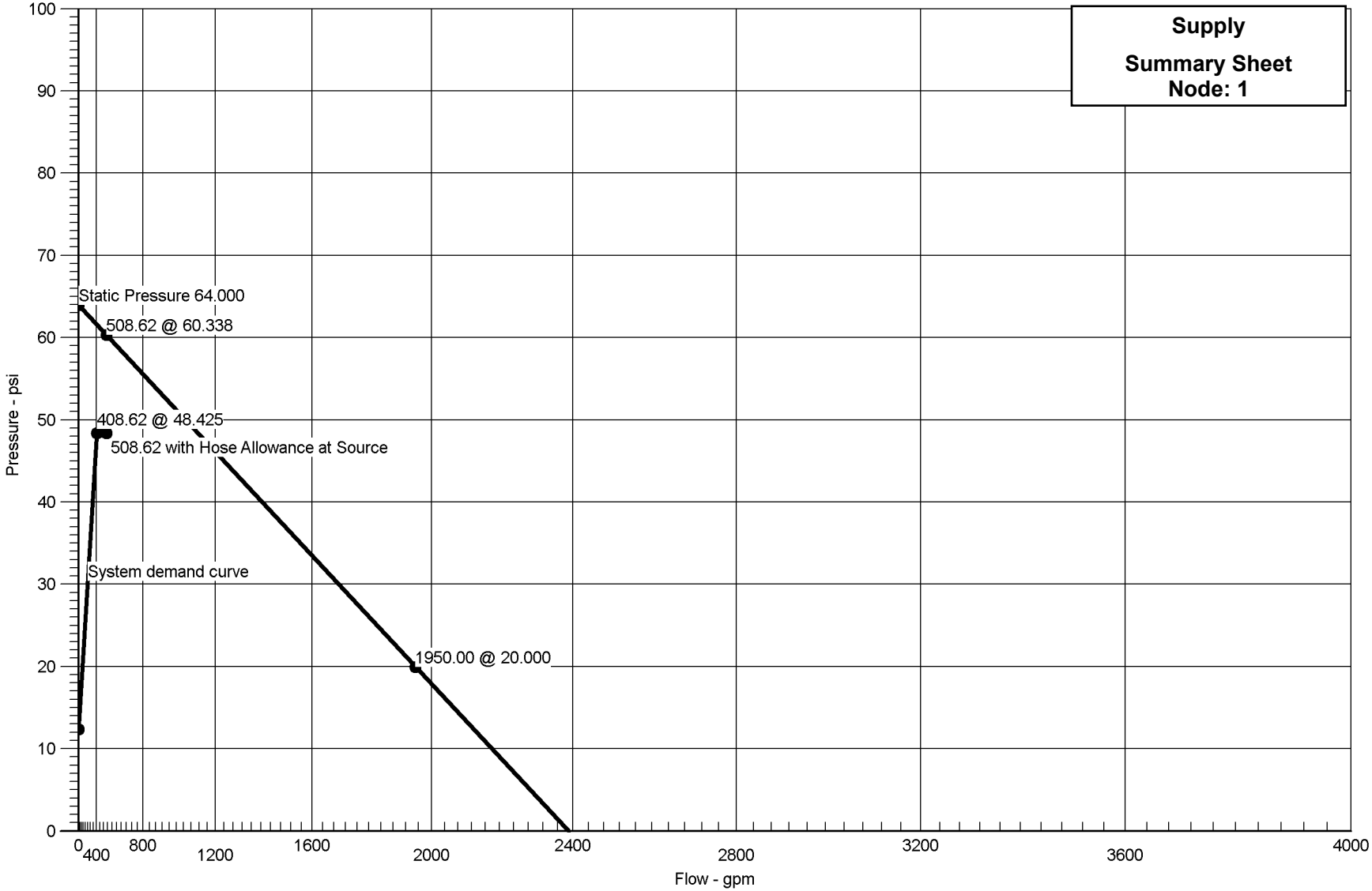
05/16/2023 Date

Expires DEC 31, 23

Hydraulic Graph

Job Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING **N** 1.85
Remote Area Number: 3

Date: 5/15/2023



Summary Of Outflowing Devices

Job Number: 22-3688
Report Description: Light Hazard (3)

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	3400	28.32	10.00	5.6	25.579		
Sprinkler	3401	19.56	10.00	5.6	12.196		
Sprinkler	3402	19.31	10.00	5.6	11.884		
Sprinkler	3403	19.47	10.00	5.6	12.084		
Sprinkler	3404	16.93	10.00	5.6	9.141		
Sprinkler	3405	19.20	10.00	5.6	11.750		
Sprinkler	3406	19.19	14.82	5.6	11.739		
Sprinkler	3407	18.71	16.50	5.6	11.165		
Sprinkler	3408	18.98	16.50	5.6	11.486		
Sprinkler	3409	18.37	16.50	5.6	10.758		
Sprinkler	3410	18.27	10.00	5.6	10.646		
Sprinkler	3411	18.24	16.50	5.6	10.605		
Sprinkler	3412	17.14	15.00	5.6	9.372		
Sprinkler	3413	17.05	14.82	5.6	9.270		
Sprinkler	**3414**	**16.50**	**16.50**	**5.6**	**8.681**		
Sprinkler	3415	18.30	14.82	5.6	10.679		
Sprinkler	3416	16.31	15.00	5.6	8.479		
Sprinkler	3417	17.49	15.00	5.6	9.752		
Sprinkler	3418	17.65	15.00	5.6	9.931		
Sprinkler	3419	17.77	15.00	5.6	10.069		
Sprinkler	3420	17.85	15.00	5.6	10.156		
Sprinkler	3421	18.04	15.00	5.6	10.375		

Most Demanding Sprinkler Data

Supply Analysis

Node	Name	Static (psi)	Residual (psi) @ Flow (gpm)		Available (psi) @ Total Demand (gpm)		Required Pressure (psi)
1	Water Supply	64.000	20.000	1950.00	60.338	508.62	48.425

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
1	-15'-0	Supply	48.425	408.62	
3400	13'-2½	Sprinkler	25.579	28.32	
3401	13'-4½	Sprinkler	12.196	19.56	
3402	13'-3½	Sprinkler	11.884	19.31	
3403	13'-4½	Sprinkler	12.084	19.47	
3404	13'-3	Sprinkler	9.141	16.93	
3405	13'-3½	Sprinkler	11.750	19.20	
3406	9'-11½	Sprinkler	11.739	19.19	
3407	13'-6½	Sprinkler	11.165	18.71	
3408	13'-6	Sprinkler	11.486	18.98	
3409	13'-6½	Sprinkler	10.758	18.37	
3410	12'-7½	Sprinkler	10.646	18.27	
3411	13'-6	Sprinkler	10.605	18.24	
3412	12'-10	Sprinkler	9.372	17.14	
3413	9'-11½	Sprinkler	9.270	17.05	
3414	13'-7½	Sprinkler	8.681	16.50	
3415	9'-11½	Sprinkler	10.679	18.30	
3416	12'-10	Sprinkler	8.479	16.31	
3417	13'-2	Sprinkler	9.752	17.49	

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
3418	13'-2	Sprinkler	9.931	17.65	
3419	13'-2	Sprinkler	10.069	17.77	
3420	13'-2	Sprinkler	10.156	17.85	
3421	13'-2	Sprinkler	10.375	18.04	
2	-15'-0		48.197		
3	-15'-0		46.151		
6	-15'-0		44.112		
7	-8'-9½		40.791		
8	2'-6½		35.669		
200	11'-5		27.989		
201	12'-2		23.854		
202	13'-2		14.279		
203	13'-2		10.936		
204	11'-5		27.751		
300	11'-5		27.833		
301	12'-9½		26.967		
302	11'-10½		18.661		
303	13'-4½		12.531		
304	12'-10		13.218		
305	11'-5		27.778		
307	12'-8½		12.198		
308	12'-8½		12.525		
309	12'-7½		11.240		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
310	12'-8½		11.768		
311	12'-7½		10.755		
312	12'-8½		11.595		
313	12'-2		14.954		
314	13'-2		10.821		
315	12'-10		9.442		
316	13'-2		9.822		
317	12'-8½		11.631		
318	13'-2		10.816		
319	11'-11½		9.812		
320	12'-2		13.430		
321	13'-2		10.818		
322	13'-2		10.831		
323	13'-2		10.867		
324	13'-2		11.111		
325	13'-2		11.090		

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) Fitting / Total	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
3414	13'-7½	5.6	16.50	1	(See Notes)	3'-2½	120	8.681	• • • • • **Route 1** • • • • •
316	13'-2		16.50	1.0490		7'-0 10'-2½	0.091164	0.208 0.933	Sprinkler, E(2'-0), T(5'-0)
316	13'-2		33.45	1½	(See Notes)	3'-4½	120	9.822	Flow (q) from Route 2
314	13'-2		49.95	1.6100		8'-0 11'-4½	0.087842	 0.999	PO(8'-0)
314	13'-2		10.06	2½	(See Notes)	2'-0½	120	10.821	Flow (q) from Route 21
203	13'-2		60.01	2.6350		8'-3 10'-3½	0.011199	 0.115	E(8'-3)
203	13'-2			2	(See Notes)	9'-4	120	10.936	
312	12'-8½		60.01	2.1570		6'-2 15'-6	0.029684	0.199 0.460	E(6'-2)
312	12'-8½		18.24	2		3'-6½	120	11.595	Flow (q) from Route 3
310	12'-8½		78.25	2.1570		 3'-6½	0.048498	0.000 0.172	
310	12'-8½		18.37	2		6'-0	120	11.768	Flow (q) from Route 4
307	12'-8½		96.62	2.1570		 6'-0	0.071637	0.000 0.430	
307	12'-8½		18.71	2		3'-3½	120	12.198	Flow (q) from Route 8
308	12'-8½		115.33	2.1570		 3'-3½	0.099398	0.000 0.327	
308	12'-8½		18.98	2	(See Notes)	2'-6	120	12.525	Flow (q) from Route 11
202	13'-2		134.31	2.1570		12'-3½ 14'-10	0.131759	-0.199 1.953	2E(6'-2)
202	13'-2			2½	(See Notes)	128'-2½	120	14.279	
204	11'-5		134.31	2.6350		127'-8 255'-10½	0.049708	0.752 12.719	4PO(16'-5½), 5E(8'-3), T(16'-5½), EE(4'-1½)
204	11'-5			6		40'-7½	120	27.751	
305	11'-5		134.31	6.3570		 40'-7½	0.000682	0.000 0.028	
305	11'-5		77.52	6		34'-9½	120	27.778	Flow (q) from Route 18
300	11'-5		211.83	6.3570		 34'-9½	0.001585	0.000 0.055	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
300	11'-5		28.32	6	(See Notes)	60'-4½	120	27.833	Flow (q) from Route 20
						17'-7	0.001999		
200	11'-5		240.15	6.3570		78'-0		0.156	E(17'-7)
200	11'-5		168.47	6	(See Notes)	30'-1	120	27.989	Flow (q) from Route 5
						125'-4½	0.005343	3.849	
8	2'-6½		408.62	6.3570		155'-5½		3.830	3E(17'-7), f(-0.000), f(-3.000), CV(17'-2½), BV(17'-7), PO(37'-8½)
8	2'-6½			6	(See Notes)	21'-0½	120	35.669	
						17'-7	0.005343	4.915	
7	-8'-9½		408.62	6.3570		38'-7½		0.206	E(17'-7)
7	-8'-9½			6	(See Notes)	86'-3½	140	40.791	
						69'-4	0.004070	2.688	
6	-15'-0		408.62	6.3400		155'-7½		0.633	3E(23'-1½)
6	-15'-0			6	(See Notes)	4'-1½	140	44.112	
							0.004070		
3	-15'-0		408.62	6.3400		4'-1½		2.039	BFP(-1.810)
3	-15'-0			6	(See Notes)	11'-2½	140	46.151	
							0.004070		
2	-15'-0		408.62	6.3400		11'-2½		2.046	PIV(-2.000)
2	-15'-0			6	(See Notes)	21'-7	140	48.197	
						34'-8	0.004070		
1	-15'-0		408.62	6.3400		56'-3		0.229	E(23'-1½), EE(11'-6½), S
			100.00					48.425	Hose Allowance At Source
1			508.62						Total(Pt) Route 1
3416	12'-10	5.6	16.31	1	(See Notes)	5'-9½	120	8.479	• • • • • **Route 2** • • • • • Sprinkler,
						5'-0	0.089195		
315	12'-10		16.31	1.0490		10'-9½		0.963	T(5'-0)
315	12'-10		17.14	1½	(See Notes)	4'-6½	120	9.442	Flow (q) from Route 6
						8'-0	0.041836	-0.145	
316	13'-2		33.45	1.6100		12'-6½		0.524	2E(4'-0)
								9.822	Total(Pt) Route 2

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
3411	13'-6	5.6	18.24	1	(See Notes)	0'-10	120	10.605	• • • • • **Route 3** • • • • •
						5'-0	0.109707	0.352	Sprinkler,
312	12'-8½		18.24	1.0490		5'-10		0.638	PO(5'-0)
								11.595	Total(Pt) Route 3
3409	13'-6½	5.6	18.37	1	(See Notes)	0'-10	120	10.758	• • • • • **Route 4** • • • • •
						5'-0	0.111166	0.361	Sprinkler,
310	12'-8½		18.37	1.0490		5'-10		0.648	PO(5'-0)
								11.768	Total(Pt) Route 4
3404	13'-3	5.6	16.93	1	(See Notes)	7'-0	120	9.141	• • • • • **Route 5** • • • • •
						7'-0	0.095614	0.277	Sprinkler,
311	12'-7½		16.93	1.0490		14'-0		1.338	E(2'-0), PO(5'-0)
311	12'-7½		18.27	1½	(See Notes)	2'-6½	120	10.755	Flow (q) from Route 15
						8'-0	0.045979	-0.000	
309	12'-7½		35.20	1.6100		10'-6½		0.485	PO(8'-0)
309	12'-7½		19.19	1½	(See Notes)	14'-2	120	11.240	Flow (q) from Route 17
						20'-0	0.102826	0.199	
313	12'-2		54.39	1.6100		34'-2		3.514	2PO(8'-0), E(4'-0)
313	12'-2		114.08	2½	(See Notes)	68'-3½	120	14.954	Flow (q) from Route 7
						49'-5	0.075597		
201	12'-2		168.47	2.6350		117'-9		8.900	6E(8'-3)
201	12'-2			3	(See Notes)	81'-7½	120	23.854	
						60'-5½	0.026813	0.325	
200	11'-5		168.47	3.2600		142'-1½		3.810	3E(9'-5), EE(4'-0½), 2Ee1(4'-0½), PO(20'-2)
								27.989	Total(Pt) Route 5
3412	12'-10	5.6	17.14	1¼	(See Notes)	2'-9	120	9.372	• • • • • **Route 6** • • • • •
							0.025736		Sprinkler
315	12'-10		17.14	1.3800		2'-9		0.070	
								9.442	Total(Pt) Route 6
3413	9'-11½	5.6	17.05	1	(See Notes)	9'-6½	120	9.270	• • • • • **Route 7** • • • • •
						5'-0	0.096870	-0.867	Sprinkler,
319	11'-11½		17.05	1.0490		14'-6½		1.409	T(5'-0), fd

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
319	11'-11½		18.30	1	(See Notes)	0'-9½	120	9.812	Flow (q) from Route 16
317	12'-8½		35.35	1.0490		5'-0 5'-9½	0.373256	-0.338 2.157	PO(5'-0)
317	12'-8½			1½	(See Notes)	13'-7½	120	11.631	
320	12'-2		35.35	1.6100		20'-0 33'-7½	0.046338	0.242 1.557	2PO(8'-0), E(4'-0)
320	12'-2		78.73	2½	(See Notes)	24'-11½	120	13.430	Flow (q) from Route 9
313	12'-2		114.08	2.6350		16'-5½ 41'-5½	0.036752	-0.000 1.523	2E(8'-3)
								14.954	Total(Pt) Route 7
3407	13'-6½	5.6	18.71	1	(See Notes)	0'-10	120	11.165	• • • • • **Route 8** • • • • •
307	12'-8½		18.71	1.0490		5'-0 5'-10	0.115053	0.361 0.671	Sprinkler, PO(5'-0)
								12.198	Total(Pt) Route 8
3417	13'-2	5.6	17.49	1	(See Notes)	5'-6	120	9.752	• • • • • **Route 9** • • • • •
318	13'-2		17.49	1.0490		5'-0 10'-6	0.101514	1.065	Sprinkler, PO(5'-0)
318	13'-2			2½		5'-8½	120	10.816	
321	13'-2		7.43	2.6350		5'-8½	0.000235	0.001	
321	13'-2		17.65	2½		6'-0½	120	10.818	Flow (q) from Route 10
322	13'-2		25.07	2.6350		6'-0½	0.002229	0.013	
322	13'-2		17.77	2½		5'-11½	120	10.831	Flow (q) from Route 12
323	13'-2		42.84	2.6350		5'-11½	0.006004	0.036	
323	13'-2		17.85	2½	(See Notes)	4'-10½	120	10.867	Flow (q) from Route 13
324	13'-2		60.69	2.6350		16'-5½ 21'-4	0.011435	0.244	PO(16'-5½)
324	13'-2		18.04	2½	(See Notes)	44'-6½	120	11.111	Flow (q) from Route 14
320	12'-2		78.73	2.6350		57'-8 102'-2½	0.018505	0.427 1.892	3E(8'-3), 2PO(16'-5½)
								13.430	Total(Pt) Route 9

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
3418	13'-2	5.6	17.65	1	(See Notes)	3'-7	120	9.931	• • • • • **Route 10** • • • • • Sprinkler,
321	13'-2		17.65	1.0490		5'-0 / 8'-7	0.103236	0.887	PO(5'-0)
								10.818	Total(Pt) Route 10
3408	13'-6	5.6	18.98	1	(See Notes)	0'-10	120	11.486	• • • • • **Route 11** • • • • • Sprinkler,
308	12'-8½		18.98	1.0490		5'-0 / 5'-10	0.118112	0.352 / 0.687	PO(5'-0)
								12.525	Total(Pt) Route 11
3419	13'-2	5.6	17.77	1	(See Notes)	2'-3½	120	10.069	• • • • • **Route 12** • • • • • Sprinkler,
322	13'-2		17.77	1.0490		5'-0 / 7'-3½	0.104569	0.762	PO(5'-0)
								10.831	Total(Pt) Route 12
3420	13'-2	5.6	17.85	1	(See Notes)	1'-9	120	10.156	• • • • • **Route 13** • • • • • Sprinkler,
323	13'-2		17.85	1.0490		5'-0 / 6'-9	0.105396	0.712	PO(5'-0)
								10.867	Total(Pt) Route 13
3421	13'-2	5.6	18.04	1	(See Notes)	1'-8	120	10.375	• • • • • **Route 14** • • • • • Sprinkler,
325	13'-2		18.04	1.0490		5'-0 / 6'-8	0.107502	0.715	PO(5'-0)
325	13'-2			2½	(See Notes)	1'-1½	120	11.090	
324	13'-2		18.04	2.6350		16'-5½ / 17'-7	0.001212	0.021	PO(16'-5½)
								11.111	Total(Pt) Route 14
3410	12'-7½	5.6	18.27	1½	(See Notes)	8'-0½	120	10.646	• • • • • **Route 15** • • • • • Sprinkler
311	12'-7½		18.27	1.6100		8'-0½	0.013667	-0.000 / 0.110	
								10.755	Total(Pt) Route 15
3415	9'-11½	5.6	18.30	1	(See Notes)	0'-0	120	10.679	• • • • • **Route 16** • • • • • Sprinkler,
319	11'-11½		18.30	1.0490		0'-0	0.110411	-0.867 / 0.000	, fd
								9.812	Total(Pt) Route 16

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
3406	9'-11½	5.6	19.19	1	(See Notes)	0'-6	120	11.739	• • • • • **Route 17** • • • • •
						5'-0	0.120512	-1.163	Sprinkler,
309	12'-7½		19.19	1.0490		5'-6		0.664	PO(5'-0), fd
								11.240	Total(Pt) Route 17
3405	13'-3½	5.6	19.20	1½	(See Notes)	9'-0	120	11.750	• • • • • **Route 18** • • • • •
							0.014974		Sprinkler
3402	13'-3½		19.20	1.6100		9'-0		0.135	
3402	13'-3½	5.6	19.31	1½	(See Notes)	12'-11	120	11.884	Sprinkler,
						8'-0	0.054266	0.199	
304	12'-10		38.50	1.6100		20'-11		1.135	2E(4'-0)
304	12'-10		39.02	1½	(See Notes)	13'-4½	120	13.218	Flow (q) from Route 19
						12'-0	0.198092	0.415	
302	11'-10½		77.52	1.6100		25'-4½		5.028	3E(4'-0)
302	11'-10½			2	(See Notes)	87'-0	120	18.661	
						65'-0	0.058668	0.199	
305	11'-5		77.52	2.0670		152'-0		8.918	9E(5'-0), 2PO(10'-0)
								27.778	Total(Pt) Route 18
3403	13'-4½	5.6	19.47	1½	(See Notes)	9'-0	120	12.084	• • • • • **Route 19** • • • • •
							0.012419		Sprinkler
3401	13'-4½		19.47	1.6820		9'-0		0.112	
3401	13'-4½	5.6	19.56	1½	(See Notes)	2'-6	120	12.196	Sprinkler,
						4'-11½	0.044960		
303	13'-4½		39.02	1.6820		7'-5½		0.335	E(4'-11½)
303	13'-4½			1½	(See Notes)	0'-0	120	12.531	
						8'-0	0.055636	0.242	
304	12'-10		39.02	1.6100		8'-0		0.445	PO(8'-0)
								13.218	Total(Pt) Route 19
3400	13'-2½	5.6	28.32	1½	(See Notes)	11'-7½	120	25.579	• • • • • **Route 20** • • • • •
						28'-0	0.030750	0.169	Sprinkler,
301	12'-9½		28.32	1.6100		39'-7½		1.219	5E(4'-0), PO(8'-0)
301	12'-9½			2½	(See Notes)	54'-2½	120	26.967	
						41'-2	0.002792	0.600	
300	11'-5		28.32	2.6350		95'-4½		0.266	3E(8'-3), PO(16'-5½)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
								27.833	Total(Pt) Route 20
318	13'-2		7.43	2½		11'-4	120	10.816	• • • • • **Route 21** • • • • • Flow (q) from Route 9
314	13'-2		10.06	2.6350		11'-4	0.000411	0.005	
								10.821	Total(Pt) Route 21

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

(Actual Inside Diameter / Schedule 40 Steel Pipe Inside Diameter) 4.87 = Factor

C Value Multiplier

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

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 Relief Valve
PRV	Pressure Reducing Valve	red	Reducer/Adapter	S	Supply
sCV	Swing Check Valve	SFx	Seismic Flex	Spr	Sprinkler
St	Strainer	T	Tee Flow Turn 90°	Tr	Tee Run
U	Union	WirF	Wirsbo	WMV	Water Meter Valve
Z	Cap				

Hydraulic Calculations

for

Project Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING
Location: 1601 39th AVE SE, Puyallup, WA 98374,
Drawing Name: 22-3688 PeirceSTEM-L21-R041-Plans Calculation Date: 5/15/2023

Design

Remote Area Number:	4
Remote Area Location:	Classroom 102/102
Occupancy Classification:	Light Hazard
Commodity Classification:	N/A
Density	0.10gpm/ft²
Area of Application:	1500ft² (Actual 1045ft²)
Coverage per Sprinkler:	130ft²
Type of sprinklers calculated:	Upright
No. of sprinklers calculated:	12
No. of nozzles calculated:	0

In-rack Demand: N/A gpm at Node: N/A
Hose Streams: 100.00 at Node: 1 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 1: 290.92 @ 37.798 (Safety Margin = 24.899)
Type of System: Wet
Volume of Dry/PreAction/Antifreeze/OtherAgent N/A

Name of Contractor: SHINN FIRE PROTECTION
Address: 18802 80TH AVE S, KENT WA98032
Phone Number: 425-204-3945
Name of designer: Ben Bernard
Authority Having Jurisdiction: CITY OF PUYALLUP

Notes:

Automatic peaking results Left: N/A Right: N/A

FPET NICET #106245 LEVEL IV,MSME

WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE PROTECTION SPRINKLER SYSTEMS

Hussein A. A. Huballa
8321-1119-C Level 3
Shinn Mechanical, Inc.
SHINNMI060QP

Signature

05/16/2023 Date

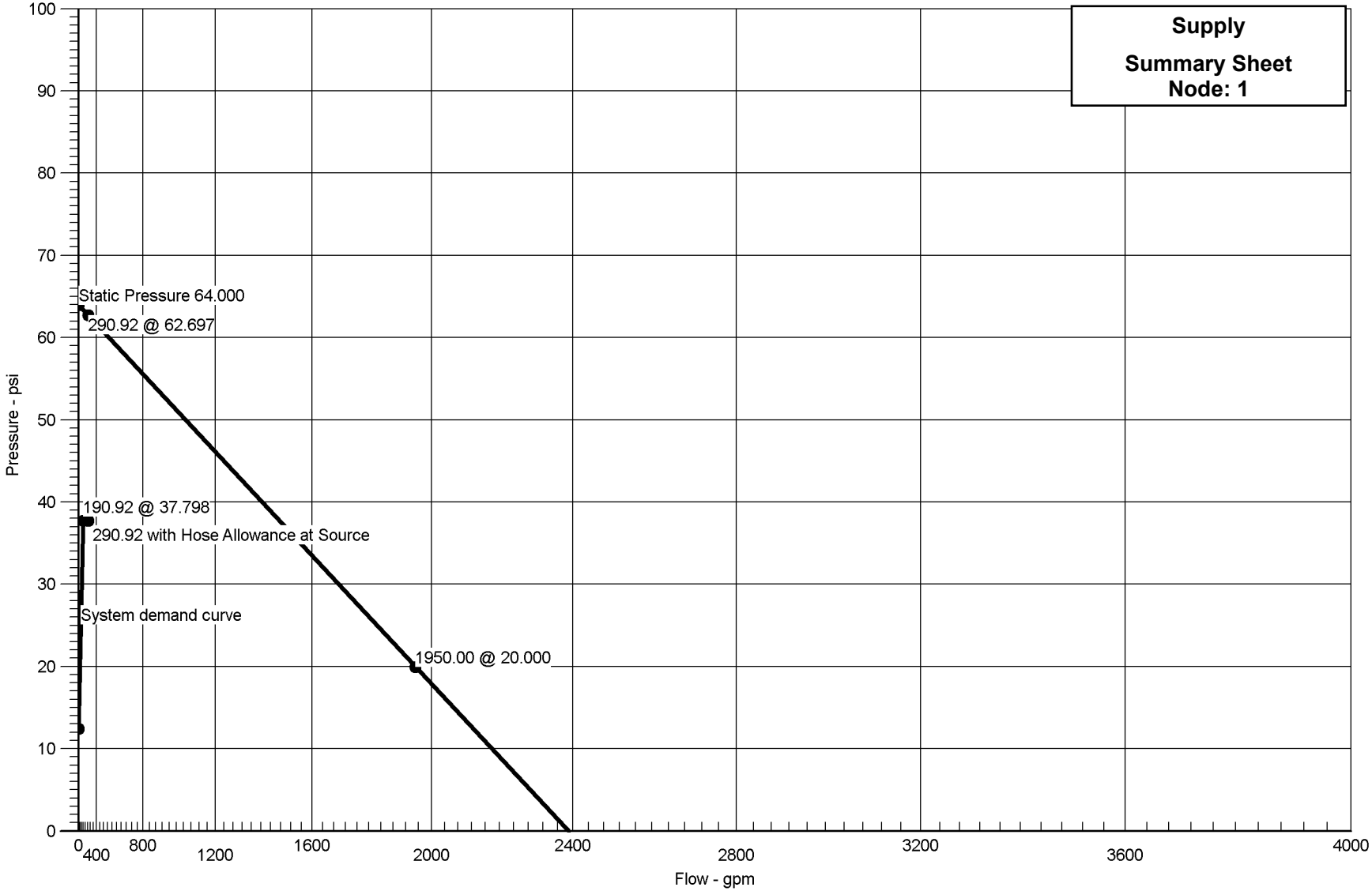
Expires DEC 31, 23

Hydraulic Graph

Job Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING **N** 1.85

Remote Area Number: 4

Date: 5/15/2023



Summary Of Outflowing Devices

Job Number: 22-3688
Report Description: Light Hazard (4)

Device	Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler 4200	16.53	13.00	5.6	8.711		
Sprinkler 4201	17.24	13.00	5.6	9.473		
Sprinkler 4202	17.15	13.00	5.6	9.381		
Sprinkler 4203	16.43	13.00	5.6	8.605		
Sprinkler 4204	15.82	13.00	5.6	7.976		
Sprinkler 4205	17.15	13.00	5.6	9.382		
Sprinkler 4206	15.00	13.00	5.6	7.176		
Sprinkler 4207	15.60	13.00	5.6	7.757		
Sprinkler 4208	15.36	13.00	5.6	7.523		
Sprinkler 4209	14.99	13.00	5.6	7.163		
Sprinkler 4210	14.84	13.00	5.6	7.023		
Sprinkler 4211	**14.82**	**13.00**	**5.6**	**7.000**		

Most Demanding Sprinkler Data

Supply Analysis

Node	Name	Static (psi)	Residual (psi) @ Flow (gpm)		Available (psi) @ Total Demand (gpm)		Required Pressure (psi)
1	Water Supply	64.000	20.000	1950.00	62.697	290.92	37.798

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
1	-15'-0	Supply	37.798	190.92	
4200	13'-8½	Sprinkler	8.711	16.53	
4201	13'-8½	Sprinkler	9.473	17.24	
4202	13'-8½	Sprinkler	9.381	17.15	
4203	13'-8½	Sprinkler	8.605	16.43	
4204	13'-8	Sprinkler	7.976	15.82	
4205	13'-8	Sprinkler	9.382	17.15	
4206	13'-8½	Sprinkler	7.176	15.00	
4207	13'-8½	Sprinkler	7.757	15.60	
4208	13'-8½	Sprinkler	7.523	15.36	
4209	13'-8	Sprinkler	7.163	14.99	
4210	13'-6	Sprinkler	7.023	14.84	
4211	13'-6	Sprinkler	7.000	14.82	
2	-15'-0		37.742		
3	-15'-0		35.731		
6	-15'-0		34.137		
7	-8'-9½		31.294		
8	2'-6½		26.329		
200	11'-5		19.276		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
201	12'-2		17.119		
202	13'-2		13.884		
203	13'-2		11.826		
204	11'-5		19.238		
400	12'-8½		9.682		
401	12'-2		10.752		
402	12'-8½		9.570		
403	12'-8½		10.511		
404	12'-8½		10.397		
405	12'-2		10.535		
406	12'-8½		8.894		
407	12'-8½		10.395		
408	12'-8½		10.379		
409	12'-8½		8.775		
410	12'-2		10.253		
411	12'-8½		9.078		
412	12'-8½		8.058		
413	12'-8½		8.459		
414	12'-8½		8.673		
415	12'-2		10.165		
416	12'-8½		8.134		
417	12'-8½		8.033		
418	12'-8½		8.109		

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
4211	13'-6	5.6	14.82	1	(See Notes)	3'-3	120	7.000	• • • • • **Route 1** • • • • •
418	12'-8½		14.82	1.0490		7'-0 10'-3	0.074703	0.343 0.766	Sprinkler, E(2'-0), PO(5'-0)
418	12'-8½		14.99	1½	(See Notes)	2'-4½	120	8.109	Flow (q) from Route 3
413	12'-8½		29.80	1.6100		8'-0 10'-4½	0.033793	 0.351	PO(8'-0)
413	12'-8½		29.84	1½	(See Notes)	0'-0	120	8.459	Flow (q) from Route 2
415	12'-2		59.65	1.6100		12'-0 12'-0	0.121966	0.242 1.464	E(4'-0), PO(8'-0)
415	12'-2			2½		8'-0	120	10.165	
410	12'-2		59.65	2.6350		 8'-0	0.011073	 0.089	
410	12'-2		46.77	2½		8'-8½	120	10.253	Flow (q) from Route 5
405	12'-2		106.42	2.6350		 8'-8½	0.032318	 0.282	
405	12'-2			2½		11'-3½	120	10.535	
401	12'-2		80.44	2.6350		 11'-3½	0.019255	 0.217	
401	12'-2		32.96	2½	(See Notes)	109'-3½	120	10.752	Flow (q) from Route 8
201	12'-2		113.39	2.6350		65'-11 175'-2	0.036344	 6.367	8E(8'-3)
201	12'-2			3	(See Notes)	81'-7½	120	17.119	
200	11'-5		113.39	3.2600		60'-5½ 142'-1½	0.012890	0.325 1.832	3E(9'-5), EE(4'-0½), 2Ee1(4'-0½), PO(20'-2)
200	11'-5		77.52	6	(See Notes)	30'-1	120	19.276	Flow (q) from Route 10
8	2'-6½		190.92	6.3570		125'-4½ 155'-5½	0.001307	3.849 3.203	3E(17'-7), f(-0.000), f(-3.000), CV(17'-2½), BV(17'-7), PO(37'-8½)
8	2'-6½			6	(See Notes)	21'-0½	120	26.329	
7	-8'-9½		190.92	6.3570		17'-7 38'-7½	0.001307	4.915 0.050	E(17'-7)
7	-8'-9½			6	(See Notes)	86'-3½	140	31.294	
6	-15'-0		190.92	6.3400		69'-4 155'-7½	0.000996	2.688 0.155	3E(23'-1½)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
6	-15'-0			6	(See Notes)	4'-1½	140	34.137	
3	-15'-0		190.92	6.3400		4'-1½	0.000996	1.594	BFP(-1.810)
3	-15'-0			6	(See Notes)	11'-2½	140	35.731	
2	-15'-0		190.92	6.3400		11'-2½	0.000996	2.011	PIV(-2.000)
2	-15'-0			6	(See Notes)	21'-7	140	37.742	
1	-15'-0		190.92	6.3400		34'-8 56'-3	0.000996	0.056	E(23'-1½), EE(11'-6½), S
			100.00					37.798	Hose Allowance At Source
1			290.92						Total(Pt) Route 1
4210	13'-6	5.6	14.84	1	(See Notes)	3'-3	120	7.023	• • • • • **Route 2** • • • • •
416	12'-8½		14.84	1.0490		7'-0 10'-3	0.074927	0.343 0.768	Sprinkler, E(2'-0), PO(5'-0)
416	12'-8½		15.00	1½	(See Notes)	1'-7½	120	8.134	Flow (q) from Route 4
413	12'-8½		29.84	1.6100		8'-0 9'-7½	0.033872	0.326	PO(8'-0)
								8.459	Total(Pt) Route 2
4209	13'-8	5.6	14.99	1	(See Notes)	0'-11½	120	7.163	• • • • • **Route 3** • • • • •
417	12'-8½		14.99	1.0490		5'-0 5'-11½	0.076313	0.415 0.455	Sprinkler, PO(5'-0)
417	12'-8½			1½		8'-0	120	8.033	
418	12'-8½		14.99	1.6100		8'-0	0.009474	0.076	
								8.109	Total(Pt) Route 3
4206	13'-8½	5.6	15.00	1	(See Notes)	0'-11½	120	7.176	• • • • • **Route 4** • • • • •
412	12'-8½		15.00	1.0490		5'-0 5'-11½	0.076444	0.424 0.457	Sprinkler, PO(5'-0)
412	12'-8½			1½		8'-0	120	8.058	
416	12'-8½		15.00	1.6100		8'-0	0.009490	0.076	
								8.134	Total(Pt) Route 4

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) Fitting / Total	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
4208	13'-8½	5.6	15.36	1	(See Notes)	3'-4½	120	7.523	• • • • • **Route 5** • • • • • Sprinkler,
409	12'-8½		15.36	1.0490		7'-0 10'-4½	0.079856	0.424 0.827	E(2'-0), PO(5'-0)
409	12'-8½		15.60	1½	(See Notes)	0'-4½	120	8.775	Flow (q) from Route 6
411	12'-8½		30.96	1.6100		8'-0 8'-4½	0.036251	0.303	PO(8'-0)
411	12'-8½		15.82	1½	(See Notes)	0'-0	120	9.078	Flow (q) from Route 7
410	12'-2		46.77	1.6100		12'-0 12'-0	0.077786	0.242 0.933	E(4'-0), PO(8'-0)
								10.253	Total(Pt) Route 5
4207	13'-8½	5.6	15.60	1	(See Notes)	0'-11½	120	7.757	• • • • • **Route 6** • • • • • Sprinkler,
414	12'-8½		15.60	1.0490		5'-0 5'-11½	0.082151	0.424 0.491	PO(5'-0)
414	12'-8½			1½		10'-0	120	8.673	
409	12'-8½		15.60	1.6100		10'-0	0.010199	0.102	
								8.775	Total(Pt) Route 6
4204	13'-8	5.6	15.82	1	(See Notes)	0'-11½	120	7.976	• • • • • **Route 7** • • • • • Sprinkler,
406	12'-8½		15.82	1.0490		5'-0 5'-11½	0.084293	0.415 0.502	PO(5'-0)
406	12'-8½			1½	(See Notes)	9'-7½	120	8.894	
411	12'-8½		15.82	1.6100		8'-0 17'-7½	0.010465	0.185	PO(8'-0)
								9.078	Total(Pt) Route 7
4203	13'-8½	5.6	16.43	1	(See Notes)	0'-11½	120	8.605	• • • • • **Route 8** • • • • • Sprinkler,
402	12'-8½		16.43	1.0490		5'-0 5'-11½	0.090421	0.424 0.541	PO(5'-0)
402	12'-8½			1½		10'-0	120	9.570	
400	12'-8½		16.43	1.6100		10'-0	0.011225	0.112	
400	12'-8½		16.53	1½	(See Notes)	0'-4½	120	9.682	Flow (q) from Route 9
401	12'-2		32.96	1.6100		20'-0 20'-4½	0.040698	0.242 0.829	2PO(8'-0), E(4'-0)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
								10.752	Total(Pt) Route 8
4200	13'-8½	5.6	16.53	1	(See Notes)	0'-11½	120	8.711	• • • • • **Route 9** • • • • • Sprinkler,
400	12'-8½		16.53	1.0490		5'-0 5'-11½	0.091452	0.424 0.547	PO(5'-0)
								9.682	Total(Pt) Route 9
4202	13'-8½	5.6	17.15	1	(See Notes)	1'-0	120	9.381	• • • • • **Route 10** • • • • • Sprinkler,
407	12'-8½		17.15	1.0490		5'-0 6'-0	0.097938	0.428 0.586	PO(5'-0)
407	12'-8½		17.15	2½		0'-5½	120	10.395	Flow (q) from Route 11
404	12'-8½		34.30	2.6350		0'-5½	0.003980	0.000 0.002	
404	12'-8½		25.98	2½		9'-6½	120	10.397	Flow (q) from Route 13
403	12'-8½		60.29	2.6350		9'-6½	0.011295	0.005 0.108	
403	12'-8½		17.24	2½	(See Notes)	42'-9½	120	10.511	Flow (q) from Route 12
203	13'-2		77.52	2.6350		41'-2 83'-11½	0.017985	-0.195 1.510	3E(8'-3), PO(16'-5½)
203	13'-2			2	(See Notes)	24'-8½	120	11.826	
202	13'-2		77.52	2.1570		18'-5½ 43'-2	0.047671	-0.000 2.058	3E(6'-2)
202	13'-2			2½	(See Notes)	128'-2½	120	13.884	
204	11'-5		77.52	2.6350		127'-8 255'-10½	0.017985	0.752 4.602	4PO(16'-5½), 5E(8'-3), T(16'-5½), EE(4'-1½)
204	11'-5			6	(See Notes)	135'-10	120	19.238	
200	11'-5		77.52	6.3570		17'-7 153'-5½	0.000247	0.000 0.038	E(17'-7)
								19.276	Total(Pt) Route 10
4205	13'-8	5.6	17.15	1	(See Notes)	0'-11½	120	9.382	• • • • • **Route 11** • • • • • Sprinkler,
408	12'-8½		17.15	1.0490		5'-0 5'-11½	0.097949	0.414 0.583	PO(5'-0)
408	12'-8½			2½		10'-0	120	10.379	
407	12'-8½		17.15	2.6350		10'-0	0.001104	0.006 0.011	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
								10.395	Total(Pt) Route 11
4201	13'-8½	5.6	17.24	1	(See Notes)	1'-0	120	9.473	• • • • • **Route 12** • • • • • Sprinkler,
403	12'-8½		17.24	1.0490		5'-0	0.098829	0.442	PO(5'-0)
						6'-0		0.595	
								10.511	Total(Pt) Route 12
405	12'-2			2½	(See Notes)	0'-11	120	10.535	• • • • • **Route 13** • • • • • PO(16'-5½)
404	12'-8½		25.98	2.6350		41'-2	0.002380	-0.238	E(8'-3), PO(16'-5½)
						42'-1		0.100	
								10.397	Total(Pt) Route 13

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

(Actual Inside Diameter / Schedule 40 Steel Pipe Inside Diameter) 4.87 = Factor

C Value Multiplier

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

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 Relief Valve
PRV	Pressure Reducing Valve	red	Reducer/Adapter	S	Supply
sCV	Swing Check Valve	SFx	Seismic Flex	Spr	Sprinkler
St	Strainer	T	Tee Flow Turn 90°	Tr	Tee Run
U	Union	WirF	Wirsbo	WMV	Water Meter Valve
Z	Cap				

Hydraulic Calculations

for

Project Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING
Location: 1601 39th AVE SE, Puyallup, WA 98374,
Drawing Name: 22-3688 PeirceSTEM-L21-R041-Plans Calculation Date: 5/15/2023

Design

Remote Area Number:	5
Remote Area Location:	LOBBY
Occupancy Classification:	Light Hazard
Commodity Classification:	N/A
Density	0.10gpm/ft²
Area of Application:	1500ft² (Actual 1335ft²)
Coverage per Sprinkler:	120ft²
Type of sprinklers calculated:	Upright, Pendent
No. of sprinklers calculated:	14
No. of nozzles calculated:	0

In-rack Demand: N/A gpm at Node: N/A
Hose Streams: 100.00 at Node: 1 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 1: 314.93 @ 29.635 (Safety Margin = 32.857)
Type of System: WET
Volume of Dry/PreAction/Antifreeze/OtherAgent N/A

Name of Contractor: SHINN FIRE PROTECTION
Address: 18802 80TH AVE S, KENT WA98032
Phone Number: 425-204-3945
Name of designer: Ben Bernard
Authority Having Jurisdiction: CITY OF PUYALLUP

Notes:

Automatic peaking results Left: N/A Right: N/A

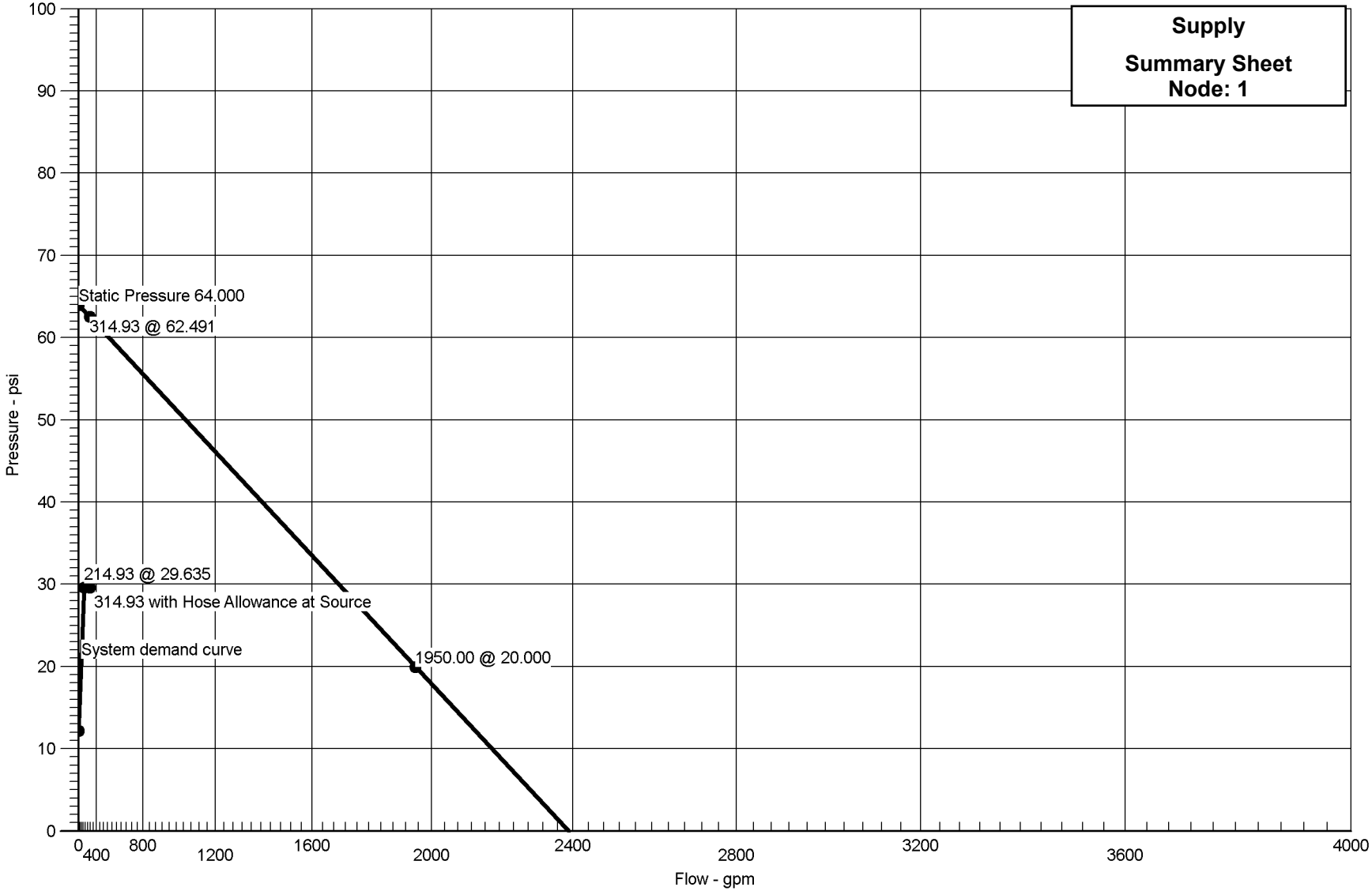
FPET NICET #106245 LEVEL IV,MSME

WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE PROTECTION SPRINKLER SYSTEMS
Hussein A. A. Huballa
8321-1119-C Level 3
Shinn Mechanical, Inc.
SHINNMI060QP
Signature
05/16/2023 Date
Expires DEC 31, 23

Hydraulic Graph

Job Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING **N** 1.85
Remote Area Number: 5

Date: 5/15/2023



Summary Of Outflowing Devices

Job Number: 22-3688
Report Description: Light Hazard (5)

Device	Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler 5600	15.69	12.00	5.6	7.853		
Sprinkler 5601	15.42	12.00	5.6	7.578		
Sprinkler 5602	15.64	12.00	5.6	7.801		
Sprinkler 5603	15.35	12.00	5.6	7.511		
Sprinkler 5604	15.63	12.00	5.6	7.795		
Sprinkler 5605	15.36	12.00	5.6	7.528		
Sprinkler 5606	15.36	12.00	5.6	7.521		
Sprinkler 5607	15.30	12.00	5.6	7.461		
Sprinkler 5608	15.02	12.00	5.6	7.192		
Sprinkler 5609	15.29	12.00	5.6	7.455		
Sprinkler 5610	14.93	12.00	5.6	7.111		
Sprinkler 5611	16.23	14.82	5.6	8.397		
Sprinkler 5612	**14.82**	**12.00**	**5.6**	**7.000**		
Sprinkler 5613	14.89	12.00	5.6	7.073		

⇨ Most Demanding Sprinkler Data

Supply Analysis

Node	Name	Static (psi)	Residual (psi) @ Flow (gpm)		Available (psi) @ Total Demand (gpm)		Required Pressure (psi)
1	Water Supply	64.000	20.000	1950.00	62.491	314.93	29.635

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
1	-15'-0	Supply	29.635	214.93	
5600	13'-2½	Sprinkler	7.853	15.69	
5601	13'-2½	Sprinkler	7.578	15.42	
5602	13'-2½	Sprinkler	7.801	15.64	
5603	13'-2½	Sprinkler	7.511	15.35	
5604	13'-2½	Sprinkler	7.795	15.63	
5605	13'-2½	Sprinkler	7.528	15.36	
5606	13'-2½	Sprinkler	7.521	15.36	
5607	13'-2½	Sprinkler	7.461	15.30	
5608	12'-9½	Sprinkler	7.192	15.02	
5609	13'-2½	Sprinkler	7.455	15.29	
5610	12'-9½	Sprinkler	7.111	14.93	
5611	10'-0	Sprinkler	8.397	16.23	
5612	13'-2½	Sprinkler	7.000	14.82	
5613	13'-2½	Sprinkler	7.073	14.89	
2	-15'-0		29.565		
3	-15'-0		27.551		
6	-15'-0		25.922		
7	-8'-9½		23.041		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
8	2'-6½		18.063		
200	11'-5		10.961		
201	12'-2		9.570		
202	13'-2		9.791		
203	13'-2		9.618		
204	11'-5		10.931		
300	11'-5		10.932		
301	12'-9½		8.862		
500	11'-7		9.850		
501	11'-7		9.795		
502	11'-7		9.784		
503	12'-9½		7.673		
504	12'-9½		8.900		
505	13'-2½		7.059		

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
5612	13'-2½	5.6	14.82	1½	(See Notes)	7'-11	120	7.000	• • • • • **Route 1** • • • • • Sprinkler
505	13'-2½		14.82	1.6820		7'-11	0.007495	0.059	
505	13'-2½			1½		1'-6	120	7.059	
5613	13'-2½		14.82	1.6100		1'-6	0.009274	0.014	
5613	13'-2½	5.6	14.89	1½	(See Notes)	20'-2½	120	7.073	Sprinkler, 5E(4'-0), PO(8'-0)
301	12'-9½		29.71	1.6100		28'-0 48'-2½	0.033595	0.170 1.619	
301	12'-9½			2½		12'-7	120	8.862	
504	12'-9½		29.71	2.6350		12'-7	0.003050	-0.000 0.038	
504	12'-9½		46.18	2½	(See Notes)	41'-7½	120	8.900	Flow (q) from Route 2 3E(8'-3), PO(16'-5½)
300	11'-5		75.89	2.6350		41'-2 82'-9½	0.017289	0.600 1.432	
300	11'-5		20.34	6	(See Notes)	60'-4½	120	10.932	Flow (q) from Route 7 E(17'-7)
200	11'-5		96.23	6.3570		17'-7 78'-0	0.000368	0.029	
200	11'-5		118.70	6	(See Notes)	30'-1	120	10.961	Flow (q) from Route 3
8	2'-6½		214.93	6.3570		125'-4½ 155'-5½	0.001628	3.849 3.253	3E(17'-7), f(-0.000), f(-3.000), CV(17'-2½), BV(17'-7), PO(37'-8½)
8	2'-6½			6	(See Notes)	21'-0½	120	18.063	
7	-8'-9½		214.93	6.3570		17'-7 38'-7½	0.001628	4.915 0.063	E(17'-7)
7	-8'-9½			6	(See Notes)	86'-3½	140	23.041	
6	-15'-0		214.93	6.3400		69'-4 155'-7½	0.001240	2.688 0.193	3E(23'-1½)
6	-15'-0			6	(See Notes)	4'-1½	140	25.922	
3	-15'-0		214.93	6.3400		4'-1½	0.001240	1.629	BFP(-1.810)
3	-15'-0			6	(See Notes)	11'-2½	140	27.551	
2	-15'-0		214.93	6.3400		11'-2½	0.001240	2.014	PIV(-2.000)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes (Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.)
2	-15'-0			6	(See Notes)	21'-7	140	29.565	
						34'-8	0.001240		
1	-15'-0		214.93	6.3400		56'-3		0.070	E(23'-1½), EE(11'-6½), S
			100.00					29.635	Hose Allowance At Source
1			314.93						Total(Pt) Route 1
5610	12'-9½	5.6	14.93	1½	(See Notes)	10'-7½	120	7.111	• • • • • **Route 2** • • • • • Sprinkler
							0.007605		
5608	12'-9½		14.93	1.6820		10'-7½		0.081	
5608	12'-9½	5.6	15.02	1½	(See Notes)	12'-6	120	7.192	Sprinkler,
						4'-11½	0.027559		
503	12'-9½		29.95	1.6820		17'-5		0.481	E(4'-11½)
503	12'-9½		16.23	1½	(See Notes)	10'-1	120	7.673	Flow (q) from Route 6
						9'-11	0.061391		
504	12'-9½		46.18	1.6820		20'-0		1.228	PO(9'-11)
								8.900	Total(Pt) Route 2
5609	13'-2½	5.6	15.29	1½	(See Notes)	8'-4½	120	7.455	• • • • • **Route 3** • • • • • Sprinkler
							0.007944		
5606	13'-2½		15.29	1.6820		8'-4½		0.067	
5606	13'-2½	5.6	15.36	1½	(See Notes)	9'-6	120	7.521	Sprinkler
							0.028755		
5604	13'-2½		30.65	1.6820		9'-6		0.273	
5604	13'-2½	5.6	15.63	1½	(See Notes)	6'-2½	120	7.795	Sprinkler,
						14'-10	0.061645	0.690	
502	11'-7		46.28	1.6820		21'-1		1.299	E(4'-11½), PO(9'-11)
502	11'-7			3		9'-0	120	9.784	
							0.000842	0.004	
501	11'-7		25.94	3.2600		9'-0		0.008	
501	11'-7		46.30	3		10'-7½	120	9.795	Flow (q) from Route 4
							0.005598	-0.004	
500	11'-7		72.24	3.2600		10'-7½		0.060	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
500	11'-7		46.46	3	(See Notes)	35'-9½	120	9.850	Flow (q) from Route 5
						37'-7½	0.014028	0.081	
200	11'-5		118.70	3.2600		73'-5		1.030	2Ee1(4'-0½), E(9'-5), PO(20'-2)
								10.961	Total(Pt) Route 3
5607	13'-2½	5.6	15.30	1½	(See Notes)	8'-4½	120	7.461	• • • • • **Route 4** • • • • • Sprinkler
							0.007950		
5605	13'-2½		15.30	1.6820		8'-4½		0.067	
5605	13'-2½	5.6	15.36	1½	(See Notes)	9'-6	120	7.528	Sprinkler
							0.028778		
5602	13'-2½		30.66	1.6820		9'-6		0.274	
5602	13'-2½	5.6	15.64	1½	(See Notes)	6'-2½	120	7.801	Sprinkler,
						14'-10	0.061693	0.693	
501	11'-7		46.30	1.6820		21'-1		1.300	E(4'-11½), PO(9'-11)
								9.795	Total(Pt) Route 4
5603	13'-2½	5.6	15.35	1½	(See Notes)	8'-4½	120	7.511	• • • • • **Route 5** • • • • • Sprinkler
							0.007999		
5601	13'-2½		15.35	1.6820		8'-4½		0.067	
5601	13'-2½	5.6	15.42	1½	(See Notes)	9'-6	120	7.578	Sprinkler
							0.028956		
5600	13'-2½		30.76	1.6820		9'-6		0.275	
5600	13'-2½	5.6	15.69	1½	(See Notes)	6'-2½	120	7.853	Sprinkler,
						14'-10	0.062075	0.690	
500	11'-7		46.46	1.6820		21'-0½		1.307	E(4'-11½), PO(9'-11)
								9.850	Total(Pt) Route 5
5611	10'-0	5.6	16.23	1	(See Notes)	0'-6½	120	8.397	• • • • • **Route 6** • • • • • Sprinkler,
						5'-0	0.088397	-1.214	
503	12'-9½		16.23	1.0490		5'-6½		0.490	PO(5'-0), fd
								7.673	Total(Pt) Route 6
203	13'-2			2	(See Notes)	24'-8½	120	9.618	• • • • • **Route 7** • • • • •
						18'-5½	0.004012	-0.000	
202	13'-2		20.34	2.1570		43'-2		0.173	3E(6'-2)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
202	13'-2			2½	(See Notes)	128'-2½	120	9.791	
204	11'-5		20.34	2.6350		127'-8	0.001514	0.752	
						255'-10½		0.387	4PO(16'-5½), 5E(8'-3), T(16'-5½), EE(4'-1½)
204	11'-5			6		75'-5½	120	10.931	
300	11'-5		20.34	6.3570			0.000021	0.000	
						75'-5½		0.002	
								10.932	Total(Pt) Route 7
502	11'-7		25.94	3	(See Notes)	26'-2½	120	9.784	**• • • • • Route 8 • • • • •** Flow (q) from Route 3
201	12'-2		20.34	3.2600		32'-3	0.000537	-0.245	
						58'-5½		0.031	EE(4'-0½), 3E(9'-5)
201	12'-2			2½	(See Notes)	173'-9½	120	9.570	
203	13'-2		20.34	2.6350		140'-0½	0.001514	-0.427	
						313'-10		0.475	11E(8'-3), 3PO(16'-5½)
								9.618	Total(Pt) Route 8

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

(Actual Inside Diameter / Schedule 40 Steel Pipe Inside Diameter) 4.87 = Factor

C Value Multiplier

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

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 Relief Valve
PRV	Pressure Reducing Valve	red	Reducer/Adapter	S	Supply
sCV	Swing Check Valve	SFx	Seismic Flex	Spr	Sprinkler
St	Strainer	T	Tee Flow Turn 90°	Tr	Tee Run
U	Union	WirF	Wirsbo	WMV	Water Meter Valve
Z	Cap				

Hydraulic Calculations

for

Project Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING
Location: 1601 39th AVE SE, Puyallup, WA 98374,
Drawing Name: 22-3688 PeirceSTEM-L22-R041-Plans Calculation Date: 5/15/2023

Design

Remote Area Number:	6
Remote Area Location:	General Bioogy Lab
Occupancy Classification:	Ordinary Group II
Commodity Classification:	N/A
Density	0.20gpm/ft²
Area of Application:	1500ft² (Actual 960ft²)
Coverage per Sprinkler:	110ft²
Type of sprinklers calculated:	Pendent
No. of sprinklers calculated:	9
No. of nozzles calculated:	0

In-rack Demand: N/A gpm at Node: N/A
Hose Streams: 250.00 at Node: 1 Type: Allowance at Source

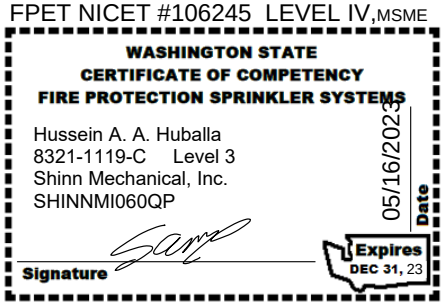
Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 1: 501.26 @ 45.628 (Safety Margin = 14.807)
Type of System: Wet
Volume of Dry/PreAction/Antifreeze/OtherAgent N/A

Name of Contractor: SHINN FIRE PROTECTION
Address: 18802 80TH AVE S, KENT WA98032
Phone Number: 425-204-3945
Name of designer: Ben Bernard
Authority Having Jurisdiction: CITY OF PUYALLUP

Notes:

Automatic peaking results Left: N/A Right: N/A

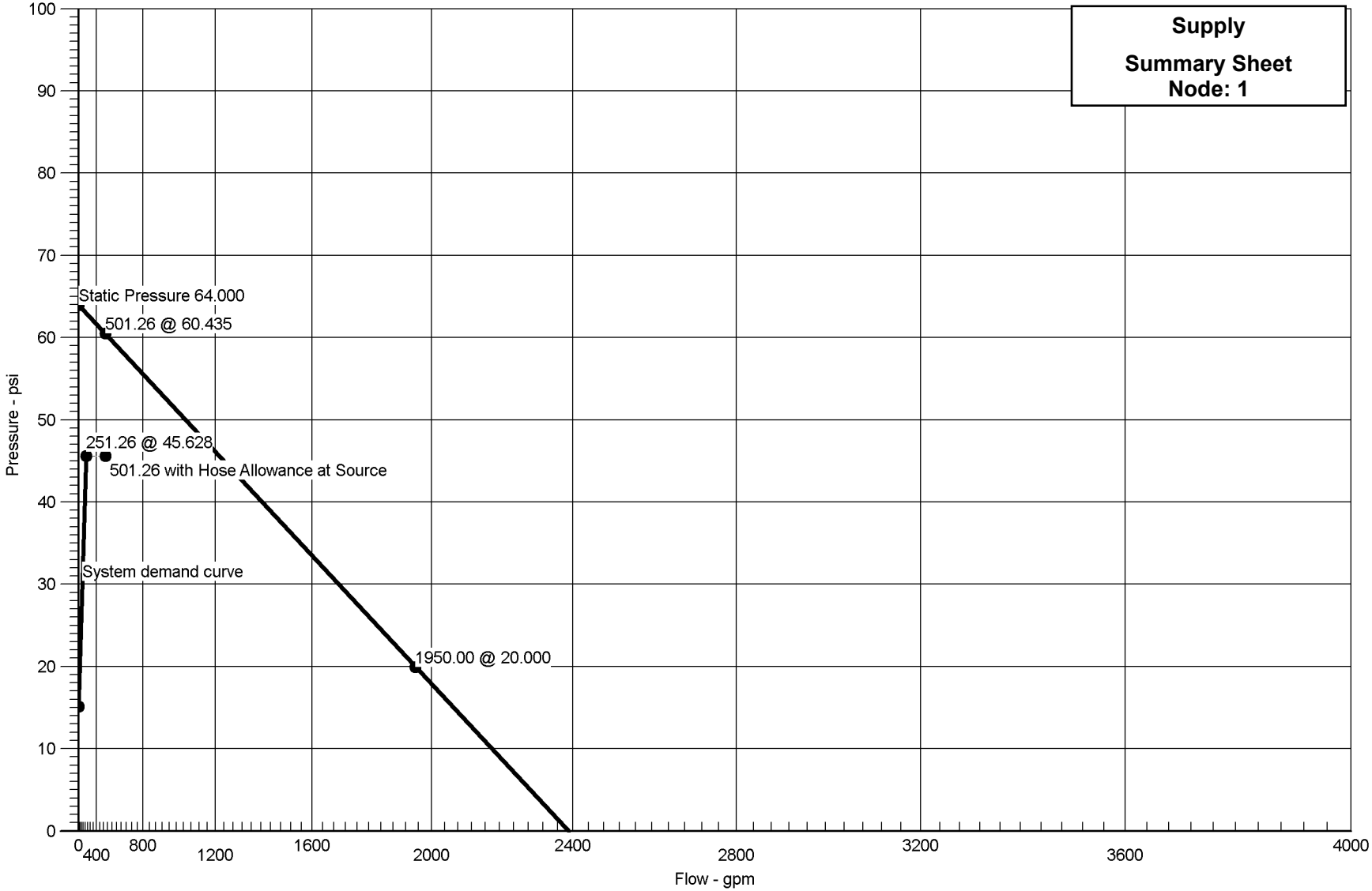
FPET NICET #106245 LEVEL IV,MSME



Hydraulic Graph

Job Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING **N** 1.85
Remote Area Number: 6

Date: 5/15/2023



Summary Of Outflowing Devices

Job Number: 22-3688
Report Description: Ordinary Group II (6)

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	6400	29.98	26.00	8	14.041		
Sprinkler	6401	26.11	26.00	8	10.649		
Sprinkler	6402	26.32	26.00	8	10.825		
Sprinkler	6403	27.17	26.00	8	11.536		
Sprinkler	6404	31.26	26.00	8	15.273		
Sprinkler	**6405**	**26.00**	**26.00**	**8**	**10.563**		
Sprinkler	6406	26.21	26.00	8	10.737		
Sprinkler	6407	27.06	26.00	8	11.443		
Sprinkler	6408	31.14	26.00	8	15.152		

Most Demanding Sprinkler Data

Supply Analysis

Node	Name	Static (psi)	Residual (psi) @ Flow (gpm)		Available (psi) @ Total Demand (gpm)		Required Pressure (psi)
1	Water Supply	64.000	20.000	1950.00	60.435	501.26	45.628

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
1	-10'-4	Supply	45.628	251.26	
6400	24'-8	Sprinkler	14.041	29.98	
6401	24'-8	Sprinkler	10.649	26.11	
6402	24'-8	Sprinkler	10.825	26.32	
6403	24'-8	Sprinkler	11.536	27.17	
6404	24'-0	Sprinkler	15.273	31.26	
6405	24'-8	Sprinkler	10.563	26.00	
6406	24'-8	Sprinkler	10.737	26.21	
6407	24'-8	Sprinkler	11.443	27.06	
6408	24'-0	Sprinkler	15.152	31.14	
2	-10'-4		45.535		
3	-10'-4		43.516		
6	-10'-4		41.827		
7	-4'-1½		38.882		
8	7'-2½		33.883		
600	26'-6		22.016		
601	26'-6		20.265		
602	26'-6		16.299		
603	26'-6		14.622		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
604	26'-6		15.072		
605	26'-6		10.920		
606	26'-6		11.112		
607	26'-6		11.888		
608	26'-6		14.628		
609	26'-6		14.189		
610	26'-6		10.825		
611	26'-6		11.016		
612	26'-6		11.786		
613	26'-6		14.505		
614	26'-6		14.069		

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
6405	24'-8	8	26.00	1	(See Notes)	0'-0	120	10.563	• • • • • **Route 1** • • • • •
						5'-0	0.211435	-0.795	Sprinkler,
610	26'-6		26.00	1.0490		5'-0		1.057	PO(5'-0), fd
610	26'-6			1½		9'-0	120	10.825	
							0.021212		
611	26'-6		26.00	1.6820		9'-0		0.191	
611	26'-6		26.21	1½		10'-0	120	11.016	Flow (q) from Route 3
							0.077053		
612	26'-6		52.21	1.6820		10'-0		0.771	
612	26'-6		27.06	1½	(See Notes)	6'-5	120	11.786	Flow (q) from Route 5
						9'-11	0.166836		
613	26'-6		79.28	1.6820		16'-3½		2.719	PO(9'-11)
613	26'-6		31.14	3		10'-0	120	14.505	Flow (q) from Route 8
							0.012272		
608	26'-6		110.42	3.2600		10'-0		0.123	
608	26'-6		79.60 + 31.26	3		10'-0	120	14.628	Flow (q) from Route 2 and 9
							0.044405		
604	26'-6		221.28	3.2600		10'-0		0.444	
604	26'-6		29.98	3		21'-10	120	15.072	Flow (q) from Route 7
							0.056170		
602	26'-6		251.26	3.2600		21'-10		1.227	
602	26'-6			3		117'-9½	120	16.299	
							0.033672		
601	26'-6		190.54	3.2600		117'-9½		3.967	
601	26'-6		60.72	3	(See Notes)	11'-0	120	20.265	Flow (q) from Route 10
						20'-2	0.056170		
600	26'-6		251.26	3.2600		31'-2		1.751	PO(20'-2)
600	26'-6			6	(See Notes)	70'-4½	120	22.016	
						160'-6½	0.002173	8.365	
8	7'-2½		251.26	6.3570		230'-11½		3.502	5E(17'-7), f(-0.000), f(-3.000), CV(17'-2½), BV(17'-7), PO(37'-8½)
8	7'-2½			6	(See Notes)	21'-0½	120	33.883	
						17'-7	0.002173	4.915	
7	-4'-1½		251.26	6.3570		38'-7½		0.084	E(17'-7)

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes (Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.)
7	-4'-1½			6	(See Notes)	86'-3½	140	38.882	
6	-10'-4		251.26	6.3400		69'-4 155'-7½	0.001655	2.688 0.258	3E(23'-1½)
6	-10'-4			6	(See Notes)	4'-1½	140	41.827	
3	-10'-4		251.26	6.3400		 4'-1½	0.001655	 1.689	BFP(-1.654)
3	-10'-4			6	(See Notes)	11'-2½	140	43.516	
2	-10'-4		251.26	6.3400		 11'-2½	0.001655	 2.019	PIV(-2.000)
2	-10'-4			6	(See Notes)	21'-7	140	45.535	
1	-10'-4		251.26	6.3400		34'-8 56'-3	0.001655	 0.093	E(23'-1½), EE(11'-6½), S
			250.00					45.628	Hose Allowance At Source
1			501.26						Total(Pt) Route 1
6401	24'-8	8	26.11	1	(See Notes)	0'-0	120	10.649	**• • • • • Route 2 • • • • •** Sprinkler,
605	26'-6		26.11	1.0490		5'-0 5'-0	0.213041	-0.795 1.065	PO(5'-0), fd
605	26'-6			1½		9'-0	120	10.920	
606	26'-6		26.11	1.6820		 9'-0	0.021373	 0.192	
606	26'-6		26.32	1½		10'-0	120	11.112	Flow (q) from Route 4
607	26'-6		52.43	1.6820		 10'-0	0.077638	 0.776	
607	26'-6		27.17	1½	(See Notes)	6'-5	120	11.888	Flow (q) from Route 6
608	26'-6		79.60	1.6820		9'-11 16'-3½	0.168101	 2.739	PO(9'-11)
								14.628	Total(Pt) Route 2
6406	24'-8	8	26.21	1	(See Notes)	0'-0	120	10.737	**• • • • • Route 3 • • • • •** Sprinkler,
611	26'-6		26.21	1.0490		5'-0 5'-0	0.214669	-0.795 1.073	PO(5'-0), fd
								11.016	Total(Pt) Route 3

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
6402	24'-8	8	26.32	1	(See Notes)	0'-0	120	10.825	• • • • • **Route 4** • • • • •
						5'-0	0.216298	-0.795	Sprinkler,
606	26'-6		26.32	1.0490		5'-0		1.081	PO(5'-0), fd
								11.112	Total(Pt) Route 4
6407	24'-8	8	27.06	1	(See Notes)	0'-0	120	11.443	• • • • • **Route 5** • • • • •
						5'-0	0.227684	-0.795	Sprinkler,
612	26'-6		27.06	1.0490		5'-0		1.138	PO(5'-0), fd
								11.786	Total(Pt) Route 5
6403	24'-8	8	27.17	1	(See Notes)	0'-0	120	11.536	• • • • • **Route 6** • • • • •
						5'-0	0.229404	-0.795	Sprinkler,
607	26'-6		27.17	1.0490		5'-0		1.147	PO(5'-0), fd
								11.888	Total(Pt) Route 6
6400	24'-8	8	29.98	1	(See Notes)	0'-0	120	14.041	• • • • • **Route 7** • • • • •
						5'-0	0.275133	-0.795	Sprinkler,
603	26'-6		29.98	1.0490		5'-0		1.376	PO(5'-0), fd
603	26'-6			1½	(See Notes)	6'-5	120	14.622	
						9'-11	0.027602		
604	26'-6		29.98	1.6820		16'-3½		0.450	PO(9'-11)
								15.072	Total(Pt) Route 7
6408	24'-0	8	31.14	1	(See Notes)	0'-0	120	15.152	• • • • • **Route 8** • • • • •
							0.295216	-1.084	Sprinkler,
614	26'-6		31.14	1.0490		0'-0		0.000	, fd
614	26'-6			1½	(See Notes)	3'-11	120	14.069	
						8'-0	0.036650		
613	26'-6		31.14	1.6100		11'-11		0.436	PO(8'-0)
								14.505	Total(Pt) Route 8
6404	24'-0	8	31.26	1	(See Notes)	0'-0	120	15.273	• • • • • **Route 9** • • • • •
							0.297387	-1.084	Sprinkler,
609	26'-6		31.26	1.0490		0'-0		0.000	, fd
609	26'-6			1½	(See Notes)	3'-10½	120	14.189	
						8'-0	0.036920		
608	26'-6		31.26	1.6100		11'-10½		0.439	PO(8'-0)
								14.628	Total(Pt) Route 9

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
602	26'-6			2½	(See Notes)	231'-3½	120	16.299	• • • • • **Route 10** • • • • •
						115'-4	0.011444	-0.000	PO(16'-5½)
601	26'-6		60.72	2.6350		346'-7½		3.967	6E(8'-3), 2T(16'-5½), PO(16'-5½)
								20.265	Total(Pt) Route 10

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

(Actual Inside Diameter / Schedule 40 Steel Pipe Inside Diameter) 4.87 = Factor

C Value Multiplier

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

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 Relief Valve
PRV	Pressure Reducing Valve	red	Reducer/Adapter	S	Supply
sCV	Swing Check Valve	SFx	Seismic Flex	Spr	Sprinkler
St	Strainer	T	Tee Flow Turn 90°	Tr	Tee Run
U	Union	WirF	Wirsbo	WMV	Water Meter Valve
Z	Cap				

Hydraulic Calculations

for

Project Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING
Location: 1601 39th AVE SE, Puyallup, WA 98374,
Drawing Name: 22-3688 PeirceSTEM-L22-R041-Plans Calculation Date: 5/15/2023

Design

Remote Area Number:	7
Remote Area Location:	Classroom 201/202
Occupancy Classification:	Light Hazard
Commodity Classification:	N/A
Density	0.10gpm/ft²
Area of Application:	1500ft² (Actual 1032ft²)
Coverage per Sprinkler:	196ft²
Type of sprinklers calculated:	Upright
No. of sprinklers calculated:	10
No. of nozzles calculated:	0

In-rack Demand: N/A gpm at Node: N/A
Hose Streams: 100.00 at Node: 1 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 1: 310.62 @ 51.897 (Safety Margin = 10.632)
Type of System: wet
Volume of Dry/PreAction/Antifreeze/OtherAgent N/A

Name of Contractor: SHINN FIRE PROTECTION
Address: 18802 80TH AVE S, KENT WA98032
Phone Number: 425-204-3945
Name of designer: Ben Bernard
Authority Having Jurisdiction: CITY OF PUYALLUP

Notes:

Automatic peaking results Left: 51.897 Right: 51.897

FPET NICET #106245 LEVEL IV,MSME

WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE PROTECTION SPRINKLER SYSTEMS

Hussein A. A. Huballa
8321-1119-C Level 3
Shinn Mechanical, Inc.
SHINNMI060QP

Signature

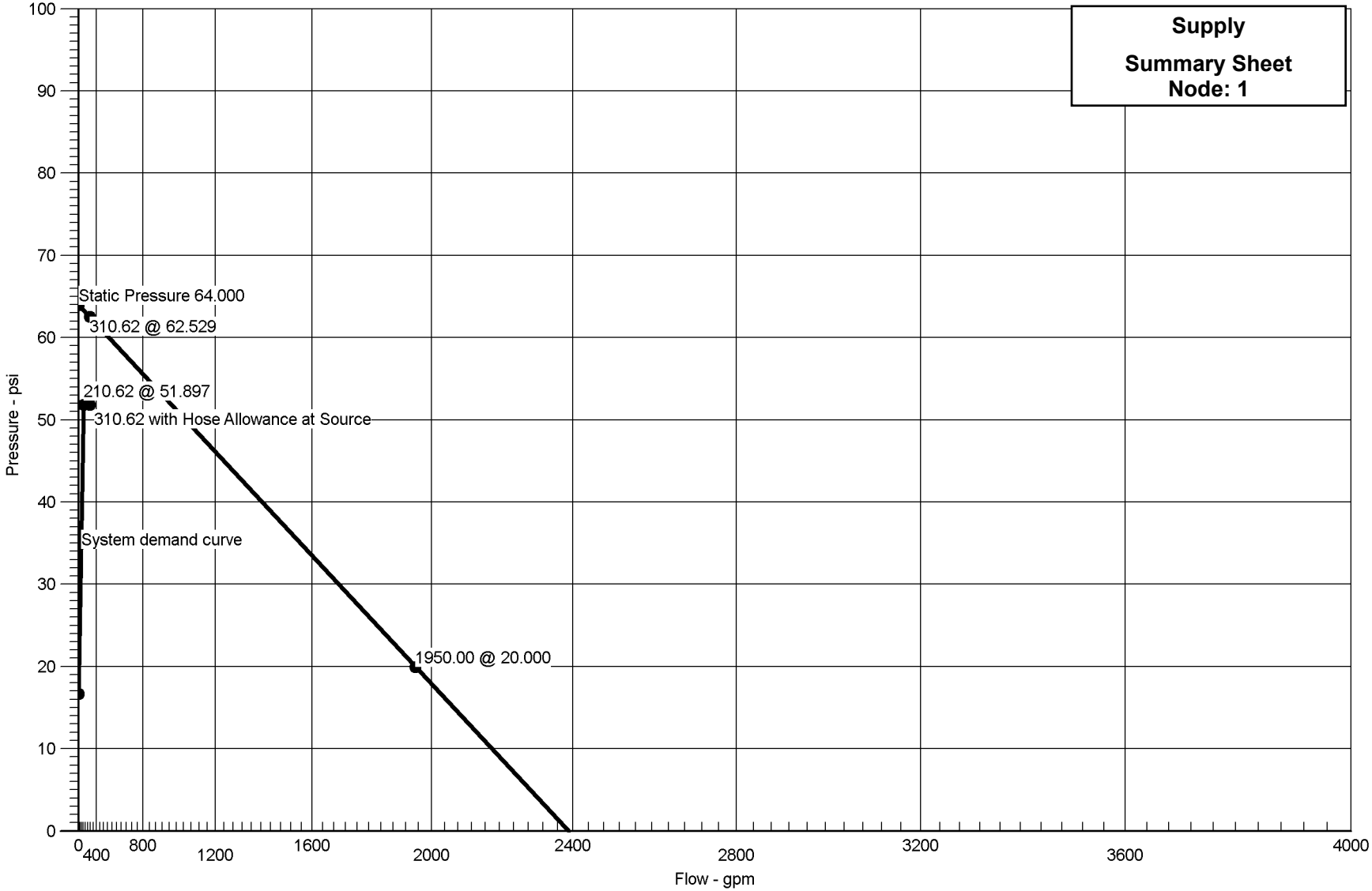
05/16/2023
Date

Expires
DEC 31, 23

Hydraulic Graph

Job Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING **N** 1.85
Remote Area Number: 7

Date: 5/15/2023



Summary Of Outflowing Devices

Job Number: 22-3688
Report Description: Light Hazard (7)

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	7000	22.19	19.60	5.6	15.697		
Sprinkler	7001	22.09	19.60	5.6	15.564		
Sprinkler	7002	22.12	19.60	5.6	15.604		
Sprinkler	7003	21.50	19.60	5.6	14.737		
Sprinkler	7004	21.41	19.60	5.6	14.611		
Sprinkler	7005	20.06	19.60	5.6	12.834		
Sprinkler	7006	19.94	19.60	5.6	12.674		
Sprinkler	7007	21.85	19.60	5.6	15.222		
Sprinkler	7008	19.87	19.60	5.6	12.584		
Sprinkler	**7009**	**19.60**	**19.60**	**5.6**	**12.250**		

Most Demanding Sprinkler Data

Supply Analysis

Node	Name	Static (psi)	Residual (psi) @ Flow (gpm)		Available (psi) @ Total Demand (gpm)		Required Pressure (psi)
1	Water Supply	64.000	20.000	1950.00	62.529	310.62	51.897

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
1	-10'-4	Supply	51.897	210.62	
7000	28'-3	Sprinkler	15.697	22.19	
7001	28'-3	Sprinkler	15.564	22.09	
7002	28'-3	Sprinkler	15.604	22.12	
7003	28'-3	Sprinkler	14.737	21.50	
7004	28'-3	Sprinkler	14.611	21.41	
7005	28'-2½	Sprinkler	12.834	20.06	
7006	28'-2½	Sprinkler	12.674	19.94	
7007	28'-2½	Sprinkler	15.222	21.85	
7008	28'-3	Sprinkler	12.584	19.87	
7009	28'-3	Sprinkler	12.250	19.60	
2	-10'-4		51.830		
3	-10'-4		49.817		
6	-10'-4		48.194		
7	-4'-1½		45.321		
8	7'-2½		40.345		
600	26'-6		28.618		
601	26'-6		27.354		
602	26'-6		26.210		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
700	26'-6		21.292		
701	26'-6		17.507		
702	26'-6		18.417		
704	26'-6		17.366		
705	26'-6		17.345		
706	26'-6		16.487		
707	26'-6		16.354		
708	26'-6		16.938		
709	26'-6		14.464		
710	26'-6		14.760		
711	26'-6		16.941		
712	26'-6		14.295		
713	26'-6		14.391		
714	26'-6		16.543		

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
7009	28'-3	5.6	19.60	1	(See Notes)	4'-1	120	12.250	• • • • • **Route 1** • • • • •
713	26'-6		19.60	1.0490		7'-0 11'-1	0.125357	0.750 1.391	Sprinkler, E(2'-0), PO(5'-0)
713	26'-6		19.94	1½		1'-7	120	14.391	Flow (q) from Route 3
709	26'-6		39.54	1.6820		1'-7	0.046061	0.074	
709	26'-6		20.06	1½		3'-0	120	14.464	Flow (q) from Route 4
710	26'-6		59.60	1.6820		3'-0	0.098416	0.295	
710	26'-6		19.87	1½	(See Notes)	3'-1½	120	14.760	Flow (q) from Route 2
711	26'-6		79.46	1.6820		9'-11 13'-0	0.167568	2.182	PO(9'-11)
711	26'-6		21.85	2½		13'-8½	120	16.941	Flow (q) from Route 7
705	26'-6		101.31	2.6350		13'-8½	0.029507	0.404	
705	26'-6		42.90 + 22.12	2½		14'-6	120	17.345	Flow (q) from Route 5 and 9
702	26'-6		166.34	2.6350		14'-6	0.073838	1.072	
702	26'-6		44.28	2½		25'-2	120	18.417	Flow (q) from Route 8
700	26'-6		210.62	2.6350		25'-2	0.114264	2.874	
700	26'-6			2½	(See Notes)	117'-8½	120	21.292	
601	26'-6		113.28	2.6350		49'-5 167'-1½	0.036279	0.000 6.063	T(16'-5½), 2E(8'-3), PO(16'-5½)
601	26'-6		97.33	3	(See Notes)	11'-0	120	27.354	Flow (q) from Route 11
600	26'-6		210.62	3.2600		20'-2 31'-2	0.040527	1.263	PO(20'-2)
600	26'-6			6	(See Notes)	70'-4½	120	28.618	
8	7'-2½		210.62	6.3570		160'-6½ 230'-11½	0.001568	8.365 3.362	5E(17'-7), f(-0.000), f(-3.000), CV(17'-2½), BV(17'-7), PO(37'-8½)
8	7'-2½			6	(See Notes)	21'-0½	120	40.345	
7	-4'-1½		210.62	6.3570		17'-7 38'-7½	0.001568	4.915 0.061	E(17'-7)

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes (Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.)
7	-4'-1½			6	(See Notes)	86'-3½	140	45.321	
6	-10'-4		210.62	6.3400		69'-4 155'-7½	0.001194	2.688 0.186	3E(23'-1½)
6	-10'-4			6	(See Notes)	4'-1½	140	48.194	
3	-10'-4		210.62	6.3400		 4'-1½	0.001194	 1.622	BFP(-1.654)
3	-10'-4			6	(See Notes)	11'-2½	140	49.817	
2	-10'-4		210.62	6.3400		 11'-2½	0.001194	 2.013	PIV(-2.000)
2	-10'-4			6	(See Notes)	21'-7	140	51.830	
1	-10'-4		210.62	6.3400		34'-8 56'-3	0.001194	 0.067	E(23'-1½), EE(11'-6½), S
			100.00					51.897	Hose Allowance At Source
1			310.62						Total(Pt) Route 1
7008	28'-3	5.6	19.87	1	(See Notes)	4'-1	120	12.584	• • • • • **Route 2** • • • • • Sprinkler,
710	26'-6		19.87	1.0490		7'-0 11'-1	0.128515	0.750 1.426	E(2'-0), PO(5'-0)
								14.760	Total(Pt) Route 2
7006	28'-2½	5.6	19.94	1	(See Notes)	1'-9	120	12.674	• • • • • **Route 3** • • • • • Sprinkler,
712	26'-6		19.94	1.0490		5'-0 6'-9	0.129369	0.750 0.871	PO(5'-0)
712	26'-6			1½		7'-5	120	14.295	
713	26'-6		19.94	1.6820		 7'-5	0.012979	 0.096	
								14.391	Total(Pt) Route 3
7005	28'-2½	5.6	20.06	1	(See Notes)	1'-9	120	12.834	• • • • • **Route 4** • • • • • Sprinkler,
709	26'-6		20.06	1.0490		5'-0 6'-9	0.130875	0.750 0.881	PO(5'-0)
								14.464	Total(Pt) Route 4
7004	28'-3	5.6	21.41	1	(See Notes)	1'-9	120	14.611	• • • • • **Route 5** • • • • • Sprinkler,
707	26'-6		21.41	1.0490		5'-0 6'-9	0.147558	0.750 0.993	PO(5'-0)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
707	26'-6			1½		9'-0	120	16.354	
706	26'-6		21.41	1.6820		9'-0	0.014804	0.133	
706	26'-6		21.50	1½	(See Notes)	6'-1½	120	16.487	Flow (q) from Route 6
705	26'-6		42.90	1.6820		16'-0	0.053578	0.858	PO(9'-11)
								17.345	Total(Pt) Route 5
7003	28'-3	5.6	21.50	1	(See Notes)	1'-9	120	14.737	• • • • • **Route 6** • • • • • Sprinkler,
706	26'-6		21.50	1.0490		6'-9	0.148728	1.001	PO(5'-0)
								16.487	Total(Pt) Route 6
7007	28'-2½	5.6	21.85	1	(See Notes)	1'-9	120	15.222	• • • • • **Route 7** • • • • • Sprinkler,
714	26'-6		21.85	1.0490		3'-9	0.153253	0.572	E(2'-0)
714	26'-6			1¼	(See Notes)	3'-10½	120	16.543	
711	26'-6		21.85	1.3800		9'-10½	0.040306	0.398	PO(6'-0)
								16.941	Total(Pt) Route 7
7001	28'-3	5.6	22.09	1	(See Notes)	1'-9	120	15.564	• • • • • **Route 8** • • • • • Sprinkler,
704	26'-6		22.09	1.0490		6'-9	0.156435	1.053	PO(5'-0)
704	26'-6			1½		9'-0	120	17.366	
701	26'-6		22.09	1.6820		9'-0	0.015694	0.141	
701	26'-6		22.19	1½	(See Notes)	6'-1½	120	17.507	Flow (q) from Route 10
702	26'-6		44.28	1.6820		16'-0	0.056801	0.910	PO(9'-11)
								18.417	Total(Pt) Route 8
7002	28'-3	5.6	22.12	1	(See Notes)	1'-9	120	15.604	• • • • • **Route 9** • • • • • Sprinkler,
708	26'-6		22.12	1.0490		3'-9	0.156804	0.585	E(2'-0)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
708	26'-6			1¼	(See Notes)	3'-10½	120	16.938	
						6'-0	0.041240	0.000	PO(6'-0)
705	26'-6		22.12	1.3800		9'-10½		0.407	
								17.345	Total(Pt) Route 9
7000	28'-3	5.6	22.19	1	(See Notes)	1'-9	120	15.697	• • • • • **Route 10** • • • • • Sprinkler,
						5'-0	0.157670	0.750	PO(5'-0)
701	26'-6		22.19	1.0490		6'-9		1.061	
								17.507	Total(Pt) Route 10
700	26'-6			2½	(See Notes)	113'-7	120	21.292	• • • • • **Route 11** • • • • • T(16'-5½)
						65'-11	0.027399	0.000	4E(8'-3), PO(16'-5½)
602	26'-6		97.33	2.6350		179'-6		4.918	
602	26'-6			3		117'-9½	120	26.210	
							0.009718		
601	26'-6		97.33	3.2600		117'-9½		1.145	
								27.354	Total(Pt) Route 11

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

(Actual Inside Diameter / Schedule 40 Steel Pipe Inside Diameter) 4.87 = Factor

C Value Multiplier

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

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 Relief Valve
PRV	Pressure Reducing Valve	red	Reducer/Adapter	S	Supply
sCV	Swing Check Valve	SFx	Seismic Flex	Spr	Sprinkler
St	Strainer	T	Tee Flow Turn 90°	Tr	Tee Run
U	Union	WirF	Wirsbo	WMV	Water Meter Valve
Z	Cap				

Hydraulic Calculations

for

Project Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING
Location: 1601 39th AVE SE, Puyallup, WA 98374,
Drawing Name: 22-3688 PeirceSTEM-L22-R041-Plans Calculation Date: 5/15/2023

Design

Remote Area Number:	8
Remote Area Location:	E Over hang
Occupancy Classification:	Light Hazard
Commodity Classification:	N/A
Density	0.10gpm/ft²
Area of Application:	1500ft² (Actual 1091ft²)
Coverage per Sprinkler:	130ft²
Type of sprinklers calculated:	Pendent
No. of sprinklers calculated:	8
No. of nozzles calculated:	0

In-rack Demand: N/A gpm at Node: N/A
Hose Streams: 100.00 at Node: 1 Type: Allowance at Source

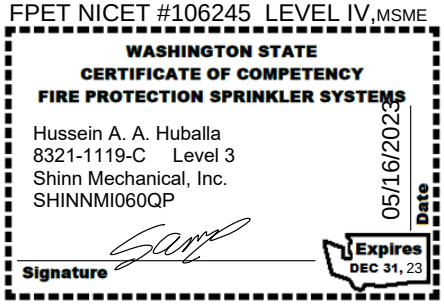
Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 1: 222.56 @ 36.530 (Safety Margin = 26.676)
Type of System: Dry
Volume of Dry/PreAction/Antifreeze/OtherAgent N/A

Name of Contractor: SHINN FIRE PROTECTION
Address: 18802 80TH AVE S, KENT WA98032
Phone Number: 425-204-3945
Name of designer: Ben Bernard
Authority Having Jurisdiction: CITY OF PUYALLUP

Notes:

Automatic peaking results Left: N/A Right: N/A

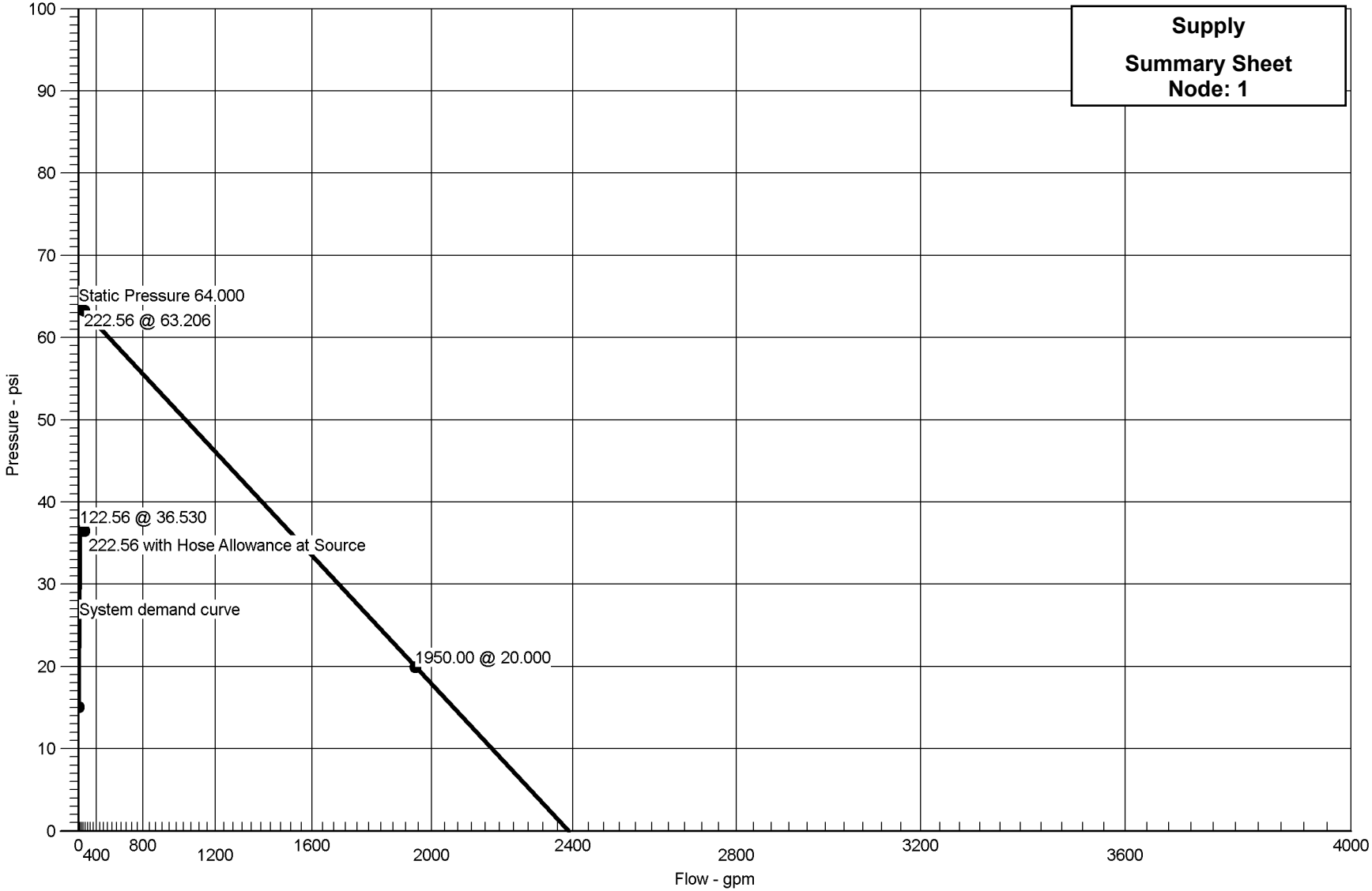
FPET NICET #106245 LEVEL IV,MSME



Hydraulic Graph

Job Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING **N** 1.85
Remote Area Number: 8

Date: 5/15/2023



Summary Of Outflowing Devices

Job Number: 22-3688
Report Description: Light Hazard (8)

Device	Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler 8400	15.90	13.00	5.6	8.066		
Sprinkler 8401	16.06	13.00	5.6	8.225		
Sprinkler 8402	15.48	13.00	5.6	7.640		
Sprinkler 8403	15.33	13.00	5.6	7.497		
Sprinkler 8404	14.92	13.00	5.6	7.102		
Sprinkler 8405	15.07	13.00	5.6	7.245		
Sprinkler 8406	**14.82**	**13.00**	**5.6**	**7.000**		
Sprinkler 8407	14.97	13.00	5.6	7.142		

⇨ Most Demanding Sprinkler Data

Supply Analysis

Node	Name	Static (psi)	Residual (psi) @ Flow (gpm)		Available (psi) @ Total Demand (gpm)		Required Pressure (psi)
1	Water Supply	64.000	20.000	1950.00	63.206	222.56	36.530

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
1	-10'-4	Supply	36.530	122.56	
8400	24'-6	Sprinkler	8.066	15.90	
8401	24'-4	Sprinkler	8.225	16.06	
8402	24'-4	Sprinkler	7.640	15.48	
8403	24'-5	Sprinkler	7.497	15.33	
8404	24'-4	Sprinkler	7.102	14.92	
8405	24'-4	Sprinkler	7.245	15.07	
8406	24'-4	Sprinkler	7.000	14.82	
8407	24'-4	Sprinkler	7.142	14.97	
2	-10'-4		36.506		
3	-10'-4		34.501		
6	-10'-4		32.988		
7	-4'-1½		30.232		
8	7'-2½		25.294		
800	26'-9		10.545		
801	16'-2½		15.459		
802	26'-9		9.551		
803	26'-9		9.383		
804	26'-9		8.166		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
805	25'-4		7.913		
806	26'-9		7.997		
807	25'-6		7.751		
808	25'-4		7.320		
809	25'-5		7.175		
810	26'-9		7.516		
811	26'-9		7.344		
812	26'-9		6.880		
813	25'-4		6.920		
814	25'-4		6.774		
815	26'-9		7.039		
816	26'-9		6.768		
817	25'-4		6.815		
818	25'-4		6.671		
819	26'-9		6.924		

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
8406	24'-4	5.6	14.82	1	(See Notes)	1'-0	100	7.000	• • • • • **Route 1** • • • • • Sprinkler
818	25'-4		14.82	1.0490		1'-0	0.104671	-0.434 0.105	
818	25'-4			1	(See Notes)	2'-5	120	6.671	
816	26'-9		14.82	1.0490		7'-0 9'-5	0.074703	-0.606 0.702	E(2'-0), PO(5'-0)
816	26'-9			1½		15'-0	120	6.768	
812	26'-9		14.82	1.6820		15'-0	0.007495	0.112	
812	26'-9		14.92	1½	(See Notes)	13'-6	120	6.880	Flow (q) from Route 2
810	26'-9		29.74	1.6820		9'-11 23'-5	0.027199	0.636	2E(4'-11½)
810	26'-9		15.48	1½		11'-0	120	7.516	Flow (q) from Route 6
804	26'-9		45.22	1.6820		11'-0	0.059050	0.650	
804	26'-9		16.06	1½	(See Notes)	3'-5½	120	8.166	Flow (q) from Route 8
802	26'-9		61.28	1.6820		9'-11 13'-4½	0.103612	1.385	PO(9'-11)
802	26'-9		61.28	2½	(See Notes)	7'-2½	120	9.551	Flow (q) from Route 3
800	26'-9		122.56	2.6350		16'-5½ 23'-8	0.041963	0.993	2E(8'-3)
800	26'-9			3	(See Notes)	10'-6½	120	10.545	
801	16'-2½		122.56	3.0680		7'-0 17'-6½	0.020002	4.564 0.351	E(7'-0)
801	16'-2½			3	(See Notes)	99'-4½	120	15.459	
8	7'-2½		122.56	3.2600		97'-2 196'-6½	0.014883	3.910 5.925	6E(9'-5), f(-3.000), CV(7'-1½), BV(13'-5½), PO(20'-2)
8	7'-2½			6	(See Notes)	21'-0½	120	25.294	
7	-4'-1½		122.56	6.3570		17'-7 38'-7½	0.000576	4.915 0.022	E(17'-7)
7	-4'-1½			6	(See Notes)	86'-3½	140	30.232	
6	-10'-4		122.56	6.3400		69'-4 155'-7½	0.000439	2.688 0.068	3E(23'-1½)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
6	-10'-4			6	(See Notes)	4'-1½	140	32.988	
3	-10'-4		122.56	6.3400		4'-1½	0.000439	1.513	BFP(-1.507)
3	-10'-4			6	(See Notes)	11'-2½	140	34.501	
2	-10'-4		122.56	6.3400		11'-2½	0.000439	2.005	PIV(-2.000)
2	-10'-4			6	(See Notes)	21'-7	140	36.506	
1	-10'-4		122.56	6.3400		34'-8 56'-3	0.000439	0.025	E(23'-1½), EE(11'-6½), S
			100.00					36.530	Hose Allowance At Source
1			222.56						Total(Pt) Route 1
8404	24'-4	5.6	14.92	1	(See Notes)	1'-0	100	7.102	• • • • • **Route 2** • • • • • Sprinkler
814	25'-4		14.92	1.0490		1'-0	0.106075	-0.434 0.106	
814	25'-4			1	(See Notes)	2'-5	120	6.774	
812	26'-9		14.92	1.0490		7'-0 9'-5	0.075706	-0.606 0.711	E(2'-0), PO(5'-0)
								6.880	Total(Pt) Route 2
8407	24'-4	5.6	14.97	1	(See Notes)	1'-0	100	7.142	• • • • • **Route 3** • • • • • Sprinkler
817	25'-4		14.97	1.0490		1'-0	0.106630	-0.434 0.107	
817	25'-4			1	(See Notes)	2'-5	120	6.815	
819	26'-9		14.97	1.0490		7'-0 9'-5	0.076101	-0.606 0.715	E(2'-0), PO(5'-0)
819	26'-9			1½		15'-0	120	6.924	
815	26'-9		14.97	1.6820		15'-0	0.007635	0.115	
815	26'-9		15.07	1½		11'-0	120	7.039	Flow (q) from Route 4
811	26'-9		30.04	1.6820		11'-0	0.027707	0.305	
811	26'-9		15.33	1½		11'-0	120	7.344	Flow (q) from Route 5
806	26'-9		45.37	1.6820		11'-0	0.059421	0.654	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
806	26'-9		15.90	1½	(See Notes)	3'-5½	120	7.997	Flow (q) from Route 7
						9'-11	0.103603		
803	26'-9		61.28	1.6820		13'-4½		1.385	PO(9'-11)
803	26'-9			2½		14'-6	120	9.383	
							0.011640		
802	26'-9		61.28	2.6350		14'-6		0.169	
								9.551	Total(Pt) Route 3
8405	24'-4	5.6	15.07	1	(See Notes)	1'-0	100	7.245	• • • • • **Route 4** • • • • • Sprinkler
							0.108058	-0.434	
813	25'-4		15.07	1.0490		1'-0		0.108	
813	25'-4			1	(See Notes)	2'-5	120	6.920	
						7'-0	0.077121	-0.606	
815	26'-9		15.07	1.0490		9'-5		0.725	E(2'-0), PO(5'-0)
								7.039	Total(Pt) Route 4
8403	24'-5	5.6	15.33	1	(See Notes)	1'-0	100	7.497	• • • • • **Route 5** • • • • • Sprinkler
							0.111528	-0.434	
809	25'-5		15.33	1.0490		1'-0		0.112	
809	25'-5			1	(See Notes)	2'-4	120	7.175	
						7'-0	0.079598	-0.574	
811	26'-9		15.33	1.0490		9'-4		0.742	E(2'-0), PO(5'-0)
								7.344	Total(Pt) Route 5
8402	24'-4	5.6	15.48	1	(See Notes)	1'-0	100	7.640	• • • • • **Route 6** • • • • • Sprinkler
							0.113498	-0.434	
808	25'-4		15.48	1.0490		1'-0		0.113	
808	25'-4			1	(See Notes)	2'-11	120	7.320	
						7'-0	0.081003	-0.606	
810	26'-9		15.48	1.0490		9'-11		0.802	E(2'-0), PO(5'-0)
								7.516	Total(Pt) Route 6
8400	24'-6	5.6	15.90	1	(See Notes)	1'-0	100	8.066	• • • • • **Route 7** • • • • • Sprinkler
							0.119330	-0.434	
807	25'-6		15.90	1.0490		1'-0		0.119	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
807	25'-6			1	(See Notes)	2'-3	120	7.751	
						7'-0	0.085166	-0.542	
806	26'-9		15.90	1.0490		9'-3		0.788	E(2'-0), PO(5'-0)
								7.997	Total(Pt) Route 7
8401	24'-4	5.6	16.06	1	(See Notes)	1'-0	100	8.225	• • • • • **Route 8** • • • • •
							0.121513	-0.434	Sprinkler
805	25'-4		16.06	1.0490		1'-0		0.122	
805	25'-4			1	(See Notes)	2'-11	120	7.913	
						7'-0	0.086724	-0.606	
804	26'-9		16.06	1.0490		9'-11		0.858	E(2'-0), PO(5'-0)
								8.166	Total(Pt) Route 8

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

(Actual Inside Diameter / Schedule 40 Steel Pipe Inside Diameter) 4.87 = Factor

C Value Multiplier

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

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 Relief Valve
PRV	Pressure Reducing Valve	red	Reducer/Adapter	S	Supply
sCV	Swing Check Valve	SFx	Seismic Flex	Spr	Sprinkler
St	Strainer	T	Tee Flow Turn 90°	Tr	Tee Run
U	Union	WirF	Wirsbo	WMV	Water Meter Valve
Z	Cap				

Hydraulic Calculations

for

Project Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING
Location: 1601 39th AVE SE, Puyallup, WA 98374,
Drawing Name: 22-3688 PeirceSTEM-L23-R040-Plans Calculation Date: 5/15/2023

Design

Remote Area Number:	9
Remote Area Location:	3rd flooor orgainc labna
Occupancy Classification:	Ordinary Group II
Commodity Classification:	N/A
Density	0.20gpm/ft²
Area of Application:	1500ft² (Actual 969ft²)
Coverage per Sprinkler:	130ft²
Type of sprinklers calculated:	Pendent
No. of sprinklers calculated:	10
No. of nozzles calculated:	0

In-rack Demand: N/A gpm at Node: N/A
Hose Streams: 250.00 at Node: 1 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 1: 515.36 @ 44.470 (Safety Margin = 15.778)
Type of System: Wet
Volume of Dry/PreAction/Antifreeze/OtherAgent N/A

Name of Contractor: SHINN FIRE PROTECTION
Address: 18802 80TH AVE S, KENT WA98032
Phone Number: 425-204-3945
Name of designer: Ben Bernard
Authority Having Jurisdiction: CITY OF PUYALLUP

Notes:

Automatic peaking results Left: 44.361 Right: 44.527

FPET NICET #106245 LEVEL IV,MSME

WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE PROTECTION SPRINKLER SYSTEMS

Hussein A. A. Huballa
8321-1119-C Level 3
Shinn Mechanical, Inc.
SHINNMI060QP

Signature

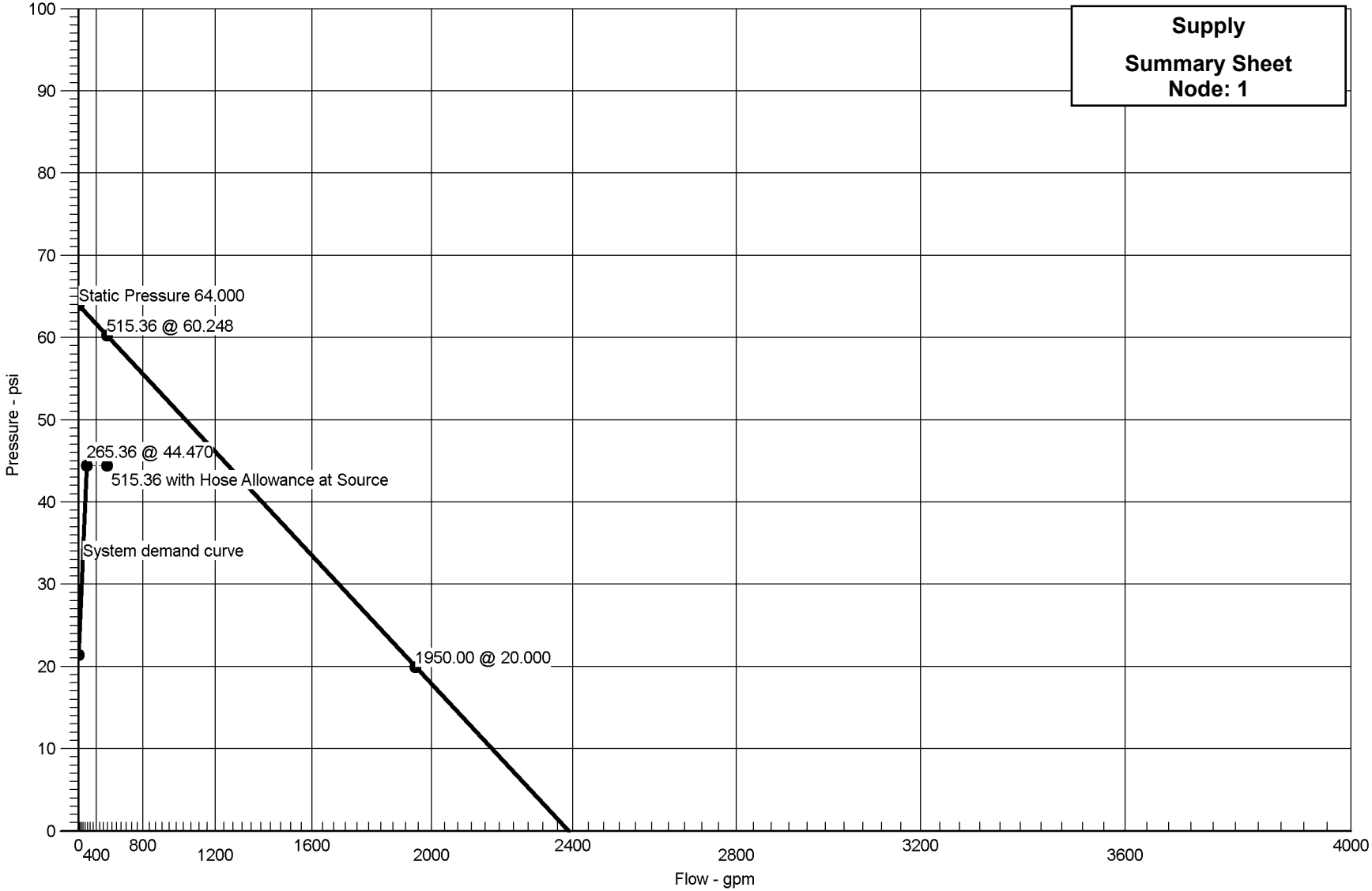
05/16/2023 Date

Expires DEC 31, 23

Hydraulic Graph

Job Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING **N** 1.85
Remote Area Number: 9

Date: 5/15/2023



Summary Of Outflowing Devices

Job Number: 22-3688
Report Description: Ordinary Group II (9)

Device	Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler 9200	26.46	26.00	8	10.943		
Sprinkler 9201	26.05	26.00	8	10.604		
Sprinkler 9202	**26.00**	**26.00**	**8**	**10.563**		
Sprinkler 9203	26.39	26.00	8	10.878		
Sprinkler 9204	26.39	26.00	8	10.878		
Sprinkler 9205	26.00	26.00	8	10.566		
Sprinkler 9206	27.75	26.00	8	12.032		
Sprinkler 9207	26.46	26.00	8	10.937		
Sprinkler 9208	27.75	26.00	8	12.031		
Sprinkler 9209	26.11	26.00	8	10.656		

Most Demanding Sprinkler Data

Supply Analysis

Node	Name	Static (psi)	Residual (psi) @ Flow (gpm)		Available (psi) @ Total Demand (gpm)		Required Pressure (psi)
1	Water Supply	64.000	20.000	1950.00	60.248	515.36	44.470

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
1	-10'-4	Supply	44.470	265.36	
9200	39'-2	Sprinkler	10.943	26.46	
9201	39'-2	Sprinkler	10.604	26.05	
9202	39'-2	Sprinkler	10.563	26.00	
9203	39'-2	Sprinkler	10.878	26.39	
9204	39'-2	Sprinkler	10.878	26.39	
9205	39'-2	Sprinkler	10.566	26.00	
9206	39'-2	Sprinkler	12.032	27.75	
9207	39'-2	Sprinkler	10.937	26.46	
9208	39'-2	Sprinkler	12.031	27.75	
9209	39'-2	Sprinkler	10.656	26.11	
2	-10'-4		44.367		
3	-10'-4		42.346		
6	-10'-4		40.631		
7	-4'-1½		37.659		
8	7'-2½		32.651		
900	44'-6		13.003		
901	44'-6		12.035		
902	44'-6		11.892		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
903	44'-6		11.841		
904	44'-6		11.797		
905	44'-6		9.211		
906	40'-6		10.031		
907	44'-6		8.855		
908	40'-6		10.370		
909	44'-6		9.143		
910	40'-6		9.990		
911	44'-6		8.812		
912	40'-6		10.306		
913	44'-6		9.143		
914	40'-6		10.306		
915	40'-6		9.993		
916	44'-6		8.815		
917	40'-6		11.459		
918	40'-6		10.365		
919	44'-6		10.352		
920	44'-6		9.205		
921	40'-6		11.458		
922	44'-6		10.351		
923	40'-6		10.071		
924	44'-6		8.908		
925	44'-6		10.694		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
926	44'-6		10.702		
927	44'-6		10.733		
928	44'-6		10.781		

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
9202	39'-2	8	26.00	1	(See Notes)	0'-0	120	10.563	• • • • • **Route 1** • • • • • Sprinkler,
910	40'-6		26.00	1.0490		0'-0	0.211435	-0.573 0.000	, fd
910	40'-6			1¼	(See Notes)	4'-0	120	9.990	
911	44'-6		26.00	1.3800		6'-0 10'-0	0.055609	-1.734 0.556	PO(6'-0)
911	44'-6			2		10'-11½	120	8.812	
907	44'-6		20.20	2.1570		10'-11½	0.003959	0.043	
907	44'-6		26.05	2	(See Notes)	122'-7	120	8.855	Flow (q) from Route 3
902	44'-6		46.25	2.1570		43'-1 165'-8	0.018332	3.037	T(12'-3½), 3E(6'-2), PO(12'-3½)
902	44'-6		165.75	4		12'-10	120	11.892	Flow (q) from Route 2
901	44'-6		212.00	4.2600		12'-10	0.011147	0.143	
901	44'-6		53.36	4	(See Notes)	31'-0	120	12.035	Flow (q) from Route 5
900	44'-6		265.36	4.2600		26'-4 57'-4	0.016886	0.968	2E(13'-2)
900	44'-6			6	(See Notes)	58'-5	120	13.003	
8	7'-2½		265.36	6.3570		142'-11½ 201'-4½	0.002404	16.163 3.484	4E(17'-7), f(-0.000), f(-3.000), CV(17'-2½), BV(17'-7), PO(37'-8½)
8	7'-2½			6	(See Notes)	21'-0½	120	32.651	
7	-4'-1½		265.36	6.3570		17'-7 38'-7½	0.002404	4.915 0.093	E(17'-7)
7	-4'-1½			6	(See Notes)	86'-3½	140	37.659	
6	-10'-4		265.36	6.3400		69'-4 155'-7½	0.001831	2.688 0.285	3E(23'-1½)
6	-10'-4			6	(See Notes)	4'-1½	140	40.631	
3	-10'-4		265.36	6.3400		4'-1½	0.001831	1.715	BFP(-1.698)
3	-10'-4			6	(See Notes)	11'-2½	140	42.346	
2	-10'-4		265.36	6.3400		11'-2½	0.001831	2.021	PIV(-2.000)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes (Fitting/Device (Equivalent Length); Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.)
2	-10'-4			6	(See Notes)	21'-7	140	44.367	
1	-10'-4		265.36	6.3400		34'-8 56'-3	0.001831	 0.103	E(23'-1½), EE(11'-6½), S
			250.00					44.470	Hose Allowance At Source
1			515.36						Total(Pt) Route 1
9205	39'-2	8	26.00	1	(See Notes)	0'-0	120	10.566	• • • • • **Route 2** • • • • • Sprinkler,
915	40'-6		26.00	1.0490		 0'-0	0.211491	-0.573 0.000	, fd
915	40'-6			1¼	(See Notes)	4'-0	120	9.993	
916	44'-6		26.00	1.3800		6'-0 10'-0	0.055623	-1.734 0.556	PO(6'-0)
916	44'-6		5.80	2		10'-1½	120	8.815	Flow (q) from Route 12
924	44'-6		31.81	2.1570		 10'-1½	0.009173	 0.093	
924	44'-6		26.11	2	(See Notes)	52'-3	120	8.908	Flow (q) from Route 4
926	44'-6		57.92	2.1570		12'-3½ 64'-6½	0.027801	 1.794	PO(12'-3½)
926	44'-6		52.33	4		9'-4½	120	10.702	Flow (q) from Route 7
927	44'-6		110.26	4.2600		 9'-4½	0.003326	 0.031	
927	44'-6		25.09	4		9'-9½	120	10.733	Flow (q) from Route 11
928	44'-6		135.34	4.2600		 9'-9½	0.004859	 0.048	
928	44'-6			4	(See Notes)	239'-6	120	10.781	
904	44'-6		112.95	4.2600		52'-8 292'-2	0.003477	 1.016	4E(13'-2)
904	44'-6		22.39	4		9'-2½	120	11.797	Flow (q) from Route 14
903	44'-6		135.34	4.2600		 9'-2½	0.004859	 0.045	
903	44'-6		30.41	4		7'-2	120	11.841	Flow (q) from Route 9
902	44'-6		165.75	4.2600		 7'-2	0.007070	 0.051	
								11.892	Total(Pt) Route 2

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
9201	39'-2	8	26.05	1	(See Notes)	0'-0	120	10.604	• • • • • **Route 3** • • • • •
									Sprinkler,
906	40'-6		26.05	1.0490		0'-0	0.212200	0.000	, fd
								-0.573	
906	40'-6			1¼	(See Notes)	4'-0	120	10.031	
						6'-0	0.055810	-1.734	
907	44'-6		26.05	1.3800		10'-0		0.558	PO(6'-0)
								8.855	Total(Pt) Route 3
9209	39'-2	8	26.11	1	(See Notes)	0'-0	120	10.656	• • • • • **Route 4** • • • • •
									Sprinkler,
923	40'-6		26.11	1.0490		0'-0	0.213157	0.000	, fd
								-0.585	
923	40'-6			1¼	(See Notes)	3'-11½	120	10.071	
						6'-0	0.056062	-1.722	
924	44'-6		26.11	1.3800		9'-11½		0.559	PO(6'-0)
								8.908	Total(Pt) Route 4
9204	39'-2	8	26.39	1	(See Notes)	0'-0	120	10.878	• • • • • **Route 5** • • • • •
									Sprinkler,
914	40'-6		26.39	1.0490		0'-0	0.217274	0.000	, fd
								-0.573	
914	40'-6			1¼	(See Notes)	4'-0	120	10.306	
						6'-0	0.057144	-1.734	
913	44'-6		26.39	1.3800		10'-0		0.571	PO(6'-0)
913	44'-6			2		9'-2	120	9.143	
909	44'-6		0.51	2.1570		9'-2	0.000004	0.000	
909	44'-6		26.39	2		10'-1	120	9.143	Flow (q) from Route 6
905	44'-6		26.89	2.1570		10'-1	0.006725	0.068	
905	44'-6		26.46	2	(See Notes)	105'-11½	120	9.211	Flow (q) from Route 8
						12'-3½			
901	44'-6		53.36	2.1570		118'-3	0.023886	2.824	PO(12'-3½)
								12.035	Total(Pt) Route 5
9203	39'-2	8	26.39	1	(See Notes)	0'-0	120	10.878	• • • • • **Route 6** • • • • •
									Sprinkler,
912	40'-6		26.39	1.0490		0'-0	0.217275	0.000	, fd
								-0.573	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
912	40'-6			1¼	(See Notes)	4'-0	120	10.306	
						6'-0	0.057144	-1.734	
909	44'-6		26.39	1.3800		10'-0		0.571	PO(6'-0)
								9.143	Total(Pt) Route 6
9207	39'-2	8	26.46	1	(See Notes)	0'-0	120	10.937	• • • • • **Route 7** • • • • •
							0.218365	-0.573	Sprinkler,
918	40'-6		26.46	1.0490		0'-0		0.000	, fd
918	40'-6			1¼	(See Notes)	4'-0	120	10.365	
						6'-0	0.057431	-1.734	
920	44'-6		26.46	1.3800		10'-0		0.574	PO(6'-0)
920	44'-6		25.88	2	(See Notes)	52'-3½	120	9.205	Flow (q) from Route 13
						12'-3½	0.023044		
925	44'-6		52.33	2.1570		64'-7½		1.489	PO(12'-3½)
925	44'-6			4		10'-0½	120	10.694	
							0.000838		
926	44'-6		52.33	4.2600		10'-0½		0.008	
								10.702	Total(Pt) Route 7
9200	39'-2	8	26.46	1	(See Notes)	0'-0	120	10.943	• • • • • **Route 8** • • • • •
							0.218469	-0.573	Sprinkler,
908	40'-6		26.46	1.0490		0'-0		0.000	, fd
908	40'-6			1¼	(See Notes)	4'-0	120	10.370	
						6'-0	0.057459	-1.734	
905	44'-6		26.46	1.3800		10'-0		0.575	PO(6'-0)
								9.211	Total(Pt) Route 8
9208	39'-2	8	27.75	1	(See Notes)	0'-0	120	12.031	• • • • • **Route 9** • • • • •
							0.238489	-0.573	Sprinkler,
921	40'-6		27.75	1.0490		0'-0		0.000	, fd
921	40'-6			1¼	(See Notes)	4'-0	120	11.458	
						6'-0	0.062724	-1.734	
922	44'-6		27.75	1.3800		10'-0		0.627	PO(6'-0)
922	44'-6			2		10'-0½	120	10.351	
							0.000093		
919	44'-6		2.66	2.1570		10'-0½		0.001	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
919	44'-6		27.75	2	(See Notes)	139'-6	120	10.352	Flow (q) from Route 10
903	44'-6		30.41	2.1570		36'-11 176'-5	0.008441	 1.489	4E(6'-2), PO(12'-3½)
								11.841	Total(Pt) Route 9
9206	39'-2	8	27.75	1	(See Notes)	0'-0	120	12.032	• • • • • **Route 10** • • • • •
917	40'-6		27.75	1.0490		 0'-0	0.238506	-0.573 0.000	Sprinkler, , fd
917	40'-6			1¼	(See Notes)	4'-0	120	11.459	
919	44'-6		27.75	1.3800		6'-0 10'-0	0.062728	-1.734 0.627	PO(6'-0)
								10.352	Total(Pt) Route 10
922	44'-6		2.66	2	(See Notes)	52'-3	120	10.351	• • • • • **Route 11** • • • • •
927	44'-6		25.09	2.1570		12'-3½ 64'-6½	0.005913	 0.382	Flow (q) from Route 9 PO(12'-3½)
								10.733	Total(Pt) Route 11
911	44'-6		20.20	2		8'-0½	120	8.812	• • • • • **Route 12** • • • • •
916	44'-6		5.80	2.1570		 8'-0½	0.000394	 0.003	Flow (q) from Route 1
								8.815	Total(Pt) Route 12
913	44'-6		0.51	2		9'-10½	120	9.143	• • • • • **Route 13** • • • • •
920	44'-6		25.88	2.1570		 9'-10½	0.006262	 0.062	Flow (q) from Route 5
								9.205	Total(Pt) Route 13
928	44'-6			2	(See Notes)	187'-4½	120	10.781	• • • • • **Route 14** • • • • •
904	44'-6		22.39	2.1570		24'-7½ 212'-0	0.004792	 1.016	PO(12'-3½) PO(12'-3½)
								11.797	Total(Pt) Route 14

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

(Actual Inside Diameter / Schedule 40 Steel Pipe Inside Diameter) 4.87 = Factor

C Value Multiplier

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

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 Relief Valve
PRV	Pressure Reducing Valve	red	Reducer/Adapter	S	Supply
sCV	Swing Check Valve	SFx	Seismic Flex	Spr	Sprinkler
St	Strainer	T	Tee Flow Turn 90°	Tr	Tee Run
U	Union	WirF	Wirsbo	WMV	Water Meter Valve
Z	Cap				

Hydraulic Calculations

for

Project Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING
Location: 1601 39th AVE SE, Puyallup, WA 98374,
Drawing Name: 22-3688 PeirceSTEM-L23-R040-Plans Calculation Date: 5/15/2023

Design

Remote Area Number:	10
Remote Area Location:	Earth Science B Lab
Occupancy Classification:	Ordinary Group II
Commodity Classification:	N/A
Density	0.20gpm/ft²
Area of Application:	1500ft² (Actual 986ft²)
Coverage per Sprinkler:	130ft²
Type of sprinklers calculated:	Pendent
No. of sprinklers calculated:	10
No. of nozzles calculated:	0

In-rack Demand:	N/A gpm	at Node:	N/A		
Hose Streams:	250.00	at Node:	1	Type:	Allowance at Source

Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 1: 515.76 @ 47.184 (Safety Margin = 13.058)
Type of System: Wet
Volume of Dry/PreAction/Antifreeze/OtherAgent N/A

Name of Contractor: SHINN FIRE PROTECTION
Address: 18802 80TH AVE S, KENT WA98032
Phone Number: 425-204-3945
Name of designer: Ben Bernard
Authority Having Jurisdiction: CITY OF PUYALLUP

Notes:

Automatic peaking results Left: 47.184 Right: 47.184

FPET NICET #106245 LEVEL IV,MSME

WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE PROTECTION SPRINKLER SYSTEMS

Hussein A. A. Huballa
8321-1119-C Level 3
Shinn Mechanical, Inc.
SHINNMI060QP

Signature

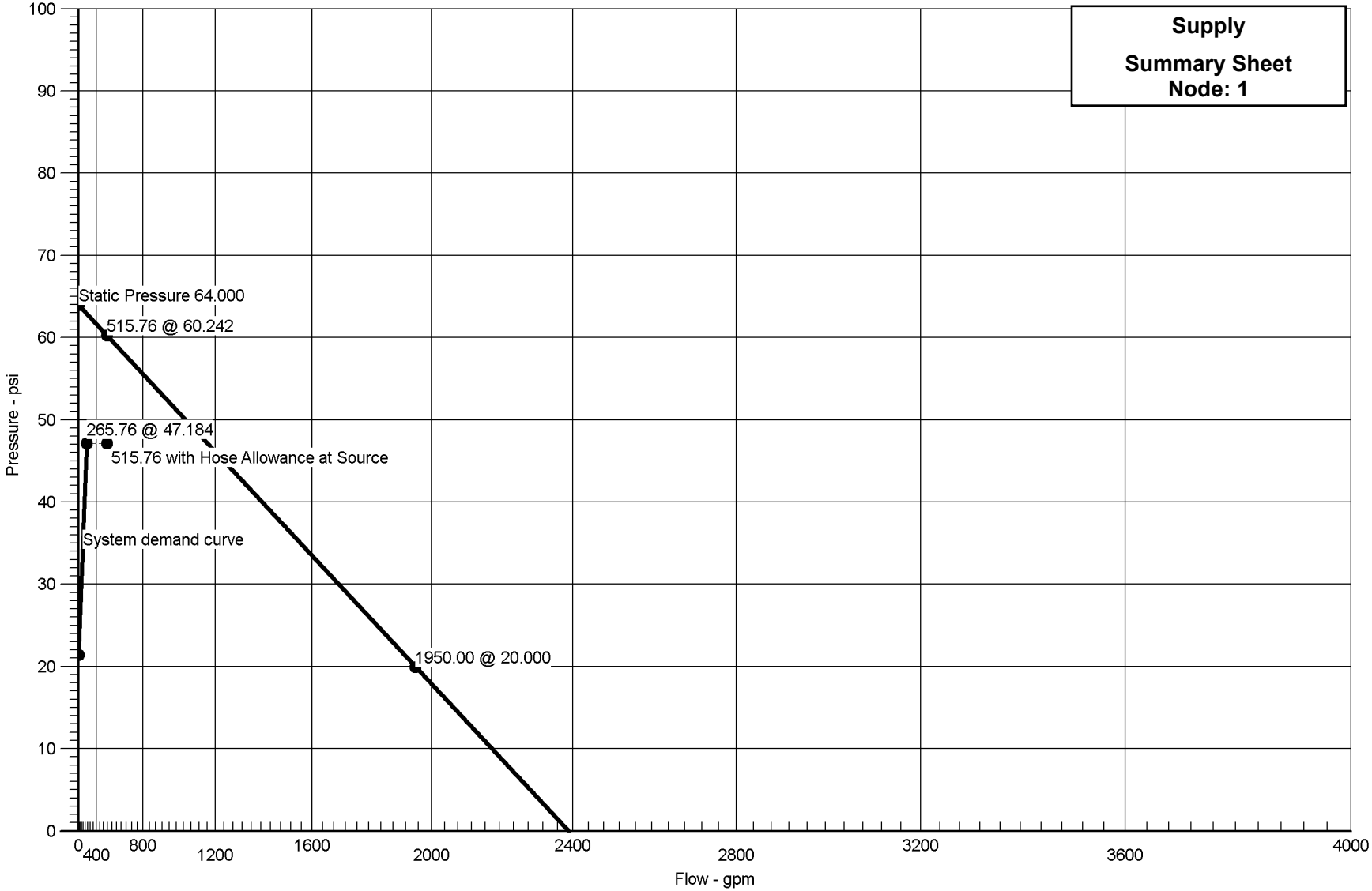
05/16/2023
Date

Expires
DEC 31, 23

Hydraulic Graph

Job Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING **N** 1.85
Remote Area Number: 10

Date: 5/15/2023



Summary Of Outflowing Devices

Job Number: 22-3688
Report Description: Ordinary Group II (10)

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	10000	26.79	26.00	8	11.215		
Sprinkler	10001	26.29	26.00	8	10.798		
Sprinkler	10002	27.57	26.00	8	11.878		
Sprinkler	10003	26.39	26.00	8	10.883		
Sprinkler	10004	26.06	26.00	8	10.614		
Sprinkler	10005	27.50	26.00	8	11.820		
Sprinkler	10006	26.46	26.00	8	10.937		
Sprinkler	**10007**	**26.00**	**26.00**	**8**	**10.563**		
Sprinkler	10008	26.38	26.00	8	10.873		
Sprinkler	10009	26.31	26.00	8	10.820		

⇨ Most Demanding Sprinkler Data

Supply Analysis

Node	Name	Static (psi)	Residual (psi) @ Flow (gpm)		Available (psi) @ Total Demand (gpm)		Required Pressure (psi)
1	Water Supply	64.000	20.000	1950.00	60.242	515.76	47.184

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
1	-10'-4	Supply	47.184	265.76	
10000	39'-2	Sprinkler	11.215	26.79	
10001	39'-2	Sprinkler	10.798	26.29	
10002	39'-2	Sprinkler	11.878	27.57	
10003	39'-2	Sprinkler	10.883	26.39	
10004	39'-2	Sprinkler	10.614	26.06	
10005	39'-2	Sprinkler	11.820	27.50	
10006	39'-2	Sprinkler	10.937	26.46	
10007	39'-2	Sprinkler	10.563	26.00	
10008	39'-2	Sprinkler	10.873	26.38	
10009	39'-2	Sprinkler	10.820	26.31	
2	-10'-4		47.081		
3	-10'-4		45.060		
6	-10'-4		43.345		
7	-4'-1½		40.371		
8	7'-2½		35.363		
900	44'-6		15.714		
901	44'-6		14.743		
902	44'-6		14.558		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
903	44'-6		14.467		
904	44'-6		14.366		
925	44'-6		13.781		
926	44'-6		13.779		
927	44'-6		13.774		
928	44'-6		13.765		
1019	44'-6		13.464		
1020	44'-6		12.692		
1021	46'-7		10.017		
1022	44'-6		12.677		
1023	47'-0		11.218		
1024	44'-6		12.309		
1025	47'-0		10.609		
1026	46'-7		9.530		
1027	46'-7		10.160		
1028	47'-0		10.541		
1029	46'-7		9.316		
1030	46'-5		9.701		
1031	44'-6		12.193		
1032	46'-5		10.125		
1033	46'-5		9.765		
1034	46'-7		9.255		
1035	46'-5		9.690		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
1036	46'-5		9.628		

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
10007	39'-2	8	26.00	1	(See Notes)	4'-0	120	10.563	• • • • • **Route 1** • • • • •
1034	46'-7		26.00	1.0490		5'-0 9'-0	0.211435	-3.210 1.903	Sprinkler, PO(5'-0), fd
1034	46'-7			2		9'-7	120	9.255	
1029	46'-7		26.00	2.1570		9'-7	0.006317	0.061	
1029	46'-7		26.06	2		9'-4½	120	9.316	Flow (q) from Route 2
1026	46'-7		52.06	2.1570		9'-4½	0.022824	0.214	
1026	46'-7		26.29	2	(See Notes)	0'-8	120	9.530	Flow (q) from Route 3
1027	46'-7		78.35	2.1570		12'-3½ 12'-11½	0.048618	0.630	PO(12'-3½)
1027	46'-7		26.79	2	(See Notes)	2'-1	120	10.160	Flow (q) from Route 8
1024	44'-6		105.14	2.0670		10'-0 12'-1	0.103095	0.903 1.246	PO(10'-0)
1024	44'-6		105.54	3		9'-1	120	12.309	Flow (q) from Route 4
1022	44'-6		210.69	3.2600		9'-1	0.040552	0.368	
1022	44'-6			4		1'-4½	120	12.677	
1020	44'-6		210.69	4.2600		1'-4½	0.011019	0.015	
1020	44'-6		55.08	4	(See Notes)	19'-3	120	12.692	Flow (q) from Route 9
1019	44'-6		265.76	4.2600		26'-4 45'-7	0.016933	0.772	PO(26'-4)
1019	44'-6			4	(See Notes)	156'-5½	120	13.464	
928	44'-6		72.64	4.2600		39'-6 195'-11½	0.001537	0.301	3E(13'-2)
928	44'-6			4		9'-9½	120	13.765	
927	44'-6		55.77	4.2600		9'-9½	0.000942	0.009	
927	44'-6			4		9'-4½	120	13.774	
926	44'-6		39.15	4.2600		9'-4½	0.000490	0.005	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes (Fitting/Device (Equivalent Length); Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.)
926	44'-6			4		10'-0½	120	13.779	
925	44'-6		21.75	4.2600		10'-0½	0.000165	0.002	
925	44'-6			2	(See Notes)	187'-4½	120	13.781	PO(12'-3½)
901	44'-6		21.75	2.1570		24'-7½ 212'-0	0.004541	0.963	PO(12'-3½)
901	44'-6		244.01	4	(See Notes)	31'-0	120	14.743	Flow (q) from Route 11
900	44'-6		265.76	4.2600		26'-4 57'-4	0.016933	0.971	2E(13'-2)
900	44'-6			6	(See Notes)	58'-5	120	15.714	
8	7'-2½		265.76	6.3570		142'-11½ 201'-4½	0.002411	16.163 3.485	4E(17'-7), f(-0.000), f(-3.000), CV(17'-2½), BV(17'-7), PO(37'-8½)
8	7'-2½			6	(See Notes)	21'-0½	120	35.363	
7	-4'-1½		265.76	6.3570		17'-7 38'-7½	0.002411	4.915 0.093	E(17'-7)
7	-4'-1½			6	(See Notes)	86'-3½	140	40.371	
6	-10'-4		265.76	6.3400		69'-4 155'-7½	0.001836	2.688 0.286	3E(23'-1½)
6	-10'-4			6	(See Notes)	4'-1½	140	43.345	
3	-10'-4		265.76	6.3400		4'-1½	0.001836	1.715	BFP(-1.698)
3	-10'-4			6	(See Notes)	11'-2½	140	45.060	
2	-10'-4		265.76	6.3400		11'-2½	0.001836	2.021	PIV(-2.000)
2	-10'-4			6	(See Notes)	21'-7	140	47.081	
1	-10'-4		265.76	6.3400		34'-8 56'-3	0.001836	0.103	E(23'-1½), EE(11'-6½), S
			250.00					47.184	Hose Allowance At Source
1			515.76						Total(Pt) Route 1
10004	39'-2	8	26.06	1	(See Notes)	4'-0	120	10.614	• • • • • **Route 2** • • • • •
1029	46'-7		26.06	1.0490		5'-0 9'-0	0.212397	-3.210 1.912	Sprinkler, PO(5'-0), fd

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
								9.316	Total(Pt) Route 2
10001	39'-2	8	26.29	1	(See Notes)	4'-0	120	10.798	• • • • • **Route 3** • • • • • Sprinkler,
1026	46'-7		26.29	1.0490		5'-0	0.215787	-3.210	PO(5'-0), fd
						9'-0		1.942	
								9.530	Total(Pt) Route 3
10009	39'-2	8	26.31	1	(See Notes)	4'-0	120	10.820	• • • • • **Route 4** • • • • • Sprinkler,
1036	46'-5		26.31	1.0490		5'-0	0.216198	-3.138	PO(5'-0), fd
						9'-0		1.946	
1036	46'-5			2		9'-7	120	9.628	
1035	46'-5		26.31	2.1570		9'-7	0.006459	0.062	
1035	46'-5		26.38	2	(See Notes)	6'-4	120	9.690	Flow (q) from Route 5
1032	46'-5		52.69	2.1570		12'-3½ 18'-7½	0.023338	0.435	PO(12'-3½)
1032	46'-5		52.85	2	(See Notes)	1'-11	120	10.125	Flow (q) from Route 6
1031	44'-6		105.54	2.0670		10'-0 11'-11	0.103822	0.831 1.237	PO(10'-0)
1031	44'-6			3		10'-3	120	12.193	
1024	44'-6		105.54	3.2600		10'-3	0.011288	0.116	
								12.309	Total(Pt) Route 4
10008	39'-2	8	26.38	1	(See Notes)	4'-0	120	10.873	• • • • • **Route 5** • • • • • Sprinkler,
1035	46'-5		26.38	1.0490		5'-0	0.217180	-3.138	PO(5'-0), fd
						9'-0		1.955	
								9.690	Total(Pt) Route 5
10003	39'-2	8	26.39	1	(See Notes)	4'-0	120	10.883	• • • • • **Route 6** • • • • • Sprinkler,
1030	46'-5		26.39	1.0490		5'-0	0.217357	-3.138	PO(5'-0), fd
						9'-0		1.956	
1030	46'-5			2		9'-9½	120	9.701	
1033	46'-5		26.39	2.1570		9'-9½	0.006494	0.064	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
1033	46'-5		26.46	2	(See Notes)	3'-0½	120	9.765	Flow (q) from Route 7
						12'-3½	0.023464		
1032	46'-5		52.85	2.1570		15'-4		0.360	PO(12'-3½)
								10.125	Total(Pt) Route 6
10006	39'-2	8	26.46	1	(See Notes)	4'-0	120	10.937	• • • • • **Route 7** • • • • •
						5'-0	0.218365	-3.138	Sprinkler,
1033	46'-5		26.46	1.0490		9'-0		1.965	PO(5'-0), fd
								9.765	Total(Pt) Route 7
10000	39'-2	8	26.79	1	(See Notes)	4'-0	120	11.215	• • • • • **Route 8** • • • • •
						5'-0	0.223492	-3.210	Sprinkler,
1021	46'-7		26.79	1.0490		9'-0		2.011	PO(5'-0), fd
1021	46'-7			2	(See Notes)	9'-2	120	10.017	
						12'-3½	0.006677		
1027	46'-7		26.79	2.1570		21'-5½		0.143	PO(12'-3½)
								10.160	Total(Pt) Route 8
10005	39'-2	8	27.50	1	(See Notes)	4'-0	120	11.820	• • • • • **Route 9** • • • • •
						5'-0	0.234626	-3.391	Sprinkler,
1028	47'-0		27.50	1.0490		9'-0		2.112	PO(5'-0), fd
1028	47'-0			2		9'-7	120	10.541	
							0.007010		
1025	47'-0		27.50	2.1570		9'-7		0.067	
1025	47'-0		27.57	2	(See Notes)	11'-9	120	10.609	Flow (q) from Route 10
						12'-3½	0.025327		
1023	47'-0		55.08	2.1570		24'-1		0.610	PO(12'-3½)
1023	47'-0			2	(See Notes)	2'-6	120	11.218	
						10'-0	0.031170	1.084	
1020	44'-6		55.08	2.0670		12'-6		0.390	PO(10'-0)
								12.692	Total(Pt) Route 9
10002	39'-2	8	27.57	1	(See Notes)	4'-0	120	11.878	• • • • • **Route 10** • • • • •
						5'-0	0.235686	-3.391	Sprinkler,
1025	47'-0		27.57	1.0490		9'-0		2.121	PO(5'-0), fd
								10.609	Total(Pt) Route 10

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
904	44'-6		16.87 + 193.13	4		9'-2½	120	14.366	• • • • • **Route 11** • • • • •
903	44'-6		209.99	4.2600		9'-2½	0.010952	0.101	Flow (q) from Route 14 and 15
903	44'-6		16.62	4		7'-2	120	14.467	Flow (q) from Route 12
902	44'-6		226.62	4.2600		7'-2	0.012610	0.090	
902	44'-6		17.40	4		12'-10	120	14.558	Flow (q) from Route 13
901	44'-6		244.01	4.2600		12'-10	0.014459	0.186	
								14.743	Total(Pt) Route 11
927	44'-6			2	(See Notes)	201'-9	120	13.774	• • • • • **Route 12** • • • • •
903	44'-6		16.62	2.1570		49'-2½ 251'-0	0.002762	0.693	PO(12'-3½) 4E(6'-2), PO(12'-3½)
								14.467	Total(Pt) Route 12
926	44'-6			2	(See Notes)	203'-11	120	13.779	• • • • • **Route 13** • • • • •
902	44'-6		17.40	2.1570		55'-4½ 259'-3½	0.003003	0.779	PO(12'-3½) T(12'-3½), 3E(6'-2), PO(12'-3½)
								14.558	Total(Pt) Route 13
928	44'-6			2	(See Notes)	187'-4½	120	13.765	• • • • • **Route 14** • • • • •
904	44'-6		16.87	2.1570		24'-7½ 212'-0	0.002837	0.601	PO(12'-3½) PO(12'-3½)
								14.366	Total(Pt) Route 14
1019	44'-6		72.64	4	(See Notes)	83'-0½	120	13.464	• • • • • **Route 15** • • • • •
904	44'-6		193.13	4.2600		13'-2 96'-2½	0.009381	0.903	Flow (q) from Route 1 E(13'-2)
								14.366	Total(Pt) Route 15

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

(Actual Inside Diameter / Schedule 40 Steel Pipe Inside Diameter) 4.87 = Factor

C Value Multiplier

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

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 Relief Valve
PRV	Pressure Reducing Valve	red	Reducer/Adapter	S	Supply
sCV	Swing Check Valve	SFx	Seismic Flex	Spr	Sprinkler
St	Strainer	T	Tee Flow Turn 90°	Tr	Tee Run
U	Union	WirF	Wirsbo	WMV	Water Meter Valve
Z	Cap				

Hydraulic Calculations

for

Project Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING
Location: 1601 39th AVE SE, Puyallup, WA 98374,
Drawing Name: 22-3688 PeirceSTEM-L24-R041-Plans Calculation Date: 5/15/2023

Design

Remote Area Number:	11
Remote Area Location:	Mech Room Pent house
Occupancy Classification:	Ordinary Group I
Commodity Classification:	N/A
Density	0.15gpm/ft²
Area of Application:	418ft² (Actual 418ft²)
Coverage per Sprinkler:	112ft²
Type of sprinklers calculated:	Pendent
No. of sprinklers calculated:	4
No. of nozzles calculated:	0

In-rack Demand: N/A gpm at Node: N/A
Hose Streams: 250.00 at Node: 1 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 1: 279.78 @ 44.009 (Safety Margin = 18.779)
Type of System: Wet
Volume of Dry/PreAction/Antifreeze/OtherAgent N/A

Name of Contractor: SHINN FIRE PROTECTION
Address: 18802 80TH AVE S, KENT WA98032
Phone Number: 425-204-3945
Name of designer: Ben Bernard
Authority Having Jurisdiction: CITY OF PUYALLUP

Notes:

Automatic peaking results Left: N/A Right: N/A

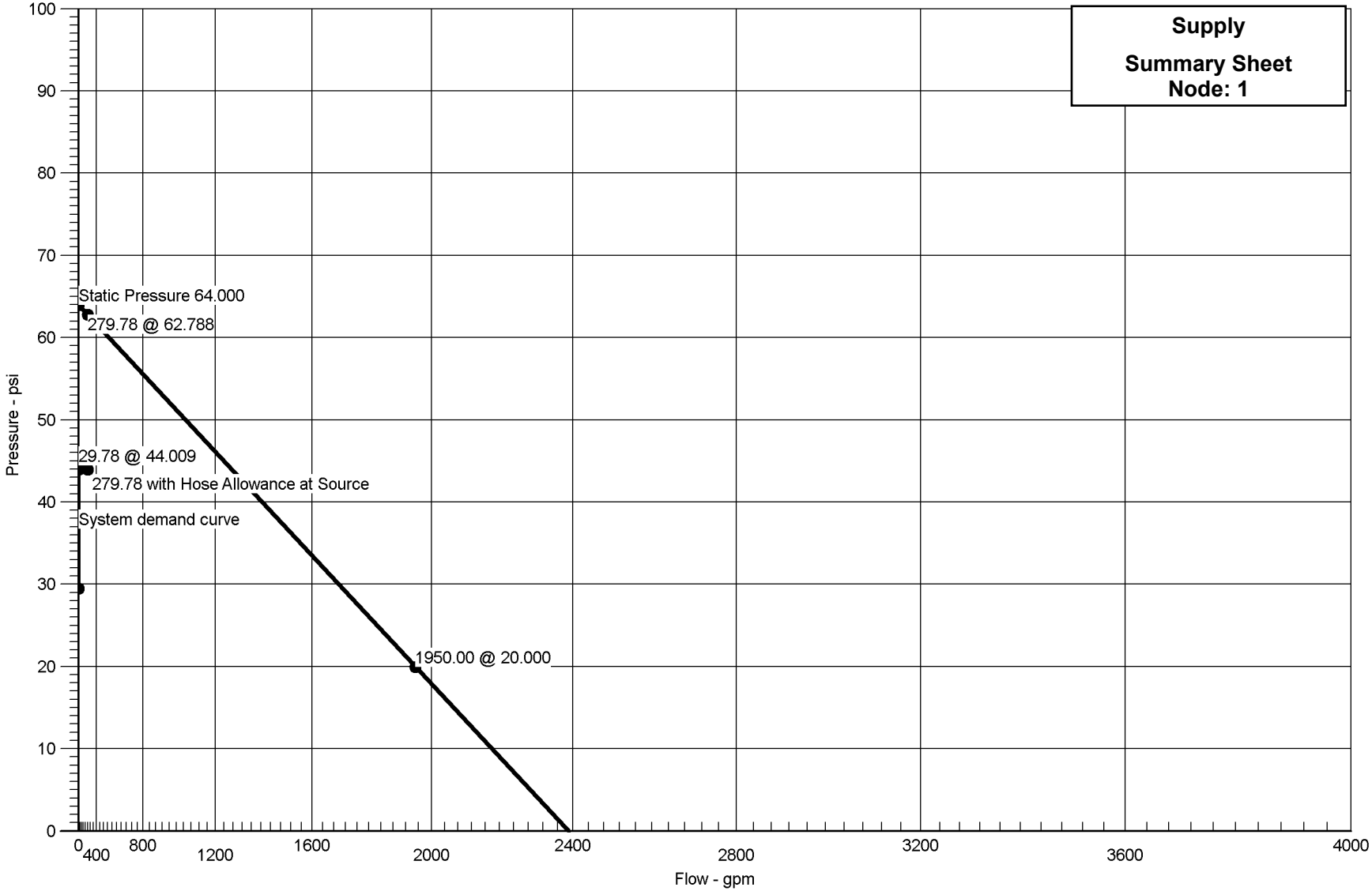
FPET NICET #106245 LEVEL IV,MSME

WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE PROTECTION SPRINKLER SYSTEMS
Hussein A. A. Huballa
8321-1119-C Level 3
Shinn Mechanical, Inc.
SHINNMI060QP
Signature
05/16/2023 Date
Expires DEC 31, 23

Hydraulic Graph

Job Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING **N** 1.85
Remote Area Number: 11

Date: 5/15/2023



Summary Of Outflowing Devices

Job Number: 22-3688
Report Description: Ordinary Group I (11)

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	11000	7.51	7.41	2.8	7.196		
Sprinkler	11001	7.45	7.41	2.8	7.074		
Sprinkler	11002	7.42	7.41	2.8	7.016		
Sprinkler	**11003**	**7.41**	**7.41**	**2.8**	**7.000**		

Most Demanding Sprinkler Data

Supply Analysis

Node	Name	Static (psi)	Residual (psi) @	Flow (gpm)	Available (psi) @	Total Demand (gpm)	Required Pressure (psi)
1	Water Supply	64.000	20.000	1950.00	62.788	279.78	44.009

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
1	-10'-4	Supply	44.009	29.78	
11000	57'-9	Sprinkler	7.196	7.51	
11001	57'-9	Sprinkler	7.074	7.45	
11002	57'-9	Sprinkler	7.016	7.42	
11003	57'-9	Sprinkler	7.000	7.41	
2	-10'-4		44.007		
3	-10'-4		42.007		
6	-10'-4		40.553		
7	-4'-1½		37.860		
8	7'-2½		32.943		
755	44'-6		13.473		
900	44'-6		13.772		
901	44'-6		13.755		
902	44'-6		13.752		
903	44'-6		13.750		
904	44'-6		13.749		
925	44'-6		13.737		
926	44'-6		13.737		
927	44'-6		13.737		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
928	44'-6		13.738		
1100	57'-9		7.406		

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
11003	57'-9	2.8	7.41	1½	(See Notes)	7'-8½	120	7.000	• • • • • Route 1 • • • • • Sprinkler
11002	57'-9		7.41	1.6820		7'-8½	0.002079	0.000 0.016	
11002	57'-9	2.8	7.42	1½	(See Notes)	7'-8	120	7.016	Sprinkler
11001	57'-9		14.82	1.6820		7'-8	0.007502	0.000 0.058	
11001	57'-9	2.8	7.45	1½	(See Notes)	7'-8½	120	7.074	Sprinkler
11000	57'-9		22.27	1.6820		7'-8½	0.015930	0.000 0.123	
11000	57'-9	2.8	7.51	1½	(See Notes)	2'-9	120	7.196	Sprinkler, E(4'-11½)
1100	57'-9		29.78	1.6820		4'-11½ 7'-8	0.027272	0.000 0.209	
1100	57'-9			2	(See Notes)	13'-3	120	7.406	f(-0.000), CV(13'-6½), T(12'-3½)
755	44'-6		29.78	2.1570		25'-10 39'-1½	0.008122	5.750 0.318	
755	44'-6			2	(See Notes)	119'-3	120	13.473	4E(6'-2), PO(12'-3½)
903	44'-6		13.08	2.1570		36'-11 156'-2½	0.001773	0.277	
903	44'-6		12.19	4		7'-2	120	13.750	Flow (q) from Route 2
902	44'-6		25.27	4.2600		7'-2	0.000218	0.002	
902	44'-6		2.01	4		12'-10	120	13.752	Flow (q) from Route 4
901	44'-6		27.28	4.2600		12'-10	0.000251	0.003	
901	44'-6		2.50	4	(See Notes)	31'-0	120	13.755	Flow (q) from Route 3 2E(13'-2)
900	44'-6		29.78	4.2600		26'-4 57'-4	0.000295	0.017	
900	44'-6			6	(See Notes)	58'-5	120	13.772	4E(17'-7), f(-0.000), f(-3.000), CV(17'-2½), BV(17'-7), PO(37'-8½)
8	7'-2½		29.78	6.3570		142'-11½ 201'-4½	0.000042	16.163 3.008	
8	7'-2½			6	(See Notes)	21'-0½	120	32.943	E(17'-7)
7	-4'-1½		29.78	6.3570		17'-7 38'-7½	0.000042	4.915 0.002	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
7	-4'-1½			6	(See Notes)	86'-3½	140	37.860	
6	-10'-4		29.78	6.3400		69'-4 155'-7½	0.000032	2.688 0.005	3E(23'-1½)
6	-10'-4			6	(See Notes)	4'-1½	140	40.553	
3	-10'-4		29.78	6.3400		 4'-1½	0.000032	 1.454	BFP(-1.454)
3	-10'-4			6	(See Notes)	11'-2½	140	42.007	
2	-10'-4		29.78	6.3400		 11'-2½	0.000032	 2.000	PIV(-2.000)
2	-10'-4			6	(See Notes)	21'-7	140	44.007	
1	-10'-4		29.78	6.3400		34'-8 56'-3	0.000032	 0.002	E(23'-1½), EE(11'-6½), S
			250.00					44.009	Hose Allowance At Source
1			279.78						Total(Pt) Route 1
904	44'-6		10.17 + 2.02	4		9'-2½	120	13.749	• • • • • **Route 2** • • • • • Flow (q) from Route 5 and 6
903	44'-6		12.19	4.2600		 9'-2½	0.000057	 0.001	
								13.750	Total(Pt) Route 2
927	44'-6		16.70	4		9'-4½	120	13.737	• • • • • **Route 3** • • • • • Flow (q) from Route 7
926	44'-6		4.51	4.2600		 9'-4½	0.000009	 0.000	
926	44'-6			4		10'-0½	120	13.737	
925	44'-6		2.50	4.2600		 10'-0½	0.000003	 0.000	
925	44'-6			2	(See Notes)	187'-4½	120	13.737	PO(12'-3½)
901	44'-6		2.50	2.1570		24'-7½ 212'-0	0.000083	 0.018	PO(12'-3½)
								13.755	Total(Pt) Route 3
926	44'-6			2	(See Notes)	203'-11	120	13.737	• • • • • **Route 4** • • • • • PO(12'-3½)
902	44'-6		2.01	2.1570		55'-4½ 259'-3½	0.000055	 0.014	T(12'-3½), 3E(6'-2), PO(12'-3½)
								13.752	Total(Pt) Route 4

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
927	44'-6		16.70	4		9'-9½	120	13.737	• • • • • **Route 5** • • • • •
928	44'-6		12.19	4.2600		9'-9½	0.000057	0.001	Flow (q) from Route 7
928	44'-6			4	(See Notes)	239'-6	120	13.738	
904	44'-6		10.17	4.2600		52'-8 292'-2	0.000040	0.012	4E(13'-2)
								13.749	Total(Pt) Route 5
928	44'-6			2	(See Notes)	187'-4½	120	13.738	• • • • • **Route 6** • • • • •
904	44'-6		2.02	2.1570		24'-7½ 212'-0	0.000056	0.012	PO(12'-3½) PO(12'-3½)
								13.749	Total(Pt) Route 6
755	44'-6		13.08	2	(See Notes)	82'-6	120	13.473	• • • • • **Route 7** • • • • •
927	44'-6		16.70	2.1570		12'-3½ 94'-9½	0.002785	0.264	Flow (q) from Route 1 PO(12'-3½)
								13.737	Total(Pt) Route 7

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

(Actual Inside Diameter / Schedule 40 Steel Pipe Inside Diameter) 4.87 = Factor

C Value Multiplier

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

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 Relief Valve
PRV	Pressure Reducing Valve	red	Reducer/Adapter	S	Supply
sCV	Swing Check Valve	SFx	Seismic Flex	Spr	Sprinkler
St	Strainer	T	Tee Flow Turn 90°	Tr	Tee Run
U	Union	WirF	Wirsbo	WMV	Water Meter Valve
Z	Cap				

Hydraulic Calculations

for

Project Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING
Location: 1601 39th AVE SE, Puyallup, WA 98374,
Drawing Name: 22-3688 PeirceSTEM-L10-R041-Standpipe Calculation Date: 5/16/2023

Design

Remote Area Number:	ROOF TOP HOSE FLOW
Remote Area Location:	ROOF TOP
Occupancy Classification:	ROOF TOP HOSE FLOW
Commodity Classification:	N/A
Density	0.10gpm/ft²
Area of Application:	1500ft² (Actual 1340ft²)
Coverage per Sprinkler:	130ft²
Type of sprinklers calculated:	NA
No. of sprinklers calculated:	0
No. of nozzles calculated:	0

In-rack Demand:	N/A gpm	at Node:	N/A		
Hose Streams:	0.0 gpm	at Node:	4	Type:	Allowance at Source
	250.00	at Node:	17	Type:	Hose
	250.00	at Node:	19	Type:	Hose
	250.00	at Node:	15	Type:	Hose

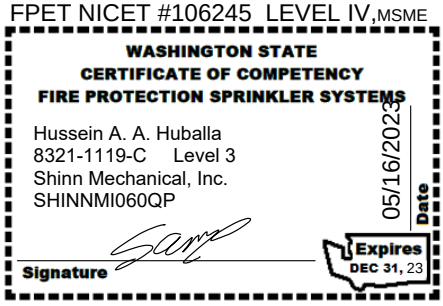
Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 4: 750.00 @ 152.781 (Safety Margin = 1.219)
Type of System: WET
Volume of Dry/PreAction/Antifreeze/OtherAgent N/A

Name of Contractor: SHINN FIRE PROTECTION
Address: 18802 80TH AVE S, KENT WA98032
Phone Number: 425-204-3945
Name of designer: Ben Bernard
Authority Having Jurisdiction: CITY OF PUYALLUP

Notes:

Automatic peaking results Left: N/A Right: N/A

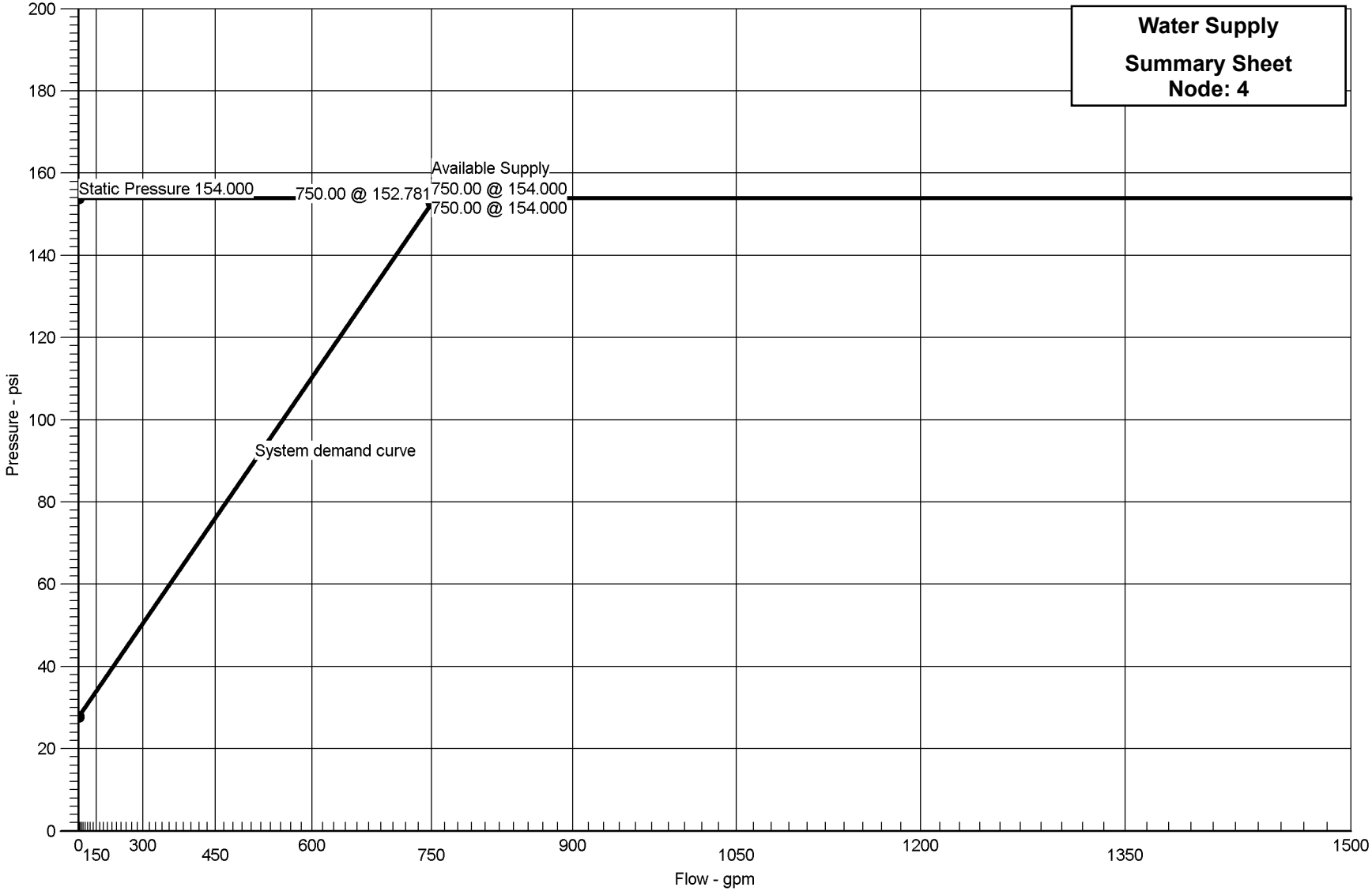
FPET NICET #106245 LEVEL IV, MSME



Hydraulic Graph

Job Name: PIERCE COLLEGE PUYALLUP NEW STEM BUILDING **N** 1.85
Remote Area Number: ROOF TOP HOSE FLOW

Date: 5/16/2023



Summary Of Outflowing Devices

Job Number: 22-3688
Report Description: ROOF TOP HOSE FLOW (ROOF TOP HOSE FLOW)

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Hose	15	250.00	250.00	28.87	101.866		
Hose	17	250.00	250.00	28.87	75.211		
Hose	19	250.00	250.00	28.87	74.987		

⇨ Most Demanding Sprinkler Data

Supply Analysis

Node	Name	Static (psi)	Residual (psi) @	Flow (gpm)	Available (psi) @	Total Demand (gpm)	Required Pressure (psi)
4	Water Supply	154.000	154.000	750.00	154.000	750.00	152.781

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
4	-21'-0	Supply	152.781	750.00	
15	22'-10	Hose	101.866	250.00	Hos
17	42'-10	Hose	75.211	250.00	Hos
19	43'-4	Hose	74.987	250.00	Hos
6	-25'-0		146.726		
7	-18'-9½		141.471		
8	-7'-5½		135.921		
12	1'-3½		126.927		
13	1'-3½		123.870		
14	22'-10		111.128		
16	42'-10		84.474		
18	43'-4		84.250		

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
19	43'-4		250.00	2½	(See Notes)	0'-0	120	74.987	• • • • • **Route 1** • • • • •
						43'-0			Hose(-74.987)(31'-0)
18	43'-4		250.00	2.4690		43'-0	0.215409	9.263	PO(12'-0)
18	43'-4			4		0'-6	120	84.250	
								0.217	
16	42'-10		250.00	4.2600		0'-6	0.015122	0.008	
16	42'-10		250.00	4	(See Notes)	218'-9	120	84.474	Flow (q) from Route 2
						173'-9½		17.995	
13	1'-3½		500.00	4.2600		392'-7	0.054516	21.401	7E(13'-2), PIV(2'-7½), 2T(26'-4), BV(15'-9½), 2EE(5'-3)
13	1'-3½		250.00	4		26'-6	120	123.870	Flow (q) from Route 3
								-0.000	
12	1'-3½		750.00	4.2600		26'-6	0.115423	3.056	
12	1'-3½			6	(See Notes)	30'-4½	120	126.927	
						103'-1		3.801	
8	-7'-5½		750.00	6.3570		133'-5½	0.016432	5.193	3E(17'-7), f(-3.000), BV(12'-7), PO(37'-8½)
8	-7'-5½			6	(See Notes)	21'-0½	120	135.921	
						17'-7		4.915	
7	-18'-9½		750.00	6.3570		38'-7½	0.016432	0.635	E(17'-7)
7	-18'-9½			6	(See Notes)	86'-3½	140	141.471	
						118'-10		2.688	
6	-25'-0		750.00	6.3400		205'-1½	0.012517	2.568	3E(23'-1½), PO(49'-6)
6	-25'-0			4	(See Notes)	31'-3	120	146.726	
						20'-0		-1.734	
4	-21'-0		750.00	4.0260		51'-3	0.151978	7.788	2E(10'-0), S
			0.00					152.781	Hose Allowance At Source
4			750.00						Total(Pt) Route 1
17	42'-10		250.00	2½	(See Notes)	0'-0	120	75.211	• • • • • **Route 2** • • • • •
						43'-0			Hose(-74.987)(31'-0)
16	42'-10		250.00	2.4690		43'-0	0.215409	9.263	PO(12'-0)
								84.474	Total(Pt) Route 2

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
15	22'-10		250.00	2½	(See Notes)	0'-0	120	101.866	• • • • • **Route 3** • • • • •
						43'-0	0.215409		Hose(-74.987)(31'-0)
14	22'-10		250.00	2.4690		43'-0		9.263	PO(12'-0), f(-0.000)
14	22'-10			4	(See Notes)	64'-10	120	111.128	
						160'-7½	0.015122	9.333	
13	1'-3½		250.00	4.2600		225'-5½		3.410	7E(13'-2), 2T(26'-4), BV(15'-9½)
								123.870	Total(Pt) Route 3

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

(Actual Inside Diameter / Schedule 40 Steel Pipe Inside Diameter) 4.87 = Factor

C Value Multiplier

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

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 Relief Valve
PRV	Pressure Reducing Valve	red	Reducer/Adapter	S	Supply
sCV	Swing Check Valve	SFx	Seismic Flex	Spr	Sprinkler
St	Strainer	T	Tee Flow Turn 90°	Tr	Tee Run
U	Union	WirF	Wirsbo	WMV	Water Meter Valve
Z	Cap				