Job Number S23-90G	3				Designer RICHARD N	Λ				
Job Name: CHC PU	YALLUP GARAGE				State Certification/License	e Number				
Address 1		A 00271			AHJ					
Address 2	AIN, POTALLOP, W	4 9037 1			Job Site/Building					
Address 3					Drawing Name					
2 · ·					S23-90 GAR	RAGE NEW	SYSTEM			
System Most Demanding	Sprinkler Data				Remote Area(s	s)	Jc	ob Suffix		
5.6 K-Fa	ctor 19.50 at 12.12	5			Ordinary Gro	oup I		rea of Application		
250.00					0.15 gpm/ft ²		A	900 ft ² (Act	ual 930 ft²)	
Additional Hose S	upplies	Flow	(gpm)		Number Of Sprinklers Cal 11	Iculated Number	Of Nozzles Calculated Co	overage Per Sprinkle 130 ft ²	r	
							L			
Total Hose Stream	ns									
250.00	nand	T	stal Water Required (Including I	Hose Allowance)						
222.90			472.90							
Maximum Pressur 0.000	re Unbalance In Loops									
Maximum Velocity 11.46 be	Above Ground	12								
Maximum Velocity	Under Ground									
- Z ST Den										
Volume capacity of	of Wet Pipes	Ve	olume capacity of Dry Pipes							
Volume capacity of 1032.57	of Wet Pipes	Ve	olume capacity of Dry Pipes							
Volume capacity of 1032.57 Supplies	gal	Hose Flow	olume capacity of Dry Pipes	Residual	Flow A	vailable	Total Demand	Re	quired	Safety Margin
Volume capacity of 1032.57 Supplies Node	gal Name	Hose Flow (gpm)	Static (psi)	Residual (psi) @	Flow A (gpm)	vailable (psi) @	Total Demand (gpm)	Red (quired psi)	Safety Margin (psi)
Volume capacity of 1032.57 Supplies Node 17	v Wet Pipes gal Name Water Supply	Hose Flow (gpm) 250.00	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00	vailable (psi) @ 50.385	Total Demand (gpm) 472.90	Red (41	quired psi) 1.582	Safety Margin (psi) 8.803
Volume capacity of 1032.57 Supplies Node 17	Name Water Supply	Hose Flow (gpm) 250.00	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00	available (psi) @ 50.385	Total Demand (gpm) 472.90	Red (quired psi) 1.582	Safety Margin (psi) 8.803
Volume capacity of 1032.57 Supplies Node 17	Name Water Supply	Hose Flow (gpm) 250.00	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00	wailable (psi) @ 50.385	Total Demand (gpm) 472.90	Re (41	quired psi) 1.582	Safety Margin (psi) 8.803
Volume capacity of 1032.57 Supplies Node 17	vi Wet Pipes gal Name Water Supply	Hose Flow (gpm) 250.00	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00	wailable (psi) @ 50.385	Total Demand (gpm) 472.90	Rei (quired psi) 1.582	Safety Margin (psi) 8.803
Volume capacity of 1032.57 Supplies Node 17	Name Water Supply	Hose Flow (gpm) 250.00	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00	wailable (psi) @ 50.385	Total Demand (gpm) 472.90	Re (41	quired psi) 1.582	Safety Margin (psi) 8.803
Volume capacity of 1032.57 Supplies Node 17	r Wet Pipes gal Name Water Supply	Hose Flow (gpm) 250.00	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00	wailable (psi) @ 50.385	Total Demand (gpm) 472.90	Rei (41	quired psi) 1.582	Safety Margin (psi) 8.803
Volume capacity of 1032.57 Supplies Node 17	Mame Water Supply	Hose Flow (gpm) 250.00	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00	wailable (psi) @ 50.385	Total Demand (gpm) 472.90	Red (quired psi) 1.582	Safety Margin (psi) 8.803
Volume capacity of 1032.57 Supplies Node 17	Name Water Supply	Hose Flow (gpm) 250.00	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00	wailable (psi) @ 50.385	Total Demand (gpm) 472.90	Rei (41	quired psi) 1.582	Safety Margin (psi) 8.803
Volume capacity of 1032.57 Supplies Node 17	Mame Water Supply	Hose Flow (gpm) 250.00	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00	wailable (psi) @ 50.385	Total Demand (gpm) 472.90	Rei (quired psi) 1.582	Safety Margin (psi) 8.803
Volume capacity of 1032.57 Supplies Node 17	Name Water Supply	Hose Flow (gpm) 250.00	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00	wailable (psi) @ 50.385	Total Demand (gpm) 472.90	Red (quired psi) 1.582	Safety Margin (psi) 8.803
Volume capacity of 1032.57 Supplies Node 17	y Wet Pipes gal Name Water Supply	Hose Flow (gpm) 250.00	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00	wailable (psi) @ 50.385	Total Demand (gpm) 472.90	Rei (quired psi) 1.582	Safety Margin (psi) 8.803
Volume capacity of 1032.57 Supplies Node 17	Marrie Mar Marrie Marrie Marri	Hose Flow (gpm) 250.00	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00	wailable (psi) @ 50.385	Total Demand (gpm) 472.90	Red (quired psi) 1.582	Safety Margin (psi) 8.803
Volume capacity of 1032.57 Supplies Node 17	Name Water Supply	Hose Flow (gpm) 250.00	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00	wailable (psi) @ 50.385	Total Demand (gpm) 472.90	Rei (quired psi) 1.582	Safety Margin (psi) 8.803
Volume capacity of 1032.57 Supplies Node 17	Mame Water Supply	Hose Flow (gpm) 250.00	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00	Available (psi) @ 50.385	Total Demand (gpm) 472.90	Red (quired psi) 1.582	Safety Margin (psi) 8.803
Volume capacity of 1032.57 Supplies Node 17	Mame Mare Supply Water Supply Contractor Number 22	er	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00 3	Available (psi) @ 50.385	Total Demand (gpm) 472.90	Re. (quired psi) 1.582 Contact Title OWNER	Safety Margin (psi) 8.803
Volume capacity of 1032.57 Supplies Node 17 Contractor	In the second se	Hose Flow (gpm) 250.00	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00 3 460.00 3	Available (psi) @ 50.385 50.385 ARCHER '222	Total Demand (gpm) 472.90	Red ((41	quired psi) 1.582 Contact Title OWNER Extension	Safety Margin (psi) 8.803
Volume capacity of 1032.57 Supplies Node 17 17 Contractor Name of Contract ARCHEF Address 1 7855 S 2	Contractor Number 22 Contractor Number 20 Contractor Number 20 Contracto	Hose Flow (gpm) 250.00	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00 3 460.00 3 7 7 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 7 7 8 7 8 7 7 7 8 7 7 7 8 7 7 7 8 7 7 7 7 8 7 7 7 7 8 7 7 7 7 7 8 7	Archer Vallable (psi) @ 50.385	Total Demand (gpm) 472.90	Red ((41	quired psi) 1.582 Contact Title OWNER Extension	Safety Margin (psi) 8.803
Volume capacity of 1032.57 Supplies Node 17 17 Contractor ARCHEF Address 1 7855 S 2 Address 2	Contractor Number 22 Contractor Number 20 Contractor Number 20 Contracto	Hose Flow (gpm) 250.00	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00 5 460.00 5 460.00 5 5 460.00 5 5 5 7 7 7 7 7 7 7 7 8 7 8 7 8 7 8 7 8	Available (psi) @ 50.385 50.385 ARCHER '222	Total Demand (gpm) 472.90	Red ((41	quired psi) 1.582 Contact Title OWNER Extension	Safety Margin (psi) 8.803
Volume capacity of 1032.57 Supplies Node 17 17 Contractor Name of Contract ARCHEF Address 1 7855 S 2 Address 2 Address 3	Contractor Number 22 Contractor Number 20 Contractor Number 20 Contracto	er 98032	Static (psi) 51.000	Residual (psi) @ 38.000 2	Flow A (gpm) 460.00 3 460.00 3	ARCHER	Total Demand (gpm) 472.90	Red ((41	quired psi) 1.582	Safety Margin (psi) 8.803







Summary Of Outflowing Devices

						· · · · · · · · · · · · · · · · · · ·	
	Device	Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	100	21.62	19.50	5.6	14.903		
Sprinkler	103	19.88	19.50	5.6	12.604		
Sprinkler	104	19.80	19.50	5.6	12.496		
Sprinkler	105	20.07	19.50	5.6	12.845		
Sprinkler	107	20.05	19.50	5.6	12.824		
📫 Sprinkler	108	19.50	19.50	5.6	12.125		
Sprinkler	109	19.73	19.50	5.6	12.410		
Sprinkler	110	19.64	19.50	5.6	12.306		
Sprinkler	600	21.52	19.50	5.6	14.770		
Sprinkler	607	21.46	19.50	5.6	14.681		
Sprinkler	608	19.63	19.50	5.6	12.292		

➡ Most Demanding Sprinkler Data

Node Analysis

NodeElevation(Foot)FittingsPressure(psi)Discharge(gpm)17 $-6\cdot11$ S 41.52 22.90 100 $-8\cdot6$ Spr(-14.903) 14.903 21.62 103 $10\cdot9$ Spr(-12.604) 12.604 19.88 104 $10\cdot9$ Spr(-12.496) 12.604 19.88 105 $-8\cdot6$ Spr(-12.845) 12.845 20.07 107 $-8\cdot6$ Spr(-12.24) 12.845 20.07 108 $-8\cdot6$ Spr(-12.24) 12.842 20.05 109 $11\cdot2$ Spr(-12.26) 12.260 19.64 100 $-8\cdot5$ Spr(-12.26) 12.206 19.64 600 $-8\cdot5$ Spr(-12.706) 12.306 19.64 600 $-8\cdot5$ Spr(-14.770) 14.770 21.52 607 $-8\cdot5$ Spr(-14.770) 14.770 21.52 607 $-8\cdot5$ Spr(-12.22) 12.292 19.63 10 $-11\cdot2$ Spr(-12.22) 12.292 19.63 11 $-6\cdot11$ $E(24\cdot2)$ 36.123 -16.166 2 -20.9 23.480 -16.166 3 -7.9 mecT($20\cdot2$) 21.124 -16.166 6 -7.9 mecT($20\cdot2$) 21.124 -16.166 6 -7.9 mecT($20\cdot2$) 11.264 -16.166 79 $-10.167.40$ -16.166 -16.166 9 -10.4 -16.166 -16.166 -16.166 11 $-10.96(5-0)$ -15.887 -16.166 <	Report Description: Ordinary Gro								
17 -6^{-11} S $441,682$ 222.90 100 -8^{-6} Spr(-12.490) -14.903 21.62 103 -10^{-9} Spr(-12.496) -12.604 19.80 104 -10^{-6} Spr(-12.485) -12.484 20.07 107 -8^{-6} Spr(-12.2845) -12.845 20.07 108 -8^{-6} Spr(-12.25) -12.125 19.50 109 -11^{-2} Spr(-12.25) -12.125 19.50 100 -8^{-6} Spr(-12.25) -12.126 19.64 1010 -11^{-2} Spr(-12.306) -12.410 19.73 1010 -11^{-2} Spr(-12.306) -12.306 19.64 600 -8^{-5} Spr(-14.770) -14.4770 21.52 607 -8^{-5} Spr(-14.770) -14.770 21.52 608 -8^{-5} Spr(-12.292) -12.292 19.63 -110 -8^{-6} Spr(-12.292) -12.292 19.63 -11 -8^{-11} $E(2^{4}-2)$ -86.123 -16.123 -12 -20.0 $P(026-4)$ -23.141 -16.123 -12 -20.0 -12.124 -16.123 -16.123 -14 -0.12 -16.123 -16.123 -16.123 -15 -7.9 $-86(-50)$ -33.077 -16.164 -14 $-90(5-0)$ -15.844 -16.123 -16.123 -15 -10.14 -10.141 -10.164 -10.141 -16 -10.141 -10.1641	Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)				
100 $\$-6$ Spr(-14.903)14.90321.62103 $10\cdot9$ Spr(-12.604)12.60419.88104 $10\cdot9$ Spr(-12.605)12.24619.80105 $\$-6$ Spr(-12.845)12.64520.07107 $\$-6$ Spr(-12.824)12.84220.05108 $\$-6$ Spr(-12.824)12.12519.50109 $11\cdot2$ Spr(-12.125)12.12519.50100 $\$-6$ Spr(-12.10)12.41019.73110111·2Spr(-12.10)12.30619.64600 $\$-5$ Spr(-14.81)14.68121.46600 $\$-5$ Spr(-14.81)14.68121.46601 $\$-5$ Spr(-14.81)14.68121.46602 $\$-5$ Spr(-14.81)14.68121.46603 $\$-5$ Spr(-12.92)12.29219.6311 $-6\cdot11$ $E(2+2)$ 36.1231412 $2(2-2)$ 33.077 141413 -7.3 $E(9-5)$ 23.4001414 0.0 33.077 14.1641415 -7.9 mecT(20-2)21.1241416 -7.9 $mecT(20-2)$ 15.8841414 10.4 $P(5-0)$ 15.8871415 11.62 $P(5-0)$ 15.8821416 11.24 $P(5-0)$ 15.8321416 11.24 $P(5-0)$ 15.8321416 11.24 $P(5-0)$ 15.832<	17	-6'-11	S	41.582	222.90				
10310-9Spr(-12.604)12.60419.80104 $(10-9)$ Spr(-12.496) 12.496 19.80 105 8^+6 Spr(-12.246) 12.845 20.07 107 8^+6 Spr(-12.224) 12.842 20.65 108 8^+6 Spr(-12.125) 112.125 19.50 109 11^+2 Spr(-12.126) 12.101 19.73 100 11^+2 Spr(-12.306) 12.306 19.64 600 8^+5 Spr(-14.770) 14.4770 21.52 607 8^+5 Spr(-14.292) 12.292 19.63 608 8^+5 Spr(-12.292) 12.292 19.63 11 -6^+11 $E(24^+2)$ 36.123 -6^+11 2 2.0^+0 $PO(26^+4)$ 32.134 -6^+11 3 7^+3 $E(9^-5)$ 23.480 -6^+11 4 0^-0 33.077 -6^+11 $-6^+11^+11^-11^-11^-11^-11^-11^-11^-11^-11$	100	8'-6	Spr(-14.903)	14.903	21.62				
1041019Spr(12.496)12.49612.24619.801056.86Spr(12.845)12.28420.0511078.66Spr(12.824)12.82420.0511088.66Spr(12.125)12.12519.5011091112Spr(12.125)12.20612.30619.646008.65Spr(14.70)14.7021.5216078.65Spr(14.70)14.7021.5216088.65Spr(14.72)12.29219.0316098.65Spr(14.72)36.123116018.65Spr(14.70)14.27036.12316029.62.9212.29219.03116038.65Spr(14.70)36.1231179.62.9138.12311179.62.9138.12311189.67.9116.74033.07711710.446.95.9115.86411810.44P0(5-0)15.86711810.44P0(5-0)15.86711910.44P0(5-0)15.867111010.99P0(5-0)15.863111110.99P0(5-0)15.862111210.99P0(5-0)15.862111310.99P0(5-0)15.8621114 <td>103</td> <td>10'-9</td> <td>Spr(-12.604)</td> <td>12.604</td> <td>19.88</td> <td></td>	103	10'-9	Spr(-12.604)	12.604	19.88				
105 8^{+6} Spr(-12.845) 12.845 20.07 107 8^{+6} Spr(-12.824) 12.824 20.05 108 8^{+6} Spr(-12.125) 12.125 19.50 109 11^{+2} Spr(-12.120) 12.410 19.73 110 11^{+2} Spr(-12.306) 12.306 19.64 600 8^{+5} Spr(-14.70) 14.770 21.52 607 8^{+5} Spr(-14.681) 14.681 21.46 608 8^{+5} Spr(-12.292) 12.292 19.63 11 -6^{+11} $E(2^{+2})$ 36.123 $22^{-0}PO(26^{-4})32.134$	104	10'-9	Spr(-12.496)	12.496	19.80				
107 8° 8_{0} 8_{0} 8_{0} 8_{0} 12_{0} 12_{0} 20_{0} 108 8° 8_{0} 11° 8_{0} 12_{125} 19_{50} 10_{10} 109 11° 8_{0} 12_{10} 12_{10} 19_{0} 10_{10} 100 11° 8_{0} 12_{306} 12_{306} 19_{64} 10_{10} 100 8° 8_{0} 12_{10} 14_{10} 21_{10} 10_{10} 100 8° 8_{0} 14_{10} 14_{10} 21_{10} 10_{10} 110 6° 8_{0} 8_{0} 8_{0} 8_{0} 10_{10} 10_{10} 111 6° 8_{0} 8_{0} 8_{0} 10_{10} 10_{10} 10_{10} 111 6° 9_{0} 21_{0} 10_{10} 10_{10} 10_{10} 10_{10} 111 10° 9_{0} 10_{10} 10_{10} 10_{10} 10_{10} 10_{10} 111 10° 9_{0} 10_{10} 10_{10} 10_{10} 10_{10} 10_{10} 10_{10} 111 10° 9_{0} 10_{10} 10_{10} 10_{10} 10_{10} 10_{10} 10_{10} 112 10° 9_{0} 10_{10} 10_{10} 10_{10} 10_{10} 10_{10} 10_{10} 112 10° 9_{0} 10_{10} 10_{10} 10_{10} 10_{10} 10_{10} 10_{10} 113 10° <td>105</td> <td>8'-6</td> <td>Spr(-12.845)</td> <td>12.845</td> <td>20.07</td> <td></td>	105	8'-6	Spr(-12.845)	12.845	20.07				
108 $8^{\circ}6$ Spr(-12.125)12.12519.5010911'-2Spr(-12.410)12.41019.7311011'-2Spr(-12.306)12.30619.64600 $8^{\circ}5$ Spr(-14.770)14.77021.52607 $8^{\circ}5$ Spr(-14.681)14.68121.46608 $8^{\circ}5$ Spr(-12.292)12.29219.631-6'.11E(24'-2)36.123	107	8'-6	Spr(-12.824)	12.824	20.05				
10911-2Spr(-12.410)12.41019.7311011'-2Spr(-12.306)12.30619.64600 8.5 Spr(-12.306)14.77021.52607 8.5 Spr(-14.770)14.77021.52607 8.5 Spr(-12.292)12.29219.631 -6.11 E(24.2)36.123122.0PO(26.4)32.13413 7.3 E(9.5)23.480140.033.077115 7.9 mecT(20'-2)21.12416 7.9 mecT(20'-2)21.1241710.4C(9.11)16.7401810.4PO(5-0)15.8871910.4PO(5-0)15.88711010.9PO(5-0)12.29811110.9PO(5-0)13.82311210.9PO(5-0)13.82311310.9PO(5-0)13.81411411.2PO(5-0)13.81411511.2PO(5-0)13.81411611.2PO(5-0)13.81411611.2PO(5-0)13.81411611.2PO(5-0)13.814118 -6.11 T(9.73)41.5651	108	8'-6	Spr(-12.125)	12.125	19.50				
11011'-2Spr(-12.306)12.30619.64600 $8'-5$ Spr(-14.770)14.77021.52607 $8'-5$ Spr(-14.681)14.68121.46608 $8'-5$ Spr(-12.292)12.29219.631 $-6'-11$ $E(24'-2)$ 36.123122'-0PO(26'-4)32.13413 $7'-3$ $E(9'-5)$ 23.480140'-033.0771157'-9mecT(26'-4)21.728167'-9mecT(26'-4)21.7281710'-4C(9'-11)16.7401810'-4PO(5'-0)15.8571910'-4PO(5'-0)15.85711010'-9C(9'-11)16.16811110'-9PO(5'-0)13.82311210'-9PO(5'-0)15.83211310'-9PO(5'-0)13.61411411'-2PO(5'-0)13.61411511'-2PO(5'-0)12.79611611'-2T(9'-11)15.923118-6'+11T(47'-3)41.5651	109	11'-2	Spr(-12.410)	12.410	19.73				
600 $8^{+}5$ Spr(-14.770) 14.770 21.52 607 $8^{+}5$ Spr(-14.681) 14.681 21.46 608 $8^{+}5$ Spr(-12.292) 12.292 19.63 1 $-6^{+}11$ $E(24^{+}2)$ 36.123 $-6^{-}11$ 2 $2^{+}0$ $PO(26^{+}4)$ 32.134 $-6^{-}11$ 3 $7^{-}3$ $E(9^{-}5)$ 23.480 $-6^{-}11$ 4 $0^{-}0$ 33.077 $-6^{-}11$ 5 $7^{+}9$ mecT(26^{+}4) 21.728 $-6^{-}11$ 6 $7^{-}9$ mecT(20^{-}2) 21.124 $-6^{-}11$ 6 $7^{-}9$ mecT(20^{-}2) 21.124 $-6^{-}11$ 7 $10^{-}4$ $C(9^{-}11)$ 16.740 $-6^{-}11$ 8 $10^{+}4$ $PO(5^{-}0)$ 15.857 $-6^{-}11$ 10 $10^{+}9$ $PO(5^{-}0)$ 15.857 $-6^{-}11$ 11 $10^{-}9$ $PO(5^{-}0)$ 13.823 $-6^{-}11$ 13 $10^{+}9$ $PO(5^{-}0)$ 13.814 $-6^{-}11$ 14 $11^{+}2$ $PO(5^{-}0)$ 13.614 $-6^{-}11$ 16 $11^{+}2$ $TO(5^{-}0)$ 12.796 $-6^{-}11$ 16 $11^{+}2$ $TO(5^{-}0)$ 12.796 $-6^{-}11$ 18 $-6^{-}11$ $T(47^{-}3)$ 41.565 $-6^{-}11$	110	11'-2	Spr(-12.306)	12.306	19.64				
607 $8 \cdot 5$ Spr(-14.681) 14.681 21.46 608 $8 \cdot 5$ Spr(-12.292) 12.292 19.63 1 $-6 \cdot 11$ $E(24 \cdot 2)$ 36.123 2 $2 \cdot 0$ PO(26'-4) 32.134 3 $7 \cdot 3$ $E(9 \cdot 5)$ 23.480 4 $0 \cdot 0$ 33.077 5 $7 \cdot 9$ mcT(26'-4) 21.728 6 $7 \cdot 9$ mcT(20'-2) 21.124 7 $10' \cdot 4$ $C(9' \cdot 11)$ 16.740 8 $10' \cdot 4$ PO(5' · 0) 15.857 9 $10' \cdot 4$ PO(5' · 0) 15.857 10 $10' \cdot 9$ PO(5' · 0) 13.823 11 $10' \cdot 9$ PO(5' · 0) 13.823 12 $10' \cdot 9$ PO(5' · 0) 13.823 13 $10' \cdot 9$ PO(5' · 0) 13.814 14 $11' \cdot 2$ PO(5' · 0) 13.614 15 $11' \cdot 2$ PO(5' · 0) 12.796 18 $-6' \cdot 11$ $1(4' \cdot 3)$ 41.565	600	8'-5	Spr(-14.770)	14.770	21.52				
608 $8^{+}5$ Spr(-12.292) 12.292 19.63 1 $-6^{+}11$ $E(2^{4}\cdot2)$ 36.123 $22^{+}0PO(26^{+}4)32.134$	607	8'-5	Spr(-14.681)	14.681	21.46				
1 $-6-11$ $E(24-2)$ 36.123 $(-6-11)$ 2 $2^{\circ}0$ $PO(26^{\circ}-4)$ 32.134 $(-6-1)^{\circ}$ 3 $7^{\circ}-3$ $E(9^{\circ}-5)$ 23.480 $(-6-1)^{\circ}$ 4 $0^{\circ}0$ 33.077 $(-6-1)^{\circ}$ 33.077 5 $7^{\circ}-9$ mecT(26^{\circ}-4) 21.728 $(-6-1)^{\circ}$ 6 $7^{\circ}-9$ mecT(20^{\circ}-2) 21.124 $(-6-1)^{\circ}$ 7 $10^{\circ}-4$ $C(9^{\circ}-1)$ 16.740 $(-6-1)^{\circ}$ 8 $10^{\circ}-4$ $PO(5^{\circ}-0)$ 15.884 $(-6-1)^{\circ}$ 9 $10^{\circ}-4$ $PO(5^{\circ}-0)$ 15.857 $(-6-1)^{\circ}$ 10 $10^{\circ}-9$ $C(9^{\circ}-1)$ 16.168 $(-6-1)^{\circ}$ 11 $10^{\circ}-9$ $PO(5^{\circ}-0)$ 13.823 $(-6-1)^{\circ}$ 12 $10^{\circ}-9$ $PO(5^{\circ}-0)$ 15.832 $(-6-1)^{\circ}-11^{\circ}-11^{\circ}$ 14 $11^{\circ}-2$ $PO(5^{\circ}-0)$ 12.796 $(-6-1)^{\circ}-11^{\circ}-$	608	8'-5	Spr(-12.292)	12.292	19.63				
2 $2'-0$ $PO(26'-4)$ 32.134 4 3 $7'-3$ $E(9'-5)$ 23.480 4 4 $0'-0$ 33.077 33.077 5 $7'-9$ mecT(26'-4) 21.728 6 $7'-9$ mecT(20'-2) 21.124 7 $10'-4$ $C(9'-11)$ 16.740 8 $10'-4$ $PO(5'-0)$ 15.984 9 $10'-4$ $PO(5'-0)$ 15.857 10 $10'-9$ $C(9'-11)$ 16.168 11 $10'-9$ $PO(5'-0)$ 12.998 12 $10'-9$ $PO(5'-0)$ 13.823 13 $10'-9$ $PO(5'-0)$ 13.832 14 $11'-2$ $PO(5'-0)$ 13.614 15 $11'-2$ $PO(5'-0)$ 12.796 16 $11'-2$ $T(9'-11)$ 15.923 18 $-6'-11$ $T(4'-3)$ 41.565	1	-6'-11	E(24'-2)	36.123					
3 $7\cdot3$ $E(9\cdot5)$ 23.480 4 $0\cdot0$ 33.077 5 $7\cdot9$ mcT(26'-4) 21.728 6 $7\cdot9$ mcT(20'-2) 21.124 7 $10\cdot4$ $C(9\cdot11)$ 16.740 8 $10\cdot4$ $PO(5\cdot0)$ 15.984 9 $10\cdot4$ $PO(5\cdot0)$ 15.857 10 $10\cdot9$ $C(9\cdot11)$ 16.168 11 $10\cdot9$ $PO(5\cdot0)$ 13.823 12 $10\cdot9$ $PO(5\cdot0)$ 13.823 13 $10\cdot9$ $PO(5\cdot0)$ 13.614 14 $11\cdot2$ $PO(5\cdot0)$ 12.796 16 $11\cdot2$ $T(9\cdot11)$ 15.923 18 $-6\cdot11$ $T(47\cdot3)$ 41.565	2	2'-0	PO(26'-4)	32.134					
4 $0'-0$ 33.077 33.077 5 $7'-9$ mecT(26'-4) 21.728 6 $7'-9$ mecT(20'-2) 21.124 7 $10'-4$ $C(9'-11)$ 16.740 8 $10'-4$ PO(5'-0) 15.867 9 $10'-4$ PO(5'-0) 15.857 10 $10'-9$ $C(9'-11)$ 16.168 11 $10'-9$ PO(5'-0) 12.998 12 $10'-9$ PO(5'-0) 13.823 13 $10'-9$ PO(5'-0) 15.832 14 $11'-2$ PO(5'-0) 13.614 15 $11'-2$ PO(5'-0) 12.796 16 $11'-2$ T(9'-11) 15.923 18 $-6'-11$ $T(47'-3)$ 41.565	3	7'-3	E(9'-5)	23.480					
5 7'-9 mecT(26'-4) 21.728 6 7'-9 mecT(20'-2) 21.124 7 10'-4 C(9'-1) 16.740 8 10'-4 PO(5'-0) 15.984 9 10'-4 PO(5'-0) 15.857 10 10'-9 C(9'-11) 16.168 11 10'-9 PO(5'-0) 11.298 11 10'-9 PO(5'-0) 13.823 12 10'-9 PO(5'-0) 15.832 13 10'-9 PO(5'-0) 13.823 14 11'-2 PO(5'-0) 13.614 15 11'-2 PO(5'-0) 13.614 14 11'-2 PO(5'-0) 12.796 16 11'-2 T(9'-1) 15.923	4	0'-0		33.077					
6 7.9 mecT(20'-2) 21.124 21.124 7 $10'-4$ $C(9'-11)$ 16.740 16.740 8 $10'-4$ $PO(5'-0)$ 15.984 $10'-4$ 9 $10'-4$ $PO(5'-0)$ 15.857 $10'-6'-11$ 10 $10'-9$ $C(9'-11)$ 16.168 $10'-6'-11$ 11 $10'-9$ $PO(5'-0)$ 12.998 $10'-6'-11$ 12 $10'-9$ $PO(5'-0)$ 13.823 $10'-6'-11$ 13 $10'-9$ $PO(5'-0)$ 15.832 $10'-6'-11$ 14 $11'-2$ $PO(5'-0)$ 13.614 $10'-6'-11$ 15 $11'-2$ $PO(5'-0)$ 12.796 $10'-6'-11$ 16 $11'-2$ $T(9'-11)$ 15.923 $10'-6'-11$ 18 $-6'-11$ $T(47'-3)$ 41.565 $10'-2$	5	7'-9	mecT(26'-4)	21.728					
7 $10'-4$ $C(9'-11)$ 16.740 16.740 8 $10'-4$ $PO(5'-0)$ 15.984 $10'-4$ 9 $10'-4$ $PO(5'-0)$ 15.857 $10'-6$ 10 $10'-9$ $C(9'-11)$ 16.168 $10'-6$ 11 $10'-9$ $PO(5'-0)$ 12.998 $10'-6$ 12 $10'-9$ $PO(5'-0)$ 13.823 $10'-6$ 13 $10'-9$ $PO(5'-0)$ 15.832 $10'-6$ 14 $11'-2$ $PO(5'-0)$ 13.614 $10'-6$ 15 $11'-2$ $PO(5'-0)$ 12.796 12.796 16 $11'-2$ $T(9'-11)$ 15.923 $10'-6$ 18 $-6'-11$ $T(47'-3)$ 41.565 $10'-6$	6	7'-9	mecT(20'-2)	21.124					
8 10'-4 PO(5'-0) 15.984 9 10'-4 PO(5'-0) 15.857 10 10'-9 C(9'-11) 16.168 11 10'-9 PO(5'-0) 12.998 12 10'-9 PO(5'-0) 13.823 13 10'-9 PO(5'-0) 15.832 14 11'-2 PO(5'-0) 13.614 15 11'-2 PO(5'-0) 12.796 16 11'-2 T(9'-11) 15.923	7	10'-4	C(9'-11)	16.740					
9 10'-4 PO(5'-0) 15.857 10 10'-9 C(9'-11) 16.168 11 10'-9 PO(5'-0) 12.998 12 10'-9 PO(5'-0) 13.823 13 10'-9 PO(5'-0) 15.832 14 11'-2 PO(5'-0) 13.614 15 11'-2 PO(5'-0) 12.796 16 11'-2 T(9'-11) 15.923 18 -6'-11 T(47'-3) 41.565	8	10'-4	PO(5'-0)	15.984					
10 10'-9 C(9'-11) 16.168 11 10'-9 PO(5'-0) 12.998 12 10'-9 PO(5'-0) 13.823 13 10'-9 PO(5'-0) 15.832 14 11'-2 PO(5'-0) 13.614 15 11'-2 PO(5'-0) 12.796 16 11'-2 T(9'-11) 15.923 18 -6'-11 T(47'-3) 41.565	9	10'-4	PO(5'-0)	15.857					
11 10'-9 PO(5'-0) 12.998 12.998 12 10'-9 PO(5'-0) 13.823 13.823 13 10'-9 PO(5'-0) 15.832 14.11'-2 14 11'-2 PO(5'-0) 13.614 14.11'-2 15 11'-2 PO(5'-0) 12.796 14.11'-2 16 11'-2 T(9'-11) 15.923 14.1565	10	10'-9	C(9'-11)	16.168					
12 10'-9 PO(5'-0) 13.823 13 10'-9 PO(5'-0) 15.832 14 11'-2 PO(5'-0) 13.614 15 11'-2 PO(5'-0) 12.796 16 11'-2 T(9'-11) 15.923 18 -6'-11 T(47'-3) 41.565	11	10'-9	PO(5'-0)	12.998					
13 10'-9 PO(5'-0) 15.832 14 11'-2 PO(5'-0) 13.614 15 11'-2 PO(5'-0) 12.796 16 11'-2 T(9'-11) 15.923 18 -6'-11 T(47'-3) 41.565	12	10'-9	PO(5'-0)	13.823					
14 11'-2 PO(5'-0) 13.614 15 11'-2 PO(5'-0) 12.796 16 11'-2 T(9'-11) 15.923 18 -6'-11 T(47'-3) 41.565	13	10'-9	PO(5'-0)	15.832					
15 11'-2 PO(5'-0) 12.796 16 11'-2 T(9'-11) 15.923 18 -6'-11 T(47'-3) 41.565	14	11'-2	PO(5'-0)	13.614					
16 11'-2 T(9'-11) 15.923 18 -6'-11 T(47'-3) 41.565	15	11'-2	PO(5'-0)	12.796					
18 -6'-11 T(47'-3) 41.565	16	11'-2	T(9'-11)	15.923					
	18	-6'-11	T(47'-3)	41.565					



Hydraulic Analysis

Pipe Type	Diameter	Flow	Velocity	нмс		Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	
Route 1 ••	•••	10.50	7.0.1	100		0.404477		
108	<u>1.0490</u> 8'-6	19.50	<u>7.24</u> 5.6	120		0.124177 Sprinkler		Pf 1.807 Pe -1 136
15	11'-2	10.00	0.0	12.796		2F(2'-0) PO(5'-0)	14'-7	Pv
BL	1.6820	58.87	8.50	120		0.096209	8'-6	Pf 0.821
15	11'-2	39.37		12.796		Flow (q) from Route 3		Pe -0.002
14	11'-2			13.614			8'-6	Pv
BL	1.6820	78.93	11.40	120		0.165478	4'-1	Pf 2.310
14	11'-2	20.05		13.614		Flow (q) from Route 5	9'-11	Pe -0.001
16	11-2			15.923		T(9'-11)	14-0	Pv
 16	3.2600	78.93	3.03	120		0.006594		Pf 0.071
10	10'-9			16.168			10'-10	Pv
CM	3 2600	179 76	6 91	120		0.030233	12'-8	Pf 0.383
10	10'-9	79.38 + 21.46	0.01	16.168		Flow (q) from Route 2 and 7		Pe 0.190
7	10'-4			16.740			12'-8	Pv
CM	3.2600	222.90	8.57	120		0.045009	48'-4	Pf 3.264
7	10'-4	43.14		16.740		Flow (q) from Route 8	24'-2	Pe 1.120
6	7'-9			21.124		Ee1(4'-0), mecT(20'-2)	72'-6	Pv
CM	4.2600	222.90	5.02	120		0.012231	23'-0	Pf 0.604
5	7-9 7'-9			21.124			20-4	Pe
CM	2 2600	222.00	9 57	120		meci(26'-4)		FV Df 1526
5	7'-9	222.90	0.37	21.728		0.045009	24-9 9'-5	Pr 1.530 Pe 0.216
3	7'-3			23.480		F(9'-5)	34'-2	Pv
СМ	4.2600	222.90	5.02	120		0.012231	5'-3	Pf 6.386
3	7'-3			23.480			26'-4	Pe 2.268
2	2'-0			32.134		BV(-6.000), PO(26'-4)	31'-7	Pv
СМ	6.3570	222.90	2.25	120		0.001741	6'-0	Pf 0.076
2	2'-0			32.134			37'-9	Pe 0.867
4	0-0			33.077		PO(37'-9)	43-9	Pv
UG	6.4000	222.90	2.22	33 077		0.001267		Pf 0.039
1	-6'-11			36.123		E(24' 2)	31'-2	Pv 3.000
	6.2800	222 00	2 31	140		0.001389	204'-10	Df 5/1/2
1	-6'-11	222.00	2.01	36.123		0.001000	113'-6	Pe
18	-6'-11			41.565		3E(22'-1), BFP(-5.000), T(47'-3)	318'-4	Pv
UG	8.3900	222.90	1.29	140		0.000339	50'-9	Pf 0.017
18	-6'-11			41.565				Pe
17	-6'-11			41.582		Water Supply	50'-9	Pv
		250.00				Hose Allowance At Source		
17		472.90						
Davita 0								
	1 0/00	10.63	7 20	120		0 125755	<i>I</i> ' 7	Df 1 710
608	8'-5	19.63	5.6	12.292		Sprinkler.	9'-0	Pe -1.003
11	10'-9			12.998		2E(2'-0), PO(5'-0)	13'-7	Pv
BL	1.6820	59.31	8.56	120		0.097538	8'-5	Pf 0.824
11	10'-9	39.68		12.998		Flow (q) from Route 4		Pe
12	10'-9			13.823			8'-5	Pv
BL	1.6820	79.38	11.46	120		0.167246	4'-1	Pf 2.345
12	10'-9	20.07		13.823		Flow (q) from Route 6	9'-11	Pe
TU Deute 2	10-9			10.100		C(9'-11)	14-0	PV
BI	1 6820	19.64	2 84	120		0.012630	8'-5	Pf 0 106
110	11'-2	19.64	5.6	12.306		Sprinkler		Pe -0.002
109	11'-2			12.410		·	8'-5	Pv
BL	1.6820	39.37	5.68	120		0.045707	8'-6	Pf 0.389
109	11'-2	19.73	5.6	12.410		Sprinkler		Pe -0.002
15	11'-2			12.796			8'-6	Pv
	•••							
104	1.6820	19.80	2.86	120		0.012810		Pf 0.108
104	10-9 10'-9	19.00	0.0	12.490		эрппкіег	8'-5	Pv
BI	1 6820	39.68	5.73	120		0.046363	ס-0 איג	Pf 0.395
103	10'-9	19.88	5.6	12.604		Sprinkler		Pe
11	10'-9			12.998		·	8'-6	Pv
🛥 ••••• Route 5 ••	•••							

Hydraulic Analysis
Hydraulic Analysis

	uu							Re	port Description:	Ordir	ary Group
Pipe Type	Diameter	Flow	Velocity	HWC		Friction Los	s		Length	Pres	ssure
Downstream Upstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings			Eq. Length Total Length	Sun	nmary
DR	1.0490	20.05	7.44	120		0.130781			5'-9	Pf	1.928
107	8'-6	20.05	5.6	12.824		Sprinkler,			9'-0	Pe	-1.138
14	11'-2			13.614		2E(2'-0), PO	0(5'-0)		14'-9	Pv	
🛥 • • • • Rou	te 6 • • • •						<u> </u>		<u>_</u>		
DR	1.0490	20.07	7.45	120		0.130981			5'-11	Pf	1.953
105	8'-6	20.07	5.6	12.845		Sprinkler,			9'-0	Pe	-0.975
12	10'-9			13.823		2E(2'-0), PO)(5'-0)		14'-11	Pv	
👄 • • • • Rou	te 7 • • • •										
DR	1.0490	21.46	7.97	120		0.148208			5'-8	Pf	2.176
607	8'-5	21.46	5.6	14.681		Sprinkler,			9'-0	Pe	-1.025
13	10'-9			15.832		2E(2'-0), PO	0(5'-0)		14'-8	Ρv	
BL	1.6820	21.46	3.10	120		0.014869			12'-8	Pf	0.336
13	10'-9			15.832					9'-11	Pe	
10	10'-9			16.168		Z, C(9'-11)			22'-7	Pv	
🛥 • • • • Rou	te 8 • • • • •					<u> </u>					
DR	1.0490	21.52	7.99	120		0.149043			3'-10	Pf	1.914
600	8'-5	21.52	5.6	14.770		Sprinkler,			9'-0	Pe	-0.828
9	10'-4			15.857		2E(2'-0), PO	0(5'-0)		12'-10	Ρv	
BL	1.6820	21.52	3.11	120		0.014953	<u> </u>		8'-6	Pf	0.127
9	10'-4			15.857					7	Pe	0.000
8	10'-4			15.984					8'-6	Pv	
BL	1.6820	43.14	6.23	120		0.054127			4'-1	Pf	0.756
8	10'-4	21.62		15.984		Flow (q) fron	n Route 9		9'-11	Pe	0.000
7	10'-4			16.740		C(9'-11)			14'-0	Pv	
👄 • • • • Rou	te 9 • • • • •								•		
DR	1.0490	21.62	8.03	120		0.150279			3'-5	Pf	1.863
100	8'-6	21.62	5.6	14.903		Sprinkler,			9'-0	Pe	-0.782
8	10'-4			15.984		2E(2'-0), PO	0(5'-0)		12'-5	Ρv	
Equivalent Pip	e Lengths of Valves an	d Fittings (C=120 onl	y)		C Value	Multiplier					
			4.87								
(Actual Inside) Diameter) = F	actor	Value O	fC	100	130	140		150
	Schedule 40 Steel Pi	pe Inside Diameter) -'	actor	Multiplyi	ng Factor	0.713	1.16	1.33		1.51
L											



Hydraulic Analysis

Job Number: S23-90G

								Report Description:	Ordinary Grou
Pipe Type Downstream Upstream	Diameter F Elevation [low)ischarge	Velocity K-Factor	HWC Pt	Pn	Friction Loss Fittings		Length Eq. Length Total Length	Pressure Summary
Pipe Type Lege	nd	· · ·	U	nits Legend				Fittings Legen	d
AOArm-OverBLBranch LineCMCross MainDNDrainDRDropDYDynamicFMFeed MainFRFeed RiserMSMiscellaneousOROutriggerRNRiser NippleSPSprigSTStand PipeUGUnderground	Diamete Elevatio Flow Dischar Velocity Pressur Length Friction HWC Pt Pn Pf Pe Pv	er Inch n Foot gpm ge gpm fps e psi Foot Loss psi/F Haze Total Norm Press point Veloc	oot en-Williams Cor pressure at a p nal pressure at a sure loss due to sure due to elev s sure due to elev s ity pressure at	istant point in a pip a point in a j p friction bet vation differe a point in a	e bipe ween points ence betwe pipe	s en indicated	ALV AngV b BalV BFP BV C cplg Cr CV DelV DPV E EE EE EE EE EE EE f f d FDC fE f g GloV	Alarm Valve Angle Valve Bushing Ball Valve Backflow Prevente Butterfly Valve Cross Flow Turn 90 Coupling Cross Run Check Valve Deluge Valve Dry Pipe Valve 90° Elbow 45° Elbow 11¼° Elbow 22½° Elbow Flow Device Flex Drop Fire Department C 90° FireLock(TM) F Flange Floating Node FireLock(TM) Tee Gauge Globe Valve	r 0° onnection Elbow

Ho

ΗV

Hyd

Noz

P1 P2

PIV PO

PRV

PrV

red

S sCV Spr

St Т

Tr

U

Ζ

WirF

Hose

Hose

Hose

Hose Valve

Post Indicating Valve

Pressure Relief Valve Reducer/Adapter

Swing Check Valve

Tee Flow Turn 90°

Pressure Reducing Valve

Hydrant LtE Long Turn Elbow mecT Mechanical Tee

Nozzle Pump In Pump Out

Pipe Outlet

Sprinkler Strainer

Tee Run

Union

Wirsbo WMV Water Meter Valve

Сар



MEMORANDUM

TO:	BRIAN JOHNSON, WATER SYSTEM
	SPECIALIST
FROM:	KERRI SIDEBOTTOM, P.E.
DATE:	NOVEMBER 13, 2023
SUBJECT:	111 – 201 WEST MAIN FIRE FLOW
	AVAILABILITY
	CITY OF PUYALLUP, PIERCE COUNTY,
	WASHINGTON
	G&O #21415.17

Per your request, I have analyzed the available fire flow at two existing hydrants located at 111 and 201 West Main, in the central part of the City's water service area. The setup of the hydraulic model and the assumptions used to determine the static pressure and available fire flow are noted as follows.

- The available fire flows and pressures are measured at Nodes J2228 and J2230, corresponding to existing hydrants NW290 and SW209, respectively, as shown in the attached Figure 1.
- Water system demands are based on projected 2038 demands and reservoirs are depleted of fire suppression and equalizing storage, as established in the *2019 Water System Plan* (WSP) approved by the Department of Health (DOH). The City's water model was updated in 2021 to reflect additional system improvements since the WSP was developed.
- All pump stations are idle, and the Salmon Springs source is operating at 1,100 gpm.

The hydrants are located in Zone 1, which is supplied by Maplewood Springs and the 15th Avenue SE Reservoirs. The system was modeled as-is, with no new piping proposed at this time.

The available pressure under 2038 peak hour demands at the hydrant is included in Table 1.

TABLE 1

Peak Hour Pressure

Node	Hydrant	Elevation, feet	Peak Hour Pressure, psi
J2228	NW290	44	51
J2230	SW209	45	51





November 13, 2023 Page 2

Available fire flow was measured at two existing hydrants: Hydrant NW290 (Node J2228) and Hydrant SW209 (Node J2230). The first hydrant is located on an existing 6-inch fire main dead-end within the property, while the other is located on an existing 8-inch main in the street. The results of this modeling are included in Table 2. The modeled fire flow is available at any hydrant individually, but not simultaneously.

TABLE 2

Modeled Fire Flow Availability

Node	Hydrant	Available Fire	Residual Pressure at Available Fire Flow psi	Minimum System Pressure at Available Fire Flow psi
J2228	NW290	880 ⁽¹⁾	42	30
J2230	SW209	$2,460^{(1)}$	38	30

(1) Limited by maximum system-wide velocity of 10 fps.

Fire flow to both of the hydrants is limited by the 10-fps maximum velocity through the existing 6-inch fire main and the 8-inch pipe on West Main. The dead-end fire main supplying Node J2228 is only 6 inches in diameter and cannot supply more than 880 gpm without exceeding the 10-fps velocity limit. However, Node J2230 is located on an 8-inch diameter main that provides water from two directions, and as such, can sustain a higher flow under the velocity and pressure constraints.

The Department of Health and City Standards for water distribution systems are to meet the peak hourly demand of the system while providing a minimum pressure of 30 psi, system-wide. Under peak daily demand with a fire flow, the system is designed to maintain a minimum pressure of 20 psi, system-wide. Although the peak hourly demand pressure may currently be higher than these standards, the Developer must recognize that the City may not provide pressure higher than 30 psi in the future. The flows and pressures determined in this memo are based on the approximate hydrant elevation at ground level. The Developer may design their sprinkler system for whatever pressure they wish; however, they must recognize and be responsible for conditions when the pressure may be less than currently exists.

KS/sr



TOLBrace™ Seismic Bracing Calculations								
Project Addre	e ss: CHC Puya 201 W. Ma Puyallup, V	llup Garage in St VA		Contractor Address Phone License	: Archer Construc : 7855 S. 206th St Kent, WA 98032 :	tion reet	P	ATON owering Business Worldwide
	Job # 23-0	90 Cal	culations ba	ased on 2016 N	FPA Pamphlet #13			
	Brace Info	rmation			TOLCO™	Brace (Compor	nents
Maximum Brace Length 7' 0" (2.134 m)			TOLCO	™ Component	Listed	Load	Adjusted Loa	
Diameter of B	race 1" Sch	n.40		Fig. 1001	Clamp	2015 lbs	(914 kg)	1425 lbs (646 kg)
Type of Brace	Sch. 1	0		Fig.909 No See Faste	o-Thread Swivel ner Information	2015 lbs	(914 kg)	1425 lbs (646 kg)
Angle of Brac	e 45° M	in.		*Please No	*Calculation Based te: These calculations	I on CONCE are for TOLC	NTRIC Loading O™ compone	g nts only. Use of any
Least Rad. of	Least Rad. of Gyration 0.42" (11 mm)			other co	Seismic Br	ace As		Detail
L/R Value	200				Colonno Br		combry	Dotan
Max Horizontal Load 1310 lbs (594 kg)			-	NO- SWAY BRA	TOLCO F THREAD CE ATTAC	IG. 909- SWIVEL CHMENT		
F	astener Inf	ormation		-		STE	EL PIPE	
Orientation to Connecting Surface NFPA Type BFastenerTypePOWERS POWER-STUD +SD2Diameter1/2in.Length3 1/4in.Maximum Load499 lbs (226 kg)			+SD2	TOLCO	D FIG. 1001 AST CLAMP			
				Brace Id	entification on	Plans c	:1	
Prying Factor	1.002			Brace Ty	pe Lateral [X]	Long	jitudinal []	4-Way []
		Sprinkler Sy	/stem Lo	ad Calcul	ation (Fpw = CpV	Vp)		
Diameter	Туре	Length	Tota	l Length	Weight Per Unit	Length	1	otal Weight
4" (100 mm)	Sch. 10	40 ft (12.2 m)	40 ft (12	.2 m)	11.78 lb/ft (17.53 kg	ı/m)	471 lbs (214	4 kg)
					Subt	otal Weight	471 lbs (214	4 kg)
Main Size	Type/Sch	Spacing (ft)			VVp	(Incl. 15%)	363 lbs (16)	o kg) 5 kg)
4"	Sch. 10	40		Maximum F	pw per 9.3.5.5.2 (if a	applicable)	769 lb (348	kg)

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TOLBrace™ Seismic Calculation

CHC Puyallup Garage 201 W. Main St	Job # 23-090	F_T•N
Brace Identification	C1	Powering Business Worldwide
Brace Type (Per NFPA#13)	NFPA Type B	
Braced Pipe (ft)	4" Sch.10 Steel Pipe	
Spacing of Brace	40' 0" (12.19 m)	
Orientation of Brace	Lateral	
Bracing Material	1" Sch.40	
Maximum Brace Length	7' 0" (2.13 m)	
Slenderness Ratio used for Load Calculation	200	
True Angle of Brace for Calculation	45°	
Type of Fastener	POWERS POWER-STUD +SD2 1/2in. x 3 1/4	in. (3,000 PSI Light Weig
Length of Fastener	3 1/4in.	

Summary of Pipe within Zone of Influence



G-Factor Used 0.67

Allowance for Heads and Fittings	15%
Conclusions	
Total Adjusted Load of Pipe in Zone of Influence	363 lbs (165 kg)
Material Capacity	1310 lbs (594 kg)
Fastener Capacity	499 lbs (226 kg)
Fig. 1001 Clamp	1425 lbs (646 kg)
Fig.909 No-Thread Swivel	1425 lbs (646 kg)
Structural Member	Concrete Deck

Calculations prepared by Queen

* The description of the Structural Member is for informational purposes only. TOLBrace™ software calculates the brace assembly only, not the structure it is attached to. Calculated with TOLBrace™ 8 Visit us at www.tolco.com



DETAIL PER NFPA 13, 2016 FIGURE A9.3.5.12.1(a - c)

TOLCO FIG. 980

TOLCO FIG. 909

	Prying Fac	tors per NFPA	13, 2016 Sec	tion 9.3.5.12 v	shen installed	l in concrete s	ab cecks	
				Fig. 980/910				
A	В	С	D	E	F	G	ŀ	1
Ρ,	Ρ,.	P,	P,	Pr	P _r	P _r	Ρ.	P.
3.275	1.156	1.738	1.461	1.850	2.894	3.478	2.459	2.008
				Fig. 909				
A	B	С	D	E	F	G	F	1
Ρ,	Ρ,	P,	P _r	P _r	P,	Pr	P,	P.
2.626	1.002	1.230	1.513	1.487	2.226	2.460	1.740	1.420

P∩y'ng I	Factors per NF	PA 13, 2016 Se	ction 9.3.5.12	2 when instal	ed in concrete	s metal decks v	vith 1" cente	r attset
				Fig. 980/910				
Α	В	C	D	E	F	G	F	1
Ρ,	Ρ,	Ρ.	Ρ,	P,	Ρ,	Ρ,	Ρ.	P.
3.275	1.156	1.738						
				Fig. 909				
A	B	с	D	E	F	G	۲	1
P,	P.,	Ρ,	Ρ,	Pr	Ρ,	P,	Ρ.	P.
2.626	1.002	1.230				-		

Prying Fa	ctors per NEPA	A 13, 2016 Secti	ion 9.3.5.12 ·	when installed	in concrete n	neta deus wi	th 1.125" con	ter offset
				Fig. 980/910				
A	В	С	D	Ľ	F	G	۲	l
Ρ,	Ρ,	Ρ.	Р,	٩,	P,	P,	Ρ.	Ρ.
3.275	1.156	1.738	141	-	-	-		
	44			Fig. 309				
۸	B	C	D	E	F	G	ŀ	l
Ρ,	Ρ,	Ρ,	Ρ,	P,	Ρ,	Ρ,	Ρ.	P.
2.626	1.003	1.230	-		-	-	2	-

*When intsalled in a concrete metal deck (Type W 4 1/2" x 3"), dimension 'B' would be dependent upon the contact area. For SD2 anchors the max offset is 1" so 'B' would be 1.25". For Bang-It and Wood-Knocker II + anchors, the max offset is 1.125" so 'B' would be 1.125".

POWERS POWER-STUD+SD2 WEDGE ANCHORS IN 3,000 PSI LIGHT WEIGHT CONCRETE



NFPA BRACE ORIENTATIONS A, B, AND C SHOWN ABOVE (MINUS ANGLES), OTHER ORIENTATIONS SIMILAR

						Fig. 980/ Fi	g. 910							
		"E" MIN	N. "D"	THE MIN		ALLOWABLE STRENGTH DESIGN (ASD)								
ANCHOR	NOMINAL			H MIN.		MAX. ALLOWABLE HORIZONTAL LOAD (LBS.)								
DIA. DEPTH DEPTH DEPTH DEPTH	DESIGN	MATCHAL			NFPA	BRACE ORI	ENTATION	PRYING FA	ACTOR					
	ENBED.	EMBED. EDGE		A	В	С	D	Ε	F	G	Н	1		
		DEPTH	TH DISTANCE	THICKNESS	3.275	1.156	1.738	1.461	1.850	2.894	3.478	2.459	2.008	
3/8"	2 3/8"	2"	4 ª	4"	106	218	169	149	162	127	84	119	146	
1/2"	3 3/4"	3 1/4"	6"	5 3/4"	222	460	355	315	340	262	177	250	308	
5/8"	3 7/8"	3 1/4"	6"	5 3/4"	225	473	363	326	347	262	181	255	314	
3/4"	4 1/2"	3 3/4"	8"	7"	287	644	483	453	461	325	241	340	418	

VALUES CALCULATED IN ACCORDANCE WITH NFPA 13-16 ANNEX E.7 AND INCLUDE OVER STRENGTH FACTOR 0 = 2.0 AND AMPLIFIED BY 1.2

						Fig. 90	9						
			"D"	"H" MIN.	ALLOWABLE STRENGTH DESIGN (ASD)								
ANICHOR	NOMINAL	E IVIIN.				MAX. ALLOWABLE HORIZONTAL LOAD (LBS.)							
DIA. EMBED. EMBED.	DESIGN	BASE		NFPA BRACE ORIENTATION PRYING FACTOR									
DIA.	DEPTH	ENBED.	EDGE	THICKNESS	А	В	С	D	E	F	G	Н	1
DEPTH	DEPTH	H DISTANCE	THICKNESS	2.626	1.002	1.230	1.513	1.487	2.226	2.460	1.740	1.420	
3/8"	2 3/8"	2"	4"	4"	126	236	210	146	187	161	105	147	182
1/2"	3 3/4"	3 1/4"	6"	5 3/4"	264	499	444	310	394	337	221	311	384
5/8"	3 7/8"	3 1/4"	6"	5 3/4"	268	514	455	320	403	341	227	320	394
3/4"	4 1/2"	3 3/4"	8"	7"	350	706	618	443	542	423	309	434	535

VALUES CALCULATED IN ACCORDANCE WITH NFPA 13-16 ANNEX E.7 AND INCLUDE OVER STRENGTH FACTOR Ω = 2.0 AND AMPLIFIED BY 1.2

NOTES:

1.) ALLOWABLE LOADS ARE FOR ANCHORS INSTALLED IN STONE AGGREGATE CONCRETE HAVING A MIN. COMPRESSIVE STRENTH OF 3,000 PSI AT THE TIME OF INSTALLATION AND DETERMINED PER ICC ESR-2502 FOR ANCHORS IN CRACKED CONCRETE. ALLOWABLE LOADS HAVE BEEN CALCULATED IN ACCORDANCE WITH ACI 318-14, CHAPTER 17

2.) PER ICC-ESR, PERIODIC SPECIAL INSPECTIONS ARE REQUIRED IN ACCORDANCE WITH SECTION 1705.1.1 AND TABLE 1705.3 OF THE 2015 AND 2012 IBC. THE SPECIAL INSPECTOR MUST MAKE PERIODIC INSPECTIONS DURING THE ANCHOR INSTALLATION TO VERIFY ANCHOR TYPE, ANCHOR DIMENSIONS CONCRETE TYPE, CONCRETE COMPRESSIVE STRENGTH, HOLE DIMENSIONS, HOLE CLEANING PROCEDURE, ANCHOR SPACING, EDGE DISTANCES, CONCRETE MEMBER THICKNESS, ANCHOR EMBEDMENT, TIGHTENING TORQUE AND ADHERENCE TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. CONSULT LOCAL CODES FOR ANY ADDITIONAL SPECIAL INSPECTION REQUIREMENTS.

3.) FOLLOW ALL WEDGE ANCHOR INSTALLATION REQUIREMENTS PER ICC ESR-2502

4.) WHEN INSTALLING ANCHORS IN REINFORCED CONCRETE, AVOID DAMAGING REINFORCING STEEL

5.) WHEN INSTALLING ANCHORS IN PRESTRESSED CONCRETE. LOCATE PRESTRESSING STEEL AND AVOID DAMAGING PRESTRESSING STEEL.

6.) STRUCTURAL ENGINEER OF RECORD SHALL VERIFY ADEQUACY OF THE STRUCTURE FOR THE TABULATED ALLOWABLE LOADS.

7.) TOLCO 900 SERIES ATTACHMENT DIAMETER SHALL BE EQUAL TO THE ANCHOR DIAMETER

8.) IF SUBSTRATE CONDITIONS DIFFER FROM WHAT IS LISTED IN THE ABOVE TABLES, CONTACT EATON B-LINE AT TOLCOSUPPORT@EATON.COM

Project Addres	SS: CHC P 201 W. Puyallu	^p uyallu ′. Main up, WA	p Garage St		Contractor Address Phone License	Archer Construct 7855 S. 206th Stra Kent, WA 98032	tion eet	F	ATON owering Business Worldwide		
	Job # :	23-090	Cal	culations ba	ised on 2016 NF	PA Pamphlet #13					
E	Brace In	forn	nation			TOLCO™ E	Brace C	ompor	nents		
Maximum Brac	e Length 7	յth 7′′′′′′ (2.134 m)			TOLCO	™ Component	Listed	Load	Adjusted Loa		
Diameter of Bra	ace 1"	Sch.4	0		Fig. 4L Clamp 2015			914 kg)	1425 lbs (646 kg)		
Type of Brace	Sc	ch. 10			Fig.909 No	-Thread Swivel	2015 lbs (914 kg)	1425 lbs (646 kg)		
Angle of Brace	45	5° Min.			*Please Not	*Calculation Based e: These calculations a	on CONCEN	TRIC Loadin	g nts only, Use of any		
Least Rad. of C	Least Rad. of Gyration 0.42" (11 mm)					nponents voids these of	calculations a	nd the listing	of the assembly.		
L/R Value	20	יי			Seismic Brace Assembly Detail						
Max Horizontal	Load 13	310 lbs	s (594 kg)			TOI NO-THREAD S BRACE A	LCO FIG. 9 WIVEL SW ATTACHME	009 /AY NT			
Fa	stener	Info	rmation				STEEL P.				
Orientation to 0 Fastener Type	Connecting S	Surface	NFPA Type B	+SD2	TOLCO FIG. 4L- PIPE CLAMP FOR SWAY BRACING						
Diameter	1/2	2in.									
Length Maximum Loac	3 1 1 67:	1/4in. 2 lbs ((305 kg)								
							Ø				
Prying Factor	1 0	202			Brace Ide	entification on F	Plans Ca	2	4 143		
, ,	1.0	JUZ			Brace Ty	pe Lateral []	Longi	tudinal [X]	4-vvay[]		
			Sprinkler Sy	stem Lo Cp	ad Calcula = 0.67	tion (Fpw = CpW	/p)				
Diameter	Туре		Length	Tota	l Length	Weight Per Unit	Length	1	otal Weight		
	Sch. 10 70 ft (21.3 m) 70 ft (2		0 ft (21.3 m)	70 ft (21	.3 m)	1.3 m) 11.78 lb/ft (17.53 kg/m) 825 lbs (374 kg)					

				Subtotal Weight	825 lbs (374 kg)
				Wp (incl. 15%)	949 lbs (430 kg)
Main Size	Type/Sch.	Spacing (ft)		Total (Fpw)	636 lbs (288 kg)
4''	Sch. 10	70	Maximum F	pw per 9.3.5.5.2 (if applicable)	N/A

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TOLBrace™ Seismic Calculation

CHC Puyallup Garage	Job # 23-090
201 W. Main St	E AK • IM
Brace Identification	C2
Brace Type (Per NFPA#13)	NFPA Type B
Braced Pipe (ft)	4" Sch.10 Steel Pipe
Spacing of Brace	70' 0" (21.34 m)
Orientation of Brace	Longitudinal
Bracing Material	1" Sch.40
Maximum Brace Length	7' 0" (2.13 m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	45°
Type of Fastener	POWERS POWER-STUD +SD2 1/2in. x 3 1/4in. (3,000 PSI Normal W
Length of Fastener	3 1/4in.

Summary of Pipe within Zone of Influence

n.10 Steel Pipe (101.6 mm)	70 ft (21.3 m)				
WASHINGTON STATE CERTIFICATE OF COMPETENCY FIRE PROTECTION SPRINKLER SYSTEMS Theodore M. Queen 4930-0205-C Level 3 Archer Construction, Inc. ARCHEI*219DR					

G-Factor Used 0.67

Allowance for Heads and Fittings	15%
Conclusions	
Total Adjusted Load of Pipe in Zone of Influence	635 lbs (288 kg)
Material Capacity	1310 lbs (594 kg)
Fastener Capacity	672 lbs (305 kg)
Fig. 4L Clamp	1425 lbs (646 kg)
Fig.909 No-Thread Swivel	1425 lbs (646 kg)
Structural Member	Concrete Deck

Calculations prepared by Queen

* The description of the Structural Member is for informational purposes only. TOLBrace™ software calculates the brace assembly only, not the structure it is attached to. Calculated with TOLBrace™ 8 Visit us at www.tolco.com



DETAIL PER NFPA 13, 2016 FIGURE A9.3.5.12.1(a - c)

TOLCO FIG. 980

TOLCO FIG. 909

	Prying Fac	tors per NFPA	13, 2016 Sed	f on 9.3.5.12 v	vhen installed	l'in concrete s	ab cecks	
				Fig. 980/910				
A	В	C	D	E	F	G	۲	I.
Ρ,	Ρ,	P,	P,	Pr	Pr	Ρ,	Ρ,	Ρ.
3.275	1.156	1.738	1.461	1.850	2.894	3.478	2.459	2.008
				Fig. 909				
А	8	C	D	C	F	G	F	I.
Ρ,	Ρ,	P.	P _r	Pr	Pr	Pr	Р.	Ρ.
2.626	1.002	1.230	1.513	1.487	2.226	2.460	1.740	1.420

P∩∕ ng f	Factors per NF	PA 13, 2016 Se	ction 9.3.5.1	2 when instal	ed in concrete	metal decks	with 1" cente	r ottset
				Fig. 980/910				
Α	В	С	D	E	F	G	F	I I
Ρ,	Ρ,	Ρ.	Ρ,	P,	Ρ,	Ρ,	Ρ.	P.
3.275	1.156	1.738						
				Fig. 909				
A	B	с	D	Γ	F	G	۲	1
Ρ,	Ρ,	Ρ,	P,	P,	Ρ,	P,	Ρ.	P.
2.626	1.002	1.230			-			

Phyling Fac	ctors per NEPA	(13, 2016 Secti	ion 9.3.5.12 ·	when installed	in concrete n	neta decisiwi	th 1.125" con	ter offset
				Fig. 980/910				
A	B	С	D	Ľ	F	G	ŀ	1
Ρ,	Ρ,	Ρ.	Ρ,	Ρ,	۴,	P,	Ρ.	Ρ.
3.275	1.156	1.738	-	-	-	-		
	dipertition of the second s			Fig. 909				
۸	В	C	D	E	F	G	F	1
Ρ,	Ρ,	Ρ,	P,	Ρ,	Ρ,	Ρ,	Ρ.	Ρ.
2.626	1.003	1.230	-		121			*

*When intsalled in a concrete metal deck (Type W 4.1/2" x.3"), dimension 'B' would be dependent upon the contact area. For SD2 anchors the max offset is 1" so 'B' would be 1.25". For Bang-It and Wope-Knocker II + anchors, the max offset is 1.125" so 'B' would be 1.125".

POWERS POWER-STUD+SD2 WEDGE ANCHORS IN 3,000 PSI NORMAL WEIGHT CONCRETE



NFPA BRACE ORIENTATIONS A, B, AND C SHOWN ABOVE (MINUS ANGLES), OTHER ORIENTATIONS SIMILAR

Fig. 980/ Fig. 910														
ANCHOR DIA.	NOMINAL	"E" MIN.	"D"	"H" MIN. BASE MATERIAL THICKNESS	ALLOWABLE STRENGTH DESIGN (ASD) MAX. ALLOWABLE HORIZONTAL LOAD (LBS.)									
	EMBED.	EFFECTIVE	DESIGN		NFPA BRACE ORIENTATION PRYING FACTOR									
	DEPTH	DEPTH	DISTANCE		Α	В	С	D	Е	F	G	Н	J	
					3.275	1.156	1.738	1.461	1.850	2.894	3.478	2.459	2.008	
3/8"	2 3/8"	2"	4"	4"	140	296	227	204	217	163	113	159	196	
1/2"	3 3/4"	3 1/4"	6"	5 3/4"	292	618	473	427	453	339	236	332	409	
5/8"	3 7/8"	3 1/4"	6"	5 3/4"	331	696	534	479	511	386	267	375	462	
3/4"	4 1/2"	3 3/4"	8"	7"	422	929	700	650	669	478	350	493	606	

VALUES CALCULATED IN ACCORDANCE WITH NFPA 13-16 ANNEX E.7 AND INCLUDE OVER STRENGTH FACTOR Q = 2.0 AND AMPLIFED BY 1.2

Fig. 909														
ANCHOR DIA. NOMINAL EMBED. DEPTH		NCP BAIN	ICE MAIN	PLIP AND	ALLOWABLE STRENGTH DESIGN (ASD)									
	AL FEFETINE	DECICN		MAX. ALLOWABLE HORIZONTAL LOAD (LBS.)										
	EMBED.	EFFECTIVE	EDGE DISTANCE	MATERIAL THICKNESS	NFPA BRACE ORIENTATION PRYING FACTOR									
	DEPTH	DEPTH			Α	В	С	D	E	F	G	Н	1	
					2.626	1.002	1.230	1.513	1.487	2.226	2.460	1.740	1.420	
3/8"	2 3/8"	2"	4"	4"	167	322	285	201	252	211	142	200	247	
1/2"	3 3/4"	3 1/4"	6"	5 3/4"	348	672	595	419	526	440	297	417	515	
5/8"	3 7/8"	3 1/4"	6"	5 3/4"	394	756	670	471	594	501	335	470	580	
3/4"	4 1/2"	3 3/4"	8"	7"	509	1017	892	637	784	621	446	627	773	

VALUES CALCULATED IN ACCORDANCE WITH NFPA 13-16 ANNEX E.7 AND INCLUDE OVER STRENGTH FACTOR Q = 2.0 AND AMPLIFED BY 1.2

NOTES:

1.) ALLOWABLE LOADS ARE FOR ANCHORS INSTALLED IN STONE AGGREGATE CONCRETE HAVING A MIN. COMPRESSIVE STRENTH OF 3,000 PSI AT THE TIME OF INSTALLATION AND DETERMINED PER ICC ESR-2502 FOR ANCHORS IN CRACKED CONCRETE. ALLOWABLE LOADS HAVE BEEN CALCULATED IN ACCORDANCE WITH ACI 318-14, CHAPTER 17

2.) PER ICC-ESR, PERIODIC SPECIAL INSPECTIONS ARE REQUIRED IN ACCORDANCE WITH SECTION 1705.1.1 AND TABLE 1705.3 OF THE 2015 AND 2012 IBC. THE SPECIAL INSPECTOR MUST MAKE PERIODIC INSPECTIONS DURING THE ANCHOR INSTALLATION TO VERIFY ANCHOR TYPE, ANCHOR DIMENSIONS CONCRETE TYPE, CONCRETE COMPRESSIVE STRENGTH, HOLE DIMENSIONS, HOLE CLEANING PROCEDURE, ANCHOR SPACING, EDGE DISTANCES, CONCRETE MEMBER THICKNESS, ANCHOR EMBEDMENT, TIGHTENING TORQUE AND ADHERENCE TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. CONSULT LOCAL CODES FOR ANY ADDITIONAL SPECIAL INSPECTION REQUIREMENTS.

3.) FOLLOW ALL WEDGE ANCHOR INSTALLATION REQUIREMENTS PER ICC ESR-2502

4.) WHEN INSTALLING ANCHORS IN REINFORCED CONCRETE, AVOID DAMAGING REINFORCING STEEL

5.) WHEN INSTALLING ANCHORS IN PRESTRESSED CONCRETE. LOCATE PRESTRESSING STEEL AND AVOID DAMAGING PRESTRESSING STEEL.

6.) STRUCTURAL ENGINEER OF RECORD SHALL VERIFY ADEQUACY OF THE STRUCTURE FOR THE TABULATED ALLOWABLE LOADS.

7.) TOLCO 900 SERIES ATTACHMENT DIAMETER SHALL BE EQUAL TO THE ANCHOR DIAMETER

8.) IF SUBSTRATE CONDITIONS DIFFER FROM WHAT IS LISTED IN THE ABOVE TABLES, CONTACT EATON B-LINE AT TOLCOSUPPORT@EATON.COM

ASCE 7 HAZARD TOOL



Linear interpolator



Fill in five values and leave one blank. Click the Calculate button, and the blank value will be filled in by linear interpolation. (<u>Help and details</u>)

x	У
1.4	.65
1.44	0.67
1.5	.7

Calculate