

Recommended fire flow pipe improvements based on zone by zone fire flow analyses with hydraulic model

Items sorted by Column Z - FF Deficiency

Yellow highlights indicate pipe identified as fire flow improvement; optimization selected to upsize

														Hydrant flow measured at US node, pipe flow measured at DS node		For Bend to fill in		\$ 21,310,626 Total	
														\$ 9,485,387	Existing		\$ 1,972,674	Build-out	
														\$ 2,561,834	Existing - Hydrant OK		\$ 2,447,152	Build-out - Hydrant OK	
														\$ 3,686,760	2-inch main replcmnt				
Sorted by:														1 - descending					
Level / Zone	Group	Pipe	Location Street name/intersection	Length (ft)	Hydrant ID connected to replaced pipe	Dead end?	Existing diam (in)	Replace New Diam (in)	Critical Hydrant	Addresses FF deficiency at Node: (identify if possible)	Pressure at node under FF	Fire Flow (1,500, 2,500 or 3,500 gpm)	Est. Available Fire Flow (gpm) at hydrant 20 psi residual	Est. Available Flow (gpm) to pipe DS node 20 psi residual	FF Deficiency	Number of Parcels	Estimated Replacement Cost	Demand condition driving improvement	
Existing System Fire Flow Improvements, sorted by existing flow deficiency (Column Z) compared to flow requirement (Column V)																			
Level 5	ExFF-1	WWM001198-FF	Clay Ave betw 3rd and 4th Sts	411	WFH001907	Dead end	6-inch	8	WFH001907	General grid problems due to 6-inch dia		2500	1054.42	1054.38	1445.58	8	\$ 57,502	Existing	
Level 5	ExFF-1	WWM001168-FF	4th St betw Franklin & Emerson	369	N/A		6-inch	8	WFH001907	General grid problems due to 6-inch dia		2500	1054.42	1315.56	1445.58	4	\$ 51,645	Existing	
Level 5	ExFF-1	WWM006192-FF	Clay Ave betw 4th and 5th Sts	437	WFH000160		6-inch	8	WFH001907	JCT-2745	-98.7	2500	1054.42	1474.86	1445.58	11	\$ 61,115	Existing	
Level 5	ExFF-1	WWM001199-FF	4th St betw DeKalb & Clay	334	N/A		6-inch	8	WFH001907	General grid problems due to 6-inch dia		2500	1054.42	1686.48	1445.58	4	\$ 46,797	Existing	
Level 5	ExFF-1	WWM002734-FF	Clay Ave betw 5th and 6th Sts	459	N/A		6-inch	8	WFH001907	JCT-2745	-98.7	2500	1054.42	1706.99	1445.58	7	\$ 64,326	Existing	
Level 5	ExFF-1	WWM001200-FF	4th St betw Emerson & DeKalb	312	N/A		6-inch	8	WFH001907	General grid problems due to 6-inch dia		2500	1054.42	2728.74	1445.58	2	\$ 43,689	Existing	
Level 5	ExFF-1	WWM001197-FF	DeKalb Ave betw 3rd & 4th Sts	460	WFH000158		6-inch	8	WFH001907	General grid problems due to 6-inch dia		2500	1054.42	2578.02	1445.58	7	\$ 64,406	Existing	
Level 5	ExFF-2	WWM003159-FF	Hwy betw Revere & Norton	1350	WFH000150	Dead end	6-inch	12	WFH000150	General grid problems due to 6-inch dia		2500	1178.94	1178.91	1321.06	15	\$ 256,456	Existing	
Zone 6B	ExFF-3	WWM004579-FF	Brogan Place	931	WFH000534	Dead end	6-inch	8	WFH000534	JCT-938	-207.4	1500	231.2	510.11	1268.8	5	\$ 130,300	Existing	
Zone 6B	ExFF-4	WWM005357-FF	Putnam Road	1538	WFH000540	Dead end	6-inch	10	WFH000543	JCT-3381	-189.0	1500	233.03	422.67	1266.97	9	\$ 246,097	Existing	
Zone 6B	ExFF-4	WWM004140-FF	Putnam Road	585	WFH000537		6-inch	10	WFH000543	JCT-3381	-189.0	1500	233.03	516	1266.97	2	\$ 93,672	Existing	
Zone 6B	ExFF-4	WWM003092-FF	Putnam Road	592	WFH000535		6-inch	10	WFH000543	JCT-952	-86.1	1500	233.03	696.2	1266.97	2	\$ 94,671	Existing	
Zone 6B	ExFF-4	WWM005194-FF	Putnam Road	754	WFH000532		6-inch	10	WFH000543	JCT-951	-25.3	1500	233.03	782.28	1266.97	4	\$ 120,596	Existing	
Zone 6B	ExFF-4	WWM002508-FF	Putnam Road	124	N/A		6-inch	12	WFH000543	JCT-951	-25.3	1500	233.03	1062.95	1266.97	1	\$ 23,604	Existing	
Zone 6B	ExFF-4	WWM003630-FF	Putnam Road	1103	WFH000528		6-inch	12	WFH000543	JCT-953	-14.8	1500	233.03	1556.97	1266.97	3	\$ 209,549	Existing	
Zone 4B	ExFF-5	WWM000750-FF	Brosterhouse / boundary Zone 3D - see note	196	N/A	Dead end	4-inch	8	WFH003697	JCT-2554	-851.0	1500	304.08	215.38	1195.92	120	\$ 27,397	Existing	
Zone 4B	ExFF-5	WWM002547-FF	Brosterhouse / boundary Zone 3D - see note	6	N/A	Dead end	4-inch	8	WFH003697	JCT-2552	-853.8	1500	304.08	219.71	1195.92		\$ 891	Existing	
Zone 4B	ExFF-5	WWM005210-FF	Brosterhouse / boundary Zone 3D - see note	1759	WFH003697		4-inch	12	WFH003697	JCT-2552	-853.8	1500	304.08	4196.49	1195.92	2	\$ 334,261	Existing	
Zone 4I	ExFF-6	FF_Z4I_11	Mt. Bachelor Drive	318	WFH001025		N/A	10	WFH001662	JCT-1077	-51.9	2500	1369.26	979.81	1130.74		\$ 50,912	Existing	
Zone 4I	ExFF-6	WWM006842-FF	Century Drive	328	WFH001025	Dead end	6-inch	10	WFH001662	JCT-1077	-51.9	2500	1369.26	979.81	1130.74	7	\$ 52,484	Existing	
Zone 4I	ExFF-6	WWM006841-FF	Century Drive	116	N/A		6-inch	10	WFH001662	JCT-1077	-51.9	2500	1369.26	1378.15	1130.74	1	\$ 18,495	Existing	
Zone 4I	ExFF-6	WWM006843-FF	Century Drive	108	WFH000704		6-inch	10	WFH001662	JCT-1077	-51.9	2500	1369.26	1628.5	1130.74		\$ 17,342	Existing	
Level 6	ExFF-7	WWM004714-FF	Nels Anderson -SW of Empire Ave	599	WFH001019	Dead end	6-inch	10	WFH001019	JCT-5002	-99.9	2500	1395.33	1395.33	1104.67	6	\$ 95,869	Existing	
Level 5	ExFF-8	WWM001679-FF	Harriman St / Linster Place	146	WFH000557	Dead end	6-inch	8	WFH000557	Small grid of 6-inch diameter mains - soi		2500	1404.95	1404.92	1095.05	100+	\$ 20,408	Existing	
Level 5	ExFF-8	WWM005794-FF	Harriman St / Linster Place	118	WFH000577	Dead end	6-inch	8	WFH000557	Small grid of 6-inch diameter mains - soi		2500	1404.95	1420.37	1095.05		\$ 16,540	Existing	
Level 5	ExFF-8	WWM005795-FF	Harriman St / Linster Place	237	N/A		6-inch	8	WFH000557	Small grid of 6-inch diameter mains - soi		2500	1404.95	1580.05	1095.05	3	\$ 33,112	Existing	
Level 5	ExFF-8	WWM002839-FF	Harriman St / Linster Place	189	N/A		6-inch	8	WFH000557	Small grid of 6-inch diameter mains - soi		2500	1404.95	2160.84	1095.05	5	\$ 26,483	Existing	
Level 5	ExFF-9	WWM001147-FF	Betw Hwy 20 & Kearney Ave off 4th St	426	WFH002786	Dead end	6-inch	8	WFH002786	JCT-2937	-59.2	2500	1463.43	1463.39	1036.57	1	\$ 59,621	Existing	
Level 6	ExFF-10	WWM005536-FF	Peerless Ct off Brinson Blvd	380	WFH000849	Dead end	6-inch	8	WFH000849	JCT-4746	-57.9	2500	1475.38	1475.39	1024.62	1	\$ 53,159	Existing	
Level 6	ExFF-10	WWM003082-FF	Peerless Ct off Brinson Blvd	313	N/A		8-inch	12	WFH000849	JCT-4746	-57.9	2500	1475.38	3541.91	1024.62	3	\$ 59,531	Existing	
Level 5	ExFF-11	WWM001556-FF	2nd St betw Seward & Revere	383	WFH000601	Dead end	6-inch	8	WFH000601	JCT-4264	-69.4	2500	1525.31	1525.27	974.69	4	\$ 53,666	Existing	
Zone 6B	ExFF-12	WWM005499-FF	Sawyer Court	669	WFH000538	Dead end	6-inch	8	WFH000539	JCT-2495	-221.3	1500	539.65	539.64	960.35	7	\$ 93,665	Existing	
Level 5	ExFF-13	WWM003994-FF	Vicksburg Ave betw Awbrey Rd & 2nd St	365	WFH000367		6-inch	8	WFH000367	Small grid of 6-inch diameter mains - rec		1500	546.83	500.75	953.17	6	\$ 51,150	Existing	
Level 5	ExFF-13	FF_Z5_185	Vicksburg Ave to Utica Ave - tie dead ends	454	WFH000367		N/A	8	WFH000367	JCT-2375	-124.4	1500	546.83	546.8	953.17		\$ 63,507	Existing	
Level 5	ExFF-13	WWM001678-FF	Vicksburg Ave betw 2nd St & 1st St	348	WFH000367	Dead end	6-inch	8	WFH000367	Small grid of 6-inch diameter mains - rec		1500	546.83	546.8	953.17	10	\$ 48,656	Existing	
Level 5	ExFF-13	WWM005791-FF	Awbrey Rd -S- Utica Ave	337	WFH000032		6-inch	8	WFH000367	Small grid of 6-inch diameter mains - rec		1500	546.83	660.69	953.17	7	\$ 47,181	Existing	
Level 5	ExFF-13	WWM005793-FF	Awbrey Rd at Utica Ave	26	N/A		6-inch	8	WFH000367	Small grid of 6-inch diameter mains - rec		1500	546.83	972.99	953.17		\$ 3,658	Existing	
Level 5	ExFF-14	FF_Z5_182	Along Hwy 20 betw Revere & Quimby - tie	407	WFH000853		N/A	8	WFH000853	JCT-4190	-58.2	2500	1547.29	1547.25	952.71		\$ 56,952	Existing	
Level 5	ExFF-14	WWM001557-FF	Quimby Ave betw 2nd and Hwy 20	326	WFH000853	Dead end	6-inch	8	WFH000853	JCT-4190	-58.2	2500	1547.29	1547.25	952.71	1	\$ 45,630	Existing	
Level 6	ExFF-15	WWM004691-FF	Off Hwy 20 -N- Butler Market Rd	510	WFH000591	Dead end	6-inch	8	WFH000591	JCT-4709	-60.5	2500	1557.66	1557.66	942.34	100+	\$ 71,428	Existing	
Zone 4B	ExFF-16	WWM006299-FF	S of Forbes Rd toward Burgess Place	242	WFH002670	Dead end	6-inch	8	WFH002670	JCT-2782	-33.7	2500	1559.65	1559.28	940.35	1	\$ 33,918	Existing	
Zone 4B	ExFF-16	WWM007266-FF	S of Forbes Rd toward Burgess Place	218	WFH002669		8-inch	12	WFH002670	JCT-2782	-33.7	2500	1559.65	2857.66	940.35	1	\$ 41,495	Existing	
Zone 4B	ExFF-16	WWM006300-FF	S of Forbes Rd toward Burgess Place	145	N/A		8-inch	12	WFH002670	JCT-2782	-33.7	2500	1559.65	3444.09	940.35	1	\$ 27,637	Existing	
Level 5	ExFF-17	WWM004026-FF	2nd St -N- Yale Ave	814	N/A		8-inch	10	WFH003421	General grid problems due to 6-inch dia		2500	1561.29	1653.2	938.71	3	\$ 130,265	Existing	
Level 5	ExFF-17	WWM004025-FF	2nd St -N- Yale Ave	58	N/A		6-inch	10	WFH003421	General grid problems due to 6-inch dia		2500	1561.29	1995.06	938.71		\$ 9,348	Existing	
Level 5	ExFF-17	WWM002868-FF	2nd St -N- Yale Ave	106	N/A		6-inch	10	WFH003421	General grid problems due to 6-inch dia		2500	1561.29	2188.18	938.71		\$ 16,949	Existing	
Level 5	ExFF-17	WWM002869-FF	2nd St -N- Yale Ave	84	N/A		6-inch	10	WFH003421	General grid problems due to 6-inch dia		2500	1561.29	2740.95	938.71		\$ 13,414	Existing	
Level 5	ExFF-18	WWM001510-FF	Off 5th St -N- Xerxes Ave	36	N/A	Dead end	6-inch	8	WFH000361	JCT-4449	-161.72	2500	1564.29	1039.54	935.71		\$ 5,106	Existing	

Fire Flow Improvements - Existing and Build-out

Level / Zone	Group	Pipe	Location Street name/intersection	Length (ft)	Hydrant ID connected to replaced pipe	Dead end?	Existing diam (in)	Replace New Diam (in)	Critical Hydrant	Addresses FF deficiency at Node: (identify if possible)	Pressure at node under FF	Fire Flow (1,500, 2,500 or 3,500 gpm)	Est. Available Fire Flow (gpm) at hydrant 20 psi residual	Est. Available Flow (gpm) to pipe DS node 20 psi residual	FF Deficiency	Number of Parcels	Estimated Replacement Cost	Demand condition driving improvement
Level 5	ExFF-18	WWM004028-FF	5th St -N- Xerxes Ave	362	N/A		6-inch	8	WFH000361	General grid problems due to 6-inch dia		2500	1564.29	1144.85	935.71	7	\$ 50,647	Existing
Level 5	ExFF-18	WWM005616-FF	Xerxes Ave - E- 4th St	448	WFH000361		6-inch	10	WFH000361	General grid problems due to 6-inch dia		2500	1564.29	1564.25	935.71		\$ 71,670	Existing
Level 5	ExFF-19	WWM006082-FF	Adams Place off Delaware Ave	408	N/A		4-inch	8	WFH000941	JCT-1692	-173.3	1500	570.8	583.71	929.2	18	\$ 57,121	Existing
Zone 6B	ExFF-20	WWM004578-FF	Slagsvold Court	310	WFH000536	Dead end	6-inch	8	WFH000536	JCT-3378	-132.2	1500	598.77	598.77	901.23	4	\$ 43,375	Existing
Zone 7D	ExFF-21	WWM004562-FF	NW Silver Buckle Rd	468	WFH001772		4-inch	8	WFH001772	JCT-3386	-73.8	1500	610.32	610.32	889.68		\$ 65,562	Existing
Zone 7D	ExFF-21	WWM005164-FF	NW Silver Buckle Rd	1212	WFH001620		4-inch	8	WFH001772	JCT-3386	-73.8	1500	610.32	830.46	889.68	16	\$ 169,735	Existing
Level 6	ExFF-22	WWM004523-FF	Off Cady Way -W- Hwy 97	250	WFH001567	Dead end	6-inch	8	WFH001567	JCT-5153	-62.1	2500	1634.93	1634.93	865.07		\$ 34,995	Existing
Level 6	ExFF-22	WWM004524-FF	Off Cady Way -W- Hwy 97	244	WFH001566		6-inch	8	WFH001567	JCT-5153	-62.1	2500	1634.93	2251.92	865.07	3	\$ 34,155	Existing
Zone 4B	ExFF-23	WWM006181-FF	W of 15th St -S- Hwy 20	458	WFH000775	Dead end	8-inch	10	WFH000775	JCT-2845	-24.3	2500	1677.5	2285.31	822.5	2	\$ 73,278	Existing
Zone 4B	ExFF-23	WWM006183-FF	W of 15th St -S- Hwy 20	509	WFH001403		8-inch	12	WFH000775	JCT-2845	-24.3	2500	1677.5	3071.24	822.5	1	\$ 96,653	Existing
Zone 4B	ExFF-24	WWM006879-FF	S of Hayes Ave, SW of Division St	203	WFH001419	Dead end	6-inch	8	WFH001419	JCT-3534	-35.8	2500	1697.38	1694.25	802.62		\$ 28,369	Existing
Zone 4B	ExFF-24	WWM006880-FF	S of Hayes Ave, SW of Division St	184	WFH001418		6-inch	8	WFH001419	JCT-3534	-35.8	2500	1697.38	2465.44	802.62	1	\$ 25,798	Existing
Level 6	ExFF-25	WWM002192-FF	Off Painters St	160	WFH001312	Dead end	6-inch	8	WFH001312	JCT-4968	-38.8	2500	1720.45	1720.45	779.55		\$ 22,399	Existing
Level 6	ExFF-25	WWM004108-FF	Painters St off Boyd Acres	223	N/A		6-inch	8	WFH001312	JCT-4968	-38.8	2500	1720.45	2206.76	779.55	3	\$ 31,271	Existing
Level 1	ExFF-26	WWM007183-FF	NW Meldrum Court	356	WFH001570	Dead end	6-inch	10	WFH001570	JCT-3112	14.5	1500	739.53	739.53	760.47	7	\$ 56,921	Existing
Level 1	ExFF-26	WWM007184-FF	NW Moore Court	345	WFH001571	Dead end	6-inch	8	WFH001570	JCT-3111	15.7	1500	739.53	784.26	760.47	4	\$ 48,278	Existing
Level 1	ExFF-26	WWM005807-FF	NW Meldrum Court	289	WFH001569		8-inch	12	WFH001570	JCT-3112	14.5	1500	739.53	2289.33	760.47	3	\$ 54,972	Existing
Level 6	ExFF-27	WWM004720-FF	Off Painters St	118	WFH000894	Dead end	6-inch	8	WFH000894	JCT-4943	-33.8	2500	1750.68	1750.68	749.32	1	\$ 16,548	Existing
Zone 6B	ExFF-28	WWM007175-FF	Stover Circle	416	WFH000530		6-inch	8	WFH000531	JCT-949	-74.9	1500	762.6	762.61	737.4	6	\$ 58,216	Existing
Level 6	ExFF-29	WWM004692-FF	Off Cady Way -W- Hwy 96	408	WFH000727	Dead end	6-inch	8	WFH000727	JCT-5105	-48.0	2500	1767.81	1767.81	732.19	3	\$ 57,085	Existing
Zone 4B	ExFF-30	WWM003780-FF	Off 5th St -S- Glenwood Drive	443	WFH003977	Dead end	6-inch	8	WFH003977	JCT-2657	-55.8	2500	1783.75	1781.66	716.25	1	\$ 61,968	Existing
Zone 7D	ExFF-31	WWM005491-FF	Broken Arrow Road	363	WFH001773		4-inch	8	WFH001773	JCT-2491	-6143.0	1500	826.93	826.93	673.07	2	\$ 50,833	Existing
Level 5	ExFF-32	WWM001354-FF	N of Twin Knolls Dr off 27th St	250	WFH001999	Dead end	6-inch	8	WFH001999	JCT-5547	-26.6	2500	1847.9	1847.72	652.1	1	\$ 35,011	Existing
Level 5	ExFF-33	FF_Z5_39	Hwy 20 to SE corner of Level 5 - tie dead end	396	WFH004309		N/A	12	WFH001999	JCT-5547	-26.6	2500	1847.9	2674.88	652.1	3	\$ 75,299	Existing
Level 5	ExFF-34	WWM000537-FF	Just -N- of Industrial Way	256	WFH003024	Dead end	6-inch	8	WFH003024	JCT-1615	-10.3	2500	1853.55	1853.46	646.45	1	\$ 35,836	Existing
Level 6	ExFF-35	WWM004651-FF	S of Archie Briggs Rd off OB Riley Rd	301	WFH001137	Dead end	6-inch	8	WFH001137	JCT-3221	-25.5	2500	1862.64	1862.64	637.36	1	\$ 42,132	Existing
Level 5	ExFF-36	WWM001655-FF	Off Vail Ave near 2nd St	107	WFH002415	Dead end	6-inch	8	WFH002415	JCT-4331	-34.7	2500	1865.34	1865.3	634.66	1	\$ 15,024	Existing
Level 5	ExFF-36	WWM003999-FF	Vail Ave -E- Division	362	WFH003427		6-inch	8	WFH002415	General grid problems due to 6-inch dia		2500	1865.34	2188.39	634.66	1	\$ 50,723	Existing
Level 5	ExFF-37	WWM005617-FF	Off 2nd St -S- Xerxes	162	WFH002523	Dead end	6-inch	8	WFH002523	JCT-4385	-35.4	2500	1873.38	1873.33	626.62		\$ 22,630	Existing
Level 5	ExFF-37	WWM001531-FF	2nd St -S- Yale Ave	220	N/A		6-inch	8	WFH002523	General grid problems due to 6-inch dia		2500	1873.38	2418.12	626.62	1	\$ 30,739	Existing
Level 5	ExFF-37	WWM001504-FF	2nd St -S- Yale Ave	162	N/A		6-inch	8	WFH002523	General grid problems due to 6-inch dia		2500	1873.38	2421.82	626.62	1	\$ 22,701	Existing
Level 5	ExFF-37	WWM005770-FF	2nd St -N- Vail Ave	388	WFH000962		6-inch	8	WFH002523	General grid problems due to 6-inch dia		2500	1873.38	2572.68	626.62		\$ 54,359	Existing
Level 6	ExFF-38	WWM002079-FF	Lyman Place off Brandis Ct	378	WFH000624	Dead end	6-inch	8	WFH000624	JCT-5215	-45.6	2500	1893.21	1893.21	606.79	3	\$ 52,917	Existing
Level 5	ExFF-39	WWM006004-FF	Norton Ave -E- Wall St	329	WFH000045	Dead end	6-inch	8	WFH000045	JCT-4088	-17.2	2500	1910.3	1910.23	589.7	4	\$ 46,104	Existing
Level 5	ExFF-40	WWM001006-FF	Emerson Ave betw 1st and 2nd Sts	509	N/A		8-inch	12	WFH003456	JCT-2800	-12.9	2500	1911.82	2665.65	588.18	5	\$ 96,792	Existing
Zone 4A	ExFF-41	FF_Z4A_01	Connect 4th St at Utica Ave & 5th St	222	WFH000679		N/A	8	WFH000679	JCT-2341	-35.9	1500	920.93	920.93	579.07	10	\$ 31,059	Existing
Level 5	ExFF-42	FF_Z5_41	Bear Creek Lane at Janalee - tie dead ends	81	WFH002542		N/A	12	WFH002542	12-inch diameter improvement connect		2500	1923.18	1922.95	576.82	1	\$ 15,458	Existing
Level 5	ExFF-43	WWM001173-FF	Hawthorne -E- 4th St	358	N/A	Dead end	6-inch	8	WFH000155	JCT-2884	-7.4	1500	923.58	1166.79	576.42	10	\$ 50,120	Existing
Level 5	ExFF-43	WWM001174-FF	Greeley Ave betw 4th & 5th Sts	489	WFH000394		6-inch	8	WFH000155	JCT-2860	-24.0	1500	923.58	928.49	576.42	10	\$ 68,391	Existing
Level 5	ExFF-43	WWM001170-FF	4th St betw Greeley & Hawthorne	361	N/A		6-inch	8	WFH000155	General grid problems due to 6-inch dia		1500	923.58	3315.6	576.42	4	\$ 50,581	Existing
Level 5	ExFF-43	WWM007254-FF	4th St betw Hawthorne & Irving	363	N/A		6-inch	8	WFH000155	General grid problems due to 6-inch dia		1500	923.58	4197.14	576.42	2	\$ 50,886	Existing
Level 1	ExFF-44	WWM005302-FF	NW Gill Court	384	WFH001269	Dead end	6-inch	8	WFH001269	JCT-3078	5.3	1500	965.56	965.56	534.44	5	\$ 53,779	Existing
Level 6	ExFF-45	WWM002248-FF	S of Painters St parallel to Boyd Acres	170	WFH002785	Dead end	6-inch	8	WFH002785	JCT-4888	-19.4	2500	1969.91	1969.91	530.09	1	\$ 23,769	Existing
Level 6	ExFF-46	WWM004807-FF	Off Mercury Place _S_ Brinson Blvd	150	WFH001469	Dead end	6-inch	8	WFH001469	JCT-4742	-20.5	2500	1992.87	3087.75	507.13	1	\$ 20,985	Existing
Zone 4B	ExFF-47	WWM000493-FF	Off 9th St -S- Business Way	194	WFH001580	Dead end	6-inch	10	WFH001580	JCT-3676	-19.5	2500	1997.67	1989.58	502.33	1	\$ 31,088	Existing
Zone 4B	ExFF-47	WWM003757-FF	Off 9th St -S- Business Way	120	WFH001581		8-inch	10	WFH001580	JCT-3676	-19.5	2500	1997.67	4137.92	502.33		\$ 19,191	Existing
Zone 4B	ExFF-48	WWM001356-FF	Karena Ct off Dorie Ct	11	N/A	Dead end	4-inch	8	WFH000910	JCT-4043	-96.7	1500	1008.45	845.7	491.55	13	\$ 1,499	Existing
Zone 4B	ExFF-48	WWM007146-FF	Karena Ct off Dorie Ct	242	WFH000910		4-inch	8	WFH000910	JCT-4043	-96.7	1500	1008.45	1006.98	491.55		\$ 33,903	Existing
Level 5	ExFF-49	WWM005975-FF	Roanoke betw 6th and 7th Sts	355	WFH000222		6-inch	8	WFH000222	General grid problems due to 6-inch dia		1500	1008.49	1008.43	491.51	2	\$ 49,755	Existing
Level 5	ExFF-49	WWM001904-FF	Roanoke at 6th St	21	N/A		6-inch	8	WFH000222	General grid problems due to 6-inch dia		1500	1008.49	2543.94	491.51		\$ 2,982	Existing
Level 5	ExFF-49	WWM003023-FF	6th St betw Roanoke & Portland	400	N/A		6-inch	8	WFH000222	General grid problems due to 6-inch dia		1500	1008.49	2820.62	491.51	5	\$ 56,003	Existing
Level 6	ExFF-50	WWM004762-FF	Opposite Brinson Blvd -W- Boyd Acres	193	WFH001204	Dead end	6-inch	8	WFH001204	JCT-4863	-14.2	2500	2014.39	2014.39	485.61	1	\$ 27,051	Existing
Level 6	ExFF-51	WWM005714-FF	Off Butler Market Rd parallel to Hwy 20	646	WFH001144		8-inch	10	WFH001144	JCT-4609	-12.8	2500	2033.19	3163.35	466.81	1	\$ 103,403	Existing
Level 6	ExFF-51	WWM005094-FF	Off Butler Market Rd -E- Hwy 20	75	WFH001056		8-inch	10	WFH001144	JCT-4612	-12.9	2500	2033.19	3163.35	466.81	1	\$ 11,947	Existing
Level 6	ExFF-51	WWM003054-FF	Off Butler Market Rd -E- Hwy 20	199	WFH004374		8-inch	10	WFH001144	JCT-4612	-12.9	2500	2033.19	3848.84	466.81	1	\$ 31,818	Existing
Level 6	ExFF-51	WWM002173-FF	Off Butler Market Rd -E- Hwy 20	125	N/A		8-inch	10	WFH001144	JCT-4612	-12.9	2500	2033.19	4880.46	466.81		\$ 20,043	Existing
Zone 4B	ExFF-52	WWM006535-FF	Off Wilson Ave just _E_ Business Way	180	WFH003583	Dead end	6-inch	8	WFH003583	JCT-3769	-17.7	2500	2035.06	3331.11	464.94	1		

Fire Flow Improvements - Existing and Build-out

Level / Zone	Group	Pipe	Location Street name/intersection	Length (ft)	Hydrant ID connected to replaced pipe	Dead end?	Existing diam (in)	Replace New Diam (in)	Critical Hydrant	Addresses FF deficiency at Node: (identify if possible)	Pressure at node under FF	Fire Flow (1,500, 2,500 or 3,500 gpm)	Est. Available Fire Flow (gpm) at hydrant 20 psi residual	Est. Available Flow (gpm) to pipe DS node 20 psi residual	FF Deficiency	Number of Parcels	Estimated Replacement Cost	Demand condition driving improvement
Zone 4B	ExFF-52	WWM006536-FF	Off Wilson Ave just _E_ Business Way	326	WFH001579		8-inch	10	WFH003583	JCT-3769	-17.7	2500	2035.06	6954.93	464.94		\$ 52,088	Existing
Zone 4B	ExFF-53	WWM006497-FF	Off SE Armour Rd	344	WFH001293		8-inch	10	WFH002302	JCT-3902	-19.8	2500	2044.24	2555.23	455.76	1	\$ 55,081	Existing
Zone 4B	ExFF-53	WWM002630-FF	SE Armour Rd	14	WFH000838		8-inch	12	WFH002302	JCT-3902	-19.8	2500	2044.24	3054.9	455.76	1	\$ 2,717	Existing
Zone 4B	ExFF-53	WWM002631-FF	SE Armour Rd	61	N/A		8-inch	12	WFH002302	JCT-3902	-19.8	2500	2044.24	3098.47	455.76	1	\$ 11,591	Existing
Zone 4B	ExFF-53	WWM002632-FF	SE Armour Rd	63	N/A		8-inch	12	WFH002302	JCT-3902	-19.8	2500	2044.24	3265.78	455.76	1	\$ 11,993	Existing
Zone 4B	ExFF-53	WWM002633-FF	SE Armour Rd	162	N/A		8-inch	12	WFH002302	JCT-3902	-19.8	2500	2044.24	3434.41	455.76	1	\$ 30,828	Existing
Zone 4B	ExFF-53	WWM003768-FF	SE Armour Rd	242	WFH000837		8-inch	12	WFH002302	JCT-3902	-19.8	2500	2044.24	4265.71	455.76	1	\$ 46,042	Existing
Level 6	ExFF-54	WWM002214-FF	S of High Desert Lane	363	WFH003387	Dead end	6-inch	8	WFH003387	JCT-4926	-27.3	2500	2055.12	2055.12	444.88	1	\$ 50,824	Existing
Level 5	ExFF-55	WWM007149-FF	Along Purcell Blvd -N- Twin Knolls Dr	119	WFH001930	Dead end	6-inch	8	WFH001930	JCT-5555	-13.1	2500	2057.35	2057.09	442.65	1	\$ 16,663	Existing
Level 5	ExFF-56	FF_Z5_84	Tie in dead end on Edgecliff	567	WFH000378		N/A	10	WFH000378	JCT-4201	-34.3	1500	1058.67	1058.64	441.33		\$ 90,701	Existing
Level 5	ExFF-56	WWM005069-FF	Edgecliff Circle off Shepard Rd	263	WFH000378	Dead end	6-inch	8	WFH000378	JCT-4201	-34.3	1500	1058.67	1058.64	441.33	6	\$ 36,884	Existing
Level 5	ExFF-57	FF_Z5_179	Penn Ave betw 1st and Lytle - tie dead ends	297	WFH001703		N/A	8	WFH001703	JCT-4169	-51.8	2500	2075.42	1592.01	424.58	3	\$ 41,640	Existing
Level 5	ExFF-58	WWM006063-FF	Betw Lava Rd & Harriman St	172	WFH002949	Dead end	6-inch	8	WFH002949	JCT-1936	3.7	2500	2079.01	2078.78	420.99	1	\$ 24,024	Existing
Level 6	ExFF-59	WWM002247-FF	S of Painters St parallel to Boyd Acres	151	WFH002103	Dead end	6-inch	8	WFH002103	JCT-4924	-14.9	2500	2082.41	2082.41	417.59	1	\$ 21,137	Existing
Level 1	ExFF-60	WWM005295-FF	NW Rimrock Rd	467	WFH000574	Dead end	6-inch	8	WFH000574	JCT-2426	-36.3	1500	1095.63	1095.63	404.37	10	\$ 65,423	Existing
Level 1	ExFF-60	WWM005300-FF	NW Tower Rock Rd	1152	WFH001011		6-inch	8	WFH000574	JCT-2423	-7.7	1500	1095.63	1338.14	404.37	11	\$ 161,239	Existing
Zone 4B	ExFF-61	WWM003906-FF	11th St betw Norton Ave & Butte Drive	290	N/A		8-inch	12	WFH000379	Area bounded by Neff, Seward, Eastwoc		1500	1128.22	1494.89	371.78	2	\$ 55,187	Existing
Zone 4B	ExFF-61	WWM005254-FF	Norton Ave betw 10th and 11th Streets	313	N/A		6-inch	12	WFH000379	Area bounded by Neff, Seward, Eastwoc		1500	1128.22	1508.65	371.78	3	\$ 59,557	Existing
Zone 4B	ExFF-61	WWM006135-FF	11th St betw Butte Drive & Penn Ave	316	N/A		8-inch	12	WFH000379	Area bounded by Neff, Seward, Eastwoc		1500	1128.22	1515.82	371.78	4	\$ 60,019	Existing
Zone 4B	ExFF-61	WWM001126-FF	Norton Ave betw 11th and 12th Streets	269	N/A		6-inch	12	WFH000379	Area bounded by Neff, Seward, Eastwoc		1500	1128.22	1569.6	371.78	4	\$ 51,177	Existing
Zone 4B	ExFF-61	WWM006129-FF	Norton Ave -E- 12th Street	159	WFH000323		8-inch	12	WFH000379	Area bounded by Neff, Seward, Eastwoc		1500	1128.22	2148.68	371.78	3	\$ 30,118	Existing
Zone 4B	ExFF-61	WWM006130-FF	NW out of P Butte to Norton Ave	806	WFH000326		8-inch	12	WFH000379	Area bounded by Neff, Seward, Eastwoc		1500	1128.22	2296.54	371.78	1	\$ 153,154	Existing
Meyer Dr	ExFF-62	WWM006889-FF	Off Reed Lane	111	WFH001408	Dead end	6-inch	8	WFH001408	JCT-1025	-7.13	2500	2132.2	2126.19	367.8		\$ 15,608	Existing
Level 5	ExFF-62	WWM007235-FF	1st St betw Gordon & Saginaw	388	N/A		4-inch	8	WFH003810	4-inch diameter main in the grid		1500	1132.27	941.28	367.73	8	\$ 54,289	Existing
Level 5	ExFF-63	FF_Z5_193	Awbrey Rd at Saginaw Ave - tie dead end	29	WFH003810		N/A	8	WFH003810	JCT-2315	-22.2	1500	1132.27	1132.24	367.73		\$ 4,096	Existing
Level 5	ExFF-63	WWM007233-FF	Awbrey Rd betw Saginaw & Portland	659	N/A		6-inch	8	WFH003810	Small grid of 6-inch diameter mains - rec		1500	1132.27	2735.34	367.73	17	\$ 92,222	Existing
Level 5	ExFF-63	WWM005980-FF	Saginaw Ave betw 1st St and Awbrey Rd	97	N/A		6-inch	8	WFH003810	Small grid of 6-inch diameter mains - rec		1500	1132.27	2752.28	367.73	0	\$ 13,517	Existing
Level 5	ExFF-63	WWM001670-FF	Saginaw Ave betw 1st St and Awbrey Rd	168	WFH000033		6-inch	8	WFH003810	Small grid of 6-inch diameter mains - rec		1500	1132.27	2896.55	367.73	0	\$ 23,557	Existing
Level 5	ExFF-63	WWM001672-FF	Saginaw Ave betw 1st St and Awbrey Rd	145	N/A		6-inch	8	WFH003810	Small grid of 6-inch diameter mains - rec		1500	1132.27	2774.3	367.73	1	\$ 20,273	Existing
Level 5	ExFF-63	WWM001671-FF	Saginaw Ave betw 1st St and Awbrey Rd	141	N/A		6-inch	8	WFH003810	Small grid of 6-inch diameter mains - rec		1500	1132.27	2784.55	367.73	2	\$ 19,771	Existing
Level 5	ExFF-64	WWM002836-FF	Division St -S- Thurston Ave	154	N/A		6-inch	12	WFH000244	Small grid of 6-inch diameter mains - rec		2500	2138.36	2125.22	361.64	1	Upsize for Build-out	Existing
Level 5	ExFF-64	WWM001687-FF	Division St -N- Revere	391	WFH000244		6-inch	12	WFH000244	General grid problems due to 6-inch dia		2500	2138.36	2138.29	361.64	9	Upsize for Build-out	Existing
Level 5	ExFF-64	WWM001688-FF	Division St -S- Thurston Ave	161	N/A		6-inch	12	WFH000244	Small grid of 6-inch diameter mains - rec		2500	2138.36	2260.52	361.64		Upsize for Build-out	Existing
Level 5	ExFF-65	WWM001560-FF	Revere Ave -W- Hwy 20	129	N/A		6-inch	12	WFH000244	General grid problems due to 6-inch dia		2500	2138.36	2741.84	361.64	1	Upsize for Build-out	Existing
Level 5	ExFF-65	WWM001693-FF	Revere at Lytle St	39	N/A		6-inch	12	WFH000244	General grid problems due to 6-inch dia		2500	2138.36	2852.19	361.64	2	Upsize for Build-out	Existing
Level 5	ExFF-65	WWM001690-FF	Revere betw Division & Lytle	413	N/A		6-inch	12	WFH000244	General grid problems due to 6-inch dia		2500	2138.36	2919.66	361.64	2	Upsize for Build-out	Existing
Level 5	ExFF-65	WWM001561-FF	Revere Ave -W- Hwy 20	349	N/A		6-inch	12	WFH000244	General grid problems due to 6-inch dia		2500	2138.36	3136.19	361.64	4	Upsize for Build-out	Existing
Level 5	ExFF-66	WWM005678-FF	Revere Ave betw 4th and Hwy 20	74	N/A		6-inch	12	WFH000244	General grid problems due to 6-inch dia		2500	2138.36	3030.85	361.64		\$ 14,016	Existing
Level 5	ExFF-66	WWM001565-FF	Revere Ave betw 4th and Hwy 20	465	N/A		6-inch	12	WFH000244	General grid problems due to 6-inch dia		2500	2138.36	10115.62	361.64	2	\$ 88,287	Existing
Level 6	ExFF-67	WWM003318-FF	S of Mt. Washington Dr -W- Hwy 20	249	N/A		8-inch	10	WFH004602	JCT-4570	-1.7	2500	2139.54	4152.06	360.46		\$ 39,858	Existing
Level 6	ExFF-67	WWM003316-FF	S of Mt. Washington Dr -W- Hwy 20	264	WFH004598		8-inch	10	WFH004602	JCT-4570	-1.7	2500	2139.54	9541.9	360.46	2	\$ 42,179	Existing
Meyer Dr	ExFF-68	WWM000712-FF	Meyer Dr pipe	366	N/A		8-inch	10	WFH002433	JCT-1030	-6.04	2500	2165.95	3660.22	334.05		\$ 58,599	Existing
Level 6	ExFF-69	WWM004741-FF	S of High Desert Lane	318	WFH003388	Dead end	6-inch	8	WFH003388	JCT-4925	-19.9	2500	2176.83	7309.36	323.17	1	\$ 44,516	Existing
Level 1	ExFF-70	WWM005517-FF	Kenwood Court	209	WFH001721	Dead end	6-inch	8	WFH001721	JCT-3131	14.1	1500	1190.91	1190.91	309.09	3	\$ 29,233	Existing
Level 6	ExFF-71	WWM005710-FF	Golf Course Dr South	417	WFH001185	Dead end	6-inch	8	WFH001185	JCT-3076	-1.1	1500	1195.02	1195.02	304.98	6	\$ 58,326	Existing
Meyer Dr	ExFF-72	WWM000696-FF	Meyer Dr pipe	121	WFH001406	Dead end	6-inch	8	WFH001406	JCT-1038	-5.95	2500	2200.45	2194.91	299.55		\$ 17,009	Existing
Meyer Dr	ExFF-73	WWM006887-FF	3rd Street	10	WFH002539	Dead end	6-inch	8	WFH002539	JCT-3518	-6.82	2500	2212.47	2268.09	287.53		\$ 1,432	Existing
Meyer Dr	ExFF-73	WWM006888-FF	3rd Street	370	WFH002538		8-inch	10	WFH002539	JCT-3518	-6.82	2500	2212.47	2268.09	287.53		\$ 59,128	Existing
Level 5	ExFF-74	WWM000657-FF	E of Columbia St betw Colorado & Emkay	154	WFH003993	Dead end	6-inch	8	WFH003993	JCT-1331	10.8	2500	2218.09	2217.98	281.91	2	\$ 21,585	Existing
Level 6	ExFF-75	WWM004526-FF	Off Jamison St -N- Halfway Rd	224	WFH002295	Dead end	6-inch	8	WFH002295	JCT-5162	-30.2	2500	2225.35	2225.35	274.65	1	\$ 31,398	Existing
Level 6	ExFF-75	WWM004527-FF	Off Jamison St -N- Halfway Rd	34	N/A		6-inch	8	WFH002295	JCT-5162	-30.2	2500	2225.35	4338.98	274.65		\$ 4,759	Existing
Level 6	ExFF-76	WWM007086-FF	Off Service Rd -N- Halfway Rd	236	WFH004411		6-inch	8	WFH004411	JCT-5184	-33.0	2500	2228.15	2228.15	271.85	1	\$ 33,024	Existing
Level 6	ExFF-76	WWM007085-FF	Off Service Rd -N- Halfway Rd	14	N/A	Dead end	6-inch	8	WFH004411	JCT-5184	-33.0	2500	2228.15	2228.15	271.85	1	\$ 1,915	Existing
Level 6	ExFF-77	WWM004715-FF	Sherman Rd / Empire Ave	54	WFH003442	Dead end	6-inch	8	WFH003442	JCT-5044	-14.3	2500	2232.89	2485.83	267.11		\$ 7,619	Existing
Level 6	ExFF-77	WWM004716-FF	Sherman Rd / Empire Ave	172	WFH003441		6-inch	8	WFH003442	JCT-5044	-14.3	2500	2232.89	2485.83	267.11	2	\$ 24,088	Existing
Level 6	ExFF-77	WWM004717-FF	Sherman Rd / Empire Ave	5	N/A		6-inch	8	WFH003442	JCT-5044	-14.3	2500	2232.89	7107.43	267.11		\$ 700	Existing
Level 5	ExFF-78	FF_Z5_314	Tie in dead end on Northview	591	WFH000476		N/A	8	WFH000476	General grid problems due to 6-inch dia		1500	1243.36	1243.33	256.64		\$ 82,783	Existing
Level 5	ExFF-78	WWM001456-FF	Northview Dr off Shepard Rd	318	WFH000476	Dead end	6-inch	8	WFH000476	General grid problems due to 6-inch dia		1500	1243.36	1243.33	256.64	7	\$ 44,518	Existing

Fire Flow Improvements - Existing and Build-out

Level / Zone	Group	Pipe	Location Street name/intersection	Length (ft)	Hydrant ID connected to replaced pipe	Dead end?	Existing diam (in)	Replace New Diam (in)	Critical Hydrant	Addresses FF deficiency at Node: (identify if possible)	Pressure at node under FF	Fire Flow (1,500, 2,500 or 3,500 gpm)	Est. Available Fire Flow (gpm) at hydrant 20 psi residual	Est. Available Flow (gpm) to pipe DS node 20 psi residual	FF Deficiency	Number of Parcels	Estimated Replacement Cost	Demand condition driving improvement
Zone 4B	ExFF-79	WWM000839-FF	Comm area off Brosterhouse and Miller	280	WFH004519	Dead end	8-inch	12	WFH004519	JCT-3488	-5.9	2500	2251.09	2229.21	248.91	1	\$ 53,106	Existing
Zone 4B	ExFF-79	WWM002539-FF	Comm area off Brosterhouse and Miller	75	N/A		8-inch	12	WFH004519	JCT-3488	-5.9	2500	2251.09	2927.43	248.91		\$ 14,308	Existing
Zone 4B	ExFF-79	WWM002540-FF	Comm area off Brosterhouse and Miller	160	WFH003905		8-inch	12	WFH004519	JCT-3488	-5.9	2500	2251.09	3196.63	248.91		\$ 30,403	Existing
Level 5	ExFF-80	WWM001212-FF	DeKalb Ave off 10th St	208	N/A	Dead end	6-inch	8	WFH000218	JCT-2758	-41.1	1500	1251.82	1011.09	248.18	4	\$ 29,156	Existing
Level 5	ExFF-80	WWM001210-FF	Emerson Ave off 10th St	243	N/A	Dead end	6-inch	8	WFH000218	JCT-2778	-35.5	1500	1251.82	1047.92	248.18	6	\$ 34,043	Existing
Level 5	ExFF-80	WWM006198-FF	10th St betw DeKalb & Emerson	448	WFH000218		6-inch	8	WFH000218	General grid problems due to 6-inch dia		1500	1251.82	1251.78	248.18	7	\$ 62,666	Existing
Level 5	ExFF-80	WWM001211-FF	10th St betw Emerson & Larch	279	WFH000202		6-inch	8	WFH000218	General grid problems due to 6-inch dia		1500	1251.82	1251.34	248.18	4	\$ 39,089	Existing
Level 5	ExFF-80	WWM001189-FF	10th St betw Larch & Franklin	472	N/A		6-inch	8	WFH000218	General grid problems due to 6-inch dia		1500	1251.82	1347.81	248.18	10	\$ 66,023	Existing
Zone 4B	ExFF-81	WWM000491-FF	Off 9th St -S- Business Way	198	WFH001582	Dead end	6-inch	8	WFH001582	JCT-3648	-9.9	2500	2257.63	2249.01	242.37	1	\$ 27,741	Existing
Level 5	ExFF-82	WWM002711-FF	S of Hwy 20, NE of Isaiiah Dr	253	N/A		8-inch	10	WFH003038	JCT-5584	-4.4	2500	2273.4	2734.12	226.6	1	\$ 40,527	Existing
Level 5	ExFF-82	WWM001291-FF	S of Hwy 20, NE of Isaiiah Dr	159	WFH003038	Dead end	8-inch	10	WFH003038	JCT-5584	-4.4	2500	2273.4	2734.12	226.6		\$ 25,508	Existing
Level 1	ExFF-83	WWM003050-FF	NW Elliot Court	447	WFH001728	Dead end	6-inch	8	WFH001728	JCT-3118	11.6	1500	1284.93	1284.93	215.07	8	\$ 62,636	Existing
Level 5	ExFF-84	WWM003162-FF	Wall St / Deschutes Place	594	WFH000289		6-inch	8	WFH000047	JCT-4198	-59.0	1500	1285.45	1679.72	214.55	4	\$ 83,189	Existing
Level 5	ExFF-84	WWM002545-FF	Wall St / Deschutes Place	3	N/A		6-inch	12	WFH000047	JCT-4198	-59.0	1500	1285.45	12576.57	214.55		\$ 614	Existing
Level 5	ExFF-85	WWM001624-FF	Off Lakeside Place -W- Division	144	WFH002204	Dead end	6-inch	8	WFH002204	JCT-4421	-11.2	2500	2288.8	2288.72	211.2	1	\$ 20,198	Existing
Zone 4B	ExFF-86	WWM001390-FF	Off SE 15th St, north of SE Ramsay Rd	564	WFH000731	Dead end	6-inch	8	WFH000731	JCT-2656	-13.9	1500	1307.83	1307.11	192.17	1	\$ 78,919	Existing
Zone 4B	ExFF-87	WWM006545-FF	Just SW of Business Way	189	WFH002932	Dead end	6-inch	8	WFH002932	JCT-3729	-6.7	2500	2314.01	2306.32	185.99	1	\$ 26,482	Existing
Zone 4B	ExFF-88	FF_Z4B_48	Tie 15th St with Sotra Loop	409	WFH004728		N/A	8	WFH004725	JCT-2572	19.7	1500	1321.56	1803.64	178.44	8	\$ 57,292	Existing
Zone 4B	ExFF-89	WWM000721-FF	Comm area off Brosterhouse and Miller	70	WFH003906	Dead end	6-inch	12	WFH003906	JCT-3466	-3.3	2500	2337.66	2313.58	162.34	1	\$ 13,301	Existing
Zone 4A	ExFF-90	WWM005384-FF	Flagline Drive - See note	1893	WFH003795		8-inch	10	WFH003795	JCT-404	11.4	1500	1338.02	1338.01	161.98	40	\$ 50,000	Existing
Zone 4A	ExFF-90	WWM001789-FF	Skyliners Rd / Flagline Drive - See note	240	N/A		8-inch	10	WFH003795	JCT-404	11.4	1500	1338.02	4238.04	161.98		\$ -	Existing
Zone 4B	ExFF-91	WWM006531-FF	Off Wilson Ave -W- Manley Place	132	WFH001783	Dead end	6-inch	10	WFH001783	JCT-3791	-6.1	2500	2340.64	2332.88	159.36	1	\$ 21,132	Existing
Zone 4B	ExFF-91	WWM006530-FF	Off Wilson Ave -W- Manley Place	238	WFH001784		8-inch	10	WFH001783	JCT-3791	-6.1	2500	2340.64	3640.39	159.36		\$ 38,080	Existing
Zone 4B	ExFF-92	WWM000473-FF	Wilson Ave -W- Marley Place	167	WFH001495	Dead end	6-inch	8	WFH001495	JCT-3811	-6.1	2500	2343.17	2335.27	156.83	1	\$ 23,312	Existing
Level 5	ExFF-93	WWM005614-FF	N Pilot Butte Lane off Harvey Dr	489	WFH000450		6-inch	8	WFH000450	JCT-4574	-23.0	1500	1346	1345.98	154	13	\$ 68,485	Existing
Level 5	ExFF-93	WWM001529-FF	Harvey Lane -N- Drost Dr	253	N/A		6-inch	8	WFH000450	JCT-4533	-15.8	1500	1346	1717.96	154		\$ 35,353	Existing
Level 6	ExFF-94	WWM002175-FF	Off OB Riley Rd	187	WFH001124	Dead end	6-inch	8	WFH001124	JCT-4726	-1.2	2500	2351.11	3913.15	148.89	1	\$ 26,120	Existing
Level 5	ExFF-95	WWM006322-FF	E of Savannah Dr, N of Hwy 20	281	WFH001843	Dead end	6-inch	8	WFH001843	JCT-5685	-6.6	1500	1354.49	1354.33	145.51	1	\$ 39,311	Existing
Level 6	ExFF-96	WWM004686-FF	Off OB Riley Rd	125	WFH001123	Dead end	6-inch	8	WFH001123	JCT-4729	0.5	2500	2365.21	2365.21	134.79	1	\$ 17,476	Existing
Zone 4B	ExFF-97	WWM006298-FF	Off Greenwood Ave near end of Forbes Rd	438	WFH001396	Dead end	8-inch	12	WFH001396	JCT-2799	1.0	2500	2392.88	2392.37	107.12	1	\$ 83,223	Existing
Level 5	ExFF-98	FF_Z5_180	Tie dead ends - off 1st St and Olney Ave	243	WFH002273		N/A	8	WFH002273	JCT-4114	5.1	2500	2398.03	2397.95	101.97	2	\$ 34,013	Existing
Level 6	ExFF-99	WWM005093-FF	Off Butler Market Rd -E- Hwy 20	157	WFH001009	Dead end	6-inch	8	WFH001009	JCT-4676	3.4	2500	2425.39	2425.39	74.61	1	\$ 22,050	Existing
Level 6	ExFF-100	WWM005564-FF	Doctors Dr off Connors Ave	271	WFH000904	Dead end	6-inch	8	WFH000904	JCT-6069	12.3	1500	1427.64	1427.64	72.36	2	\$ 37,891	Existing
Level 5	ExFF-101	WWM001547-FF	11th Place off Ulysses Dr	573	WFH000871	Dead end	6-inch	8	WFH000871	General grid problems due to 6-inch dia		1500	1433.47	1433.44	66.53	11	\$ 80,202	Existing
Zone 4B	ExFF-102	WWM001262-FF	N of Wakefield Place off McCartney Dr	287	WFH001335	Dead end	8-inch	12	WFH001335	JCT-2783	2.5	2500	2446.23	2445.31	53.77	1	\$ 54,442	Existing
Zone 4B	ExFF-102	WWM003005-FF	McCartney Dr -S- Forbes Rd	452	WFH000669		8-inch	12	WFH001335	JCT-2783	2.5	2500	2446.23	3676.26	53.77	2	\$ 85,866	Existing
Zone 4B	ExFF-103	WWM001419-FF	N of Wilson betw 9th and Bridgeford	156	WFH001342	Dead end	6-inch	8	WFH001342	JCT-3870	-2.2	2500	2460.47	2453.77	39.53	1	\$ 21,872	Existing
Level 5	ExFF-104	FF_Z5_157	Tie dead end - Deschutes Place & Division St	335	WFH000646		N/A	8	WFH000646	JCT-4297	-37.2	1500	1466.95	1114.71	33.05	10	\$ 46,957	Existing
Level 5	ExFF-105	FF_Z5_35	Aurora Ave & Tierra Rd - tie dead ends	186	WFH003653		N/A	8	WFH003653	JCT-5679	-14.9	1500	1470.09	1288.36	29.91	10	\$ 26,093	Existing
Level 5	ExFF-105	FF_Z5_36	Aurora Ave & Tierra Rd - tie dead ends	131	WFH003653		N/A	8	WFH003653	JCT-5679	-14.9	1500	1470.09	1288.36	29.91		\$ 18,299	Existing
Build-out System Fire Flow Improvements, sorted by existing flow deficiency (Column Z) compared to flow requirement (Column V)																		
Level 5	BoFF-1	FF_Z5_263	Along 3rd St betw Clay & DeKalb - tie dead er	355	WFH001907		N/A	8	WFH001907	JCT-2745	-98.7	2500	1054.42	1054.38	1445.58		\$ 49,756	Build-out
Level 5	BoFF-1	WWM003157-FF	NW of Addison Ave near Hwy 20	108	WFH000302	Dead end	6-inch	8	WFH000302	JCT-4530	-89.0	2500	1510.38	1634.54	989.62		\$ 15,118	Build-out
Level 5	BoFF-1	FF_Z5_160	2nd St betw Seward & Thurston - tie dead en	418	N/A		N/A	8	WFH000601	JCT-4278	-21572.67	2500	1525.31	91.53	974.69		\$ 58,495	Build-out
Level 5	BoFF-1	FF_Z5_186	2nd St betw Vicksburg & Utica - tie dead end	151	N/A		N/A	8	WFH000367	JCT-2363	-106.3	1500	546.83	623.32	953.17		\$ 21,129	Build-out
Level 5	BoFF-1	WWM003993-FF	2nd St betw Vicksburg & Utica	180	N/A	Dead end	6-inch	8	WFH000367	JCT-2363	-106.3	1500	546.83	623.32	953.17		\$ 25,200	Build-out
Level 5	BoFF-1	WWM005567-FF	N of Addison Ave parallel to Hwy 97	409	WFH003421	Dead end	8-inch	10	WFH003421	JCT-4578	-83.7	2500	1561.29	1561.27	938.71		\$ 65,486	Build-out
Level 5	BoFF-1	WWM002867-FF	Addison Ave near Hwy 20	5	N/A		8-inch	10	WFH003421	Recommend upsizing the 8-inch diamet		2500	1561.29	1651.6	938.71		\$ 773	Build-out
Level 5	BoFF-1	WWM006352-FF	Purcell Blvd -N- Twin Knolls Dr	307	N/A		8-inch	12	WFH002545	Recommend upsizing the 8-inch diamet		2500	1638.58	3374.49	861.42		\$ 58,367	Build-out
Level 5	BoFF-1	WWM003192-FF	Purcell -S- Hwy 20	236	N/A		8-inch	12	WFH002545	Recommend upsizing the 8-inch diamet		2500	1638.58	4016.3	861.42		\$ 44,889	Build-out
Level 5	BoFF-1	WWM003849-FF	Purcell -S- Hwy 20	95	N/A		8-inch	12	WFH002545	Recommend upsizing the 8-inch diamet		2500	1638.58	5489.06	861.42		\$ 18,049	Build-out
Level 5	BoFF-1	WWM002695-FF	Twin Knolls Dr between Purcell and Windy Kr	159	WFH002009		8-inch	12	WFH002545	Recommend upsizing the 8-inch diamet		2500	1638.58	4061.04	861.42		\$ 30,206	Build-out
Level 5	BoFF-1	WWM001296-FF	Twin Knolls Dr between Purcell and Windy Kr	209	N/A		8-inch	12	WFH002545	Recommend upsizing the 8-inch diamet		2500	1638.58	3566.75	861.42		\$ 39,800	Build-out

Fire Flow Improvements - Existing and Build-out

Level / Zone	Group	Pipe	Location Street name/intersection	Length (ft)	Hydrant ID connected to replaced pipe	Dead end?	Existing diam (in)	Replace New Diam (in)	Critical Hydrant	Addresses FF deficiency at Node: (identify if possible)	Pressure at node under FF	Fire Flow (1,500, 2,500 or 3,500 gpm)	Est. Available Fire Flow (gpm) at hydrant 20 psi residual	Est. Available Flow (gpm) to pipe DS node 20 psi residual	FF Deficiency	Number of Parcels	Estimated Replacement Cost	Demand condition driving improvement
Level 5	BoFF-1	WWM002696-FF	Twin Knolls Dr between Purcell and Windy Kr	180	WFH002012		8-inch	12	WFH002545	Recommend upsizing the 8-inch diameter		2500	1638.58	5621.02	861.42		\$ 34,186	Build-out
Level 5	BoFF-1	WWM002697-FF	Twin Knolls Dr at Windy Knolls	47	N/A		8-inch	12	WFH002545	Recommend upsizing the 8-inch diameter		2500	1638.58	5189.55	861.42		\$ 8,929	Build-out
Level 5	BoFF-1	FF_Z5_49	Bear Creek Rd at 27th St - tie dead ends	262	WFH002543		N/A	8	WFH002543	JCT-5505	-32.3	2500	1890.45	1758.07	609.55		\$ 36,747	Build-out
Level 5	BoFF-1	FF_Z5_262	W-NW of Emerson Ave & 1st St	228	WFH003456		N/A	8	WFH003456	JCT-2800	-12.9	2500	1911.82	2197.12	588.18		\$ 31,980	Build-out
Level 3	BoFF-1	FF_Z3_13	Connect Bainbridge Ct to Cultus Lake Ct	450	WFH004841		N/A	8	WFH004841	JCT-108	2.4	1500	975.7	1173.8	524.3		\$ 62,965	Build-out
Level 6	BoFF-1	WWM004806-FF	Off Mercury Place _S_ Brinson Blvd	278	WFH001453		8-inch	10	WFH001469	JCT-4742	-20.5	2500	1992.87	3087.75	507.13		\$ 44,487	Build-out
Level 5	BoFF-1	WWM006113-FF	Parallel & east of Hwy 97, S of Colorado	463	WFH001167	Dead end	8-inch	10	WFH001167	JCT-1612	13.2	2500	2079.69	2077.42	420.31		\$ 74,059	Build-out
Level 5	BoFF-1	WWM005067-FF	Shepard Rd at Northview	97	WFH000375		8-inch	12	WFH000473	Recommend upsizing the 8-inch diameter		1500	1100.04	1844.38	399.96		\$ 18,377	Build-out
Level 5	BoFF-1	WWM003065-FF	Shepard Rd betw Meadow Lane & Northview	416	N/A		8-inch	12	WFH000473	Recommend upsizing the 8-inch diameter		1500	1100.04	1944.85	399.96		\$ 78,959	Build-out
Level 5	BoFF-1	WWM005022-FF	Shepard betw Hollinshead & Meadow	718	N/A		8-inch	12	WFH000473	Recommend upsizing the 8-inch diameter		1500	1100.04	4226.13	399.96		\$ 136,446	Build-out
Level 5	BoFF-1	WWM005029-FF	Shepard betw Watson & Hollinshead	363	N/A		8-inch	12	WFH000473	Recommend upsizing the 8-inch diameter		1500	1100.04	4637.84	399.96		\$ 68,966	Build-out
Zone 4B	BoFF-1	WWM001424-FF	Off SE Armour Rd	133	WFH001645	Dead end	6-inch	8	WFH001645	JCT-3949	-15.5	2500	2128.51	2123.67	371.49		\$ 18,618	Build-out
Level 5	BoFF-1	WWM005772-FF	Division St -S- Underwood	148	WFH002414		6-inch	12	WFH000244	Small grid of 6-inch diameter mains - rec		2500	2138.36	2407.08	361.64		Upsize for Build-out	Build-out
Level 5	BoFF-1	WWM001653-FF	Division St -N- Thurston Ave	216	WFH000049		6-inch	12	WFH000244	Small grid of 6-inch diameter mains - rec		2500	2138.36	2396.25	361.64		Upsize for Build-out	Build-out
Level 5	BoFF-1	WWM005773-FF	Division St -N- Underwood	366	N/A		6-inch	12	WFH000244	Small grid of 6-inch diameter mains - rec		2500	2138.36	2580.69	361.64		Upsize for Build-out	Build-out
Zone 4A	BoFF-1	WWM005597-FF	Saginaw Ave betw 4th and 5th Streets	363	WFH000678		6-inch	8	WFH000678	JCT-2313	15.7	1500	1261.68	1261.68	238.32		\$ 50,847	Build-out
Zone 4A	BoFF-1	WWM005874-FF	Quincy Ave -W- 12th Street	531	N/A		6-inch	8	WFH000193	JCT-2277	19.9	1500	1300	1307.83	200		\$ 74,405	Build-out
Zone 4A	BoFF-1	WWM005875-FF	Quincy Ave -E- 12th Street	18	N/A		6-inch	8	WFH000193	JCT-2277	19.9	1500	1300	3524.81	200		\$ 2,520	Build-out
Level 5	BoFF-1	WWM006317-FF	Along Purcell Blvd just -N- Hwy 20	160	WFH002998	Dead end	6-inch	8	WFH002998	JCT-5611	-6.7	2500	2337.28	2337.03	162.72		\$ 22,406	Build-out
Meyer Dr	BoFF-1	WWM000700-FF	Meyer Dr pipe	120	WFH001409	Dead end	6-inch	8	WFH001409	JCT-1041	-3.27	2500	2341.64	2335.62	158.36		\$ 16,797	Build-out
Level 5	BoFF-1	WWM005627-FF	Parallel to 4th St near Addison Ave	148	WFH003650	Dead end	6-inch	8	WFH003650	JCT-4514	-5.7	2500	2352.62	2352.52	147.38		\$ 20,780	Build-out
Level 5	BoFF-1	WWM003007-FF	E of Savannah Dr, N of Hwy 20	390	WFH001109		8-inch	12	WFH001843	JCT-5685	-6.6	1500	1354.49	2730.63	145.51		\$ 74,187	Build-out
Level 5	BoFF-1	WWM007268-FF	E of Savannah Dr, N of Hwy 20	424	N/A		8-inch	12	WFH001843	JCT-5685	-6.6	1500	1354.49	3432.98	145.51		\$ 80,623	Build-out
Level 5	BoFF-1	WWM001355-FF	S of Hwy 20, E of 27th St	123	WFH002002	Dead end	6-inch	8	WFH002002	JCT-5558	-8.2	2500	2369.13	4212.55	130.87		\$ 17,289	Build-out
Level 3	BoFF-1	FF_Z3_12	Connect Phils Loop to Talapus Ct	418	WFH003506		N/A	8	WFH003506	JCT-377	7.1	1500	1394.26	1034.62	105.74		\$ 58,488	Build-out
Level 5	BoFF-1	FF_Z5_42	Bear Creek Rd / Airstrip Dr - tie dead end	643	WFH004770		N/A	12	WFH004770	JCT-5501	-3.2	1500	1403.02	1654.43	96.98		\$ 122,191	Build-out
Level 5	BoFF-1	WWM001548-FF	11th Place -N- Ulysses	587	WFH000869		8-inch	10	WFH000871	JCT-4364	-18.2	1500	1433.47	2115.29	66.53		\$ 93,971	Build-out
Level 6	BoFF-1	WWM007094-FF	Off Corporate Place below Empire Ave	341	N/A		8-inch	10	WFH004164	JCT-4974	-8.3	2500	2452.39	3164.64	47.61		\$ 54,611	Build-out
Level 5	BoFF-1	WWM001643-FF	Deschutes Place -S- Vail Ave	488	WFH000646	Dead end	6-inch	8	WFH000646	Small grid of 6-inch diameter mains - rec		1500	1466.95	1114.71	33.05		\$ 68,366	Build-out
Level 5	BoFF-1	WWM001646-FF	Vail Ave betw Division & Deschutes	335	N/A		6-inch	8	WFH000646	Small grid of 6-inch diameter mains - rec		1500	1466.95	1508.21	33.05		\$ 46,957	Build-out
Level 6	BoFF-1	WWM004794-FF	Off Brinson Blvd betw Layton and 18th St	460	WFH001885		8-inch	12	WFH001889	JCT-4874	-6.7	2500	2480.32	3460.6	19.68		\$ 87,366	Build-out
Level 6	BoFF-1	WWM004481-FF	Nels Anderson Rd / Hwy 97	278	WFH001344	Dead end	6-inch	8	WFH001344	JCT-5381	-16.8	2500	2495.02	2495.02	4.98		\$ 38,880	Build-out

Pipes/areas which cannot carry fire flow under existing conditions, but do not affect ability to supply flow to existing hydrants (e.g. hydrant is close to main line)

Zone 4F	ExFF-HydOK	FF_Z4F_01	Connect dead-end mains off Falcon Ridge	272	WFH002260		N/A	8	WFH002260	JCT-3243	0.4	1500	1514.61	1317.47	Hydrant not deficient		\$ 38,114	Existing-HydrantOK
Level 6	ExFF-HydOK	WWM004949-FF	Woodridge Lane off Shepard Rd	213	N/A		6-inch	8	WFH000550	JCT-4588	-1064.97	1500	1519.67	2293	Hydrant not deficient		\$ 29,869	Existing-HydrantOK
Zone 5D	ExFF-HydOK	WWM007451-FF	Summerfield -S- Archie Briggs Rd	12	N/A		8-inch	12	WFH001163	JCT-3307	5.9	1500	1528.04	1080.75	Hydrant not deficient		\$ 2,318	Existing-HydrantOK
Zone 5D	ExFF-HydOK	WWM003148-FF	Summerfield -S- Archie Briggs Rd	869	WFH001163		8-inch	12	WFH001163	JCT-3307	5.9	1500	1528.04	1528.04	Hydrant not deficient		\$ 165,042	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM006519-FF	SE 6th St -S- Roosevelt Ave	82	N/A	Dead end	4-inch	8	WFH000723	JCT-3714	-37.6	1500	1539.76	1019.34	Hydrant not deficient		\$ 11,459	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM006520-FF	SE 6th St -S- Roosevelt Ave	475	WFH000717		6-inch	8	WFH000723	JCT-3714	-37.6	1500	1539.76	1536.73	Hydrant not deficient		\$ 66,560	Existing-HydrantOK
Zone 5B	ExFF-HydOK	WWM000392-FF	Putnam Road	11	N/A		6-inch	10	WFH000528	High line loss with 6-inch but pressures >		1500	1556.97	3533.13	Hydrant not deficient		\$ 1,689	Existing-HydrantOK
Zone 5B	ExFF-HydOK	WWM002509-FF	Putnam Road	16	N/A		6-inch	10	WFH000528	High line loss with 6-inch but pressures >		1500	1556.97	3613.37	Hydrant not deficient		\$ 2,543	Existing-HydrantOK
Zone 5B	ExFF-HydOK	WWM007174-FF	Putnam Road	82	N/A		6-inch	10	WFH000528	High line loss with 6-inch but pressures >		1500	1556.97	3775.67	Hydrant not deficient		\$ 13,181	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM006426-FF	Gatewood Place off Arborwood Ave	535	WFH000911	Dead end	6-inch	8	WFH000911	JCT-5472	-15.2	1500	1563.77	1559.31	Hydrant not deficient		\$ 74,838	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM003709-FF	S of Hayes Ave, SW of Division St	405	N/A		8-inch	12	WFH001141	JCT-3527	1.5	2500	2565.23	3198.18	Hydrant not deficient		\$ 76,949	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM000720-FF	W of American Lane -N- Brosterhouse	217	WFH003100	Dead end	8-inch	12	WFH003101	JCT-3498	0.6	2500	2565.7	3423.56	Hydrant not deficient		\$ 41,281	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM003705-FF	W of American Lane -N- Brosterhouse	359	N/A		10-inch	12	WFH003101	JCT-3498	0.6	2500	2565.7	3423.56	Hydrant not deficient		\$ 68,141	Existing-HydrantOK
Level 5	ExFF-HydOK	WWM006059-FF	Harriman St off Georgia Ave	420	WFH000422	Dead end	6-inch	8	WFH000422	JCT-1852	-48.1	2500	2568.07	1333.18	Hydrant not deficient		\$ 58,751	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM003336-FF	Division St & Reed Market Rd	428	WFH001436		8-inch	12	WFH004736	JCT-3647	3.6	2500	2573.38	3414.91	Hydrant not deficient		\$ 81,270	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM003591-FF	Division St & Reed Market Rd	79	N/A		8-inch	12	WFH004736	JCT-3647	3.6	2500	2573.38	6976.11	Hydrant not deficient		\$ 15,094	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM000458-FF	Off 4th Street just -S- Wilson Ave	188	WFH000924	Dead end	6-inch	8	WFH000924	JCT-3816	3.6	2500	2601.48	2596.39	Hydrant not deficient		\$ 26,383	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM000722-FF	Comm area off Brosterhouse and Miller	28	WFH003907	Dead end	6-inch	12	WFH003907	JCT-3472	1.6	2500	2601.61	2927.43	Hydrant not deficient		\$ 5,320	Existing-HydrantOK

Level / Zone	Group	Pipe	Location Street name/intersection	Length (ft)	Hydrant ID connected to replaced pipe	Dead end?	Existing diam (in)	Replace New Diam (in)	Critical Hydrant	Addresses FF deficiency at Node: (identify if possible)	Pressure at node under FF	Fire Flow (1,500, 2,500 or 3,500 gpm)	Est. Available Fire Flow (gpm) at hydrant 20 psi residual	Est. Available Flow (gpm) to pipe DS node 20 psi residual	FF Deficiency	Number of Parcels	Estimated Replacement Cost	Demand condition driving improvement
Zone 4B	ExFF-HydOK	WWM003703-FF	Carmen Loop off American Lane	334	N/A		8-inch	12	WFH003584	JCT-3482	-0.1	2500	2609.51	3106.62	Hydrant not deficient		\$ 63,453	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM003704-FF	Carmen Loop off American Lane	201	N/A		8-inch	12	WFH003584	JCT-3482	-0.1	2500	2609.51	3601.05	Hydrant not deficient		\$ 38,104	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM006405-FF	Laurelwood Place off Bronzewood Ave	360	WFH000889	Dead end	6-inch	8	WFH000889	JCT-3663	7.9	1500	1696.71	1691.39	Hydrant not deficient		\$ 50,334	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM006524-FF	SE Polaris Ct -S- Roosevelt Ave	167	N/A	Dead end	4-inch	8	WFH000724	JCT-3712	-72.7	1500	1724.91	861.3	Hydrant not deficient		\$ 23,386	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM006523-FF	SE Polaris Ct -S- Roosevelt Ave	402	WFH000724		6-inch	8	WFH000724	JCT-3712	-72.7	1500	1724.91	1721.69	Hydrant not deficient		\$ 56,263	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM003795-FF	S of Ironwood Ct -E- 15th St	227	WFH003525	Dead end	6-inch	8	WFH003525	JCT-3574	7.7	1500	1729.07	2788.94	Hydrant not deficient		\$ 31,784	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM006452-FF	Off SE Bridgeford Blvd	193	WFH002202	Dead end	6-inch	8	WFH002202	JCT-4013	8.2	2500	2754.28	2748.28	Hydrant not deficient		\$ 26,958	Existing-HydrantOK
Zone 4B	ExFF-HydOK	FF_Z4B_27	Off SE Bridgeford Blvd - tie dead ends	318	WFH003564		N/A	8	WFH003564	JCT-4029	7.9	1500	1763.44	2218.79	Hydrant not deficient		\$ 44,530	Existing-HydrantOK
Zone 4I	ExFF-HydOK	WWM006837-FF	Just north of Mt. Bachelor Drive	64	N/A	Dead end	4-inch	8	WFH000670	JCT-1042	17.6	1500	1807.44	1039.41	Hydrant not deficient		\$ 8,954	Existing-HydrantOK
Zone 4I	ExFF-HydOK	WWM006836-FF	Just north of Mt. Bachelor Drive	132	WFH000670		6-inch	8	WFH000670	JCT-1042	17.6	1500	1807.44	1807.44	Hydrant not deficient		\$ 18,535	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM006654-FF	Just north of Wilson Ave and -W- of Hwy 97	99	WFH003911	Dead end	6-inch	8	WFH003911	JCT-3875	8.3	2500	2814.97	2810.87	Hydrant not deficient		\$ 13,894	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM000624-FF	N of Hayes Ave, W of Division St	139	WFH001297	Dead end	6-inch	8	WFH001297	JCT-3564	10.6	2500	2900.3	2893.86	Hydrant not deficient		\$ 19,399	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM006539-FF	Off Wilson Ave just _E_ SE 9th St	309	WFH002297	Dead end	6-inch	8	WFH002297	JCT-3795	-17.8	2500	2926.21	2092.89	Hydrant not deficient		\$ 43,258	Existing-HydrantOK
Level 5	ExFF-HydOK	WWM003949-FF	13th St -S- Albany Ave	396	WFH000319	Dead end	6-inch	8	WFH000319	JCT-1630	-28.3	2500	2937.74	1611.91	Hydrant not deficient		\$ 55,481	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM000621-FF	N of Hayes Ave, W of Division St	71	WFH001299	Dead end	6-inch	8	WFH001299	JCT-3585	11.4	2500	2938.28	2931.88	Hydrant not deficient		\$ 9,939	Existing-HydrantOK
Level 5	ExFF-HydOK	WWM003019-FF	Kearney Ave betw Hill St & Hwy 97	430	WFH000200		6-inch	8	WFH000200	General grid problems due to 6-inch dia		2500	2985.79	3258.55	Hydrant not deficient		\$ 60,195	Existing-HydrantOK
Level 5	ExFF-HydOK	WWM000946-FF	Hill St -N- Greenwood Ave	232	N/A		6-inch	8	WFH000200	General grid problems due to 6-inch dia		2500	2985.79	12267.26	Hydrant not deficient		\$ 32,478	Existing-HydrantOK
Level 5	ExFF-HydOK	WWM001534-FF	Hwy 20 -N- Revere Ave	673	WFH000209		6-inch	8	WFH000209	General grid problems due to 6-inch dia		2500	3003.88	2195.78	Hydrant not deficient		\$ 94,198	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM001358-FF	Wildcat Dr -S- Skylark Drive	347	WFH000576	Dead end	6-inch	8	WFH000576	JCT-3817	-5.8	1500	2014.87	1397.71	Hydrant not deficient		\$ 48,514	Existing-HydrantOK
Level 5	ExFF-HydOK	FF_Z5_40	Bear Creek Lane - tie dead ends	855	WFH004954		N/A	16	WFH004954	16-inch diameter improvement connect		1500	2078.8	2078.48	Hydrant not deficient		\$ 205,106	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM000465-FF	SE Douglas St -S- Roosevelt Ave	564	WFH000720	Dead end	6-inch	8	WFH000720	JCT-3713	-3.5	1500	2092.3	1380.92	Hydrant not deficient		\$ 78,993	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM006424-FF	Arborwood Ave off Teakwood Dr	467	WFH000918	Dead end	6-inch	8	WFH000918	JCT-3566	-11.4	1500	2107.25	1308.11	Hydrant not deficient		\$ 65,318	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM002611-FF	Baer / Reed Market / 15th St	244	N/A		8-inch	10	WFH003608	JCT-3596	9.5	2500	3133.56	3362.4	Hydrant not deficient		\$ 39,034	Existing-HydrantOK
Zone 4I	ExFF-HydOK	WWM006851-FF	West of Mt. Bachelor Drive	30	N/A	Dead end	6-inch	10	WFH002996	JCT-1053	-7.1	1500	2143.52	1944.1	Hydrant not deficient		\$ 4,786	Existing-HydrantOK
Zone 4I	ExFF-HydOK	WWM006850-FF	West of Mt. Bachelor Drive	34	WFH002996		8-inch	10	WFH002996	JCT-1053	4.4	1500	2143.52	2143.53	Hydrant not deficient		\$ 5,447	Existing-HydrantOK
Level 6	ExFF-HydOK	WWM004695-FF	Off Nels Anderson -S- Cady Way	117	WFH002462	Dead end	6-inch	8	WFH002462	JCT-5110	8.0	2500	3239.37	3239.37	Hydrant not deficient		\$ 16,367	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM007058-FF	Brentwood Ave off Brosterhouse	483	WFH004346		8-inch	10	WFH004346	JCT-3519	13.3	1500	2264.84	3977.2	Hydrant not deficient		\$ 77,262	Existing-HydrantOK
Level 6	ExFF-HydOK	FF_Z6_21	Just -N- Builders St - tie dead ends	558	WFH004162		N/A	8	WFH004162	JCT-4974	-8.3	2500	3552.91	2452.38	Hydrant not deficient		\$ 78,151	Existing-HydrantOK
Level 5	ExFF-HydOK	WWM005321-FF	Yale Ave betw 2nd & 4th	417	N/A		8-inch	10	WFH000287	General grid problems due to 6-inch dia		2500	3582.44	4362.22	Hydrant not deficient		\$ 66,750	Existing-HydrantOK
Level 5	ExFF-HydOK	WWM001506-FF	Yale Ave betw 2nd & 4th	434	N/A		8-inch	10	WFH000287	General grid problems due to 6-inch dia		2500	3582.44	5246.87	Hydrant not deficient		\$ 69,423	Existing-HydrantOK
Level 5	ExFF-HydOK	WWM004009-FF	Vail Ave off 4th St	207	WFH000502	Dead end	6-inch	8	WFH000502	JCT-4349	-18.4	2500	3972.67	2182.93	Hydrant not deficient		\$ 29,009	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM006534-FF	Off SE 9th St -W- BusinessWay	169	WFH002222	Dead end	6-inch	8	WFH002222	JCT-3746	5.2	2500	4418.13	2711	Hydrant not deficient		\$ 23,614	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM003331-FF	Ramsay Rd off 15th Street	765	WFH000311	Dead end	6-inch	8	WFH000311	JCT-2660	-26.9	1500	3692.59	996.81	Hydrant not deficient		\$ 107,162	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM000725-FF	Franke Lane off Brosterhouse	10	N/A	Dead end	6-inch	8	WFH003094	JCT-3433	-4.3	1500	3983.85	1287.6	Hydrant not deficient		\$ 1,359	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM000724-FF	Franke Lane off Brosterhouse	5	N/A	Dead end	6-inch	8	WFH003094	JCT-3433	-4.3	1500	3983.85	1293.76	Hydrant not deficient		\$ 642	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM002568-FF	Franke Lane off Brosterhouse	425	WFH003094		6-inch	8	WFH003094	JCT-3433	-4.3	1500	3983.85	1299.76	Hydrant not deficient		\$ 59,436	Existing-HydrantOK
Level 5	ExFF-HydOK	WWM000913-FF	Shepard Rd -N- Watson Dr	270	WFH000294		6-inch	8	WFH000294	General grid problems due to 6-inch dia		1500	4351.32	4063.34	Hydrant not deficient		\$ 37,867	Existing-HydrantOK
Level 5	ExFF-HydOK	WWM002789-FF	Greenwood Ave at 1st St	90	WFH000070		6-inch	12	WFH000070	General grid problems due to 6-inch dia		2500	5628.15	5627.7	Hydrant not deficient		\$ 17,096	Existing-HydrantOK
Zone 4B	ExFF-HydOK	WWM005226-FF	SW Maricopa Dr off Chukar Lane	433	WFH000890	Dead end	6-inch	8	WFH000890	JCT-1113	13.9	1500	7084	1728.4	Hydrant not deficient		\$ 60,553	Existing-HydrantOK

Pipes/areas which cannot carry fire flow under build-out conditions, but do not affect ability to supply flow to existing hydrants (e.g. hydrant is close to main line)

Level 5	BoFF-HydOK	WWM005984-FF	4th St betw Roanoke & Portland	480	WFH001400	Dead end	6-inch	8	WFH001400	JCT-2294	14.0	1500	1503.4	1503.35	Hydrant not deficient		\$ 67,146	Build-out-HydrantOK
Level 6	BoFF-HydOK	WWM002920-FF	E of Hwy 20 -S- Bend River Mall Ave	193	WFH000855	Dead end	6-inch	8	WFH000855	JCT-4751	3	2500	2510.93	2510.94	Hydrant not deficient		\$ 27,040	Build-out-HydrantOK
Level 6	BoFF-HydOK	WWM004722-FF	Off Builders St near Boyd Acres	200	WFH002185	Dead end	6-inch	8	WFH002185	JCT-4976	-2.9	2500	2516.56	2516.56	Hydrant not deficient		\$ 27,950	Build-out-HydrantOK
Level 6	BoFF-HydOK	WWM002174-FF	E of Hwy 20 -S- Bend River Mall Ave	184	WFH000857	Dead end	6-inch	8	WFH000857	JCT-4727	4.6	2500	2528.71	2528.71	Hydrant not deficient		\$ 25,798	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM004000-FF	Division St betw Vail & Webster	360	WFH000192		6-inch	8	WFH000192	Small grid of 6-inch diameter mains - rec		2500	2530.16	2644.46	Hydrant not deficient		\$ 50,457	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM001647-FF	Division St -S- Vail	2	N/A		6-inch	8	WFH000192	Small grid of 6-inch diameter mains - rec		2500	2530.16	2586.04	Hydrant not deficient		\$ 317	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM005767-FF	Division St at Webster	61	N/A		6-inch	8	WFH000192	Small grid of 6-inch diameter mains - rec		2500	2530.16	2814.48	Hydrant not deficient		\$ 8,509	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM005738-FF	Division St betw Xerxes & Yale	338	WFH000050		6-inch	8	WFH000192	Small grid of 6-inch diameter mains - rec		2500	2530.16	3402.29	Hydrant not deficient		\$ 47,342	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM005771-FF	Division St betw Webster & Xerxes	343	N/A		6-inch	8	WFH000192	Small grid of 6-inch diameter mains - rec		2500	2530.16	3288.66	Hydrant not deficient		\$ 47,968	Build-out-HydrantOK
Meyer Dr	BoFF-HydOK	FF_Z4B_84	3rd Street	546	N/A		N/A	10	WFH001407	JCT-1024	2.16	2500	2539.04	2530.91	Hydrant not deficient		\$ 87,296	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM005028-FF	Bluebird Court off Pheasant Lane	351	WFH000820	Dead end	6-inch	8	WFH000820	JCT-4280	-3.5	1500	1561.47	1561.39	Hydrant not deficient		\$ 49,148	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM002430-FF	Pheasant Lane / Bluebird Court	19	N/A		6-inch	8	WFH000820	JCT-4280	-3.5	1500	1561.47	3011.12	Hydrant not deficient		\$ 2,648	Build-out-HydrantOK
Zone 4G	BoFF-HydOK	FF_Z4G_01	Connect two dead ends off Yates Drive	197	WFH003408		N/A	8	WFH003408	JCT-1212	-2.4	2500	2575.16	2572.47	Hydrant not deficient		\$ 27,521	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM005624-FF	Off 4th St -N- Xerxes	119	WFH001782	Dead end	6-inch	8	WFH001782	JCT-4417	-3.6	2500	2610.3	2610.16	Hydrant not deficient		\$ 16,701	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM005652-FF	Harvey Lane -N- Drost Dr	360	WFH000449	Dead end	6-inch	8	WFH000449	JCT-4533	-15.8	1500	1632.7	1275.07	Hydrant not deficient		\$ 50,411	Build-out-HydrantOK

Level / Zone	Group	Pipe	Location Street name/intersection	Length (ft)	Hydrant ID connected to replaced pipe	Dead end?	Existing diam (in)	Replace New Diam (in)	Critical Hydrant	Addresses FF deficiency at Node: (identify if possible)	Pressure at node under FF	Fire Flow (1,500, 2,500 or 3,500 gpm)	Est. Available Fire Flow (gpm) at hydrant 20 psi residual	Est. Available Flow (gpm) to pipe DS node 20 psi residual	FF Deficiency	Number of Parcels	Estimated Replacement Cost	Demand condition driving improvement
Level 5	BoFF-HydOK	WWM001552-FF	Viking Court off Jones Rd	360	WFH000873	Dead end	6-inch	8	WFH000873	JCT-4341	0.0	1500	1641.49	1641.45	Hydrant not deficient		\$ 50,412	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM001554-FF	Edgewood St / Viking Ave	112	N/A	Dead end	6-inch	8	WFH000637	JCT-4299	-1.3	1500	1647.19	1555.72	Hydrant not deficient		\$ 15,638	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM002856-FF	Edgewood St / Viking Ave	119	WFH000637	Dead end	6-inch	8	WFH000637	JCT-4321	-3.7	1500	1647.19	1517.5	Hydrant not deficient		\$ 16,695	Build-out-HydrantOK
Level 6	BoFF-HydOK	WWM005470-FF	Near Nels Anderson -W- Hwy 96	237	WFH002837	Dead end	6-inch	8	WFH002837	JCT-5399	-12.1	2500	2656.43	2656.43	Hydrant not deficient		\$ 33,228	Build-out-HydrantOK
Meyer Dr	BoFF-HydOK	WWM000707-FF	Meyer Dr pipe	62	WFH001404	Dead end	6-inch	8	WFH001404	JCT-1048	4.6	2500	2660.47	2653.08	Hydrant not deficient		\$ 8,749	Build-out-HydrantOK
Meyer Dr	BoFF-HydOK	WWM002575-FF	Meyer Dr pipe	353	WFH001405		8-inch	12	WFH001405	JCT-1024	2.16	2500	2660.47	3621.53	Hydrant not deficient		\$ 67,098	Build-out-HydrantOK
Meyer Dr	BoFF-HydOK	WWM003708-FF	Meyer Dr pipe	281	WFH004767		8-inch	12	WFH001404	JCT-1024	2.16	2500	2660.47	4029.9	Hydrant not deficient		\$ 53,375	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM005268-FF	5th St at Saginaw - near boundary with Level	364	WFH000243		6-inch	8	WFH000243	Recommend upsizing the 6-inch diameter		1500	1670.68	1670.61	Hydrant not deficient		\$ 50,956	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM006355-FF	Betw Purcell, Twin Knolls, Windy Knolls, & Hw	115	WFH002187	Dead end	6-inch	8	WFH002187	JCT-5568	0.1	2500	2671.5	2671.2	Hydrant not deficient		\$ 16,098	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM005675-FF	Off Jones Rd -S- Ulysses Dr	391	WFH001420	Dead end	6-inch	8	WFH001420	JCT-4298	-0.9	1500	1675.6	1675.56	Hydrant not deficient		\$ 54,736	Build-out-HydrantOK
Zone 3C	BoFF-HydOK	WWM003121-FF	Mammoth Dr	496	N/A		8-inch	10	WFH003282	JCT-2	15	1500	1680.61	1944.32	Hydrant not deficient		\$ 79,290	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM005075-FF	Moonglow Ct off Cliff Drive	212	WFH000651	Dead end	6-inch	8	WFH000651	JCT-5994	1.3	1500	1748.61	1748.46	Hydrant not deficient		\$ 29,640	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM002850-FF	Revere Ave betw Rosewood & Pinewood	253	WFH000345		6-inch	8	WFH000345	Small grid of 6-inch diameter mains - rec		1500	1781.55	1781.38	Hydrant not deficient		\$ 35,393	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM002851-FF	Revere Ave betw Rosewood & 8th St	321	WFH000346		6-inch	8	WFH000345	Small grid of 6-inch diameter mains - rec		1500	1781.55	1953.14	Hydrant not deficient		\$ 44,878	Build-out-HydrantOK
Zone 4E	BoFF-HydOK	WWM007171-FF	Champion Circle -SW- Awbrey Glen Dr	1110	WFH002196		8-inch	12	WFH003360	JCT-807	15.7	1500	1917.96	3099.79	Hydrant not deficient		\$ 210,924	Build-out-HydrantOK
Level 6	BoFF-HydOK	WWM004476-FF	Near Nels Anderson -W- Hwy 97	168	WFH002839	Dead end	6-inch	8	WFH002839	JCT-5371	-2.9	2500	2953.62	2953.62	Hydrant not deficient		\$ 23,501	Build-out-HydrantOK
Level 6	BoFF-HydOK	WWM004146-FF	Off Nels Anderson -N- Brandis Ct	181	WFH002265	Dead end	6-inch	8	WFH002265	JCT-5224	-0.1	2500	2981.66	2981.66	Hydrant not deficient		\$ 25,297	Build-out-HydrantOK
Level 3	BoFF-HydOK	WWM006732-FF	Turnberry Place	574	WFH002212	Dead end	8-inch	10	WFH002212	JCT-1629	14	1500	2014.49	1124.98	Hydrant not deficient		\$ 91,808	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM002516-FF	Diablo Way -S- Laramie Way	521	WFH000771	Dead end	6-inch	8	WFH000771	JCT-5971	-6.0	1500	2025.62	1488.69	Hydrant not deficient		\$ 72,902	Build-out-HydrantOK
Zone 6A	BoFF-HydOK	FF_Z6A_01	Tie dead ends - Barrington & Elizabeth Cts	325	WFH001868		N/A	8	WFH001868	JCT-5774	18.0	1500	2034.6	2034.57	Hydrant not deficient		\$ 45,469	Build-out-HydrantOK
Zone 4G	BoFF-HydOK	FF_Z4G_02	Connect Yates Drive and nearby dead end	782	WFH003055		N/A	8	WFH003055	JCT-1194	12.1	2500	3129.04	3129.03	Hydrant not deficient		\$ 109,512	Build-out-HydrantOK
Zone 4G	BoFF-HydOK	WWM000659-FF	Connect Yates Drive and nearby dead end	211	WFH003055	Dead end	8-inch	12	WFH003055	JCT-1194	12.1	2500	3129.04	3129.03	Hydrant not deficient		\$ 40,095	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM007163-FF	Carson Way -S- Laramie Way	500	WFH000767	Dead end	6-inch	8	WFH000767	JCT-5972	-1.6	1500	2232.21	1557.55	Hydrant not deficient		\$ 69,992	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM001581-FF	Penn Ave betw 6th and 7th	470	WFH000445		6-inch	8	WFH000445	Small grid of 6-inch diameter mains - rec		1500	2262.2	2262.03	Hydrant not deficient		\$ 65,792	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM001580-FF	Penn Ave betw 7th and 8th	430	N/A		6-inch	8	WFH000445	Small grid of 6-inch diameter mains - rec		1500	2262.2	2993.38	Hydrant not deficient		\$ 60,172	Build-out-HydrantOK
Level 6	BoFF-HydOK	WWM004544-FF	Off Jamison St - far north Level 6	122	WFH002034	Dead end	6-inch	8	WFH002034	JCT-5267	-16.1	2500	3438.89	2793.58	Hydrant not deficient		\$ 17,019	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM003845-FF	Off Windy Knolls -S- Hwy 20	122	WFH002188	Dead end	6-inch	8	WFH002188	JCT-5580	0.7	2500	3607.85	2689.92	Hydrant not deficient		\$ 17,058	Build-out-HydrantOK
Zone 4D	BoFF-HydOK	WWM003116-FF	Scandia Loop -W- Torsway St	536	WFH000879	Dead end	6-inch	8	WFH000879	JCT-669	18.3	1500	2631.84	1561.72	Hydrant not deficient		\$ 75,079	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM006329-FF	Betw Purcell, Hwy 20, 27th & Forum	620	WFH002351	Dead end	8-inch	10	WFH002351	JCT-5678	1.6	2500	3702.62	2716.36	Hydrant not deficient		\$ 99,247	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM003008-FF	S of Hwy 20 opposite Azure Dr	372	WFH003036	Dead end	8-inch	10	WFH003036	JCT-5566	-1.2	2500	3893.21	2444.99	Hydrant not deficient		\$ 59,522	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM005650-FF	Watson Dr betw Jones & Shepard	1296	WFH000293		8-inch	12	WFH000293	Recommend upsizing the 8-inch diameter		1500	3930.37	4637.84	Hydrant not deficient		\$ 246,328	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM005676-FF	Hollinshead Dr betw Edgewood & Shepard	179	WFH000320		6-inch	8	WFH000320	Recommend upsizing the 6-inch diameter		1500	4082.82	4082.63	Hydrant not deficient		\$ 25,000	Build-out-HydrantOK
Level 5	BoFF-HydOK	WWM001519-FF	Butler Market Rd / Ravenwood Dr	612	WFH000504	Dead end	6-inch	12	WFH000504	JCT-4498	-2.0	1500	5716.34	1927.52	Hydrant not deficient		Upsize for Build-out	Build-out-HydrantOK

Improvements linked to pipes that do not currently have hydrants on them

Level 6	ExFF-NoHyd	WWM003460-FF	S of Archie Briggs Rd off OB Riley Rd	164	N/A	Dead end	4-inch	8	NO HYDRANT	JCT-3234	-1055.6	2500	#N/A	386	2114		\$ 22,896	Existing-No hydrant
Level 6	ExFF-NoHyd	WWM003461-FF	S of Archie Briggs Rd off OB Riley Rd	188	N/A		4-inch	8	NO HYDRANT	JCT-3234	-1055.6	2500	#N/A	436.11	2063.89		\$ 26,354	Existing-No hydrant
Zone 4B	ExFF-NoHyd	WWM006393-FF	Skylark Dr -W- Wildcat Drive	292	N/A	Dead end	4-inch	8	NO HYDRANT	JCT-3857	2.5	2500	#N/A	701.84	1798.16		\$ 40,882	Existing-No hydrant
Level 5	ExFF-NoHyd	FF_Z5_245	14th St / Baltimore Ave - tie dead end	420	N/A		N/A	8	NO HYDRANT	JCT-1702	-15960.0	1500	#N/A	60.49	1439.51		\$ 58,849	Existing-No hydrant
Zone 7C	ExFF-NoHyd	FF_Z7C_01	Tie dead ends - Nasu Pl & Thornhill Lane	255	N/A		N/A	8	NO HYDRANT	JCT-6460	-7.6	1500	#N/A	109.87	1390.13		\$ 35,755	Existing-No hydrant
Level 6	ExFF-NoHyd	WWM003085-FF	S of OB Riley Rd and Hwy 20 intersection	121	N/A	Dead end	4-inch	8	NO HYDRANT	JCT-4698	-114.1	2500	#N/A	1152.26	1347.74		\$ 16,893	Existing-No hydrant
Level 6	ExFF-NoHyd	WWM004789-FF	Off High Desert Lane -W- Layton Ave	73	N/A	Dead end	4-inch	8	NO HYDRANT	JCT-4918	-73.1	2500	#N/A	1333.06	1166.94		\$ 10,278	Existing-No hydrant
Level 6	ExFF-NoHyd	WWM005168-FF	S of Archie Briggs Rd off OB Riley Rd	229	N/A		4-inch	10	NO HYDRANT	JCT-3227	-3225.4	1500	#N/A	526.62	973.38		\$ 36,624	Existing-No hydrant
Level 6	ExFF-NoHyd	WWM005178-FF	S of Archie Briggs Rd off OB Riley Rd	66	N/A	Dead end	4-inch	8	NO HYDRANT	JCT-3227	-3225.4	1500	#N/A	526.62	973.38		\$ 9,192	Existing-No hydrant
Level 6	ExFF-NoHyd	WWM004748-FF	High Desert Court / High Desert Lane	81	N/A	Dead end	4-inch	8	NO HYDRANT	JCT-4991	-68.5	2500	#N/A	1639.55	860.45		\$ 11,407	Existing-No hydrant
Zone 4B	ExFF-NoHyd	WWM006917-FF	Parallel to Brosterhouse near Foxborough Ln	256	N/A	Dead end	4-inch	8	NO HYDRANT	JCT-3417	-99.3	1500	#N/A	686.74	813.26		\$ 35,869	Existing-No hydrant
Level 5	ExFF-NoHyd	WWM000630-FF	Overturf Ave -E- 16th St	259	N/A	Dead end	4-inch	6	NO HYDRANT	JCT-1622	-83.9	1500	#N/A	702.1	797.9		\$ 33,668	Existing-No hydrant
Level 6	ExFF-NoHyd	WWM005177-FF	S of Archie Briggs Rd off OB Riley Rd	214	N/A		4-inch	10	NO HYDRANT	JCT-3227	-3225.4	1500	#N/A	727.36	772.64		\$ 34,268	Existing-No hydrant
Level 6	ExFF-NoHyd	WWM005176-FF	S of Archie Briggs Rd off OB Riley Rd	235	N/A	Dead end	4-inch	8	NO HYDRANT	JCT-3228	-102.6	1500	#N/A	761.89	738.11		\$ 32,896	Existing-No hydrant
Zone 4B	ExFF-NoHyd	WWM002847-FF	Seward Ave -E- 14th St (north of P Butte)	218	N/A	Dead end	4-inch	8	NO HYDRANT	JCT-4263	-152.2	1500	#N/A	762.2	737.8		\$ 30,554	Existing-No hydrant
Level 5	ExFF-NoHyd	WWM005578-FF	Division / Tweet Pl / Hwy 97	188	N/A	Dead end	6-inch	8	NO HYDRANT	JCT-4548	-50.59	2500	#N/A	1797.63	702.37		\$ 26,345	Existing-No hydrant
Zone 4A	ExFF-NoHyd	WWM005777-FF	Trenton Ave -W- NW Eastes St	172	N/A	Dead end	6-inch	8	NO HYDRANT	JCT-2333	-6	1500	#N/A	853.41	646.59		\$ 24,086	Existing-No hydrant
Level 5	ExFF-NoHyd	WWM000970-FF	Broadway -S- St. Helens	164	N/A	Dead end	4-inch	6	NO HYDRANT	JCT-1816	-51.9	1500	#N/A	873.91	626.09		\$ 21,277	Existing-No hydrant
Zone 4B	ExFF-NoHyd	WWM006423-FF	Moorwood Ct off Teakwood Dr	211	N/A	Dead end	4-inch	8	NO HYDRANT	JCT-3593	-76.2	1500	#N/A	884.77	615.23		\$ 29,606	Existing-No hydrant
Zone 4B	ExFF-NoHyd	WWM001370-FF	Banewood Ct off Teakwood Dr	180	N/A	Dead end	4-inch	8	NO HYDRANT	JCT-3683	-56.9	1500	#N/A	963.59	536.41		\$ 25,229	Existing-No hydrant
Zone 7C	ExFF-NoHyd	WWM007165-FF	Nasu Place -NW - Nasu Park Loop	130	N/A	Dead end	4-inch	8	NO HYDRANT	JCT-6460	-7.6	1500	#N/A	1006.13	493.87		\$ 18,231	Existing-No hydrant
Zone 4B	ExFF-NoHyd	WWM006525-FF	Sun Lane -N- Roosevelt Ave	133	N/A	Dead end	4-inch	6	NO HYDRANT	JCT-3807	-41.1	1500	#N/A	1052.81	447.19		\$ 17,306	Existing-No hydrant

Level / Zone	Group	Pipe	Location Street name/intersection	Length (ft)	Hydrant ID connected to replaced pipe	Dead end?	Existing diam (in)	Replace New Diam (in)	Critical Hydrant	Addresses FF deficiency at Node: (identify if possible)	Pressure at node under FF	Fire Flow (1,500, 2,500 or 3,500 gpm)	Est. Available Fire Flow (gpm) at hydrant 20 psi residual	Est. Available Flow (gpm) to pipe DS node 20 psi residual	FF Deficiency	Number of Parcels	Estimated Replacement Cost	Demand condition driving improvement
Zone 6B	ExFF-NoHyd	WWM007176-FF	Putnam Road	100	N/A	Dead end	6-inch	8	NO HYDRANT	JCT-954	-14.9	1500	#N/A	1078.53	421.47		\$ 14,045	Existing-No hydrant
Level 5	ExFF-NoHyd	WWM005224-FF	Knoll Ave betw 16th and 17th Sts	506	N/A		6-inch	8	NO HYDRANT	JCT-1547	0.6	1500	#N/A	1130.01	369.99		\$ 70,846	Existing-No hydrant
Level 5	ExFF-NoHyd	WWM005267-B-FF	3rd St off Portland Ave	219	N/A	Dead end	6-inch	8	NO HYDRANT	JCT-2269	-21.0	1500	#N/A	1138.91	361.09		\$ 30,605	Existing-No hydrant
Level 5	ExFF-NoHyd	WWM005073-FF	Snowbird Ct off Cliff Dr	73	N/A	Dead end	4-inch	8	NO HYDRANT	JCT-5979	15.2	1500	#N/A	1151.78	348.22		\$ 10,268	Existing-No hydrant
Level 5	ExFF-NoHyd	WWM005744-FF	Division / Tweet Pl/ Hwy 97	91	N/A		6-inch	8	NO HYDRANT	General grid problems due to 6-inch dia		2500	#N/A	2185.56	314.44		\$ 12,694	Existing-No hydrant
Level 5	ExFF-NoHyd	WWM006807-FF	Off Disk Dr - SW corner of Level 5	75	N/A	Dead end	6-inch	8	NO HYDRANT	JCT-1256	11.6	2500	#N/A	2236.73	263.27		\$ 10,498	Existing-No hydrant
Level 5	ExFF-NoHyd	WWM002738-FF	6th St -N- Franklin Ave	222	N/A		6-inch	8	NO HYDRANT	JCT-2853	-1.7	1500	#N/A	1292.7	207.3		\$ 31,076	Existing-No hydrant
Level 6	ExFF-NoHyd	WWM007376-FF	Juniper Ridge	38	N/A	Dead end	6-inch	8	NO HYDRANT	JCT-5456	17.9	3500	#N/A	3294.77	205.23		\$ 5,281	Existing-No hydrant
Zone 4B	ExFF-NoHyd	WWM006696-FF	Tenos Ct -S- Blakely Ct	121	N/A	Dead end	4-inch	6	NO HYDRANT	JCT-1149	-6.0	1500	#N/A	1369.96	130.04		\$ 15,726	Existing-No hydrant
Zone 4B	ExFF-NoHyd	WWM006197-FF	NE of 5th and Burnside	784	N/A	Dead end	6-inch	8	NO HYDRANT	JCT-2746	1.1	1500	#N/A	1538.43	-38.43		\$ 109,826	Existing-No hydrant
Level 5	ExFF-NoHyd	WWM000130-FF	Division / Tweet Pl/ Hwy 97	17	N/A		6-inch	8	NO HYDRANT	General grid problems due to 6-inch dia		2500	#N/A	2576.77	-76.77		\$ 2,362	Existing-No hydrant
Level 6	ExFF-NoHyd	WWM005174-FF	S of Archie Briggs Rd off OB Riley Rd	60	N/A		4-inch	12	NO HYDRANT	JCT-3227	-3225.4	1500	#N/A	1649.32	-149.32		\$ 11,322	Existing-No hydrant
Level 5	ExFF-NoHyd	WWM000131-FF	Division / Tweet Pl/ Hwy 97	16	N/A		6-inch	8	NO HYDRANT	General grid problems due to 6-inch dia		2500	#N/A	2655.85	-155.85		\$ 2,297	Existing-No hydrant
Level 5	ExFF-NoHyd	WWM000132-FF	Division / Tweet Pl/ Hwy 97	9	N/A		6-inch	8	NO HYDRANT	General grid problems due to 6-inch dia		2500	#N/A	2763.09	-263.09		\$ 1,293	Existing-No hydrant
Level 5	ExFF-NoHyd	WWM001176-FF	Franklin Ave at 6th St	5	N/A		6-inch	8	NO HYDRANT	Recommend upsizing the 6-inch diameter		1500	#N/A	2275.43	-775.43		\$ 760	Existing-No hydrant
Level 2	ExFF-NoHyd	WWM004389-FF	Parallel to NW College Way -N- PRV 3	430	N/A	Dead end	6-inch	8	NO HYDRANT	Very high line loss		1500	#N/A	2307.86	-807.86		\$ 60,241	Existing-No hydrant
Level 5	ExFF-NoHyd	WWM003018-FF	Tumalo Ave betw Congress & Broadway	485	N/A		4-inch	6	NO HYDRANT	4-inch diameter main in the grid		1500	#N/A	2865.69	-1365.69		\$ 63,087	Existing-No hydrant
Level 5	ExFF-NoHyd	WWM003925-FF	Broadway betw Tumalo & St. Helens	305	N/A		4-inch	6	NO HYDRANT	4-inch diameter main in the grid		1500	#N/A	2865.69	-1365.69		\$ 39,652	Existing-No hydrant
Zone 4I	ExFF-NoHyd	WWM007340-FF	West of Mt. Bachelor Drive	140	N/A	Dead end	4-inch	8	NO HYDRANT	JCT-1021	-34.6	1500	#N/A	3211.23	-1711.23		\$ 19,658	Existing-No hydrant
Level 5	ExFF-NoHyd	WWM001038-FF	Wall St betw Delaware & Colorado	138	N/A		6-inch	8	NO HYDRANT	Small grid of 6-inch diameter mains - rec		1500	#N/A	4875.57	-3375.57		\$ 19,352	Existing-No hydrant
Level 5	ExFF-NoHyd	WWM006096-FF	Wall St betw Delaware & Colorado	172	N/A		6-inch	8	NO HYDRANT	Small grid of 6-inch diameter mains - rec		1500	#N/A	7870.46	-6370.46		\$ 24,089	Existing-No hydrant
Zone 4F	BoFF-NoHyd	FF_Z4F_03	Connect dead-end mains off Falcon Ridge	11	N/A		N/A	8	NO HYDRANT	JCT-3248	10	1500	#N/A	1544.81	-44.81		\$ 1,579	Build-out-NoHydrant
Zone 4F	BoFF-NoHyd	FF_Z4F_02	Connect dead-end mains off Falcon Ridge	13	N/A		N/A	8	NO HYDRANT	JCT-3244	10.1	1500	#N/A	1576.67	-76.67		\$ 1,798	Build-out-NoHydrant
2-inch Main Replacements - Sorted by Zone																		
Level 1		WWM001699-FF	Loggan Court	216	N/A	Dead end	2-inch	8		JCT-3051	-3118.3	1500	#N/A	107.57	1392.43		\$ 30,259	2-inch Replacement
Level 1		WWM005834-FF	Cul-de-sac off NW Glassow Dr	193	N/A	Dead end	2-inch	8		JCT-2486	-2818.4	1500	#N/A	113.87	1386.13		\$ 26,999	2-inch Replacement
Zone 4A		WWM005779-FF	Panama St	294	N/A	Dead end	2-inch	8		JCT-2392	-4200.8	1500	#N/A	86.63	1413.37		\$ 41,196	2-inch Replacement
Zone 4A		WWM005780-FF	Panama St	13	N/A		6-inch	8		JCT-2392	-4200.8	1500	#N/A	1696.09	-196.09		\$ 1,831	2-inch Replacement
Zone 4A		WWM002840-FF	Dead end off 5th St -N- Utica Ave	140	N/A	Dead end	2-inch	8		JCT-2380	-1960.5	1500	#N/A	182.11	1317.89		\$ 19,569	2-inch Replacement
Zone 4A		WWM001669-FF	2nd Street -S- Wilmington Ave	144	N/A	Dead end	2-inch	8		JCT-2405	-1991.4	1500	#N/A	188.84	1311.16		\$ 20,122	2-inch Replacement
Zone 4A		WWM003998-FF	NW 7th St betw Saginaw and Trenton	378	N/A		2-inch	8		JCT-2312	-141	1500	#N/A	563.13	936.87		\$ 52,951	2-inch Replacement
Zone 4A		WWM005783-FF	NW Eastes St betw Saginaw and Trenton	340	N/A		2-inch	8		JCT-2335	7.6	1500	#N/A	943.58	556.42		\$ 47,545	2-inch Replacement
Zone 4B		WWM000908-FF	Wilson Ave -E- 3rd St	346	N/A	Dead end	2-inch	12		JCT-3844	-12779	2500	#N/A	125.32	2374.68		Upsize for Build-out	2-inch Replacement
Zone 4B		WWM006434-FF	Between Scott and Railroad Streets	315	N/A	Dead end	2-inch	8		JCT-2665	-15888.0	2500	#N/A	133.19	2366.81		\$ 44,041	2-inch Replacement
Zone 4B		WWM006436-FF	Between Scott, 2nd, and 3rd Streets	404	N/A	Dead end	2-inch	8		JCT-4032	-14946.0	2500	#N/A	135.15	2364.85		\$ 56,605	2-inch Replacement
Zone 4B		WWM006477-FF	Wilson Ave -W- 3rd St	269	N/A	Dead end	2-inch	8		JCT-3829	-9921	2500	#N/A	143.51	2356.49		\$ 37,640	2-inch Replacement
Zone 4B		WWM006443-FF	Between 2nd & 3rd Sts -N- Miller Ave	269	N/A	Dead end	2-inch	8		JCT-4010	-9896.2	2500	#N/A	165.59	2334.41		\$ 37,598	2-inch Replacement
Zone 4B		WWM000461-FF	Roosevelt -E- 3rd St	167	N/A	Dead end	2-inch	8		JCT-3756	-6213.3	2500	#N/A	176.33	2323.67		\$ 23,434	2-inch Replacement
Zone 4B		WWM006441-FF	Off 2nd Street -N- Miller Ave	177	N/A	Dead end	2-inch	8		JCT-4011	-6584.0	2500	#N/A	212.52	2287.48		\$ 24,737	2-inch Replacement
Zone 4B		WWM007292-FF	Reed Market Rd apprx betw 4th and 5th Sts	804	N/A	Dead end	2-inch	8		JCT-3631	-11778	1500	#N/A	65.81	1434.19		\$ 112,601	2-inch Replacement
Zone 4B		WWM000602-FF	Taft Ave -E- Pelton Place	245	N/A	Dead end	2-inch	8		JCT-3801	-8070.9	1500	#N/A	97.86	1402.14		\$ 34,272	2-inch Replacement
Zone 4B		WWM000603-FF	Pelton Place -N- Taft Ave	168	N/A	Dead end	2-inch	8		JCT-3813	-6950.9	1500	#N/A	111.85	1388.15		\$ 23,588	2-inch Replacement
Zone 4B		WWM006677-FF	Cleveland Ave off Hill St	363	N/A	Dead end	2-inch	8		JCT-1181	-5194.1	1500	#N/A	125.2	1374.8		\$ 50,826	2-inch Replacement
Zone 4B		WWM001285-FF	Lesley Place -E- McCartney Drive	255	N/A	Dead end	2-inch	8		JCT-2700	-3662.1	1500	#N/A	125.94	1374.06		\$ 35,726	2-inch Replacement
Zone 4B		WWM002594-FF	Pelton Place -S- Taft Ave	310	N/A		2-inch	8		JCT-3813	-6950.9	1500	#N/A	132.84	1367.16		\$ 43,390	2-inch Replacement
Zone 4B		WWM001284-FF	McLaughlin Place -W- McCartney Drive	237	N/A	Dead end	2-inch	8		JCT-2699	-3391.9	1500	#N/A	140.05	1359.95		\$ 33,222	2-inch Replacement
Zone 4B		WWM006386-FF	16th St off Virginia Road	285	N/A	Dead end	2-inch	8		JCT-4012	-4099.2	1500	#N/A	142.79	1357.21		\$ 39,832	2-inch Replacement
Zone 4B		WWM001283-FF	Meister off McCartney Drive	212	N/A	Dead end	2-inch	8		JCT-2728	-3031.0	1500	#N/A	142.92	1357.08		\$ 29,645	2-inch Replacement
Zone 4B		WWM000448-FF	Roosevelt -E- 4th St	228	N/A	Dead end	2-inch	8		JCT-3768	-3246.5	1500	#N/A	146.07	1353.93		\$ 31,854	2-inch Replacement
Zone 4B		WWM000593-FF	Cleveland Ave off Chamberlain St	302	N/A	Dead end	2-inch	8		JCT-1185	-4287.0	1500	#N/A	149.39	1350.61		\$ 42,284	2-inch Replacement
Zone 4B		WWM006679-FF	Sisemore St -S- McKinley Ave	298	N/A	Dead end	2-inch	8		JCT-1195	-4227.2	1500	#N/A	151.44	1348.56		\$ 41,719	2-inch Replacement
Zone 4B		WWM006134-FF	Butte Dr -E- 11th St	185	N/A	Dead end	2-inch	6		JCT-4122	-40.6	1500	#N/A	159.54	1340.46		\$ 24,025	2-inch Replacement
Zone 4B		WWM001364-FF	Cutlass Place off Riviera Dr	176	N/A	Dead end	2-inch	8		JCT-3967	-2493.5	1500	#N/A	181.1	1318.9		\$ 24,571	2-inch Replacement

Fire Flow Improvements - Existing and Build-out

Level / Zone	Group	Pipe	Location Street name/intersection	Length (ft)	Hydrant ID connected to replaced pipe	Dead end?	Existing diam (in)	Replace New Diam (in)	Critical Hydrant	Addresses FF deficiency at Node: (identify if possible)	Pressure at node under FF	Fire Flow (1,500, 2,500 or 3,500 gpm)	Est. Available Fire Flow (gpm) at hydrant 20 psi residual	Est. Available Flow (gpm) to pipe DS node 20 psi residual	FF Deficiency	Number of Parcels	Estimated Replacement Cost	Demand condition driving improvement
Zone 4B		WWM001361-FF	16th St off Riviera Dr	175	N/A	Dead end	2-inch	8		JCT-3968	-2492.4	1500	#N/A	182.17	1317.83		\$ 24,535	2-inch Replacement
Zone 4B		WWM002995-FF	Parallel to 5th, crossing Miller & Centennial	373	N/A	Dead end	2-inch	6		JCT-4000	-5292.7	1500	#N/A	8482.64	-6982.64		\$ 48,465	2-inch Replacement
Level 5		WWM001532-FF	Thurston Ave off Hwy 20	426	N/A	Dead end	2-inch	8		General grid problems due to 6-inch dia		2500	#N/A	91.53	2408.47		\$ 59,673	2-inch Replacement
Level 5		WWM006058-FF	Off Sisemore St betw Georgia & Franklin	282	N/A	Dead end	2-inch	8		JCT-1843	-10478.2	2500	#N/A	101.22	2398.78		\$ 39,492	2-inch Replacement
Level 5		WWM002752-FF	N of Lafayette betw Hwy 20 and 2nd St	403	N/A	Dead end	2-inch	8		JCT-4085	-14934.5	2500	#N/A	102.34	2397.66		\$ 56,378	2-inch Replacement
Level 5		WWM001167-FF	Just south of Franklin Ave at 2nd St	250	N/A	Dead end	2-inch	8		JCT-2811	-9235.8	2500	#N/A	121.65	2378.35		\$ 34,995	2-inch Replacement
Level 5		WWM001040-FF	Off Wall St betw Delaware & Colorado	217	N/A	Dead end	2-inch	8		JCT-1711	-8034.4	2500	#N/A	136.98	2363.02		\$ 30,424	2-inch Replacement
Level 5		WWM000959-FF	Greenwood Ave at 1st St	223	N/A	Dead end	2-inch	8		JCT-2925	-8231.9	2500	#N/A	146.86	2353.14		\$ 31,270	2-inch Replacement
Level 5		WWM002785-FF	W of 2nd St betw Irving and Greenwood	41	N/A	Dead end	2-inch	6		JCT-2910	-5579.1	2500	#N/A	154.35	2345.65		\$ 5,326	2-inch Replacement
Level 5		WWM003352-FF	W of Staats St betw Colorado & Arizona	184	N/A	Dead end	2-inch	8		JCT-1666	-6967.7	2500	#N/A	156.38	2343.62		\$ 25,708	2-inch Replacement
Level 5		WWM0006161-FF	Greeley Ave at 2nd St	176	N/A	Dead end	2-inch	8		JCT-2864	-6511.2	2500	#N/A	156.51	2343.49		\$ 24,657	2-inch Replacement
Level 5		WWM000962-FF	W of 2nd St betw Irving and Greenwood	7	N/A	Dead end	2-inch	6		JCT-2911	-5839.1	2500	#N/A	171.6	2328.4		\$ 947	2-inch Replacement
Level 5		WWM002784-FF	W of 2nd St betw Irving and Greenwood	151	N/A	Dead end	2-inch	6		JCT-2911	-5839.1	2500	#N/A	174.96	2325.04		\$ 19,646	2-inch Replacement
Level 5		WWM001134-FF	Betw Greenwood and Kearney off 2nd St	144	N/A	Dead end	2-inch	6		JCT-2938	-5288.2	2500	#N/A	180.52	2319.48		\$ 18,665	2-inch Replacement
Level 5		WWM001058-FF	E of Staats St betw Colorado & Arizona	15	N/A	Dead end	2-inch	8		JCT-1660	-2611.4	2500	#N/A	260.28	2239.72		\$ 2,085	2-inch Replacement
Level 5		WWM001689-FF	E of Division, S of Thurston	68	N/A	Dead end	2-inch	6		JCT-4269	-2532.6	2500	#N/A	275.94	2224.06		\$ 8,840	2-inch Replacement
Level 5		WWM003353-FF	E of Staats St betw Colorado & Arizona	330	N/A	Dead end	2-inch	8		JCT-1660	-2611.4	2500	#N/A	295.47	2204.53		\$ 46,192	2-inch Replacement
Level 5		WWM002758-FF	Parallel to Hill St, -S- Hastings Pl	39	N/A	Dead end	2-inch	8		JCT-1736	-1415.3	2500	#N/A	324.05	2175.95		\$ 5,489	2-inch Replacement
Level 5		WWM000961-FF	E of 2nd St betw Irving and Greenwood	26	N/A	Dead end	2-inch	6		JCT-2907	-913.4	2500	#N/A	451.18	2048.82		\$ 3,344	2-inch Replacement
Level 5		WWM003569-FF	W of Staats St betw Colorado & Arizona	7	N/A	Dead end	2-inch	8		JCT-1666	-6967.7	2500	#N/A	1004.38	1495.62		\$ 990	2-inch Replacement
Level 5		WWM007231-FF	W of Columbia St between Baltimore & Albar	1105	N/A	Dead end	2-inch	6		JCT-1702	-15960.0	1500	#N/A	60.49	1439.51		\$ 143,707	2-inch Replacement
Level 5		WWM001902-FF	Roanoke at 7th St	208	N/A	Dead end	2-inch	8		JCT-2287	-45.4	1500	#N/A	80.47	1419.53		\$ 29,145	2-inch Replacement
Level 5		WWM006084-FF	Off Delaware, -W- Jefferson	607	N/A	Dead end	2-inch	8		JCT-1704	-8858.2	1500	#N/A	85.44	1414.56		\$ 84,930	2-inch Replacement
Level 5		WWM001117-FF	Olney Court off 8th St	326	N/A	Dead end	2-inch	8		JCT-4137	-4696.9	1500	#N/A	90.07	1409.93		\$ 45,699	2-inch Replacement
Level 5		WWM007229-FF	Harmon Blvd betw Columbia & Galveston	508	N/A	Dead end	2-inch	8		JCT-1905	-8647.2	1500	#N/A	95.02	1404.98		\$ 71,143	2-inch Replacement
Level 5		WWM006061-FF	Georgia Ave -W- Sisemore	301	N/A	Dead end	2-inch	8		JCT-1815	-5051.4	1500	#N/A	97.52	1402.48		\$ 42,114	2-inch Replacement
Level 5		WWM005914-FF	N of Jacksonville Ave betw Union and Federal	86	N/A	Dead end	2-inch	6		JCT-2045	-6121.0	1500	#N/A	109.98	1390.02		\$ 11,226	2-inch Replacement
Level 5		WWM007241-FF	Rocklyn Rd / Glen Rd	459	N/A	Dead end	2-inch	8		JCT-2070	-6554.0	1500	#N/A	111.26	1388.74		\$ 64,210	2-inch Replacement
Level 5		WWM005932-FF	16th St -S- Galveston Ave	166	N/A	Dead end	2-inch	8		JCT-1876	-2390.0	1500	#N/A	115.58	1384.42		\$ 23,243	2-inch Replacement
Level 5		WWM001784-FF	N of Jacksonville Ave betw Union and Federal	14	N/A	Dead end	2-inch	6		JCT-2036	-4878.8	1500	#N/A	120.15	1379.85		\$ 1,857	2-inch Replacement
Level 5		WWM001598-FF	Pinewood Dr -S- Revere Ave	128	N/A	Dead end	2-inch	6		JCT-4199	-1851.3	1500	#N/A	122.88	1377.12		\$ 16,661	2-inch Replacement
Level 5		WWM001592-FF	7th St -S- Seward Ave	198	N/A	Dead end	2-inch	6		JCT-4234	-2850.5	1500	#N/A	124.77	1375.23		\$ 25,753	2-inch Replacement
Level 5		WWM005913-FF	N of Jacksonville Ave betw Union and Federal	340	N/A	Dead end	2-inch	6		JCT-2045	-6121.0	1500	#N/A	125.02	1374.98		\$ 44,227	2-inch Replacement
Level 5		WWM002854-FF	Seward Ave -W- 6th St	47	N/A	Dead end	2-inch	6		JCT-4248	-3309.5	1500	#N/A	126.97	1373.03		\$ 6,067	2-inch Replacement
Level 5		WWM005981-FF	4th St off Newport Ave	329	N/A	Dead end	2-inch	8		JCT-2185	-4762.7	1500	#N/A	129.37	1370.63		\$ 46,022	2-inch Replacement
Level 5		WWM001597-FF	Rosewood Dr -S- Revere Ave	128	N/A	Dead end	2-inch	6		JCT-4200	-1843.0	1500	#N/A	132.19	1367.81		\$ 16,629	2-inch Replacement
Level 5		WWM002853-FF	Seward Ave -W- 6th St	10	N/A	Dead end	2-inch	6		JCT-4246	-3450.6	1500	#N/A	139.36	1360.64		\$ 1,299	2-inch Replacement
Level 5		WWM003060-FF	Seward Ave -W- 6th St	231	N/A	Dead end	2-inch	6		JCT-4246	-3450.6	1500	#N/A	139.38	1360.62		\$ 30,033	2-inch Replacement
Level 5		WWM001896-FF	Off 8th St betw Ogden & Portland	276	N/A	Dead end	2-inch	6		JCT-2214	-3975.3	1500	#N/A	141.67	1358.33		\$ 35,936	2-inch Replacement
Level 5		WWM005684-FF	Penn Ave -W- 6th St	225	N/A	Dead end	2-inch	6		JCT-4167	-3211.8	1500	#N/A	148.56	1351.44		\$ 29,248	2-inch Replacement
Level 5		WWM001520-FF	Raven Ct off Ravenwood Dr	250	N/A	Dead end	2-inch	6		JCT-4472	-3581.8	1500	#N/A	152.65	1347.35		\$ 32,509	2-inch Replacement
Level 5		WWM005797-FF	Harriman St / Linster Place	161	N/A	Dead end	2-inch	8	NO HYDRANT	JCT-2340	-240.8	1500	#N/A	157.46	1342.54		\$ 22,534	2-inch Replacement
Level 5		WWM005798-FF	Harriman St / Linster Place	298	N/A	Dead end	4-inch	8	NO HYDRANT	JCT-2340	-240.8	1500	#N/A	630.21	869.79		\$ 41,782	2-inch Replacement
Level 5		WWM003203-FF	Along Jones Rd -N- Bennington Way	244	N/A	Dead end	2-inch	6		JCT-4476	-3480.2	1500	#N/A	158.2	1341.8		\$ 31,662	2-inch Replacement
Level 5		WWM005940-FF	S of Jacksonville Ave betw Union and Federal	229	N/A	Dead end	2-inch	6		JCT-1987	-3257.9	1500	#N/A	160.86	1339.14		\$ 29,789	2-inch Replacement
Level 5		WWM001204-FF	5th St off Clay Ave	88	N/A	Dead end	2-inch	8		JCT-2733	-1273.8	1500	#N/A	164.33	1335.67		\$ 12,327	2-inch Replacement
Level 5		WWM002429-FF	Pheasant Ct off Meadow Lane	184	N/A	Dead end	2-inch	6		JCT-4274	-2659.7	1500	#N/A	168.86	1331.14		\$ 23,887	2-inch Replacement
Level 5		WWM001067-FF	Off Chamberlain betw Delaware & Colorado	153	N/A	Dead end	2-inch	6		JCT-1709	-2170.0	1500	#N/A	169.16	1330.84		\$ 19,912	2-inch Replacement
Level 5		WWM005878-FF	14th St -N- Newport Ave	4	N/A	Dead end	2-inch	8		JCT-2181	-2120.0	1500	#N/A	180.11	1319.89		\$ 624	2-inch Replacement
Level 5		WWM007218-FF	14th St -N- Newport Ave	147	N/A	Dead end	2-inch	8		JCT-2181	-2120.0	1500	#N/A	183.18	1316.82		\$ 20,541	2-inch Replacement
Level 5		WWM001227-FF	Grant Circle off Sharkey Terrace	155	N/A	Dead end	2-inch	6		JCT-5856	-2216.9	1500	#N/A	192.35	1307.65		\$ 20,147	2-inch Replacement
Level 5		WWM001522-FF	Marion Place off Ravenwood Dr	151	N/A	Dead end	2-inch	6		JCT-4428	-2149.1	1500	#N/A	199.62	1300.38		\$ 19,586	2-inch Replacement
Level 5		WWM001524-FF	Libby Place off Ravenwood Dr	126	N/A	Dead end	2-inch	6		JCT-4407	-1795.5	1500	#N/A	214.6	1285.4		\$ 16,413	2-inch Replacement
Level 5		WWM002432-FF	Pheasant Circle off Meadow Lane	122	N/A	Dead end	2-inch	6		JCT-4335	-1743.5	1500	#N/A	219.4	1280.6		\$ 15,862	2-inch Replacement
Level 5		WWM001958-FF	Irving Ave at 6th St	88	N/A	Dead end	2-inch	6		JCT-2894	-1263.0	1500	#N/A	222.69	1277.31		\$ 11,424	2-inch Replacement
Level 5		WWM005786-FF	W of 1st St -N- Saginaw Ave	87	N/A	Dead end	2-inch	6	NO HYDRANT	JCT-2336	-1594.8	1500	#N/A	236.08	1263.92		\$ 11,371	2-inch Replacement

Fire Flow Improvements - Existing and Build-out

Level / Zone	Group	Pipe	Location Street name/intersection	Length (ft)	Hydrant ID connected to replaced pipe	Dead end?	Existing diam (in)	Replace New Diam (in)	Critical Hydrant	Addresses FF deficiency at Node: (identify if possible)	Pressure at node under FF	Fire Flow (1,500, 2,500 or 3,500 gpm)	Est. Available Fire Flow (gpm) at hydrant 20 psi residual	Est. Available Flow (gpm) to pipe DS node 20 psi residual	FF Deficiency	Number of Parcels	Estimated Replacement Cost	Demand condition driving improvement
Level 5		WWM005787-FF	W of 1st St -N- Saginaw Ave	315	N/A		4-inch	6	NO HYDRANT	JCT-2336	-1594.8	1500	#N/A	746.01	753.99		\$ 41,011	2-inch Replacement
Level 5		WWM001909-FF	Off 6th St betw Ogden & Newport	102	N/A	Dead end	2-inch	6		JCT-2173	-1421.0	1500	#N/A	241.5	1258.5		\$ 13,245	2-inch Replacement
Level 5		WWM002808-FF	Harmon Blvd betw Columbia & Galveston	2	N/A	Dead end	2-inch	8		JCT-1838	-1374.6	1500	#N/A	241.77	1258.23		\$ 332	2-inch Replacement
Level 5		WWM005950-FF	Harmon Blvd betw Columbia & Galveston	97	N/A		2-inch	8		JCT-1905	-8647.2	1500	#N/A	246.91	1253.09		\$ 13,630	2-inch Replacement
Level 5		WWM001898-FF	Off 8th St betw Ogden & Newport	87	N/A	Dead end	2-inch	6		JCT-2175	-1198.2	1500	#N/A	266.99	1233.01		\$ 11,261	2-inch Replacement
Level 5		WWM001047-FF	Wall St -S- Florida	13	N/A	Dead end	2-inch	6		JCT-1768	-132.0	1500	#N/A	638.56	861.44		\$ 1,638	2-inch Replacement
Level 5		WWM001185-FF	6th St -N- Franklin Ave	2	N/A	Dead end	2-inch	6		JCT-2850	-27.8	1500	#N/A	878.08	621.92		\$ 260	2-inch Replacement
Level 5		WWM002735-FF	6th St -N- Franklin Ave	2	N/A	Dead end	2-inch	6		JCT-2852	0.8	1500	#N/A	878.34	621.66		\$ 260	2-inch Replacement
Level 5		WWM005985-FF	1st St betw Gordon & Portland	279	N/A		2-inch	8		2-inch diameter main in the grid		1500	#N/A	941.28	558.72		\$ 39,088	2-inch Replacement
Level 5		WWM000935-FF	Riverside Blvd / Kansas Ave	5	N/A	Dead end	2-inch	8		JCT-2023	-1.6	1500	#N/A	1297.04	202.96		\$ 677	2-inch Replacement
Level 5		WWM001505-FF	2nd St -N- Yale Ave	339	WFH001101		2-inch	8		2-inch diameter main in the grid		2500	2324.33	3632.72	175.67		\$ 47,424	2-inch Replacement
Level 5		WWM003963-FF	Milwaukee Ave betw 12th & 13th Sts	168	N/A		2-inch	6		2-inch diameter main in the grid		1500	#N/A	1754.64	-254.64		\$ 21,811	2-inch Replacement
Level 5		WWM003964-FF	Milwaukee Ave betw 12th & 13th Sts	149	WFH000467		4-inch	6	WFH000467	4-inch diameter main in the grid		1500	3033.77	1242.07	-1533.77		\$ 19,306	2-inch Replacement
Level 5		WWM006170-FF	6th St betw Emerson & Franklin	365	N/A		2-inch	8		2-inch diameter main in the grid		1500	#N/A	2275.43	-775.43		\$ 51,156	2-inch Replacement
Level 5		WWM003995-FF	1st St -N- Saginaw Ave	315	WFH000034	Dead end	2-inch	6		JCT-2326	-6133.4	1500	2613.69	122.46	-1113.69		\$ 40,952	2-inch Replacement
Level 5		WWM002757-FF	Parallel to Hill St betw Lake Pl & Hastings Pl	235	N/A		2-inch	8		2-inch diameter main in the grid		2500	#N/A	4238.1	-1738.1		\$ 32,845	2-inch Replacement
Level 5		WWM007245-FF	Hawthorne Ave -E- 2nd St	262	WFH000457	Dead end	2-inch	8		JCT-2882	-9704.2	2500	5379.94	125.38	-2879.94		\$ 36,736	2-inch Replacement
Level 5		WWM006090-FF	Wall St betw Georgia & Florida	349	N/A		2-inch	6		2-inch diameter main in the grid		1500	#N/A	4573.36	-3073.36		\$ 45,369	2-inch Replacement
Level 5		WWM007244-FF	Georgia Ave betw Sisemore & Harriman	380	N/A		2-inch	8		2-inch diameter main in the grid		2500	#N/A	5752.49	-3252.49		\$ 53,225	2-inch Replacement
Level 5		WWM002769-FF	E of Staats St betw Colorado & Arizona	141	N/A		2-inch	8		JCT-1660	-2611.4	2500	#N/A	13501.4	-11001.4		\$ 19,752	2-inch Replacement
Level 6		WWM005169-FF	S of Archie Briggs Rd off OB Riley Rd	203	N/A	Dead end	2-inch	8		JCT-3224	-3241.2	1500	#N/A	130.04	1369.96		\$ 28,477	2-inch Replacement
Level 6		WWM005170-FF	S of Archie Briggs Rd off OB Riley Rd	217	N/A	Dead end	2-inch	8		JCT-3227	-3225.4	1500	#N/A	135.56	1364.44		\$ 30,342	2-inch Replacement
Level 6		WWM004564-FF	Off Cherokee Lane near Zone 7D	280	N/A	Dead end	2-inch	8		JCT-2501	-4030.4	1500	#N/A	145.72	1354.28		\$ 39,239	2-inch Replacement
Level 6		WWM004565-FF	Off Cherokee Lane near Zone 7D	264	N/A	Dead end	2-inch	8		JCT-2494	-3788.9	1500	#N/A	150.76	1349.24		\$ 37,024	2-inch Replacement
Level 6		WWM004950-FF	Canyon Park Place off Canyon Park Dr	186	N/A	Dead end	2-inch	8		JCT-4542	-3063.7	1500	#N/A	155.32	1344.68		\$ 25,992	2-inch Replacement
Level 6		WWM002268-FF	Bradford Ct off Lotno Dr	132	N/A	Dead end	2-inch	8		JCT-4678	-1884.5	1500	#N/A	158.43	1341.57		\$ 18,536	2-inch Replacement
Level 6		WWM001498-FF	Adrian Ct off Waller Drive	116	N/A	Dead end	2-inch	8		JCT-4656	-1643.4	1500	#N/A	184.41	1315.59		\$ 16,299	2-inch Replacement
Level 6		WWM002380-FF	Woodridge Ct off Woodridge Lane	126	N/A	Dead end	2-inch	6		JCT-4576	-2074.6	1500	#N/A	185.84	1314.16		\$ 16,327	2-inch Replacement
Level 6		WWM002269-FF	Lotno Drive	87	N/A	Dead end	2-inch	8		JCT-4702	-1236.6	1500	#N/A	197.83	1302.17		\$ 12,240	2-inch Replacement
Level 6		WWM002378-FF	Flower Ct off Daggett Lane	107	N/A	Dead end	2-inch	8		JCT-4546	-1491.1	1500	#N/A	229.13	1270.87		\$ 15,002	2-inch Replacement
Level 6		WWM005493-FF	Below Fire Rock Rd near Zone 7D	98	N/A	Dead end	2-inch	8		JCT-3382	-1387.3	1500	#N/A	258.73	1241.27		\$ 13,754	2-inch Replacement
Level 6		WWM002379-FF	Canyon Park Place off Woodridge Lane	64	N/A	Dead end	2-inch	6		JCT-4588	-1065.0	1500	#N/A	265.09	1234.91		\$ 8,344	2-inch Replacement
Level 6		WWM002309-FF	Hollow Tree Lane -S- Cackler Lane	82	N/A	Dead end	2-inch	8		JCT-4703	-1131.5	1500	#N/A	271.45	1228.55		\$ 11,463	2-inch Replacement
Level 6		WWM004970-FF	Rock Chuck Dr	64	N/A	Dead end	2-inch	8		JCT-6287	29.3	1500	#N/A	305.23	1194.77		\$ 9,014	2-inch Replacement
Zone 6B		WWM004417-FF	Stover Circle	255	N/A	Dead end	2-inch	8		JCT-948	-4342.3	1500	#N/A	119.4	1380.6		\$ 35,672	2-inch Replacement
Zone 6B		WWM002021-FF	Stover Circle	112	N/A	Dead end	2-inch	8		JCT-950	-98	1500	#N/A	184.22	1315.78		\$ 15,718	2-inch Replacement
Zone 7C		WWM005549-FF	Nasu park Loop / Nicole Court	282	N/A	Dead end	2-inch	8		JCT-6443	-3991.2	1500	#N/A	109.87	1390.13		\$ 39,492	2-inch Replacement
Zone 7C		WWM004909-FF	Extends NE off Nasu Park Loop	165	N/A	Dead end	2-inch	8		JCT-6463	-2334.9	1500	#N/A	151.28	1348.72		\$ 23,115	2-inch Replacement
Zone 7D		WWM003142-FF	Broken Arrow Road	457	N/A	Dead end	2-inch	8		JCT-3364	-6693.9	1500	#N/A	67.26	1432.74		\$ 63,919	2-inch Replacement
Zone 7D		WWM005490-FF	Lower Village Road	428	N/A	Dead end	2-inch	8		JCT-2491	-6143.0	1500	#N/A	83.7	1416.3		\$ 59,936	2-inch Replacement
Zone 7D		WWM004561-FF	Broken Arrow Road	167	N/A	Dead end	2-inch	8		JCT-3402	-2475.3	1500	#N/A	133.03	1366.97		\$ 23,382	2-inch Replacement
Zone 7D		WWM003094-FF	Broken Arrow Road	119	N/A	Dead end	2-inch	8		JCT-3401	-1781.0	1500	#N/A	157.47	1342.53		\$ 16,611	2-inch Replacement
Zone 7D		WWM005492-FF	Broken Arrow Road	130	N/A		2-inch	8		JCT-3401	-1781.0	1500	#N/A	576.33	923.67		\$ 18,161	2-inch Replacement

Level / Zone	Group	Pipe	Location Street name/intersection	Length (ft)	Hydrant ID connected to replaced pipe	Dead end?	Existing diam (in)	Replace New Diam (in)	Critical Hydrant	Addresses FF deficiency at Node: (identify if possible)	Pressure at node under FF	Fire Flow (1,500, 2,500 or 3,500 gpm)	Est. Available Fire Flow (gpm) at hydrant 20 psi residual	Est. Available Flow (gpm) to pipe DS node 20 psi residual	FF Deficiency	Number of Parcels	Estimated Replacement Cost	Demand condition driving improvement
New Parallel transmission mains that assist fire flow																		
Zone 4B		FF_Z4B_140	In Build-out improvements list	245			N/A	24									Upsize for Build-out	Build-out - not driven by
Zone 4B		FF_Z4B_141	In Build-out improvements list	192.15			N/A	24									Upsize for Build-out	Build-out - not driven by
Zone 4B		FF_Z4B_142	In Build-out improvements list	11.2			N/A	24									Upsize for Build-out	Build-out - not driven by
Zone 4B		FF_Z4B_143	In Build-out improvements list	2311.27			N/A	24									Upsize for Build-out	Build-out - not driven by
Zone 4B		FF_Z4B_144	In Build-out improvements list	2278.97			N/A	24									Upsize for Build-out	Build-out - not driven by
Zone 4B		FF_Z4B_144_2	In Build-out improvements list	1740.2			N/A	24									Upsize for Build-out	Build-out - not driven by
Zone 4B		FF_Z4B_145	In Build-out improvements list	1269			N/A	24									Upsize for Build-out	Build-out - not driven by
Level 5		FF_Z5_01	In Build-out improvements list	96			N/A	24									In Ground	
Level 5		FF_Z5_02	In Build-out improvements list	139			N/A	24									In Ground	
Level 5		FF_Z5_02_2	In Build-out improvements list	159			N/A	24									In Ground	
Level 5		FF_Z5_03	In Build-out improvements list	213			N/A	24									In Ground	
Level 5		FF_Z5_04	In Build-out improvements list	272			N/A	36									Upsize for Build-out	Build-out - not driven by
Level 5		FF_Z5_05	In Build-out improvements list	27			N/A	36									Upsize for Build-out	Build-out - not driven by
Level 5		FF_Z5_32	In Build-out improvements list	290			N/A	36									Upsize for Build-out	Build-out - not driven by
Level 5		FF_Z5_33	In Build-out improvements list	292			N/A	36									Upsize for Build-out	Build-out - not driven by
Level 5		FF_Z5_34	In Build-out improvements list	273			N/A	36									Upsize for Build-out	Build-out - not driven by
Level 5		OP209	In Build-out improvements list	1362			N/A	36									Upsize for Build-out	Build-out - not driven by
Level 5		FF_Z5_06	In Build-out improvements list	750			N/A	16									Upsize for Build-out	Build-out - not driven by
Level 5		FF_Z5_17	In Build-out improvements list	728			N/A	16									Upsize for Build-out	Build-out - not driven by
Level 5		FF_Z5_18	In Build-out improvements list	157			N/A	16									Upsize for Build-out	Build-out - not driven by
Level 5		FF_Z5_19	In Build-out improvements list	221			N/A	16									Upsize for Build-out	Build-out - not driven by
Level 5		FF_Z5_20	In Build-out improvements list	29			N/A	16									Upsize for Build-out	Build-out - not driven by
Level 5		FF_Z5_21	In Build-out improvements list	224			N/A	16									Upsize for Build-out	Build-out - not driven by
Level 5		FF_Z5_22	In Build-out improvements list	178			N/A	16									Upsize for Build-out	Build-out - not driven by
Level 5		FF_Z5_23	In Build-out improvements list	96			N/A	16									Upsize for Build-out	Build-out - not driven by
Level 5		FF_Z5_24	In Build-out improvements list	160			N/A	12									Upsize for Build-out	Build-out - not driven by
Level 5		FF_Z5_25	In Build-out improvements list	89			N/A	12									Upsize for Build-out	Build-out - not driven by
Level 5		FF_Z5_26	In Build-out improvements list	228			N/A	12									Upsize for Build-out	Build-out - not driven by
Level 5		FF_Z5_27	In Build-out improvements list	74			N/A	12									Upsize for Build-out	Build-out - not driven by
Level 5		FF_Z5_28	In Build-out improvements list	1222			N/A	12									Upsize for Build-out	Build-out - not driven by
Level 5		OP192	In Build-out improvements list	960			N/A	12									Upsize for Build-out	Build-out - not driven by
Level 5		OP193	In Build-out improvements list	396			N/A	12									Upsize for Build-out	Build-out - not driven by
Zone 2A		Tetherow. MSA performed separate study under existing demand conditions and recommended several improvements.																
Zone 2A		Optimatics built upon these improvements and upsized several of the pipe diameters to meet Build-out demands.																
Zone 2A		No additional distribution pipe needed to meet fire flow beyond the improvements recommended.																
Zone 2B		South Bend area. Small diameter pipes exist here now, inadequate for fire flow. MSA has recommended replacing the existing grid with 8-inch distribution and 16-/12-inch transmission pipe improvements, which will provide the fire flow capacity needed.																
Zone 2B																		
Zone 3A		No improvements needed to meet projected fire flows.																
Zone 3B		No improvements needed to meet projected fire flows.																
Zone 3D		South Bend area. Small diameter pipes exist here now, inadequate for fire flow. MSA has recommended replacing the existing grid with 8-inch distribution and 16-/12-inch transmission pipe improvements, which will provide the fire flow capacity needed.																
Zone 3D																		
Zone 4C		No improvements needed to meet projected fire flows. Note - there is a high elevation area of the zone to the far NW that could be a candidate for zone reconfiguration																
Zone 4H		No improvements needed to meet projected fire flows.																
Zone 4J		No improvements needed to meet projected fire flows.																
Zone 4K		No improvements needed to meet projected fire flows.																
Zone 5A		No improvements needed to meet projected fire flows.																
Zone 5C		No improvements needed to meet projected fire flows.																
Zone 6B		Still 2 nodes not meeting 20 psi under Build-out MDD + FF, but these are at high ground elevations. Might connect to Zone 5C.																
Zone 7A		No improvements needed to meet projected fire flows. Note that new 16-inch diameter line assumed in place along Brightwater Drive to J.R.																
Zone 7B		No improvements needed to meet projected fire flows.																