

## Appendix G

### Cost Summary - Build-out System Improvements

<b>Cost Item</b>	<b>Cost</b>
"Surface Water Supply"	
13.5 MGD, membrane treatment, no hydro <sup>1</sup>	\$57,750,000
Additional supply to meet 23 MGD (9.5 MGD) <sup>2</sup>	\$12,825,000
New Groundwater Wells (35.7 MGD)	\$45,490,000
New Storage (14.5 MG)	\$24,130,000
New Pipe Improvements for Growth	\$43,625,000
Pipe Improvements for Fire Flow	\$11,458,000
Pump Station Expansion	\$1,744,000
New Valves	\$600,000
<b>TOTAL</b>	<b>\$197,622,000</b>

# Appendix G

## Cost Summary - 10-year CIP

Year	MDD (MGD)	ADD (MGD)	Pipes	Cost	Tanks	Capacity	Cost	Wells	Capacity	Cost	Total Cost
2010	29	12.8	Juniper Ridge 16-inch connection on 18 <sup>th</sup>	\$1,292,000							\$1,292,000
2011	31	13.8	Tetherow improvements – B (Skyline Ranch 18-inch main), T (reconfiguration of the customers on the suction side of Tetherow PS). Open Zone 4J/4A boundary	\$1,434,000							\$1,434,000
2012	33	14.7	Extend larger diameter pipe out of Pilot Butte on Lafayette to 11th, piping associated with new Awbrey well	\$241,000				Awbrey	1.5 MGD	\$1,944,000	\$2,185,000
2013	35	15.6	New parallel pipe near College PS in Level 3, new Level 5 pipe connection on Roanoke; site and discharge piping for new Level 5 Well east of Pilot Butte	\$1,169,000				New Level 5 A	2 MGD	\$2,721,600	\$3,890,600
2014	37	16.4	Parallel piping from Rock Bluff to Brookwood	\$1,535,000							\$1,535,000
2015	39	17.3	Continue parallel piping from Rock Bluff to Brosterhaus; open Zone 4B/4I boundary at Reed Market	\$2,940,000				Shilo	2 MGD	\$2,721,600	\$5,661,600
2016	41	18.2	Parallel mains on Brosterhaus and Reed Market, replace piping along Wilson in Zone 4B	\$1,742,000				New Level 6	1 MGD	\$1,360,800	\$3,102,800
2017	43	19.1	Extend larger diameter piping out of Pilot Butte on Lafayette from 11th to 8th	\$402,000				New Level 5 A	2 MGD	\$2,721,600	\$3,123,600
2018	45	20.0	Parallel piping in Level 6 – Boyd Acres and Brinson Blvd; piping for Level 6 Well at Butler Market Well; New Pilot Butte tank connection	\$1,364,000	Pilot Butte 4	3 MG	\$5,807,000	New Level 6	2 MGD	\$2,721,600	\$9,892,600
2019	47	20.9	Replace existing pipe along 8 <sup>th</sup> from Lafayette to Seward	\$1,000,000				New Level 5 A	1 MGD	\$1,360,800	\$2,360,800
2020	49	21.8	Parallel main on Glassow and new main on Summit in Level 2; Replacement of piping on Norton and Olney in Level 5	\$1,366,000				New Level 6	2 MGD	\$2,721,600	\$4,087,600
<b>TOTAL</b>				<b>\$14,485,000</b>			<b>\$5,807,000</b>			<b>\$18,273,600</b>	<b>\$38,565,600</b>
								Including 3 valves:		\$225,000	\$38,790,600

**Appendix G**  
**Pipe Improvements Summary**

Improvements are sorted by year

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

<b>Cost Summary</b>	Planned	\$421,851
	10-year Plan	\$14,485,798
	Surface water > 13.5 MGD	\$3,081,634
	Build-out	\$26,057,948
	<b>Total (not including Planned)</b>	<b>\$43,625,381</b>

Zone	Model ID	Project ID	Location/Description	Length (ft)	Diameter (in)	Roughness (HW)	Status	Estimated Cost	Refined Timing	Need/Relationships	MSA recommendation /reference
<b>Improvements already planned or in place</b>											
L5	OP175	Constructed	Pilot Butte 1 replacement - in place	113	24	130	Open	In ground	In ground		
L5	FF_Z5_01	Constructed	Pilot Butte 1 replacement - in place	96	24	130	Open	In ground	In ground		
L5	FF_Z5_02	Constructed	Pilot Butte 1 replacement - in place	139	24	130	Open	In ground	In ground		
L5	FF_Z5_02_2	Constructed	Pilot Butte 1 replacement - in place	159	24	130	Open	In ground	In ground		
L5	FF_Z5_03	Constructed	Pilot Butte 1 replacement - in place	213	24	130	Open	In ground	In ground		
Fac	OP158	Constructed	Pilot Butte Well 4 piping	14	16	130	Open	In ground	In ground		
Fac	OP157	Constructed	Pilot Butte Well 4 piping	93	16	130	Open	In ground	In ground		
Fac	OP159	Constructed	Pilot Butte Well 4 to Zone 4B piping	6	12	130	Closed	In ground	In ground		
Z4A	OP41	Z4A-1	New Level 3 to 4J/4A piping as planned	1,264	8	130	Open	\$176,949	Planned	Future development	
Z4A	OP42	Z4A-1	New Level 3 to 4J/4A piping as planned	1,749	8	130	Open	\$244,902	Planned	Future development	
<b>Zone Boundary Changes</b>											
ZB	WWM007035	ZB-1	Open 4J/4A boundary, Shevlin	534	16	130	Open	\$0	2011	Recommended in operations optimization	
ZB	WWM006821	ZB-2	Open 4I/4B boundary, Mt Bachelor at Reed Market	107	12	130	Open	\$0	2015	Recommended in operations optimization	
ZB	OP12	ZB-3	4F into 4A, Mesa Verde to Summerfield	348	8	130	Open	\$48,751	Build-out		
<b>Piping Improvements listed by year and by pressure level</b>											
L6	OP34	L6-1	Juniper Ridge planned pipe - needed for fire flow	5,384	16	130	Open	\$1,292,263	2010	Juniper Ridge - Under construction?	
L3/T	OP21	L3-1	Tetherow discharge connection to Level 3 customers	10	16	130	Open	\$2,400	2011	Triggered by higher Tetherow FF requirements	T
L3/T	OP39	L3-2	Skyline Ranch - Tetherow Suction	2,457	18	130	Open	\$651,137	2011	Tetherow suction	B
L3/T	OP37	L3-2	Skyline Ranch - Tetherow Suction	2,943	18	130	Open	\$779,935	2011	Tetherow suction	B
L5	WWM001124-R	L5-1	Lafayette, 12th to 11th, replace 12"	270	36	130	Open	\$128,070	2012		
L5	WWM006131-R	L5-1	Lafayette, at 11th, replace 12"	23	36	130	Open	\$11,080	2012		
Fac	OP143	Fac-1	Awbrey Well piping	16	30	130	Open	\$6,441	2012	New Level 5 well	
Fac	OP144	Fac-1	Awbrey Well piping	21	30	130	Open	\$8,614	2012	New Level 5 well	
Fac	OP287	Fac-1	Awbrey Outlet parallel	328	18	130	Open	\$86,965	2012	New Level 5 well/Tank outlet parallel	
L3	OP11	L3-3	Crossings/Shevlin Drive parallel in Level 3	735	16	130	Open	\$176,407	2013	Assists filling Awbrey	
L3	OP74	L3-3	Level 3 conn Shevlin to Saginaw (past College PS)	1,059	12	130	Open	\$201,161	2013	Assists filling Awbrey	
L5	FF_Z5_205	L5-2	Roanoke Ave, near Awbrey outlet	566	8	130	Open	\$79,178	2013	Addresses pressure problem	
L5	OP331	L5-3	East Level 5 Well piping	2,435	18	130	Open	\$645,294	2013	New Level 5 well	
Fac	OP328	Fac-2	East Level 5 Well piping	36	18	130	Open	\$9,580	2013	New Level 5 well	
Fac	OP54	Fac-2	East Level 5 Well discharge piping	304	12	130	Open	\$57,697	2013	New Level 5 well	
Z4B	FF_Z4B_140	Z4B-1	Rock Bluff outlet parallel	245	42	130	Open	\$136,431	2014	Fire flow, SE Interceptor 2015, Consider installing dual 24-inch in place of single 42-inch	
Z4B	FF_Z4B_141	Z4B-1	Rock Bluff outlet parallel, Powers	192	42	130	Open	\$106,835	2014	Fire flow, SE Interceptor 2015, Consider installing dual 24-inch in place of single 42-inch	
Z4B	FF_Z4B_142	Z4B-1	Rock Bluff outlet parallel, Powers	11	42	130	Open	\$6,227	2014	Fire flow, SE Interceptor 2015, Consider installing dual 24-inch in place of single 42-inch	
Z4B	FF_Z4B_143	Z4B-1	Powers parallel to Brookwood	2,311	42	130	Open	\$1,285,066	2014	Fire flow, SE Interceptor 2015, Consider installing dual 24-inch in place of single 42-inch	
Z4B	FF_Z4B_144	Z4B-2	Powers parallel, Brookwood to 3rd	2,279	42	130	Open	\$1,267,107	2015	With well expansion, fire flow, SE Interceptor 2015, Consider dual 24-inch in place of single 42-inch	
Z4B	FF_Z4B_144_2	Z4B-2	Powers/Chase parallel, 3rd to Eena	1,740	42	130	Open	\$967,662	2015	With well expansion, fire flow, SE Interceptor 2015, Consider dual 24-inch in place of single 42-inch	
Z4B	FF_Z4B_145	Z4B-2	Powers/Chase parallel, Eena to Brosterhouse	1,269	42	130	Open	\$705,347	2015	With well expansion, fire flow, SE Interceptor 2015, Consider dual 24-inch in place of single 42-inch	
Z4B	OP243	Z4B-3	Brosterhouse parallel	2,492	30	130	Open	\$1,021,585	2016	With well expansion, SE Interceptor 2015	
Z4B	FF_Z4B_68	Z4B-4	Reed Market parallel	831	16	130	Open	\$199,457	2016	With well expansion, SE Interceptor 2015	
Z4B	FF_Z4B_67	Z4B-4	Reed Market connection	37	16	130	Open	\$8,866	2016	With well expansion, SE Interceptor 2015	
Z4B	WWM000908-FF-R	Z4B-5	Wilson replace 2"	346	12	130	Open	\$65,699	2016	With well expansion, SE Interceptor 2015	
Z4B	WWM000908-E	Z4B-5	Wilson (new connection)	134	12	130	Open	\$25,494	2016		
Z4B	WWM003763-R	Z4B-6	Wilson replace 12"	264	18	130	Open	\$70,071	2016		
Z4B	WWM001410-R	Z4B-6	Wilson replace 12"	261	18	130	Open	\$69,190	2016		
Z4B	WWM000462-R	Z4B-6	Wilson replace 12"	454	18	130	Open	\$120,232	2016		
Z4B	WWM003771-R	Z4B-6	Wilson replace 12"	610	18	130	Open	\$161,726	2016		

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Zone	Model ID	Project ID	Location/Description	Length (ft)	Diameter (in)	Roughness (HW)	Status	Estimated Cost	Refined Timing	Need/Relationships	MSA recommendation /reference
L5	WWM006132-R	L5-4	Lafayette, 11th to 10th, replace 12"	286	36	130	Open	\$136,044	2017		
L5	WWM001123-R	L5-4	Lafayette, 10th to 9th, replace 12"	290	36	130	Open	\$137,882	2017		
L5	WWM001112-R	L5-4	Lafayette, 9th to 8th, replace 12"	270	36	130	Open	\$128,263	2017		
L5	OP104	L5-5	New Pilot Butte Tank connection	1,242	24	130	Open	\$434,795	2018	New Pilot Butte Tank	
L6	OP197	L6-2	Brinson parallel	942	12	130	Open	\$179,010	2018	New Level 6 Well	
L6	OP205	L6-3	Boyd Acres parallel, Level 6	1,882	18	130	Open	\$498,738	2018	New Level 6 Well	
L6	OP206	L6-3	Boyd Acres parallel, Level 6	597	16	130	Open	\$143,350	2018	New Level 6 Well	
Fac	OP317	Fac-4	Butler Market Well piping	76	24	130	Open	\$26,576	2018	New Level 6 Well	
Fac	OP46	Fac-4	Butler Market Well piping (no tank)	308	12	130	Open	\$58,514	2018	New Level 6 Well	
Fac	OP320	Fac-4	Butler Market Well piping	66	24	130	Open	\$23,041	2018	New Level 6 Well	
L5	WWM002750-R	L5-6	8th, replace 12"	730	30	130	Open	\$299,244	2019		
L5	WWM005259-R	L5-6	8th, replace 12"	626	30	130	Open	\$256,705	2019		
L5	WWM001111-R	L5-6	8th, replace 12"	716	30	130	Open	\$293,446	2019		
L5	WWM001599-R	L5-6	8th, replace 12"	150	30	130	Open	\$61,611	2019		
L5	WWM002849-R	L5-6	8th, replace 12"	217	30	130	Open	\$88,866	2019		
L2	OP298	L2-1	Glassow parallel	2,654	8	130	Open	\$371,535	2020	Enhances connectivity in Level 2	
L2	OP296	L2-1	Summit parallel, Glassow to Coe Ct	1,039	8	130	Open	\$145,484	2020	Enhances connectivity in Level 2	
L3	TTεOP2	L3-4	4K Bypass - Tetherow Suction	1,073	12	130	Open	\$203,935	2020	Tetherow suction	A
L5	WWM001102-R	L5-7	Norton Ave, replace 8"	459	12	130	Open	\$87,136	2020		
L5	WWM001102_2-R	L5-7	Norton Ave, replace 8"	39	18	130	Open	\$10,422	2020		
L5	WWM006117-R	L5-7	Norton Ave, replace 8"	342	18	130	Open	\$90,555	2020		
L5	WWM006006-R	L5-8	2nd, Olney to Norton, replace 12"	333	18	130	Open	\$88,288	2020		
L5	WWM002799-R	L5-8	Olney parallel, Wall to 2nd, replace 12"	284	18	130	Open	\$75,309	2020		
L5	WWM006002-R	L5-8	Olney parallel, Wall to 2nd, replace 12"	138	18	130	Open	\$36,442	2020		
L5	WWM006001-R	L5-8	Olney parallel, Wall to 2nd, replace 12"	4	18	130	Open	\$948	2020		
L5	WWM001921-R	L5-8	Olney parallel, Wall to 2nd, replace 12"	540	18	130	Open	\$143,031	2020		
L5	WWM001920-R	L5-8	Olney parallel, Wall to 2nd, replace 12"	9	18	130	Open	\$2,451	2020		
L5	WWM005997-R	L5-8	Olney parallel, Wall to 2nd, replace 12"	408	18	130	Open	\$108,160	2020		
L5	WWM003936-R	L5-8	Olney parallel, Wall to 2nd, replace 12"	11	18	130	Open	\$2,803	2020		
L3	OP249	L3-6	Skyliners parallel, west of Mt Washington	4,332	48	130	Open	\$2,729,223	Outback > 22 MGD	For Surface up to 18 MGD and no NW dev, 18-inch diameter is sufficient	
Fac	SW_YP_1	Fac-5	Outback Surface/CT/1/2 piping	154	30	130	Open	\$63,148	Outback > 22 MGD		
Fac	SW_YP_2	Fac-5	Outback Surface/CT/1/2 piping	441	30	130	Open	\$180,712	Outback > 22 MGD		
Fac	SW_YP_3	Fac-5	Outback Surface/CT/1/2 piping	118	30	130	Open	\$48,179	Outback > 22 MGD		
Fac	SW_YP_4	Fac-5	Outback Surface/CT/1/2 piping	147	30	130	Open	\$60,373	Outback > 22 MGD		
L3	OP247	L3-10	Outback to Skyliners parallel	529	30	130	Open	\$217,038	Build-out		
L3	OP248	L3-10	Outback to Skyliners parallel	543	48	130	Open	\$341,958	Build-out		
L3	OP250	L3-11	Skyliners parallel, west of Mt Washington	1,794	48	130	Open	\$1,129,955	Build-out		
L3	OP252	L3-11	Skyliners parallel, west of Mt Washington	2,320	36	130	Open	\$1,101,810	Build-out		
L3	OP278	L3-12	Mt Washington parallel, north of Skyliners	416	16	130	Open	\$99,902	Build-out		
L3	TTεOP40	L3-13	Skyline Ranch to Broken Top Drive	1,146	12	130	Open	\$217,725	Build-out		D
L3	TTεWWM004268-R	L3-5	Hosmer Lake replace 8"	341	16	130	Open	\$81,903	Build-out		G
L3	WWM001960-R	L3-7	Mt Washington replace 12"	246	30	130	Open	\$100,784	Build-out		G
L3	WWM004261-R	L3-7	Mt Washington replace 12"	1,287	30	130	Open	\$527,846	Build-out		G
L3	WWM005408-R	L3-7	Mt Washington replace 12"	1,621	30	130	Open	\$664,758	Build-out		G
L3	WWM004292-R	L3-7	Mt Washington replace 12"	1,031	30	130	Open	\$422,821	Build-out		G
L3	WWM002946-R	L3-8	Mt Washington replace 30"	14	36	130	Open	\$6,722	Build-out		G
L3	WWM002945-R	L3-8	Mt Washington replace 16"	20	36	130	Open	\$9,633	Build-out		G
L3	WWM003570-R	L3-8	Mt Washington replace 16"	37	36	130	Open	\$17,746	Build-out		G
L3	WWM003371-R	L3-8	Mt Washington replace 16"	631	36	130	Open	\$299,619	Build-out		G
L3	WWM005372-R	L3-8	Mt Washington replace 16"	1,021	30	130	Open	\$418,799	Build-out		G
L3	WWM004307-R	L3-9	Mt Washington replace 16"	1,202	24	130	Open	\$420,665	Build-out		G
L5	WWM001561-FF	L5-10	Reverse, replace 6"	349	12	130	Open	\$66,390	Build-out	Existing FF improvement	
FF	WWM001560-FF	L5-10	Reverse, replace 6"	129	12	130	Open	\$24,459	Build-out	Existing FF improvement	
FF	WWM001693-FF	L5-10	Reverse, replace 6"	39	12	130	Open	\$7,316	Build-out	Existing FF improvement	
FF	WWM001690-FF	L5-10	Reverse, replace 6"	413	12	130	Open	\$78,471	Build-out	Existing FF improvement	

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Zone	Model ID	Project ID	Location/Description	Length (ft)	Diameter (in)	Roughness (HW)	Status	Estimated Cost	Refined Timing	Need/Relationships	MSA recommendation /reference
FF	WWM001687-FF	L5-11	Division, replace 6"	391	12	130	Open	\$74,291	Build-out	Existing FF improvement	
FF	WWM001688-FF	L5-11	Division, replace 6"	161	12	130	Open	\$30,587	Build-out	Existing FF improvement	
FF	WWM002836-FF	L5-11	Division, replace 6"	154	12	130	Open	\$29,354	Build-out	Existing FF improvement	
FF	WWM001653-FF	L5-11	Division, replace 6"	216	12	130	Open	\$41,078	Build-out	Existing FF improvement	
FF	WWM005772-FF	L5-11	Division, replace 6"	148	12	130	Open	\$28,170	Build-out	Existing FF improvement	
FF	WWM005773-FF	L5-11	Division, replace 6"	366	12	130	Open	\$69,485	Build-out	Existing FF improvement	
L5	WWM005739-R	L5-12	Division, replace 6"	633	12	130	Open	\$120,293	Build-out		
L5	WWM001630-R	L5-12	Division, replace 6"	131	12	130	Open	\$24,858	Build-out		
L5	OP76	L5-13	New Level 5/6 connection, Highway 20	1,079	12	130	Open	\$205,067	Build-out		
L5	OP77	L5-13	New Level 5/6 connection, Highway 20	47	12	130	Open	\$9,017	Build-out		
L5	WWM006157-R	L5-14	12th, Lafayette to Hwy 20, replace 16"	746	18	130	Open	\$197,688	Build-out		
L5	WWM005663-R	L5-15	8th, replace 12"	172	24	130	Open	\$60,044	Build-out		
L5	WWM002866-R	L5-15	8th, replace 12"	90	24	130	Open	\$31,482	Build-out		
L5	WWM002865-R	L5-15	8th, replace 12"	154	24	130	Open	\$54,048	Build-out		
L5	WWM002864-R	L5-15	8th, replace 12"	83	24	130	Open	\$29,179	Build-out		
L5	WWM004023-R	L5-15	8th, replace 12"	224	24	130	Open	\$78,416	Build-out		
L5	WWM004022-R	L5-16	8th, replace 12"	71	24	130	Open	\$24,978	Build-out		
L5	WWM005645-R	L5-16	8th, replace 12"	1,216	24	130	Open	\$425,684	Build-out		
L5	WWM005646-R	L5-16	8th, replace 12"	3	24	130	Open	\$1,050	Build-out		
L5	WWM001519-FF-R	L5-17	Bulter Market, Ravenwood to 8th, replace 8"	612	12	130	Open	\$116,320	Build-out		
L5	OP28	L5-17	Level 5 connect, 8th to Butler Market	315	12	130	Open	\$59,875	Build-out		
L5	OP308	L5-18	Century parallel, Knoll to Simpson	827	12	130	Open	\$157,153	Build-out		
L5	WWM000898-R	L5-9	8th, replace 12"	26	30	130	Open	\$10,683	Build-out		
L5	WWM001587-R	L5-9	8th, replace 12"	220	30	130	Open	\$90,294	Build-out		
L6	WWM007109-R	L6-4	Level 6 east of 97 north/west of 20	314	18	130	Open	\$83,124	Build-out		
L6	WWM000867-R	L6-4	Level 6 east of 97 north/west of 20	15	18	130	Open	\$3,962	Build-out		
Ww	OP5	WW-1	Connection across Century Drive at Braeburn	705	10	130	Open	\$112,790	Build-out		
Ww	OP112	WW-1	Swarens, Century, Braeburn, Mammoth (Teetherow to south)	2,094	8	130	Open	\$293,194	Build-out		
Ww	OP106	WW-2	Tie Teetherow to north high elv Westwood	75	10	130	Open	\$12,016	Build-out		
Ww	OP293	WW-2	Westwood/Teetherow boundary	35	16	130	Open	\$8,402	Build-out	Small bypass	
Ww	OP9	WW-3	Connection, Cultus Lake to Campbell (footpath)	505	10	130	Open	\$80,800	Build-out		
Ww	OP10	WW-4	Connection, Pine Hollow (unpaved)	189	10	130	Open	\$30,219	Build-out		
Ww	WWM006860-R	WW-5	Existing pipe - East Campbell, replace	508	12	130	Open	\$96,524	Build-out		
Ww	WWM006826-R	WW-6	Existing pipe - Longview Street, replace	51	8	130	Open	\$7,173	Build-out		
Ww	OP8	WW-6	Longview Street (extend to West Ridge though park)	808	8	130	Open	\$113,084	Build-out		
Ww	WWM004318-R	WW-7	Devils Lake replace 8"	508	12	130	Open	\$96,491	Build-out		
Ww	WWM004248-R	WW-7	Devils Lake replace 8"	303	12	130	Open	\$57,622	Build-out		
Ww	WWM004241	WW-8	Boundary change - Kemple	1,099	8	130	Closed	\$0	Build-out	Closed to separate higher elevation Westwood	
Ww	WWM005402	WW-8	Boundary change - Mammoth	1,465	8	130	Closed	\$0	Build-out	Closed to separate higher elevation Westwood	
Z4A	OP66	Z4A-2	Troon to Knoll parallel	455	12	130	Open	\$86,429	Build-out		
Z4A	OP19	Z4A-3	4A connection - Monterey Pines	235	10	130	Open	\$37,560	Build-out		
Z4B	OP260	Z4B-10	Pilot Butte 2 outlet parallel	227	12	130	Open	\$43,174	Build-out		
Z4B	OP261	Z4B-10	Pilot Butte 2 outlet parallel	1,050	18	130	Open	\$278,330	Build-out		
Z4B	OP256	Z4B-11	3rd parallel, Reed Market to Cleveland	785	16	130	Open	\$188,465	Build-out		
Z4B	FF_Z4B_84	Z4B-12	Meyer Drive development	546	10	130	Open	\$87,296	Build-out		
Z4B	OP244	Z4B-7	Brosterhaus parallel	1,084	30	130	Open	\$444,506	Build-out	just >2020	
Z4B	OP215	Z4B-8	Reed Market parallel, 3rd to "4th"	685	16	130	Open	\$164,503	Build-out	just >2020	
Z4B	WWM001401-R	Z4B-9	Wilson replace 6"	206	12	130	Open	\$39,150	Build-out		
Z4B	WWM006516-R	Z4B-9	Wilson replace 12"	283	18	130	Open	\$74,977	Build-out		

**Appendix G**

Zone	Model ID	Project ID	Location/Description	Length (ft)	Diameter (in)	Roughness (HW)	Status	Estimated Cost	Refined Timing	Need/Relationships	MSA recommendation /reference
Dev	OP43	Dev-1	NW development	140	36	130	Open	\$66,605	NW Development		
Dev	OP44	Dev-1	NW development	8,832	30	130	Open	\$3,621,284	NW Development		
Dev	OP50	Dev-1	NW development	1,739	16	130	Open	\$417,310	NW Development		
Dev	OP45	Dev-1	NW development	7,809	24	130	Open	\$2,733,189	NW Development		
Dev	OP82	Dev-2	NW development Level 3 tie, Shevlin	2,940	16	130	Open	\$705,497	NW Development		
Dev	OP53	Dev-2	NW development	6,672	24	130	Open	\$2,335,253	NW Development		
Dev	6669_connect	Dev-2	NW development	976	8	130	Open	\$136,632	NW Development		
Dev	OP305	Dev-3	Zone 4D to new development	1	8	130	Open	\$140	NW Development		
Dev	OP303	Dev-4	NW development	5,464	24	130	Open	\$1,912,383	NW Development		
Dev	OP86	Dev-4	NW development	2,058	18	130	Open	\$545,455	NW Development		
Dev	OP49	Dev-4	NW development	3,030	18	130	Open	\$803,067	NW Development		
Dev	OP56	Dev-4	NW development	2,977	18	130	Open	\$788,966	NW Development		
Dev	OP167	Dev-4	NW development Level 6 tie, Cooley	4,350	12	130	Open	\$826,553	NW Development	Juniper Ridge	
Dev	6661_connect	Dev-5	Level 6 development	971	8	130	Open	\$135,941	NW Development		
Fac	OP137	Fac-10	Overturf Well piping	23	36	130	Open	\$11,058	Build-out		
Fac	OP138	Fac-10	Overturf Well piping - existing tank inlet	36	36	130	Open	\$16,939	Build-out		
Fac		8	Overturf Well piping - existing tank inlet	1	12	130	Open	\$190	Build-out		
Fac	OP139	Fac-3	Rock Bluff Well piping	11	24	130	Open	\$3,948	Build-out		
Fac	OP140	Fac-3	Rock Bluff Well piping	15	24	130	Open	\$5,292	Build-out		
Fac	OP274	Fac-3	Rock Bluff Inlet piping	239	16	130	Open	\$57,466	Build-out		
Fac	OP179	Fac-6	Outback 3/New inlet piping	150	24	130	Open	\$52,392	Build-out		
Fac	OP176	Fac-6	Outback 3/New outlet piping	257	24	130	Open	\$89,887	Build-out		
Fac	OP177	Fac-6	Outback 3/New outlet piping	54	24	130	Open	\$18,799	Build-out		
Fac	OP133	Fac-7	Outback New Well piping	28	30	130	Open	\$11,566	Build-out		
Fac	OP134	Fac-7	Outback New Well piping	23	30	130	Open	\$9,446	Build-out		
Fac	OP131	Fac-8	College PS piping	5	16	130	Open	\$1,241	Build-out		
Fac	OP132	Fac-8	College PS piping	12	16	130	Open	\$2,928	Build-out		
Fac	OP324	Fac-9	Paula/Purcell Well piping	28	18	130	Open	\$7,330	Build-out		
Fac	OP55	Fac-9	Paula/Purcell Well piping (no tank)	113	12	130	Open	\$21,453	Build-out		
Fac	OP327	Fac-9	Paula/Purcell Well piping	22	18	130	Open	\$5,793	Build-out		

South Bend Improvements

Zone	Model ID	Project ID	Location/Description	Length (ft)	Diameter (in)	Roughness (HW)	Status	Estimated Cost	Refined Timing	Need/Relationships	MSA recommendation/reference	Length	Juniper Utility City	Total
<b>Tillicum - into 4B</b>														
	Tillicu P12	Till-1	Tillicum connection - planned, Mowitch & Chase	77	8	130	Open	\$10,735	In ground		Per Former Juniper Utility - Proposed Water System Improvements, Jan 2011	P12	40	\$10,000
	Tillicu P13	Till-2	Tillicum connection - planned, Klahani & Brosterhous	62	8	130	Open	\$8,665	In ground			P13	100	\$13,000
	Tillicu P14	Till-3	Tillicum connection - planned, Killowan	145	8	130	Open	\$20,231	In ground			P14	190	\$26,000
	Tillicu P15	Till-4	Tillicum connection - planned, Rae & Jackson	23	8	130	Open	\$3,262	In ground			P15	30	\$10,000
	Tillicu OP187	Till-8	Tillicum connection to Splendor	82	8	130	Open	\$11,500	2010	Additional connection		n/a		\$0
	Tillicu P16	Till-5	Tillicum - Benham parallel	379	8	130	Open	\$52,990	Fire flow	Fire flow		P16	320	\$45,000
	Tillicu P17	Till-6	Tillicum - Rae parallel	1,627	8	130	Open	\$227,772	Fire flow	Fire flow		P17	1,550	\$217,000
	Tillicu P18	Till-7	Tillicum - Illahee parallel	673	8	130	Open	\$94,153	Fire flow	Fire flow		P18	690	\$96,000
<b>South Bend</b>														
SB	P1	Constructed	Murphy PS to Shilo	2,507	12	130	Open	\$476,311	In ground			P1	2,580	\$489,000
SB	OP173	Constructed	Shilo Well piping (P9 as per MSA)	10	12	130	Closed	\$10,000	In ground	P9		P9	50	\$10,000
Z4B	OP13	Constructed	Shilo to Level 4	3,256	12	130	Open	\$618,638	In ground			n/a		\$0
SB	P2	Constructed	Shilo to new Valve nth of Timber Ridge	1,433	16	130	Open	\$343,963	In ground			P2	1,430	\$271,000
SB	P3	SB-1	Country Club	3,204	16	130	Open	\$768,955	Planned 2012/13			P3	2,950	\$561,000
SB	P4	SB-2	Mountain High Loop	860	12	130	Open	\$163,448	Planned 2012/13			P4	860	\$163,000
SB	P5	SB-3	Mountain High Loop	740	12	130	Open	\$140,539	Planned 2012/13			P5	1,800	\$342,000
SB	P5A	SB-3	Mountain High Loop	1,045	12	130	Open	\$198,548	Planned 2012/13					\$0
SB	P7	SB-4	Mountain High Drive	841	12	130	Open	\$159,762	Planned 2012/13			P7	1,830	\$348,000
SB	P7A	SB-4	Mountain High Drive	548	12	130	Open	\$104,143	Planned 2012/13					\$0
SB	P7B	SB-4	Mountain High Drive	523	12	130	Open	\$99,463	Planned 2012/13					\$0
SB	P8	SB-4	Mountain High Drive	1,023	12	130	Open	\$194,353	Planned 2012/13			P8	1,020	\$193,000
SB	P10	SB-5	South Bend - planned, Murphy to Brosterhous	1,527	16	130	Open	\$366,398	In ground			P10	1,590	\$381,000
SB	P11	SB-5	South Bend - planned, Brosterhous to Pines Mobile	1,994	16	130	Open	\$478,531	Planned 2011/12			P11	1,790	\$430,000
SB	Pumps & Surge tank (PS1-2 VFD pumps at Murphy and PS2-Surge Tank)													
SB	Valves (V1-North of Timber Ridge and V2-PRV at Brosterhous for Pines Mobile)													
SB	Hydrants (H1 - 47 new hydrants at 400 ft spacing)													
SB	<b>Category 1 per MSA 11/20/09</b>													
SB	<b>Category 2 per MSA 11/20/09 (Tillicum, Nottingham, Timber Ridge, Mountain High &amp; Pines Mobile, including hydrants)</b>													
												<b>\$3,558,000</b>	<b>\$882,000</b>	<b>\$4,440,000</b>
												<b>\$9,859,000</b>		<b>\$9,859,000</b>

Appendix G

Storage Cost Summary

[TANKS] Model ID	Elevation	InitLevel	MinLevel	MaxLevel	Diameter	Vol f <sup>3</sup>	Vol MG	Storage construction:		New Volume (MG)	Cost
								Buried	Above Ground		
OUTBACK_3	3982	22.4	1	29.38	237	1,296,100	9.70	Expand	Above Ground Concrete	6.0	\$7,020,000
COLLEGE_2	4087.93	25.4	1	31.5	74.1	135,843	1.02			0.0	
COLLEGE_1	4095.8	21.4	1	23.27	105	201,495	1.51	Expand	Above Ground Concrete	1.0	\$2,366,000
AWBREY	3775	17	1	20.5	206.3	685,239	5.13			0.0	
TOWER_ROCK	4213	29.5	1	31	129	405,164	3.03	Expand	Above Ground Concrete	2.0	\$3,755,000
PILOT_BUTTE_1	3750	23	1	31.5	89.3	197,289	1.48			0.0	
PILOT_BUTTE_2	3840.5	33.5	1	39.5	65.2	131,881	0.99			0.0	
PILOT_BUTTE_3	3757.25	18	1	24.25	188	673,158	5.04			0.0	
ROCK_BLUFF_1	3840	36	1	39	130	517,656	3.87	Expand	Above Ground Concrete	2.0	\$3,755,000
WESTWOOD	3842	21	1	28	53.3	62,474	0.47	Refurbish	Above Ground Concrete	0.5	\$1,427,000
OVERTURF_WEST	3844	22	1	28	94	194,314	1.45			0.0	
OVERTURF_EAST	3844	22	1	28	94	194,314	1.45			0.0	
OUTBACK_CT_BASIN	3980	27	1	31	91.5	203,842	1.52			0.0	
OUTBACK_2	3976	30	1	35.38	120.8	405,491	3.03			0.0	
OUTBACK_1	3976	27	1	40.1	98.6	306,188	2.29			0.0	
OP_NewPB4Tank	3760	15	0	20	160	402,124	3.01	New	Buried Concrete	3.0	\$5,807,000
<b>Total Cost</b>										<b>14.5</b>	<b>\$24,130,000</b>



## Appendix G

### New Infrastructure Costs - Wells, Pumps and Valves

ID	Description	Max Day Flow (MGD)	Maximum Flow Rate (gpm)	Pump Capacity (MGD)	Pump Head (ft)	Cost <sup>1</sup>
<b>New or expanded booster pump stations</b>						
Tetherow PS	MD + fire flow = 4,000 gpm	-	-	3 x 1,250	95	\$784,800
MD = 500 gpm, FF = 3,500 gpm. Switch out three pumps to increase firm capacity: 150, 700, 700, <b>1250, 1250, 1250</b> gpm						
Murphy PS	MD + fire flow = 2,500 gpm	-	-	3 x 1,000	185	\$959,400
MD = 1,000 gpm, FF = 1,500 gpm. Switch out three pumps to increase firm capacity: 300, 300, <b>1000, 1000, 1000</b> gpm						
<b>Total Pump Station Cost</b>						<b>\$1,744,200</b>
<b>New or expanded wells</b>						
OP_New_Outback_Wells	Expanded Outback	5.8	4,000	5.8	500	\$7,776,000
New_Overturf_Wells	New Overturf Wells	1.4	1,000	1.4	500	\$1,944,000
SHILO3	Expanded Shilo <sup>3</sup>	1.3	1,400	2.0	500	\$2,721,600
New_RBWells	Expanded Rock Bluff	4.0	2,800	4.0	400	\$5,443,200
New_AwbWells	New Awbrey Wells	4.3	3,000	4.3	500	\$5,832,000
New_Forum_Well	New Level 5 Well	7.1	4,900	7.1	~800	\$9,525,600
New_PurcelPaulaWell	New Level 5 Well	2.0	1,400	2.0	~800	\$2,721,600
New_BulterMarketWell	New Level 6 Well	7.1	4,900	7.1	~800	\$9,525,600
<b>Total Well Cost</b>		<b>33.0</b>		<b>33.7</b>		<b>\$45,489,600</b>
<b>New PRV Stations</b>						
Z3_Z4_SKY_2	New PRV on Skyliners,	0.0	0			\$75,000
Z3_Z4_SKY_8	Level 3 to Zone 4J	0.5	383			
PRV_Z3_Z5_NEarea	PRV in new NW Development	8.6	10,038			\$75,000
PRV_Z5_Z6_8	New Level 5 to 6 connection	1.0	2,079			\$75,000
PRV_Z5_Z6_2	at Division and Mt Washington	0.0	0			
NE_Level6_CV	Connection from new NW	0.0	0			\$75,000
NE_Level6_CV_2	development to Level 6	0.7	500			
PRV_4B_5_South	Second conn to east Level 5	0.0	0		<i>Normally closed</i>	\$75,000
PRV_3_4A	Level 3-4A - assist Westwood	0.0	167			\$75,000
PRV_L3_4A	For fire flow, north of Overturf	0.0	0		<i>Normally closed</i>	\$75,000
Zone 7C	Second connection for reliabl	0.0	0		<i>Normally closed</i>	\$75,000
<b>Total Valve Cost</b>		<b>10.9</b>				<b>\$600,000</b>

1) Costs are calculated based on maximum flow for booster pumps and wells. Cost for pump replacement assumed 60% of new

2) Westwood pump station cost only applies above a flow rate of 1,500 gpm, the existing station capacity (without the fire pump)