



INFORMATION BULLETIN / PUBLIC - PLUMBING CODE

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DOMESTIC WATER PIPE SIZING

This Information Bulletin provides additional information to designers of plumbing systems for sizing domestic water piping systems of all types of construction in accordance with the method identified in Appendix A of the Los Angeles Plumbing Code. This bulletin includes the following:

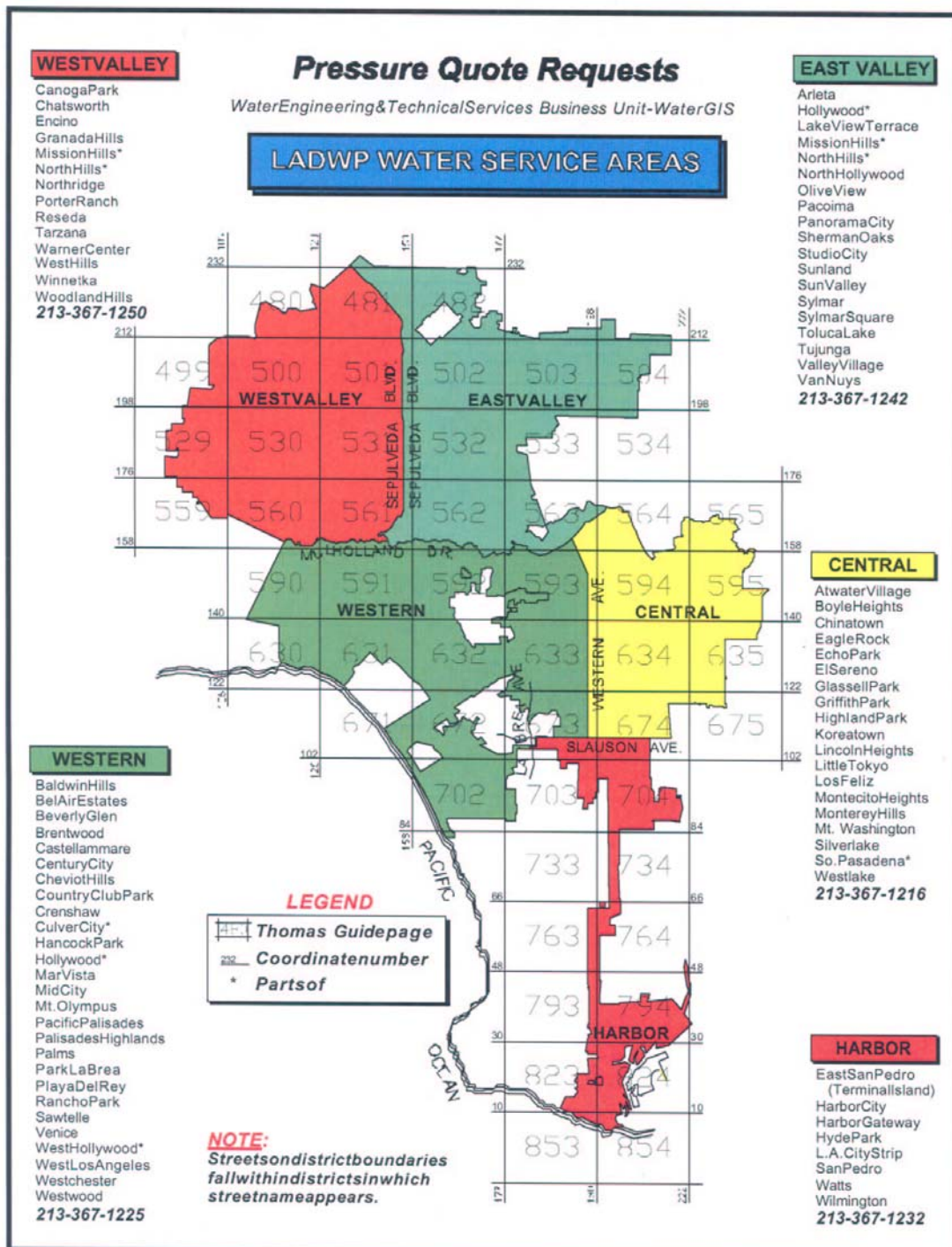
1. The telephone numbers from the Department of Water and Power needed to obtain the minimum and maximum daily service pressure in areas within the City of Los Angeles. (See pages 2 through 3).
2. The capacities and pressure losses of domestic water meters that are supplied by the Los Angeles Department of Water and Power. (See pages 4 through 6).
3. A conversion table of the water demand load in fixture units to gallons per minute tabulated based on Chart A-2, of Appendix A of the Los Angeles Plumbing Code. (See pages 7 through 9).
4. Fixture unit allowance table based on allowable friction loss and pipe diameter for type L copper pipe tabulated based on Charts A-2 and A-4, of Appendix A of the Los Angeles Plumbing Code. (See pages 10 through 17).
5. Sizing forms to aid in designing simple domestic water systems. (See pages 18 through 20).

The attached sizing tables provide designers with information consistent with that used by Mechanical Plan Check Engineers during their plan review process.

A. Available Pressure

Information regarding the minimum and maximum daily service pressure is obtained by calling the Los Angeles Department of Water and Power at the following numbers depending on where the service is located. See also the map on the next page for additional reference.

WEST VALLEY (213) 367-1250		EAST VALLEY (213) 367-1242	
West of Sepulveda Blvd. North of Mulholland Dr.		East of Sepulveda Blvd. North of Mulholland Dr.	
Canoga Park Chatsworth Encino Granada Hills Mission Hills North Hills Northridge Porter Ranch Reseda	Tarzana Warner Center West Hills Winnetka Woodland Hills	Arleta Hollywood Lake View Terrace Mission Hills North Hills Olive View Pacoima Panorama City Sherman Oaks	Studio City Sunland Sun Valley Sylmar Sylmar Square Toluca Lake Tujunga Valley Village Van Nuys
WESTERN (213) 367-1225		CENTRAL (213) 367-1216	
West of Western Ave. South of Mulholland Dr.		East of Western Ave. South of Mulholland Dr.	
Baldwin Hills Bel Air Estates Beverly Glen Brentwood Castellammare Century City Cheviot Hills Country Club Park Crenshaw Culver City Hancock Park Hollywood Hyde Park Mar Vista	Mid City Mt. Olympus Pacific Palisades Palisades Highlands Palms Park La Brea Playa Del Rey Rancho Park Sawtelle Venice West Hollywood West Los Angeles Westchester Westwood	Atwater Village Boyle Heights Chinatown Eagle Rock Echo Park El Sereno Glassel Park Griffith Park Highland Park Koreatown Lincoln Heights Little Tokyo Los Feliz Montecito Heights	Monterey Hills Mt. Washington Silverlake So. Pasadena Westlake
HARBOR (213) 367-1232			
South of Slauson Ave			
East San Pedro (Terminal Island)	Harbor City Harbor Gateway	LA City Strip San Pedro	South Los Angeles Wilmington



LEGEND

- Thomas Guide page
- Coordinatenumber
- Part of

NOTE:
Street and district boundaries fall within districts in which street name appears.

B. Information regarding friction loss relative to the rate of flow for meters in the range allowed to be used.

Domestic Water Meter Capacities and Pressure Losses						
	Pressure Loss in p.s.i.					
Meter Size inches	1"	1 ½ "	2"	3" equivalent	4"	6"
Flow g.p.m.						
30	3.0	0.9	0.3			
35	4.2	1.3	0.4	0.2	3.9	2.4
40	5.5	1.7	0.6	0.3	3.8	2.5
45	7.0	2.3	0.8	0.3	3.7	2.6
50	8.8	2.8	1.0	0.4	3.6	2.7
56	11.2	3.6	1.2	0.5	3.6	2.8
60	Use larger meter	4.2	1.4	0.6	3.5	2.9
65		5.0	1.7	0.7	3.4	3
70		6.0	2.0	0.8	3.3	3.1
75		6.8	2.3	0.9	3.3	3.2
80		8.0	2.6	1.0	3.2	3.2
85		9.0	3.0	1.2	3.2	3.3
90		10.0	3.4	1.3	3.1	3.4
96		11.5	3.8	1.4	3.0	3.4
100		12.7	4.2	1.4	3.0	3.5
110		Use larger meter	5.3	1.7	3.0	3.6
120			6.4	2.0	3.0	3.6
130			7.6	2.3	3.0	3.7

Domestic Water Meter Capacities and Pressure Losses						
	Pressure Loss in p.s.i.					
Meter Size inches	1"	1 ½ "	2"	3" equivalent	4"	6"
Flow g.p.m.						
140			8.9	2.6	3.1	3.7
150			10.2	3.0	3.1	3.7
160			11.7	3.3	3.1	3.7
170			Use larger meter	3.6	3.2	3.8
180				3.8	3.2	3.8
190				4.3	3.3	3.8
200				4.8	3.3	3.8
210				5.4	3.6	3.8
220				6.0	3.8	3.7
230				Use larger meter	4.1	3.7
240					4.4	3.7
250					4.6	3.6
260					4.9	3.6
270					5.2	3.5
280					5.4	3.5
290					5.7	3.4
300					6.0	3.4
310					6.6	3.2
320					7.2	3.1
330					7.8	3.0
340					7.8	3.1
360					7.8	3.0

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Domestic Water Meter Capacities and Pressure Losses						
	Pressure Loss in p.s.i.					
Meter Size inches	1"	1 ½ "	2"	3" equivalent	4"	6"
Flow g.p.m.						
380					8.5	2.9
400					9.1	2.8
420					Use larger meter	2.7
440						2.8
460						2.9
480						3.2
500						3.5
550						4.3
600						4.9
650						5.8
700						6.7
Over 700						Use larger meter
Meter Size inches	8"	10"		Meter Size inches	8"	10"
Flow g.p.m.				Flow g.p.m.		
300	2.7	2.2		1500	4.0	3.0
600	3.2	2.5		2000	Use larger meter	3.3
900	3.5	2.8		2500		3.6
1200	3.7	2.9		Over 2500		Use larger meter

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C. Demand Load

Fixture Units versus g.p.m. Conversion Table								
Flow	Fixture Units		Flow	Fixture Units		Flow	Fixture Units	
g.p.m.	Flush Tank	Flush Valve	g.p.m.	Flush Tank	Flush Valve	g.p.m.	Flush Tank	Flush Valve
1	0	-	22	34	5	43	99	33
2	1	-	23	36	6	44	103	35
3	3	-	24	39	7	45	107	37
4	4	-	25	42	8	46	111	39
5	6	-	26	44	9	47	115	42
6	7	-	27	46	10	48	119	44
7	8	-	28	49	11	49	123	46
8	10	-	29	51	12	50	127	48
9	12	-	30	54	13	51	130	50
10	13	-	31	56	14	52	135	52
11	15	-	32	58	15	53	141	54
12	16	-	33	60	16	54	146	57
13	18	-	34	63	18	55	151	60
14	20	-	35	66	20	56	155	63
15	21	-	36	69	21	57	160	66
16	23	-	37	74	23	58	165	69
17	24	-	38	78	25	59	170	73
18	26	-	39	83	26	60	175	76
19	28	-	40	86	28	62	185	82
20	30	-	41	90	30	64	195	88
21	32	-	42	95	31	66	205	95

Fixture Units versus g.p.m. Conversion Table								
Flow	Fixture Units		Flow	Fixture Units		Flow	Fixture Units	
g.p.m.	Flush Tank	Flush Valve	g.p.m.	Flush Tank	Flush Valve	g.p.m.	Flush Tank	Flush Valve
68	215	102	135	559	460	300	1755	1755
70	225	108	140	585	490	310	1845	1845
72	236	116	145	611	521	320	1926	1926
74	245	124	150	638	559	330	2018	2018
76	254	132	155	665	596	340	2110	2110
78	264	140	160	692	631	350	2204	2204
82	284	158	165	719	666	360	2298	2298
84	294	168	170	748	700	370	2388	2388
86	305	176	175	778	739	380	2480	2480
88	315	186	180	809	775	390	2575	2575
90	326	195	185	840	811	400	2670	2670
92	337	205	190	874	850	410	2765	2765
94	348	214	200	945	931	420	2862	2862
96	359	223	210	1018	1009	430	2960	2960
98	370	234	220	1091	1091	440	3060	3060
100	380	245	230	1173	1173	450	3150	3150
105	406	270	240	1254	1254	500	3620	3620
110	431	295	250	1335	1335	550	4070	4070
115	455	329	260	1418	1418	600	4480	4480
120	479	365	270	1500	1500	700	5380	5380
125	506	396	280	1583	1583	800	6280	6280
130	533	430	290	1668	1668	900	7280	7280

Fixture Units versus g.p.m. Conversion Table											
Flow		Fixture Units		Flow		Fixture Units		Flow		Fixture Units	
g.p.m.	Flush Tank	Flush Valve	g.p.m.	Flush Tank	Flush Valve	g.p.m.	Flush Tank	Flush Valve	g.p.m.	Flush Tank	Flush Valve
1000	8300	8300	1600	14420	14420	2200	20540	20540			
1100	9320	9320	1700	15440	15440	2300	21560	21560			
1200	10340	10340	1800	16460	16460	2400	22580	22580			
1300	11360	11360	1900	17480	17480	2500	23600	23600			
1400	12380	12380	2000	18500	18500	2600	24620	24620			
1500	13400	13400	2100	19520	19520	2700	25640	25640			

D. Permissible Friction Loss

1. Section 94.608.0 of the Los Angeles Plumbing Code requires a residual pressure of at least 15 psi. Whenever fixtures and/or fixture fittings are installed which require residual pressure higher than 15 psi, that minimum pressure shall be provided.
2. Sections 94.610.12.1 and 94.610.12.2 limit the maximum velocities in copper and copper alloy tube and fitting systems to a maximum of 8 ft/s in cold water and 5 ft/s in hot water. The following table reports the fixture unit loading in type L copper (the most common) for various allowable friction losses and water velocities not to exceed the maximum allowed. For pressure losses of 25 psi per 100 feet of pipe and higher, the system is limited by the maximum velocity, and at this point a higher allowable loss will make no difference in the sizing of the water system.

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WATER PIPE SIZING
FIXTURE UNITS versus FRICTION LOSS (PSI/100 ft)
TYPE L COPPER

Friction Loss psi 100 ft	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.545	0.785	1.025	1.265	1.505	1.985	2.465	2.945	3.425	3.905
1	Cold Water - Flush Valve	0	0	0	0	0	13	54	195	355	778
	Cold Water - Flush Tank	0	2	6	12	20	54	141	326	472	812
	Hot Water (5 ft/s max)	0	2	6	12	20	54	141	326	472	812
1.1	Cold Water - Flush Valve	0	0	0	0	0	14	63	219	398	855
	Cold Water - Flush Tank	0	2	6	12	22	57	155	354	508	878
	Hot Water (5 ft/s max)	0	2	6	12	22	57	155	354	508	851
1.2	Cold Water - Flush Valve	0	0	0	0	0	16	73	245	441	935
	Cold Water - Flush Tank	0	2	6	13	23	61	170	380	542	948
	Hot Water (5 ft/s max)	0	2	6	13	23	61	170	380	542	851
1.3	Cold Water - Flush Valve	0	0	0	0	0	20	81	269	478	1009
	Cold Water - Flush Tank	0	3	7	14	24	66	184	405	575	1018
	Hot Water (5 ft/s max)	0	3	7	14	24	66	184	405	575	851
1.4	Cold Water - Flush Valve	0	0	0	0	0	22	89	292	515	1084
	Cold Water - Flush Tank	0	3	7	15	25	71	197	428	606	1085
	Hot Water (5 ft/s max)	0	3	7	15	25	71	197	412	603	851
1.5	Cold Water - Flush Valve	0	0	0	0	0	25	99	321	558	1157
	Cold Water - Flush Tank	0	3	7	15	27	78	210	449	637	1157
	Hot Water (5 ft/s max)	0	3	7	15	27	78	210	412	603	851
1.6	Cold Water - Flush Valve	0	0	0	0	0	27	107	351	600	1227
	Cold Water - Flush Tank	0	3	7	16	28	84	223	470	668	1227
	Hot Water (5 ft/s max)	0	3	7	16	28	84	223	412	603	851
1.7	Cold Water - Flush Valve	0	0	0	0	0	29	116	379	639	1296
	Cold Water - Flush Tank	0	3	8	16	29	89	236	492	698	1296
	Hot Water (5 ft/s max)	0	3	8	16	29	89	236	412	603	851
1.8	Cold Water - Flush Valve	0	0	0	0	0	31	126	406	676	1363
	Cold Water - Flush Tank	0	3	8	17	31	95	247	514	728	1363
	Hot Water (5 ft/s max)	0	3	8	17	31	95	246	412	603	851
1.9	Cold Water - Flush Valve	0	0	0	0	0	34	135	433	714	1430
	Cold Water - Flush Tank	0	3	8	18	32	101	258	535	758	1430
	Hot Water (5 ft/s max)	0	3	8	18	32	101	246	412	603	851
2	Cold Water - Flush Valve	0	0	0	0	3	36	144	456	753	1494
	Cold Water - Flush Tank	0	4	9	19	33	106	270	556	790	1494
	Hot Water (5 ft/s max)	0	4	9	19	33	106	246	412	603	851
2.2	Cold Water - Flush Valve	0	0	0	0	6	42	166	503	826	1622
	Cold Water - Flush Tank	0	4	10	20	35	116	292	596	853	1622
	Hot Water (5 ft/s max)	0	4	10	20	35	116	246	412	603	851

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WATER PIPE SIZING
FIXTURE UNITS versus FRICTION LOSS (PSI/100 ft)

TYPE L COPPER

Friction Loss psi 100 ft	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.545	0.785	1.025	1.265	1.505	1.985	2.465	2.945	3.425	3.905
2.4	Cold Water - Flush Valve	0	0	0	0	7	47	185	594	903	1743
	Cold Water - Flush Tank	0	4	10	21	39	126	314	635	920	1743
	Hot Water (5 ft/s max)	0	4	10	21	39	120	246	412	603	851
2.6	Cold Water - Flush Valve	0	0	0	0	8	52	205	606	976	1743
	Cold Water - Flush Tank	0	5	11	22	42	137	337	673	987	1743
	Hot Water (5 ft/s max)	0	5	11	22	42	120	246	412	603	851
2.8	Hot Water (5 ft/s max)	0	0	0	0	9	58	223	654	1048	1743
	Cold Water - Flush Tank	0	5	12	23	44	148	359	710	1053	1743
	Hot Water (5 ft/s max)	0	5	12	23	44	120	246	412	603	851
3	Cold Water - Flush Valve	0	0	0	0	10	65	245	699	1120	1743
	Cold Water - Flush Tank	0	5	12	24	46	158	380	747	1120	1743
	Hot Water (5 ft/s max)	0	5	12	24	46	120	246	412	603	851
3.2	Cold Water - Flush Valve	0	0	0	0	11	72	264	699	1171	1743
	Cold Water - Flush Tank	1	6	13	25	49	169	399	747	1171	1743
	Hot Water (5 ft/s max)	1	6	13	25	48	120	246	412	603	851
3.4	Cold Water - Flush Valve	0	0	0	0	12	79	282	699	1171	1743
	Cold Water - Flush Tank	1	6	13	26	51	179	418	747	1171	1743
	Hot Water (5 ft/s max)	1	6	13	26	48	120	246	412	603	851
3.6	Cold Water - Flush Valve	0	0	0	0	13	85	302	699	1171	1743
	Cold Water - Flush Tank	1	6	14	28	54	190	436	747	1171	1743
	Hot Water (5 ft/s max)	1	6	14	28	48	120	246	412	603	851
3.8	Cold Water - Flush Valve	0	0	0	0	14	91	326	699	1171	1743
	Cold Water - Flush Tank	1	6	14	29	56	200	453	747	1171	1743
	Hot Water (5 ft/s max)	1	6	14	29	48	120	246	412	603	851
4	Cold Water - Flush Valve	0	0	0	0	15	98	350	699	1171	1743
	Cold Water - Flush Tank	1	6	15	30	58	209	469	747	1171	1743
	Hot Water (5 ft/s max)	1	6	15	29	48	120	246	412	603	851
4.2	Cold Water - Flush Valve	0	0	0	0	16	104	358	699	1171	1743
	Cold Water - Flush Tank	1	7	15	31	59	219	474	747	1171	1743
	Hot Water (5 ft/s max)	1	7	15	29	48	120	246	412	603	851
4.4	Cold Water - Flush Valve	0	0	0	1	17	111	358	699	1171	1743
	Cold Water - Flush Tank	1	7	15	32	62	229	474	747	1171	1743
	Hot Water (5 ft/s max)	1	7	15	29	48	120	246	412	603	851
4.6	Cold Water - Flush Valve	0	0	0	4	19	118	358	699	1171	1743
	Cold Water - Flush Tank	1	7	16	33	64	238	474	747	1171	1743
	Hot Water (5 ft/s max)	1	7	16	29	48	120	246	412	603	851

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FIXTURE UNITS versus FRICTION LOSS (PSI/100 ft)
TYPE L COPPER

Friction Loss psi 100 ft	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.545	0.785	1.025	1.265	1.505	1.985	2.465	2.945	3.425	3.905
4.8	Cold Water - Flush Valve	0	0	0	5	20	125	358	699	1171	1743
	Cold Water - Flush Tank	1	7	16	35	67	247	474	747	1171	1743
	Hot Water (5 ft/s max)	1	7	16	29	48	120	246	412	603	851
5	Cold Water - Flush Valve	0	0	0	6	21	132	358	699	1171	1743
	Cold Water - Flush Tank	1	7	17	36	69	255	474	747	1171	1743
	Hot Water (5 ft/s max)	1	7	17	29	48	120	246	412	603	851
5.2	Cold Water - Flush Valve	0	0	0	6	23	136	358	699	1171	1743
	Cold Water - Flush Tank	1	7	18	37	73	260	474	747	1171	1743
	Hot Water (5 ft/s max)	1	7	17	29	48	120	246	412	603	851
5.4	Cold Water - Flush Valve	0	0	0	7	24	136	358	699	1171	1743
	Cold Water - Flush Tank	2	7	18	39	77	260	474	747	1171	1743
	Hot Water (5 ft/s max)	2	7	17	29	48	120	246	412	603	851
5.6	Cold Water - Flush Valve	0	0	0	7	25	136	358	699	1171	1743
	Cold Water - Flush Tank	2	8	19	40	80	260	474	747	1171	1743
	Hot Water (5 ft/s max)	2	8	17	29	48	120	246	412	603	851
5.8	Hot Water (5 ft/s max)	0	0	0	8	26	136	358	699	1171	1743
	Cold Water - Flush Tank	2	8	19	42	84	260	474	747	1171	1743
	Hot Water (5 ft/s max)	2	8	17	29	48	120	246	412	603	851
6	Cold Water - Flush Valve	0	0	0	8	28	136	358	699	1171	1743
	Cold Water - Flush Tank	2	8	20	43	86	260	474	747	1171	1743
	Hot Water (5 ft/s max)	2	8	17	29	48	120	246	412	603	851
6.2	Cold Water - Flush Valve	0	0	0	9	29	136	358	699	1171	1743
	Cold Water - Flush Tank	2	8	20	44	89	260	474	747	1171	1743
	Hot Water (5 ft/s max)	2	8	17	29	48	120	246	412	603	851
6.4	Cold Water - Flush Valve	0	0	0	9	30	136	358	699	1171	1743
	Cold Water - Flush Tank	2	9	20	45	92	260	474	747	1171	1743
	Hot Water (5 ft/s max)	2	9	17	29	48	120	246	412	603	851
6.6	Cold Water - Flush Valve	0	0	0	10	31	136	358	699	1171	1743
	Cold Water - Flush Tank	2	9	21	45	95	260	474	747	1171	1743
	Hot Water (5 ft/s max)	2	9	17	29	48	120	246	412	603	851
6.8	Cold Water - Flush Valve	0	0	0	10	33	136	358	699	1171	1743
	Cold Water - Flush Tank	2	9	21	47	98	260	474	747	1171	1743
	Hot Water (5 ft/s max)	2	9	17	29	48	120	246	412	603	851

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FIXTURE UNITS versus FRICTION LOSS (PSI/100 ft)
TYPE L COPPER

Friction Loss <u>psi</u> 100 ft	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.545	0.785	1.025	1.265	1.505	1.985	2.465	2.945	3.425	3.905
7	Cold Water - Flush Valve	0	0	0	11	34	136	358	699	1171	1743
	Cold Water - Flush Tank	2	9	21	48	101	260	474	747	1171	1743
	Hot Water (5 ft/s max)	2	9	17	29	48	120	246	412	603	851
7.2	Cold Water - Flush Valve	0	0	0	11	35	136	358	699	1171	1743
	Cold Water - Flush Tank	2	10	22	49	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	2	9	17	29	48	120	246	412	603	851
7.4	Cold Water - Flush Valve	0	0	0	11	35	136	358	699	1171	1743
	Cold Water - Flush Tank	2	10	22	50	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	2	9	17	29	48	120	246	412	603	851
7.6	Cold Water - Flush Valve	0	0	0	12	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	10	23	51	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
7.8	Cold Water - Flush Valve	0	0	0	12	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	10	23	52	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
8	Cold Water - Flush Valve	0	0	0	13	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	11	23	54	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
8.2	Cold Water - Flush Valve	0	0	0	13	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	11	23	55	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
8.4	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	11	24	55	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
8.6	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	11	24	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
8.8	Hot Water (5 ft/s max)	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	12	25	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
9	Cold Water - Flush Valve	0	0	0	14	5	136	358	699	1171	1743
	Cold Water - Flush Tank	3	12	25	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851

WATER PIPE SIZING
FIXTURE UNITS versus FRICTION LOSS (PSI/100 ft)
TYPE L COPPER

Friction Loss <u>psi</u> 100 ft	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.545	0.785	1.025	1.265	1.505	1.985	2.465	2.945	3.425	3.905
9.2	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	12	26	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
9.4	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	12	26	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
9.6	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	12	26	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
9.8	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	12	27	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
10	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	12	27	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
10.2	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	12	28	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
10.4	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	13	28	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
10.6	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	12	29	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
10.8	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	12	29	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
11	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	13	29	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
11.2	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	13	30	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851

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WATER PIPE SIZING
FIXTURE UNITS versus FRICTION LOSS (PSI/100 ft)
TYPE L COPPER

Friction Loss <u>psi</u> 100 ft	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.545	0.785	1.025	1.265	1.505	1.985	2.465	2.945	3.425	3.905
11.4	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	13	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
11.6	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	3	14	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
11.8	Hot Water (5 ft/s max)	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	4	14	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
12	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	4	14	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
12.2	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	4	14	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
12.4	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	4	14	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
12.6	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	4	15	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
12.8	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	4	15	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
13	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	4	15	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
13.2	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	4	15	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
13.4	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	4	15	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851

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WATER PIPE SIZING
FIXTURE UNITS versus FRICTION LOSS (PSI/100 ft)
TYPE L COPPER

Friction Loss <u>psi</u> 100 ft	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.545	0.785	1.025	1.265	1.505	1.985	2.465	2.945	3.425	3.905
13.6	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	4	15	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
13.8	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	4	15	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
14	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	4	15	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
14.2	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	4	15	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
14.4	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	4	16	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
14.6	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	4	16	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
14.8	Hot Water (5 ft/s max)	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	4	16	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
15	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	4	16	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
15.5	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	4	16	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
16	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	5	16	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
16.5	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	5	16	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851

WATER PIPE SIZING
FIXTURE UNITS versus FRICTION LOSS (PSI/100 ft)
TYPE L COPPER

Friction Loss psi 100 ft	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.545	0.785	1.025	1.265	1.505	1.985	2.465	2.945	3.425	3.905
17	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	5	16	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
17.5	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	5	16	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
18	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	5	16	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
19	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	5	16	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
20	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	6	16	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
21	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	6	16	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
22	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	6	16	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
23	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	6	16	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
24	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	6	16	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
25	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	6	16	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851
>25	Cold Water - Flush Valve	0	0	0	14	35	136	358	699	1171	1743
	Cold Water - Flush Tank	7	16	31	56	104	260	474	747	1171	1743
	Hot Water (5 ft/s max)	3	9	17	29	48	120	246	412	603	851

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E. Simple Sizing Forms

The following forms are provided for sizing simple domestic water systems. These forms do not cover complex water system design features such as a substantial distance or change in elevation between the pressure reducing valve and the building, nor do they allow for designing by branches, node points, down-feed systems, or booster pumps. The engineering of complex systems requires all the expertise of an experienced designer and goes beyond the scope of these forms.

SIMPLE SIZING FORM FOR DOMESTIC WATER SYSTEMS

This is a very simplified form and should not be used for complex design as design by branches, systems with booster pumps, down-feed systems, etc.

JOB ADDRESS

WATER INFORMATION FROM DWP: MAX PRESS. _____ psi MIN PRESS. _____ psi at _____ ft a.s.l.

GIVEN BY _____ DATE _____ METER SIZE _____ in

_____ F. U. _____ g.p.m. DEVELOPED LENGTH _____ ft

25% OF DEVELOPED LENGTH _____ ft

EQUIVALENT LENGTH (Developed length + 25%) _____ ft

WATER CLOSETS AND URINALS

	With Tank	W/Flush Valve	MAKE	MODEL
WC1				
WC2				
WC3				
WC4				
UR1				
UR2				

SYSTEM COMPONENTS

PIPING MATERIAL COPPER TYPE K _____ L _____ M _____ GALVANIZED IRON _____ OTHER (specify)

PRESSURE REDUCING VALVE SIZE _____ MAKE _____ MODEL _____

BACKFLOW PREVENTION DEVICE SIZE _____ MAKE _____ MODEL _____

HYDRAULIC CALCULATIONS

A.	MINIMUM PRESSURE AT CITY MAIN	psi
B.	SET PRESSURE AT PRESSURE REDUCING VALVE	psi
C.	PRESSURE LOSS THROUGH _____ inch METER	psi
D.	PRESSURE LOSS THROUGH _____ inch REDUCED PRESSURE BACKFLOW PREVENTER	psi
E.	PRESSURE LOSS THROUGH _____ inch PRESSURE REDUCING VALVE	psi
F.	PRESSURE LOSS THROUGH SOFTENER OR OTHER MISCELLANEOUS EQUIPMENT	psi
G.	PRESSURE LOSS DUE TO ELEVATION _____ ftX0.43=	psi
H.	RESIDUAL PRESSURE	psi
I.	TOTAL PRESSURE LOSSES	psi
J.	PRESSURE AVAILABLE FOR FRICTION LOSS IN THE SYSTEM	psi
K.	PRESSURE/100ft (J/EQUIVALENT LENGTH X100)	psi/100ft

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FIXTURE UNIT COUNT				PIPE SIZE SCHEDULE			
FIXTURE UNIT TYPE	F. U. Value	Quantity	TOTAL	PIPE MAT.			
Kitchen Sinks	1.5			PRESS. LOSS psi/100ft			
Dishwashers	1.5			ALLOWED F. U.			
Bar Sinks					Flush Tank		Flush Valve
Mop or Service Sinks				Size (in.)	Hot Water	Cold Water	Cold Water
Clothes Washers	4				(5ft/s)	(8ft/s)	(8ft/s)
Lavatories	1			1/2			0
Bathtub	4			3/4			0
Bathtub 3/4 inch fill	10			1			0
Showers	2			1 1/4			
Water Closets				1 1/2			
Water Closets with Flushometer Valve				2			
Urinals with Flushometer Valve				2 1/2			
First Hose Bibb	2.5			3			
Additional Hose Bibbs	1			3 1/2			
				4			
				5			
				6			
TOTAL FIXTURE UNITS				=			g.p.m.
Additional Flow				=			g.p.m.
TOTAL FLOW				=			g.p.m.

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