

B13.3 Pipeline Operational & Economic Design Model* Return to MAIN Menu

* All cost data is rough information only, do not use without professional consultation.

Chart initial flow:	700 GPM	Chart step interval:	20 GPM	Total Static Head:	500 feet
Pipe Size:	18 inches	Pipe cost est. / ft.:	\$54.00	Total Pipeline Rough Estimated Cost *:	1,404,000 \$
Amortize Pipeline over:	20 Years	Pipeline Amortized at an Annual Interest Rate of:	6.00 %		
Power (Energy) Costs per Kilowatt Hour:	0.0259 \$/kW-hr	Power Demand Charge / Kilowatt/Month:	7.67 \$/kW/Mo.		
Desired Max. Gallons / year to Pump:	735,840,000	Pump Efficiency:	80.00%	Motor Efficiency:	80.00%

	Flow & Headloss Characteristics				Gravity Flow Systems		Pumped Flow Systems							
	18 inch Pipe Flow GPM	18 inch Pipe Velocity (fps)	18 inch Pipe Velocity Head (ft.)	18 inch Pipe Head Loss per 100 feet	Total Pipe Length Loss of Head (ft.)	Gravity System Pipeline Dynamic Head (ft.)	Gravity System Suitability	Pipeline Total Dynamic Pumping Head (ft.)	Total Dynamic Pumping Head (PSI)	Pumping Total Horse Power Hp	Continuous Volume Pumped Vol. / Year in Gallons	Pumping Duty Factor at Planned Volume	Annual Pumping Power \$ at Planned Volume	Annual Total Costs at Planned Volume
1	700	0.88	0.01	0.01	3.30	496.70	GOOD	503.30	217.88	139	367,920,000	2.00	56,571	178,978
2	720	0.91	0.01	0.01	3.47	496.53	GOOD	503.47	217.95	143	378,432,000	1.94	56,863	179,270
3	740	0.93	0.01	0.01	3.65	496.35	GOOD	503.65	218.03	147	388,944,000	1.89	57,156	179,563
4	760	0.96	0.01	0.01	3.83	496.17	GOOD	503.83	218.11	151	399,456,000	1.84	57,450	179,857
5	780	0.98	0.02	0.02	4.02	495.98	GOOD	504.02	218.19	155	409,968,000	1.79	57,744	180,151
6	800	1.01	0.02	0.02	4.21	495.79	GOOD	504.21	218.27	159	420,480,000	1.75	58,039	180,446
7	820	1.03	0.02	0.02	4.40	495.60	GOOD	504.40	218.36	163	430,992,000	1.71	58,334	180,741
8	840	1.06	0.02	0.02	4.60	495.40	GOOD	504.60	218.44	167	441,504,000	1.67	58,631	181,038
9	860	1.08	0.02	0.02	4.81	495.19	GOOD	504.81	218.53	171	452,016,000	1.63	58,927	181,335
10	880	1.11	0.02	0.02	5.01	494.99	GOOD	505.01	218.62	175	462,528,000	1.59	59,225	181,632
11	900	1.13	0.02	0.02	5.22	494.78	GOOD	505.22	218.71	179	473,040,000	1.56	59,523	181,930
12	920	1.16	0.02	0.02	5.44	494.56	GOOD	505.44	218.80	183	483,552,000	1.52	59,822	182,229
13	940	1.19	0.02	0.02	5.65	494.35	GOOD	505.65	218.90	188	494,064,000	1.49	60,122	182,529
14	960	1.21	0.02	0.02	5.88	494.12	GOOD	505.88	218.99	192	504,576,000	1.46	60,422	182,829
15	980	1.24	0.02	0.02	6.10	493.90	GOOD	506.10	219.08	196	515,088,000	1.43	60,723	183,131
16	1,000	1.26	0.02	0.02	6.33	493.67	GOOD	506.33	219.19	200	525,600,000	1.40	61,025	183,432
17	1,020	1.29	0.03	0.03	6.57	493.43	GOOD	506.57	219.29	204	536,112,000	1.37	61,328	183,735
18	1,040	1.31	0.03	0.03	6.80	493.20	GOOD	506.80	219.40	208	546,624,000	1.35	61,631	184,038
19	1,060	1.34	0.03	0.03	7.05	492.95	GOOD	507.05	219.50	212	557,136,000	1.32	61,935	184,342
20	1,080	1.36	0.03	0.03	7.29	492.71	GOOD	507.29	219.61	216	567,648,000	1.30	62,240	184,647
21	1,100	1.39	0.03	0.03	7.54	492.46	GOOD	507.54	219.71	220	578,160,000	1.27	62,545	184,952
22	1,120	1.41	0.03	0.03	7.79	492.21	GOOD	507.79	219.82	224	588,672,000	1.25	62,851	185,258
23	1,140	1.44	0.03	0.03	8.05	491.95	GOOD	508.05	219.93	229	599,184,000	1.23	63,158	185,565
24	1,160	1.46	0.03	0.03	8.31	491.69	GOOD	508.31	220.05	233	609,696,000	1.21	63,466	185,873
25	1,180	1.49	0.03	0.03	8.57	491.43	GOOD	508.57	220.16	237	620,208,000	1.19	63,774	186,181
26	1,200	1.51	0.04	0.03	8.84	491.16	GOOD	508.84	220.28	241	630,720,000	1.17	64,083	186,490
27	1,220	1.54	0.04	0.04	9.11	490.89	GOOD	509.11	220.40	245	641,232,000	1.15	64,393	186,800
28	1,240	1.56	0.04	0.04	9.39	490.61	GOOD	509.39	220.51	249	651,744,000	1.13	64,704	187,111
29	1,260	1.59	0.04	0.04	9.67	490.33	GOOD	509.67	220.63	253	662,256,000	1.11	65,015	187,422
30	1,280	1.61	0.04	0.04	9.95	490.05	GOOD	509.95	220.76	258	672,768,000	1.09	65,327	187,734
31	1,300	1.64	0.04	0.04	10.24	489.76	GOOD	510.24	220.88	262	683,280,000	1.08	65,640	188,047
32	1,320	1.66	0.04	0.04	10.53	489.47	GOOD	510.53	221.01	266	693,792,000	1.06	65,954	188,361
33	1,340	1.69	0.04	0.04	10.82	489.18	GOOD	510.82	221.13	270	704,304,000	1.04	66,269	188,676
34	1,360	1.71	0.05	0.04	11.12	488.88	GOOD	511.12	221.26	274	714,816,000	1.03	66,584	188,991
35	1,380	1.74	0.05	0.04	11.42	488.58	GOOD	511.42	221.39	278	725,328,000	1.01	66,900	189,307
36	1,400	1.77	0.05	0.05	11.72	488.28	GOOD	511.72	221.52	283	735,840,000	1.00	67,217	189,624
37	1,420	1.79	0.05	0.05	12.03	487.97	GOOD	512.03	221.66	287	746,352,000	0.99	67,535	189,942
38	1,440	1.82	0.05	0.05	12.34	487.66	GOOD	512.34	221.79	291	756,864,000	0.97	67,854	190,261
39	1,460	1.84	0.05	0.05	12.66	487.34	GOOD	512.66	221.93	295	767,376,000	0.96	68,173	190,580
40	1,480	1.87	0.05	0.05	12.98	487.02	GOOD	512.98	222.07	300	777,888,000	0.95	68,493	190,900
41	1,500	1.89	0.06	0.05	13.30	486.70	GOOD	513.30	222.21	304	788,400,000	0.93	68,814	191,221
42	1,520	1.92	0.06	0.05	13.63	486.37	GOOD	513.63	222.35	308	798,912,000	0.92	69,136	191,543
43	1,540	1.94	0.06	0.05	13.96	486.04	GOOD	513.96	222.49	312	809,424,000	0.91	69,459	191,866
44	1,560	1.97	0.06	0.05	14.29	485.71	GOOD	514.29	222.64	317	819,936,000	0.90	69,783	192,190
45	1,580	1.99	0.06	0.06	14.63	485.37	GOOD	514.63	222.78	321	830,448,000	0.89	70,107	192,514
46	1,600	2.02	0.06	0.06	14.97	485.03	GOOD	514.97	222.93	325	840,960,000	0.88	70,432	192,839
47	1,620	2.04	0.06	0.06	15.31	484.69	GOOD	515.31	223.08	329	851,472,000	0.86	70,758	193,165
48	1,640	2.07	0.07	0.06	15.66	484.34	GOOD	515.66	223.23	334	861,984,000	0.85	71,085	193,492
49	1,660	2.09	0.07	0.06	16.01	483.99	GOOD	516.01	223.38	338	872,496,000	0.84	71,413	193,820
50	1,680	2.12	0.07	0.06	16.37	483.63	GOOD	516.37	223.53	342	883,008,000	0.83	71,742	194,149
51	1,700	2.14	0.07	0.06	16.72	483.28	GOOD	516.72	223.69	347	893,520,000	0.82	72,072	194,479
52	1,720	2.17	0.07	0.07	17.09	482.91	GOOD	517.09	223.85	351	904,032,000	0.81	72,402	194,809
53	1,740	2.19	0.07	0.07	17.45	482.55	GOOD	517.45	224.00	355	914,544,000	0.80	72,733	195,141
54	1,760	2.22	0.08	0.07	17.82	482.18	GOOD	517.82	224.16	360	925,056,000	0.80	73,066	195,473
55	1,780	2.24	0.08	0.07	18.19	481.81	GOOD	518.19	224.33	364	935,568,000	0.79	73,399	195,806
56	1,800	2.27	0.08	0.07	18.57	481.43	GOOD	518.57	224.49	368	946,080,000	0.78	73,733	196,140
57	1,820	2.29	0.08	0.07	18.95	481.05	GOOD	518.95	224.65	373	956,592,000	0.77	74,068	196,475
58	1,840	2.32	0.08	0.07	19.33	480.67	GOOD	519.33	224.82	377	967,104,000	0.76	74,404	196,811
59	1,860	2.35	0.09	0.08	19.72	480.28	GOOD	519.72	224.99	381	977,616,000	0.75	74,741	197,148
60	1,880	2.37	0.09	0.08	20.11	479.89	GOOD	520.11	225.15	386	988,128,000	0.74	75,078	197,485

The ORANGE Highlight Signifies the Level at which the duty cycle is 1.0 (System is pumped 100% of the time). Values above this level can not be possible. Lower the Annual gallons to pump or increase the flow rate of the piping system.