

HYDRAULIC PROPERTIES OF CONCRETE PIPE

**PIPE SIZES
DIAMETERS 100 MILLIMETERS
THROUGH 3000 MILLIMETERS**



**UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION**

**DIVISION OF DESIGN
ENGINEERING AND RESEARCH CENTER
DENVER, COLORADO**

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INTRODUCTION

These tables were compiled by the Pipelines Section of the Water Conveyance Branch to expedite hydraulic computations for water flowing in pipelines. The tables include the following pipe internal diameters in millimeters:

100	400	825	1350	2400
150	450	900	1500	2550
200	500	975	1650	2700
250	525	1050	1800	2850
300	600	1125	1950	3000
350	675	1200	2100	
375	750	1275	2250	

Flow rates are limited by velocity. The minimum velocity is 0.5 meter per second and the maximum velocity is 5.0 meters per second. These velocities may vary in the tables due to the rounding of flow rates.

The friction slopes are based on Scobey's formula for concrete pipe.

$$H = V^2 \left[D \times 10^{-3} \right]^{-1.25} \left[\frac{0.010 \ 447 \ 3}{C_s} \right]^2$$

where:

H = friction slope

V = velocity in meters per second

D = inside diameter of pipe in millimeters

C_s = coefficient of retardation

= 0.345 for pipe sizes 100 through 525 millimeters

= 0.370 for pipe sizes 600 through 3000 millimeters

The smaller value of C_s is used because of the difficulty in making smooth joints in the smaller pipes.

METRIC TABLES

HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICTION SLOPES ARE BASED ON SCOBAY'S FORMULA

SCOBAY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 100 MILLIMETERS

CS = .345

QO INCREMENT = .0025 CUBIC METERS PER SECOND

AREA = .0079 SQUARE METERS

$H = (.26436E+03) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
.0050	.637	.021	.006609 I	.0175	2.228	.253	.080959 I	.0300	3.820	.744	.237920 I
.0075	.955	.046	.014870 I	.0200	2.546	.331	.105742 I	.0325	4.138	.973	.279225 I
.0100	1.273	.083	.026436 I	.0225	2.865	.419	.133830 I	.0350	4.456	1.012	.323835 I
.0125	1.592	.129	.041306 I	.0250	3.183	.516	.165222 I	.0375	4.775	1.162	.371750 I
.0150	1.910	.186	.059480 I	.0275	3.501	.625	.199919 I	.0400	5.093	1.322	.422969 I

100 MILLIMETER PIPE THE FLOW RANGE IS .0050 TO .0400 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOREY'S FORMULA

SCOREY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 150 MILLIMETERS

CS = .345

QQ INCREMENT = .0025 CUBIC METERS PER SECOND

AREA = .0177 SQUARE METERS

$H = (.31456E+02) * (Q ** 2)$

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
.0100	.566	.016	.003146	I	.0375	2.122	.230	.044236	I	.0650	3.578	.690	.132903	I
.0125	.707	.026	.004915	I	.0400	2.264	.251	.050330	I	.0675	3.920	.744	.143323	I
.0150	.849	.037	.007078	I	.0425	2.405	.295	.056818	I	.0700	3.961	.800	.154136	I
.0175	.990	.050	.009634	I	.0450	2.546	.331	.063699	I	.0725	4.103	.858	.165343	I
.0200	1.132	.065	.012583	I	.0475	2.688	.368	.070974	I	.0750	4.244	.918	.176942	I
.0225	1.273	.083	.015925	I	.0500	2.829	.408	.078641	I	.0775	4.386	.980	.188935	I
.0250	1.415	.102	.019660	I	.0525	2.971	.450	.086702	I	.0800	4.527	1.045	.201321	I
.0275	1.556	.123	.023789	I	.0550	3.112	.494	.095156	I	.0825	4.669	1.111	.214150	I
.0300	1.698	.147	.028311	I	.0575	3.254	.540	.104303	I	.0850	4.810	1.179	.227272	I
.0325	1.839	.172	.033226	I	.0600	3.395	.588	.113243	I	.0875	4.951	1.250	.240838	I
.0350	1.981	.200	.038534	I	.0625	3.537	.638	.122877	I	.0900	5.093	1.322	.254797	I

150 MILLIMETER PIPE THE FLOW RANGE IS .0100 TO .0900 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBAY'S FORMULA

SCOBAY'S FORMULA -- $H = (V * 0.010467 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- C = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 200 MILLIMETERS

CS = .345

QQ INCREMENT = .0025 CUBIC METERS PER SECOND

AREA = .0314 SQUARE METERS

H = (.69467E+01) * (Q ** 2)

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
.0175	.557	.016	.002127	I	.0650	2.069	.218	.029350	I	.1125	3.581	.654	.087920	I
.0200	.637	.021	.002779	I	.0675	2.149	.235	.031651	I	.1150	3.561	.683	.091871	I
.0225	.716	.026	.003517	I	.0700	2.228	.253	.034039	I	.1175	3.740	.713	.095908	I
.0250	.796	.032	.004342	I	.0725	2.308	.271	.036514	I	.1200	3.820	.744	.100033	I
.0275	.875	.039	.005253	I	.0750	2.387	.290	.039075	I	.1225	3.899	.775	.104244	I
.0300	.955	.046	.006252	I	.0775	2.467	.310	.041724	I	.1250	3.979	.807	.108543	I
.0325	1.035	.055	.007337	I	.0800	2.546	.331	.044459	I	.1275	4.058	.839	.112928	I
.0350	1.114	.063	.008510	I	.0825	2.626	.351	.047281	I	.1300	4.138	.873	.117400	I
.0375	1.194	.073	.009769	I	.0850	2.706	.373	.050190	I	.1325	4.218	.907	.121959	I
.0400	1.273	.083	.011115	I	.0875	2.785	.395	.053186	I	.1350	4.297	.941	.126604	I
.0425	1.353	.093	.012548	I	.0900	2.865	.418	.056269	I	.1375	4.377	.976	.131337	I
.0450	1.432	.105	.014067	I	.0925	2.944	.442	.059438	I	.1400	4.456	1.012	.136156	I
.0475	1.512	.117	.015674	I	.0950	3.024	.466	.062694	I	.1425	4.536	1.049	.141062	I
.0500	1.592	.129	.017367	I	.0975	3.104	.491	.066037	I	.1450	4.615	1.086	.146055	I
.0525	1.671	.142	.019147	I	.1000	3.183	.516	.069467	I	.1475	4.695	1.124	.151135	I
.0550	1.751	.156	.021014	I	.1025	3.263	.543	.072984	I	.1500	4.775	1.162	.156302	I
.0575	1.830	.171	.022968	I	.1050	3.342	.569	.076588	I	.1525	4.854	1.201	.161555	I
.0600	1.910	.186	.025008	I	.1075	3.422	.597	.080278	I	.1550	4.934	1.241	.166895	I
.0625	1.989	.202	.027136	I	.1100	3.501	.625	.084055	I	.1575	5.013	1.281	.172322	I

200 MILLIMETER PIPE THE FLOW RANGE IS .0175 TO .1575 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICTION SLOPES ARE BASED ON SCOBNEY'S FORMULA

SCOBNEY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 250 MILLIMETERS

CS = .345

QQ INCREMENT = .0025 CUBIC METERS PER SECOND

AREA = .0491 SQUARE METERS

$H = (.21520E+01) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
.0250	.509	.013	.001345	I	.1000	2.037	.217	.021528	I	.1750	3.565	.648	.065929	I
.0275	.560	.016	.001628	I	.1025	2.388	.222	.022618	I	.1775	3.516	.666	.067827	I
.0300	.611	.019	.001938	I	.1050	2.139	.233	.023735	I	.1800	3.667	.685	.069751	I
.0325	.662	.022	.002274	I	.1075	2.190	.244	.024878	I	.1825	3.718	.705	.071702	I
.0350	.713	.026	.002637	I	.1100	2.241	.256	.026049	I	.1850	3.769	.724	.073679	I
.0375	.764	.030	.003027	I	.1125	2.292	.268	.027246	I	.1875	3.820	.744	.075684	I
.0400	.815	.034	.003444	I	.1150	2.343	.280	.028471	I	.1900	3.871	.764	.077716	I
.0425	.866	.038	.003888	I	.1175	2.394	.292	.029722	I	.1925	3.922	.784	.079775	I
.0450	.917	.043	.004359	I	.1200	2.445	.305	.031030	I	.1950	3.972	.804	.081863	I
.0475	.968	.048	.004857	I	.1225	2.496	.317	.032305	I	.1975	4.023	.825	.083973	I
.0500	1.019	.053	.005382	I	.1250	2.546	.331	.033637	I	.2000	4.074	.846	.086112	I
.0525	1.070	.058	.005934	I	.1275	2.597	.344	.034936	I	.2025	4.125	.867	.088278	I
.0550	1.120	.064	.006512	I	.1300	2.648	.357	.036382	I	.2050	4.176	.889	.090471	I
.0575	1.171	.070	.007118	I	.1325	2.699	.371	.037795	I	.2075	4.227	.911	.092691	I
.0600	1.222	.076	.007750	I	.1350	2.750	.386	.039235	I	.2100	4.278	.933	.094938	I
.0625	1.273	.083	.008409	I	.1375	2.801	.400	.040701	I	.2125	4.329	.955	.097212	I
.0650	1.324	.089	.009096	I	.1400	2.852	.415	.042195	I	.2150	4.380	.978	.099513	I
.0675	1.375	.096	.009809	I	.1425	2.903	.430	.043715	I	.2175	4.431	1.001	.101841	I
.0700	1.426	.104	.010549	I	.1450	2.954	.445	.045263	I	.2200	4.482	1.024	.104195	I
.0725	1.477	.111	.011316	I	.1475	3.005	.460	.046837	I	.2225	4.533	1.047	.106577	I
.0750	1.528	.119	.012109	I	.1500	3.056	.476	.048438	I	.2250	4.584	1.071	.108985	I
.0775	1.579	.127	.012930	I	.1525	3.107	.492	.050066	I	.2275	4.635	1.095	.111421	I
.0800	1.630	.135	.013779	I	.1550	3.158	.508	.051721	I	.2300	4.686	1.119	.113883	I
.0825	1.681	.144	.014652	I	.1575	3.209	.525	.053403	I	.2325	4.736	1.143	.116372	I
.0850	1.732	.153	.015554	I	.1600	3.259	.542	.055112	I	.2350	4.787	1.168	.118888	I
.0875	1.783	.162	.016482	I	.1625	3.310	.559	.056847	I	.2375	4.838	1.193	.121431	I
.0900	1.833	.171	.017438	I	.1650	3.361	.576	.058610	I	.2400	4.889	1.218	.124001	I
.0925	1.884	.181	.018420	I	.1675	3.412	.593	.060399	I	.2425	4.940	1.244	.126598	I
.0950	1.935	.191	.019429	I	.1700	3.463	.611	.062216	I	.2450	4.991	1.270	.129222	I
.0975	1.986	.201	.020465	I	.1725	3.514	.629	.064059	I	.2475	5.042	1.296	.131872	I

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBAY'S FORMULA

SCOBAY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 300 MILLIMETERS

CS = .345

QQ INCREMENT = .0025 CUBIC METERS PER SECOND

AREA = .0707 SQUARE METERS

$H = (.02661E+00) * (Q ** 2)$

Q	V	HV	H		Q	V	HV	H	Q	V	HV	H		
.0375	.531	.014	.001162	I	.1275	1.804	.166	.013438	I	.2175	3.077	.483	.039104	I
.0400	.566	.016	.001323	I	.1300	1.839	.172	.013970	I	.2200	3.112	.494	.040008	I
.0425	.601	.018	.001493	I	.1325	1.874	.179	.014512	I	.2225	3.148	.505	.040922	I
.0450	.637	.021	.001674	I	.1350	1.910	.186	.015065	I	.2250	3.183	.516	.041847	I
.0475	.672	.023	.001865	I	.1375	1.945	.193	.015628	I	.2275	3.218	.528	.042782	I
.0500	.707	.026	.002067	I	.1400	1.981	.200	.016202	I	.2300	3.254	.540	.043728	I
.0525	.743	.028	.002278	I	.1425	2.016	.207	.016785	I	.2325	3.289	.551	.044684	I
.0550	.778	.031	.002501	I	.1450	2.051	.214	.017380	I	.2350	3.325	.563	.045650	I
.0575	.813	.034	.002733	I	.1475	2.087	.222	.017984	I	.2375	3.360	.575	.046626	I
.0600	.849	.037	.002976	I	.1500	2.122	.230	.018599	I	.2400	3.395	.588	.047613	I
.0625	.884	.040	.003229	I	.1525	2.157	.237	.019224	I	.2425	3.431	.600	.048610	I
.0650	.920	.043	.003492	I	.1550	2.193	.245	.019859	I	.2450	3.466	.612	.049617	I
.0675	.955	.046	.003766	I	.1575	2.228	.253	.020505	I	.2475	3.501	.625	.050635	I
.0700	.990	.050	.004050	I	.1600	2.264	.261	.021161	I	.2500	3.537	.638	.051663	I
.0725	1.026	.054	.004345	I	.1625	2.299	.269	.021828	I	.2525	3.572	.650	.052702	I
.0750	1.061	.057	.004650	I	.1650	2.334	.278	.022505	I	.2550	3.608	.663	.053750	I
.0775	1.096	.061	.004965	I	.1675	2.370	.286	.023192	I	.2575	3.643	.676	.054810	I
.0800	1.132	.065	.005290	I	.1700	2.405	.295	.023889	I	.2600	3.678	.690	.055879	I
.0825	1.167	.069	.005626	I	.1725	2.440	.304	.024597	I	.2625	3.714	.703	.056959	I
.0850	1.203	.074	.005972	I	.1750	2.476	.312	.025315	I	.2650	3.749	.716	.058049	I
.0875	1.238	.078	.006329	I	.1775	2.511	.321	.026043	I	.2675	3.784	.730	.059149	I
.0900	1.273	.083	.006696	I	.1800	2.546	.331	.026782	I	.2700	3.820	.744	.060260	I
.0925	1.309	.087	.007073	I	.1825	2.582	.340	.027531	I	.2725	3.855	.757	.061381	I
.0950	1.344	.092	.007460	I	.1850	2.617	.349	.028291	I	.2750	3.890	.771	.062513	I
.0975	1.379	.097	.007858	I	.1875	2.653	.359	.029061	I	.2775	3.926	.786	.063654	I
.1000	1.415	.102	.008266	I	.1900	2.688	.368	.029841	I	.2800	3.961	.800	.064806	I
.1025	1.450	.107	.008685	I	.1925	2.723	.378	.030631	I	.2825	3.997	.814	.065969	I
.1050	1.485	.112	.009113	I	.1950	2.759	.388	.031432	I	.2850	4.032	.829	.067142	I
.1075	1.521	.118	.009553	I	.1975	2.794	.398	.032243	I	.2875	4.067	.843	.068325	I
.1100	1.556	.123	.010002	I	.2000	2.829	.409	.033064	I	.2900	4.103	.858	.069518	I
.1125	1.592	.129	.010462	I	.2025	2.865	.418	.033896	I	.2925	4.138	.873	.070722	I
.1150	1.627	.135	.010932	I	.2050	2.900	.429	.034738	I	.2950	4.173	.888	.071936	I
.1175	1.662	.141	.011412	I	.2075	2.936	.439	.035591	I	.2975	4.209	.903	.073160	I
.1200	1.698	.147	.011903	I	.2100	2.971	.450	.036454	I	.3000	4.244	.918	.074395	I
.1225	1.733	.153	.012404	I	.2125	3.006	.461	.037327	I	.3025	4.279	.933	.075640	I
.1250	1.768	.159	.012916	I	.2150	3.042	.472	.038210	I	.3050	4.315	.949	.076896	I

300 MILLIMETER PIPE THE FLOW RANGE IS .0375 TO .3050 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBNEY'S FORMULA

SCOBNEY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 350 MILLIMETERS

CS = .345

QQ INCREMENT = .0025 CUBIC METERS PER SECOND

AREA = .0962 SQUARE METERS

$H = (.36799E+00) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
.0500	.520	.014	.000920 I	.1400	1.455	.108	.007213 I	.2300	2.391	.291	.019466 I
.0525	.546	.015	.001014 I	.1425	1.481	.112	.007472 I	.2325	2.417	.298	.019892 I
.0550	.572	.017	.001113 I	.1450	1.507	.116	.007737 I	.2350	2.443	.304	.020322 I
.0575	.598	.018	.001217 I	.1475	1.533	.120	.008006 I	.2375	2.469	.311	.020757 I
.0600	.624	.020	.001325 I	.1500	1.559	.124	.008280 I	.2400	2.495	.317	.021196 I
.0625	.650	.022	.001437 I	.1525	1.585	.128	.008558 I	.2425	2.520	.324	.021640 I
.0650	.676	.023	.001555 I	.1550	1.611	.132	.008841 I	.2450	2.546	.331	.022088 I
.0675	.702	.025	.001677 I	.1575	1.637	.137	.009128 I	.2475	2.572	.337	.022541 I
.0700	.728	.027	.001803 I	.1600	1.663	.141	.009420 I	.2500	2.598	.344	.022999 I
.0725	.754	.029	.001934 I	.1625	1.689	.145	.009717 I	.2525	2.624	.351	.023461 I
.0750	.780	.031	.002070 I	.1650	1.715	.150	.010018 I	.2550	2.650	.358	.023928 I
.0775	.806	.033	.002210 I	.1675	1.741	.154	.010324 I	.2575	2.676	.365	.024400 I
.0800	.832	.035	.002355 I	.1700	1.767	.159	.010635 I	.2600	2.702	.372	.024876 I
.0825	.857	.037	.002505 I	.1725	1.793	.164	.010950 I	.2625	2.728	.379	.025357 I
.0850	.883	.040	.002659 I	.1750	1.819	.169	.011270 I	.2650	2.754	.387	.025842 I
.0875	.909	.042	.002817 I	.1775	1.845	.173	.011594 I	.2675	2.780	.394	.026332 I
.0900	.935	.045	.002981 I	.1800	1.871	.178	.011923 I	.2700	2.806	.401	.026826 I
.0925	.961	.047	.003149 I	.1825	1.897	.183	.012256 I	.2725	2.832	.409	.027325 I
.0950	.987	.050	.003321 I	.1850	1.923	.188	.012594 I	.2750	2.858	.416	.027829 I
.0975	1.013	.052	.003498 I	.1875	1.949	.194	.012937 I	.2775	2.884	.424	.028337 I
.1000	1.039	.055	.003680 I	.1900	1.975	.199	.013284 I	.2800	2.910	.432	.028850 I
.1025	1.065	.058	.003866 I	.1925	2.001	.204	.013636 I	.2825	2.936	.439	.029368 I
.1050	1.091	.061	.004057 I	.1950	2.027	.209	.013993 I	.2850	2.962	.447	.029890 I
.1075	1.117	.064	.004253 I	.1975	2.053	.215	.014354 I	.2875	2.988	.455	.030416 I
.1100	1.143	.067	.004453 I	.2000	2.079	.220	.014719 I	.2900	3.014	.463	.030948 I
.1125	1.169	.070	.004657 I	.2025	2.105	.226	.015090 I	.2925	3.040	.471	.031483 I
.1150	1.195	.073	.004867 I	.2050	2.131	.231	.015465 I	.2950	3.066	.479	.032024 I
.1175	1.221	.076	.005081 I	.2075	2.157	.237	.015844 I	.2975	3.092	.487	.032569 I
.1200	1.247	.079	.005299 I	.2100	2.183	.243	.016228 I	.3000	3.118	.496	.033119 I
.1225	1.273	.083	.005522 I	.2125	2.209	.249	.016617 I	.3025	3.144	.504	.033673 I
.1250	1.299	.086	.005750 I	.2150	2.235	.255	.017010 I	.3050	3.170	.512	.034232 I
.1275	1.325	.090	.005982 I	.2175	2.261	.260	.017408 I	.3075	3.196	.521	.034795 I
.1300	1.351	.093	.006219 I	.2200	2.287	.266	.017811 I	.3100	3.222	.529	.035363 I
.1325	1.377	.097	.006460 I	.2225	2.313	.273	.018218 I	.3125	3.248	.538	.035936 I
.1350	1.403	.100	.006707 I	.2250	2.339	.279	.018629 I	.3150	3.274	.546	.036513 I
.1375	1.429	.104	.006957 I	.2275	2.365	.285	.019046 I	.3175	3.300	.555	.037095 I

350 MILLIMETER PIPE THE FLOW RANGE IS .0500 TO .3175 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICTION SLOPES ARE BASED ON SCOBAY'S FORMULA

SCOBAY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 375 MILLIMETERS

CS = .345

QQ INCREMENT = .0025 CUBIC METERS PER SECOND

AREA = .1104 SQUARE METERS

$H = (.25617E+00) * (Q ** 2)$

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
.0575	.521	.014	.000847	I	.1475	1.335	.091	.005573	I	.2375	2.150	.236	.014449	I
.0680	.543	.015	.000922	I	.1500	1.358	.094	.005764	I	.2400	2.173	.241	.014755	I
.0625	.566	.016	.001001	I	.1525	1.381	.097	.005957	I	.2425	2.196	.246	.015064	I
.0650	.589	.018	.001082	I	.1550	1.403	.100	.006154	I	.2450	2.218	.251	.015376	I
.0675	.611	.019	.001167	I	.1575	1.426	.104	.006355	I	.2475	2.241	.256	.015692	I
.0700	.634	.020	.001255	I	.1600	1.449	.107	.006558	I	.2500	2.264	.261	.016010	I
.0725	.656	.022	.001346	I	.1625	1.471	.110	.006764	I	.2525	2.286	.266	.016332	I
.0750	.679	.024	.001441	I	.1650	1.494	.114	.006974	I	.2550	2.309	.272	.016657	I
.0775	.702	.025	.001539	I	.1675	1.517	.117	.007187	I	.2575	2.331	.277	.016986	I
.0800	.724	.027	.001639	I	.1700	1.539	.121	.007403	I	.2600	2.354	.282	.017317	I
.0825	.747	.028	.001744	I	.1725	1.562	.124	.007623	I	.2625	2.377	.288	.017652	I
.0850	.770	.030	.001851	I	.1750	1.584	.128	.007845	I	.2650	2.399	.293	.017989	I
.0875	.792	.032	.001961	I	.1775	1.607	.132	.008071	I	.2675	2.422	.299	.018330	I
.0900	.815	.034	.002075	I	.1800	1.630	.135	.008300	I	.2700	2.445	.305	.018675	I
.0925	.838	.036	.002192	I	.1825	1.652	.139	.008532	I	.2725	2.467	.310	.019022	I
.0950	.860	.038	.002312	I	.1850	1.675	.143	.008767	I	.2750	2.490	.316	.019373	I
.0975	.883	.040	.002435	I	.1875	1.698	.147	.009006	I	.2775	2.513	.322	.019726	I
.1000	.905	.042	.002562	I	.1900	1.720	.151	.009248	I	.2800	2.535	.328	.020084	I
.1025	.928	.044	.002691	I	.1925	1.743	.155	.009493	I	.2825	2.558	.333	.020444	I
.1050	.951	.046	.002824	I	.1950	1.766	.159	.009741	I	.2850	2.580	.339	.020807	I
.1075	.973	.048	.002960	I	.1975	1.788	.163	.009992	I	.2875	2.603	.345	.021174	I
.1100	.996	.051	.003100	I	.2000	1.811	.167	.010247	I	.2900	2.626	.351	.021544	I
.1125	1.019	.053	.003242	I	.2025	1.833	.171	.010504	I	.2925	2.648	.357	.021917	I
.1150	1.041	.055	.003388	I	.2050	1.856	.176	.010765	I	.2950	2.671	.364	.022293	I
.1175	1.064	.058	.003537	I	.2075	1.879	.180	.011030	I	.2975	2.694	.370	.022672	I
.1200	1.086	.060	.003689	I	.2100	1.901	.184	.011297	I	.3000	2.716	.376	.023055	I
.1225	1.109	.063	.003844	I	.2125	1.924	.189	.011568	I	.3025	2.739	.382	.023441	I
.1250	1.132	.065	.004003	I	.2150	1.947	.193	.011841	I	.3050	2.762	.389	.023830	I
.1275	1.154	.068	.004164	I	.2175	1.969	.198	.012118	I	.3075	2.784	.395	.024222	I
.1300	1.177	.071	.004329	I	.2200	1.992	.202	.012399	I	.3100	2.807	.402	.024618	I
.1325	1.200	.073	.004497	I	.2225	2.015	.207	.012682	I	.3125	2.829	.408	.025016	I
.1350	1.222	.076	.004669	I	.2250	2.037	.212	.012968	I	.3150	2.852	.415	.025418	I
.1375	1.245	.079	.004843	I	.2275	2.060	.216	.013258	I	.3175	2.875	.421	.025823	I
.1400	1.268	.082	.005021	I	.2300	2.082	.221	.013551	I	.3200	2.897	.428	.026232	I
.1425	1.290	.085	.005202	I	.2325	2.105	.226	.013847	I	.3225	2.920	.435	.026643	I
.1450	1.313	.088	.005386	I	.2350	2.128	.231	.014147	I	.3250	2.943	.441	.027058	I

375 MILLIMETER PIPE THE FLOW RANGE IS .0575 TO .3250 CURIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
.3275	2.965	.448	.027476	I	.4050	3.667	.685	.042018	I	.4825	4.369	.973	.059637	I
.3307	2.988	.455	.027897	I	.4075	3.690	.694	.042538	I	.4850	4.391	.983	.060257	I
.3325	3.010	.462	.028321	I	.4100	3.712	.702	.043062	I	.4875	4.414	.993	.060880	I
.3350	3.033	.469	.028748	I	.4125	3.735	.711	.043588	I	.4900	4.437	1.003	.061506	I
.3375	3.056	.476	.029179	I	.4150	3.757	.720	.044118	I	.4925	4.459	1.013	.062135	I
.3409	3.078	.483	.029613	I	.4175	3.780	.728	.044652	I	.4950	4.482	1.024	.062767	I
.3425	3.101	.490	.030050	I	.4200	3.803	.737	.045188	I	.4975	4.504	1.034	.063403	I
.3450	3.124	.497	.030490	I	.4225	3.825	.746	.045727	I	.5000	4.527	1.045	.064042	I
.3475	3.146	.505	.030934	I	.4250	3.848	.755	.046270	I	.5025	4.550	1.055	.064684	I
.3500	3.169	.512	.031381	I	.4275	3.871	.764	.046816	I	.5050	4.572	1.066	.065329	I
.3525	3.192	.519	.031830	I	.4300	3.893	.773	.047365	I	.5075	4.595	1.076	.065978	I
.3550	3.214	.527	.032284	I	.4325	3.916	.782	.047918	I	.5100	4.618	1.087	.066629	I
.3575	3.237	.534	.032740	I	.4350	3.939	.791	.048473	I	.5125	4.640	1.097	.067284	I
.3600	3.259	.542	.033199	I	.4375	3.961	.800	.049032	I	.5150	4.663	1.108	.067942	I
.3625	3.282	.549	.033662	I	.4400	3.984	.809	.049594	I	.5175	4.686	1.119	.068603	I
.3650	3.305	.557	.034128	I	.4425	4.006	.818	.050159	I	.5200	4.708	1.130	.069268	I
.3675	3.327	.564	.034597	I	.4450	4.029	.827	.050728	I	.5225	4.731	1.141	.069935	I
.3700	3.350	.572	.035069	I	.4475	4.052	.837	.051299	I	.5250	4.753	1.152	.070606	I
.3725	3.373	.580	.035545	I	.4500	4.074	.846	.051874	I	.5275	4.776	1.163	.071280	I
.3750	3.395	.588	.036024	I	.4525	4.097	.856	.052452	I	.5300	4.799	1.174	.071957	I
.3775	3.418	.595	.036505	I	.4550	4.120	.865	.053033	I	.5325	4.821	1.185	.072638	I
.3800	3.441	.603	.036991	I	.4575	4.142	.875	.053617	I	.5350	4.844	1.196	.073322	I
.3825	3.463	.611	.037479	I	.4600	4.165	.884	.054205	I	.5375	4.867	1.207	.074008	I
.3850	3.486	.619	.037970	I	.4625	4.188	.894	.054796	I	.5400	4.889	1.218	.074698	I
.3875	3.508	.627	.038465	I	.4650	4.210	.903	.055390	I	.5425	4.912	1.230	.075392	I
.3900	3.531	.636	.038963	I	.4675	4.233	.913	.055987	I	.5450	4.934	1.241	.076088	I
.3925	3.554	.644	.039464	I	.4700	4.255	.923	.056587	I	.5475	4.957	1.252	.076788	I
.3950	3.576	.652	.039969	I	.4725	4.278	.933	.057191	I	.5500	4.980	1.264	.077491	I
.3975	3.599	.660	.040476	I	.4750	4.301	.943	.057798	I	.5525	5.002	1.275	.078197	I
.4007	3.622	.669	.040987	I	.4775	4.323	.953	.058408	I	.5550	5.025	1.287	.078906	I
.4025	3.644	.677	.041501	I	.4800	4.346	.963	.059021	I	.5575	5.048	1.299	.079618	I

375 MILLIMETER PIPE THE FLOW RANGE IS .3275 TO .5575 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
.0575	.521	.014	.000847 I	.1475	1.335	.091	.005573 I	.2375	2.150	.236	.014449 I
.0600	.543	.015	.000922 I	.1500	1.358	.094	.005764 I	.2400	2.173	.241	.014755 I
.0625	.566	.016	.001001 I	.1525	1.381	.097	.005957 I	.2425	2.196	.246	.015064 I
.0650	.589	.018	.001082 I	.1550	1.403	.100	.006154 I	.2450	2.218	.251	.015376 I
.0675	.611	.019	.001167 I	.1575	1.426	.104	.006355 I	.2475	2.241	.256	.015692 I
.0700	.634	.020	.001255 I	.1600	1.449	.107	.006558 I	.2500	2.264	.261	.016010 I
.0725	.656	.022	.001346 I	.1625	1.471	.110	.006764 I	.2525	2.286	.266	.016332 I
.0750	.679	.024	.001441 I	.1650	1.494	.114	.006974 I	.2550	2.309	.272	.016657 I
.0775	.702	.025	.001539 I	.1675	1.517	.117	.007187 I	.2575	2.331	.277	.016986 I
.0800	.724	.027	.001639 I	.1700	1.539	.121	.007403 I	.2600	2.354	.282	.017317 I
.0825	.747	.028	.001744 I	.1725	1.562	.124	.007623 I	.2625	2.377	.288	.017652 I
.0850	.770	.030	.001851 I	.1750	1.584	.128	.007845 I	.2650	2.399	.293	.017989 I
.0875	.792	.032	.001961 I	.1775	1.607	.132	.008071 I	.2675	2.422	.299	.018330 I
.0900	.815	.034	.002075 I	.1800	1.630	.135	.008300 I	.2700	2.445	.305	.018675 I
.0925	.838	.036	.002192 I	.1825	1.652	.139	.008532 I	.2725	2.467	.310	.019022 I
.0950	.860	.038	.002312 I	.1850	1.675	.143	.008767 I	.2750	2.490	.316	.019373 I
.0975	.883	.040	.002435 I	.1875	1.698	.147	.009006 I	.2775	2.513	.322	.019726 I
.1000	.905	.042	.002562 I	.1900	1.720	.151	.009248 I	.2800	2.535	.328	.020084 I
.1025	.928	.044	.002691 I	.1925	1.743	.155	.009493 I	.2825	2.558	.333	.020444 I
.1050	.951	.046	.002824 I	.1950	1.766	.159	.009741 I	.2850	2.580	.339	.020807 I
.1075	.973	.048	.002960 I	.1975	1.788	.163	.009992 I	.2875	2.563	.345	.021174 I
.1100	.996	.051	.003100 I	.2000	1.811	.167	.010247 I	.2900	2.626	.351	.021544 I
.1125	1.019	.053	.003242 I	.2025	1.833	.171	.010504 I	.2925	2.648	.357	.021917 I
.1150	1.041	.055	.003388 I	.2050	1.856	.176	.010765 I	.2950	2.671	.364	.022293 I
.1175	1.064	.058	.003537 I	.2075	1.879	.180	.011030 I	.2975	2.694	.370	.022672 I
.1200	1.086	.060	.003689 I	.2100	1.901	.184	.011297 I	.3000	2.716	.376	.023055 I
.1225	1.109	.063	.003844 I	.2125	1.924	.189	.011568 I	.3025	2.739	.382	.023441 I
.1250	1.132	.065	.004003 I	.2150	1.947	.193	.011841 I	.3050	2.762	.389	.023830 I
.1275	1.154	.068	.004164 I	.2175	1.969	.198	.012118 I	.3075	2.784	.395	.024222 I
.1300	1.177	.071	.004329 I	.2200	1.992	.202	.012399 I	.3100	2.807	.402	.024618 I
.1325	1.200	.073	.004497 I	.2225	2.015	.207	.012682 I	.3125	2.829	.408	.025016 I
.1350	1.222	.076	.004669 I	.2250	2.037	.212	.012968 I	.3150	2.852	.415	.025418 I
.1375	1.245	.079	.004843 I	.2275	2.060	.216	.013258 I	.3175	2.875	.421	.025823 I
.1400	1.268	.082	.005021 I	.2300	2.082	.221	.013551 I	.3200	2.897	.428	.026232 I
.1425	1.290	.085	.005202 I	.2325	2.105	.226	.013847 I	.3225	2.920	.435	.026643 I
.1450	1.313	.088	.005386 I	.2350	2.128	.231	.014147 I	.3250	2.943	.441	.027058 I

375 MILLIMETER PIPE THE FLOW RANGE IS .0575 TO .3250 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
.3275	2.965	.448	.027476	I	.4050	3.667	.685	.042018	I	.4825	4.369	.973	.059637	I
.3301	2.988	.455	.027897	I	.4075	3.690	.694	.042538	I	.4850	4.391	.983	.060257	I
.3325	3.010	.462	.028321	I	.4100	3.712	.702	.043062	I	.4875	4.414	.993	.060880	I
.3350	3.033	.469	.028748	I	.4125	3.735	.711	.043588	I	.4900	4.437	1.003	.061506	I
.3375	3.056	.476	.029179	I	.4150	3.757	.720	.044118	I	.4925	4.459	1.013	.062135	I
.3401	3.078	.483	.029613	I	.4175	3.780	.728	.044652	I	.4950	4.482	1.024	.062767	I
.3425	3.101	.490	.030050	I	.4200	3.803	.737	.045188	I	.4975	4.504	1.034	.063403	I
.3450	3.124	.497	.030490	I	.4225	3.825	.746	.045727	I	.5000	4.527	1.045	.064042	I
.3475	3.146	.505	.030934	I	.4250	3.848	.755	.046270	I	.5025	4.550	1.055	.064684	I
.3500	3.169	.512	.031381	I	.4275	3.871	.764	.046816	I	.5050	4.572	1.066	.065329	I
.3525	3.192	.519	.031830	I	.4300	3.893	.773	.047365	I	.5075	4.595	1.076	.065978	I
.3550	3.214	.527	.032284	I	.4325	3.916	.782	.047918	I	.5100	4.618	1.087	.066629	I
.3575	3.237	.534	.032740	I	.4350	3.939	.791	.048473	I	.5125	4.640	1.097	.067284	I
.3600	3.259	.542	.033199	I	.4375	3.961	.800	.049032	I	.5150	4.663	1.108	.067942	I
.3625	3.282	.549	.033662	I	.4400	3.984	.809	.049594	I	.5175	4.686	1.119	.068603	I
.3650	3.305	.557	.034128	I	.4425	4.006	.818	.050159	I	.5200	4.708	1.130	.069268	I
.3675	3.327	.564	.034597	I	.4450	4.029	.827	.050728	I	.5225	4.731	1.141	.069935	I
.3700	3.350	.572	.035069	I	.4475	4.052	.837	.051299	I	.5250	4.753	1.152	.070606	I
.3725	3.373	.580	.035545	I	.4500	4.074	.846	.051874	I	.5275	4.776	1.163	.071280	I
.3750	3.395	.588	.036024	I	.4525	4.097	.856	.052452	I	.5300	4.799	1.174	.071957	I
.3775	3.418	.595	.036505	I	.4550	4.120	.865	.053033	I	.5325	4.821	1.185	.072638	I
.3800	3.441	.603	.036991	I	.4575	4.142	.875	.053617	I	.5350	4.844	1.196	.073322	I
.3825	3.463	.611	.037479	I	.4600	4.165	.884	.054205	I	.5375	4.867	1.207	.074008	I
.3850	3.486	.619	.037970	I	.4625	4.188	.894	.054796	I	.5400	4.889	1.218	.074698	I
.3875	3.508	.627	.038465	I	.4650	4.210	.903	.055390	I	.5425	4.912	1.230	.075392	I
.3900	3.531	.636	.038963	I	.4675	4.233	.913	.055987	I	.5450	4.934	1.241	.076088	I
.3925	3.554	.644	.039464	I	.4700	4.255	.923	.056587	I	.5475	4.957	1.252	.076788	I
.3950	3.576	.652	.039969	I	.4725	4.278	.933	.057191	I	.5500	4.980	1.264	.077491	I
.3975	3.599	.660	.040476	I	.4750	4.301	.943	.057798	I	.5525	5.002	1.275	.078197	I
.4001	3.622	.669	.040987	I	.4775	4.323	.953	.058408	I	.5550	5.025	1.287	.078906	I
.4025	3.644	.677	.041501	I	.4800	4.346	.963	.059021	I	.5575	5.048	1.299	.079618	I

375 MILLIMETER PIPE THE FLOW RANGE IS .3275 TO .5575 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
.0575	.521	.014	.000847 I	.1475	1.335	.091	.005573 I	.2375	2.150	.236	.014449 I
.0600	.543	.015	.000922 I	.1500	1.358	.094	.005764 I	.2400	2.173	.241	.014755 I
.0625	.566	.016	.001001 I	.1525	1.381	.097	.005957 I	.2425	2.196	.246	.015064 I
.0650	.589	.018	.001082 I	.1550	1.403	.100	.006154 I	.2450	2.218	.251	.015376 I
.0675	.611	.019	.001167 I	.1575	1.426	.104	.006355 I	.2475	2.241	.256	.015692 I
.0700	.634	.020	.001255 I	.1600	1.449	.107	.006558 I	.2500	2.264	.261	.016010 I
.0725	.656	.022	.001346 I	.1625	1.471	.110	.006764 I	.2525	2.286	.266	.016332 I
.0750	.679	.024	.001441 I	.1650	1.494	.114	.006974 I	.2550	2.309	.272	.016657 I
.0775	.702	.025	.001539 I	.1675	1.517	.117	.007187 I	.2575	2.331	.277	.016986 I
.0800	.724	.027	.001639 I	.1700	1.539	.121	.007403 I	.2600	2.354	.282	.017317 I
.0825	.747	.028	.001744 I	.1725	1.562	.124	.007623 I	.2625	2.377	.288	.017652 I
.0850	.770	.030	.001851 I	.1750	1.584	.128	.007845 I	.2650	2.399	.293	.017989 I
.0875	.792	.032	.001961 I	.1775	1.607	.132	.008071 I	.2675	2.422	.299	.018330 I
.0900	.815	.034	.002075 I	.1800	1.630	.135	.008300 I	.2700	2.445	.305	.018675 I
.0925	.838	.036	.002192 I	.1825	1.652	.139	.008532 I	.2725	2.467	.310	.019022 I
.0950	.860	.038	.002312 I	.1850	1.675	.143	.008767 I	.2750	2.490	.316	.019373 I
.0975	.883	.040	.002435 I	.1875	1.698	.147	.009006 I	.2775	2.513	.322	.019726 I
.1000	.905	.042	.002562 I	.1900	1.720	.151	.009248 I	.2800	2.535	.328	.020084 I
.1025	.928	.044	.002691 I	.1925	1.743	.155	.009493 I	.2825	2.558	.333	.020444 I
.1050	.951	.046	.002824 I	.1950	1.766	.159	.009741 I	.2850	2.580	.339	.020807 I
.1075	.973	.048	.002960 I	.1975	1.788	.163	.009992 I	.2875	2.603	.345	.021174 I
.1100	.996	.051	.003100 I	.2000	1.811	.167	.010247 I	.2900	2.626	.351	.021544 I
.1125	1.019	.053	.003242 I	.2025	1.833	.171	.010504 I	.2925	2.648	.357	.021917 I
.1150	1.041	.055	.003388 I	.2050	1.856	.176	.010765 I	.2950	2.671	.364	.022293 I
.1175	1.064	.058	.003537 I	.2075	1.879	.180	.011030 I	.2975	2.694	.370	.022672 I
.1200	1.086	.060	.003689 I	.2100	1.901	.184	.011297 I	.3000	2.716	.376	.023055 I
.1225	1.109	.063	.003844 I	.2125	1.924	.189	.011568 I	.3025	2.739	.382	.023441 I
.1250	1.132	.065	.004003 I	.2150	1.947	.193	.011841 I	.3050	2.762	.389	.023830 I
.1275	1.154	.068	.004164 I	.2175	1.969	.198	.012118 I	.3075	2.784	.395	.024222 I
.1300	1.177	.071	.004329 I	.2200	1.992	.202	.012399 I	.3100	2.807	.402	.024618 I
.1325	1.200	.073	.004497 I	.2225	2.015	.207	.012682 I	.3125	2.829	.408	.025016 I
.1350	1.222	.076	.004669 I	.2250	2.037	.212	.012968 I	.3150	2.852	.415	.025418 I
.1375	1.245	.079	.004843 I	.2275	2.060	.216	.013258 I	.3175	2.875	.421	.025823 I
.1400	1.268	.082	.005021 I	.2300	2.082	.221	.013551 I	.3200	2.897	.428	.026232 I
.1425	1.290	.085	.005202 I	.2325	2.105	.226	.013847 I	.3225	2.920	.435	.026643 I
.1450	1.313	.088	.005386 I	.2350	2.128	.231	.014147 I	.3250	2.943	.441	.027058 I

375 MILLIMETER PIPE THE FLOW RANGE IS .0575 TO .3250 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
.3275	2.965	.448	.027476	I	.4050	3.667	.685	.042018	I	.4825	4.369	.973	.059637	I
.3301	2.988	.455	.027897	I	.4075	3.690	.694	.042538	I	.4850	4.391	.983	.060257	I
.3325	3.010	.462	.028321	I	.4100	3.712	.702	.043062	I	.4875	4.414	.993	.060880	I
.3350	3.033	.469	.028748	I	.4125	3.735	.711	.043588	I	.4900	4.437	1.003	.061506	I
.3375	3.056	.476	.029179	I	.4150	3.757	.720	.044118	I	.4925	4.459	1.013	.062135	I
.3400	3.078	.483	.029613	I	.4175	3.780	.728	.044652	I	.4950	4.482	1.024	.062767	I
.3425	3.101	.490	.030050	I	.4200	3.803	.737	.045188	I	.4975	4.504	1.034	.063403	I
.3450	3.124	.497	.030490	I	.4225	3.825	.746	.045727	I	.5000	4.527	1.045	.064042	I
.3475	3.146	.505	.030934	I	.4250	3.848	.755	.046270	I	.5025	4.550	1.055	.064684	I
.3500	3.169	.512	.031381	I	.4275	3.871	.764	.046816	I	.5050	4.572	1.066	.065329	I
.3525	3.192	.519	.031830	I	.4300	3.893	.773	.047365	I	.5075	4.595	1.076	.065978	I
.3550	3.214	.527	.032284	I	.4325	3.916	.782	.047918	I	.5100	4.618	1.087	.066629	I
.3575	3.237	.534	.032740	I	.4350	3.939	.791	.048473	I	.5125	4.640	1.097	.067284	I
.3600	3.259	.542	.033199	I	.4375	3.961	.800	.049032	I	.5150	4.663	1.108	.067942	I
.3625	3.282	.549	.033662	I	.4400	3.984	.809	.049594	I	.5175	4.686	1.119	.068603	I
.3650	3.305	.557	.034128	I	.4425	4.006	.818	.050159	I	.5200	4.708	1.130	.069268	I
.3675	3.327	.564	.034597	I	.4450	4.029	.827	.050728	I	.5225	4.731	1.141	.069935	I
.3700	3.350	.572	.035069	I	.4475	4.052	.837	.051299	I	.5250	4.753	1.152	.070606	I
.3725	3.373	.580	.035545	I	.4500	4.074	.846	.051874	I	.5275	4.776	1.163	.071280	I
.3750	3.395	.588	.036024	I	.4525	4.097	.856	.052452	I	.5300	4.799	1.174	.071957	I
.3775	3.418	.595	.036505	I	.4550	4.120	.865	.053033	I	.5325	4.821	1.185	.072638	I
.3800	3.441	.603	.036991	I	.4575	4.142	.875	.053617	I	.5350	4.844	1.196	.073322	I
.3825	3.463	.611	.037479	I	.4600	4.165	.884	.054205	I	.5375	4.867	1.207	.074008	I
.3850	3.486	.619	.037970	I	.4625	4.188	.894	.054796	I	.5400	4.889	1.218	.074698	I
.3875	3.508	.627	.038465	I	.4650	4.210	.903	.055390	I	.5425	4.912	1.230	.075392	I
.3900	3.531	.636	.038963	I	.4675	4.233	.913	.055987	I	.5450	4.934	1.241	.076088	I
.3925	3.554	.644	.039464	I	.4700	4.255	.923	.056587	I	.5475	4.957	1.252	.076788	I
.3950	3.576	.652	.039969	I	.4725	4.278	.933	.057191	I	.5500	4.980	1.264	.077491	I
.3975	3.599	.660	.040476	I	.4750	4.301	.943	.057798	I	.5525	5.002	1.275	.078197	I
.4000	3.622	.669	.040987	I	.4775	4.323	.953	.058408	I	.5550	5.025	1.287	.078906	I
.4025	3.644	.677	.041501	I	.4800	4.346	.963	.059021	I	.5575	5.048	1.299	.079618	I

375 MILLIMETER PIPE THE FLOW RANGE IS .3275 TO .5575 CUBIC METERS PER SECOND

METRIC TABLES

HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICTION SLOPES ARE BASED ON SCOBAY'S FORMULA

SCOBAY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 400 MILLIMETERS

CS = .345

QQ INCREMENT = .0025 CUBIC METERS PER SECOND

AREA = .1257 SQUARE METERS

$H = (.10255E+00) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
.0650	.517	.014	.000771 I	.1550	1.233	.078	.004386 I	.2450	1.950	.194	.010957 I
.0675	.537	.015	.000832 I	.1575	1.253	.080	.004528 I	.2475	1.970	.198	.011182 I
.0700	.557	.016	.000894 I	.1600	1.273	.083	.004673 I	.2500	1.989	.202	.011409 I
.0725	.577	.017	.000960 I	.1625	1.293	.085	.004820 I	.2525	2.009	.206	.011638 I
.0750	.597	.018	.001027 I	.1650	1.313	.088	.004970 I	.2550	2.029	.210	.011870 I
.0775	.617	.019	.001096 I	.1675	1.333	.091	.005122 I	.2575	2.049	.214	.012104 I
.0800	.637	.021	.001168 I	.1700	1.353	.093	.005276 I	.2600	2.069	.218	.012340 I
.0825	.657	.022	.001242 I	.1725	1.373	.096	.005432 I	.2625	2.089	.222	.012579 I
.0850	.676	.023	.001319 I	.1750	1.393	.099	.005590 I	.2650	2.109	.227	.012819 I
.0875	.696	.025	.001398 I	.1775	1.412	.102	.005751 I	.2675	2.129	.231	.013062 I
.0900	.716	.026	.001479 I	.1800	1.432	.105	.005915 I	.2700	2.149	.235	.013308 I
.0925	.736	.028	.001562 I	.1825	1.452	.107	.006080 I	.2725	2.168	.240	.013555 I
.0950	.756	.029	.001647 I	.1850	1.472	.110	.006248 I	.2750	2.188	.244	.013805 I
.0975	.776	.031	.001735 I	.1875	1.492	.113	.006418 I	.2775	2.208	.249	.014057 I
.1000	.796	.032	.001825 I	.1900	1.512	.117	.006590 I	.2800	2.228	.253	.014312 I
.1025	.816	.034	.001918 I	.1925	1.532	.120	.006764 I	.2825	2.248	.258	.014568 I
.1050	.836	.036	.002013 I	.1950	1.552	.123	.006941 I	.2850	2.268	.262	.014827 I
.1075	.855	.037	.002110 I	.1975	1.572	.126	.007120 I	.2875	2.288	.267	.015089 I
.1100	.875	.039	.002209 I	.2000	1.592	.129	.007302 I	.2900	2.308	.271	.015352 I
.1125	.895	.041	.002310 I	.2025	1.611	.132	.007486 I	.2925	2.328	.276	.015618 I
.1150	.915	.043	.002414 I	.2050	1.631	.136	.007672 I	.2950	2.348	.281	.015886 I
.1175	.935	.045	.002520 I	.2075	1.651	.139	.007860 I	.2975	2.367	.286	.016156 I
.1200	.955	.046	.002629 I	.2100	1.671	.142	.008050 I	.3000	2.387	.290	.016429 I
.1225	.975	.048	.002739 I	.2125	1.691	.146	.008243 I	.3025	2.407	.295	.016704 I
.1250	.995	.050	.002852 I	.2150	1.711	.149	.008438 I	.3050	2.427	.300	.016981 I
.1275	1.015	.052	.002968 I	.2175	1.731	.153	.008636 I	.3075	2.447	.305	.017261 I
.1300	1.035	.055	.003085 I	.2200	1.751	.156	.008835 I	.3100	2.467	.310	.017543 I
.1325	1.054	.057	.003205 I	.2225	1.771	.160	.009037 I	.3125	2.487	.315	.017827 I
.1350	1.074	.059	.003327 I	.2250	1.790	.163	.009241 I	.3150	2.507	.320	.018113 I
.1375	1.094	.061	.003451 I	.2275	1.810	.167	.009448 I	.3175	2.527	.325	.018402 I
.1400	1.114	.063	.003578 I	.2300	1.830	.171	.009657 I	.3200	2.546	.331	.018693 I
.1425	1.134	.066	.003707 I	.2325	1.850	.174	.009868 I	.3225	2.566	.336	.018986 I
.1450	1.154	.068	.003838 I	.2350	1.870	.178	.010081 I	.3250	2.586	.341	.019281 I
.1475	1.174	.070	.003972 I	.2375	1.890	.182	.010297 I	.3275	2.606	.346	.019579 I
.1500	1.194	.073	.004107 I	.2400	1.910	.186	.010515 I	.3300	2.626	.351	.019879 I
.1525	1.214	.075	.004245 I	.2425	1.930	.190	.010735 I	.3325	2.646	.357	.020182 I

400 MILLIMETER PIPE THE FLOW RANGE IS .0650 TO .3325 CUBIC METERS PER SECOND

O	V	HV	H	Q	V	HV	H	Q	V	HV	H			
.3350	2.666	.362	.020486	I	.4250	3.382	.583	.032972	I	.5150	4.898	.856	.048416	I
.3375	2.686	.368	.020793	I	.4275	3.402	.590	.033361	I	.5175	4.118	.864	.048887	I
.3400	2.706	.373	.021102	I	.4300	3.422	.597	.033753	I	.5200	4.138	.873	.049361	I
.3425	2.726	.379	.021414	I	.4325	3.442	.604	.034146	I	.5225	4.158	.881	.049836	I
.3450	2.745	.384	.021728	I	.4350	3.462	.611	.034542	I	.5250	4.178	.890	.050314	I
.3475	2.765	.390	.022044	I	.4375	3.482	.618	.034941	I	.5275	4.198	.898	.050795	I
.3500	2.785	.395	.022362	I	.4400	3.501	.625	.035341	I	.5300	4.218	.907	.051277	I
.3525	2.805	.401	.022683	I	.4425	3.521	.632	.035744	I	.5325	4.237	.915	.051762	I
.3550	2.825	.407	.023005	I	.4450	3.541	.639	.036149	I	.5350	4.257	.924	.052249	I
.3575	2.845	.413	.023331	I	.4475	3.561	.646	.036556	I	.5375	4.277	.932	.052739	I
.3600	2.865	.418	.023658	I	.4500	3.581	.654	.036966	I	.5400	4.297	.941	.053231	I
.3625	2.885	.424	.023988	I	.4525	3.601	.661	.037378	I	.5425	4.317	.950	.053725	I
.3650	2.905	.430	.024320	I	.4550	3.621	.668	.037792	I	.5450	4.337	.959	.054221	I
.3675	2.924	.436	.024654	I	.4575	3.641	.676	.038208	I	.5475	4.357	.967	.054719	I
.3700	2.944	.442	.024991	I	.4600	3.661	.683	.038627	I	.5500	4.377	.976	.055220	I
.3725	2.964	.448	.025329	I	.4625	3.680	.690	.039048	I	.5525	4.397	.985	.055723	I
.3750	2.984	.454	.025671	I	.4650	3.700	.698	.039471	I	.5550	4.417	.994	.056229	I
.3775	3.004	.460	.026014	I	.4675	3.720	.705	.039897	I	.5575	4.436	1.003	.056737	I
.3800	3.024	.466	.026360	I	.4700	3.740	.713	.040324	I	.5600	4.456	1.012	.057247	I
.3825	3.044	.472	.026708	I	.4725	3.760	.721	.040755	I	.5625	4.476	1.021	.057759	I
.3850	3.064	.478	.027058	I	.4750	3.780	.728	.041187	I	.5650	4.496	1.030	.058273	I
.3875	3.084	.485	.027410	I	.4775	3.800	.736	.041622	I	.5675	4.516	1.039	.058790	I
.3900	3.104	.491	.027765	I	.4800	3.820	.744	.042059	I	.5700	4.536	1.049	.059309	I
.3925	3.123	.497	.028122	I	.4825	3.840	.751	.042498	I	.5725	4.556	1.058	.059831	I
.3950	3.143	.504	.028482	I	.4850	3.859	.759	.042939	I	.5750	4.576	1.067	.060354	I
.3975	3.163	.510	.028843	I	.4875	3.879	.767	.043383	I	.5775	4.596	1.076	.060880	I
.4000	3.183	.516	.029207	I	.4900	3.899	.775	.043829	I	.5800	4.615	1.086	.061409	I
.4025	3.203	.523	.029574	I	.4925	3.919	.783	.044278	I	.5825	4.635	1.095	.061939	I
.4050	3.223	.529	.029942	I	.4950	3.939	.791	.044728	I	.5850	4.655	1.105	.062472	I
.4075	3.243	.536	.030313	I	.4975	3.959	.799	.045181	I	.5875	4.675	1.114	.063007	I
.4100	3.263	.543	.030686	I	.5000	3.979	.807	.045637	I	.5900	4.695	1.124	.063544	I
.4125	3.283	.549	.031061	I	.5025	3.999	.815	.046094	I	.5925	4.715	1.133	.064084	I
.4150	3.302	.556	.031439	I	.5050	4.019	.823	.046554	I	.5950	4.735	1.143	.064626	I
.4175	3.322	.563	.031819	I	.5075	4.039	.831	.047016	I	.5975	4.755	1.152	.065170	I
.4200	3.342	.569	.032201	I	.5100	4.058	.839	.047480	I	.6000	4.775	1.162	.065717	I
.4225	3.362	.576	.032586	I	.5125	4.078	.848	.047947	I	.6025	4.795	1.172	.066265	I

400 MILLIMETER PIPE THE FLOW RANGE IS .3350 TO .6025 CUBIC METERS PER SECOND

Q	V	MV	H		Q	V	MV	H		Q	V	MV	H	
.6050	4.814	1.181	.066817	I	.6150	4.894	1.221	.069044	I	.6250	4.974	1.261	.071307	I
.6075	4.834	1.191	.067370	I	.6175	4.914	1.231	.069606	I	.6275	4.993	1.271	.071879	I
.6100	4.854	1.201	.067926	I	.6200	4.934	1.241	.070171	I	.6300	5.013	1.281	.072453	I
.6125	4.874	1.211	.068483	I	.6225	4.954	1.251	.070738	I	.6325	5.033	1.291	.073029	I

400 MILLIMETER PIPE THE FLOW RANGE IS .6050 TO .6325 CUBIC METERS PER SECOND

METRIC TABLES

HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBAY'S FORMULA

SCOBAY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 450 MILLIMETERS

CS = .345

QO INCREMENT = .0025 CUBIC METERS PER SECOND

AREA = .1590 SQUARE METERS

$H = (.98361E-01) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
.0800	.503	.013	.000630 I	.1700	1.069	.058	.002843 I	.2600	1.635	.136	.006649 I
.0825	.519	.014	.000669 I	.1725	1.085	.060	.002927 I	.2625	1.650	.139	.006778 I
.0850	.534	.015	.000711 I	.1750	1.100	.062	.003012 I	.2650	1.666	.142	.006907 I
.0875	.550	.015	.000753 I	.1775	1.116	.063	.003099 I	.2675	1.582	.144	.007038 I
.0900	.566	.016	.000797 I	.1800	1.132	.065	.003187 I	.2700	1.698	.147	.007171 I
.0925	.582	.017	.000842 I	.1825	1.147	.067	.003276 I	.2725	1.713	.150	.007304 I
.0950	.597	.018	.000888 I	.1850	1.163	.069	.003366 I	.2750	1.729	.152	.007439 I
.0975	.613	.019	.000935 I	.1875	1.179	.071	.003458 I	.2775	1.745	.155	.007574 I
.1000	.629	.020	.000984 I	.1900	1.195	.073	.003551 I	.2800	1.761	.158	.007711 I
.1025	.644	.021	.001033 I	.1925	1.210	.075	.003645 I	.2825	1.776	.161	.007850 I
.1050	.660	.022	.001084 I	.1950	1.226	.077	.003740 I	.2850	1.792	.164	.007989 I
.1075	.676	.023	.001137 I	.1975	1.242	.079	.003837 I	.2875	1.808	.167	.008130 I
.1100	.692	.024	.001190 I	.2000	1.258	.081	.003934 I	.2900	1.823	.169	.008272 I
.1125	.707	.026	.001245 I	.2025	1.273	.083	.004033 I	.2925	1.839	.172	.008415 I
.1150	.723	.027	.001301 I	.2050	1.289	.085	.004134 I	.2950	1.855	.175	.008560 I
.1175	.739	.028	.001358 I	.2075	1.305	.087	.004235 I	.2975	1.871	.178	.008706 I
.1200	.755	.029	.001416 I	.2100	1.320	.089	.004338 I	.3000	1.886	.181	.008852 I
.1225	.770	.030	.001476 I	.2125	1.336	.091	.004442 I	.3025	1.902	.184	.009001 I
.1250	.786	.031	.001537 I	.2150	1.352	.093	.004547 I	.3050	1.918	.187	.009150 I
.1275	.802	.033	.001599 I	.2175	1.368	.095	.004653 I	.3075	1.933	.191	.009301 I
.1300	.817	.034	.001662 I	.2200	1.383	.098	.004761 I	.3100	1.949	.194	.009452 I
.1325	.833	.035	.001727 I	.2225	1.399	.100	.004869 I	.3125	1.965	.197	.009606 I
.1350	.849	.037	.001793 I	.2250	1.415	.102	.004980 I	.3150	1.981	.200	.009760 I
.1375	.865	.038	.001860 I	.2275	1.430	.104	.005091 I	.3175	1.996	.203	.009915 I
.1400	.880	.039	.001928 I	.2300	1.446	.107	.005203 I	.3200	2.012	.206	.010072 I
.1425	.896	.041	.001997 I	.2325	1.462	.109	.005317 I	.3225	2.028	.210	.010230 I
.1450	.912	.042	.002068 I	.2350	1.478	.111	.005432 I	.3250	2.043	.213	.010389 I
.1475	.927	.044	.002140 I	.2375	1.493	.114	.005548 I	.3275	2.059	.216	.010550 I
.1500	.943	.045	.002213 I	.2400	1.509	.116	.005666 I	.3300	2.075	.219	.010712 I
.1525	.959	.047	.002288 I	.2425	1.525	.118	.005784 I	.3325	2.091	.223	.010874 I
.1550	.975	.048	.002363 I	.2450	1.540	.121	.005904 I	.3350	2.106	.226	.011039 I
.1575	.990	.050	.002440 I	.2475	1.556	.123	.006025 I	.3375	2.122	.230	.011204 I
.1600	1.006	.052	.002518 I	.2500	1.572	.126	.006148 I	.3400	2.138	.233	.011371 I
.1625	1.022	.053	.002597 I	.2525	1.588	.128	.006271 I	.3425	2.153	.236	.011538 I
.1650	1.037	.055	.002678 I	.2550	1.603	.131	.006396 I	.3450	2.169	.240	.011707 I
.1675	1.053	.057	.002760 I	.2575	1.619	.134	.006522 I	.3475	2.185	.243	.011878 I

450 MILLIMETER PIPE THE FLOW RANGE IS .0800 TO .3475 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
.3500	2.201	.247	.012049	I	.4400	2.767	.330	.019043	I	.5300	3.332	.566	.027630	I
.3525	2.216	.250	.012222	I	.4425	2.782	.395	.019260	I	.5325	3.348	.571	.027891	I
.3550	2.232	.254	.012396	I	.4450	2.798	.399	.019478	I	.5350	3.364	.577	.028153	I
.3575	2.248	.258	.012571	I	.4475	2.814	.434	.019697	I	.5375	3.380	.582	.028417	I
.3600	2.264	.261	.012748	I	.4500	2.829	.408	.019918	I	.5400	3.395	.588	.028682	I
.3625	2.279	.265	.012925	I	.4525	2.845	.413	.020140	I	.5425	3.411	.593	.028948	I
.3650	2.295	.268	.013104	I	.4550	2.861	.417	.020363	I	.5450	3.427	.598	.029216	I
.3675	2.311	.272	.013284	I	.4575	2.877	.422	.020588	I	.5475	3.442	.604	.029484	I
.3700	2.326	.276	.013466	I	.4600	2.892	.426	.020813	I	.5500	3.458	.610	.029754	I
.3725	2.342	.280	.013649	I	.4625	2.908	.431	.021040	I	.5525	3.474	.615	.030025	I
.3750	2.358	.283	.013832	I	.4650	2.924	.436	.021268	I	.5550	3.490	.621	.030298	I
.3775	2.374	.287	.014017	I	.4675	2.939	.440	.021497	I	.5575	3.505	.626	.030571	I
.3800	2.389	.291	.014203	I	.4700	2.955	.445	.021728	I	.5600	3.521	.632	.030846	I
.3825	2.405	.295	.014391	I	.4725	2.971	.450	.021960	I	.5625	3.537	.638	.031122	I
.3850	2.421	.299	.014580	I	.4750	2.987	.455	.022193	I	.5650	3.552	.643	.031399	I
.3875	2.436	.303	.014770	I	.4775	3.002	.459	.022427	I	.5675	3.568	.649	.031678	I
.3900	2.452	.306	.014961	I	.4800	3.018	.464	.022662	I	.5700	3.584	.655	.031957	I
.3925	2.468	.310	.015153	I	.4825	3.034	.469	.022899	I	.5725	3.600	.660	.032238	I
.3950	2.484	.314	.015347	I	.4850	3.049	.474	.023137	I	.5750	3.615	.666	.032521	I
.3975	2.499	.318	.015542	I	.4875	3.065	.479	.023376	I	.5775	3.631	.672	.032804	I
.4000	2.515	.322	.015738	I	.4900	3.081	.484	.023616	I	.5800	3.647	.678	.033089	I
.4025	2.531	.326	.015935	I	.4925	3.097	.489	.023858	I	.5825	3.663	.684	.033374	I
.4050	2.546	.331	.016134	I	.4950	3.112	.494	.024101	I	.5850	3.678	.690	.033662	I
.4075	2.562	.335	.016333	I	.4975	3.128	.499	.024345	I	.5875	3.694	.695	.033950	I
.4100	2.578	.339	.016534	I	.5000	3.144	.504	.024590	I	.5900	3.710	.701	.034239	I
.4125	2.594	.343	.016737	I	.5025	3.160	.509	.024837	I	.5925	3.725	.707	.034530	I
.4150	2.609	.347	.016940	I	.5050	3.175	.514	.025084	I	.5950	3.741	.713	.034822	I
.4175	2.625	.351	.017145	I	.5075	3.191	.519	.025333	I	.5975	3.757	.719	.035115	I
.4200	2.641	.355	.017351	I	.5100	3.207	.524	.025584	I	.6000	3.773	.725	.035410	I
.4225	2.657	.360	.017558	I	.5125	3.222	.529	.025835	I	.6025	3.788	.731	.035706	I
.4250	2.672	.364	.017766	I	.5150	3.238	.534	.026088	I	.6050	3.804	.738	.036003	I
.4275	2.688	.368	.017976	I	.5175	3.254	.540	.026342	I	.6075	3.820	.744	.036301	I
.4300	2.704	.373	.018187	I	.5200	3.270	.545	.026597	I	.6100	3.835	.750	.036600	I
.4325	2.719	.377	.018399	I	.5225	3.285	.550	.026853	I	.6125	3.851	.756	.036901	I
.4350	2.735	.381	.018612	I	.5250	3.301	.555	.027111	I	.6150	3.867	.762	.037203	I
.4375	2.751	.386	.018827	I	.5275	3.317	.561	.027370	I	.6175	3.883	.768	.037506	I

450 MILLIMETER PIPE THE FLOW RANGE IS .3500 TO .6175 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H	Q	V	HV	H		
.6200	3.898	.775	.037810	I	.6825	4.291	.939	.045817	I	.7450	4.584	1.118	.054593	I
.6225	3.914	.781	.037115	I	.6850	4.307	.945	.046153	I	.7475	4.700	1.126	.054960	I
.6250	3.930	.787	.038422	I	.6875	4.323	.952	.046491	I	.7500	4.716	1.133	.055328	I
.6275	3.945	.793	.038730	I	.6900	4.338	.959	.046830	I	.7525	4.731	1.141	.055697	I
.6300	3.961	.800	.039039	I	.6925	4.354	.966	.047170	I	.7550	4.747	1.149	.056068	I
.6325	3.977	.806	.039350	I	.6950	4.370	.973	.047511	I	.7575	4.763	1.156	.056440	I
.6350	3.993	.812	.039662	I	.6975	4.386	.980	.047853	I	.7600	4.779	1.164	.056813	I
.6375	4.008	.819	.039974	I	.7000	4.401	.987	.048197	I	.7625	4.794	1.172	.057188	I
.6400	4.024	.825	.040289	I	.7025	4.417	.994	.048542	I	.7650	4.810	1.179	.057563	I
.6425	4.040	.832	.040604	I	.7050	4.433	1.001	.048888	I	.7675	4.826	1.187	.057940	I
.6450	4.055	.838	.040921	I	.7075	4.448	1.009	.049235	I	.7700	4.841	1.195	.058318	I
.6475	4.071	.845	.041238	I	.7100	4.464	1.016	.049584	I	.7725	4.857	1.202	.058697	I
.6500	4.087	.851	.041557	I	.7125	4.480	1.023	.049934	I	.7750	4.873	1.210	.059078	I
.6525	4.103	.858	.041878	I	.7150	4.496	1.030	.050285	I	.7775	4.889	1.218	.059460	I
.6550	4.118	.864	.042199	I	.7175	4.511	1.037	.050637	I	.7800	4.904	1.226	.059843	I
.6575	4.134	.871	.042522	I	.7200	4.527	1.045	.050990	I	.7825	4.920	1.234	.060227	I
.6600	4.150	.878	.042846	I	.7225	4.543	1.052	.051345	I	.7850	4.936	1.242	.060612	I
.6625	4.166	.884	.043171	I	.7250	4.559	1.059	.051701	I	.7875	4.951	1.250	.060999	I
.6650	4.181	.891	.043498	I	.7275	4.574	1.066	.052058	I	.7900	4.967	1.258	.061387	I
.6675	4.197	.898	.043825	I	.7300	4.590	1.074	.052417	I	.7925	4.983	1.266	.061776	I
.6700	4.213	.905	.044154	I	.7325	4.606	1.081	.052776	I	.7950	4.999	1.274	.062167	I
.6725	4.228	.911	.044484	I	.7350	4.621	1.089	.053137	I	.7975	5.014	1.282	.062558	I
.6750	4.244	.918	.044816	I	.7375	4.637	1.096	.053499	I	.8000	5.030	1.290	.062951	I
.6775	4.260	.925	.045148	I	.7400	4.653	1.103	.053862	I	.8025	5.046	1.298	.063345	I
.6800	4.276	.932	.045482	I	.7425	4.669	1.111	.054227	I	.8050	5.062	1.306	.063740	I

450 MILLIMETER PIPE THE FLOW RANGE IS .6200 TO .8050 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBEE'S FORMULA

SCOBEE'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 500 MILLIMETERS

CS = .345

QO INCREMENT = .0025 CUBIC METERS PER SECOND

AREA = .1964 SQUARE METERS

$H = (.56571E-01) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
.1000	.509	.013	.000566	I	.1900	.968	.048	.002042	I	.2800	1.426	.104	.004435	I
.1025	.522	.014	.000594	I	.1925	.980	.049	.002096	I	.2825	1.439	.106	.004515	I
.1050	.535	.015	.000624	I	.1950	.993	.051	.002151	I	.2850	1.451	.107	.004595	I
.1075	.547	.015	.000654	I	.1975	1.006	.052	.002207	I	.2875	1.464	.109	.004676	I
.1100	.560	.016	.000685	I	.2000	1.019	.053	.002263	I	.2900	1.477	.111	.004758	I
.1125	.573	.017	.000716	I	.2025	1.031	.054	.002320	I	.2925	1.490	.113	.004840	I
.1150	.586	.017	.000748	I	.2050	1.044	.056	.002377	I	.2950	1.502	.115	.004923	I
.1175	.598	.018	.000781	I	.2075	1.057	.057	.002436	I	.2975	1.515	.117	.005007	I
.1200	.611	.019	.000815	I	.2100	1.070	.058	.002495	I	.3000	1.528	.119	.005091	I
.1225	.624	.020	.000849	I	.2125	1.082	.060	.002555	I	.3025	1.541	.121	.005177	I
.1250	.637	.021	.000884	I	.2150	1.095	.061	.002615	I	.3050	1.553	.123	.005263	I
.1275	.649	.021	.000920	I	.2175	1.108	.063	.002676	I	.3075	1.566	.125	.005349	I
.1300	.662	.022	.000956	I	.2200	1.120	.064	.002738	I	.3100	1.579	.127	.005436	I
.1325	.675	.023	.000993	I	.2225	1.133	.065	.002801	I	.3125	1.592	.129	.005525	I
.1350	.688	.024	.001031	I	.2250	1.146	.067	.002864	I	.3150	1.604	.131	.005613	I
.1375	.700	.025	.001070	I	.2275	1.159	.068	.002928	I	.3175	1.617	.133	.005703	I
.1400	.713	.026	.001109	I	.2300	1.171	.070	.002993	I	.3200	1.630	.135	.005793	I
.1425	.726	.027	.001149	I	.2325	1.184	.071	.003058	I	.3225	1.642	.137	.005884	I
.1450	.738	.028	.001189	I	.2350	1.197	.073	.003124	I	.3250	1.655	.140	.005975	I
.1475	.751	.029	.001231	I	.2375	1.210	.075	.003191	I	.3275	1.668	.142	.006068	I
.1500	.764	.030	.001273	I	.2400	1.222	.076	.003259	I	.3300	1.681	.144	.006161	I
.1525	.777	.031	.001316	I	.2425	1.235	.078	.003327	I	.3325	1.693	.146	.006254	I
.1550	.789	.032	.001359	I	.2450	1.248	.079	.003396	I	.3350	1.706	.148	.006349	I
.1575	.802	.033	.001403	I	.2475	1.261	.081	.003465	I	.3375	1.719	.151	.006444	I
.1600	.815	.034	.001448	I	.2500	1.273	.083	.003536	I	.3400	1.732	.153	.006540	I
.1625	.828	.035	.001494	I	.2525	1.286	.084	.003607	I	.3425	1.744	.155	.006636	I
.1650	.840	.036	.001540	I	.2550	1.299	.086	.003679	I	.3450	1.757	.157	.006733	I
.1675	.853	.037	.001587	I	.2575	1.311	.088	.003751	I	.3475	1.770	.160	.006831	I
.1700	.866	.038	.001635	I	.2600	1.324	.089	.003824	I	.3500	1.783	.162	.006930	I
.1725	.879	.039	.001683	I	.2625	1.337	.091	.003898	I	.3525	1.795	.164	.007029	I
.1750	.891	.040	.001732	I	.2650	1.350	.093	.003973	I	.3550	1.808	.167	.007129	I
.1775	.904	.042	.001782	I	.2675	1.362	.095	.004048	I	.3575	1.821	.169	.007230	I
.1800	.917	.043	.001833	I	.2700	1.375	.096	.004124	I	.3600	1.833	.171	.007332	I
.1825	.929	.044	.001884	I	.2725	1.388	.098	.004201	I	.3625	1.846	.174	.007434	I
.1850	.942	.045	.001936	I	.2750	1.401	.100	.004278	I	.3650	1.859	.176	.007537	I
.1875	.955	.046	.001989	I	.2775	1.413	.102	.004356	I	.3675	1.872	.179	.007640	I

500 MILLIMETER PIPE THE FLOW RANGE IS .1000 TO .3675 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
.3700	1.884	.181	.007745	.4600	2.343	.280	.011970	.5500	2.801	.400	.017113
.3725	1.897	.183	.007850	.4625	2.355	.283	.012101	.5525	2.814	.404	.017269
.3750	1.910	.186	.007955	.4650	2.368	.286	.012232	.5550	2.827	.407	.017425
.3775	1.923	.188	.008062	.4675	2.381	.289	.012364	.5575	2.839	.411	.017583
.3800	1.935	.191	.008169	.4700	2.394	.292	.012497	.5600	2.852	.415	.017741
.3825	1.948	.193	.008277	.4725	2.406	.295	.012630	.5625	2.865	.418	.017899
.3850	1.961	.196	.008385	.4750	2.419	.298	.012764	.5650	2.878	.422	.018059
.3875	1.974	.199	.008495	.4775	2.432	.301	.012899	.5675	2.890	.426	.018219
.3900	1.986	.201	.008604	.4800	2.445	.305	.013034	.5700	2.903	.430	.018380
.3925	1.999	.204	.008715	.4825	2.457	.308	.013170	.5725	2.916	.433	.018542
.3950	2.012	.206	.008827	.4850	2.470	.311	.013307	.5750	2.928	.437	.018704
.3975	2.024	.209	.008939	.4875	2.483	.314	.013445	.5775	2.941	.441	.018867
.4000	2.037	.212	.009051	.4900	2.496	.317	.013583	.5800	2.954	.445	.019031
.4025	2.050	.214	.009165	.4925	2.508	.321	.013722	.5825	2.967	.449	.019195
.4050	2.063	.217	.009279	.4950	2.521	.324	.013861	.5850	2.979	.452	.019360
.4075	2.075	.220	.009394	.4975	2.534	.327	.014002	.5875	2.992	.456	.019526
.4100	2.088	.222	.009510	.5000	2.546	.331	.014143	.5900	3.005	.460	.019692
.4125	2.101	.225	.009626	.5025	2.559	.334	.014285	.5925	3.018	.464	.019860
.4150	2.114	.228	.009743	.5050	2.572	.337	.014427	.5950	3.030	.468	.020028
.4175	2.126	.230	.009861	.5075	2.585	.340	.014570	.5975	3.043	.472	.020196
.4200	2.139	.233	.009979	.5100	2.597	.344	.014714	.6000	3.056	.476	.020366
.4225	2.152	.236	.010098	.5125	2.610	.347	.014859	.6025	3.069	.480	.020536
.4250	2.165	.239	.010218	.5150	2.623	.351	.015004	.6050	3.081	.484	.020706
.4275	2.177	.242	.010339	.5175	2.636	.354	.015150	.6075	3.094	.488	.020878
.4300	2.190	.244	.010460	.5200	2.648	.357	.015297	.6100	3.107	.492	.021050
.4325	2.203	.247	.010582	.5225	2.661	.361	.015444	.6125	3.119	.496	.021223
.4350	2.215	.250	.010705	.5250	2.674	.364	.015592	.6150	3.132	.500	.021397
.4375	2.228	.253	.010828	.5275	2.687	.368	.015741	.6175	3.145	.504	.021571
.4400	2.241	.256	.010952	.5300	2.699	.371	.015891	.6200	3.158	.508	.021746
.4425	2.254	.259	.011077	.5325	2.712	.375	.016041	.6225	3.170	.512	.021922
.4450	2.266	.262	.011203	.5350	2.725	.378	.016192	.6250	3.183	.516	.022098
.4475	2.279	.265	.011329	.5375	2.737	.382	.016344	.6275	3.196	.521	.022275
.4500	2.292	.268	.011456	.5400	2.750	.386	.016496	.6300	3.209	.525	.022453
.4525	2.305	.271	.011583	.5425	2.763	.389	.016649	.6325	3.221	.529	.022632
.4550	2.317	.274	.011712	.5450	2.776	.393	.016803	.6350	3.234	.533	.022811
.4575	2.330	.277	.011841	.5475	2.788	.396	.016958	.6375	3.247	.537	.022991

500 MILLIMETER PIPE THE FLOW RANGE IS .3700 TO .6375 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
.6400	3.259	.542	.023172	I	.7300	3.718	.705	.030147	I	.8200	4.176	.889	.038038	I
.6425	3.272	.546	.023353	I	.7325	3.731	.709	.030354	I	.8225	4.189	.894	.038271	I
.6450	3.285	.550	.023535	I	.7350	3.743	.714	.030561	I	.8250	4.202	.900	.038504	I
.6475	3.298	.554	.023718	I	.7375	3.756	.719	.030769	I	.8275	4.214	.905	.038738	I
.6500	3.310	.559	.023901	I	.7400	3.769	.724	.030978	I	.8300	4.227	.911	.038972	I
.6525	3.323	.563	.024086	I	.7425	3.782	.729	.031188	I	.8325	4.240	.916	.039207	I
.6550	3.336	.567	.024270	I	.7450	3.794	.734	.031398	I	.8350	4.253	.922	.039443	I
.6575	3.349	.572	.024456	I	.7475	3.807	.739	.031610	I	.8375	4.265	.927	.039679	I
.6600	3.361	.576	.024642	I	.7500	3.820	.744	.031821	I	.8400	4.278	.933	.039917	I
.6625	3.374	.580	.024829	I	.7525	3.832	.749	.032034	I	.8425	4.291	.938	.040155	I
.6650	3.387	.585	.025017	I	.7550	3.845	.754	.032247	I	.8450	4.304	.944	.040393	I
.6675	3.400	.589	.025206	I	.7575	3.858	.759	.032461	I	.8475	4.316	.950	.040633	I
.6700	3.412	.593	.025395	I	.7600	3.871	.764	.032676	I	.8500	4.329	.955	.040873	I
.6725	3.425	.598	.025585	I	.7625	3.883	.769	.032891	I	.8525	4.342	.961	.041113	I
.6750	3.438	.602	.025775	I	.7650	3.896	.774	.033107	I	.8550	4.354	.966	.041355	I
.6775	3.450	.607	.025967	I	.7675	3.909	.779	.033324	I	.8575	4.367	.972	.041597	I
.6800	3.463	.611	.026159	I	.7700	3.922	.784	.033541	I	.8600	4.380	.978	.041840	I
.6825	3.476	.616	.026351	I	.7725	3.934	.789	.033759	I	.8625	4.393	.983	.042084	I
.6850	3.489	.620	.026545	I	.7750	3.947	.794	.033978	I	.8650	4.405	.989	.042328	I
.6875	3.501	.625	.026739	I	.7775	3.960	.799	.034198	I	.8675	4.418	.995	.042573	I
.6900	3.514	.629	.026934	I	.7800	3.972	.804	.034418	I	.8700	4.431	1.001	.042819	I
.6925	3.527	.634	.027129	I	.7825	3.985	.809	.034639	I	.8725	4.444	1.006	.043065	I
.6950	3.540	.639	.027325	I	.7850	3.998	.815	.034861	I	.8750	4.456	1.012	.043312	I
.6975	3.552	.643	.027522	I	.7875	4.011	.820	.035083	I	.8775	4.469	1.018	.043560	I
.7000	3.565	.648	.027720	I	.7900	4.023	.825	.035306	I	.8800	4.482	1.024	.043809	I
.7025	3.578	.652	.027918	I	.7925	4.036	.830	.035530	I	.8825	4.495	1.030	.044058	I
.7050	3.591	.657	.028117	I	.7950	4.049	.836	.035754	I	.8850	4.507	1.035	.044308	I
.7075	3.603	.662	.028317	I	.7975	4.062	.841	.035980	I	.8875	4.520	1.041	.044559	I
.7100	3.616	.666	.028514	I	.8000	4.074	.846	.036206	I	.8900	4.533	1.047	.044810	I
.7125	3.629	.671	.028719	I	.8025	4.087	.851	.036432	I	.8925	4.545	1.053	.045062	I
.7150	3.641	.676	.028921	I	.8050	4.100	.857	.036660	I	.8950	4.558	1.059	.045315	I
.7175	3.654	.681	.029123	I	.8075	4.113	.862	.036888	I	.8975	4.571	1.065	.045568	I
.7200	3.667	.685	.029327	I	.8100	4.125	.867	.037116	I	.9000	4.584	1.071	.045823	I
.7225	3.680	.690	.029531	I	.8125	4.138	.873	.037346	I	.9025	4.596	1.077	.046078	I
.7250	3.692	.695	.029735	I	.8150	4.151	.878	.037576	I	.9050	4.609	1.083	.046333	I
.7275	3.705	.700	.029941	I	.8175	4.163	.884	.037807	I	.9075	4.622	1.089	.046590	I

500 MILLIMETER PIPE THE FLOW RANGE IS .6400 TO .9075 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
.9100	4.635	1.095	.046847	I	.9375	4.775	1.162	.049721	I	.9650	4.915	1.231	.052681	I
.9125	4.647	1.101	.047104	I	.9400	4.787	1.168	.049986	I	.9675	4.927	1.237	.052954	I
.9150	4.660	1.107	.047363	I	.9425	4.800	1.174	.050253	I	.9700	4.940	1.244	.053228	I
.9175	4.673	1.113	.047622	I	.9450	4.813	1.181	.050520	I	.9725	4.953	1.250	.053503	I
.9200	4.686	1.119	.047882	I	.9475	4.826	1.187	.050787	I	.9750	4.966	1.257	.053778	I
.9225	4.698	1.125	.048142	I	.9500	4.838	1.193	.051056	I	.9775	4.978	1.263	.054054	I
.9250	4.711	1.131	.048404	I	.9525	4.851	1.199	.051325	I	.9800	4.991	1.270	.054331	I
.9275	4.724	1.137	.048666	I	.9550	4.864	1.206	.051594	I	.9825	5.004	1.276	.054609	I
.9300	4.736	1.143	.048928	I	.9575	4.876	1.212	.051865	I	.9850	5.017	1.283	.054887	I
.9325	4.749	1.150	.049192	I	.9600	4.889	1.218	.052136	I	.9875	5.029	1.289	.055166	I
.9350	4.762	1.156	.049456	I	.9625	4.902	1.225	.052408	I	.9900	5.042	1.296	.055445	I

500 MILLIMETER PIPE THE FLOW RANGE IS .9100 TO .9900 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBEE'S FORMULA

SCOBEE'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 525 MILLIMETERS

CS = .345

QQ INCREMENT = .0025 CUBIC METERS PER SECOND

AREA = .2165 SQUARE METERS

H = (.43788E-01) * (Q ** 2)

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
.1100	.508	.013	.000530	I	.2000	.924	.044	.001752	I	.2900	1.340	.091	.003683	I
.1125	.520	.014	.000554	I	.2025	.935	.045	.001796	I	.2925	1.351	.093	.003746	I
.1150	.531	.014	.000579	I	.2050	.947	.045	.001840	I	.2950	1.363	.095	.003811	I
.1175	.543	.015	.000605	I	.2075	.959	.047	.001885	I	.2975	1.374	.096	.003875	I
.1200	.554	.016	.000631	I	.2100	.970	.048	.001931	I	.3000	1.386	.098	.003941	I
.1225	.566	.016	.000657	I	.2125	.982	.049	.001977	I	.3025	1.397	.100	.004007	I
.1250	.577	.017	.000684	I	.2150	.993	.050	.002024	I	.3050	1.409	.101	.004073	I
.1275	.589	.018	.000712	I	.2175	1.005	.051	.002071	I	.3075	1.420	.103	.004140	I
.1300	.601	.018	.000740	I	.2200	1.016	.053	.002119	I	.3100	1.432	.105	.004208	I
.1325	.612	.019	.000769	I	.2225	1.028	.054	.002168	I	.3125	1.444	.106	.004276	I
.1350	.624	.020	.000798	I	.2250	1.039	.055	.002217	I	.3150	1.455	.108	.004345	I
.1375	.635	.021	.000828	I	.2275	1.051	.056	.002266	I	.3175	1.467	.110	.004414	I
.1400	.647	.021	.000858	I	.2300	1.062	.058	.002316	I	.3200	1.478	.111	.004484	I
.1425	.658	.022	.000889	I	.2325	1.074	.059	.002367	I	.3225	1.490	.113	.004554	I
.1450	.670	.023	.000921	I	.2350	1.086	.060	.002418	I	.3250	1.501	.115	.004625	I
.1475	.681	.024	.000953	I	.2375	1.097	.061	.002470	I	.3275	1.513	.117	.004697	I
.1500	.693	.024	.000985	I	.2400	1.109	.063	.002522	I	.3300	1.524	.118	.004768	I
.1525	.704	.025	.001018	I	.2425	1.120	.064	.002575	I	.3325	1.536	.120	.004841	I
.1550	.716	.026	.001052	I	.2450	1.132	.065	.002628	I	.3350	1.548	.122	.004914	I
.1575	.728	.027	.001086	I	.2475	1.143	.067	.002682	I	.3375	1.559	.124	.004988	I
.1600	.739	.028	.001121	I	.2500	1.155	.068	.002737	I	.3400	1.571	.126	.005062	I
.1625	.751	.029	.001156	I	.2525	1.166	.069	.002792	I	.3425	1.582	.128	.005137	I
.1650	.762	.030	.001192	I	.2550	1.178	.071	.002847	I	.3450	1.594	.129	.005212	I
.1675	.774	.031	.001229	I	.2575	1.190	.072	.002903	I	.3475	1.605	.131	.005288	I
.1700	.785	.031	.001265	I	.2600	1.201	.074	.002960	I	.3500	1.617	.133	.005364	I
.1725	.797	.032	.001303	I	.2625	1.213	.075	.003017	I	.3525	1.628	.135	.005441	I
.1750	.808	.033	.001341	I	.2650	1.224	.076	.003075	I	.3550	1.640	.137	.005518	I
.1775	.820	.034	.001380	I	.2675	1.236	.078	.003133	I	.3575	1.651	.139	.005596	I
.1800	.832	.035	.001419	I	.2700	1.247	.079	.003192	I	.3600	1.663	.141	.005675	I
.1825	.843	.036	.001458	I	.2725	1.259	.081	.003252	I	.3625	1.675	.143	.005754	I
.1850	.855	.037	.001499	I	.2750	1.270	.082	.003311	I	.3650	1.686	.145	.005834	I
.1875	.866	.038	.001539	I	.2775	1.282	.084	.003372	I	.3675	1.698	.147	.005914	I
.1900	.878	.039	.001581	I	.2800	1.293	.085	.003433	I	.3700	1.709	.149	.005995	I
.1925	.889	.040	.001623	I	.2825	1.305	.087	.003495	I	.3725	1.721	.151	.006076	I
.1950	.901	.041	.001665	I	.2850	1.317	.088	.003557	I	.3750	1.732	.153	.006158	I
.1975	.912	.042	.001708	I	.2875	1.328	.090	.003619	I	.3775	1.744	.155	.006240	I

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
.3800	1.755	.157	.006323	I	.4700	2.171	.240	.009673	I	.5600	2.587	.341	.013732	I
.3825	1.767	.159	.006406	I	.4725	2.183	.243	.009776	I	.5625	2.598	.344	.013855	I
.3850	1.778	.161	.006490	I	.4750	2.194	.245	.009880	I	.5650	2.610	.347	.013978	I
.3875	1.790	.163	.006575	I	.4775	2.206	.248	.009984	I	.5675	2.622	.350	.014102	I
.3900	1.802	.165	.006660	I	.4800	2.217	.251	.010089	I	.5700	2.633	.353	.014227	I
.3925	1.813	.168	.006746	I	.4825	2.229	.253	.010194	I	.5725	2.645	.356	.014352	I
.3950	1.825	.170	.006832	I	.4850	2.240	.256	.010300	I	.5750	2.656	.360	.014477	I
.3975	1.836	.172	.006919	I	.4875	2.252	.258	.010406	I	.5775	2.668	.363	.014603	I
.4000	1.848	.174	.007006	I	.4900	2.264	.261	.010513	I	.5800	2.679	.366	.014730	I
.4025	1.859	.176	.007094	I	.4925	2.275	.264	.010621	I	.5825	2.691	.369	.014857	I
.4050	1.871	.178	.007182	I	.4950	2.287	.266	.010729	I	.5850	2.702	.372	.014985	I
.4075	1.882	.181	.007271	I	.4975	2.298	.269	.010838	I	.5875	2.714	.375	.015114	I
.4100	1.894	.183	.007361	I	.5000	2.310	.272	.010947	I	.5900	2.725	.379	.015242	I
.4125	1.906	.185	.007451	I	.5025	2.321	.275	.011057	I	.5925	2.737	.382	.015372	I
.4150	1.917	.187	.007541	I	.5050	2.333	.277	.011167	I	.5950	2.749	.385	.015502	I
.4175	1.929	.190	.007632	I	.5075	2.344	.280	.011278	I	.5975	2.760	.388	.015632	I
.4200	1.940	.192	.007724	I	.5100	2.356	.283	.011389	I	.6000	2.772	.392	.015764	I
.4225	1.952	.194	.007816	I	.5125	2.367	.286	.011501	I	.6025	2.783	.395	.015895	I
.4250	1.963	.196	.007909	I	.5150	2.379	.288	.011614	I	.6050	2.795	.398	.016027	I
.4275	1.975	.199	.008002	I	.5175	2.391	.291	.011727	I	.6075	2.806	.401	.016160	I
.4300	1.986	.201	.008096	I	.5200	2.402	.294	.011840	I	.6100	2.818	.405	.016293	I
.4325	1.998	.203	.008191	I	.5225	2.414	.297	.011954	I	.6125	2.829	.408	.016427	I
.4350	2.009	.206	.008286	I	.5250	2.425	.300	.012069	I	.6150	2.841	.411	.016562	I
.4375	2.021	.208	.008381	I	.5275	2.437	.303	.012184	I	.6175	2.853	.415	.016697	I
.4400	2.033	.211	.008477	I	.5300	2.448	.306	.012300	I	.6200	2.864	.418	.016832	I
.4425	2.044	.213	.008574	I	.5325	2.460	.308	.012416	I	.6225	2.876	.421	.016968	I
.4450	2.056	.215	.008671	I	.5350	2.471	.311	.012533	I	.6250	2.887	.425	.017105	I
.4475	2.067	.218	.008769	I	.5375	2.483	.314	.012651	I	.6275	2.899	.428	.017242	I
.4500	2.079	.220	.008867	I	.5400	2.495	.317	.012768	I	.6300	2.910	.432	.017379	I
.4525	2.090	.223	.008966	I	.5425	2.506	.320	.012887	I	.6325	2.922	.435	.017518	I
.4550	2.102	.225	.009065	I	.5450	2.518	.323	.013006	I	.6350	2.933	.439	.017656	I
.4575	2.113	.228	.009165	I	.5475	2.529	.326	.013126	I	.6375	2.945	.442	.017796	I
.4600	2.125	.230	.009265	I	.5500	2.541	.329	.013246	I	.6400	2.956	.445	.017935	I
.4625	2.136	.233	.009366	I	.5525	2.552	.332	.013366	I	.6425	2.968	.449	.018076	I
.4650	2.148	.235	.009468	I	.5550	2.564	.335	.013488	I	.6450	2.980	.452	.018217	I
.4675	2.160	.238	.009570	I	.5575	2.575	.338	.013609	I	.6475	2.991	.456	.018358	I

525 MILLIMETER PIPE THE FLOW RANGE IS .3800 TO .5475 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
.6500	3.003	.460	.010500 I	.7400	3.418	.596	.023978 I	.8300	3.834	.749	.030165 I
.6525	3.014	.463	.010643 I	.7425	3.430	.600	.024140 I	.8325	3.846	.754	.030347 I
.6550	3.026	.467	.010786 I	.7450	3.441	.604	.024303 I	.8350	3.857	.758	.030530 I
.6575	3.037	.470	.010930 I	.7475	3.453	.608	.024467 I	.8375	3.869	.763	.030713 I
.6600	3.049	.474	.011074 I	.7500	3.465	.612	.024631 I	.8400	3.880	.767	.030897 I
.6625	3.060	.477	.011219 I	.7525	3.476	.616	.024795 I	.8425	3.892	.772	.031081 I
.6650	3.072	.481	.011364 I	.7550	3.488	.620	.024960 I	.8450	3.903	.777	.031265 I
.6675	3.083	.485	.011510 I	.7575	3.499	.624	.025126 I	.8475	3.915	.781	.031451 I
.6700	3.095	.488	.011656 I	.7600	3.511	.628	.025292 I	.8500	3.927	.786	.031637 I
.6725	3.107	.492	.011803 I	.7625	3.522	.632	.025458 I	.8525	3.938	.790	.031823 I
.6750	3.118	.496	.011951 I	.7650	3.534	.637	.025626 I	.8550	3.950	.795	.032010 I
.6775	3.130	.499	.022099 I	.7675	3.545	.641	.025793 I	.8575	3.961	.800	.032197 I
.6800	3.141	.503	.020247 I	.7700	3.557	.645	.025962 I	.8600	3.973	.804	.032385 I
.6825	3.153	.507	.020397 I	.7725	3.569	.649	.026131 I	.8625	3.984	.809	.032574 I
.6850	3.164	.510	.020546 I	.7750	3.580	.653	.026300 I	.8650	3.996	.814	.032763 I
.6875	3.176	.514	.020697 I	.7775	3.592	.657	.026470 I	.8675	4.007	.819	.032953 I
.6900	3.187	.518	.020847 I	.7800	3.603	.662	.026640 I	.8700	4.019	.823	.033143 I
.6925	3.199	.522	.020999 I	.7825	3.615	.666	.026811 I	.8725	4.030	.828	.033334 I
.6950	3.211	.525	.021151 I	.7850	3.626	.670	.026983 I	.8750	4.042	.833	.033525 I
.6975	3.222	.529	.021303 I	.7875	3.638	.675	.027155 I	.8775	4.054	.837	.033717 I
.7000	3.234	.533	.021456 I	.7900	3.649	.679	.027328 I	.8800	4.065	.842	.033909 I
.7025	3.245	.537	.021609 I	.7925	3.661	.683	.027501 I	.8825	4.077	.847	.034102 I
.7050	3.257	.541	.021764 I	.7950	3.672	.687	.027675 I	.8850	4.088	.852	.034296 I
.7075	3.268	.544	.021918 I	.7975	3.684	.692	.027849 I	.8875	4.100	.857	.034490 I
.7100	3.280	.548	.022073 I	.8000	3.696	.696	.028024 I	.8900	4.111	.862	.034684 I
.7125	3.291	.552	.022229 I	.8025	3.707	.700	.028200 I	.8925	4.123	.866	.034879 I
.7150	3.303	.556	.022385 I	.8050	3.719	.705	.028376 I	.8950	4.134	.871	.035075 I
.7175	3.314	.560	.022542 I	.8075	3.730	.709	.028552 I	.8975	4.146	.876	.035271 I
.7200	3.326	.564	.022700 I	.8100	3.742	.714	.028729 I	.9000	4.158	.881	.035468 I
.7225	3.338	.568	.022857 I	.8125	3.753	.718	.028907 I	.9025	4.169	.886	.035665 I
.7250	3.349	.572	.023016 I	.8150	3.765	.722	.029085 I	.9050	4.181	.891	.035863 I
.7275	3.361	.576	.023175 I	.8175	3.776	.727	.029264 I	.9075	4.192	.896	.036062 I
.7300	3.372	.580	.023334 I	.8200	3.788	.731	.029443 I	.9100	4.204	.901	.036261 I
.7325	3.384	.584	.023495 I	.8225	3.799	.736	.029623 I	.9125	4.215	.906	.036460 I
.7350	3.395	.588	.023655 I	.8250	3.811	.740	.029803 I	.9150	4.227	.911	.036660 I
.7375	3.407	.592	.023816 I	.8275	3.823	.745	.029984 I	.9175	4.238	.916	.036861 I

525 MILLIMETER PIPE THE FLOW RANGE IS .6500 TO .9175 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
.9201	4.250	.921	.037662	I	.9775	4.516	1.039	.041839	I	1.0350	4.781	1.165	.046906	I
.9225	4.251	.926	.037264	I	.9803	4.527	1.045	.042054	I	1.0375	4.793	1.171	.047133	I
.9250	4.273	.931	.037466	I	.9825	4.539	1.050	.042269	I	1.0400	4.804	1.176	.047361	I
.9275	4.285	.936	.037669	I	.9850	4.550	1.055	.042484	I	1.0425	4.816	1.182	.047589	I
.9300	4.296	.941	.037872	I	.9875	4.562	1.061	.042700	I	1.0450	4.827	1.188	.047817	I
.9325	4.308	.946	.038076	I	.9900	4.573	1.066	.042916	I	1.0475	4.839	1.193	.048046	I
.9350	4.319	.951	.038280	I	.9925	4.585	1.071	.043133	I	1.0500	4.850	1.199	.048276	I
.9375	4.331	.956	.038485	I	.9950	4.596	1.077	.043351	I	1.0525	4.862	1.205	.048506	I
.9400	4.342	.961	.038691	I	.9975	4.608	1.082	.043569	I	1.0550	4.874	1.211	.048737	I
.9425	4.354	.966	.038897	I	1.0000	4.619	1.088	.043788	I	1.0575	4.885	1.216	.048968	I
.9450	4.365	.971	.039103	I	1.0025	4.631	1.093	.044007	I	1.0600	4.897	1.222	.049200	I
.9475	4.377	.976	.039311	I	1.0050	4.643	1.099	.044227	I	1.0625	4.908	1.228	.049432	I
.9500	4.389	.982	.039518	I	1.0075	4.654	1.104	.044447	I	1.0650	4.920	1.234	.049665	I
.9525	4.400	.987	.039727	I	1.0100	4.666	1.109	.044668	I	1.0675	4.931	1.239	.049899	I
.9550	4.412	.992	.039935	I	1.0125	4.677	1.115	.044889	I	1.0700	4.943	1.245	.050132	I
.9575	4.423	.997	.040145	I	1.0150	4.689	1.121	.045111	I	1.0725	4.954	1.251	.050367	I
.9600	4.435	1.002	.040355	I	1.0175	4.700	1.126	.045334	I	1.0750	4.966	1.257	.050602	I
.9625	4.446	1.008	.040565	I	1.0200	4.712	1.132	.045557	I	1.0775	4.977	1.263	.050838	I
.9650	4.458	1.013	.040776	I	1.0225	4.723	1.137	.045780	I	1.0800	4.989	1.269	.051074	I
.9675	4.469	1.018	.040988	I	1.0250	4.735	1.143	.046004	I	1.0825	5.001	1.274	.051311	I
.9700	4.481	1.023	.041200	I	1.0275	4.746	1.148	.046229	I	1.0850	5.012	1.280	.051548	I
.9725	4.492	1.029	.041412	I	1.0300	4.758	1.154	.046454	I	1.0875	5.024	1.286	.051786	I
.9750	4.504	1.034	.041626	I	1.0325	4.770	1.159	.046680	I	1.0900	5.035	1.292	.052024	I

525 MILLIMETER PIPE THE FLOW RANGE IS .9200 TO 1.0900 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBAY'S FORMULA

SCOBAY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 600 MILLIMETERS

CS = .370

QQ INCREMENT = .0050 CUBIC METERS PER SECOND

AREA = .2827 SQUARE METERS

$H = (.10006E-01) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
.1450	.513	.013	.000397	I	.3250	1.149	.067	.001995	I	.5050	1.786	.163	.004816	I
.1500	.531	.014	.000425	I	.3300	1.167	.069	.002057	I	.5100	1.804	.166	.004912	I
.1550	.548	.015	.000454	I	.3350	1.185	.072	.002119	I	.5150	1.821	.169	.005009	I
.1600	.566	.016	.000483	I	.3400	1.203	.074	.002183	I	.5200	1.839	.172	.005107	I
.1650	.584	.017	.000514	I	.3450	1.220	.076	.002248	I	.5250	1.857	.176	.005205	I
.1700	.601	.018	.000546	I	.3500	1.238	.078	.002313	I	.5300	1.874	.179	.005305	I
.1750	.619	.020	.000578	I	.3550	1.256	.080	.002380	I	.5350	1.892	.182	.005406	I
.1800	.637	.021	.000612	I	.3600	1.273	.083	.002448	I	.5400	1.910	.186	.005507	I
.1850	.654	.022	.000646	I	.3650	1.291	.085	.002516	I	.5450	1.928	.189	.005609	I
.1900	.672	.023	.000682	I	.3700	1.309	.087	.002585	I	.5500	1.945	.193	.005713	I
.1950	.690	.024	.000718	I	.3750	1.326	.090	.002656	I	.5550	1.963	.196	.005817	I
.2000	.707	.026	.000755	I	.3800	1.344	.092	.002727	I	.5600	1.981	.200	.005922	I
.2050	.725	.027	.000794	I	.3850	1.362	.095	.002799	I	.5650	1.998	.204	.006029	I
.2100	.743	.028	.000833	I	.3900	1.379	.097	.002872	I	.5700	2.016	.207	.006136	I
.2150	.760	.029	.000873	I	.3950	1.397	.099	.002947	I	.5750	2.034	.211	.006244	I
.2200	.778	.031	.000914	I	.4000	1.415	.102	.003022	I	.5800	2.051	.214	.006353	I
.2250	.796	.032	.000956	I	.4050	1.432	.105	.003098	I	.5850	2.069	.218	.006463	I
.2300	.813	.034	.000999	I	.4100	1.450	.107	.003175	I	.5900	2.087	.222	.006574	I
.2350	.831	.035	.001043	I	.4150	1.468	.110	.003253	I	.5950	2.104	.226	.006686	I
.2400	.849	.037	.001088	I	.4200	1.485	.112	.003331	I	.6000	2.122	.230	.006799	I
.2450	.867	.038	.001134	I	.4250	1.503	.115	.003411	I	.6050	2.140	.233	.006913	I
.2500	.884	.040	.001180	I	.4300	1.521	.118	.003492	I	.6100	2.157	.237	.007027	I
.2550	.902	.041	.001228	I	.4350	1.538	.121	.003574	I	.6150	2.175	.241	.007143	I
.2600	.920	.043	.001277	I	.4400	1.556	.123	.003656	I	.6200	2.193	.245	.007260	I
.2650	.937	.045	.001326	I	.4450	1.574	.126	.003740	I	.6250	2.210	.249	.007377	I
.2700	.955	.046	.001377	I	.4500	1.592	.129	.003824	I	.6300	2.228	.253	.007496	I
.2750	.973	.048	.001428	I	.4550	1.609	.132	.003910	I	.6350	2.246	.257	.007615	I
.2800	.990	.050	.001481	I	.4600	1.627	.135	.003996	I	.6400	2.264	.261	.007736	I
.2850	1.008	.052	.001534	I	.4650	1.645	.138	.004084	I	.6450	2.281	.265	.007857	I
.2900	1.026	.054	.001588	I	.4700	1.662	.141	.004172	I	.6500	2.299	.269	.007979	I
.2950	1.043	.055	.001644	I	.4750	1.680	.144	.004261	I	.6550	2.317	.274	.008102	I
.3000	1.061	.057	.001700	I	.4800	1.698	.147	.004351	I	.6600	2.334	.278	.008227	I
.3050	1.079	.059	.001757	I	.4850	1.715	.150	.004442	I	.6650	2.352	.282	.008352	I
.3100	1.096	.061	.001815	I	.4900	1.733	.153	.004534	I	.6700	2.370	.286	.008478	I
.3150	1.114	.063	.001874	I	.4950	1.751	.156	.004627	I	.6750	2.387	.290	.008605	I
.3200	1.132	.065	.001934	I	.5000	1.768	.159	.004721	I	.6800	2.405	.295	.008733	I

600 MILLIMETER PIPE THE FLOW RANGE IS .1450 TO .6800 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
.6850	2.423	.299	.008862	I	.8650	3.059	.477	.014131	I	1.0450	3.696	.696	.020623	I
.6900	2.440	.304	.008991	I	.8700	3.077	.483	.014294	I	1.0500	3.714	.703	.020821	I
.6950	2.458	.304	.009122	I	.8750	3.095	.488	.014459	I	1.0550	3.731	.710	.021020	I
.7000	2.476	.312	.009254	I	.8800	3.112	.494	.014625	I	1.0600	3.749	.716	.021220	I
.7050	2.493	.317	.009387	I	.8850	3.130	.499	.014792	I	1.0650	3.767	.723	.021420	I
.7100	2.511	.321	.009520	I	.8900	3.148	.505	.014959	I	1.0700	3.784	.730	.021622	I
.7150	2.529	.326	.009655	I	.8950	3.165	.511	.015128	I	1.0750	3.802	.737	.021825	I
.7200	2.546	.331	.009790	I	.9000	3.183	.516	.015297	I	1.0800	3.820	.744	.022028	I
.7250	2.564	.335	.009927	I	.9050	3.201	.522	.015468	I	1.0850	3.837	.751	.022233	I
.7300	2.582	.340	.010064	I	.9100	3.218	.528	.015639	I	1.0900	3.855	.757	.022438	I
.7350	2.600	.344	.010202	I	.9150	3.236	.534	.015811	I	1.0950	3.873	.764	.022644	I
.7400	2.617	.349	.010342	I	.9200	3.254	.540	.015985	I	1.1000	3.890	.771	.022851	I
.7450	2.635	.354	.010482	I	.9250	3.272	.546	.016159	I	1.1050	3.908	.778	.023060	I
.7500	2.653	.359	.010623	I	.9300	3.289	.551	.016334	I	1.1100	3.926	.786	.023269	I
.7550	2.670	.363	.010765	I	.9350	3.307	.557	.016510	I	1.1150	3.943	.793	.023479	I
.7600	2.688	.368	.010908	I	.9400	3.325	.563	.016687	I	1.1200	3.961	.800	.023690	I
.7650	2.706	.373	.011052	I	.9450	3.342	.569	.016865	I	1.1250	3.979	.807	.023902	I
.7700	2.723	.378	.011197	I	.9500	3.360	.575	.017044	I	1.1300	3.997	.814	.024115	I
.7750	2.741	.383	.011343	I	.9550	3.378	.581	.017224	I	1.1350	4.014	.821	.024329	I
.7800	2.759	.388	.011490	I	.9600	3.395	.588	.017405	I	1.1400	4.032	.829	.024544	I
.7850	2.776	.393	.011638	I	.9650	3.413	.594	.017587	I	1.1450	4.050	.836	.024759	I
.7900	2.794	.398	.011786	I	.9700	3.431	.600	.017769	I	1.1500	4.067	.843	.024976	I
.7950	2.812	.403	.011936	I	.9750	3.448	.606	.017953	I	1.1550	4.085	.851	.025194	I
.8000	2.829	.408	.012087	I	.9800	3.466	.612	.018138	I	1.1600	4.103	.858	.025412	I
.8050	2.847	.413	.012238	I	.9850	3.484	.619	.018323	I	1.1650	4.120	.865	.025632	I
.8100	2.865	.418	.012391	I	.9900	3.501	.625	.018510	I	1.1700	4.138	.873	.025852	I
.8150	2.882	.423	.012544	I	.9950	3.519	.631	.018697	I	1.1750	4.156	.880	.026074	I
.8200	2.900	.429	.012699	I	1.0000	3.537	.638	.018886	I	1.1800	4.173	.888	.026296	I
.8250	2.918	.434	.012854	I	1.0050	3.554	.644	.019075	I	1.1850	4.191	.895	.026520	I
.8300	2.936	.439	.013010	I	1.0100	3.572	.650	.019265	I	1.1900	4.209	.903	.026744	I
.8350	2.953	.445	.013167	I	1.0150	3.590	.657	.019456	I	1.1950	4.226	.910	.026969	I
.8400	2.971	.450	.013326	I	1.0200	3.608	.663	.019648	I	1.2000	4.244	.918	.027195	I
.8450	2.989	.455	.013485	I	1.0250	3.625	.670	.019842	I	1.2050	4.262	.926	.027422	I
.8500	3.006	.461	.013645	I	1.0300	3.643	.676	.020036	I	1.2100	4.279	.933	.027650	I
.8550	3.024	.466	.013806	I	1.0350	3.661	.683	.020231	I	1.2150	4.297	.941	.027879	I
.8600	3.042	.472	.013968	I	1.0400	3.678	.690	.020427	I	1.2200	4.315	.949	.028109	I

600 MILLIMETER PIPE THE FLOW RANGE IS .6850 TO 1.2200 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
1.2250	4.333	.957	.028340	I 1.2950	4.580	1.069	.031671	I 1.3650	4.828	1.188	.035188
1.2300	4.350	.965	.028572	I 1.3000	4.598	1.077	.031917	I 1.3700	4.845	1.197	.035446
1.2350	4.368	.972	.028805	I 1.3050	4.615	1.086	.032163	I 1.3750	4.863	1.205	.035705
1.2400	4.386	.980	.029038	I 1.3100	4.633	1.094	.032409	I 1.3800	4.881	1.214	.035966
1.2450	4.403	.988	.029273	I 1.3150	4.651	1.102	.032657	I 1.3850	4.898	1.223	.036227
1.2500	4.421	.996	.029509	I 1.3200	4.669	1.111	.032906	I 1.3900	4.916	1.232	.036489
1.2550	4.439	1.004	.029745	I 1.3250	4.686	1.119	.033156	I 1.3950	4.934	1.241	.036752
1.2600	4.456	1.012	.029983	I 1.3300	4.704	1.128	.033407	I 1.4000	4.951	1.250	.037016
1.2650	4.474	1.020	.030221	I 1.3350	4.722	1.136	.033658	I 1.4050	4.969	1.259	.037280
1.2700	4.492	1.028	.030460	I 1.3400	4.739	1.145	.033911	I 1.4100	4.987	1.268	.037546
1.2750	4.509	1.036	.030701	I 1.3450	4.757	1.153	.034164	I 1.4150	5.005	1.277	.037813
1.2800	4.527	1.045	.030942	I 1.3500	4.775	1.162	.034419	I 1.4200	5.022	1.286	.038081
1.2850	4.545	1.053	.031184	I 1.3550	4.792	1.171	.034674	I 1.4250	5.040	1.295	.038349
1.2900	4.562	1.061	.031427	I 1.3600	4.810	1.179	.034931	I 1.4300	5.058	1.304	.038619

500 MILLIMETER PIPE THE FLOW RANGE IS 1.2250 TO 1.4300 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBNEY'S FORMULA

SCOBNEY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SFCOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 675 MILLIMETERS

CS = .370

QQ INCREMENT = .0050 CUBIC METERS PER SECOND

AREA = .3578 SQUARE METERS

$H = (.10176E-01) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
.1800	.503	.013	.000330 I	.3600	1.006	.052	.001319 I	.5400	1.509	.116	.002967 I
.1850	.517	.014	.000348 I	.3650	1.020	.053	.001356 I	.5450	1.523	.118	.003023 I
.1900	.531	.014	.000367 I	.3700	1.034	.054	.001393 I	.5500	1.537	.120	.003078 I
.1950	.545	.015	.000387 I	.3750	1.048	.056	.001431 I	.5550	1.551	.123	.003134 I
.2000	.559	.016	.000407 I	.3800	1.062	.057	.001469 I	.5600	1.565	.125	.003191 I
.2050	.573	.017	.000428 I	.3850	1.076	.059	.001508 I	.5650	1.579	.127	.003248 I
.2100	.587	.018	.000449 I	.3900	1.090	.061	.001548 I	.5700	1.593	.129	.003306 I
.2150	.601	.018	.000470 I	.3950	1.104	.062	.001588 I	.5750	1.607	.132	.003364 I
.2200	.615	.019	.000493 I	.4000	1.118	.064	.001628 I	.5800	1.621	.134	.003423 I
.2250	.629	.020	.000515 I	.4050	1.132	.065	.001669 I	.5850	1.635	.136	.003482 I
.2300	.643	.021	.000538 I	.4100	1.146	.067	.001711 I	.5900	1.649	.139	.003542 I
.2350	.657	.022	.000562 I	.4150	1.160	.069	.001753 I	.5950	1.663	.141	.003603 I
.2400	.671	.023	.000586 I	.4200	1.174	.070	.001795 I	.6000	1.677	.143	.003663 I
.2450	.685	.024	.000611 I	.4250	1.188	.072	.001838 I	.6050	1.691	.146	.003725 I
.2500	.699	.025	.000636 I	.4300	1.202	.074	.001882 I	.6100	1.705	.148	.003786 I
.2550	.713	.026	.000662 I	.4350	1.216	.075	.001926 I	.6150	1.719	.151	.003849 I
.2600	.727	.027	.000688 I	.4400	1.230	.077	.001970 I	.6200	1.733	.153	.003912 I
.2650	.741	.028	.000715 I	.4450	1.244	.079	.002015 I	.6250	1.747	.155	.003975 I
.2700	.755	.029	.000742 I	.4500	1.258	.081	.002061 I	.6300	1.761	.158	.004039 I
.2750	.768	.030	.000770 I	.4550	1.271	.082	.002107 I	.6350	1.774	.160	.004103 I
.2800	.782	.031	.000798 I	.4600	1.285	.084	.002153 I	.6400	1.788	.163	.004168 I
.2850	.796	.032	.000827 I	.4650	1.299	.086	.002200 I	.6450	1.802	.166	.004233 I
.2900	.810	.033	.000856 I	.4700	1.313	.088	.002248 I	.6500	1.816	.168	.004299 I
.2950	.824	.035	.000886 I	.4750	1.327	.090	.002296 I	.6550	1.830	.171	.004366 I
.3000	.838	.036	.000916 I	.4800	1.341	.092	.002345 I	.6600	1.844	.173	.004433 I
.3050	.852	.037	.000947 I	.4850	1.355	.094	.002394 I	.6650	1.858	.176	.004500 I
.3100	.866	.038	.000978 I	.4900	1.369	.096	.002443 I	.6700	1.872	.179	.004568 I
.3150	.880	.039	.001010 I	.4950	1.383	.098	.002493 I	.6750	1.886	.181	.004636 I
.3200	.894	.041	.001042 I	.5000	1.397	.100	.002544 I	.6800	1.900	.184	.004705 I
.3250	.908	.042	.001075 I	.5050	1.411	.102	.002595 I	.6850	1.914	.187	.004775 I
.3300	.922	.043	.001108 I	.5100	1.425	.104	.002647 I	.6900	1.928	.189	.004845 I
.3350	.936	.045	.001142 I	.5150	1.439	.106	.002699 I	.6950	1.942	.192	.004915 I
.3400	.950	.046	.001176 I	.5200	1.453	.108	.002752 I	.7000	1.956	.195	.004986 I
.3450	.964	.047	.001211 I	.5250	1.467	.110	.002805 I	.7050	1.970	.198	.005058 I
.3500	.978	.049	.001247 I	.5300	1.481	.112	.002858 I	.7100	1.984	.201	.005130 I
.3550	.992	.050	.001282 I	.5350	1.495	.114	.002913 I	.7150	1.998	.203	.005202 I

675 MILLIMETER PIPE THE FLOW RANGE IS .1600 TO .7150 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
.7200	2.012	.206	.005275 I	.9000	2.515	.322	.008243 I	1.0800	3.018	.464	.011869 I
.7250	2.026	.209	.005349 I	.9050	2.529	.326	.008334 I	1.0850	3.032	.469	.011979 I
.7300	2.040	.212	.005423 I	.9100	2.543	.330	.008427 I	1.0900	3.046	.473	.012090 I
.7350	2.054	.215	.005497 I	.9150	2.557	.333	.008520 I	1.0950	3.060	.477	.012201 I
.7400	2.068	.218	.005572 I	.9200	2.571	.337	.008613 I	1.1000	3.074	.482	.012313 I
.7450	2.082	.221	.005648 I	.9250	2.585	.341	.008707 I	1.1050	3.088	.486	.012425 I
.7500	2.096	.224	.005724 I	.9300	2.599	.344	.008801 I	1.1100	3.102	.490	.012538 I
.7550	2.110	.227	.005801 I	.9350	2.613	.348	.008896 I	1.1150	3.116	.495	.012651 I
.7600	2.124	.230	.005878 I	.9400	2.627	.352	.008992 I	1.1200	3.130	.499	.012765 I
.7650	2.138	.233	.005955 I	.9450	2.641	.355	.009087 I	1.1250	3.144	.504	.012879 I
.7700	2.152	.236	.006033 I	.9500	2.655	.359	.009184 I	1.1300	3.158	.508	.012994 I
.7750	2.166	.239	.006112 I	.9550	2.669	.363	.009281 I	1.1350	3.172	.513	.013109 I
.7800	2.180	.242	.006191 I	.9600	2.683	.367	.009378 I	1.1400	3.186	.517	.013225 I
.7850	2.194	.245	.006271 I	.9650	2.697	.371	.009476 I	1.1450	3.200	.522	.013341 I
.7900	2.208	.248	.006351 I	.9700	2.711	.374	.009575 I	1.1500	3.214	.526	.013458 I
.7950	2.222	.252	.006432 I	.9750	2.725	.378	.009674 I	1.1550	3.228	.531	.013575 I
.8000	2.236	.255	.006513 I	.9800	2.739	.382	.009773 I	1.1600	3.242	.536	.013693 I
.8050	2.250	.258	.006594 I	.9850	2.753	.386	.009873 I	1.1650	3.256	.540	.013811 I
.8100	2.264	.261	.006676 I	.9900	2.767	.390	.009974 I	1.1700	3.270	.545	.013930 I
.8150	2.278	.264	.006759 I	.9950	2.781	.394	.010075 I	1.1750	3.284	.550	.014049 I
.8200	2.291	.268	.006842 I	1.0000	2.794	.398	.010176 I	1.1800	3.297	.554	.014169 I
.8250	2.305	.271	.006926 I	1.0050	2.808	.402	.010278 I	1.1850	3.311	.559	.014289 I
.8300	2.319	.274	.007010 I	1.0100	2.822	.406	.010381 I	1.1900	3.325	.564	.014410 I
.8350	2.333	.278	.007095 I	1.0150	2.836	.410	.010484 I	1.1950	3.339	.568	.014532 I
.8400	2.347	.281	.007180 I	1.0200	2.850	.414	.010587 I	1.2000	3.353	.573	.014653 I
.8450	2.361	.284	.007266 I	1.0250	2.864	.418	.010691 I	1.2050	3.367	.578	.014776 I
.8500	2.375	.288	.007352 I	1.0300	2.878	.422	.010796 I	1.2100	3.381	.583	.014899 I
.8550	2.389	.291	.007439 I	1.0350	2.892	.426	.010901 I	1.2150	3.395	.588	.015022 I
.8600	2.403	.294	.007526 I	1.0400	2.906	.430	.011006 I	1.2200	3.409	.592	.015146 I
.8650	2.417	.298	.007614 I	1.0450	2.920	.435	.011112 I	1.2250	3.423	.597	.015270 I
.8700	2.431	.301	.007702 I	1.0500	2.934	.439	.011219 I	1.2300	3.437	.602	.015395 I
.8750	2.445	.305	.007791 I	1.0550	2.948	.443	.011326 I	1.2350	3.451	.607	.015521 I
.8800	2.459	.308	.007880 I	1.0600	2.962	.447	.011434 I	1.2400	3.465	.612	.015647 I
.8850	2.473	.312	.007970 I	1.0650	2.976	.451	.011542 I	1.2450	3.479	.617	.015773 I
.8900	2.487	.315	.008060 I	1.0700	2.990	.456	.011651 I	1.2500	3.493	.622	.015900 I
.8950	2.501	.319	.008151 I	1.0750	3.004	.460	.011760 I	1.2550	3.507	.627	.016027 I

675 MILLIMETER PIPE THE FLOW RANGE IS .7200 TO 1.2550 CUBIC METERS PER SECOND

Q	V	HV	H	O	V	HV	H	O	V	HV	H	
1.2600	3.521	.632	.016155	I 1.4400	4.024	.825	.021101	I 1.6200	4.527	1.045	.026706	I
1.2650	3.535	.637	.016284	I 1.4450	4.038	.831	.021248	I 1.6250	4.541	1.051	.026871	I
1.2700	3.549	.642	.016413	I 1.4500	4.052	.837	.021395	I 1.6300	4.555	1.057	.027037	I
1.2750	3.563	.647	.016542	I 1.4550	4.066	.843	.021543	I 1.6350	4.569	1.064	.027203	I
1.2800	3.577	.652	.016672	I 1.4600	4.080	.848	.021691	I 1.6400	4.583	1.071	.027369	I
1.2850	3.591	.657	.016803	I 1.4650	4.094	.854	.021840	I 1.6450	4.597	1.077	.027537	I
1.2900	3.605	.662	.016934	I 1.4700	4.108	.860	.021989	I 1.6500	4.611	1.084	.027704	I
1.2950	3.619	.667	.017065	I 1.4750	4.122	.866	.022139	I 1.6550	4.625	1.090	.027872	I
1.3000	3.633	.673	.017197	I 1.4800	4.136	.872	.022290	I 1.6600	4.639	1.097	.028041	I
1.3050	3.647	.678	.017330	I 1.4850	4.150	.878	.022440	I 1.6650	4.653	1.103	.028210	I
1.3100	3.661	.683	.017463	I 1.4900	4.164	.884	.022592	I 1.6700	4.667	1.110	.028380	I
1.3150	3.675	.688	.017597	I 1.4950	4.178	.890	.022744	I 1.6750	4.681	1.117	.028550	I
1.3200	3.689	.694	.017731	I 1.5000	4.192	.896	.022896	I 1.6800	4.695	1.123	.028721	I
1.3250	3.703	.699	.017865	I 1.5050	4.206	.902	.023049	I 1.6850	4.709	1.130	.028892	I
1.3300	3.717	.704	.018000	I 1.5100	4.220	.908	.023202	I 1.6900	4.723	1.137	.029064	I
1.3350	3.731	.709	.018136	I 1.5150	4.234	.914	.023356	I 1.6950	4.737	1.144	.029236	I
1.3400	3.745	.715	.018272	I 1.5200	4.248	.920	.023511	I 1.7000	4.751	1.150	.029409	I
1.3450	3.759	.720	.018409	I 1.5250	4.262	.926	.023666	I 1.7050	4.765	1.157	.029582	I
1.3500	3.773	.725	.018546	I 1.5300	4.276	.932	.023821	I 1.7100	4.779	1.164	.029756	I
1.3550	3.787	.731	.018683	I 1.5350	4.290	.938	.023977	I 1.7150	4.793	1.171	.029930	I
1.3600	3.800	.736	.018822	I 1.5400	4.304	.944	.024133	I 1.7200	4.807	1.178	.030105	I
1.3650	3.814	.742	.018960	I 1.5450	4.317	.950	.024290	I 1.7250	4.820	1.184	.030280	I
1.3700	3.828	.747	.019099	I 1.5500	4.331	.956	.024448	I 1.7300	4.834	1.191	.030456	I
1.3750	3.842	.753	.019239	I 1.5550	4.345	.962	.024606	I 1.7350	4.848	1.198	.030632	I
1.3800	3.856	.758	.019379	I 1.5600	4.359	.969	.024764	I 1.7400	4.862	1.205	.030809	I
1.3850	3.870	.763	.019520	I 1.5650	4.373	.975	.024923	I 1.7450	4.876	1.212	.030986	I
1.3900	3.884	.769	.019661	I 1.5700	4.387	.981	.025083	I 1.7500	4.890	1.219	.031164	I
1.3950	3.898	.775	.019803	I 1.5750	4.401	.987	.025243	I 1.7550	4.904	1.226	.031342	I
1.4000	3.912	.780	.019945	I 1.5800	4.415	.994	.025403	I 1.7600	4.918	1.233	.031521	I
1.4050	3.926	.786	.020088	I 1.5850	4.429	1.000	.025564	I 1.7650	4.932	1.240	.031701	I
1.4100	3.940	.791	.020231	I 1.5900	4.443	1.006	.025726	I 1.7700	4.946	1.247	.031880	I
1.4150	3.954	.797	.020375	I 1.5950	4.457	1.013	.025888	I 1.7750	4.960	1.254	.032061	I
1.4200	3.968	.803	.020519	I 1.6000	4.471	1.019	.026051	I 1.7800	4.974	1.261	.032242	I
1.4250	3.982	.808	.020664	I 1.6050	4.485	1.025	.026214	I 1.7850	4.988	1.268	.032423	I
1.4300	3.996	.814	.020809	I 1.6100	4.499	1.032	.026377	I 1.7900	5.002	1.275	.032605	I
1.4350	4.010	.820	.020955	I 1.6150	4.513	1.038	.026541	I 1.7950	5.016	1.282	.032787	I

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBAY'S FORMULA

SCOBAY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 750 MILLIMETERS

CS = .370

QQ INCREMENT = .0050 CUBIC METERS PER SECOND

AREA = .4418 SQUARE METERS

$H = (.50526E-02) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
.2250	.509	.013	.000296 I	.4050	.917	.043	.000960 I	.5850	1.324	.089	.002003 I
.2300	.521	.014	.000310 I	.4100	.928	.044	.000984 I	.5900	1.335	.091	.002037 I
.2350	.532	.014	.000323 I	.4150	.939	.045	.001008 I	.5950	1.347	.092	.002072 I
.2400	.543	.015	.000337 I	.4200	.951	.046	.001032 I	.6000	1.358	.094	.002107 I
.2450	.555	.016	.000351 I	.4250	.962	.047	.001057 I	.6050	1.369	.096	.002142 I
.2500	.566	.016	.000366 I	.4300	.973	.048	.001082 I	.6100	1.381	.097	.002178 I
.2550	.577	.017	.000381 I	.4350	.985	.049	.001107 I	.6150	1.392	.099	.002214 I
.2600	.589	.018	.000396 I	.4400	.996	.051	.001133 I	.6200	1.403	.100	.002250 I
.2650	.600	.018	.000411 I	.4450	1.007	.052	.001159 I	.6250	1.415	.102	.002286 I
.2700	.611	.019	.000427 I	.4500	1.019	.053	.001185 I	.6300	1.426	.104	.002323 I
.2750	.622	.020	.000443 I	.4550	1.030	.054	.001212 I	.6350	1.437	.105	.002360 I
.2800	.634	.020	.000459 I	.4600	1.041	.055	.001238 I	.6400	1.449	.107	.002397 I
.2850	.645	.021	.000475 I	.4650	1.053	.056	.001265 I	.6450	1.460	.109	.002435 I
.2900	.656	.022	.000492 I	.4700	1.064	.058	.001293 I	.6500	1.471	.110	.002473 I
.2950	.668	.023	.000509 I	.4750	1.075	.059	.001321 I	.6550	1.483	.112	.002511 I
.3000	.679	.024	.000527 I	.4800	1.086	.060	.001348 I	.6600	1.494	.114	.002549 I
.3050	.690	.024	.000544 I	.4850	1.098	.061	.001377 I	.6650	1.505	.115	.002588 I
.3100	.702	.025	.000562 I	.4900	1.109	.063	.001405 I	.6700	1.517	.117	.002627 I
.3150	.713	.026	.000581 I	.4950	1.120	.064	.001434 I	.6750	1.528	.119	.002667 I
.3200	.724	.027	.000599 I	.5000	1.132	.065	.001463 I	.6800	1.539	.121	.002706 I
.3250	.736	.028	.000618 I	.5050	1.143	.067	.001493 I	.6850	1.551	.123	.002746 I
.3300	.747	.028	.000637 I	.5100	1.154	.068	.001522 I	.6900	1.562	.124	.002786 I
.3350	.758	.029	.000657 I	.5150	1.166	.069	.001552 I	.6950	1.573	.126	.002827 I
.3400	.770	.030	.000677 I	.5200	1.177	.071	.001583 I	.7000	1.584	.128	.002868 I
.3450	.781	.031	.000697 I	.5250	1.188	.072	.001613 I	.7050	1.596	.130	.002909 I
.3500	.792	.032	.000717 I	.5300	1.200	.073	.001644 I	.7100	1.607	.132	.002950 I
.3550	.804	.033	.000738 I	.5350	1.211	.075	.001675 I	.7150	1.618	.134	.002992 I
.3600	.815	.034	.000759 I	.5400	1.222	.076	.001707 I	.7200	1.630	.135	.003034 I
.3650	.826	.035	.000780 I	.5450	1.234	.078	.001738 I	.7250	1.641	.137	.003076 I
.3700	.838	.036	.000801 I	.5500	1.245	.079	.001770 I	.7300	1.652	.139	.003119 I
.3750	.849	.037	.000823 I	.5550	1.256	.080	.001803 I	.7350	1.664	.141	.003162 I
.3800	.860	.038	.000845 I	.5600	1.268	.082	.001835 I	.7400	1.675	.143	.003205 I
.3850	.871	.039	.000868 I	.5650	1.279	.083	.001868 I	.7450	1.686	.145	.003248 I
.3900	.883	.040	.000890 I	.5700	1.290	.085	.001902 I	.7500	1.698	.147	.003292 I
.3950	.894	.041	.000913 I	.5750	1.302	.086	.001935 I	.7550	1.709	.149	.003336 I
.4000	.905	.042	.000936 I	.5800	1.313	.088	.001969 I	.7600	1.720	.151	.003380 I

750 MILLIMETER PIPE THE FLOW RANGE IS .2250 TO .7600 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
.7650	1.732	.153	.003425	I	.9450	2.139	.233	.005227	I	1.1250	2.546	.331	.007407	I
.7700	1.743	.155	.003470	I	.9500	2.150	.236	.005282	I	1.1300	2.558	.333	.007473	I
.7750	1.754	.157	.003515	I	.9550	2.162	.238	.005338	I	1.1350	2.569	.336	.007540	I
.7800	1.766	.159	.003561	I	.9600	2.173	.241	.005394	I	1.1400	2.580	.339	.007606	I
.7850	1.777	.161	.003607	I	.9650	2.184	.243	.005450	I	1.1450	2.592	.342	.007673	I
.7900	1.788	.163	.003653	I	.9700	2.196	.246	.005507	I	1.1500	2.603	.345	.007740	I
.7950	1.800	.165	.003699	I	.9750	2.207	.248	.005564	I	1.1550	2.614	.348	.007808	I
.8000	1.811	.167	.003746	I	.9800	2.218	.251	.005621	I	1.1600	2.626	.351	.007875	I
.8050	1.822	.169	.003793	I	.9850	2.230	.253	.005678	I	1.1650	2.637	.354	.007943	I
.8100	1.833	.171	.003840	I	.9900	2.241	.256	.005736	I	1.1700	2.648	.357	.008012	I
.8150	1.845	.173	.003887	I	.9950	2.252	.259	.005794	I	1.1750	2.660	.361	.008080	I
.8200	1.856	.176	.003935	I	1.0000	2.264	.261	.005853	I	1.1800	2.671	.364	.008149	I
.8250	1.867	.178	.003983	I	1.0050	2.275	.264	.005911	I	1.1850	2.682	.367	.008218	I
.8300	1.879	.190	.004032	I	1.0100	2.286	.266	.005970	I	1.1900	2.694	.370	.008288	I
.8350	1.890	.182	.004081	I	1.0150	2.297	.269	.006030	I	1.1950	2.705	.373	.008358	I
.8400	1.901	.184	.004130	I	1.0200	2.309	.272	.006089	I	1.2000	2.716	.376	.008428	I
.8450	1.913	.186	.004179	I	1.0250	2.320	.274	.006149	I	1.2050	2.728	.379	.008498	I
.8500	1.924	.189	.004229	I	1.0300	2.331	.277	.006209	I	1.2100	2.739	.382	.008569	I
.8550	1.935	.191	.004278	I	1.0350	2.343	.280	.006269	I	1.2150	2.750	.386	.008640	I
.8600	1.947	.193	.004329	I	1.0400	2.354	.282	.006330	I	1.2200	2.762	.389	.008711	I
.8650	1.958	.195	.004379	I	1.0450	2.365	.285	.006391	I	1.2250	2.773	.392	.008783	I
.8700	1.969	.198	.004430	I	1.0500	2.377	.288	.006453	I	1.2300	2.784	.395	.008854	I
.8750	1.981	.200	.004481	I	1.0550	2.388	.291	.006514	I	1.2350	2.795	.398	.008927	I
.8800	1.992	.202	.004532	I	1.0600	2.399	.293	.006576	I	1.2400	2.807	.402	.008999	I
.8850	2.003	.205	.004584	I	1.0650	2.411	.296	.006638	I	1.2450	2.818	.405	.009072	I
.8900	2.015	.207	.004636	I	1.0700	2.422	.299	.006701	I	1.2500	2.829	.408	.009145	I
.8950	2.026	.209	.004688	I	1.0750	2.433	.302	.006763	I	1.2550	2.841	.411	.009218	I
.9000	2.037	.212	.004741	I	1.0800	2.445	.305	.006827	I	1.2600	2.852	.415	.009292	I
.9050	2.048	.214	.004793	I	1.0850	2.456	.307	.006890	I	1.2650	2.863	.418	.009366	I
.9100	2.060	.216	.004847	I	1.0900	2.467	.310	.006954	I	1.2700	2.875	.421	.009440	I
.9150	2.071	.219	.004900	I	1.0950	2.479	.313	.007017	I	1.2750	2.886	.425	.009514	I
.9200	2.082	.221	.004954	I	1.1000	2.490	.316	.007082	I	1.2800	2.897	.428	.009589	I
.9250	2.094	.223	.005008	I	1.1050	2.501	.319	.007146	I	1.2850	2.909	.431	.009664	I
.9300	2.105	.226	.005062	I	1.1100	2.513	.322	.007211	I	1.2900	2.920	.435	.009739	I
.9350	2.116	.228	.005117	I	1.1150	2.524	.325	.007276	I	1.2950	2.931	.438	.009815	I
.9400	2.128	.231	.005171	I	1.1200	2.535	.328	.007342	I	1.3000	2.943	.441	.009891	I

750 MILLIMETER PIPE THE FLOW RANGE IS .7650 TO 1.3000 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
1.3050	2.954	.445	.009967 I	1.4850	3.361	.576	.012906 I	1.6650	3.769	.724	.016225 I
1.3100	2.965	.448	.010044 I	1.4900	3.373	.580	.012993 I	1.6700	3.780	.728	.016322 I
1.3150	2.977	.452	.010121 I	1.4950	3.384	.584	.013081 I	1.6750	3.791	.733	.016420 I
1.3200	2.988	.455	.010198 I	1.5000	3.395	.588	.013168 I	1.6800	3.803	.737	.016518 I
1.3250	2.999	.458	.010275 I	1.5050	3.407	.591	.013256 I	1.6850	3.814	.741	.016617 I
1.3300	3.010	.462	.010353 I	1.5100	3.418	.595	.013345 I	1.6900	3.825	.746	.016716 I
1.3350	3.022	.465	.010431 I	1.5150	3.429	.599	.013433 I	1.6950	3.837	.750	.016815 I
1.3400	3.033	.469	.010509 I	1.5200	3.441	.603	.013522 I	1.7000	3.848	.755	.016914 I
1.3450	3.044	.472	.010588 I	1.5250	3.452	.607	.013611 I	1.7050	3.859	.759	.017014 I
1.3500	3.056	.476	.010666 I	1.5300	3.463	.611	.013700 I	1.7100	3.871	.764	.017114 I
1.3550	3.067	.479	.010746 I	1.5350	3.475	.615	.013790 I	1.7150	3.882	.768	.017214 I
1.3600	3.078	.483	.010825 I	1.5400	3.486	.619	.013880 I	1.7200	3.893	.773	.017314 I
1.3650	3.090	.487	.010905 I	1.5450	3.497	.623	.013970 I	1.7250	3.905	.777	.017415 I
1.3700	3.101	.490	.010985 I	1.5500	3.508	.627	.014061 I	1.7300	3.916	.782	.017516 I
1.3750	3.112	.494	.011065 I	1.5550	3.520	.631	.014152 I	1.7350	3.927	.786	.017618 I
1.3800	3.124	.497	.011146 I	1.5600	3.531	.636	.014243 I	1.7400	3.939	.791	.017719 I
1.3850	3.135	.501	.011227 I	1.5650	3.542	.640	.014334 I	1.7450	3.950	.795	.017821 I
1.3900	3.146	.505	.011308 I	1.5700	3.554	.644	.014426 I	1.7500	3.961	.800	.017924 I
1.3950	3.158	.508	.011389 I	1.5750	3.565	.648	.014518 I	1.7550	3.972	.804	.018026 I
1.4000	3.169	.512	.011471 I	1.5800	3.576	.652	.014611 I	1.7600	3.984	.809	.018129 I
1.4050	3.180	.515	.011553 I	1.5850	3.588	.656	.014703 I	1.7650	3.995	.814	.018232 I
1.4100	3.192	.519	.011636 I	1.5900	3.599	.660	.014796 I	1.7700	4.006	.818	.018336 I
1.4150	3.203	.523	.011718 I	1.5950	3.610	.664	.014889 I	1.7750	4.018	.823	.018439 I
1.4200	3.214	.527	.011801 I	1.6000	3.622	.669	.014983 I	1.7800	4.029	.827	.018543 I
1.4250	3.226	.530	.011885 I	1.6050	3.633	.673	.015077 I	1.7850	4.040	.832	.018648 I
1.4300	3.237	.534	.011968 I	1.6100	3.644	.677	.015171 I	1.7900	4.052	.837	.018752 I
1.4350	3.248	.538	.012052 I	1.6150	3.656	.681	.015265 I	1.7950	4.063	.841	.018857 I
1.4400	3.259	.542	.012136 I	1.6200	3.667	.685	.015360 I	1.8000	4.074	.846	.018963 I
1.4450	3.271	.545	.012220 I	1.6250	3.678	.690	.015455 I	1.8050	4.086	.851	.019068 I
1.4500	3.282	.549	.012305 I	1.6300	3.690	.694	.015550 I	1.8100	4.097	.856	.019174 I
1.4550	3.293	.553	.012390 I	1.6350	3.701	.698	.015645 I	1.8150	4.108	.860	.019280 I
1.4600	3.305	.557	.012475 I	1.6400	3.712	.702	.015741 I	1.8200	4.120	.865	.019386 I
1.4650	3.316	.560	.012561 I	1.6450	3.724	.707	.015837 I	1.8250	4.131	.870	.019493 I
1.4700	3.327	.564	.012647 I	1.6500	3.735	.711	.015934 I	1.8300	4.142	.875	.019600 I
1.4750	3.339	.568	.012733 I	1.6550	3.746	.715	.016031 I	1.8350	4.154	.879	.019707 I
1.4800	3.350	.572	.012820 I	1.6600	3.757	.720	.016128 I	1.8400	4.165	.884	.019815 I

750 MILLIMETER PIPE THE FLOW RANGE IS 1.3050 TO 1.8400 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
1.8450	4.176	.889	.019923 I	1.9750	4.470	1.019	.022829 I	2.1050	4.765	1.157	.025933 I
1.8500	4.188	.894	.020031 I	1.9800	4.482	1.024	.022945 I	2.1100	4.776	1.163	.026057 I
1.8550	4.199	.899	.020139 I	1.9850	4.493	1.029	.023061 I	2.1150	4.787	1.168	.026180 I
1.8600	4.210	.903	.020248 I	1.9900	4.504	1.034	.023177 I	2.1200	4.799	1.174	.026304 I
1.8650	4.221	.908	.020357 I	1.9950	4.516	1.039	.023294 I	2.1250	4.810	1.179	.026428 I
1.8700	4.233	.913	.020466 I	2.0000	4.527	1.045	.023411 I	2.1300	4.821	1.185	.026553 I
1.8750	4.244	.918	.020576 I	2.0050	4.538	1.050	.023528 I	2.1350	4.833	1.190	.026678 I
1.8800	4.255	.923	.020686 I	2.0100	4.550	1.055	.023645 I	2.1400	4.844	1.196	.026803 I
1.8850	4.267	.928	.020796 I	2.0150	4.561	1.060	.023763 I	2.1450	4.855	1.202	.026928 I
1.8900	4.278	.933	.020906 I	2.0200	4.572	1.066	.023881 I	2.1500	4.867	1.207	.027054 I
1.8950	4.289	.938	.021017 I	2.0250	4.584	1.071	.023999 I	2.1550	4.878	1.213	.027180 I
1.9000	4.301	.943	.021128 I	2.0300	4.595	1.076	.024118 I	2.1600	4.889	1.218	.027306 I
1.9050	4.312	.948	.021239 I	2.0350	4.606	1.081	.024237 I	2.1650	4.901	1.224	.027433 I
1.9100	4.323	.953	.021351 I	2.0400	4.618	1.087	.024356 I	2.1700	4.912	1.230	.027559 I
1.9150	4.335	.958	.021463 I	2.0450	4.629	1.092	.024476 I	2.1750	4.923	1.235	.027687 I
1.9200	4.346	.963	.021575 I	2.0500	4.640	1.097	.024596 I	2.1800	4.934	1.241	.027814 I
1.9250	4.357	.968	.021688 I	2.0550	4.652	1.103	.024716 I	2.1850	4.946	1.247	.027942 I
1.9300	4.369	.973	.021800 I	2.0600	4.663	1.108	.024836 I	2.1900	4.957	1.252	.028070 I
1.9350	4.380	.978	.021914 I	2.0650	4.674	1.114	.024957 I	2.1950	4.968	1.258	.028198 I
1.9400	4.391	.983	.022027 I	2.0700	4.686	1.119	.025078 I	2.2000	4.980	1.264	.028327 I
1.9450	4.403	.988	.022141 I	2.0750	4.697	1.124	.025199 I	2.2050	4.991	1.270	.028456 I
1.9500	4.414	.993	.022255 I	2.0800	4.708	1.130	.025321 I	2.2100	5.002	1.275	.028585 I
1.9550	4.425	.998	.022369 I	2.0850	4.719	1.135	.025443 I	2.2150	5.014	1.281	.028714 I
1.9600	4.437	1.003	.022483 I	2.0900	4.731	1.141	.025565 I	2.2200	5.025	1.287	.028844 I
1.9650	4.448	1.008	.022598 I	2.0950	4.742	1.146	.025687 I	2.2250	5.036	1.293	.028974 I
1.9700	4.459	1.013	.022713 I	2.1000	4.753	1.152	.025810 I	2.2300	5.048	1.299	.029105 I

750 MILLIMETER PIPE THE FLOW RANGE IS 1.8450 TO 2.2300 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBNEY'S FORMULA

SCOBNEY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 825 MILLIMETERS

CS = .370

QQ INCPMENT = .0050 CUBIC METERS PER SECOND

AREA = .5346 SQUARE METERS

H = (.35485E-02) * (Q ** 2)

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
.2700	.505	.013	.000259 I	.4500	.842	.036	.000719 I	.6300	1.179	.071	.001408 I
.2750	.514	.013	.000268 I	.4550	.851	.037	.000735 I	.6350	1.188	.072	.001431 I
.2800	.524	.014	.000278 I	.4600	.861	.038	.000751 I	.6400	1.197	.073	.001453 I
.2850	.533	.014	.000288 I	.4650	.870	.039	.000767 I	.6450	1.207	.074	.001476 I
.2900	.542	.015	.000298 I	.4700	.879	.039	.000784 I	.6500	1.216	.075	.001499 I
.2950	.552	.016	.000309 I	.4750	.889	.040	.000801 I	.6550	1.225	.077	.001522 I
.3000	.561	.016	.000319 I	.4800	.898	.041	.000818 I	.6600	1.235	.078	.001546 I
.3050	.571	.017	.000330 I	.4850	.907	.042	.000835 I	.6650	1.244	.079	.001569 I
.3100	.580	.017	.000341 I	.4900	.917	.043	.000852 I	.6700	1.253	.080	.001593 I
.3150	.589	.018	.000352 I	.4950	.926	.044	.000869 I	.6750	1.263	.081	.001617 I
.3200	.599	.018	.000363 I	.5000	.935	.045	.000887 I	.6800	1.272	.082	.001641 I
.3250	.608	.019	.000375 I	.5050	.945	.045	.000905 I	.6850	1.281	.084	.001665 I
.3300	.617	.019	.000386 I	.5100	.954	.046	.000923 I	.6900	1.291	.085	.001689 I
.3350	.627	.020	.000398 I	.5150	.963	.047	.000941 I	.6950	1.300	.086	.001714 I
.3400	.636	.021	.000410 I	.5200	.973	.048	.000960 I	.7000	1.309	.087	.001739 I
.3450	.645	.021	.000422 I	.5250	.982	.049	.000978 I	.7050	1.319	.089	.001764 I
.3500	.655	.022	.000435 I	.5300	.991	.050	.000997 I	.7100	1.328	.090	.001789 I
.3550	.664	.022	.000447 I	.5350	1.001	.051	.001016 I	.7150	1.338	.091	.001814 I
.3600	.673	.023	.000460 I	.5400	1.010	.052	.001035 I	.7200	1.347	.092	.001840 I
.3650	.683	.024	.000473 I	.5450	1.020	.053	.001054 I	.7250	1.356	.094	.001865 I
.3700	.692	.024	.000486 I	.5500	1.029	.054	.001073 I	.7300	1.366	.095	.001891 I
.3750	.702	.025	.000499 I	.5550	1.038	.055	.001093 I	.7350	1.375	.096	.001917 I
.3800	.711	.026	.000512 I	.5600	1.048	.056	.001113 I	.7400	1.384	.098	.001943 I
.3850	.720	.026	.000526 I	.5650	1.057	.057	.001133 I	.7450	1.394	.099	.001969 I
.3900	.730	.027	.000540 I	.5700	1.066	.058	.001153 I	.7500	1.403	.100	.001996 I
.3950	.739	.028	.000554 I	.5750	1.076	.059	.001173 I	.7550	1.412	.102	.002023 I
.4000	.748	.029	.000568 I	.5800	1.085	.060	.001194 I	.7600	1.422	.103	.002050 I
.4050	.758	.029	.000582 I	.5850	1.094	.061	.001214 I	.7650	1.431	.104	.002077 I
.4100	.767	.030	.000596 I	.5900	1.104	.062	.001235 I	.7700	1.440	.106	.002104 I
.4150	.776	.031	.000611 I	.5950	1.113	.063	.001256 I	.7750	1.450	.107	.002131 I
.4200	.786	.031	.000626 I	.6000	1.122	.064	.001277 I	.7800	1.459	.109	.002159 I
.4250	.795	.032	.000641 I	.6050	1.132	.065	.001299 I	.7850	1.468	.110	.002187 I
.4300	.804	.033	.000656 I	.6100	1.141	.066	.001320 I	.7900	1.478	.111	.002215 I
.4350	.814	.034	.000671 I	.6150	1.150	.067	.001342 I	.7950	1.487	.113	.002243 I
.4400	.823	.035	.000687 I	.6200	1.160	.069	.001364 I	.8000	1.497	.114	.002271 I
.4450	.832	.035	.000703 I	.6250	1.169	.070	.001386 I	.8050	1.506	.116	.002299 I

825 MILLIMETER PIPE THE FLOW RANGE IS .2700 TO .8050 CUBIC METERS PER SECOND

Q	V	HW	H	Q	V	HW	H	Q	V	HW	H
.8100	1.515	.117	.002328 I	.9900	1.852	.175	.003478 I	1.1700	2.189	.244	.004857 I
.8150	1.525	.118	.002357 I	.9950	1.861	.177	.003513 I	1.1750	2.198	.246	.004899 I
.8200	1.534	.120	.002386 I	1.0000	1.871	.178	.003548 I	1.1800	2.207	.248	.004941 I
.8250	1.543	.121	.002415 I	1.0050	1.880	.180	.003584 I	1.1850	2.217	.250	.004983 I
.8300	1.553	.123	.002445 I	1.0100	1.889	.182	.003620 I	1.1900	2.226	.253	.005025 I
.8350	1.562	.124	.002474 I	1.0150	1.899	.184	.003656 I	1.1950	2.235	.255	.005067 I
.8400	1.571	.126	.002504 I	1.0200	1.908	.186	.003692 I	1.2000	2.245	.257	.005110 I
.8450	1.581	.127	.002534 I	1.0250	1.917	.187	.003728 I	1.2050	2.254	.259	.005152 I
.8500	1.590	.129	.002564 I	1.0300	1.927	.189	.003765 I	1.2100	2.264	.261	.005195 I
.8550	1.599	.130	.002594 I	1.0350	1.936	.191	.003801 I	1.2150	2.273	.263	.005238 I
.8600	1.609	.132	.002624 I	1.0400	1.946	.193	.003838 I	1.2200	2.282	.265	.005282 I
.8650	1.618	.133	.002655 I	1.0450	1.955	.195	.003875 I	1.2250	2.292	.268	.005325 I
.8700	1.627	.135	.002686 I	1.0500	1.964	.197	.003912 I	1.2300	2.301	.270	.005368 I
.8750	1.637	.137	.002717 I	1.0550	1.974	.199	.003950 I	1.2350	2.310	.272	.005412 I
.8800	1.646	.138	.002748 I	1.0600	1.983	.200	.003987 I	1.2400	2.320	.274	.005456 I
.8850	1.656	.140	.002779 I	1.0650	1.992	.202	.004025 I	1.2450	2.329	.276	.005500 I
.8900	1.665	.141	.002811 I	1.0700	2.002	.204	.004063 I	1.2500	2.338	.279	.005544 I
.8950	1.674	.143	.002842 I	1.0750	2.011	.206	.004101 I	1.2550	2.348	.281	.005589 I
.9000	1.684	.144	.002874 I	1.0800	2.020	.208	.004139 I	1.2600	2.357	.283	.005634 I
.9050	1.693	.146	.002906 I	1.0850	2.030	.210	.004177 I	1.2650	2.366	.285	.005678 I
.9100	1.702	.148	.002938 I	1.0900	2.039	.212	.004216 I	1.2700	2.376	.288	.005723 I
.9150	1.712	.149	.002971 I	1.0950	2.048	.214	.004255 I	1.2750	2.385	.290	.005768 I
.9200	1.721	.151	.003003 I	1.1000	2.058	.216	.004294 I	1.2800	2.394	.292	.005814 I
.9250	1.730	.153	.003036 I	1.1050	2.067	.218	.004333 I	1.2850	2.404	.295	.005859 I
.9300	1.740	.154	.003069 I	1.1100	2.076	.220	.004372 I	1.2900	2.413	.297	.005905 I
.9350	1.749	.156	.003102 I	1.1150	2.086	.222	.004412 I	1.2950	2.423	.299	.005951 I
.9400	1.758	.158	.003135 I	1.1200	2.095	.224	.004451 I	1.3000	2.432	.301	.005997 I
.9450	1.768	.159	.003169 I	1.1250	2.105	.226	.004491 I	1.3050	2.441	.304	.006043 I
.9500	1.777	.161	.003202 I	1.1300	2.114	.228	.004531 I	1.3100	2.451	.306	.006090 I
.9550	1.787	.163	.003236 I	1.1350	2.123	.230	.004571 I	1.3150	2.460	.308	.006136 I
.9600	1.796	.164	.003270 I	1.1400	2.133	.232	.004612 I	1.3200	2.469	.311	.006183 I
.9650	1.805	.166	.003304 I	1.1450	2.142	.234	.004652 I	1.3250	2.479	.313	.006230 I
.9700	1.815	.168	.003339 I	1.1500	2.151	.236	.004693 I	1.3300	2.488	.316	.006277 I
.9750	1.824	.170	.003373 I	1.1550	2.161	.238	.004734 I	1.3350	2.497	.318	.006324 I
.9800	1.833	.171	.003408 I	1.1600	2.170	.240	.004775 I	1.3400	2.507	.320	.006372 I
.9850	1.843	.173	.003443 I	1.1650	2.179	.242	.004816 I	1.3450	2.516	.323	.006419 I

825 MILLIMETER PIPE THE FLOW RANGE IS .8100 TO 1.3450 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
1.3500	2.525	.325	.006467	I	1.5300	2.862	.418	.008307	I	1.7100	3.199	.522	.010376	I
1.3550	2.535	.327	.006515	I	1.5350	2.872	.420	.008361	I	1.7150	3.208	.525	.010437	I
1.3600	2.544	.330	.006563	I	1.5400	2.881	.423	.008416	I	1.7200	3.218	.528	.010498	I
1.3650	2.553	.332	.006612	I	1.5450	2.890	.426	.008470	I	1.7250	3.227	.531	.010559	I
1.3700	2.563	.335	.006660	I	1.5500	2.900	.429	.008525	I	1.7300	3.236	.534	.010620	I
1.3750	2.572	.337	.006709	I	1.5550	2.909	.431	.008580	I	1.7350	3.246	.537	.010682	I
1.3800	2.582	.340	.006758	I	1.5600	2.918	.434	.008636	I	1.7400	3.255	.540	.010743	I
1.3850	2.591	.342	.006807	I	1.5650	2.928	.437	.008691	I	1.7450	3.264	.543	.010805	I
1.3900	2.600	.345	.006856	I	1.5700	2.937	.440	.008747	I	1.7500	3.274	.546	.010867	I
1.3950	2.610	.347	.006905	I	1.5750	2.946	.442	.008802	I	1.7550	3.283	.549	.010929	I
1.4000	2.619	.350	.006955	I	1.5800	2.956	.445	.008858	I	1.7600	3.292	.552	.010992	I
1.4050	2.628	.352	.007005	I	1.5850	2.965	.448	.008915	I	1.7650	3.302	.556	.011054	I
1.4100	2.638	.355	.007055	I	1.5900	2.974	.451	.008971	I	1.7700	3.311	.559	.011117	I
1.4150	2.647	.357	.007105	I	1.5950	2.984	.454	.009027	I	1.7750	3.320	.562	.011180	I
1.4200	2.656	.360	.007155	I	1.6000	2.993	.457	.009084	I	1.7800	3.330	.565	.011243	I
1.4250	2.666	.362	.007206	I	1.6050	3.002	.459	.009141	I	1.7850	3.339	.568	.011306	I
1.4300	2.675	.365	.007256	I	1.6100	3.012	.462	.009198	I	1.7900	3.349	.571	.011370	I
1.4350	2.684	.367	.007307	I	1.6150	3.021	.465	.009255	I	1.7950	3.358	.575	.011433	I
1.4400	2.694	.370	.007358	I	1.6200	3.031	.468	.009313	I	1.8000	3.367	.578	.011497	I
1.4450	2.703	.372	.007409	I	1.6250	3.040	.471	.009370	I	1.8050	3.377	.581	.011561	I
1.4500	2.712	.375	.007461	I	1.6300	3.049	.474	.009428	I	1.8100	3.386	.584	.011625	I
1.4550	2.722	.378	.007512	I	1.6350	3.059	.477	.009486	I	1.8150	3.395	.588	.011689	I
1.4600	2.731	.380	.007564	I	1.6400	3.068	.480	.009544	I	1.8200	3.405	.591	.011754	I
1.4650	2.741	.383	.007616	I	1.6450	3.077	.483	.009602	I	1.8250	3.414	.594	.011819	I
1.4700	2.750	.385	.007668	I	1.6500	3.087	.486	.009661	I	1.8300	3.423	.597	.011883	I
1.4750	2.759	.388	.007720	I	1.6550	3.096	.489	.009719	I	1.8350	3.433	.601	.011948	I
1.4800	2.769	.391	.007773	I	1.6600	3.105	.491	.009778	I	1.8400	3.442	.604	.012014	I
1.4850	2.778	.393	.007825	I	1.6650	3.115	.494	.009837	I	1.8450	3.451	.607	.012079	I
1.4900	2.787	.396	.007878	I	1.6700	3.124	.497	.009896	I	1.8500	3.461	.610	.012145	I
1.4950	2.797	.399	.007931	I	1.6750	3.133	.500	.009956	I	1.8550	3.470	.614	.012210	I
1.5000	2.806	.401	.007984	I	1.6800	3.143	.503	.010015	I	1.8600	3.479	.617	.012276	I
1.5050	2.815	.404	.008037	I	1.6850	3.152	.506	.010075	I	1.8650	3.489	.620	.012342	I
1.5100	2.825	.407	.008091	I	1.6900	3.161	.509	.010135	I	1.8700	3.498	.624	.012409	I
1.5150	2.834	.409	.008145	I	1.6950	3.171	.512	.010195	I	1.8750	3.508	.627	.012475	I
1.5200	2.843	.412	.008198	I	1.7000	3.180	.515	.010255	I	1.8800	3.517	.630	.012542	I
1.5250	2.853	.415	.008252	I	1.7050	3.190	.519	.010315	I	1.8850	3.526	.634	.012608	I

825 MILLIMETER PIPE THE FLOW RANGE IS 1.3500 TO 1.8850 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H	
1.8900	3.536	.637	.012675	I 2.0700	3.872	.764	.015205	I 2.2500	4.209	.903	.017964	I
1.8950	3.545	.641	.012743	I 2.0750	3.882	.768	.015278	I 2.2550	4.218	.907	.018044	I
1.9000	3.554	.644	.012810	I 2.0800	3.891	.772	.015352	I 2.2600	4.228	.911	.018124	I
1.9050	3.564	.647	.012877	I 2.0850	3.900	.775	.015426	I 2.2650	4.237	.915	.018204	I
1.9100	3.573	.651	.012945	I 2.0900	3.910	.779	.015500	I 2.2700	4.246	.919	.018285	I
1.9150	3.582	.654	.013013	I 2.0950	3.919	.783	.015574	I 2.2750	4.256	.923	.018365	I
1.9200	3.592	.658	.013081	I 2.1000	3.928	.787	.015649	I 2.2800	4.265	.927	.018446	I
1.9250	3.601	.661	.013149	I 2.1050	3.938	.790	.015723	I 2.2850	4.275	.931	.018527	I
1.9300	3.610	.664	.013218	I 2.1100	3.947	.794	.015798	I 2.2900	4.284	.935	.018608	I
1.9350	3.620	.668	.013286	I 2.1150	3.957	.798	.015873	I 2.2950	4.293	.939	.018690	I
1.9400	3.629	.671	.013355	I 2.1200	3.966	.802	.015948	I 2.3000	4.303	.944	.018771	I
1.9450	3.638	.675	.013424	I 2.1250	3.975	.805	.016024	I 2.3050	4.312	.948	.018853	I
1.9500	3.648	.678	.013493	I 2.1300	3.985	.809	.016099	I 2.3100	4.321	.952	.018935	I
1.9550	3.657	.682	.013562	I 2.1350	3.994	.813	.016175	I 2.3150	4.331	.956	.019017	I
1.9600	3.667	.685	.013632	I 2.1400	4.003	.817	.016251	I 2.3200	4.340	.960	.019099	I
1.9650	3.676	.689	.013701	I 2.1450	4.013	.821	.016327	I 2.3250	4.349	.964	.019182	I
1.9700	3.685	.692	.013771	I 2.1500	4.022	.824	.016403	I 2.3300	4.359	.968	.019264	I
1.9750	3.695	.696	.013841	I 2.1550	4.031	.828	.016479	I 2.3350	4.368	.972	.019347	I
1.9800	3.704	.699	.013911	I 2.1600	4.041	.832	.016556	I 2.3400	4.377	.977	.019430	I
1.9850	3.713	.703	.013982	I 2.1650	4.050	.836	.016632	I 2.3450	4.387	.981	.019513	I
1.9900	3.723	.706	.014052	I 2.1700	4.059	.840	.016709	I 2.3500	4.396	.985	.019596	I
1.9950	3.732	.710	.014123	I 2.1750	4.069	.844	.016786	I 2.3550	4.405	.989	.019680	I
2.0000	3.741	.713	.014194	I 2.1800	4.078	.848	.016864	I 2.3600	4.415	.993	.019763	I
2.0050	3.751	.717	.014265	I 2.1850	4.087	.852	.016941	I 2.3650	4.424	.998	.019847	I
2.0100	3.760	.721	.014336	I 2.1900	4.097	.855	.017019	I 2.3700	4.434	1.002	.019931	I
2.0150	3.769	.724	.014408	I 2.1950	4.106	.859	.017097	I 2.3750	4.443	1.006	.020016	I
2.0200	3.779	.728	.014479	I 2.2000	4.116	.863	.017175	I 2.3800	4.452	1.010	.020100	I
2.0250	3.788	.731	.014551	I 2.2050	4.125	.867	.017253	I 2.3850	4.462	1.015	.020184	I
2.0300	3.797	.735	.014623	I 2.2100	4.134	.871	.017331	I 2.3900	4.471	1.019	.020269	I
2.0350	3.807	.739	.014695	I 2.2150	4.144	.875	.017410	I 2.3950	4.480	1.023	.020354	I
2.0400	3.816	.742	.014767	I 2.2200	4.153	.879	.017488	I 2.4000	4.490	1.027	.020439	I
2.0450	3.826	.746	.014840	I 2.2250	4.162	.883	.017567	I 2.4050	4.499	1.032	.020524	I
2.0500	3.835	.750	.014912	I 2.2300	4.172	.887	.017646	I 2.4100	4.508	1.036	.020610	I
2.0550	3.844	.753	.014985	I 2.2350	4.181	.891	.017725	I 2.4150	4.518	1.040	.020695	I
2.0600	3.854	.757	.015058	I 2.2400	4.190	.895	.017805	I 2.4200	4.527	1.045	.020781	I
2.0650	3.863	.761	.015131	I 2.2450	4.200	.899	.017884	I 2.4250	4.536	1.049	.020867	I

825 MILLIMETER PIPE THE FLOW RANGE IS 1.8900 TO 2.4250 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
2.4300	4.546	1.053	.020953 I	2.5200	4.714	1.133	.022534 I	2.6100	4.882	1.215	.024172 I
2.4350	4.555	1.058	.021040 I	2.5250	4.723	1.137	.022624 I	2.6150	4.892	1.220	.024265 I
2.4400	4.564	1.062	.021126 I	2.5300	4.733	1.142	.022713 I	2.6200	4.901	1.224	.024358 I
2.4450	4.574	1.066	.021213 I	2.5350	4.742	1.146	.022803 I	2.6250	4.911	1.229	.024451 I
2.4500	4.583	1.071	.021300 I	2.5400	4.752	1.151	.022893 I	2.6300	4.920	1.234	.024544 I
2.4550	4.593	1.075	.021387 I	2.5450	4.761	1.155	.022983 I	2.6350	4.929	1.238	.024638 I
2.4600	4.602	1.079	.021474 I	2.5500	4.770	1.160	.023074 I	2.6400	4.939	1.243	.024731 I
2.4650	4.611	1.084	.021561 I	2.5550	4.780	1.164	.023164 I	2.6450	4.948	1.248	.024825 I
2.4700	4.621	1.088	.021649 I	2.5600	4.789	1.169	.023255 I	2.6500	4.957	1.253	.024919 I
2.4750	4.630	1.093	.021737 I	2.5650	4.798	1.173	.023346 I	2.6550	4.967	1.257	.025013 I
2.4800	4.639	1.097	.021824 I	2.5700	4.808	1.178	.023437 I	2.6600	4.976	1.262	.025107 I
2.4850	4.649	1.101	.021913 I	2.5750	4.817	1.183	.023528 I	2.6650	4.985	1.267	.025202 I
2.4900	4.658	1.106	.022001 I	2.5800	4.826	1.187	.023620 I	2.6700	4.995	1.272	.025297 I
2.4950	4.667	1.110	.022089 I	2.5850	4.836	1.192	.023712 I	2.6750	5.004	1.276	.025391 I
2.5000	4.677	1.115	.022178 I	2.5900	4.845	1.196	.023803 I	2.6800	5.013	1.281	.025486 I
2.5050	4.686	1.119	.022267 I	2.5950	4.854	1.201	.023895 I	2.6850	5.023	1.286	.025582 I
2.5100	4.695	1.124	.022356 I	2.6000	4.864	1.206	.023988 I	2.6900	5.032	1.291	.025677 I
2.5150	4.705	1.128	.022445 I	2.6050	4.873	1.210	.024080 I	2.6950	5.042	1.295	.025773 I

825 MILLIMETER PIPE THE FLOW RANGE IS 2.4300 TO 2.6950 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICTION SLOPES ARE BASED ON SCOREY'S FORMULA

SCOREY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 900 MILLIMETERS

CS = .370

QO INCREMENT = .0250 CUBIC METERS PER SECOND

AREA = .6362 SQUARE METERS

$H = (.22472E-02) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
.325	.511	.013	.000237	I	1.225	1.926	.189	.003372	I	2.125	3.340	.569	.010148	I
.350	.550	.015	.000275	I	1.250	1.965	.197	.003511	I	2.150	3.380	.582	.010388	I
.375	.589	.018	.000316	I	1.275	2.004	.205	.003653	I	2.175	3.419	.596	.010631	I
.400	.629	.020	.000360	I	1.300	2.043	.213	.003798	I	2.200	3.458	.610	.010877	I
.425	.668	.023	.000406	I	1.325	2.083	.221	.003945	I	2.225	3.497	.623	.011125	I
.450	.707	.026	.000455	I	1.350	2.122	.230	.004096	I	2.250	3.537	.638	.011377	I
.475	.747	.028	.000507	I	1.375	2.161	.238	.004249	I	2.275	3.576	.652	.011631	I
.500	.786	.031	.000562	I	1.400	2.201	.247	.004405	I	2.300	3.615	.666	.011888	I
.525	.825	.035	.000619	I	1.425	2.240	.256	.004563	I	2.325	3.655	.681	.012148	I
.550	.865	.038	.000680	I	1.450	2.279	.265	.004725	I	2.350	3.694	.695	.012410	I
.575	.904	.042	.000743	I	1.475	2.319	.274	.004889	I	2.375	3.733	.710	.012676	I
.600	.943	.045	.000809	I	1.500	2.358	.283	.005056	I	2.400	3.773	.725	.012944	I
.625	.982	.049	.000878	I	1.525	2.397	.293	.005226	I	2.425	3.812	.741	.013215	I
.650	1.022	.053	.000949	I	1.550	2.436	.303	.005399	I	2.450	3.851	.756	.013489	I
.675	1.061	.057	.001024	I	1.575	2.476	.312	.005575	I	2.475	3.890	.771	.013766	I
.700	1.100	.062	.001101	I	1.600	2.515	.322	.005753	I	2.500	3.930	.787	.014045	I
.725	1.140	.066	.001181	I	1.625	2.554	.333	.005934	I	2.525	3.969	.803	.014328	I
.750	1.179	.071	.001264	I	1.650	2.594	.343	.006118	I	2.550	4.008	.819	.014613	I
.775	1.218	.076	.001350	I	1.675	2.633	.353	.006305	I	2.575	4.048	.835	.014901	I
.800	1.258	.081	.001438	I	1.700	2.672	.364	.006495	I	2.600	4.087	.851	.015191	I
.825	1.297	.086	.001530	I	1.725	2.712	.375	.006687	I	2.625	4.126	.868	.015485	I
.850	1.336	.091	.001624	I	1.750	2.751	.386	.006882	I	2.650	4.166	.884	.015781	I
.875	1.375	.096	.001721	I	1.775	2.790	.397	.007080	I	2.675	4.205	.901	.016080	I
.900	1.415	.102	.001820	I	1.800	2.829	.408	.007281	I	2.700	4.244	.918	.016382	I
.925	1.454	.108	.001923	I	1.825	2.869	.419	.007485	I	2.725	4.283	.935	.016687	I
.950	1.493	.114	.002028	I	1.850	2.908	.431	.007691	I	2.750	4.323	.952	.016995	I
.975	1.533	.120	.002136	I	1.875	2.947	.443	.007900	I	2.775	4.362	.970	.017305	I
1.000	1.572	.126	.002247	I	1.900	2.987	.455	.008113	I	2.800	4.401	.987	.017618	I
1.025	1.611	.132	.002361	I	1.925	3.026	.467	.008327	I	2.825	4.441	1.005	.017934	I
1.050	1.650	.139	.002478	I	1.950	3.065	.479	.008545	I	2.850	4.480	1.023	.018253	I
1.075	1.690	.146	.002597	I	1.975	3.104	.491	.008766	I	2.875	4.519	1.041	.018575	I
1.100	1.729	.152	.002719	I	2.000	3.144	.504	.008989	I	2.900	4.559	1.059	.018899	I
1.125	1.768	.159	.002844	I	2.025	3.183	.516	.009215	I	2.925	4.598	1.077	.019227	I
1.150	1.808	.167	.002972	I	2.050	3.222	.529	.009444	I	2.950	4.637	1.096	.019557	I
1.175	1.847	.174	.003103	I	2.075	3.262	.542	.009676	I	2.975	4.676	1.115	.019889	I
1.200	1.886	.181	.003236	I	2.100	3.301	.555	.009910	I	3.000	4.716	1.133	.020225	I

900 MILLIMETER PIPE THE FLOW RANGE IS .3250 TO 3.0000 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
3.025	4.755	1.152	.020564	I	3.100	4.873	1.210	.021596	I	3.175	4.991	1.270	.022654	I
3.050	4.794	1.172	.020905	I	3.125	4.912	1.230	.021946	I	3.200	5.030	1.290	.023012	I
3.075	4.834	1.191	.021249	I	3.150	4.951	1.250	.022298	I	3.225	5.069	1.310	.023373	I

900 MILLIMETER PIPE THE FLOW RANGE IS 3.0250 TO 3.2250 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBNEY'S FORMULA

SCOBNEY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 975 MILLIMETERS

CS = .370

QQ INCREMENT = .0250 CUBIC METERS PER SECOND

AREA = .7466 SQUARE METERS

$H = (.14762E-02) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
.375	.502	.013	.000208	I	1.275	1.708	.149	.002400	I	2.175	2.913	.433	.006983	I
.400	.536	.015	.000236	I	1.300	1.741	.155	.002495	I	2.200	2.947	.443	.007145	I
.425	.569	.017	.000267	I	1.325	1.775	.161	.002592	I	2.225	2.980	.453	.007308	I
.450	.603	.019	.000299	I	1.350	1.808	.167	.002690	I	2.250	3.014	.463	.007473	I
.475	.636	.021	.000333	I	1.375	1.842	.173	.002791	I	2.275	3.047	.473	.007640	I
.500	.670	.023	.000369	I	1.400	1.875	.179	.002893	I	2.300	3.081	.484	.007809	I
.525	.703	.025	.000407	I	1.425	1.909	.186	.002998	I	2.325	3.114	.494	.007980	I
.550	.737	.028	.000447	I	1.450	1.942	.192	.003104	I	2.350	3.148	.505	.008152	I
.575	.770	.030	.000488	I	1.475	1.976	.199	.003212	I	2.375	3.181	.516	.008327	I
.600	.804	.033	.000531	I	1.500	2.009	.206	.003321	I	2.400	3.214	.527	.008503	I
.625	.837	.036	.000577	I	1.525	2.043	.213	.003433	I	2.425	3.248	.538	.008681	I
.650	.871	.039	.000624	I	1.550	2.076	.220	.003547	I	2.450	3.281	.549	.008861	I
.675	.904	.042	.000673	I	1.575	2.110	.227	.003662	I	2.475	3.315	.560	.009043	I
.700	.938	.045	.000723	I	1.600	2.143	.234	.003779	I	2.500	3.348	.571	.009226	I
.725	.971	.048	.000776	I	1.625	2.176	.241	.003898	I	2.525	3.382	.583	.009412	I
.750	1.005	.051	.000830	I	1.650	2.210	.249	.004019	I	2.550	3.415	.595	.009599	I
.775	1.038	.055	.000887	I	1.675	2.243	.257	.004142	I	2.575	3.449	.606	.009788	I
.800	1.071	.059	.000945	I	1.700	2.277	.264	.004266	I	2.600	3.482	.618	.009979	I
.825	1.105	.062	.001005	I	1.725	2.310	.272	.004393	I	2.625	3.516	.630	.010172	I
.850	1.138	.066	.001067	I	1.750	2.344	.280	.004521	I	2.650	3.549	.642	.010367	I
.875	1.172	.070	.001130	I	1.775	2.377	.288	.004651	I	2.675	3.583	.654	.010563	I
.900	1.205	.074	.001196	I	1.800	2.411	.296	.004783	I	2.700	3.616	.667	.010762	I
.925	1.239	.078	.001263	I	1.825	2.444	.305	.004917	I	2.725	3.650	.679	.010962	I
.950	1.272	.083	.001332	I	1.850	2.478	.313	.005052	I	2.750	3.683	.691	.011164	I
.975	1.306	.087	.001403	I	1.875	2.511	.321	.005190	I	2.775	3.717	.704	.011368	I
1.000	1.339	.091	.001475	I	1.900	2.545	.330	.005329	I	2.800	3.750	.717	.011574	I
1.025	1.373	.096	.001551	I	1.925	2.578	.339	.005470	I	2.825	3.784	.730	.011781	I
1.050	1.406	.101	.001624	I	1.950	2.612	.348	.005613	I	2.850	3.817	.743	.011991	I
1.075	1.440	.106	.001706	I	1.975	2.645	.357	.005758	I	2.875	3.851	.756	.012202	I
1.100	1.473	.111	.001786	I	2.000	2.679	.366	.005905	I	2.900	3.884	.769	.012415	I
1.125	1.507	.116	.001868	I	2.025	2.712	.375	.006053	I	2.925	3.918	.782	.012630	I
1.150	1.540	.121	.001952	I	2.050	2.746	.384	.006204	I	2.950	3.951	.796	.012847	I
1.175	1.574	.126	.002038	I	2.075	2.779	.394	.006356	I	2.975	3.985	.809	.013065	I
1.200	1.607	.132	.002126	I	2.100	2.813	.403	.006510	I	3.000	4.018	.823	.013286	I
1.225	1.641	.137	.002215	I	2.125	2.846	.413	.006666	I	3.025	4.052	.837	.013508	I
1.250	1.674	.143	.002307	I	2.150	2.880	.423	.006824	I	3.050	4.085	.851	.013732	I

975 MILLIMETER PIPE THE FLOW RANGE IS .3750 TO 3.0500 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
3.075	4.119	.865	.013959	I	3.306	4.420	.996	.016076	I	3.525	4.721	1.136	.018343	I
3.100	4.152	.879	.014186	I	3.325	4.453	1.011	.016320	I	3.550	4.755	1.152	.018604	I
3.125	4.186	.893	.014416	I	3.350	4.487	1.026	.016567	I	3.575	4.788	1.169	.018867	I
3.150	4.219	.907	.014648	I	3.375	4.520	1.041	.016815	I	3.600	4.822	1.185	.019132	I
3.175	4.252	.922	.014881	I	3.400	4.554	1.057	.017065	I	3.625	4.855	1.201	.019398	I
3.200	4.286	.936	.015116	I	3.425	4.587	1.073	.017317	I	3.650	4.889	1.218	.019667	I
3.225	4.319	.951	.015354	I	3.450	4.621	1.088	.017571	I	3.675	4.922	1.235	.019937	I
3.250	4.353	.966	.015592	I	3.475	4.654	1.104	.017826	I	3.700	4.956	1.252	.020209	I
3.275	4.386	.981	.015833	I	3.500	4.688	1.120	.018084	I	3.725	4.989	1.269	.020483	I

975 MILLIMETER PIPE THE FLOW RANGE IS 3.0750 TO 3.7250 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICTION SLOPES ARE BASED ON SCOREY'S FORMULA

SCOREY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 1050 MILLIMETERS

CS = .370

QQ INCREMENT = .0250 CUBIC METERS PER SECOND

AREA = .8659 SQUARE METERS

$H = (.10004E-02) * (Q ** 2)$

Q	V	HV	H		Q	V	HV	H	Q	V	HV	H		
.450	.520	.014	.000233	I	1.350	1.559	.124	.001823	I	2.250	2.598	.344	.005065	I
.475	.549	.015	.000226	I	1.375	1.588	.129	.001891	I	2.275	2.627	.352	.005178	I
.500	.577	.017	.000250	I	1.400	1.617	.133	.001961	I	2.300	2.656	.360	.005292	I
.525	.606	.019	.000276	I	1.425	1.646	.138	.002031	I	2.325	2.685	.367	.005408	I
.550	.635	.021	.000303	I	1.450	1.675	.143	.002103	I	2.350	2.714	.375	.005525	I
.575	.664	.022	.000331	I	1.475	1.703	.148	.002177	I	2.375	2.743	.383	.005643	I
.600	.693	.024	.000360	I	1.500	1.732	.153	.002251	I	2.400	2.772	.392	.005762	I
.625	.722	.027	.000391	I	1.525	1.761	.158	.002327	I	2.425	2.801	.400	.005883	I
.650	.751	.029	.000423	I	1.550	1.790	.163	.002403	I	2.450	2.829	.408	.006005	I
.675	.780	.031	.000456	I	1.575	1.819	.169	.002482	I	2.475	2.858	.416	.006128	I
.700	.808	.033	.000490	I	1.600	1.848	.174	.002561	I	2.500	2.887	.425	.006253	I
.725	.837	.036	.000526	I	1.625	1.877	.180	.002642	I	2.525	2.916	.433	.006378	I
.750	.866	.038	.000563	I	1.650	1.906	.185	.002724	I	2.550	2.945	.442	.006505	I
.775	.895	.041	.000601	I	1.675	1.934	.191	.002807	I	2.575	2.974	.451	.006633	I
.800	.924	.044	.000640	I	1.700	1.963	.196	.002891	I	2.600	3.003	.460	.006763	I
.825	.953	.046	.000681	I	1.725	1.992	.202	.002977	I	2.625	3.032	.468	.006893	I
.850	.982	.049	.000723	I	1.750	2.021	.209	.003064	I	2.650	3.060	.477	.007025	I
.875	1.011	.052	.000766	I	1.775	2.050	.214	.003152	I	2.675	3.089	.486	.007159	I
.900	1.039	.055	.000810	I	1.800	2.079	.220	.003241	I	2.700	3.118	.496	.007293	I
.925	1.068	.058	.000856	I	1.825	2.108	.226	.003332	I	2.725	3.147	.505	.007429	I
.950	1.097	.061	.000903	I	1.850	2.136	.233	.003424	I	2.750	3.176	.514	.007566	I
.975	1.126	.065	.000951	I	1.875	2.165	.239	.003517	I	2.775	3.205	.523	.007704	I
1.000	1.155	.068	.001000	I	1.900	2.194	.245	.003611	I	2.800	3.234	.533	.007843	I
1.025	1.184	.071	.001051	I	1.925	2.223	.252	.003707	I	2.825	3.262	.542	.007984	I
1.050	1.213	.075	.001103	I	1.950	2.252	.258	.003804	I	2.850	3.291	.552	.008126	I
1.075	1.241	.079	.001156	I	1.975	2.281	.265	.003902	I	2.875	3.320	.562	.008269	I
1.100	1.270	.082	.001210	I	2.000	2.310	.272	.004002	I	2.900	3.349	.572	.008413	I
1.125	1.299	.086	.001266	I	2.025	2.339	.279	.004102	I	2.925	3.378	.582	.008559	I
1.150	1.328	.090	.001323	I	2.050	2.367	.286	.004204	I	2.950	3.407	.592	.008706	I
1.175	1.357	.094	.001381	I	2.075	2.396	.293	.004307	I	2.975	3.436	.602	.008854	I
1.200	1.386	.098	.001441	I	2.100	2.425	.300	.004412	I	3.000	3.465	.612	.009004	I
1.225	1.415	.102	.001501	I	2.125	2.454	.307	.004517	I	3.025	3.493	.622	.009154	I
1.250	1.444	.106	.001563	I	2.150	2.483	.314	.004624	I	3.050	3.522	.632	.009306	I
1.275	1.472	.111	.001626	I	2.175	2.512	.322	.004733	I	3.075	3.551	.643	.009460	I
1.300	1.501	.115	.001691	I	2.200	2.541	.329	.004842	I	3.100	3.580	.653	.009614	I
1.325	1.530	.119	.001756	I	2.225	2.570	.337	.004953	I	3.125	3.609	.664	.009770	I

1050 MILLIMETER PIPE THE FLOW RANGE IS .4500 TO 3.1250 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		U	V	HV	n	
3.150	3.638	.675	.009927	I	3.550	4.100	.857	.012608	I	3.950	4.562	1.061	.015609	I
3.175	3.667	.685	.010085	I	3.575	4.129	.869	.012786	I	3.975	4.591	1.074	.015807	I
3.200	3.696	.696	.010244	I	3.600	4.158	.881	.012965	I	4.000	4.619	1.088	.016007	I
3.225	3.724	.707	.010405	I	3.625	4.186	.893	.013146	I	4.025	4.648	1.101	.016207	I
3.250	3.753	.718	.010567	I	3.650	4.215	.906	.013328	I	4.050	4.677	1.115	.016409	I
3.275	3.782	.729	.010730	I	3.675	4.244	.918	.013511	I	4.075	4.706	1.129	.016612	I
3.300	3.811	.740	.010894	I	3.700	4.273	.931	.013696	I	4.100	4.735	1.143	.016817	I
3.325	3.840	.752	.011060	I	3.725	4.302	.943	.013881	I	4.125	4.764	1.157	.017023	I
3.350	3.869	.763	.011227	I	3.750	4.331	.956	.014068	I	4.150	4.793	1.171	.017230	I
3.375	3.898	.774	.011395	I	3.775	4.360	.969	.014257	I	4.175	4.822	1.185	.017438	I
3.400	3.927	.786	.011565	I	3.800	4.388	.982	.014446	I	4.200	4.850	1.199	.017647	I
3.425	3.955	.797	.011735	I	3.825	4.417	.995	.014637	I	4.225	4.879	1.213	.017856	I
3.450	3.984	.809	.011907	I	3.850	4.446	1.008	.014829	I	4.250	4.908	1.228	.018070	I
3.475	4.013	.821	.012091	I	3.875	4.475	1.021	.015022	I	4.275	4.937	1.242	.018283	I
3.500	4.042	.833	.012255	I	3.900	4.504	1.034	.015216	I	4.300	4.966	1.257	.018498	I
3.525	4.071	.845	.012431	I	3.925	4.533	1.047	.015412	I	4.325	4.995	1.272	.018713	I

1050 MILLIMETER PIPE THE FLOW RANGE IS 3.1500 TO 4.3250 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICION SLOPES ARE BASED ON SCOBEE'S FORMULA

SCOBEE'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- C = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 1125 MILLIMETERS

CS = .370

QQ INCREMENT = .0250 CUBIC METERS PER SECOND

AREA = .9940 SQUARE METERS

$H = (.69642E-03) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
.500	.503	.013	.000174 I	1.400	1.408	.101	.001365 I	2.300	2.314	.273	.003684 I
.525	.528	.014	.000192 I	1.425	1.434	.105	.001414 I	2.325	2.339	.279	.003765 I
.550	.553	.016	.000211 I	1.450	1.459	.108	.001464 I	2.350	2.364	.285	.003846 I
.575	.578	.017	.000230 I	1.475	1.484	.112	.001515 I	2.375	2.389	.291	.003928 I
.600	.604	.019	.000251 I	1.500	1.509	.116	.001567 I	2.400	2.414	.297	.004011 I
.625	.629	.020	.000272 I	1.525	1.534	.120	.001620 I	2.425	2.440	.303	.004095 I
.650	.654	.022	.000294 I	1.550	1.559	.124	.001673 I	2.450	2.465	.310	.004180 I
.675	.679	.024	.000317 I	1.575	1.584	.128	.001728 I	2.475	2.490	.316	.004266 I
.700	.704	.025	.000341 I	1.600	1.610	.132	.001783 I	2.500	2.515	.322	.004353 I
.725	.729	.027	.000366 I	1.625	1.635	.136	.001839 I	2.525	2.540	.329	.004440 I
.750	.755	.029	.000392 I	1.650	1.660	.140	.001896 I	2.550	2.565	.335	.004528 I
.775	.780	.031	.000418 I	1.675	1.685	.145	.001954 I	2.575	2.590	.342	.004618 I
.800	.805	.033	.000446 I	1.700	1.710	.149	.002013 I	2.600	2.616	.349	.004708 I
.825	.830	.035	.000474 I	1.725	1.735	.153	.002072 I	2.625	2.641	.355	.004799 I
.850	.855	.037	.000503 I	1.750	1.761	.158	.002133 I	2.650	2.666	.362	.004891 I
.875	.880	.039	.000533 I	1.775	1.786	.163	.002194 I	2.675	2.691	.369	.004983 I
.900	.905	.042	.000564 I	1.800	1.811	.167	.002256 I	2.700	2.716	.376	.005077 I
.925	.931	.044	.000596 I	1.825	1.836	.172	.002320 I	2.725	2.741	.383	.005171 I
.950	.956	.047	.000629 I	1.850	1.861	.177	.002384 I	2.750	2.767	.390	.005267 I
.975	.981	.049	.000662 I	1.875	1.886	.181	.002448 I	2.775	2.792	.397	.005363 I
1.000	1.006	.052	.000696 I	1.900	1.911	.186	.002514 I	2.800	2.817	.404	.005460 I
1.025	1.031	.054	.000732 I	1.925	1.937	.191	.002581 I	2.825	2.842	.412	.005558 I
1.050	1.056	.057	.000768 I	1.950	1.962	.196	.002648 I	2.850	2.867	.419	.005657 I
1.075	1.081	.060	.000805 I	1.975	1.987	.201	.002716 I	2.875	2.892	.426	.005756 I
1.100	1.107	.062	.000843 I	2.000	2.012	.206	.002784 I	2.900	2.917	.434	.005857 I
1.125	1.132	.065	.000881 I	2.025	2.037	.212	.002856 I	2.925	2.943	.441	.005958 I
1.150	1.157	.068	.000921 I	2.050	2.062	.217	.002927 I	2.950	2.968	.449	.006061 I
1.175	1.182	.071	.000961 I	2.075	2.087	.222	.002999 I	2.975	2.993	.457	.006164 I
1.200	1.207	.074	.001003 I	2.100	2.113	.227	.003071 I	3.000	3.018	.464	.006268 I
1.225	1.232	.077	.001045 I	2.125	2.138	.233	.003145 I	3.025	3.043	.472	.006373 I
1.250	1.258	.081	.001088 I	2.150	2.163	.238	.003219 I	3.050	3.068	.480	.006478 I
1.275	1.283	.084	.001132 I	2.175	2.188	.244	.003295 I	3.075	3.093	.488	.006585 I
1.300	1.308	.087	.001177 I	2.200	2.213	.250	.003371 I	3.100	3.119	.496	.006693 I
1.325	1.333	.091	.001223 I	2.225	2.238	.255	.003448 I	3.125	3.144	.504	.006801 I
1.350	1.358	.094	.001269 I	2.250	2.264	.261	.003526 I	3.150	3.164	.512	.006910 I
1.375	1.383	.098	.001317 I	2.275	2.289	.267	.003604 I	3.175	3.194	.520	.007020 I

1125 MILLIMETER PIPE THE FLOW RANGE IS .5000 TO 3.1750 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
3.200	3.219	.528	.007131	I	3.800	3.823	.745	.010056	I	4.400	4.426	.999	.013483	I
3.225	3.244	.536	.007243	I	3.825	3.848	.755	.010189	I	4.425	4.452	1.010	.013636	I
3.250	3.270	.545	.007356	I	3.850	3.873	.765	.010323	I	4.450	4.477	1.021	.013791	I
3.275	3.295	.553	.007470	I	3.875	3.898	.775	.010457	I	4.475	4.502	1.033	.013946	I
3.300	3.320	.562	.007584	I	3.900	3.923	.785	.010593	I	4.500	4.527	1.045	.014103	I
3.325	3.345	.570	.007699	I	3.925	3.949	.795	.010729	I	4.525	4.552	1.056	.014260	I
3.350	3.370	.579	.007816	I	3.950	3.974	.805	.010866	I	4.550	4.577	1.068	.014418	I
3.375	3.395	.588	.007933	I	3.975	3.999	.815	.011004	I	4.575	4.603	1.080	.014577	I
3.400	3.420	.596	.008051	I	4.000	4.024	.825	.011143	I	4.600	4.628	1.092	.014736	I
3.425	3.446	.605	.008169	I	4.025	4.049	.836	.011282	I	4.625	4.653	1.103	.014897	I
3.450	3.471	.614	.008289	I	4.050	4.074	.846	.011423	I	4.650	4.678	1.115	.015058	I
3.475	3.496	.623	.008410	I	4.075	4.100	.857	.011565	I	4.675	4.703	1.127	.015221	I
3.500	3.521	.632	.008531	I	4.100	4.125	.867	.011707	I	4.700	4.728	1.139	.015384	I
3.525	3.546	.641	.008653	I	4.125	4.150	.878	.011850	I	4.725	4.753	1.152	.015548	I
3.550	3.571	.650	.008777	I	4.150	4.175	.888	.011994	I	4.750	4.779	1.164	.015713	I
3.575	3.597	.659	.008901	I	4.175	4.200	.899	.012139	I	4.775	4.804	1.176	.015879	I
3.600	3.622	.669	.009026	I	4.200	4.225	.910	.012285	I	4.800	4.829	1.188	.016046	I
3.625	3.647	.678	.009151	I	4.225	4.250	.921	.012432	I	4.825	4.854	1.201	.016213	I
3.650	3.672	.687	.009279	I	4.250	4.276	.932	.012579	I	4.850	4.879	1.213	.016382	I
3.675	3.697	.697	.009406	I	4.275	4.301	.943	.012728	I	4.875	4.904	1.226	.016551	I
3.700	3.722	.706	.009534	I	4.300	4.326	.954	.012877	I	4.900	4.929	1.239	.016721	I
3.725	3.747	.716	.009663	I	4.325	4.351	.965	.013027	I	4.925	4.955	1.251	.016892	I
3.750	3.773	.725	.009793	I	4.350	4.376	.976	.013178	I	4.950	4.980	1.264	.017064	I
3.775	3.798	.735	.009924	I	4.375	4.401	.987	.013330	I	4.975	5.005	1.277	.017237	I

1125 MILLIMETER PIPE THE FLOW RANGE IS 3.2000 TO 4.9750 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOFES ARE BASED ON SCOBAY'S FORMULA

SCOBAY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 1200 MILLIMETERS

CS = .370

QQ INCREMENT = .0250 CUBIC METERS PER SECOND

AREA = 1.1310 SQUARE METERS

$H = (.49627E-03) * (Q ** 2)$

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
.575	.508	.013	.000164	I	1.475	1.304	.087	.001080	I	2.375	2.100	.225	.002799	I
.600	.531	.014	.000179	I	1.500	1.326	.096	.001117	I	2.400	2.122	.230	.002859	I
.625	.553	.016	.000194	I	1.525	1.348	.093	.001154	I	2.425	2.144	.234	.002918	I
.650	.575	.017	.000210	I	1.550	1.370	.096	.001192	I	2.450	2.166	.239	.002979	I
.675	.597	.018	.000226	I	1.575	1.393	.099	.001231	I	2.475	2.188	.244	.003040	I
.700	.619	.020	.000243	I	1.600	1.415	.102	.001270	I	2.500	2.210	.249	.003102	I
.725	.641	.021	.000261	I	1.625	1.437	.105	.001310	I	2.525	2.233	.254	.003164	I
.750	.663	.022	.000279	I	1.650	1.459	.108	.001351	I	2.550	2.255	.259	.003227	I
.775	.685	.024	.000298	I	1.675	1.481	.112	.001392	I	2.575	2.277	.264	.003291	I
.800	.707	.026	.000318	I	1.700	1.503	.115	.001434	I	2.600	2.299	.269	.003355	I
.825	.729	.027	.000338	I	1.725	1.525	.119	.001477	I	2.625	2.321	.275	.003420	I
.850	.752	.029	.000359	I	1.750	1.547	.122	.001520	I	2.650	2.343	.280	.003485	I
.875	.774	.031	.000380	I	1.775	1.569	.126	.001564	I	2.675	2.365	.285	.003551	I
.900	.796	.032	.000402	I	1.800	1.592	.129	.001608	I	2.700	2.387	.290	.003618	I
.925	.818	.034	.000425	I	1.825	1.614	.133	.001653	I	2.725	2.409	.296	.003685	I
.950	.840	.036	.000448	I	1.850	1.636	.136	.001698	I	2.750	2.432	.301	.003753	I
.975	.862	.038	.000472	I	1.875	1.658	.140	.001745	I	2.775	2.454	.307	.003822	I
1.000	.884	.040	.000496	I	1.900	1.680	.144	.001792	I	2.800	2.476	.312	.003891	I
1.025	.906	.042	.000521	I	1.925	1.702	.148	.001839	I	2.825	2.498	.318	.003961	I
1.050	.928	.044	.000547	I	1.950	1.724	.152	.001887	I	2.850	2.520	.324	.004031	I
1.075	.951	.046	.000574	I	1.975	1.746	.155	.001936	I	2.875	2.542	.329	.004102	I
1.100	.973	.048	.000600	I	2.000	1.768	.159	.001985	I	2.900	2.564	.335	.004174	I
1.125	.995	.050	.000628	I	2.025	1.790	.163	.002035	I	2.925	2.586	.341	.004246	I
1.150	1.017	.053	.000656	I	2.050	1.813	.167	.002086	I	2.950	2.608	.347	.004319	I
1.175	1.039	.055	.000685	I	2.075	1.835	.172	.002137	I	2.975	2.630	.353	.004392	I
1.200	1.061	.057	.000715	I	2.100	1.857	.176	.002189	I	3.000	2.653	.359	.004466	I
1.225	1.083	.060	.000745	I	2.125	1.879	.180	.002241	I	3.025	2.675	.365	.004541	I
1.250	1.105	.062	.000775	I	2.150	1.901	.184	.002294	I	3.050	2.697	.371	.004617	I
1.275	1.127	.065	.000807	I	2.175	1.923	.189	.002348	I	3.075	2.719	.377	.004693	I
1.300	1.149	.067	.000839	I	2.200	1.945	.193	.002402	I	3.100	2.741	.383	.004769	I
1.325	1.172	.070	.000871	I	2.225	1.967	.197	.002457	I	3.125	2.763	.389	.004846	I
1.350	1.194	.073	.000904	I	2.250	1.989	.202	.002512	I	3.150	2.785	.395	.004924	I
1.375	1.216	.075	.000938	I	2.275	2.012	.206	.002569	I	3.175	2.807	.402	.005003	I
1.400	1.238	.078	.000973	I	2.300	2.034	.211	.002625	I	3.200	2.829	.408	.005082	I
1.425	1.260	.081	.001008	I	2.325	2.056	.215	.002683	I	3.225	2.852	.414	.005162	I
1.450	1.282	.084	.001043	I	2.350	2.078	.220	.002741	I	3.250	2.874	.421	.005242	I

1200 MILLIMETER PIPE THE FLOW RANGE IS .5750 TO 3.2500 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
3.275	2.896	.427	.005323 I	4.100	3.625	.670	.008342 I	4.925	4.355	.967	.012037 I
3.300	2.918	.434	.005404 I	4.125	3.647	.678	.008444 I	4.950	4.377	.976	.012160 I
3.325	2.940	.441	.005487 I	4.150	3.669	.686	.008547 I	4.975	4.399	.986	.012283 I
3.350	2.962	.447	.005569 I	4.175	3.692	.695	.008650 I	5.000	4.421	.996	.012407 I
3.375	2.984	.454	.005653 I	4.200	3.714	.703	.008754 I	5.025	4.443	1.006	.012531 I
3.400	3.006	.461	.005737 I	4.225	3.736	.711	.008859 I	5.050	4.465	1.016	.012656 I
3.425	3.029	.467	.005822 I	4.250	3.758	.720	.008964 I	5.075	4.487	1.026	.012782 I
3.450	3.050	.474	.005907 I	4.275	3.780	.728	.009070 I	5.100	4.509	1.036	.012908 I
3.475	3.073	.481	.005993 I	4.300	3.802	.737	.009176 I	5.125	4.531	1.047	.013035 I
3.500	3.095	.488	.006079 I	4.325	3.824	.745	.009283 I	5.150	4.554	1.057	.013162 I
3.525	3.117	.495	.006167 I	4.350	3.846	.754	.009391 I	5.175	4.576	1.067	.013291 I
3.550	3.139	.502	.006254 I	4.375	3.868	.763	.009499 I	5.200	4.598	1.077	.013419 I
3.575	3.161	.509	.006343 I	4.400	3.890	.771	.009608 I	5.225	4.620	1.088	.013549 I
3.600	3.183	.516	.006432 I	4.425	3.913	.780	.009717 I	5.250	4.642	1.098	.013679 I
3.625	3.205	.524	.006521 I	4.450	3.935	.789	.009827 I	5.275	4.664	1.109	.013809 I
3.650	3.227	.531	.006612 I	4.475	3.957	.798	.009938 I	5.300	4.686	1.119	.013940 I
3.675	3.249	.538	.006702 I	4.500	3.979	.807	.010050 I	5.325	4.708	1.130	.014072 I
3.700	3.272	.546	.006794 I	4.525	4.001	.816	.010162 I	5.350	4.730	1.141	.014205 I
3.725	3.294	.553	.006886 I	4.550	4.023	.825	.010274 I	5.375	4.753	1.151	.014338 I
3.750	3.316	.560	.006979 I	4.575	4.045	.834	.010387 I	5.400	4.775	1.162	.014471 I
3.775	3.338	.568	.007072 I	4.600	4.067	.843	.010501 I	5.425	4.797	1.173	.014606 I
3.800	3.360	.575	.007166 I	4.625	4.089	.852	.010616 I	5.450	4.819	1.184	.014741 I
3.825	3.382	.583	.007261 I	4.650	4.111	.862	.010731 I	5.475	4.841	1.194	.014876 I
3.850	3.404	.591	.007356 I	4.675	4.134	.871	.010846 I	5.500	4.863	1.205	.015012 I
3.875	3.426	.598	.007452 I	4.700	4.156	.880	.010963 I	5.525	4.885	1.216	.015149 I
3.900	3.448	.606	.007548 I	4.725	4.178	.890	.011080 I	5.550	4.907	1.227	.015286 I
3.925	3.470	.614	.007645 I	4.750	4.200	.899	.011197 I	5.575	4.929	1.238	.015424 I
3.950	3.493	.622	.007743 I	4.775	4.222	.909	.011315 I	5.600	4.951	1.250	.015563 I
3.975	3.515	.630	.007841 I	4.800	4.244	.919	.011434 I	5.625	4.974	1.261	.015702 I
4.000	3.537	.638	.007940 I	4.825	4.266	.928	.011554 I	5.650	4.996	1.272	.015842 I
4.025	3.559	.646	.008040 I	4.850	4.288	.937	.011674 I	5.675	5.018	1.283	.015983 I
4.050	3.581	.654	.008140 I	4.875	4.310	.947	.011794 I	5.700	5.040	1.295	.016124 I
4.075	3.603	.662	.008241 I	4.900	4.333	.957	.011916 I	5.725	5.062	1.306	.016266 I

1200 MILLIMETER PIPE THE FLOW RANGE IS 3.2750 TO 5.7250 CUBIC METERS PER SECOND

METRIC TABLES

HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBNEY'S FORMULA

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WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARJATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 1275 MILLIMETERS

CS = .370

QQ INCREMENT = .0250 CUBIC METERS PER SECOND

AREA = 1.2760 SQUARE METERS

$H = (.36099E-03) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
.650	.509	.013	.000153 I	1.550	1.214	.075	.000867 I	2.450	1.919	.188	.002167 I
.675	.529	.014	.000164 I	1.575	1.234	.078	.000895 I	2.475	1.938	.192	.002211 I
.700	.548	.015	.000177 I	1.600	1.253	.080	.000924 I	2.500	1.958	.195	.002256 I
.725	.568	.016	.000190 I	1.625	1.273	.083	.000953 I	2.525	1.978	.199	.002302 I
.750	.587	.018	.000203 I	1.650	1.292	.085	.000983 I	2.550	1.997	.203	.002347 I
.775	.607	.019	.000217 I	1.675	1.312	.088	.001013 I	2.575	2.017	.207	.002394 I
.800	.627	.020	.000231 I	1.700	1.331	.090	.001043 I	2.600	2.036	.211	.002440 I
.825	.646	.021	.000246 I	1.725	1.351	.093	.001074 I	2.625	2.056	.215	.002487 I
.850	.666	.023	.000261 I	1.750	1.371	.096	.001106 I	2.650	2.076	.220	.002535 I
.875	.685	.024	.000276 I	1.775	1.390	.099	.001137 I	2.675	2.095	.224	.002583 I
.900	.705	.025	.000292 I	1.800	1.410	.101	.001170 I	2.700	2.115	.228	.002632 I
.925	.724	.027	.000309 I	1.825	1.429	.104	.001202 I	2.725	2.134	.232	.002681 I
.950	.744	.028	.000326 I	1.850	1.449	.107	.001235 I	2.750	2.154	.236	.002730 I
.975	.764	.030	.000343 I	1.875	1.469	.110	.001269 I	2.775	2.173	.241	.002780 I
1.000	.783	.031	.000361 I	1.900	1.488	.113	.001303 I	2.800	2.193	.245	.002830 I
1.025	.803	.033	.000379 I	1.925	1.508	.116	.001338 I	2.825	2.213	.250	.002881 I
1.050	.822	.034	.000398 I	1.950	1.527	.119	.001373 I	2.850	2.232	.254	.002932 I
1.075	.842	.036	.000417 I	1.975	1.547	.122	.001408 I	2.875	2.252	.258	.002984 I
1.100	.862	.038	.000437 I	2.000	1.566	.125	.001444 I	2.900	2.271	.263	.003036 I
1.125	.881	.040	.000457 I	2.025	1.586	.128	.001480 I	2.925	2.291	.268	.003088 I
1.150	.901	.041	.000477 I	2.050	1.606	.131	.001517 I	2.950	2.311	.272	.003142 I
1.175	.920	.043	.000498 I	2.075	1.625	.135	.001554 I	2.975	2.330	.277	.003195 I
1.200	.940	.045	.000520 I	2.100	1.645	.138	.001592 I	3.000	2.350	.281	.003249 I
1.225	.959	.047	.000542 I	2.125	1.664	.141	.001630 I	3.025	2.369	.286	.003303 I
1.250	.979	.049	.000564 I	2.150	1.684	.145	.001669 I	3.050	2.389	.291	.003358 I
1.275	.999	.051	.000587 I	2.175	1.704	.148	.001708 I	3.075	2.408	.296	.003413 I
1.300	1.018	.053	.000610 I	2.200	1.723	.151	.001747 I	3.100	2.428	.300	.003469 I
1.325	1.038	.055	.000634 I	2.225	1.743	.155	.001787 I	3.125	2.448	.305	.003525 I
1.350	1.057	.057	.000658 I	2.250	1.762	.158	.001828 I	3.150	2.467	.310	.003582 I
1.375	1.077	.059	.000682 I	2.275	1.782	.162	.001868 I	3.175	2.487	.315	.003639 I
1.400	1.097	.061	.000708 I	2.300	1.801	.165	.001910 I	3.200	2.506	.320	.003697 I
1.425	1.116	.063	.000733 I	2.325	1.821	.169	.001951 I	3.225	2.526	.325	.003755 I
1.450	1.136	.066	.000759 I	2.350	1.841	.173	.001994 I	3.250	2.545	.330	.003813 I
1.475	1.155	.068	.000785 I	2.375	1.860	.176	.002036 I	3.275	2.565	.335	.003872 I
1.500	1.175	.070	.000812 I	2.400	1.880	.180	.002079 I	3.300	2.585	.340	.003931 I
1.525	1.194	.073	.000840 I	2.425	1.899	.184	.002123 I	3.325	2.604	.346	.003991 I

1275 MILLIMETER PIPE THE FLOW RANGE IS .6500 TO 3.3250 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V
3.350	2.624	.351	.004051	I	4.250	3.329	.565	.006520	I	5.150	4.034
3.375	2.643	.356	.004112	I	4.275	3.348	.571	.006597	I	5.175	4.053
3.400	2.663	.361	.004173	I	4.300	3.368	.578	.006675	I	5.200	4.073
3.425	2.683	.367	.004235	I	4.325	3.387	.585	.006753	I	5.225	4.092
3.450	2.702	.372	.004297	I	4.350	3.407	.592	.006831	I	5.250	4.112
3.475	2.722	.378	.004359	I	4.375	3.427	.598	.006910	I	5.275	4.132
3.500	2.741	.383	.004422	I	4.400	3.446	.605	.006989	I	5.300	4.151
3.525	2.761	.389	.004486	I	4.425	3.466	.612	.007068	I	5.325	4.171
3.550	2.780	.394	.004549	I	4.450	3.485	.619	.007148	I	5.350	4.190
3.575	2.800	.400	.004614	I	4.475	3.505	.626	.007229	I	5.375	4.210
3.600	2.820	.405	.004678	I	4.500	3.525	.633	.007310	I	5.400	4.229
3.625	2.839	.411	.004744	I	4.525	3.544	.640	.007391	I	5.425	4.249
3.650	2.859	.417	.004809	I	4.550	3.564	.647	.007473	I	5.450	4.269
3.675	2.878	.422	.004875	I	4.575	3.583	.654	.007556	I	5.475	4.288
3.700	2.898	.428	.004942	I	4.600	3.603	.662	.007639	I	5.500	4.308
3.725	2.918	.434	.005009	I	4.625	3.622	.669	.007722	I	5.525	4.327
3.750	2.937	.440	.005076	I	4.650	3.642	.676	.007805	I	5.550	4.347
3.775	2.957	.446	.005144	I	4.675	3.662	.683	.007890	I	5.575	4.367
3.800	2.976	.451	.005213	I	4.700	3.681	.691	.007974	I	5.600	4.386
3.825	2.996	.457	.005282	I	4.725	3.701	.698	.008059	I	5.625	4.406
3.850	3.015	.463	.005351	I	4.750	3.720	.705	.008145	I	5.650	4.425
3.875	3.035	.469	.005420	I	4.775	3.740	.713	.008231	I	5.675	4.445
3.900	3.055	.476	.005491	I	4.800	3.759	.720	.008317	I	5.700	4.464
3.925	3.074	.482	.005561	I	4.825	3.779	.728	.008404	I	5.725	4.484
3.950	3.094	.488	.005632	I	4.850	3.799	.735	.008491	I	5.750	4.504
3.975	3.113	.494	.005704	I	4.875	3.818	.743	.008579	I	5.775	4.523
4.000	3.133	.500	.005776	I	4.900	3.838	.751	.008667	I	5.800	4.543
4.025	3.152	.507	.005848	I	4.925	3.857	.758	.008756	I	5.825	4.562
4.050	3.172	.513	.005921	I	4.950	3.877	.766	.008845	I	5.850	4.582
4.075	3.192	.519	.005994	I	4.975	3.897	.774	.008935	I	5.875	4.601
4.100	3.211	.526	.006068	I	5.000	3.916	.782	.009025	I	5.900	4.621
4.125	3.231	.532	.006142	I	5.025	3.936	.789	.009115	I	5.925	4.641
4.150	3.250	.538	.006217	I	5.050	3.955	.797	.009206	I	5.950	4.660
4.175	3.270	.545	.006292	I	5.075	3.975	.805	.009298	I	5.975	4.680
4.200	3.290	.552	.006368	I	5.100	3.994	.813	.009389	I	6.000	4.699
4.225	3.309	.558	.006444	I	5.125	4.014	.821	.009482	I	6.025	4.719

1275 MILLIMETER PIPE THE FLOW RANGE IS 3.3500 TO 6.0250 CUBIC METERS PER SECOND

Q	V	Hv	H	Q	V	Hv	H	Q	V	Hv	H
6.050	4.739	1.144	.013213 I	6.175	4.836	1.192	.013765 I	6.306	4.934	1.241	.014328 I
6.075	4.758	1.154	.013323 I	6.200	4.856	1.212	.013876 I	6.325	4.954	1.251	.014442 I
6.100	4.778	1.163	.013432 I	6.225	4.876	1.212	.013989 I	6.350	4.974	1.261	.014556 I
6.125	4.797	1.173	.013543 I	6.250	4.895	1.221	.014101 I	6.375	4.993	1.271	.014671 I
6.150	4.817	1.183	.013654 I	6.275	4.915	1.231	.014214 I	6.400	5.013	1.281	.014786 I

1275 MILLIMETER PIPE THE FLOW RANGE IS 6.0500 TO 6.4000 CUBIC METERS PER SECOND

METRIC TABLES

HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBAY'S FORMULA

SCOBAY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 1350 MILLIMETERS

CS = .370

QQ INCREMENT = .0250 CUBIC METERS PER SECOND

AREA = 1.4314 SQUARE METERS

$H = (.26741E-03) * (Q ** 2)$

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
.725	.507	.013	.000141	I	1.625	1.135	.066	.000736	I	2.525	1.764	.159	.001705	I
.750	.524	.014	.000150	I	1.650	1.153	.068	.000728	I	2.550	1.781	.162	.001739	I
.775	.541	.015	.000161	I	1.675	1.170	.070	.000750	I	2.575	1.799	.165	.001773	I
.800	.559	.016	.000171	I	1.700	1.188	.072	.000773	I	2.600	1.816	.168	.001808	I
.825	.576	.017	.000182	I	1.725	1.205	.074	.000796	I	2.625	1.834	.171	.001843	I
.850	.594	.018	.000193	I	1.750	1.223	.076	.000819	I	2.650	1.851	.175	.001878	I
.875	.611	.019	.000205	I	1.775	1.240	.078	.000842	I	2.675	1.869	.178	.001913	I
.900	.629	.020	.000217	I	1.800	1.258	.081	.000866	I	2.700	1.886	.181	.001949	I
.925	.646	.021	.000229	I	1.825	1.275	.083	.000891	I	2.725	1.904	.185	.001986	I
.950	.664	.022	.000241	I	1.850	1.292	.085	.000915	I	2.750	1.921	.188	.002022	I
.975	.681	.024	.000254	I	1.875	1.310	.087	.000940	I	2.775	1.939	.192	.002059	I
1.000	.699	.025	.000267	I	1.900	1.327	.090	.000965	I	2.800	1.956	.195	.002096	I
1.025	.716	.026	.000281	I	1.925	1.345	.092	.000991	I	2.825	1.974	.199	.002134	I
1.050	.734	.027	.000295	I	1.950	1.362	.095	.001017	I	2.850	1.991	.202	.002172	I
1.075	.751	.029	.000309	I	1.975	1.380	.097	.001043	I	2.875	2.009	.206	.002210	I
1.100	.768	.030	.000324	I	2.000	1.397	.100	.001070	I	2.900	2.026	.209	.002249	I
1.125	.786	.031	.000338	I	2.025	1.415	.102	.001097	I	2.925	2.043	.213	.002288	I
1.150	.803	.033	.000354	I	2.050	1.432	.105	.001124	I	2.950	2.061	.216	.002327	I
1.175	.821	.034	.000369	I	2.075	1.450	.107	.001151	I	2.975	2.078	.220	.002367	I
1.200	.838	.036	.000385	I	2.100	1.467	.110	.001179	I	3.000	2.096	.224	.002407	I
1.225	.856	.037	.000401	I	2.125	1.485	.112	.001208	I	3.025	2.113	.228	.002447	I
1.250	.873	.039	.000418	I	2.150	1.502	.115	.001236	I	3.050	2.131	.231	.002488	I
1.275	.891	.040	.000435	I	2.175	1.520	.118	.001265	I	3.075	2.148	.235	.002528	I
1.300	.908	.042	.000452	I	2.200	1.537	.120	.001294	I	3.100	2.166	.239	.002570	I
1.325	.926	.044	.000469	I	2.225	1.554	.123	.001324	I	3.125	2.183	.243	.002611	I
1.350	.943	.045	.000487	I	2.250	1.572	.126	.001354	I	3.150	2.201	.247	.002653	I
1.375	.961	.047	.000506	I	2.275	1.589	.129	.001384	I	3.175	2.218	.251	.002696	I
1.400	.978	.049	.000524	I	2.300	1.607	.132	.001415	I	3.200	2.236	.255	.002738	I
1.425	.996	.051	.000543	I	2.325	1.624	.134	.001445	I	3.225	2.253	.259	.002781	I
1.450	1.013	.052	.000562	I	2.350	1.642	.137	.001477	I	3.250	2.271	.263	.002824	I
1.475	1.030	.054	.000582	I	2.375	1.659	.140	.001508	I	3.275	2.288	.267	.002868	I
1.500	1.048	.056	.000602	I	2.400	1.677	.143	.001540	I	3.300	2.305	.271	.002912	I
1.525	1.065	.058	.000622	I	2.425	1.694	.146	.001573	I	3.325	2.323	.275	.002956	I
1.550	1.083	.060	.000642	I	2.450	1.712	.149	.001605	I	3.350	2.340	.279	.003001	I
1.575	1.100	.062	.000663	I	2.475	1.729	.152	.001638	I	3.375	2.358	.283	.003046	I
1.600	1.118	.064	.000685	I	2.500	1.747	.155	.001671	I	3.400	2.375	.288	.003091	I

1350 MILLIMETER PIPE THE FLOW RANGE IS .7250 TO 3.4000 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
3.425	2.393	.292	.003137	I	4.325	3.022	.465	.005002	I	5.225	3.650	.679	.007300	I
3.451	2.410	.296	.003163	I	4.350	3.039	.471	.005060	I	5.250	3.668	.686	.007370	I
3.475	2.428	.300	.003229	I	4.375	3.056	.476	.005118	I	5.275	3.685	.692	.007441	I
3.500	2.445	.305	.003276	I	4.400	3.074	.482	.005177	I	5.300	3.703	.699	.007511	I
3.525	2.463	.309	.003323	I	4.425	3.091	.487	.005236	I	5.325	3.720	.705	.007582	I
3.550	2.480	.314	.003370	I	4.450	3.109	.493	.005295	I	5.350	3.738	.712	.007654	I
3.575	2.498	.318	.003418	I	4.475	3.126	.498	.005355	I	5.375	3.755	.719	.007726	I
3.600	2.515	.322	.003466	I	4.500	3.144	.504	.005415	I	5.400	3.773	.725	.007798	I
3.625	2.533	.327	.003514	I	4.525	3.161	.509	.005475	I	5.425	3.790	.732	.007870	I
3.650	2.550	.331	.003563	I	4.550	3.179	.515	.005536	I	5.450	3.807	.739	.007943	I
3.675	2.567	.336	.003611	I	4.575	3.196	.521	.005597	I	5.475	3.825	.746	.008016	I
3.700	2.585	.341	.003661	I	4.600	3.214	.526	.005658	I	5.500	3.842	.753	.008089	I
3.725	2.602	.345	.003710	I	4.625	3.231	.532	.005720	I	5.525	3.860	.759	.008163	I
3.750	2.620	.350	.003760	I	4.650	3.249	.538	.005782	I	5.550	3.877	.766	.008237	I
3.775	2.637	.355	.003811	I	4.675	3.266	.544	.005844	I	5.575	3.895	.773	.008311	I
3.800	2.655	.359	.003861	I	4.700	3.284	.550	.005907	I	5.600	3.912	.780	.008386	I
3.825	2.672	.364	.003912	I	4.725	3.301	.555	.005970	I	5.625	3.930	.787	.008461	I
3.850	2.690	.369	.003964	I	4.750	3.318	.561	.006033	I	5.650	3.947	.794	.008536	I
3.875	2.707	.374	.004015	I	4.775	3.336	.567	.006097	I	5.675	3.965	.801	.008612	I
3.900	2.725	.378	.004067	I	4.800	3.353	.573	.006161	I	5.700	3.982	.808	.008688	I
3.925	2.742	.383	.004120	I	4.825	3.371	.579	.006225	I	5.725	4.000	.815	.008764	I
3.950	2.760	.388	.004172	I	4.850	3.388	.585	.006290	I	5.750	4.017	.822	.008841	I
3.975	2.777	.393	.004225	I	4.875	3.406	.591	.006355	I	5.775	4.035	.830	.008918	I
4.000	2.794	.398	.004278	I	4.900	3.423	.597	.006420	I	5.800	4.052	.837	.008996	I
4.025	2.812	.403	.004332	I	4.925	3.441	.603	.006486	I	5.825	4.069	.844	.009073	I
4.050	2.829	.408	.004386	I	4.950	3.458	.610	.006552	I	5.850	4.087	.851	.009151	I
4.075	2.847	.413	.004440	I	4.975	3.476	.616	.006618	I	5.875	4.104	.859	.009230	I
4.100	2.864	.418	.004495	I	5.000	3.493	.622	.006685	I	5.900	4.122	.866	.009308	I
4.125	2.882	.423	.004550	I	5.025	3.511	.628	.006752	I	5.925	4.139	.873	.009387	I
4.150	2.899	.428	.004605	I	5.050	3.528	.634	.006820	I	5.950	4.157	.881	.009467	I
4.175	2.917	.434	.004661	I	5.075	3.546	.641	.006887	I	5.975	4.174	.888	.009547	I
4.200	2.934	.439	.004717	I	5.100	3.563	.647	.006955	I	6.000	4.192	.896	.009627	I
4.225	2.952	.444	.004773	I	5.125	3.580	.653	.007024	I	6.025	4.209	.903	.009707	I
4.250	2.969	.449	.004830	I	5.150	3.598	.660	.007092	I	6.050	4.227	.911	.009788	I
4.275	2.987	.455	.004887	I	5.175	3.615	.666	.007161	I	6.075	4.244	.918	.009869	I
4.300	3.004	.460	.004944	I	5.200	3.633	.673	.007231	I	6.100	4.262	.926	.009950	I

1350 MILLIMETER PIPE THE FLOW RANGE IS 3.4250 TO 6.1000 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
6.125	4.279	.933	.010032 I	6.500	4.541	1.051	.011298 I	6.875	4.803	1.176	.012639 I
6.150	4.297	.941	.010114 I	6.525	4.559	1.059	.011385 I	6.900	4.820	1.184	.012731 I
6.175	4.314	.949	.010196 I	6.550	4.576	1.067	.011472 I	6.925	4.838	1.193	.012824 I
6.200	4.331	.956	.010279 I	6.575	4.593	1.075	.011560 I	6.950	4.855	1.202	.012916 I
6.225	4.349	.964	.010362 I	6.600	4.611	1.084	.011648 I	6.975	4.873	1.210	.013009 I
6.250	4.366	.972	.010446 I	6.625	4.628	1.092	.011737 I	7.000	4.890	1.219	.013103 I
6.275	4.384	.980	.010529 I	6.650	4.646	1.100	.011825 I	7.025	4.908	1.228	.013197 I
6.300	4.401	.987	.010613 I	6.675	4.663	1.108	.011914 I	7.050	4.925	1.236	.013291 I
6.325	4.419	.995	.010694 I	6.700	4.681	1.117	.012004 I	7.075	4.943	1.245	.013385 I
6.350	4.436	1.003	.010782 I	6.725	4.698	1.125	.012094 I	7.100	4.960	1.254	.013480 I
6.375	4.454	1.011	.010868 I	6.750	4.716	1.133	.012184 I	7.125	4.978	1.263	.013575 I
6.400	4.471	1.019	.010953 I	6.775	4.733	1.142	.012274 I	7.150	4.995	1.272	.013670 I
6.425	4.489	1.027	.011039 I	6.800	4.751	1.150	.012365 I	7.175	5.013	1.281	.013766 I
6.450	4.506	1.035	.011125 I	6.825	4.768	1.159	.012456 I	7.200	5.030	1.290	.013862 I
6.475	4.524	1.043	.011211 I	6.850	4.786	1.167	.012547 I	7.225	5.048	1.299	.013959 I

1350 MILLIMETER PIPE THE FLOW RANGE IS 6.1250 TO 7.2250 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBNEY'S FORMULA

SCOBNEY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

Hv = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 1500 MILLIMETERS

CS = .370

QQ INCREMENT = .0250 CUBIC METERS PER SECOND

AREA = 1.7672 SQUARE METERS

$H = (.15380E-03) * (Q ** 2)$

Q	V	HW	H	Q	V	HW	H	Q	V	HW	H
.900	.509	.013	.000125 I	1.800	1.019	.053	.000498 I	2.700	1.528	.119	.001121 I
.925	.523	.014	.000132 I	1.825	1.033	.054	.000512 I	2.725	1.542	.121	.001142 I
.950	.538	.015	.000139 I	1.850	1.047	.056	.000526 I	2.750	1.556	.123	.001163 I
.975	.552	.016	.000146 I	1.875	1.061	.057	.000541 I	2.775	1.570	.126	.001184 I
1.000	.566	.016	.000154 I	1.900	1.075	.059	.000555 I	2.800	1.584	.128	.001206 I
1.025	.580	.017	.000162 I	1.925	1.089	.060	.000570 I	2.825	1.599	.130	.001227 I
1.050	.594	.018	.000170 I	1.950	1.103	.062	.000585 I	2.850	1.613	.133	.001249 I
1.075	.608	.019	.000178 I	1.975	1.118	.064	.000600 I	2.875	1.627	.135	.001271 I
1.100	.622	.020	.000186 I	2.000	1.132	.065	.000615 I	2.900	1.641	.137	.001293 I
1.125	.637	.021	.000195 I	2.025	1.146	.067	.000631 I	2.925	1.655	.140	.001316 I
1.150	.651	.022	.000203 I	2.050	1.160	.069	.000646 I	2.950	1.669	.142	.001338 I
1.175	.665	.023	.000212 I	2.075	1.174	.070	.000662 I	2.975	1.684	.144	.001361 I
1.200	.679	.024	.000221 I	2.100	1.188	.072	.000678 I	3.000	1.698	.147	.001384 I
1.225	.693	.024	.000231 I	2.125	1.203	.074	.000694 I	3.025	1.712	.149	.001407 I
1.250	.707	.026	.000240 I	2.150	1.217	.075	.000711 I	3.050	1.726	.152	.001431 I
1.275	.722	.027	.000250 I	2.175	1.231	.077	.000728 I	3.075	1.740	.154	.001454 I
1.300	.735	.028	.000260 I	2.200	1.245	.079	.000744 I	3.100	1.754	.157	.001477 I
1.325	.750	.029	.000270 I	2.225	1.259	.081	.000761 I	3.125	1.768	.159	.001502 I
1.350	.764	.030	.000280 I	2.250	1.273	.083	.000779 I	3.150	1.783	.162	.001526 I
1.375	.778	.031	.000291 I	2.275	1.287	.084	.000796 I	3.175	1.797	.165	.001550 I
1.400	.792	.032	.000301 I	2.300	1.302	.086	.000814 I	3.200	1.811	.167	.001575 I
1.425	.806	.033	.000312 I	2.325	1.316	.088	.000831 I	3.225	1.825	.170	.001600 I
1.450	.821	.034	.000323 I	2.350	1.330	.090	.000849 I	3.250	1.839	.172	.001624 I
1.475	.835	.036	.000335 I	2.375	1.344	.092	.000868 I	3.275	1.853	.175	.001650 I
1.500	.849	.037	.000346 I	2.400	1.358	.094	.000886 I	3.300	1.867	.178	.001675 I
1.525	.863	.038	.000358 I	2.425	1.372	.096	.000904 I	3.325	1.882	.180	.001700 I
1.550	.877	.039	.000369 I	2.450	1.386	.098	.000923 I	3.350	1.896	.183	.001726 I
1.575	.891	.040	.000382 I	2.475	1.401	.100	.000942 I	3.375	1.910	.186	.001752 I
1.600	.905	.042	.000394 I	2.500	1.415	.102	.000961 I	3.400	1.924	.189	.001778 I
1.625	.920	.043	.000406 I	2.525	1.429	.104	.000981 I	3.425	1.938	.191	.001804 I
1.650	.934	.044	.000419 I	2.550	1.443	.106	.001000 I	3.450	1.952	.194	.001831 I
1.675	.948	.046	.000431 I	2.575	1.457	.108	.001020 I	3.475	1.966	.197	.001857 I
1.700	.962	.047	.000444 I	2.600	1.471	.110	.001040 I	3.500	1.981	.200	.001884 I
1.725	.976	.049	.000458 I	2.625	1.485	.112	.001060 I	3.525	1.995	.203	.001911 I
1.750	.990	.050	.000471 I	2.650	1.500	.115	.001080 I	3.550	2.009	.206	.001938 I
1.775	1.004	.051	.000485 I	2.675	1.514	.117	.001101 I	3.575	2.023	.209	.001966 I

1500 MILLIMETER PIPE THE FLOW RANGE IS .9000 TO 3.5750 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V
3.600	2.037	.212	.001993	I	4.500	2.546	.331	.003114	I	5.400	3.056
3.625	2.051	.214	.002021	I	4.525	2.561	.334	.003149	I	5.425	3.070
3.650	2.065	.217	.002049	I	4.550	2.575	.338	.003184	I	5.450	3.084
3.675	2.080	.220	.002077	I	4.575	2.589	.342	.003219	I	5.475	3.098
3.700	2.094	.223	.002105	I	4.600	2.603	.345	.003254	I	5.500	3.112
3.725	2.108	.226	.002134	I	4.625	2.617	.349	.003290	I	5.525	3.127
3.750	2.122	.230	.002163	I	4.650	2.631	.353	.003325	I	5.550	3.141
3.775	2.136	.233	.002192	I	4.675	2.646	.357	.003361	I	5.575	3.155
3.800	2.150	.236	.002221	I	4.700	2.660	.361	.003397	I	5.600	3.169
3.825	2.165	.239	.002250	I	4.725	2.674	.364	.003434	I	5.625	3.183
3.850	2.179	.242	.002280	I	4.750	2.688	.368	.003470	I	5.650	3.197
3.875	2.193	.245	.002309	I	4.775	2.702	.372	.003507	I	5.675	3.211
3.900	2.207	.248	.002339	I	4.800	2.716	.376	.003543	I	5.700	3.226
3.925	2.221	.251	.002369	I	4.825	2.730	.380	.003580	I	5.725	3.240
3.950	2.235	.255	.002400	I	4.850	2.745	.384	.003618	I	5.750	3.254
3.975	2.249	.258	.002430	I	4.875	2.759	.388	.003655	I	5.775	3.268
4.000	2.264	.261	.002461	I	4.900	2.773	.392	.003693	I	5.800	3.282
4.025	2.278	.264	.002492	I	4.925	2.787	.396	.003730	I	5.825	3.296
4.050	2.292	.268	.002523	I	4.950	2.801	.400	.003768	I	5.850	3.310
4.075	2.306	.271	.002554	I	4.975	2.815	.404	.003807	I	5.875	3.325
4.100	2.320	.274	.002585	I	5.000	2.829	.408	.003845	I	5.900	3.339
4.125	2.334	.278	.002617	I	5.025	2.844	.412	.003883	I	5.925	3.353
4.150	2.348	.281	.002649	I	5.050	2.858	.416	.003922	I	5.950	3.367
4.175	2.363	.284	.002681	I	5.075	2.872	.420	.003961	I	5.975	3.381
4.200	2.377	.288	.002713	I	5.100	2.886	.425	.004000	I	6.000	3.395
4.225	2.391	.291	.002745	I	5.125	2.900	.429	.004040	I	6.025	3.409
4.250	2.405	.295	.002778	I	5.150	2.914	.433	.004079	I	6.050	3.424
4.275	2.419	.298	.002811	I	5.175	2.928	.437	.004119	I	6.075	3.438
4.300	2.433	.302	.002844	I	5.200	2.943	.441	.004159	I	6.100	3.452
4.325	2.447	.305	.002877	I	5.225	2.957	.446	.004199	I	6.125	3.466
4.350	2.462	.309	.002910	I	5.250	2.971	.450	.004239	I	6.150	3.480
4.375	2.476	.312	.002944	I	5.275	2.985	.454	.004279	I	6.175	3.494
4.400	2.490	.316	.002977	I	5.300	2.999	.458	.004320	I	6.200	3.508
4.425	2.504	.320	.003011	I	5.325	3.013	.463	.004361	I	6.225	3.523
4.450	2.518	.323	.003046	I	5.350	3.027	.467	.004402	I	6.250	3.537
4.475	2.532	.327	.003080	I	5.375	3.042	.472	.004443	I	6.275	3.551

1500 MILLIMETER PIPE THE FLOW RANGE IS 3.6000 TO 6.2750 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
6.300	3.565	.648	.006104	I	7.175	4.060	.840	.007917	I	8.050	4.555	1.058	.009966	I
6.325	3.579	.653	.006153	I	7.200	4.074	.846	.007973	I	8.075	4.570	1.064	.010028	I
6.350	3.593	.658	.006201	I	7.225	4.089	.852	.008028	I	8.100	4.584	1.071	.010091	I
6.375	3.608	.663	.006250	I	7.250	4.103	.858	.008084	I	8.125	4.598	1.077	.010153	I
6.400	3.622	.669	.006299	I	7.275	4.117	.864	.008140	I	8.150	4.612	1.084	.010215	I
6.425	3.636	.674	.006349	I	7.300	4.131	.870	.008196	I	8.175	4.626	1.091	.010278	I
6.450	3.650	.679	.006398	I	7.325	4.145	.876	.008252	I	8.200	4.640	1.097	.010341	I
6.475	3.664	.684	.006448	I	7.350	4.159	.882	.008308	I	8.225	4.654	1.104	.010404	I
6.500	3.678	.690	.006498	I	7.375	4.173	.888	.008365	I	8.250	4.669	1.111	.010468	I
6.525	3.692	.695	.006548	I	7.400	4.188	.894	.008422	I	8.275	4.683	1.118	.010531	I
6.550	3.707	.700	.006598	I	7.425	4.202	.900	.008479	I	8.300	4.697	1.124	.010595	I
6.575	3.721	.706	.006649	I	7.450	4.216	.906	.008536	I	8.325	4.711	1.131	.010659	I
6.600	3.735	.711	.006699	I	7.475	4.230	.912	.008593	I	8.350	4.725	1.138	.010723	I
6.625	3.749	.716	.006750	I	7.500	4.244	.918	.008651	I	8.375	4.739	1.145	.010787	I
6.650	3.763	.722	.006801	I	7.525	4.258	.924	.008709	I	8.400	4.753	1.152	.010852	I
6.675	3.777	.727	.006852	I	7.550	4.272	.930	.008767	I	8.425	4.768	1.158	.010917	I
6.700	3.791	.733	.006904	I	7.575	4.287	.937	.008825	I	8.450	4.782	1.165	.010981	I
6.725	3.806	.738	.006956	I	7.600	4.301	.943	.008883	I	8.475	4.796	1.172	.011046	I
6.750	3.820	.744	.007007	I	7.625	4.315	.949	.008942	I	8.500	4.810	1.179	.011112	I
6.775	3.834	.749	.007059	I	7.650	4.329	.955	.009001	I	8.525	4.824	1.186	.011177	I
6.800	3.848	.755	.007112	I	7.675	4.343	.961	.009059	I	8.550	4.838	1.193	.011243	I
6.825	3.862	.760	.007164	I	7.700	4.357	.968	.009119	I	8.575	4.852	1.200	.011309	I
6.850	3.876	.766	.007216	I	7.725	4.371	.974	.009178	I	8.600	4.867	1.207	.011375	I
6.875	3.890	.771	.007269	I	7.750	4.386	.980	.009237	I	8.625	4.881	1.214	.011441	I
6.900	3.905	.777	.007322	I	7.775	4.400	.987	.009297	I	8.650	4.895	1.221	.011507	I
6.925	3.919	.783	.007375	I	7.800	4.414	.993	.009357	I	8.675	4.909	1.228	.011574	I
6.950	3.933	.788	.007429	I	7.825	4.428	.999	.009417	I	8.700	4.923	1.235	.011641	I
6.975	3.947	.794	.007482	I	7.850	4.442	1.006	.009477	I	8.725	4.937	1.242	.011708	I
7.000	3.961	.800	.007536	I	7.875	4.456	1.012	.009538	I	8.750	4.951	1.250	.011775	I
7.025	3.975	.805	.007590	I	7.900	4.470	1.019	.009598	I	8.775	4.966	1.257	.011842	I
7.050	3.989	.811	.007644	I	7.925	4.485	1.025	.009659	I	8.800	4.980	1.264	.011910	I
7.075	4.004	.817	.007698	I	7.950	4.499	1.032	.009720	I	8.825	4.994	1.271	.011978	I
7.100	4.018	.823	.007753	I	7.975	4.513	1.038	.009781	I	8.850	5.008	1.278	.012046	I
7.125	4.032	.829	.007808	I	8.000	4.527	1.045	.009843	I	8.875	5.022	1.286	.012114	I
7.150	4.046	.834	.007862	I	8.025	4.541	1.051	.009905	I	8.900	5.036	1.293	.012182	I

1500 MILLIMETER PIPE THE FLOW RANGE IS 6.3000 TO 8.9000 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBAY'S FORMULA

SCOBAY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 1650 MILLIMETERS

CS = .370

QQ INCREMENT = .8250 CUBIC METERS PER SECOND

AREA = 2.1383 SQUARE METERS

$H = (.93246E-04) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
1.075	.503	.013	.000108 I	1.975	.924	.043	.000364 I	2.875	1.345	.092	.000771 I
1.100	.514	.013	.000113 I	2.000	.935	.045	.000373 I	2.900	1.356	.094	.000784 I
1.125	.526	.014	.000118 I	2.025	.947	.046	.000382 I	2.925	1.368	.095	.000798 I
1.150	.538	.015	.000123 I	2.050	.959	.047	.000392 I	2.950	1.380	.097	.000811 I
1.175	.550	.015	.000129 I	2.075	.970	.048	.000401 I	2.975	1.391	.099	.000825 I
1.200	.561	.016	.000134 I	2.100	.982	.049	.000411 I	3.000	1.403	.100	.000839 I
1.225	.573	.017	.000140 I	2.125	.994	.050	.000421 I	3.025	1.415	.102	.000853 I
1.250	.585	.017	.000146 I	2.150	1.005	.052	.000431 I	3.050	1.426	.104	.000867 I
1.275	.596	.018	.000152 I	2.175	1.017	.053	.000441 I	3.075	1.438	.105	.000882 I
1.300	.608	.019	.000158 I	2.200	1.029	.054	.000451 I	3.100	1.450	.107	.000896 I
1.325	.620	.020	.000164 I	2.225	1.041	.055	.000462 I	3.125	1.461	.109	.000911 I
1.350	.631	.020	.000170 I	2.250	1.052	.056	.000472 I	3.150	1.473	.111	.000925 I
1.375	.643	.021	.000176 I	2.275	1.064	.058	.000483 I	3.175	1.485	.112	.000940 I
1.400	.655	.022	.000183 I	2.300	1.076	.059	.000493 I	3.200	1.497	.114	.000955 I
1.425	.666	.023	.000189 I	2.325	1.087	.060	.000504 I	3.225	1.508	.116	.000970 I
1.450	.678	.023	.000196 I	2.350	1.099	.062	.000515 I	3.250	1.520	.118	.000985 I
1.475	.690	.024	.000203 I	2.375	1.111	.063	.000526 I	3.275	1.532	.120	.001000 I
1.500	.702	.025	.000210 I	2.400	1.122	.064	.000537 I	3.300	1.543	.121	.001015 I
1.525	.713	.026	.000217 I	2.425	1.134	.066	.000548 I	3.325	1.555	.123	.001031 I
1.550	.725	.027	.000224 I	2.450	1.146	.067	.000560 I	3.350	1.567	.125	.001046 I
1.575	.737	.028	.000231 I	2.475	1.157	.068	.000571 I	3.375	1.578	.127	.001062 I
1.600	.748	.029	.000239 I	2.500	1.169	.070	.000583 I	3.400	1.590	.129	.001078 I
1.625	.760	.029	.000246 I	2.525	1.181	.071	.000595 I	3.425	1.602	.131	.001094 I
1.650	.772	.030	.000254 I	2.550	1.193	.072	.000606 I	3.450	1.613	.133	.001110 I
1.675	.783	.031	.000262 I	2.575	1.204	.074	.000618 I	3.475	1.625	.135	.001126 I
1.700	.795	.032	.000269 I	2.600	1.216	.075	.000630 I	3.500	1.637	.137	.001142 I
1.725	.807	.033	.000277 I	2.625	1.228	.077	.000643 I	3.525	1.649	.139	.001159 I
1.750	.818	.034	.000286 I	2.650	1.239	.078	.000655 I	3.550	1.660	.140	.001175 I
1.775	.830	.035	.000294 I	2.675	1.251	.080	.000667 I	3.575	1.672	.142	.001192 I
1.800	.842	.036	.000302 I	2.700	1.263	.081	.000680 I	3.600	1.684	.144	.001208 I
1.825	.854	.037	.000311 I	2.725	1.274	.083	.000692 I	3.625	1.695	.146	.001225 I
1.850	.865	.038	.000319 I	2.750	1.286	.084	.000705 I	3.650	1.707	.149	.001242 I
1.875	.877	.039	.000328 I	2.775	1.298	.086	.000718 I	3.675	1.719	.151	.001259 I
1.900	.889	.040	.000337 I	2.800	1.309	.087	.000731 I	3.700	1.730	.153	.001277 I
1.925	.900	.041	.000346 I	2.825	1.321	.089	.000744 I	3.725	1.742	.155	.001294 I
1.950	.912	.042	.000355 I	2.850	1.333	.091	.000757 I	3.750	1.754	.157	.001311 I

1650 MILLIMETER PIPE THE FLOW RANGE IS 1.0750 TO 3.7500 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
3.775	1.765	.159	.001329	I	4.675	2.186	.244	.002038	I	5.575	2.607	.346	.002898	I
3.800	1.777	.161	.001346	I	4.700	2.198	.246	.002060	I	5.600	2.619	.350	.002924	I
3.825	1.789	.163	.001364	I	4.725	2.210	.249	.002082	I	5.625	2.631	.353	.002950	I
3.850	1.801	.165	.001382	I	4.750	2.221	.252	.002104	I	5.650	2.642	.356	.002977	I
3.875	1.812	.167	.001400	I	4.775	2.233	.254	.002126	I	5.675	2.654	.359	.003003	I
3.900	1.824	.170	.001418	I	4.800	2.245	.257	.002148	I	5.700	2.666	.362	.003030	I
3.925	1.836	.172	.001437	I	4.825	2.257	.260	.002171	I	5.725	2.677	.365	.003056	I
3.950	1.847	.174	.001455	I	4.850	2.268	.262	.002193	I	5.750	2.689	.369	.003083	I
3.975	1.859	.176	.001473	I	4.875	2.280	.265	.002216	I	5.775	2.701	.372	.003110	I
4.000	1.871	.178	.001492	I	4.900	2.292	.268	.002239	I	5.800	2.712	.375	.003137	I
4.025	1.882	.181	.001511	I	4.925	2.303	.270	.002262	I	5.825	2.724	.378	.003164	I
4.050	1.894	.183	.001529	I	4.950	2.315	.273	.002285	I	5.850	2.736	.382	.003191	I
4.075	1.906	.185	.001548	I	4.975	2.327	.276	.002308	I	5.875	2.748	.385	.003218	I
4.100	1.917	.187	.001567	I	5.000	2.338	.279	.002331	I	5.900	2.759	.388	.003246	I
4.125	1.929	.190	.001587	I	5.025	2.350	.281	.002355	I	5.925	2.771	.391	.003273	I
4.150	1.941	.192	.001606	I	5.050	2.362	.284	.002378	I	5.950	2.783	.395	.003301	I
4.175	1.953	.194	.001625	I	5.075	2.373	.287	.002402	I	5.975	2.794	.398	.003329	I
4.200	1.964	.197	.001645	I	5.100	2.385	.290	.002425	I	6.000	2.806	.401	.003357	I
4.225	1.976	.199	.001665	I	5.125	2.397	.293	.002449	I	6.025	2.818	.405	.003385	I
4.250	1.988	.201	.001684	I	5.150	2.409	.296	.002473	I	6.050	2.829	.408	.003413	I
4.275	1.999	.204	.001704	I	5.175	2.420	.299	.002497	I	6.075	2.841	.411	.003441	I
4.300	2.011	.206	.001724	I	5.200	2.432	.301	.002521	I	6.100	2.853	.415	.003470	I
4.325	2.023	.209	.001744	I	5.225	2.444	.304	.002546	I	6.125	2.864	.418	.003498	I
4.350	2.034	.211	.001764	I	5.250	2.455	.307	.002570	I	6.150	2.876	.422	.003527	I
4.375	2.046	.213	.001785	I	5.275	2.467	.310	.002595	I	6.175	2.888	.425	.003556	I
4.400	2.058	.216	.001805	I	5.300	2.479	.313	.002619	I	6.200	2.900	.429	.003584	I
4.425	2.069	.218	.001826	I	5.325	2.490	.316	.002644	I	6.225	2.911	.432	.003613	I
4.450	2.081	.221	.001847	I	5.350	2.502	.319	.002669	I	6.250	2.923	.435	.003642	I
4.475	2.093	.223	.001867	I	5.375	2.514	.322	.002694	I	6.275	2.935	.439	.003672	I
4.500	2.105	.226	.001888	I	5.400	2.525	.325	.002719	I	6.300	2.946	.442	.003701	I
4.525	2.116	.228	.001909	I	5.425	2.537	.328	.002744	I	6.325	2.958	.446	.003730	I
4.550	2.128	.231	.001931	I	5.450	2.549	.331	.002770	I	6.350	2.970	.450	.003760	I
4.575	2.140	.233	.001952	I	5.475	2.561	.334	.002795	I	6.375	2.981	.453	.003790	I
4.600	2.151	.236	.001973	I	5.500	2.572	.337	.002821	I	6.400	2.993	.457	.003819	I
4.625	2.163	.238	.001995	I	5.525	2.584	.340	.002846	I	6.425	3.005	.460	.003849	I
4.650	2.175	.241	.002016	I	5.550	2.596	.343	.002872	I	6.450	3.016	.464	.003879	I

1650 MILLIMETER PIPE THE FLOW RANGE IS 3.7750 TO 6.4500 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
6.475	3.028	.467	.003909	I	7.375	3.449	.606	.005072	I	8.275	3.870	.763	.006385	I
6.500	3.040	.471	.003940	I	7.400	3.461	.610	.005106	I	8.300	3.882	.768	.006424	I
6.525	3.052	.475	.003970	I	7.425	3.472	.615	.005141	I	8.325	3.893	.773	.006463	I
6.550	3.063	.478	.004001	I	7.450	3.484	.619	.005175	I	8.350	3.905	.777	.006501	I
6.575	3.075	.482	.004031	I	7.475	3.496	.623	.005210	I	8.375	3.917	.782	.006540	I
6.600	3.087	.486	.004062	I	7.500	3.508	.627	.005245	I	8.400	3.928	.787	.006579	I
6.625	3.098	.489	.004093	I	7.525	3.519	.631	.005280	I	8.425	3.940	.791	.006619	I
6.650	3.110	.493	.004124	I	7.550	3.531	.635	.005315	I	8.450	3.952	.796	.006658	I
6.675	3.122	.497	.004155	I	7.575	3.543	.640	.005351	I	8.475	3.964	.801	.006697	I
6.700	3.133	.500	.004186	I	7.600	3.554	.644	.005386	I	8.500	3.975	.805	.006737	I
6.725	3.145	.504	.004217	I	7.625	3.566	.648	.005421	I	8.525	3.987	.810	.006777	I
6.750	3.157	.508	.004249	I	7.650	3.578	.652	.005457	I	8.550	3.999	.815	.006817	I
6.775	3.168	.512	.004280	I	7.675	3.589	.657	.005493	I	8.575	4.010	.820	.006856	I
6.800	3.180	.515	.004312	I	7.700	3.601	.661	.005529	I	8.600	4.022	.824	.006897	I
6.825	3.192	.519	.004343	I	7.725	3.613	.665	.005565	I	8.625	4.034	.829	.006937	I
6.850	3.204	.523	.004375	I	7.750	3.624	.670	.005601	I	8.650	4.045	.834	.006977	I
6.875	3.215	.527	.004407	I	7.775	3.636	.674	.005637	I	8.675	4.057	.839	.007017	I
6.900	3.227	.531	.004439	I	7.800	3.648	.678	.005673	I	8.700	4.069	.844	.007058	I
6.925	3.239	.535	.004472	I	7.825	3.660	.683	.005710	I	8.725	4.080	.849	.007098	I
6.950	3.250	.538	.004504	I	7.850	3.671	.687	.005746	I	8.750	4.092	.853	.007139	I
6.975	3.262	.542	.004536	I	7.875	3.683	.691	.005783	I	8.775	4.104	.858	.007180	I
7.000	3.274	.546	.004569	I	7.900	3.695	.696	.005820	I	8.800	4.116	.863	.007221	I
7.025	3.285	.550	.004602	I	7.925	3.706	.700	.005856	I	8.825	4.127	.868	.007262	I
7.050	3.297	.554	.004635	I	7.950	3.718	.705	.005893	I	8.850	4.139	.873	.007303	I
7.075	3.309	.558	.004668	I	7.975	3.730	.709	.005931	I	8.875	4.151	.878	.007345	I
7.100	3.320	.562	.004701	I	8.000	3.741	.713	.005968	I	8.900	4.162	.883	.007386	I
7.125	3.332	.566	.004734	I	8.025	3.753	.718	.006005	I	8.925	4.174	.888	.007428	I
7.150	3.344	.570	.004767	I	8.050	3.765	.722	.006043	I	8.950	4.186	.893	.007469	I
7.175	3.356	.574	.004800	I	8.075	3.776	.727	.006080	I	8.975	4.197	.898	.007511	I
7.200	3.367	.578	.004834	I	8.100	3.788	.731	.006118	I	9.000	4.209	.903	.007553	I
7.225	3.379	.582	.004868	I	8.125	3.800	.736	.006156	I	9.025	4.221	.908	.007595	I
7.250	3.391	.586	.004901	I	8.150	3.812	.740	.006194	I	9.050	4.232	.913	.007637	I
7.275	3.402	.590	.004935	I	8.175	3.823	.745	.006232	I	9.075	4.244	.918	.007679	I
7.300	3.414	.594	.004969	I	8.200	3.835	.750	.006270	I	9.100	4.256	.923	.007722	I
7.325	3.426	.598	.005003	I	8.225	3.847	.754	.006308	I	9.125	4.268	.928	.007764	I
7.350	3.437	.602	.005037	I	8.250	3.858	.759	.006347	I	9.150	4.279	.933	.007807	I

1650 MILLIMETER PIPE THE FLOW RANGE IS 6.4750 TO 9.1500 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V
9.175	4.291	.938	.007850	I	9.725	4.548	1.054	.008819	I	10.275	4.805
9.200	4.303	.944	.007892	I	9.750	4.560	1.060	.008864	I	10.300	4.817
9.225	4.314	.949	.007935	I	9.775	4.571	1.065	.008910	I	10.325	4.829
9.250	4.326	.954	.007978	I	9.800	4.583	1.071	.008955	I	10.350	4.840
9.275	4.338	.959	.008022	I	9.825	4.595	1.076	.009001	I	10.375	4.852
9.300	4.349	.964	.008065	I	9.850	4.607	1.082	.009047	I	10.400	4.864
9.325	4.361	.969	.008108	I	9.875	4.618	1.087	.009093	I	10.425	4.875
9.350	4.373	.975	.008152	I	9.900	4.630	1.093	.009139	I	10.450	4.887
9.375	4.384	.980	.008195	I	9.925	4.642	1.098	.009185	I	10.475	4.899
9.400	4.396	.985	.008239	I	9.950	4.653	1.104	.009232	I	10.500	4.911
9.425	4.408	.990	.008283	I	9.975	4.665	1.109	.009278	I	10.525	4.922
9.450	4.419	.996	.008327	I	10.000	4.677	1.115	.009325	I	10.550	4.934
9.475	4.431	1.001	.008371	I	10.025	4.688	1.120	.009371	I	10.575	4.946
9.500	4.443	1.006	.008415	I	10.050	4.700	1.126	.009418	I	10.600	4.957
9.525	4.455	1.011	.008460	I	10.075	4.712	1.132	.009465	I	10.625	4.969
9.550	4.466	1.017	.008504	I	10.100	4.723	1.137	.009512	I	10.650	4.981
9.575	4.478	1.022	.008549	I	10.125	4.735	1.143	.009559	I	10.675	4.992
9.600	4.490	1.027	.008594	I	10.150	4.747	1.148	.009606	I	10.700	5.004
9.625	4.501	1.033	.008638	I	10.175	4.759	1.154	.009654	I	10.725	5.016
9.650	4.513	1.038	.008683	I	10.200	4.770	1.160	.009701	I	10.750	5.027
9.675	4.525	1.043	.008728	I	10.225	4.782	1.165	.009749	I	10.775	5.039
9.700	4.536	1.049	.008774	I	10.250	4.794	1.171	.009797	I	10.800	5.051

1650 MILLIMETER PIPE THE FLOW RANGE IS 9.1750 TO 10.8000 CUBIC METERS PER SECOND

METRIC TABLES

HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBNEY'S FORMULA

SCOBNEY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 1800 MILLIMETERS

CS = .370

QQ INCREMENT = .0500 CUBIC METERS PER SECOND

AREA = 2.5447 SQUARE METERS

$H = (.59053E-04) * (Q ** 2)$

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
1.30	.511	.013	.000100	I	3.10	1.218	.076	.000567	I	4.90	1.926	.189	.001418	I
1.35	.531	.014	.000108	I	3.15	1.238	.078	.000586	I	4.95	1.945	.193	.001447	I
1.40	.550	.015	.000116	I	3.20	1.258	.081	.000605	I	5.00	1.965	.197	.001476	I
1.45	.570	.017	.000124	I	3.25	1.277	.083	.000624	I	5.05	1.985	.201	.001506	I
1.50	.589	.018	.000133	I	3.30	1.297	.086	.000643	I	5.10	2.004	.205	.001536	I
1.55	.609	.019	.000142	I	3.35	1.316	.088	.000663	I	5.15	2.024	.209	.001566	I
1.60	.629	.020	.000151	I	3.40	1.336	.091	.000683	I	5.20	2.043	.213	.001597	I
1.65	.648	.021	.000161	I	3.45	1.356	.094	.000703	I	5.25	2.063	.217	.001628	I
1.70	.668	.023	.000171	I	3.50	1.375	.096	.000723	I	5.30	2.083	.221	.001659	I
1.75	.688	.024	.000181	I	3.55	1.395	.099	.000744	I	5.35	2.102	.225	.001690	I
1.80	.707	.026	.000191	I	3.60	1.415	.102	.000765	I	5.40	2.122	.230	.001722	I
1.85	.727	.027	.000202	I	3.65	1.434	.105	.000787	I	5.45	2.142	.234	.001754	I
1.90	.747	.028	.000213	I	3.70	1.454	.108	.000808	I	5.50	2.161	.238	.001786	I
1.95	.766	.030	.000225	I	3.75	1.474	.111	.000830	I	5.55	2.181	.242	.001819	I
2.00	.786	.031	.000236	I	3.80	1.493	.114	.000853	I	5.60	2.201	.247	.001852	I
2.05	.806	.033	.000248	I	3.85	1.513	.117	.000875	I	5.65	2.220	.251	.001885	I
2.10	.825	.035	.000260	I	3.90	1.533	.120	.000898	I	5.70	2.240	.256	.001919	I
2.15	.845	.036	.000273	I	3.95	1.552	.123	.000921	I	5.75	2.260	.260	.001952	I
2.20	.865	.038	.000286	I	4.00	1.572	.126	.000945	I	5.80	2.279	.265	.001987	I
2.25	.884	.040	.000299	I	4.05	1.592	.129	.000969	I	5.85	2.299	.269	.002021	I
2.30	.904	.042	.000312	I	4.10	1.611	.132	.000993	I	5.90	2.319	.274	.002056	I
2.35	.923	.043	.000326	I	4.15	1.631	.136	.001017	I	5.95	2.338	.279	.002091	I
2.40	.943	.045	.000340	I	4.20	1.650	.139	.001042	I	6.00	2.358	.283	.002126	I
2.45	.963	.047	.000354	I	4.25	1.670	.142	.001067	I	6.05	2.377	.288	.002161	I
2.50	.982	.049	.000369	I	4.30	1.690	.146	.001092	I	6.10	2.397	.293	.002197	I
2.55	1.002	.051	.000384	I	4.35	1.709	.149	.001117	I	6.15	2.417	.298	.002234	I
2.60	1.022	.053	.000399	I	4.40	1.729	.152	.001143	I	6.20	2.436	.303	.002270	I
2.65	1.041	.055	.000415	I	4.45	1.749	.156	.001169	I	6.25	2.456	.307	.002307	I
2.70	1.061	.057	.000430	I	4.50	1.768	.159	.001196	I	6.30	2.476	.312	.002344	I
2.75	1.081	.060	.000447	I	4.55	1.788	.163	.001223	I	6.35	2.495	.317	.002381	I
2.80	1.100	.062	.000463	I	4.60	1.808	.167	.001250	I	6.40	2.515	.322	.002419	I
2.85	1.120	.064	.000480	I	4.65	1.827	.170	.001277	I	6.45	2.535	.327	.002457	I
2.90	1.140	.066	.000497	I	4.70	1.847	.174	.001304	I	6.50	2.554	.333	.002495	I
2.95	1.159	.068	.000514	I	4.75	1.867	.178	.001332	I	6.55	2.574	.338	.002534	I
3.00	1.179	.071	.000531	I	4.80	1.886	.181	.001361	I	6.60	2.594	.343	.002572	I
3.05	1.199	.073	.000549	I	4.85	1.906	.185	.001389	I	6.65	2.613	.348	.002611	I

1800 MILLIMETER PIPE THE FLOW RANGE IS 1.3000 TO 6.6500 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V
6.70	2.633	.353	.002651	I	8.50	3.340	.569	.004267	I	10.30	4.048
6.75	2.653	.359	.002691	I	8.55	3.360	.575	.004317	I	10.35	4.067
6.80	2.672	.364	.002731	I	8.60	3.380	.582	.004368	I	10.40	4.087
6.85	2.692	.369	.002771	I	8.65	3.399	.589	.004418	I	10.45	4.107
6.90	2.712	.375	.002812	I	8.70	3.419	.596	.004470	I	10.50	4.126
6.95	2.731	.380	.002852	I	8.75	3.439	.603	.004521	I	10.55	4.146
7.00	2.751	.386	.002894	I	8.80	3.458	.610	.004573	I	10.60	4.166
7.05	2.770	.391	.002935	I	8.85	3.478	.616	.004625	I	10.65	4.185
7.10	2.790	.397	.002977	I	8.90	3.497	.623	.004678	I	10.70	4.205
7.15	2.810	.402	.003019	I	8.95	3.517	.630	.004730	I	10.75	4.224
7.20	2.829	.408	.003061	I	9.00	3.537	.639	.004783	I	10.80	4.244
7.25	2.849	.414	.003104	I	9.05	3.556	.645	.004837	I	10.85	4.264
7.30	2.869	.419	.003147	I	9.10	3.576	.652	.004890	I	10.90	4.283
7.35	2.888	.425	.003190	I	9.15	3.596	.659	.004944	I	10.95	4.303
7.40	2.908	.431	.003234	I	9.20	3.615	.666	.004998	I	11.00	4.323
7.45	2.928	.437	.003278	I	9.25	3.635	.673	.005053	I	11.05	4.342
7.50	2.947	.443	.003322	I	9.30	3.655	.681	.005107	I	11.10	4.362
7.55	2.967	.449	.003366	I	9.35	3.674	.688	.005163	I	11.15	4.382
7.60	2.987	.455	.003411	I	9.40	3.694	.695	.005218	I	11.20	4.401
7.65	3.006	.461	.003456	I	9.45	3.714	.703	.005274	I	11.25	4.421
7.70	3.026	.467	.003501	I	9.50	3.733	.710	.005330	I	11.30	4.441
7.75	3.046	.473	.003547	I	9.55	3.753	.718	.005386	I	11.35	4.460
7.80	3.065	.479	.003593	I	9.60	3.773	.725	.005442	I	11.40	4.480
7.85	3.085	.485	.003639	I	9.65	3.792	.733	.005499	I	11.45	4.500
7.90	3.104	.491	.003686	I	9.70	3.812	.741	.005556	I	11.50	4.519
7.95	3.124	.497	.003732	I	9.75	3.831	.748	.005614	I	11.55	4.539
8.00	3.144	.504	.003779	I	9.80	3.851	.756	.005671	I	11.60	4.559
8.05	3.163	.510	.003827	I	9.85	3.871	.764	.005729	I	11.65	4.578
8.10	3.183	.516	.003874	I	9.90	3.890	.771	.005788	I	11.70	4.598
8.15	3.203	.523	.003922	I	9.95	3.910	.779	.005846	I	11.75	4.617
8.20	3.222	.529	.003971	I	10.00	3.930	.787	.005905	I	11.80	4.637
8.25	3.242	.536	.004019	I	10.05	3.949	.795	.005965	I	11.85	4.657
8.30	3.262	.542	.004068	I	10.10	3.969	.803	.006024	I	11.90	4.676
8.35	3.281	.549	.004117	I	10.15	3.989	.811	.006084	I	11.95	4.696
8.40	3.301	.555	.004167	I	10.20	4.008	.819	.006144	I	12.00	4.716
8.45	3.321	.562	.004217	I	10.25	4.028	.827	.006204	I	12.05	4.735

1400 MILLIMETER PIPE THE FLOW RANGE IS 6.7000 TO 12.0500 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
12.10	4.755	1.152	.008646	I	12.35	4.853	1.201	.009007	I	12.60	4.951	1.250	.009375	I
12.15	4.775	1.162	.008710	I	12.40	4.873	1.210	.009080	I	12.65	4.971	1.260	.009450	I
12.20	4.794	1.172	.008789	I	12.45	4.893	1.220	.009153	I	12.70	4.991	1.270	.009525	I
12.25	4.814	1.181	.008862	I	12.50	4.912	1.230	.009227	I	12.75	5.010	1.280	.009600	I
12.30	4.834	1.191	.008934	I	12.55	4.932	1.240	.009301	I	12.80	5.030	1.290	.009675	I

1000 MILLIMETER PIPE THE FLOW RANGE IS 12.1000 TO 12.8000 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBAY'S FORMULA

SCOBAY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 1950 MILLIMETERS

CS = .370

QQ INCREMENT = .0500 CUBIC METERS PER SECOND

AREA = 2.9865 SQUARE METERS

$H = (.38792E-04) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
1.50	.502	.013	.000087	I	3.30	1.105	.062	.000422	I	5.10	1.708	.149	.001009	I
1.55	.519	.014	.000093	I	3.35	1.122	.064	.000435	I	5.15	1.724	.152	.001029	I
1.60	.536	.015	.000099	I	3.40	1.138	.066	.000448	I	5.20	1.741	.155	.001049	I
1.65	.552	.016	.000106	I	3.45	1.155	.068	.000462	I	5.25	1.758	.158	.001069	I
1.70	.569	.017	.000112	I	3.50	1.172	.070	.000475	I	5.30	1.775	.161	.001090	I
1.75	.586	.018	.000119	I	3.55	1.189	.072	.000489	I	5.35	1.791	.164	.001110	I
1.80	.603	.019	.000126	I	3.60	1.205	.074	.000503	I	5.40	1.808	.167	.001131	I
1.85	.619	.020	.000133	I	3.65	1.222	.076	.000517	I	5.45	1.825	.170	.001152	I
1.90	.636	.021	.000140	I	3.70	1.239	.078	.000531	I	5.50	1.842	.173	.001173	I
1.95	.653	.022	.000148	I	3.75	1.256	.080	.000546	I	5.55	1.858	.176	.001195	I
2.00	.670	.023	.000155	I	3.80	1.272	.083	.000560	I	5.60	1.875	.179	.001217	I
2.05	.686	.024	.000163	I	3.85	1.289	.085	.000575	I	5.65	1.892	.182	.001238	I
2.10	.703	.025	.000171	I	3.90	1.306	.087	.000590	I	5.70	1.909	.186	.001260	I
2.15	.720	.026	.000179	I	3.95	1.323	.089	.000605	I	5.75	1.925	.189	.001283	I
2.20	.737	.028	.000188	I	4.00	1.339	.091	.000621	I	5.80	1.942	.192	.001305	I
2.25	.753	.029	.000196	I	4.05	1.356	.094	.000636	I	5.85	1.959	.196	.001328	I
2.30	.770	.030	.000205	I	4.10	1.373	.096	.000652	I	5.90	1.976	.199	.001350	I
2.35	.787	.032	.000214	I	4.15	1.390	.098	.000668	I	5.95	1.992	.202	.001373	I
2.40	.804	.033	.000223	I	4.20	1.406	.101	.000684	I	6.00	2.009	.206	.001397	I
2.45	.820	.034	.000233	I	4.25	1.423	.103	.000701	I	6.05	2.026	.209	.001420	I
2.50	.837	.036	.000242	I	4.30	1.440	.106	.000717	I	6.10	2.043	.213	.001443	I
2.55	.854	.037	.000252	I	4.35	1.457	.108	.000734	I	6.15	2.059	.216	.001467	I
2.60	.871	.039	.000262	I	4.40	1.473	.111	.000751	I	6.20	2.076	.220	.001491	I
2.65	.887	.040	.000272	I	4.45	1.490	.113	.000768	I	6.25	2.093	.223	.001515	I
2.70	.904	.042	.000283	I	4.50	1.507	.116	.000786	I	6.30	2.110	.227	.001540	I
2.75	.921	.043	.000293	I	4.55	1.524	.118	.000803	I	6.35	2.126	.230	.001564	I
2.80	.938	.045	.000304	I	4.60	1.540	.121	.000821	I	6.40	2.143	.234	.001589	I
2.85	.954	.046	.000315	I	4.65	1.557	.124	.000839	I	6.45	2.160	.238	.001614	I
2.90	.971	.048	.000326	I	4.70	1.574	.126	.000857	I	6.50	2.176	.241	.001639	I
2.95	.988	.050	.000338	I	4.75	1.590	.129	.000875	I	6.55	2.193	.245	.001664	I
3.00	1.005	.051	.000349	I	4.80	1.607	.132	.000894	I	6.60	2.210	.249	.001690	I
3.05	1.021	.053	.000361	I	4.85	1.624	.134	.000912	I	6.65	2.227	.253	.001715	I
3.10	1.038	.055	.000373	I	4.90	1.641	.137	.000931	I	6.70	2.243	.257	.001741	I
3.15	1.055	.057	.000385	I	4.95	1.657	.140	.000950	I	6.75	2.260	.260	.001767	I
3.20	1.071	.059	.000397	I	5.00	1.674	.143	.000970	I	6.80	2.277	.264	.001794	I
3.25	1.088	.060	.000410	I	5.05	1.691	.146	.000989	I	6.85	2.294	.268	.001820	I

1950 MILLIMETER PIPE THE FLOW RANGE IS 1.5000 TO 6.8500 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
6.90	2.310	.272	.001847	I	8.70	2.913	.433	.002936	I	10.50	3.516	.630	.004277	I
6.95	2.327	.276	.001874	I	8.75	2.930	.438	.002970	I	10.55	3.533	.636	.004318	I
7.00	2.344	.280	.001901	I	8.80	2.947	.443	.003004	I	10.60	3.549	.642	.004359	I
7.05	2.361	.284	.001928	I	8.85	2.963	.448	.003038	I	10.65	3.566	.648	.004400	I
7.10	2.377	.288	.001956	I	8.90	2.980	.453	.003073	I	10.70	3.583	.654	.004441	I
7.15	2.394	.292	.001983	I	8.95	2.997	.458	.003107	I	10.75	3.600	.660	.004483	I
7.20	2.411	.296	.002011	I	9.00	3.014	.463	.003142	I	10.80	3.616	.667	.004525	I
7.25	2.428	.300	.002039	I	9.05	3.030	.468	.003177	I	10.85	3.633	.673	.004567	I
7.30	2.444	.305	.002067	I	9.10	3.047	.473	.003212	I	10.90	3.650	.679	.004609	I
7.35	2.461	.309	.002096	I	9.15	3.064	.478	.003248	I	10.95	3.667	.685	.004651	I
7.40	2.478	.313	.002124	I	9.20	3.081	.484	.003283	I	11.00	3.683	.691	.004694	I
7.45	2.495	.317	.002153	I	9.25	3.097	.489	.003319	I	11.05	3.700	.698	.004737	I
7.50	2.511	.321	.002182	I	9.30	3.114	.494	.003355	I	11.10	3.717	.704	.004780	I
7.55	2.528	.326	.002211	I	9.35	3.131	.500	.003391	I	11.15	3.733	.710	.004823	I
7.60	2.545	.330	.002241	I	9.40	3.148	.505	.003428	I	11.20	3.750	.717	.004866	I
7.65	2.562	.334	.002270	I	9.45	3.164	.510	.003464	I	11.25	3.767	.723	.004910	I
7.70	2.578	.339	.002300	I	9.50	3.181	.516	.003501	I	11.30	3.784	.730	.004953	I
7.75	2.595	.343	.002330	I	9.55	3.198	.521	.003538	I	11.35	3.800	.736	.004997	I
7.80	2.612	.348	.002360	I	9.60	3.214	.527	.003575	I	11.40	3.817	.743	.005041	I
7.85	2.629	.352	.002390	I	9.65	3.231	.532	.003612	I	11.45	3.834	.749	.005086	I
7.90	2.645	.357	.002421	I	9.70	3.248	.538	.003650	I	11.50	3.851	.756	.005130	I
7.95	2.662	.361	.002452	I	9.75	3.265	.543	.003688	I	11.55	3.867	.762	.005175	I
8.00	2.679	.366	.002483	I	9.80	3.281	.549	.003726	I	11.60	3.884	.769	.005220	I
8.05	2.695	.370	.002514	I	9.85	3.298	.554	.003764	I	11.65	3.901	.776	.005265	I
8.10	2.712	.375	.002545	I	9.90	3.315	.560	.003802	I	11.70	3.918	.782	.005310	I
8.15	2.729	.380	.002577	I	9.95	3.332	.566	.003840	I	11.75	3.934	.789	.005356	I
8.20	2.746	.384	.002608	I	10.00	3.348	.571	.003879	I	11.80	3.951	.796	.005401	I
8.25	2.762	.389	.002640	I	10.05	3.365	.577	.003918	I	11.85	3.968	.802	.005447	I
8.30	2.779	.394	.002672	I	10.10	3.382	.583	.003957	I	11.90	3.985	.809	.005493	I
8.35	2.796	.398	.002705	I	10.15	3.399	.589	.003996	I	11.95	4.001	.816	.005540	I
8.40	2.813	.403	.002737	I	10.20	3.415	.595	.004036	I	12.00	4.018	.823	.005586	I
8.45	2.829	.408	.002770	I	10.25	3.432	.600	.004076	I	12.05	4.035	.830	.005633	I
8.50	2.846	.413	.002803	I	10.30	3.449	.606	.004115	I	12.10	4.052	.837	.005680	I
8.55	2.863	.418	.002836	I	10.35	3.466	.612	.004155	I	12.15	4.068	.844	.005727	I
8.60	2.880	.423	.002869	I	10.40	3.482	.618	.004196	I	12.20	4.085	.851	.005774	I
8.65	2.896	.428	.002903	I	10.45	3.499	.624	.004236	I	12.25	4.102	.858	.005821	I

1950 MILLIMETER PIPE THE FLOW RANGE IS 6.9000 TO 12.2500 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
12.30	4.119	.865	.005869	I	13.25	4.437	1.003	.006810	I	14.20	4.755	1.152	.007822	I
12.35	4.135	.872	.005917	I	13.30	4.453	1.011	.006862	I	14.25	4.771	1.160	.007877	I
12.40	4.152	.879	.005965	I	13.35	4.470	1.018	.006914	I	14.30	4.788	1.169	.007933	I
12.45	4.169	.886	.006013	I	13.40	4.487	1.026	.006965	I	14.35	4.805	1.177	.007988	I
12.50	4.186	.893	.006061	I	13.45	4.504	1.034	.007018	I	14.40	4.822	1.185	.008044	I
12.55	4.202	.900	.006110	I	13.50	4.520	1.041	.007070	I	14.45	4.838	1.193	.008100	I
12.60	4.219	.907	.006159	I	13.55	4.537	1.049	.007122	I	14.50	4.855	1.201	.008156	I
12.65	4.236	.914	.006208	I	13.60	4.554	1.057	.007175	I	14.55	4.872	1.210	.008212	I
12.70	4.252	.922	.006257	I	13.65	4.571	1.065	.007228	I	14.60	4.889	1.218	.008269	I
12.75	4.269	.929	.006306	I	13.70	4.587	1.073	.007281	I	14.65	4.905	1.226	.008326	I
12.80	4.286	.936	.006356	I	13.75	4.604	1.080	.007334	I	14.70	4.922	1.235	.008383	I
12.85	4.303	.944	.006405	I	13.80	4.621	1.088	.007388	I	14.75	4.939	1.243	.008440	I
12.90	4.319	.951	.006455	I	13.85	4.638	1.096	.007441	I	14.80	4.956	1.252	.008497	I
12.95	4.336	.958	.006506	I	13.90	4.654	1.104	.007495	I	14.85	4.972	1.260	.008554	I
13.00	4.353	.966	.006556	I	13.95	4.671	1.112	.007549	I	14.90	4.989	1.269	.008612	I
13.05	4.370	.973	.006606	I	14.00	4.688	1.120	.007603	I	14.95	5.006	1.277	.008670	I
13.10	4.386	.981	.006657	I	14.05	4.705	1.128	.007658	I	15.00	5.023	1.286	.008728	I
13.15	4.403	.988	.006708	I	14.10	4.721	1.136	.007712	I	15.05	5.039	1.294	.008786	I
13.20	4.420	.996	.006759	I	14.15	4.738	1.144	.007767	I	15.10	5.056	1.303	.008845	I

1950 MILLIMETER PIPE THE FLOW RANGE IS 12.3000 TO 15.1000 CUBIC METERS PER SECOND

METRIC TABLES

HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICTION SLOPES ARE BASED ON SCOBAY'S FORMULA

SCOBAY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 2100 MILLIMETERS

CS = .370

QQ INCPENENT = .0500 CUBIC METERS PER SECOND

AREA = 3.4636 SQUARE METERS

$H = (.26209E-04) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
1.75	.505	.013	.000081 I	3.55	1.025	.054	.000331 I	5.35	1.545	.122	.000752 I
1.80	.520	.014	.000085 I	3.60	1.039	.055	.000341 I	5.40	1.559	.124	.000767 I
1.85	.534	.015	.000090 I	3.65	1.054	.057	.000350 I	5.45	1.574	.126	.000781 I
1.90	.549	.015	.000095 I	3.70	1.068	.058	.000360 I	5.50	1.588	.129	.000795 I
1.95	.563	.016	.000100 I	3.75	1.083	.060	.000370 I	5.55	1.602	.131	.000810 I
2.00	.577	.017	.000105 I	3.80	1.097	.061	.000380 I	5.60	1.617	.133	.000824 I
2.05	.592	.018	.000110 I	3.85	1.112	.063	.000390 I	5.65	1.631	.136	.000839 I
2.10	.606	.019	.000116 I	3.90	1.126	.065	.000400 I	5.70	1.646	.138	.000854 I
2.15	.621	.020	.000122 I	3.95	1.140	.066	.000410 I	5.75	1.660	.140	.000869 I
2.20	.635	.021	.000127 I	4.00	1.155	.069	.000421 I	5.80	1.675	.143	.000884 I
2.25	.650	.022	.000133 I	4.05	1.169	.070	.000431 I	5.85	1.689	.145	.000899 I
2.30	.664	.022	.000139 I	4.10	1.184	.071	.000442 I	5.90	1.703	.148	.000915 I
2.35	.678	.023	.000145 I	4.15	1.198	.073	.000453 I	5.95	1.718	.150	.000931 I
2.40	.693	.024	.000151 I	4.20	1.213	.075	.000464 I	6.00	1.732	.153	.000946 I
2.45	.707	.026	.000158 I	4.25	1.227	.077	.000475 I	6.05	1.747	.156	.000962 I
2.50	.722	.027	.000164 I	4.30	1.241	.079	.000486 I	6.10	1.761	.158	.000978 I
2.55	.736	.028	.000171 I	4.35	1.256	.080	.000497 I	6.15	1.776	.161	.000994 I
2.60	.751	.029	.000178 I	4.40	1.270	.082	.000509 I	6.20	1.790	.163	.001011 I
2.65	.765	.030	.000185 I	4.45	1.285	.084	.000521 I	6.25	1.804	.166	.001027 I
2.70	.780	.031	.000192 I	4.50	1.299	.086	.000532 I	6.30	1.819	.169	.001043 I
2.75	.794	.032	.000199 I	4.55	1.314	.088	.000544 I	6.35	1.833	.171	.001060 I
2.80	.808	.033	.000206 I	4.60	1.328	.090	.000556 I	6.40	1.848	.174	.001077 I
2.85	.823	.035	.000214 I	4.65	1.343	.092	.000568 I	6.45	1.862	.177	.001094 I
2.90	.837	.036	.000221 I	4.70	1.357	.094	.000581 I	6.50	1.877	.180	.001111 I
2.95	.852	.037	.000229 I	4.75	1.371	.096	.000593 I	6.55	1.891	.182	.001128 I
3.00	.866	.038	.000237 I	4.80	1.386	.098	.000606 I	6.60	1.906	.185	.001145 I
3.05	.881	.040	.000245 I	4.85	1.400	.100	.000618 I	6.65	1.920	.188	.001163 I
3.10	.895	.041	.000253 I	4.90	1.415	.102	.000631 I	6.70	1.934	.191	.001180 I
3.15	.909	.042	.000261 I	4.95	1.429	.104	.000644 I	6.75	1.949	.194	.001198 I
3.20	.924	.044	.000269 I	5.00	1.444	.106	.000657 I	6.80	1.963	.196	.001216 I
3.25	.938	.045	.000278 I	5.05	1.458	.108	.000670 I	6.85	1.978	.199	.001234 I
3.30	.953	.046	.000286 I	5.10	1.472	.111	.000684 I	6.90	1.992	.202	.001252 I
3.35	.967	.048	.000295 I	5.15	1.487	.113	.000697 I	6.95	2.007	.205	.001270 I
3.40	.982	.049	.000304 I	5.20	1.501	.115	.000711 I	7.00	2.021	.208	.001288 I
3.45	.996	.051	.000313 I	5.25	1.516	.117	.000725 I	7.05	2.035	.211	.001307 I
3.50	1.011	.052	.000322 I	5.30	1.530	.119	.000738 I	7.10	2.050	.214	.001325 I

2100 MILLIMETER PIPE THE FLOW RANGE IS 1.7500 TO 7.1000 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V		
7.15	2.064	.217	.001344	I	8.95	2.584	.340	.002106	I	10.75	3.104
7.20	2.079	.220	.001363	I	9.00	2.598	.344	.002129	I	10.80	3.118
7.25	2.093	.223	.001382	I	9.05	2.613	.348	.002153	I	10.85	3.133
7.30	2.108	.226	.001401	I	9.10	2.627	.352	.002177	I	10.90	3.147
7.35	2.122	.230	.001420	I	9.15	2.642	.356	.002201	I	10.95	3.161
7.40	2.136	.233	.001440	I	9.20	2.656	.360	.002225	I	11.00	3.176
7.45	2.151	.236	.001459	I	9.25	2.671	.364	.002249	I	11.05	3.190
7.50	2.165	.239	.001479	I	9.30	2.685	.367	.002274	I	11.10	3.205
7.55	2.180	.242	.001499	I	9.35	2.699	.371	.002298	I	11.15	3.219
7.60	2.194	.245	.001518	I	9.40	2.714	.375	.002323	I	11.20	3.234
7.65	2.209	.249	.001534	I	9.45	2.728	.379	.002348	I	11.25	3.248
7.70	2.223	.252	.001559	I	9.50	2.743	.383	.002373	I	11.30	3.262
7.75	2.238	.255	.001579	I	9.55	2.757	.387	.002398	I	11.35	3.277
7.80	2.252	.258	.001599	I	9.60	2.772	.392	.002423	I	11.40	3.291
7.85	2.266	.262	.001620	I	9.65	2.786	.396	.002448	I	11.45	3.306
7.90	2.281	.265	.001641	I	9.70	2.801	.400	.002474	I	11.50	3.320
7.95	2.295	.269	.001662	I	9.75	2.815	.404	.002499	I	11.55	3.335
8.00	2.310	.272	.001682	I	9.80	2.829	.408	.002525	I	11.60	3.349
8.05	2.324	.275	.001704	I	9.85	2.844	.412	.002551	I	11.65	3.364
8.10	2.339	.279	.001725	I	9.90	2.858	.416	.002577	I	11.70	3.378
8.15	2.353	.282	.001746	I	9.95	2.873	.421	.002603	I	11.75	3.392
8.20	2.367	.286	.001768	I	10.00	2.887	.425	.002629	I	11.80	3.407
8.25	2.382	.289	.001789	I	10.05	2.902	.429	.002655	I	11.85	3.421
8.30	2.396	.293	.001811	I	10.10	2.916	.433	.002682	I	11.90	3.436
8.35	2.411	.296	.001833	I	10.15	2.930	.438	.002708	I	11.95	3.450
8.40	2.425	.300	.001855	I	10.20	2.945	.442	.002735	I	12.00	3.465
8.45	2.440	.303	.001877	I	10.25	2.959	.446	.002762	I	12.05	3.479
8.50	2.454	.307	.001899	I	10.30	2.974	.451	.002789	I	12.10	3.493
8.55	2.469	.311	.001922	I	10.35	2.988	.455	.002816	I	12.15	3.508
8.60	2.483	.314	.001944	I	10.40	3.003	.460	.002843	I	12.20	3.522
8.65	2.497	.318	.001967	I	10.45	3.017	.464	.002871	I	12.25	3.537
8.70	2.512	.322	.001990	I	10.50	3.032	.468	.002898	I	12.30	3.551
8.75	2.526	.325	.002013	I	10.55	3.046	.473	.002926	I	12.35	3.566
8.80	2.541	.329	.002036	I	10.60	3.060	.477	.002954	I	12.40	3.580
8.85	2.555	.333	.002059	I	10.65	3.075	.482	.002982	I	12.45	3.595
8.90	2.570	.337	.002082	I	10.70	3.089	.486	.003010	I	12.50	3.609

2105 MILLIMETER PIPE THE FLOW RANGE IS 7.1500 TO 12.5000 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
12.55	3.623	.669	.004141	14.20	4.100	.857	.005301	15.85	4.576	1.067	.006604
12.60	3.638	.675	.004174	14.25	4.114	.863	.005338	15.90	4.591	1.074	.006646
12.65	3.652	.680	.004207	14.30	4.129	.869	.005376	15.95	4.605	1.081	.006688
12.70	3.667	.685	.004240	14.35	4.143	.875	.005413	16.00	4.619	1.088	.006730
12.75	3.681	.691	.004274	14.40	4.158	.881	.005451	16.05	4.634	1.094	.006772
12.80	3.696	.696	.004307	14.45	4.172	.887	.005489	16.10	4.648	1.101	.006814
12.85	3.710	.702	.004341	14.50	4.186	.893	.005527	16.15	4.663	1.108	.006857
12.90	3.724	.707	.004375	14.55	4.201	.899	.005565	16.20	4.677	1.115	.006899
12.95	3.739	.712	.004409	14.60	4.215	.906	.005604	16.25	4.692	1.122	.006942
13.00	3.753	.718	.004443	14.65	4.230	.912	.005642	16.30	4.706	1.129	.006985
13.05	3.768	.724	.004477	14.70	4.244	.918	.005681	16.35	4.721	1.136	.007028
13.10	3.782	.729	.004511	14.75	4.259	.924	.005719	16.40	4.735	1.143	.007071
13.15	3.797	.735	.004546	14.80	4.273	.931	.005758	16.45	4.749	1.150	.007114
13.20	3.811	.740	.004581	14.85	4.287	.937	.005797	16.50	4.764	1.157	.007157
13.25	3.825	.746	.004615	14.90	4.302	.943	.005836	16.55	4.778	1.164	.007201
13.30	3.840	.752	.004650	14.95	4.316	.950	.005876	16.60	4.793	1.171	.007244
13.35	3.854	.757	.004685	15.00	4.331	.956	.005915	16.65	4.807	1.178	.007288
13.40	3.869	.763	.004720	15.05	4.345	.962	.005954	16.70	4.822	1.185	.007332
13.45	3.883	.769	.004756	15.10	4.360	.969	.005994	16.75	4.836	1.192	.007376
13.50	3.898	.774	.004791	15.15	4.374	.975	.006034	16.80	4.850	1.199	.007420
13.55	3.912	.780	.004827	15.20	4.388	.982	.006074	16.85	4.865	1.206	.007464
13.60	3.927	.786	.004862	15.25	4.403	.988	.006114	16.90	4.879	1.213	.007508
13.65	3.941	.792	.004898	15.30	4.417	.995	.006154	16.95	4.894	1.221	.007553
13.70	3.955	.797	.004934	15.35	4.432	1.001	.006194	17.00	4.908	1.228	.007597
13.75	3.970	.803	.004970	15.40	4.446	1.008	.006235	17.05	4.923	1.235	.007642
13.80	3.984	.809	.005006	15.45	4.461	1.014	.006275	17.10	4.937	1.242	.007687
13.85	3.999	.815	.005043	15.50	4.475	1.021	.006316	17.15	4.951	1.250	.007732
13.90	4.013	.821	.005079	15.55	4.490	1.027	.006357	17.20	4.966	1.257	.007777
13.95	4.028	.827	.005116	15.60	4.504	1.034	.006398	17.25	4.980	1.264	.007823
14.00	4.042	.833	.005153	15.65	4.518	1.041	.006439	17.30	4.995	1.272	.007868
14.05	4.056	.839	.005189	15.70	4.533	1.047	.006480	17.35	5.009	1.279	.007914
14.10	4.071	.845	.005226	15.75	4.547	1.054	.006521	17.40	5.024	1.286	.007959
14.15	4.085	.851	.005264	15.80	4.562	1.061	.006563	17.45	5.038	1.294	.008005

2100 MILLIMETER PIPE THE FLOW RANGE IS 12.5500 TO 17.4500 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBNEY'S FORMULA

SCOBNEY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 2250 MILLIMETERS

CS = .370

QQ INCREMENT = .0500 CUBIC METERS PER SECOND

AREA = 3.9761 SQUARE METERS

$H = (.10301E-04) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
2.00	.503	.013	.000073	3.80	.956	.047	.000264	5.60	1.408	.101	.000574
2.05	.516	.014	.000077	3.85	.968	.048	.000271	5.65	1.421	.103	.000584
2.10	.528	.014	.000081	3.90	.981	.049	.000278	5.70	1.434	.105	.000595
2.15	.541	.015	.000085	3.95	.993	.050	.000286	5.75	1.446	.107	.000605
2.20	.553	.016	.000089	4.00	1.006	.052	.000293	5.80	1.459	.108	.000616
2.25	.566	.016	.000093	4.05	1.019	.053	.000300	5.85	1.471	.110	.000626
2.30	.578	.017	.000097	4.10	1.031	.054	.000308	5.90	1.484	.112	.000637
2.35	.591	.018	.000101	4.15	1.044	.056	.000315	5.95	1.496	.114	.000648
2.40	.604	.019	.000105	4.20	1.056	.057	.000323	6.00	1.509	.116	.000659
2.45	.616	.019	.000110	4.25	1.069	.058	.000331	6.05	1.522	.118	.000670
2.50	.629	.020	.000114	4.30	1.081	.060	.000338	6.10	1.534	.120	.000681
2.55	.641	.021	.000119	4.35	1.094	.061	.000346	6.15	1.547	.122	.000692
2.60	.654	.022	.000124	4.40	1.107	.062	.000354	6.20	1.559	.124	.000703
2.65	.666	.023	.000129	4.45	1.119	.064	.000362	6.25	1.572	.126	.000715
2.70	.679	.024	.000133	4.50	1.132	.065	.000371	6.30	1.584	.128	.000726
2.75	.692	.024	.000138	4.55	1.144	.067	.000379	6.35	1.597	.130	.000738
2.80	.704	.025	.000143	4.60	1.157	.068	.000387	6.40	1.610	.132	.000750
2.85	.717	.026	.000149	4.65	1.169	.070	.000396	6.45	1.622	.134	.000761
2.90	.729	.027	.000154	4.70	1.182	.071	.000404	6.50	1.635	.136	.000773
2.95	.742	.028	.000159	4.75	1.195	.073	.000413	6.55	1.647	.138	.000785
3.00	.755	.029	.000165	4.80	1.207	.074	.000422	6.60	1.660	.140	.000797
3.05	.767	.030	.000170	4.85	1.220	.076	.000430	6.65	1.672	.143	.000809
3.10	.780	.031	.000176	4.90	1.232	.077	.000439	6.70	1.685	.145	.000822
3.15	.792	.032	.000182	4.95	1.245	.079	.000448	6.75	1.698	.147	.000834
3.20	.805	.033	.000187	5.00	1.258	.081	.000458	6.80	1.710	.149	.000846
3.25	.817	.034	.000193	5.05	1.270	.082	.000467	6.85	1.723	.151	.000859
3.30	.830	.035	.000199	5.10	1.283	.084	.000476	6.90	1.735	.153	.000871
3.35	.843	.036	.000205	5.15	1.295	.086	.000485	6.95	1.748	.156	.000884
3.40	.855	.037	.000212	5.20	1.308	.087	.000495	7.00	1.761	.158	.000897
3.45	.868	.038	.000218	5.25	1.320	.089	.000504	7.05	1.773	.160	.000910
3.50	.880	.039	.000224	5.30	1.333	.091	.000514	7.10	1.786	.163	.000923
3.55	.893	.041	.000231	5.35	1.346	.092	.000524	7.15	1.798	.165	.000936
3.60	.905	.042	.000237	5.40	1.358	.094	.000534	7.20	1.811	.167	.000949
3.65	.918	.043	.000244	5.45	1.371	.096	.000544	7.25	1.823	.169	.000962
3.70	.931	.044	.000251	5.50	1.383	.098	.000554	7.30	1.836	.172	.000975
3.75	.943	.045	.000257	5.55	1.396	.099	.000564	7.35	1.849	.174	.000989

2250 MILLIMETER PIPE THE FLOW RANGE IS 2.0000 TO 7.3500 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
7.40	1.861	.177	.001002	9.20	2.314	.273	.001549	11.00	2.767	.390	.002214
7.45	1.874	.179	.001016	9.25	2.326	.276	.001566	11.05	2.779	.394	.002235
7.51	1.886	.181	.001029	9.30	2.339	.279	.001583	11.10	2.792	.397	.002255
7.55	1.899	.184	.001043	9.35	2.352	.282	.001600	11.15	2.804	.401	.002275
7.60	1.911	.186	.001057	9.40	2.364	.285	.001617	11.20	2.817	.404	.002296
7.65	1.924	.189	.001071	9.45	2.377	.288	.001634	11.25	2.829	.408	.002316
7.70	1.937	.191	.001085	9.50	2.389	.291	.001652	11.30	2.842	.412	.002337
7.75	1.949	.194	.001099	9.55	2.402	.294	.001669	11.35	2.855	.415	.002358
7.80	1.962	.196	.001113	9.60	2.414	.297	.001687	11.40	2.867	.419	.002378
7.85	1.974	.199	.001128	9.65	2.427	.300	.001704	11.45	2.880	.423	.002399
7.90	1.987	.201	.001142	9.70	2.440	.303	.001722	11.50	2.892	.426	.002420
7.95	1.999	.204	.001157	9.75	2.452	.306	.001740	11.55	2.905	.430	.002441
8.00	2.012	.206	.001171	9.80	2.465	.310	.001758	11.60	2.917	.434	.002463
8.05	2.025	.209	.001186	9.85	2.477	.313	.001776	11.65	2.930	.438	.002484
8.10	2.037	.212	.001201	9.90	2.490	.316	.001794	11.70	2.943	.441	.002505
8.15	2.050	.214	.001216	9.95	2.502	.319	.001812	11.75	2.955	.445	.002527
8.20	2.062	.217	.001231	10.00	2.515	.322	.001830	11.80	2.968	.449	.002548
8.25	2.075	.219	.001246	10.05	2.528	.326	.001848	11.85	2.980	.453	.002570
8.30	2.087	.222	.001261	10.10	2.540	.329	.001867	11.90	2.993	.457	.002592
8.35	2.100	.225	.001276	10.15	2.553	.332	.001885	11.95	3.005	.460	.002613
8.40	2.113	.227	.001291	10.20	2.565	.335	.001904	12.00	3.018	.464	.002635
8.45	2.125	.230	.001307	10.25	2.578	.339	.001923	12.05	3.031	.468	.002657
8.50	2.138	.233	.001322	10.30	2.590	.342	.001942	12.10	3.043	.472	.002679
8.55	2.150	.236	.001338	10.35	2.603	.345	.001960	12.15	3.056	.476	.002702
8.60	2.163	.238	.001354	10.40	2.616	.349	.001979	12.20	3.068	.480	.002724
8.65	2.176	.241	.001369	10.45	2.628	.352	.001998	12.25	3.081	.484	.002746
8.70	2.188	.244	.001385	10.50	2.641	.355	.002018	12.30	3.093	.488	.002769
8.75	2.201	.247	.001401	10.55	2.653	.359	.002037	12.35	3.106	.492	.002791
8.80	2.213	.250	.001417	10.60	2.666	.362	.002056	12.40	3.119	.496	.002814
8.85	2.226	.253	.001433	10.65	2.679	.366	.002076	12.45	3.131	.500	.002837
8.90	2.238	.255	.001450	10.70	2.691	.369	.002095	12.50	3.144	.504	.002859
8.95	2.251	.258	.001466	10.75	2.704	.373	.002115	12.55	3.156	.508	.002882
9.00	2.264	.261	.001482	10.80	2.716	.376	.002135	12.60	3.169	.512	.002905
9.05	2.276	.264	.001499	10.85	2.729	.380	.002154	12.65	3.182	.516	.002929
9.10	2.289	.267	.001515	10.90	2.741	.383	.002174	12.70	3.194	.520	.002952
9.15	2.301	.270	.001532	10.95	2.754	.387	.002194	12.75	3.207	.524	.002975

2250 MILLIMETER PIPE THE FLOW RANGE IS 7.4000 TO 12.7500 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
12.80	3.219	.528	.002998	I	14.60	3.672	.687	.003901	I	16.40	4.125	.867	.004922	I
12.85	3.232	.532	.003022	I	14.65	3.685	.692	.003928	I	16.45	4.137	.872	.004952	I
12.90	3.244	.536	.003045	I	14.70	3.697	.697	.003955	I	16.50	4.150	.878	.004982	I
12.95	3.257	.541	.003069	I	14.75	3.710	.701	.003982	I	16.55	4.162	.883	.005013	I
13.00	3.270	.545	.003093	I	14.80	3.722	.706	.004009	I	16.60	4.175	.888	.005043	I
13.05	3.282	.549	.003117	I	14.85	3.735	.711	.004036	I	16.65	4.188	.894	.005073	I
13.10	3.295	.553	.003141	I	14.90	3.747	.716	.004063	I	16.70	4.200	.899	.005104	I
13.15	3.307	.557	.003165	I	14.95	3.760	.721	.004090	I	16.75	4.213	.905	.005134	I
13.20	3.320	.562	.003189	I	15.00	3.773	.725	.004118	I	16.80	4.225	.910	.005165	I
13.25	3.332	.566	.003213	I	15.05	3.785	.730	.004145	I	16.85	4.238	.915	.005196	I
13.30	3.345	.570	.003237	I	15.10	3.798	.735	.004173	I	16.90	4.250	.921	.005227	I
13.35	3.358	.575	.003262	I	15.15	3.810	.740	.004200	I	16.95	4.263	.926	.005258	I
13.40	3.370	.579	.003286	I	15.20	3.823	.745	.004228	I	17.00	4.276	.932	.005289	I
13.45	3.383	.583	.003311	I	15.25	3.835	.750	.004256	I	17.05	4.288	.937	.005320	I
13.50	3.395	.588	.003335	I	15.30	3.848	.755	.004284	I	17.10	4.301	.943	.005351	I
13.55	3.408	.592	.003360	I	15.35	3.861	.760	.004312	I	17.15	4.313	.948	.005383	I
13.60	3.420	.596	.003385	I	15.40	3.873	.765	.004340	I	17.20	4.326	.954	.005414	I
13.65	3.433	.601	.003410	I	15.45	3.886	.770	.004368	I	17.25	4.338	.959	.005446	I
13.70	3.446	.605	.003435	I	15.50	3.898	.775	.004397	I	17.30	4.351	.965	.005477	I
13.75	3.458	.610	.003460	I	15.55	3.911	.780	.004425	I	17.35	4.364	.970	.005509	I
13.80	3.471	.614	.003485	I	15.60	3.923	.785	.004454	I	17.40	4.376	.976	.005541	I
13.85	3.483	.618	.003510	I	15.65	3.936	.790	.004482	I	17.45	4.389	.982	.005573	I
13.90	3.496	.623	.003536	I	15.70	3.949	.795	.004511	I	17.50	4.401	.987	.005605	I
13.95	3.508	.627	.003561	I	15.75	3.961	.800	.004540	I	17.55	4.414	.993	.005637	I
14.00	3.521	.632	.003587	I	15.80	3.974	.805	.004569	I	17.60	4.426	.999	.005669	I
14.05	3.534	.636	.003613	I	15.85	3.986	.810	.004598	I	17.65	4.439	1.004	.005701	I
14.10	3.546	.641	.003638	I	15.90	3.999	.815	.004627	I	17.70	4.452	1.010	.005733	I
14.15	3.559	.646	.003664	I	15.95	4.011	.820	.004656	I	17.75	4.464	1.016	.005766	I
14.20	3.571	.650	.003690	I	16.00	4.024	.825	.004685	I	17.80	4.477	1.021	.005798	I
14.25	3.584	.655	.003716	I	16.05	4.037	.830	.004714	I	17.85	4.489	1.027	.005831	I
14.30	3.597	.659	.003742	I	16.10	4.049	.836	.004744	I	17.90	4.502	1.033	.005864	I
14.35	3.609	.664	.003768	I	16.15	4.062	.841	.004773	I	17.95	4.514	1.039	.005896	I
14.40	3.622	.669	.003795	I	16.20	4.074	.846	.004803	I	18.00	4.527	1.045	.005929	I
14.45	3.634	.673	.003821	I	16.25	4.087	.851	.004832	I	18.05	4.540	1.050	.005962	I
14.50	3.647	.678	.003848	I	16.30	4.100	.857	.004862	I	18.10	4.552	1.056	.005995	I
14.55	3.659	.683	.003874	I	16.35	4.112	.862	.004892	I	18.15	4.565	1.062	.006029	I

2250 MILLIMETER PIPE THE FLOW RANGE IS 12.0000 TO 18.1500 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V
18.20	4.577	1.068	.006062 I	18.85	4.741	1.146	.006503 I	19.50	4.904
18.25	4.590	1.074	.006095 I	18.90	4.753	1.152	.006537 I	19.55	4.917
18.30	4.603	1.080	.006129 I	18.95	4.766	1.158	.006572 I	19.60	4.929
18.35	4.615	1.086	.006162 I	19.00	4.779	1.164	.006607 I	19.65	4.942
18.40	4.628	1.092	.006196 I	19.05	4.791	1.170	.006641 I	19.70	4.955
18.45	4.640	1.097	.006230 I	19.10	4.804	1.176	.006676 I	19.75	4.967
18.50	4.653	1.103	.006263 I	19.15	4.816	1.182	.006711 I	19.80	4.980
18.55	4.665	1.109	.006297 I	19.20	4.829	1.188	.006746 I	19.85	4.992
18.60	4.678	1.115	.006331 I	19.25	4.841	1.195	.006782 I	19.90	5.005
18.65	4.691	1.121	.006365 I	19.30	4.854	1.201	.006817 I	19.95	5.017
18.70	4.703	1.127	.006400 I	19.35	4.867	1.207	.006852 I	20.00	5.030
18.75	4.716	1.133	.006434 I	19.40	4.879	1.213	.006888 I	20.05	5.043
18.80	4.728	1.139	.006468 I	19.45	4.892	1.220	.006923 I	20.10	5.055

2250 MILLIMETER PIPE THE FLOW RANGE IS 18.2000 TO 20.1000 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBAY'S FORMULA

SCOBAY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 2400 MILLIMETERS

CS = .370

QQ INCREMENT = .1000 CUBIC METERS PER SECOND

AREA = 4.5239 SQUARE METERS

$H = (.13041E-04) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
2.30	.508	.013	.000069 I	5.90	1.304	.087	.000454 I	9.50	2.100	.225	.001177 I
2.40	.531	.014	.000075 I	6.00	1.326	.090	.000469 I	9.60	2.122	.230	.001202 I
2.50	.553	.016	.000082 I	6.10	1.348	.093	.000485 I	9.70	2.144	.234	.001227 I
2.60	.575	.017	.000088 I	6.20	1.370	.096	.000501 I	9.80	2.166	.239	.001252 I
2.70	.597	.018	.000095 I	6.30	1.393	.099	.000518 I	9.90	2.188	.244	.001278 I
2.80	.619	.020	.000102 I	6.40	1.415	.102	.000534 I	10.00	2.210	.249	.001304 I
2.90	.641	.021	.000110 I	6.50	1.437	.105	.000551 I	10.10	2.233	.254	.001330 I
3.00	.663	.022	.000117 I	6.60	1.459	.108	.000568 I	10.20	2.255	.259	.001357 I
3.10	.685	.024	.000125 I	6.70	1.481	.112	.000585 I	10.30	2.277	.264	.001384 I
3.20	.707	.026	.000134 I	6.80	1.503	.115	.000603 I	10.40	2.299	.269	.001411 I
3.30	.729	.027	.000142 I	6.90	1.525	.119	.000621 I	10.50	2.321	.275	.001438 I
3.40	.752	.029	.000151 I	7.00	1.547	.122	.000639 I	10.60	2.343	.280	.001465 I
3.50	.774	.031	.000160 I	7.10	1.569	.126	.000657 I	10.70	2.365	.285	.001493 I
3.60	.796	.032	.000169 I	7.20	1.592	.129	.000676 I	10.80	2.387	.290	.001521 I
3.70	.818	.034	.000179 I	7.30	1.614	.133	.000695 I	10.90	2.409	.296	.001549 I
3.80	.840	.036	.000188 I	7.40	1.636	.136	.000714 I	11.00	2.432	.301	.001578 I
3.90	.862	.038	.000198 I	7.50	1.658	.140	.000734 I	11.10	2.454	.307	.001607 I
4.00	.884	.040	.000209 I	7.60	1.680	.144	.000753 I	11.20	2.476	.312	.001636 I
4.10	.906	.042	.000219 I	7.70	1.702	.148	.000773 I	11.30	2.498	.318	.001665 I
4.20	.928	.044	.000230 I	7.80	1.724	.152	.000793 I	11.40	2.520	.324	.001695 I
4.30	.951	.046	.000241 I	7.90	1.746	.155	.000814 I	11.50	2.542	.329	.001725 I
4.40	.973	.048	.000252 I	8.00	1.768	.159	.000835 I	11.60	2.564	.335	.001755 I
4.50	.995	.050	.000264 I	8.10	1.790	.163	.000856 I	11.70	2.586	.341	.001785 I
4.60	1.017	.053	.000276 I	8.20	1.813	.167	.000877 I	11.80	2.608	.347	.001816 I
4.70	1.039	.055	.000288 I	8.30	1.835	.172	.000898 I	11.90	2.630	.353	.001847 I
4.80	1.061	.057	.000300 I	8.40	1.857	.176	.000920 I	12.00	2.653	.359	.001878 I
4.90	1.083	.060	.000313 I	8.50	1.879	.180	.000942 I	12.10	2.675	.365	.001909 I
5.00	1.105	.062	.000326 I	8.60	1.901	.184	.000965 I	12.20	2.697	.371	.001941 I
5.10	1.127	.065	.000339 I	8.70	1.923	.189	.000987 I	12.30	2.719	.377	.001973 I
5.20	1.149	.067	.000353 I	8.80	1.945	.193	.001010 I	12.40	2.741	.383	.002005 I
5.30	1.172	.070	.000366 I	8.90	1.967	.197	.001033 I	12.50	2.763	.389	.002038 I
5.40	1.194	.073	.000380 I	9.00	1.989	.202	.001056 I	12.60	2.785	.395	.002070 I
5.50	1.216	.075	.000394 I	9.10	2.012	.206	.001080 I	12.70	2.807	.402	.002103 I
5.60	1.238	.078	.000409 I	9.20	2.034	.211	.001104 I	12.80	2.829	.408	.002137 I
5.70	1.260	.081	.000424 I	9.30	2.056	.215	.001128 I	12.90	2.852	.414	.002170 I
5.80	1.282	.084	.000439 I	9.40	2.078	.220	.001152 I	13.00	2.874	.421	.002204 I

2400 MILLIMETER PIPE THE FLOW RANGE IS 2.3000 TO 13.0000 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V
13.10	2.896	.427	.002234 I	16.40	3.625	.670	.003508 I	19.70	4.355
13.20	2.918	.434	.002272 I	16.50	3.647	.678	.003550 I	19.80	4.377
13.30	2.940	.441	.002307 I	16.60	3.669	.686	.003594 I	19.90	4.399
13.40	2.962	.447	.002342 I	16.70	3.692	.695	.003637 I	20.00	4.421
13.50	2.984	.454	.002377 I	16.80	3.714	.703	.003681 I	20.10	4.443
13.60	3.006	.461	.002412 I	16.90	3.736	.711	.003725 I	20.20	4.465
13.70	3.028	.467	.002448 I	17.00	3.758	.720	.003769 I	20.30	4.487
13.80	3.050	.474	.002484 I	17.10	3.780	.728	.003813 I	20.40	4.509
13.90	3.073	.481	.002520 I	17.20	3.802	.737	.003858 I	20.50	4.531
14.00	3.095	.488	.002556 I	17.30	3.824	.745	.003903 I	20.60	4.554
14.10	3.117	.495	.002593 I	17.40	3.846	.754	.003948 I	20.70	4.576
14.20	3.139	.502	.002630 I	17.50	3.868	.763	.003994 I	20.80	4.598
14.30	3.161	.509	.002667 I	17.60	3.890	.771	.004040 I	20.90	4.620
14.40	3.183	.516	.002704 I	17.70	3.913	.780	.004086 I	21.00	4.642
14.50	3.205	.524	.002742 I	17.80	3.935	.789	.004132 I	21.10	4.664
14.60	3.227	.531	.002780 I	17.90	3.957	.798	.004178 I	21.20	4.686
14.70	3.249	.538	.002818 I	18.00	3.979	.807	.004225 I	21.30	4.708
14.80	3.272	.546	.002857 I	18.10	4.001	.816	.004272 I	21.40	4.730
14.90	3.294	.553	.002895 I	18.20	4.023	.825	.004320 I	21.50	4.753
15.00	3.316	.560	.002934 I	18.30	4.045	.834	.004367 I	21.60	4.775
15.10	3.338	.568	.002973 I	18.40	4.067	.843	.004415 I	21.70	4.797
15.20	3.360	.575	.003013 I	18.50	4.089	.852	.004463 I	21.80	4.819
15.30	3.382	.583	.003053 I	18.60	4.111	.862	.004512 I	21.90	4.841
15.40	3.404	.591	.003093 I	18.70	4.134	.871	.004560 I	22.00	4.863
15.50	3.426	.598	.003133 I	18.80	4.156	.880	.004609 I	22.10	4.885
15.60	3.448	.606	.003174 I	18.90	4.178	.890	.004658 I	22.20	4.907
15.70	3.470	.614	.003214 I	19.00	4.200	.899	.004708 I	22.30	4.929
15.80	3.493	.622	.003256 I	19.10	4.222	.909	.004758 I	22.40	4.951
15.90	3.515	.630	.003297 I	19.20	4.244	.918	.004807 I	22.50	4.974
16.00	3.537	.638	.003339 I	19.30	4.266	.928	.004858 I	22.60	4.996
16.10	3.559	.646	.003380 I	19.40	4.288	.937	.004908 I	22.70	5.018
16.20	3.581	.654	.003423 I	19.50	4.310	.947	.004959 I	22.80	5.040
16.30	3.603	.662	.003465 I	19.60	4.333	.957	.005010 I	22.90	5.062

2400 MILLIMETER PIPE THE FLOW RANGE IS 13.1000 TO 22.9000 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBNEY'S FORMULA

SCOBNEY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 2550 MILLIMETERS

CS = .370

QQ INCREMENT = .1000 CUBIC METERS PER SECOND

AREA = 5.1071 SQUARE METERS

$H = (.94861E-05) * (Q ** 2)$

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
2.60	.509	.013	.000064	I	6.20	1.214	.075	.000365	I	9.80	1.919	.188	.000911	I
2.70	.529	.014	.000069	I	6.30	1.234	.078	.000377	I	9.90	1.938	.192	.000930	I
2.80	.548	.015	.000074	I	6.40	1.253	.080	.000389	I	10.00	1.958	.195	.000949	I
2.90	.568	.016	.000080	I	6.50	1.273	.083	.000401	I	10.10	1.978	.199	.000968	I
3.00	.587	.018	.000085	I	6.60	1.292	.085	.000413	I	10.20	1.997	.203	.000987	I
3.10	.607	.019	.000091	I	6.70	1.312	.088	.000426	I	10.30	2.017	.207	.001006	I
3.20	.627	.020	.000097	I	6.80	1.331	.090	.000439	I	10.40	2.036	.211	.001026	I
3.30	.646	.021	.000103	I	6.90	1.351	.093	.000452	I	10.50	2.056	.215	.001046	I
3.40	.666	.023	.000110	I	7.00	1.371	.096	.000465	I	10.60	2.076	.220	.001066	I
3.50	.685	.024	.000116	I	7.10	1.390	.099	.000478	I	10.70	2.095	.224	.001086	I
3.60	.705	.025	.000123	I	7.20	1.410	.101	.000492	I	10.80	2.115	.228	.001106	I
3.70	.724	.027	.000130	I	7.30	1.429	.104	.000506	I	10.90	2.134	.232	.001127	I
3.80	.744	.028	.000137	I	7.40	1.449	.107	.000519	I	11.00	2.154	.236	.001148	I
3.90	.764	.030	.000144	I	7.50	1.469	.110	.000534	I	11.10	2.173	.241	.001169	I
4.00	.783	.031	.000152	I	7.60	1.488	.113	.000548	I	11.20	2.193	.245	.001190	I
4.10	.803	.033	.000159	I	7.70	1.508	.116	.000562	I	11.30	2.213	.250	.001211	I
4.20	.822	.034	.000167	I	7.80	1.527	.119	.000577	I	11.40	2.232	.254	.001233	I
4.30	.842	.036	.000175	I	7.90	1.547	.122	.000592	I	11.50	2.252	.258	.001255	I
4.40	.862	.038	.000184	I	8.00	1.566	.125	.000607	I	11.60	2.271	.263	.001276	I
4.50	.881	.040	.000192	I	8.10	1.586	.128	.000622	I	11.70	2.291	.268	.001299	I
4.60	.901	.041	.000201	I	8.20	1.606	.131	.000638	I	11.80	2.311	.272	.001321	I
4.70	.920	.043	.000210	I	8.30	1.625	.135	.000653	I	11.90	2.330	.277	.001343	I
4.80	.940	.045	.000219	I	8.40	1.645	.138	.000669	I	12.00	2.350	.281	.001366	I
4.90	.959	.047	.000228	I	8.50	1.664	.141	.000685	I	12.10	2.369	.286	.001389	I
5.00	.979	.049	.000237	I	8.60	1.684	.145	.000702	I	12.20	2.389	.291	.001412	I
5.10	.999	.051	.000247	I	8.70	1.704	.148	.000718	I	12.30	2.408	.296	.001435	I
5.20	1.018	.053	.000257	I	8.80	1.723	.151	.000735	I	12.40	2.428	.300	.001459	I
5.30	1.038	.055	.000266	I	8.90	1.743	.155	.000751	I	12.50	2.448	.305	.001482	I
5.40	1.057	.057	.000277	I	9.00	1.762	.158	.000768	I	12.60	2.467	.310	.001506	I
5.50	1.077	.059	.000287	I	9.10	1.782	.162	.000786	I	12.70	2.487	.315	.001530	I
5.60	1.097	.061	.000297	I	9.20	1.801	.165	.000803	I	12.80	2.506	.320	.001554	I
5.70	1.116	.063	.000308	I	9.30	1.821	.169	.000820	I	12.90	2.526	.325	.001579	I
5.80	1.136	.066	.000319	I	9.40	1.841	.173	.000838	I	13.00	2.545	.330	.001603	I
5.90	1.155	.068	.000330	I	9.50	1.860	.176	.000856	I	13.10	2.565	.335	.001628	I
6.00	1.175	.070	.000341	I	9.60	1.880	.180	.000874	I	13.20	2.585	.340	.001653	I
6.10	1.194	.073	.000353	I	9.70	1.899	.184	.000893	I	13.30	2.604	.346	.001678	I

2550 MILLIMETER PIPE THE FLOW RANGE IS 2.6000 TO 13.3000 CUBIC METERS PER SECOND

Q	V	HV	H	O	V	HV	H	O	V		
13.40	2.624	.351	.001703	I	17.00	3.329	.565	.002741	I	20.60	4.034
13.50	2.643	.356	.001729	I	17.10	3.348	.571	.002774	I	20.70	4.053
13.60	2.663	.361	.001755	I	17.20	3.368	.578	.002806	I	20.80	4.073
13.70	2.683	.367	.001780	I	17.30	3.387	.585	.002839	I	20.90	4.092
13.80	2.702	.372	.001807	I	17.40	3.407	.592	.002872	I	21.00	4.112
13.90	2.722	.378	.001833	I	17.50	3.427	.598	.002905	I	21.10	4.132
14.00	2.741	.383	.001859	I	17.60	3.446	.605	.002938	I	21.20	4.151
14.10	2.761	.389	.001886	I	17.70	3.466	.612	.002972	I	21.30	4.171
14.20	2.780	.394	.001913	I	17.80	3.485	.619	.003006	I	21.40	4.190
14.30	2.800	.400	.001940	I	17.90	3.505	.626	.003039	I	21.50	4.210
14.40	2.820	.405	.001967	I	18.00	3.525	.633	.003073	I	21.60	4.229
14.50	2.839	.411	.001994	I	18.10	3.544	.640	.003106	I	21.70	4.249
14.60	2.859	.417	.002022	I	18.20	3.564	.647	.003142	I	21.80	4.269
14.70	2.878	.422	.002050	I	18.30	3.583	.654	.003177	I	21.90	4.288
14.80	2.898	.428	.002078	I	18.40	3.603	.662	.003212	I	22.00	4.308
14.90	2.918	.434	.002106	I	18.50	3.622	.669	.003247	I	22.10	4.327
15.00	2.937	.440	.002134	I	18.60	3.642	.676	.003282	I	22.20	4.347
15.10	2.957	.446	.002163	I	18.70	3.662	.683	.003317	I	22.30	4.367
15.20	2.976	.451	.002192	I	18.80	3.681	.691	.003353	I	22.40	4.386
15.30	2.996	.457	.002221	I	18.90	3.701	.698	.003389	I	22.50	4.406
15.40	3.015	.463	.002250	I	19.00	3.720	.705	.003424	I	22.60	4.425
15.50	3.035	.469	.002279	I	19.10	3.740	.713	.003461	I	22.70	4.445
15.60	3.055	.476	.002309	I	19.20	3.759	.720	.003497	I	22.80	4.464
15.70	3.074	.482	.002338	I	19.30	3.779	.728	.003533	I	22.90	4.484
15.80	3.094	.488	.002368	I	19.40	3.799	.735	.003570	I	23.00	4.504
15.90	3.113	.494	.002398	I	19.50	3.818	.743	.003607	I	23.10	4.523
16.00	3.133	.500	.002428	I	19.60	3.838	.751	.003644	I	23.20	4.543
16.10	3.152	.507	.002459	I	19.70	3.857	.758	.003681	I	23.30	4.562
16.20	3.172	.513	.002490	I	19.80	3.877	.766	.003719	I	23.40	4.582
16.30	3.192	.519	.002520	I	19.90	3.897	.774	.003757	I	23.50	4.601
16.40	3.211	.526	.002551	I	20.00	3.916	.782	.003794	I	23.60	4.621
16.50	3.231	.532	.002583	I	20.10	3.936	.789	.003832	I	23.70	4.641
16.60	3.250	.538	.002614	I	20.20	3.955	.797	.003871	I	23.80	4.660
16.70	3.270	.545	.002646	I	20.30	3.975	.805	.003909	I	23.90	4.680
16.80	3.290	.552	.002677	I	20.40	3.994	.813	.003948	I	24.00	4.699
16.90	3.309	.558	.002709	I	20.50	4.014	.821	.003987	I	24.10	4.719

2550 MILLIMETER PIPE THE FLOW RANGE IS 13.4000 TO 24.1000 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
24.20	4.739	1.144	.005555	I	24.70	4.836	1.192	.005787	I	25.20	4.934	1.241	.006024	I
24.30	4.758	1.154	.005601	I	24.80	4.856	1.202	.005834	I	25.30	4.954	1.251	.006072	I
24.40	4.778	1.163	.005648	I	24.90	4.876	1.212	.005881	I	25.40	4.974	1.261	.006120	I
24.50	4.797	1.173	.005694	I	25.00	4.895	1.221	.005929	I	25.50	4.993	1.271	.006168	I
24.60	4.817	1.183	.005741	I	25.10	4.915	1.231	.005976	I	25.60	5.013	1.281	.006217	I

2550 MILLIMETER PIPE THE FLOW RANGE IS 24.2000 TO 25.6000 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBAY'S FORMULA

SCOBAY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 2700 MILLIMETERS

CS = .370

QO INCREMENT = .1000 CUBIC METERS PER SECOND

AREA = 5.7256 SQUARE METERS

$H = (.70269E-05) * (Q ** 2)$

Q	V	HW	H	Q	V	HW	H	Q	V	HW	H
2.90	.507	.013	.000059	6.50	1.135	.066	.000297	10.10	1.764	.159	.000717
3.00	.524	.014	.000063	6.60	1.153	.068	.000306	10.20	1.781	.162	.000731
3.10	.541	.015	.000068	6.70	1.170	.070	.000315	10.30	1.799	.165	.000745
3.20	.559	.016	.000072	6.80	1.188	.072	.000325	10.40	1.816	.168	.000760
3.30	.576	.017	.000077	6.90	1.205	.074	.000335	10.50	1.834	.171	.000775
3.40	.594	.018	.000081	7.00	1.223	.076	.000344	10.60	1.851	.175	.000790
3.50	.611	.019	.000086	7.10	1.240	.078	.000354	10.70	1.869	.178	.000805
3.60	.629	.020	.000091	7.20	1.258	.081	.000364	10.80	1.886	.181	.000820
3.71	.646	.021	.000096	7.30	1.275	.083	.000374	10.90	1.904	.185	.000835
3.80	.664	.022	.000101	7.40	1.292	.085	.000385	11.00	1.921	.188	.000850
3.90	.681	.024	.000107	7.50	1.310	.087	.000395	11.10	1.939	.192	.000866
4.00	.699	.025	.000112	7.60	1.327	.090	.000406	11.20	1.956	.195	.000881
4.10	.716	.026	.000118	7.70	1.345	.092	.000417	11.30	1.974	.199	.000897
4.20	.734	.027	.000124	7.80	1.362	.095	.000428	11.40	1.991	.202	.000913
4.30	.751	.029	.000130	7.90	1.380	.097	.000439	11.50	2.009	.206	.000929
4.40	.768	.030	.000136	8.00	1.397	.100	.000450	11.60	2.026	.209	.000946
4.50	.786	.031	.000142	8.10	1.415	.102	.000461	11.70	2.043	.213	.000962
4.60	.803	.033	.000149	8.20	1.432	.105	.000472	11.80	2.061	.216	.000978
4.70	.821	.034	.000155	8.30	1.450	.107	.000484	11.90	2.078	.220	.000995
4.80	.838	.036	.000162	8.40	1.467	.110	.000496	12.00	2.096	.224	.001012
4.90	.856	.037	.000169	8.50	1.485	.112	.000508	12.10	2.113	.228	.001029
5.00	.873	.039	.000176	8.60	1.502	.115	.000520	12.20	2.131	.231	.001046
5.10	.891	.040	.000183	8.70	1.520	.118	.000532	12.30	2.148	.235	.001063
5.20	.908	.042	.000190	8.80	1.537	.120	.000544	12.40	2.166	.239	.001080
5.30	.926	.044	.000197	8.90	1.554	.123	.000557	12.50	2.183	.243	.001098
5.40	.943	.045	.000205	9.00	1.572	.126	.000569	12.60	2.201	.247	.001116
5.50	.961	.047	.000213	9.10	1.589	.129	.000582	12.70	2.218	.251	.001133
5.60	.978	.049	.000220	9.20	1.607	.132	.000595	12.80	2.236	.255	.001151
5.70	.996	.051	.000228	9.30	1.624	.134	.000608	12.90	2.253	.259	.001169
5.80	1.013	.052	.000236	9.40	1.642	.137	.000621	13.00	2.271	.263	.001188
5.90	1.030	.054	.000245	9.50	1.659	.140	.000634	13.10	2.288	.267	.001206
6.00	1.049	.056	.000253	9.60	1.677	.143	.000648	13.20	2.305	.271	.001224
6.10	1.065	.058	.000261	9.70	1.694	.146	.000661	13.30	2.323	.275	.001243
6.20	1.083	.060	.000270	9.80	1.712	.149	.000675	13.40	2.340	.279	.001262
6.30	1.100	.062	.000279	9.90	1.729	.152	.000689	13.50	2.358	.283	.001281
6.40	1.118	.064	.000289	10.00	1.747	.155	.000703	13.60	2.375	.288	.001300

2700 MILLIMETER PIPE THE FLOW RANGE IS 2.9000 TO 13.6000 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
13.70	2.393	.292	.001319	I	17.30	3.022	.465	.002103	I	20.90	3.650	.679	.003069	I
13.80	2.410	.296	.001338	I	17.40	3.039	.471	.002127	I	21.00	3.668	.686	.003099	I
13.90	2.428	.300	.001358	I	17.50	3.056	.476	.002152	I	21.10	3.685	.692	.003128	I
14.00	2.445	.305	.001377	I	17.60	3.074	.482	.002177	I	21.20	3.703	.699	.003158	I
14.10	2.463	.309	.001397	I	17.70	3.091	.487	.002201	I	21.30	3.720	.705	.003188	I
14.20	2.480	.314	.001417	I	17.80	3.109	.493	.002226	I	21.40	3.738	.712	.003218	I
14.30	2.498	.318	.001437	I	17.90	3.126	.498	.002251	I	21.50	3.755	.719	.003248	I
14.40	2.515	.322	.001457	I	18.00	3.144	.504	.002277	I	21.60	3.773	.725	.003278	I
14.50	2.533	.327	.001477	I	18.10	3.161	.509	.002302	I	21.70	3.790	.732	.003309	I
14.60	2.550	.331	.001498	I	18.20	3.179	.515	.002328	I	21.80	3.807	.739	.003339	I
14.70	2.567	.336	.001518	I	18.30	3.196	.521	.002353	I	21.90	3.825	.746	.003370	I
14.80	2.585	.341	.001539	I	18.40	3.214	.526	.002379	I	22.00	3.842	.753	.003401	I
14.90	2.602	.345	.001560	I	18.50	3.231	.532	.002405	I	22.10	3.860	.759	.003432	I
15.00	2.620	.350	.001581	I	18.60	3.249	.538	.002431	I	22.20	3.877	.766	.003463	I
15.10	2.637	.355	.001602	I	18.70	3.266	.544	.002457	I	22.30	3.895	.773	.003494	I
15.20	2.655	.359	.001623	I	18.80	3.284	.550	.002484	I	22.40	3.912	.780	.003526	I
15.30	2.672	.364	.001645	I	18.90	3.301	.555	.002510	I	22.50	3.930	.787	.003557	I
15.40	2.690	.369	.001666	I	19.00	3.318	.561	.002537	I	22.60	3.947	.794	.003589	I
15.50	2.707	.374	.001688	I	19.10	3.336	.567	.002563	I	22.70	3.965	.801	.003621	I
15.60	2.725	.378	.001710	I	19.20	3.353	.573	.002590	I	22.80	3.982	.808	.003653	I
15.70	2.742	.383	.001732	I	19.30	3.371	.579	.002617	I	22.90	4.000	.815	.003685	I
15.80	2.760	.388	.001754	I	19.40	3.388	.585	.002645	I	23.00	4.017	.822	.003717	I
15.90	2.777	.393	.001776	I	19.50	3.406	.591	.002672	I	23.10	4.035	.830	.003750	I
16.00	2.794	.398	.001799	I	19.60	3.423	.597	.002699	I	23.20	4.052	.837	.003782	I
16.10	2.812	.403	.001821	I	19.70	3.441	.603	.002727	I	23.30	4.069	.844	.003815	I
16.20	2.829	.408	.001844	I	19.80	3.458	.610	.002755	I	23.40	4.087	.851	.003848	I
16.30	2.847	.413	.001867	I	19.90	3.476	.616	.002783	I	23.50	4.104	.859	.003881	I
16.40	2.864	.418	.001890	I	20.00	3.493	.622	.002811	I	23.60	4.122	.866	.003914	I
16.50	2.882	.423	.001913	I	20.10	3.511	.628	.002839	I	23.70	4.139	.873	.003947	I
16.60	2.899	.428	.001936	I	20.20	3.528	.634	.002867	I	23.80	4.157	.881	.003980	I
16.70	2.917	.434	.001960	I	20.30	3.546	.641	.002896	I	23.90	4.174	.888	.004014	I
16.80	2.934	.439	.001983	I	20.40	3.563	.647	.002924	I	24.00	4.192	.896	.004047	I
16.90	2.952	.444	.002007	I	20.50	3.580	.653	.002953	I	24.10	4.209	.903	.004081	I
17.00	2.969	.449	.002031	I	20.60	3.598	.660	.002982	I	24.20	4.227	.911	.004115	I
17.10	2.987	.455	.002055	I	20.70	3.615	.666	.003011	I	24.30	4.244	.918	.004149	I
17.20	3.004	.460	.002079	I	20.80	3.633	.673	.003040	I	24.40	4.262	.926	.004184	I

2700 MILLIMETER PIPE THE FLOW RANGE IS 13.7000 TO 24.6000 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
24.50	4.279	.933	.004218	I	26.00	4.541	1.051	.004750	I	27.50	4.803	1.176	.005314	I
24.60	4.297	.941	.004252	I	26.10	4.559	1.059	.004787	I	27.60	4.826	1.184	.005353	I
24.70	4.314	.949	.004287	I	26.20	4.576	1.067	.004824	I	27.70	4.838	1.193	.005392	I
24.80	4.331	.956	.004322	I	26.30	4.593	1.075	.004860	I	27.80	4.855	1.202	.005431	I
24.90	4.349	.964	.004357	I	26.40	4.611	1.084	.004897	I	27.90	4.873	1.210	.005470	I
25.00	4.366	.972	.004392	I	26.50	4.628	1.092	.004935	I	28.00	4.890	1.219	.005509	I
25.10	4.384	.980	.004427	I	26.60	4.646	1.100	.004972	I	28.10	4.908	1.228	.005549	I
25.20	4.401	.987	.004462	I	26.70	4.663	1.108	.005009	I	28.20	4.925	1.236	.005588	I
25.30	4.419	.995	.004498	I	26.80	4.681	1.117	.005047	I	28.30	4.943	1.245	.005628	I
25.40	4.436	1.003	.004533	I	26.90	4.698	1.125	.005085	I	28.40	4.960	1.254	.005668	I
25.50	4.454	1.011	.004569	I	27.00	4.716	1.133	.005123	I	28.50	4.978	1.263	.005708	I
25.60	4.471	1.019	.004605	I	27.10	4.733	1.142	.005161	I	28.60	4.995	1.272	.005748	I
25.70	4.489	1.027	.004641	I	27.20	4.751	1.150	.005199	I	28.70	5.013	1.281	.005788	I
25.80	4.506	1.035	.004677	I	27.30	4.768	1.159	.005237	I	28.80	5.030	1.290	.005828	I
25.90	4.524	1.043	.004714	I	27.40	4.786	1.167	.005276	I	28.90	5.048	1.299	.005869	I

2700 MILLIMETER PIPE THE FLOW RANGE IS 24.5000 TO 28.9000 CUBIC METERS PER SECOND

METRIC TABLES
HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOBAY'S FORMULA

SCOBAY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 2850 MILLIMETERS

CS = .370

QQ INCREMENT = .1000 CUBIC METERS PER SECOND

AREA = 6.3794 SQUARE METERS

H = (.52904E-05) * (Q ** 2)

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
3.20	.502	.013	.000054	I	6.80	1.066	.058	.000245	I	10.40	1.530	.135	.000572	I
3.30	.517	.014	.000058	I	6.90	1.082	.060	.000252	I	10.50	1.546	.138	.000583	I
3.40	.533	.014	.000061	I	7.00	1.097	.061	.000259	I	10.60	1.662	.141	.000594	I
3.50	.549	.015	.000065	I	7.10	1.113	.063	.000267	I	10.70	1.677	.143	.000606	I
3.60	.564	.016	.000069	I	7.20	1.129	.065	.000274	I	10.80	1.693	.146	.000617	I
3.70	.580	.017	.000072	I	7.30	1.144	.067	.000282	I	10.90	1.709	.149	.000629	I
3.80	.596	.018	.000076	I	7.40	1.160	.069	.000290	I	11.00	1.724	.152	.000640	I
3.90	.611	.019	.000080	I	7.50	1.176	.070	.000298	I	11.10	1.740	.154	.000652	I
4.00	.627	.020	.000085	I	7.60	1.191	.072	.000306	I	11.20	1.756	.157	.000664	I
4.10	.643	.021	.000089	I	7.70	1.207	.074	.000314	I	11.30	1.771	.160	.000676	I
4.20	.658	.022	.000093	I	7.80	1.223	.076	.000322	I	11.40	1.787	.163	.000688	I
4.30	.674	.023	.000098	I	7.90	1.238	.078	.000330	I	11.50	1.803	.166	.000700	I
4.40	.690	.024	.000102	I	8.00	1.254	.080	.000339	I	11.60	1.818	.169	.000712	I
4.50	.705	.025	.000107	I	8.10	1.270	.082	.000347	I	11.70	1.834	.171	.000724	I
4.60	.721	.027	.000112	I	8.20	1.285	.084	.000356	I	11.80	1.850	.174	.000737	I
4.70	.737	.028	.000117	I	8.30	1.301	.086	.000364	I	11.90	1.865	.177	.000749	I
4.80	.752	.029	.000122	I	8.40	1.317	.088	.000373	I	12.00	1.881	.180	.000762	I
4.90	.768	.030	.000127	I	8.50	1.332	.090	.000382	I	12.10	1.897	.183	.000775	I
5.00	.784	.031	.000132	I	8.60	1.348	.093	.000391	I	12.20	1.912	.186	.000787	I
5.10	.799	.033	.000138	I	8.70	1.364	.095	.000400	I	12.30	1.928	.189	.000800	I
5.20	.815	.034	.000143	I	8.80	1.379	.097	.000410	I	12.40	1.944	.193	.000813	I
5.30	.831	.035	.000149	I	8.90	1.395	.099	.000419	I	12.50	1.959	.196	.000827	I
5.40	.846	.037	.000154	I	9.00	1.411	.101	.000429	I	12.60	1.975	.199	.000840	I
5.50	.862	.038	.000160	I	9.10	1.426	.104	.000438	I	12.70	1.991	.202	.000853	I
5.60	.878	.039	.000166	I	9.20	1.442	.106	.000448	I	12.80	2.006	.205	.000867	I
5.70	.893	.041	.000172	I	9.30	1.458	.108	.000458	I	12.90	2.022	.208	.000880	I
5.80	.909	.042	.000178	I	9.40	1.473	.111	.000467	I	13.00	2.038	.212	.000894	I
5.90	.925	.044	.000184	I	9.50	1.489	.113	.000477	I	13.10	2.053	.215	.000908	I
6.00	.941	.045	.000190	I	9.60	1.505	.115	.000488	I	13.20	2.069	.218	.000922	I
6.10	.956	.047	.000197	I	9.70	1.521	.118	.000498	I	13.30	2.085	.222	.000936	I
6.20	.972	.048	.000203	I	9.80	1.536	.120	.000508	I	13.40	2.101	.225	.000950	I
6.30	.988	.050	.000210	I	9.90	1.552	.123	.000519	I	13.50	2.116	.228	.000964	I
6.40	1.003	.051	.000217	I	10.00	1.568	.125	.000529	I	13.60	2.132	.232	.000979	I
6.50	1.019	.053	.000224	I	10.10	1.583	.128	.000540	I	13.70	2.148	.235	.000993	I
6.60	1.035	.055	.000230	I	10.20	1.599	.130	.000550	I	13.80	2.163	.239	.001008	I
6.70	1.050	.056	.000237	I	10.30	1.615	.133	.000561	I	13.90	2.179	.242	.001022	I

2050 MILLIMETER PIPE THE FLOW RANGE IS 3.2000 TO 13.9000 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V
14.00	2.195	.245	.001037	I	17.60	2.759	.388	.001639	I	21.20	3.323
14.10	2.210	.249	.001052	I	17.70	2.775	.392	.001657	I	21.30	3.339
14.20	2.226	.253	.001067	I	17.80	2.790	.397	.001676	I	21.40	3.355
14.30	2.242	.256	.001082	I	17.90	2.806	.401	.001695	I	21.50	3.370
14.40	2.257	.260	.001097	I	18.00	2.822	.406	.001714	I	21.60	3.386
14.50	2.273	.263	.001112	I	18.10	2.837	.410	.001733	I	21.70	3.402
14.60	2.289	.267	.001128	I	18.20	2.853	.415	.001752	I	21.80	3.417
14.70	2.304	.271	.001143	I	18.30	2.869	.419	.001772	I	21.90	3.433
14.80	2.320	.274	.001159	I	18.40	2.884	.424	.001791	I	22.00	3.449
14.90	2.336	.278	.001175	I	18.50	2.900	.429	.001811	I	22.10	3.464
15.00	2.351	.282	.001190	I	18.60	2.916	.433	.001830	I	22.20	3.480
15.10	2.367	.286	.001206	I	18.70	2.931	.438	.001850	I	22.30	3.496
15.20	2.383	.289	.001222	I	18.80	2.947	.443	.001870	I	22.40	3.511
15.30	2.398	.293	.001239	I	18.90	2.963	.447	.001890	I	22.50	3.527
15.40	2.414	.297	.001255	I	19.00	2.978	.452	.001910	I	22.60	3.543
15.50	2.430	.301	.001271	I	19.10	2.994	.457	.001930	I	22.70	3.558
15.60	2.445	.305	.001287	I	19.20	3.010	.462	.001950	I	22.80	3.574
15.70	2.461	.309	.001304	I	19.30	3.025	.467	.001971	I	22.90	3.590
15.80	2.477	.313	.001321	I	19.40	3.041	.471	.001991	I	23.00	3.605
15.90	2.492	.317	.001337	I	19.50	3.057	.476	.002012	I	23.10	3.621
16.00	2.508	.321	.001354	I	19.60	3.072	.481	.002032	I	23.20	3.637
16.10	2.524	.325	.001371	I	19.70	3.088	.486	.002053	I	23.30	3.652
16.20	2.539	.329	.001388	I	19.80	3.104	.491	.002074	I	23.40	3.668
16.30	2.555	.333	.001406	I	19.90	3.119	.496	.002095	I	23.50	3.684
16.40	2.571	.337	.001423	I	20.00	3.135	.501	.002116	I	23.60	3.699
16.50	2.586	.341	.001440	I	20.10	3.151	.506	.002137	I	23.70	3.715
16.60	2.602	.345	.001458	I	20.20	3.166	.511	.002159	I	23.80	3.731
16.70	2.618	.349	.001475	I	20.30	3.182	.516	.002180	I	23.90	3.746
16.80	2.633	.353	.001493	I	20.40	3.198	.521	.002202	I	24.00	3.762
16.90	2.649	.358	.001511	I	20.50	3.213	.526	.002223	I	24.10	3.778
17.00	2.665	.362	.001529	I	20.60	3.229	.531	.002245	I	24.20	3.793
17.10	2.680	.366	.001547	I	20.70	3.245	.537	.002267	I	24.30	3.809
17.20	2.696	.371	.001565	I	20.80	3.260	.542	.002289	I	24.40	3.825
17.30	2.712	.375	.001583	I	20.90	3.276	.547	.002311	I	24.50	3.840
17.40	2.728	.379	.001602	I	21.00	3.292	.552	.002333	I	24.60	3.856
17.50	2.743	.384	.001620	I	21.10	3.308	.558	.002355	I	24.70	3.872

2950 MILLIMETER PIPE THE FLOW RANGE IS 14.0000 TO 24.7000 CUBIC METERS PER SECOND

Q	V	HV	H		Q	V	HV	H		Q	V	HV	H	
24.80	3.888	.770	.003254	I	27.30	4.279	.933	.003943	I	29.80	4.671	1.112	.004698	I
24.90	3.903	.776	.003280	I	27.40	4.295	.940	.003972	I	29.90	4.687	1.120	.004730	I
25.00	3.919	.783	.003306	I	27.50	4.311	.947	.004001	I	30.00	4.703	1.127	.004761	I
25.10	3.935	.789	.003333	I	27.60	4.326	.954	.004030	I	30.10	4.718	1.135	.004793	I
25.20	3.950	.795	.003360	I	27.70	4.342	.961	.004059	I	30.20	4.734	1.142	.004825	I
25.30	3.966	.802	.003386	I	27.80	4.358	.968	.004089	I	30.30	4.750	1.150	.004857	I
25.40	3.982	.808	.003413	I	27.90	4.373	.975	.004118	I	30.40	4.765	1.157	.004889	I
25.50	3.997	.814	.003440	I	28.00	4.389	.982	.004148	I	30.50	4.781	1.165	.004921	I
25.60	4.013	.821	.003467	I	28.10	4.405	.989	.004177	I	30.60	4.797	1.173	.004954	I
25.70	4.029	.827	.003494	I	28.20	4.420	.996	.004207	I	30.70	4.812	1.180	.004986	I
25.80	4.044	.834	.003521	I	28.30	4.436	1.003	.004237	I	30.80	4.828	1.188	.005019	I
25.90	4.060	.840	.003549	I	28.40	4.452	1.010	.004267	I	30.90	4.844	1.196	.005051	I
26.00	4.076	.847	.003576	I	28.50	4.467	1.017	.004297	I	31.00	4.859	1.204	.005084	I
26.10	4.091	.853	.003604	I	28.60	4.483	1.024	.004327	I	31.10	4.875	1.211	.005117	I
26.20	4.107	.860	.003632	I	28.70	4.499	1.032	.004358	I	31.20	4.891	1.219	.005150	I
26.30	4.123	.866	.003659	I	28.80	4.515	1.039	.004388	I	31.30	4.906	1.227	.005183	I
26.40	4.138	.873	.003687	I	28.90	4.530	1.046	.004419	I	31.40	4.922	1.235	.005216	I
26.50	4.154	.879	.003715	I	29.00	4.546	1.053	.004449	I	31.50	4.938	1.243	.005249	I
26.60	4.170	.886	.003743	I	29.10	4.562	1.061	.004480	I	31.60	4.953	1.251	.005283	I
26.70	4.185	.893	.003771	I	29.20	4.577	1.068	.004511	I	31.70	4.969	1.259	.005316	I
26.80	4.201	.900	.003800	I	29.30	4.593	1.075	.004542	I	31.80	4.985	1.266	.005350	I
26.90	4.217	.906	.003828	I	29.40	4.609	1.083	.004573	I	31.90	5.000	1.274	.005384	I
27.00	4.232	.913	.003857	I	29.50	4.624	1.090	.004604	I	32.00	5.016	1.282	.005417	I
27.10	4.248	.920	.003885	I	29.60	4.640	1.097	.004635	I	32.10	5.032	1.290	.005451	I
27.20	4.264	.927	.003914	I	29.70	4.656	1.105	.004667	I	32.20	5.047	1.299	.005485	I

2450 MILLIMETER PIPE THE FLOW RANGE IS 24.8000 TO 32.2000 CUBIC METERS PER SECOND

METRIC TABLES

HYDRAULIC PROPERTIES OF CONCRETE PIPE

FRICITION SLOPES ARE BASED ON SCOPEY'S FORMULA

SCOPEY'S FORMULA -- $H = (V * 0.010447 / CS) ** 2 / (D / 1000) ** 1.25$

WHERE -- V = VELOCITY (METERS PER SECOND)

CS = COEFFICIENT OF RETARDATION

H = FRICTION SLOPE (METERS PER METER)

D = PIPE DIAMETER (MILLIMETERS)

AND -- Q = FLOW RATE (CUBIC METERS PER SECOND)

HV = VELOCITY HEAD (METERS)

PIPE CHARACTERISTICS --

D = 3000 MILLIMETERS

CS = .370

Q0 INCREMENT = .1000 CUBIC METERS PER SECOND

AREA = 7.0686 SQUARE METERS

H = (.40414E-05) * (Q ** 2)

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
3.60	.509	.013	.000052	I	7.20	1.019	.053	.000210	I	10.80	1.528	.119	.000471	I
3.70	.523	.014	.000055	I	7.30	1.033	.054	.000215	I	10.90	1.542	.121	.000480	I
3.80	.538	.015	.000058	I	7.40	1.047	.056	.000221	I	11.00	1.556	.123	.000489	I
3.90	.552	.016	.000061	I	7.50	1.061	.057	.000227	I	11.10	1.570	.126	.000498	I
4.00	.566	.016	.000065	I	7.60	1.075	.059	.000233	I	11.20	1.584	.128	.000507	I
4.10	.580	.017	.000068	I	7.70	1.089	.060	.000240	I	11.30	1.599	.130	.000516	I
4.20	.594	.018	.000071	I	7.80	1.103	.062	.000246	I	11.40	1.613	.133	.000525	I
4.30	.608	.019	.000075	I	7.90	1.118	.064	.000252	I	11.50	1.627	.135	.000534	I
4.40	.622	.020	.000078	I	8.00	1.132	.065	.000259	I	11.60	1.641	.137	.000544	I
4.50	.637	.021	.000082	I	8.10	1.146	.067	.000265	I	11.70	1.655	.140	.000553	I
4.60	.651	.022	.000086	I	8.20	1.160	.069	.000272	I	11.80	1.669	.142	.000563	I
4.70	.665	.023	.000089	I	8.30	1.174	.070	.000278	I	11.90	1.684	.144	.000572	I
4.80	.679	.024	.000093	I	8.40	1.188	.072	.000285	I	12.00	1.698	.147	.000582	I
4.90	.693	.024	.000097	I	8.50	1.203	.074	.000292	I	12.10	1.712	.149	.000592	I
5.00	.707	.026	.000101	I	8.60	1.217	.075	.000299	I	12.20	1.726	.152	.000602	I
5.10	.722	.027	.000105	I	8.70	1.231	.077	.000306	I	12.30	1.740	.154	.000611	I
5.20	.736	.028	.000109	I	8.80	1.245	.079	.000313	I	12.40	1.754	.157	.000621	I
5.30	.750	.029	.000114	I	8.90	1.259	.081	.000320	I	12.50	1.768	.159	.000631	I
5.40	.764	.030	.000118	I	9.00	1.273	.083	.000327	I	12.60	1.783	.162	.000642	I
5.50	.778	.031	.000122	I	9.10	1.287	.084	.000335	I	12.70	1.797	.165	.000652	I
5.60	.792	.032	.000127	I	9.20	1.302	.086	.000342	I	12.80	1.811	.167	.000662	I
5.70	.806	.033	.000131	I	9.30	1.316	.088	.000350	I	12.90	1.825	.170	.000673	I
5.80	.821	.034	.000136	I	9.40	1.330	.090	.000357	I	13.00	1.839	.172	.000683	I
5.90	.835	.036	.000141	I	9.50	1.344	.092	.000365	I	13.10	1.853	.175	.000694	I
6.00	.849	.037	.000145	I	9.60	1.358	.094	.000372	I	13.20	1.867	.178	.000704	I
6.10	.863	.038	.000150	I	9.70	1.372	.096	.000380	I	13.30	1.882	.180	.000715	I
6.20	.877	.039	.000155	I	9.80	1.386	.098	.000388	I	13.40	1.896	.183	.000726	I
6.30	.891	.040	.000160	I	9.90	1.401	.100	.000396	I	13.50	1.910	.186	.000737	I
6.40	.905	.042	.000166	I	10.00	1.415	.102	.000404	I	13.60	1.924	.189	.000748	I
6.50	.920	.043	.000171	I	10.10	1.429	.104	.000412	I	13.70	1.938	.191	.000759	I
6.60	.934	.044	.000176	I	10.20	1.443	.106	.000420	I	13.80	1.952	.194	.000770	I
6.70	.948	.046	.000181	I	10.30	1.457	.108	.000429	I	13.90	1.966	.197	.000781	I
6.80	.962	.047	.000187	I	10.40	1.471	.110	.000437	I	14.00	1.981	.200	.000792	I
6.90	.976	.049	.000192	I	10.50	1.485	.112	.000446	I	14.10	1.995	.203	.000803	I
7.00	.990	.050	.000198	I	10.60	1.500	.115	.000454	I	14.20	2.009	.206	.000815	I
7.10	1.004	.051	.000204	I	10.70	1.514	.117	.000463	I	14.30	2.023	.209	.000826	I

3000 MILLIMETER PIPE THE FLOW RANGE IS 3.6000 TO 14.3000 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H
14.40	2.037	.212	.000838 I	18.00	2.546	.331	.001309 I	21.60	3.056	.476	.001886 I
14.50	2.051	.214	.000850 I	18.10	2.561	.334	.001324 I	21.70	3.070	.480	.001903 I
14.60	2.065	.217	.000861 I	18.20	2.575	.339	.001339 I	21.80	3.084	.485	.001921 I
14.70	2.080	.220	.000873 I	18.30	2.589	.342	.001353 I	21.90	3.098	.489	.001938 I
14.80	2.094	.223	.000885 I	18.40	2.603	.345	.001368 I	22.00	3.112	.494	.001956 I
14.90	2.108	.226	.000897 I	18.50	2.617	.349	.001383 I	22.10	3.127	.498	.001974 I
15.00	2.122	.230	.000909 I	18.60	2.631	.353	.001398 I	22.20	3.141	.503	.001992 I
15.10	2.136	.233	.000921 I	18.70	2.646	.357	.001413 I	22.30	3.155	.507	.002010 I
15.20	2.150	.236	.000934 I	18.80	2.660	.361	.001428 I	22.40	3.169	.512	.002028 I
15.30	2.165	.239	.000946 I	18.90	2.674	.364	.001444 I	22.50	3.183	.516	.002046 I
15.40	2.179	.242	.000958 I	19.00	2.688	.368	.001459 I	22.60	3.197	.521	.002064 I
15.50	2.193	.245	.000971 I	19.10	2.702	.372	.001474 I	22.70	3.211	.526	.002083 I
15.60	2.207	.248	.000984 I	19.20	2.716	.376	.001490 I	22.80	3.226	.530	.002101 I
15.70	2.221	.251	.000996 I	19.30	2.730	.380	.001505 I	22.90	3.240	.535	.002119 I
15.80	2.235	.255	.001009 I	19.40	2.745	.384	.001521 I	23.00	3.254	.540	.002138 I
15.90	2.249	.258	.001022 I	19.50	2.759	.388	.001537 I	23.10	3.268	.544	.002157 I
16.00	2.264	.261	.001035 I	19.60	2.773	.392	.001553 I	23.20	3.282	.549	.002175 I
16.10	2.278	.264	.001048 I	19.70	2.787	.396	.001568 I	23.30	3.296	.554	.002194 I
16.20	2.292	.268	.001061 I	19.80	2.801	.400	.001584 I	23.40	3.310	.559	.002213 I
16.30	2.306	.271	.001074 I	19.90	2.815	.404	.001600 I	23.50	3.325	.563	.002232 I
16.40	2.320	.274	.001087 I	20.00	2.829	.408	.001617 I	23.60	3.339	.568	.002251 I
16.50	2.334	.278	.001100 I	20.10	2.844	.412	.001633 I	23.70	3.353	.573	.002270 I
16.60	2.348	.281	.001114 I	20.20	2.858	.416	.001649 I	23.80	3.367	.578	.002289 I
16.70	2.363	.284	.001127 I	20.30	2.872	.420	.001665 I	23.90	3.381	.583	.002309 I
16.80	2.377	.288	.001141 I	20.40	2.886	.425	.001682 I	24.00	3.395	.588	.002328 I
16.90	2.391	.291	.001154 I	20.50	2.900	.429	.001698 I	24.10	3.409	.592	.002347 I
17.00	2.405	.295	.001168 I	20.60	2.914	.433	.001715 I	24.20	3.424	.597	.002367 I
17.10	2.419	.298	.001182 I	20.70	2.928	.437	.001732 I	24.30	3.438	.602	.002386 I
17.20	2.433	.302	.001196 I	20.80	2.943	.441	.001748 I	24.40	3.452	.607	.002406 I
17.30	2.447	.305	.001210 I	20.90	2.957	.446	.001765 I	24.50	3.466	.612	.002426 I
17.40	2.462	.309	.001224 I	21.00	2.971	.450	.001782 I	24.60	3.480	.617	.002446 I
17.50	2.476	.312	.001238 I	21.10	2.985	.454	.001799 I	24.70	3.494	.622	.002466 I
17.60	2.490	.316	.001252 I	21.20	2.999	.458	.001816 I	24.80	3.508	.627	.002486 I
17.70	2.504	.320	.001266 I	21.30	3.013	.463	.001834 I	24.90	3.523	.632	.002506 I
17.80	2.518	.323	.001280 I	21.40	3.027	.467	.001851 I	25.00	3.537	.638	.002526 I
17.90	2.532	.327	.001295 I	21.50	3.042	.472	.001868 I	25.10	3.551	.643	.002546 I

3000 MILLIMETER PIPE THE FLOW RANGE IS 14.4000 TO 25.1000 CUBIC METERS PER SECOND

Q	V	HV	H	Q	V	HV	H	Q	V	HV	H			
25.20	3.565	.648	.002566	I	28.70	4.060	.840	.003329	I	32.20	4.555	1.058	.004190	I
25.30	3.579	.653	.002587	I	28.80	4.074	.846	.003352	I	32.30	4.570	1.064	.004216	I
25.40	3.593	.658	.002607	I	28.90	4.089	.852	.003375	I	32.40	4.584	1.071	.004243	I
25.50	3.608	.663	.002628	I	29.00	4.103	.858	.003399	I	32.50	4.598	1.077	.004269	I
25.60	3.622	.669	.002649	I	29.10	4.117	.864	.003422	I	32.60	4.612	1.084	.004295	I
25.70	3.636	.674	.002669	I	29.20	4.131	.870	.003446	I	32.70	4.626	1.091	.004321	I
25.80	3.650	.679	.002690	I	29.30	4.145	.876	.003470	I	32.80	4.640	1.097	.004348	I
25.90	3.664	.684	.002711	I	29.40	4.159	.882	.003493	I	32.90	4.654	1.104	.004374	I
26.00	3.678	.690	.002732	I	29.50	4.173	.888	.003517	I	33.00	4.669	1.111	.004401	I
26.10	3.692	.695	.002753	I	29.60	4.188	.894	.003541	I	33.10	4.683	1.118	.004428	I
26.20	3.707	.700	.002774	I	29.70	4.202	.900	.003565	I	33.20	4.697	1.124	.004455	I
26.30	3.721	.706	.002795	I	29.80	4.216	.906	.003589	I	33.30	4.711	1.131	.004482	I
26.40	3.735	.711	.002817	I	29.90	4.230	.912	.003613	I	33.40	4.725	1.138	.004508	I
26.50	3.749	.716	.002838	I	30.00	4.244	.918	.003637	I	33.50	4.739	1.145	.004536	I
26.60	3.763	.722	.002860	I	30.10	4.258	.924	.003662	I	33.60	4.753	1.152	.004563	I
26.70	3.777	.727	.002881	I	30.20	4.272	.930	.003686	I	33.70	4.768	1.158	.004590	I
26.80	3.791	.733	.002903	I	30.30	4.287	.937	.003710	I	33.80	4.782	1.165	.004617	I
26.90	3.806	.738	.002924	I	30.40	4.301	.943	.003735	I	33.90	4.796	1.172	.004644	I
27.00	3.820	.744	.002946	I	30.50	4.315	.949	.003760	I	34.00	4.810	1.179	.004672	I
27.10	3.834	.749	.002968	I	30.60	4.329	.955	.003784	I	34.10	4.824	1.186	.004699	I
27.20	3.848	.755	.002990	I	30.70	4.343	.961	.003809	I	34.20	4.838	1.193	.004727	I
27.30	3.862	.760	.003012	I	30.80	4.357	.968	.003834	I	34.30	4.852	1.200	.004755	I
27.40	3.876	.766	.003034	I	30.90	4.371	.974	.003859	I	34.40	4.867	1.207	.004782	I
27.50	3.890	.771	.003056	I	31.00	4.386	.980	.003884	I	34.50	4.881	1.214	.004810	I
27.60	3.905	.777	.003079	I	31.10	4.400	.987	.003909	I	34.60	4.895	1.221	.004838	I
27.70	3.919	.783	.003101	I	31.20	4.414	.993	.003934	I	34.70	4.909	1.228	.004866	I
27.80	3.933	.788	.003123	I	31.30	4.428	.999	.003959	I	34.80	4.923	1.235	.004894	I
27.90	3.947	.794	.003146	I	31.40	4.442	1.006	.003985	I	34.90	4.937	1.242	.004923	I
28.00	3.961	.800	.003168	I	31.50	4.456	1.012	.004010	I	35.00	4.951	1.250	.004951	I
28.10	3.975	.805	.003191	I	31.60	4.470	1.019	.004036	I	35.10	4.966	1.257	.004979	I
28.20	3.989	.811	.003214	I	31.70	4.485	1.025	.004061	I	35.20	4.980	1.264	.005008	I
28.30	4.004	.817	.003237	I	31.80	4.499	1.032	.004087	I	35.30	4.994	1.271	.005036	I
28.40	4.018	.823	.003260	I	31.90	4.513	1.038	.004113	I	35.40	5.008	1.278	.005065	I
28.50	4.032	.829	.003283	I	32.00	4.527	1.045	.004138	I	35.50	5.022	1.286	.005093	I
28.60	4.046	.834	.003306	I	32.10	4.541	1.051	.004164	I	35.60	5.036	1.293	.005122	I

3000 MILLIMETER PIPE THE FLOW RANGE IS 25.2000 TO 35.6000 CUBIC METERS PER SECOND

