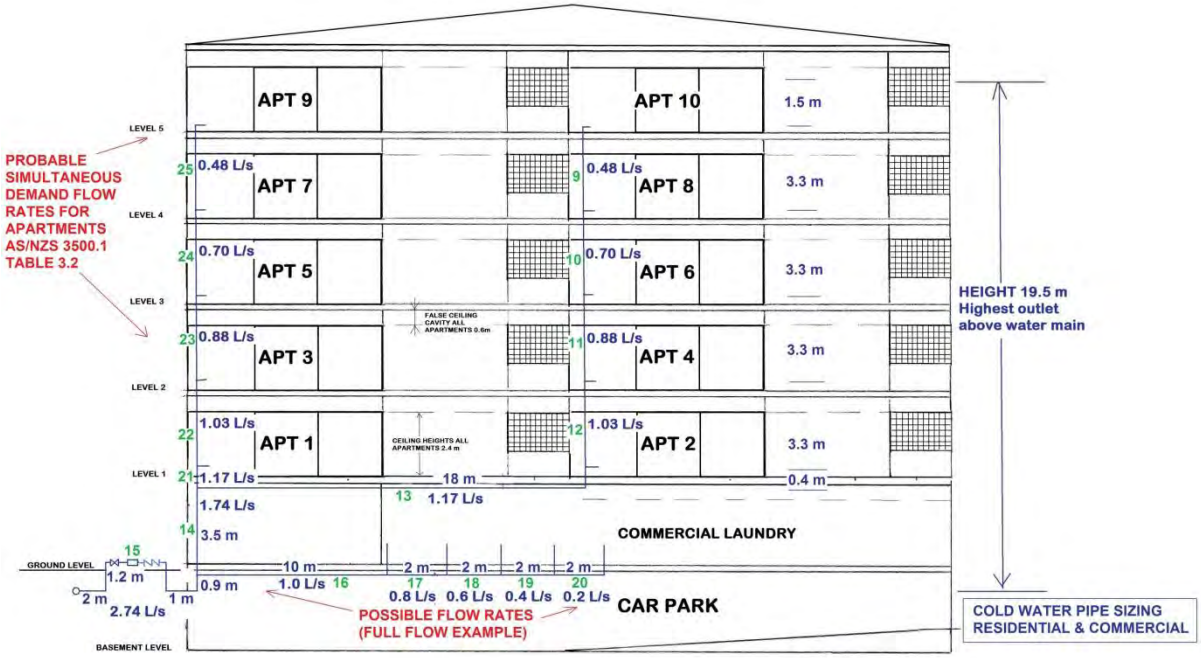

Figure 1 Example project: Elevation of 6 floor building

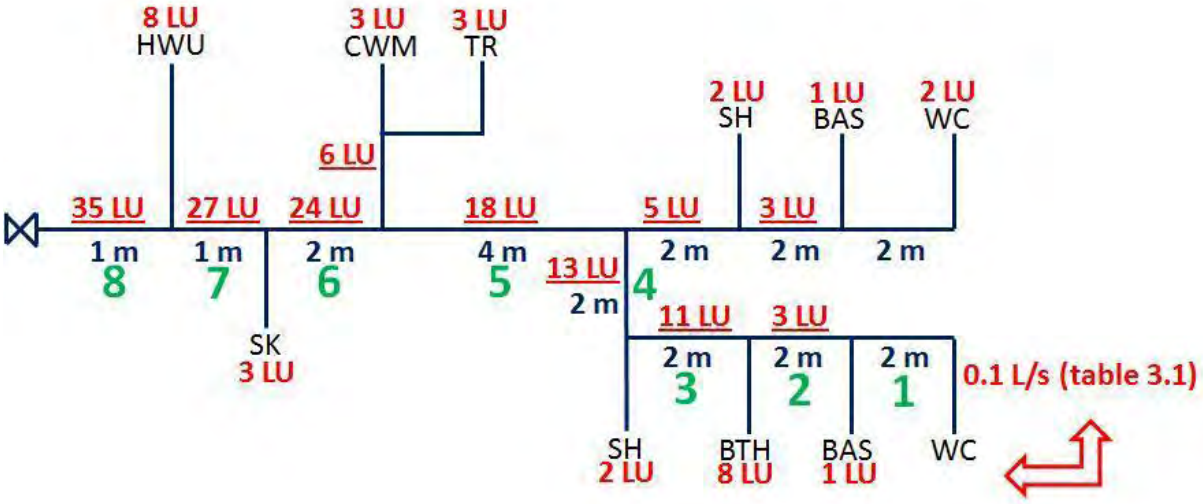

Figure 2 Example project: Schematic arrangement of piping within Apartment 10

PIPE SIZING TABULATION SHEET												
FITTINGS AND VALVES VELOCITY PRESSURE LOSS METHOD												
PIPE SECTION	LOADING UNITS	FLOW RATE	TUBE SIZE	VELOCITY	FITTINGS & VALVES				PIPE SECTION LENGTH	PRESSURE LOSS PER 100 m TUBE	FITTINGS & VALVES PRESSURE LOSS	PIPE SECTION PRESSURE LOSS
							Head loss factor	Pressure loss each $m=K*(v^2/2g)$				
Labelled	No	L/s	DN	m/s	No	Type	K	m. head	m	m. head	m. head	m. head
1	*	0.1	15									
1	*	0.1	15									
1	*	0.1	15									
2	3	0.14	20									
2	3	0.14	20									
3	11	0.28	20									
3	11	0.28	20									

Figure 3 Example project: Loading units, flow rates and tube sizes entered for Apartment 10.

PIPE SIZING TABULATION SHEET												
FITTINGS AND VALVES VELOCITY PRESSURE LOSS METHOD												
PIPE SECTION	LOADING UNITS	FLOW RATE	TUBE SIZE	VELOCITY	FITTINGS & VALVES				PIPE SECTION LENGTH	PRESSURE LOSS PER 100 m TUBE	FITTINGS & VALVES PRESSURE LOSS	PIPE SECTION PRESSURE LOSS
							Head loss factor	Pressure loss each $m=K*(v^2/2g)$				
Labelled	No	L/s	DN	m/s	No	Type	K	m. head	m	m. head	m. head	m. head
1	*	0.1	15	1.076				0.000	2		0.000	0.000
1	*	0.1	15	1.076	1	elbow		0.000			0.000	0.000
1	*	0.1	15	1.076	1	reducer		0.000			0.000	0.000
2	3	0.14	20	0.616				0.000	2		0.000	0.000
2	3	0.14	20	0.616	1	flow tee		0.000			0.000	0.000
3	11	0.28	20	1.232				0.000	2		0.000	0.000
3	11	0.28	20	1.232	1	flow tee		0.000			0.000	0.000

Figure 4 Example project: Pipe lengths, fittings and valves entered for the main run (water main to furthest fixture)

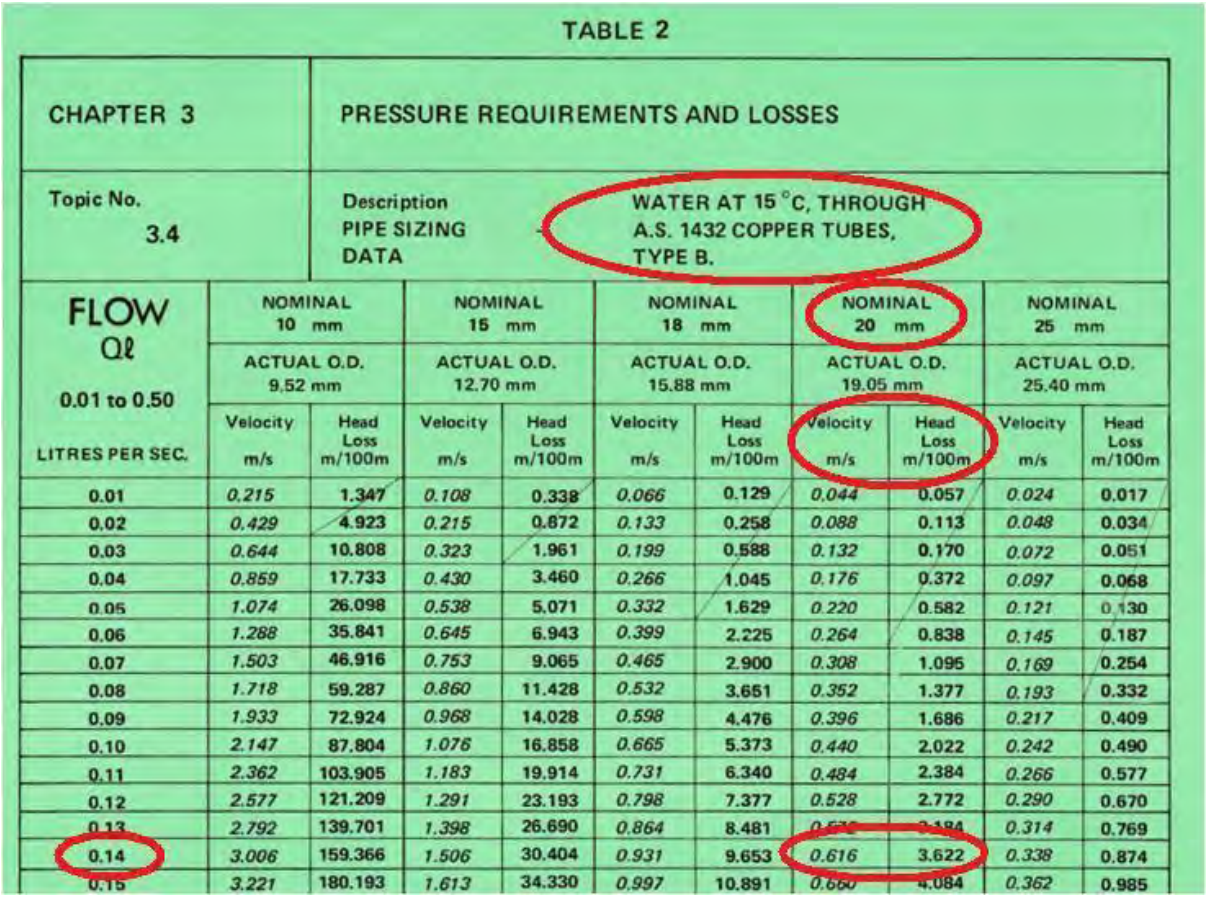

TABLE 2

CHAPTER 3	PRESSURE REQUIREMENTS AND LOSSES
Topic No. 3.4	Description PIPE SIZING DATA — WATER AT 15 °C, THROUGH A.S. 1432 COPPER TUBES, TYPE B.

FLOW Ql 0.01 to 0.50 LITRES PER SEC.	NOMINAL 10 mm ACTUAL O.D. 9.52 mm		NOMINAL 15 mm ACTUAL O.D. 12.70 mm		NOMINAL 18 mm ACTUAL O.D. 15.88 mm		NOMINAL 20 mm ACTUAL O.D. 19.05 mm		NOMINAL 25 mm ACTUAL O.D. 25.40 mm	
	Velocity m/s	Head Loss m/100m	Velocity m/s	Head Loss m/100m	Velocity m/s	Head Loss m/100m	Velocity m/s	Head Loss m/100m	Velocity m/s	Head Loss m/100m
0.01	0.215	1.347	0.108	0.338	0.066	0.129	0.044	0.057	0.024	0.017
0.02	0.429	4.923	0.215	0.872	0.133	0.258	0.088	0.113	0.048	0.034
0.03	0.644	10.808	0.323	1.961	0.199	0.588	0.132	0.170	0.072	0.051
0.04	0.859	17.733	0.430	3.460	0.266	1.045	0.176	0.372	0.097	0.068
0.05	1.074	26.098	0.538	5.071	0.332	1.629	0.220	0.582	0.121	0.130
0.06	1.288	35.841	0.645	6.943	0.399	2.225	0.264	0.838	0.145	0.187
0.07	1.503	46.916	0.753	9.065	0.465	2.900	0.308	1.095	0.169	0.254
0.08	1.718	59.287	0.860	11.428	0.532	3.651	0.352	1.377	0.193	0.332
0.09	1.933	72.924	0.968	14.028	0.598	4.476	0.396	1.686	0.217	0.409
0.10	2.147	87.804	1.076	16.858	0.665	5.373	0.440	2.022	0.242	0.490
0.11	2.362	103.905	1.183	19.914	0.731	6.340	0.484	2.384	0.266	0.577
0.12	2.577	121.209	1.291	23.193	0.798	7.377	0.528	2.772	0.290	0.670
0.13	2.792	139.701	1.398	26.690	0.864	8.481	0.572	3.184	0.314	0.769
0.14	3.006	159.366	1.506	30.404	0.931	9.653	0.616	3.622	0.338	0.874
0.15	3.221	180.193	1.613	34.330	0.997	10.891	0.660	4.084	0.362	0.985

Figure 5 Example project: Reading the velocity for a given flow and pipe size from the Barrie Smith book.

PIPE SIZING TABULATION SHEET

FITTINGS AND VALVES VELOCITY PRESSURE LOSS METHOD

PIPE SECTION	LOADING UNITS	FLOW RATE	TUBE SIZE	VELOCITY	FITTINGS & VALVES				PIPE SECTION LENGTH	PRESSURE LOSS PER 100 m TUBE	FITTINGS & VALVES PRESSURE LOSS	PIPE SECTION PRESSURE LOSS
							Head loss factor	Pressure loss each $m=K*(v^2/2g)$				
Labelled	No	L/s	DN	m/s	No	Type	K	m. head	m	m. head	m. head	m. head
1	*	0.1	15	1.076				0.000	2	16.858	0.000	0.337
1	*	0.1	15	1.076	1	elbow		0.000			0.000	0.000
1	*	0.1	15	1.076	1	reducer		0.000			0.000	0.000
2	3	0.14	20	0.616				0.000	2	3.622	0.000	0.072
2	3	0.14	20	0.616	1	flow tee		0.000			0.000	0.000
3	11	0.28	20	1.232				0.000	2	12.191	0.000	0.244
3	11	0.28	20	1.232	1	flow tee		0.000			0.000	0.000

Figure 6 Example project: Calculated pressure losses for each pipe section (right hand column)

TABLE 32

CHAPTER 3	PRESSURE REQUIREMENTS AND LOSSES								TEES
Topic No. 3.5.2	Description PRESSURE LOSS DATA $m = K\frac{V^2}{2g}$ — VELOCITY DETERMINED FROM FLOW THROUGH A.S.1432 TYPE B. COPPER TUBE PRESSURE LOSSES IN METRES HEAD FOR: TEES — LINE FLOW.								
FLOW Qℓ	15 mm	20 mm	25 mm	32 mm	40 mm	50 mm	65 mm	80 mm	100 mm
Litres per Sec.	K = 0.9	K = 0.9	K = 0.9	K = 0.9	K = 0.9	K = 0.9	K = 0.9	K = 0.9	K = 0.9
0.10	0.053								
0.20	0.212	0.036							
0.30	0.478	0.080	0.024						

Figure 7 Example project: Identifying the 'K' factor for a given size and type of fitting (From Barrie Smith book)

PIPE SIZING TABULATION SHEET												
FITTINGS AND VALVES VELOCITY PRESSURE LOSS METHOD												
PIPE SECTION	LOADING UNITS	FLOW RATE	TUBE SIZE	VELOCITY	FITTINGS & VALVES				PIPE SECTION LENGTH	PRESSURE LOSS PER 100 m TUBE	FITTINGS & VALVES PRESSURE LOSS	PIPE SECTION PRESSURE LOSS
							Head loss factor	Pressure loss each $m=K*(v^2/2g)$				
Labelled	No	L/s	DN	m/s	No	Type	K	m. head	m	m. head	m. head	m. head
1	*	0.1	15	1.076				0.000	2	16.858	0.000	0.337
1	*	0.1	15	1.076	1	elbow	2.2	0.130			0.130	0.000
1	*	0.1	15	1.076	1	reducer	1	0.059			0.059	0.000
2	3	0.14	20	0.616				0.000	2	3.622	0.000	0.072
2	3	0.14	20	0.616	1	flow tee	0.9	0.017			0.017	0.000
3	11	0.28	20	1.232				0.000	2	12.191	0.000	0.244
3	11	0.28	20	1.232	1	flow tee	0.9	0.070			0.070	0.000

Figure 8 Example project: Entering the fitting and valve 'K' factors to calculate the fitting and valve pressure loss

PIPE SIZING TABULATION SHEET

FITTINGS AND VALVES VELOCITY PRESSURE LOSS METHOD

PIPE SECTION	LOADING UNITS	FLOW RATE	TUBE SIZE	VELOCITY	FITTINGS & VALVES				PIPE SECTION LENGTH	PRESSURE LOSS PER 100 m TUBE	FITTINGS & VALVES PRESSURE LOSS	PIPE SECTION PRESSURE LOSS
							Head loss factor	Pressure loss each $m=K^*(v^2/2g)$				
Labelled	No	L/s	DN	m/s	No	Type	K	m. head	m	m. head	m. head	m. head
1	*	0.1	15	1.076				0.000	2	16.858	0.000	0.337
1	*	0.1	15	1.076	1	elbow	2.2	0.130			0.130	0.000
1	*	0.1	15	1.076	1	reducer	1	0.059			0.059	0.000
2	3	0.14	20	0.616				0.000	2	3.622	0.000	0.072
2	3	0.14	20	0.616	1	flow tee	0.9	0.017			0.017	0.000
3	11	0.28	20	1.232				0.000	2	12.191	0.000	0.244
3	11	0.28	20	1.232	1	flow tee	0.9	0.070			0.070	0.000
4	13	0.3	20	1.32				0.000	2	13.769	0.000	0.275
4	13	0.3	20	1.32	1	branch tee	2.1	0.187			0.187	0.000
5	18	0.36	20	1.584				0.000	4	19.009	0.000	0.760
5	18	0.36	20	1.584	1	branch tee	2.1	0.269			0.269	0.000
6	24	0.42	20	1.848				0.000	2	24.989	0.000	0.500
6	24	0.42	20	1.848	1	flow tee	0.9	0.157			0.157	0.000
7	27	0.44	20	1.936				0.000	1	27.144	0.000	0.271
7	27	0.44	20	1.936	1	flow tee	0.9	0.172			0.172	0.000
8	35	0.51	20	2.244				0.000	1	35.309	0.000	0.353
8	35	0.51	20	2.244	1	flow tee	0.9	0.231			0.231	0.000
8	35	0.51	20	2.244	1	ball valve	0.27	0.069			0.069	0.000
								0.000			0.000	0.000
9		0.48	20	2.112				0.000	3.3	31.692	0.000	1.046
9		0.48	20	2.112	1	elbow	1.7	0.387			0.387	0.000
10		0.7	25	1.691				0.000	3.3	14.71	0.000	0.485
10		0.7	25	1.691	1	flow tee	0.9	0.131			0.131	0.000
11		0.88	25	2.125				0.000	3.3	22.13	0.000	0.730
11		0.88	25	2.125	1	flow tee	0.9	0.207			0.207	0.000
12		1.03	32	1.556				0.000	3.3	9.391	0.000	0.310
12		1.03	32	1.556	1	flow tee	0.9	0.111			0.111	0.000
13		1.17	32	1.779				0.000	18.4	11.919	0.000	2.193
13		1.17	32	1.779	1	flow tee	0.9	0.145			0.145	0.000
13		1.17	32	1.779	1	elbow	1.4	0.226			0.226	0.000
13		1.17	32	1.779	1	reducer	1	0.161			0.161	0.000
14		1.74	40	1.752				0.000	3.5	9.125	0.000	0.319
14		1.74	40	1.752	1	branch tee	1.6	0.251			0.251	0.000
14		1.74	40	1.752	1	reducer	1	0.157			0.157	0.000
15		2.74	50	1.524				0.000	6.3	4.899	0.000	0.309
15		2.74	50	1.524	1	flow tee	0.9	0.107			0.107	0.000
15		2.74	50	1.524	1	elbow	1	0.118			0.592	0.000
15		2.74	50	1.524	1	**bflow device**		**0.000**			**4.000**	0.000
15		2.74	50	1.524	1	**meter**		**0.000**			**1.175**	0.000
15		2.74	50	1.524	1	ball valve	0.17	0.020			0.020	0.000
									Pressure Loss ∑		9.032	8.206

=

Total friction losses	17.238	
Elevation pressure loss	19.5	from Figure 1
Elevation pressure gain	0	
Total pressure loss/gain	36.738	at flow 2.74 L/s
Mains pressure	60	
Pressure required at outlets	40	
Residual pressure at flow	-16.738	

Residual pressure negative
Pumping solution required

Figure 9 Example project: Completed spreadsheet for main run