

the top floor, that the length of run from the tank to the farthest fixture is 200 ft, equivalent length of fittings 100 ft, and the pressure required at the fixture is 7 lb.

The 30-ft head is equal to a static pressure of 0.43×30 or 12.9 lb per square inch and to maintain a pressure of 7 lb at the highest fixtures the drop allowable in pressure is $12.9 - 7.0$ lb or 5.9 lb. As the total equivalent run is 300 ft, this is a drop per 100 ft of 1.97 lb, or practically 2 lb. Therefore, all risers and mains from the top floor back to the

TABLE 4. TYPICAL CALCULATION OF PIPE SIZES ON DOWN-FEED RISER WITH FLUSH VALVE WATER-CLOSETS AND URINALS

Riser No. 1

FLOOR OF BLDG.	FIXTURES ON FLOOR	GPM PER FIXT.	MAX. FIXT. GPM	PROBABLE USE (PER CENT)	PROBABLE FIXT. GPM	PROBABLE RISER GPM	ALLOWABLE DROP LB PER 100 FT	PIPE SIZE IN.
1st	1 S. S.	4	4	100	4	4	30	$\frac{3}{4}$
2nd	1 S. S.	4	4	100	4	8	30	$\frac{3}{4}$
3rd	1 S. S.	4	4					
	3		12	80	10	10	30	$\frac{3}{4}$
4th	10 Lav.	3	30					
	13		42	45	19	19	30	1
5th	4 W. C.	50	200					
	2 U.	40	80					
	6		280	40	112			
	3 Lav.	3	9	45	22	134	30	2
	16		51					
6th	4 W. C.	50	200					
	2 U.	40	80					
	12		560	25	140			
	3 Lav.	3	9	42	25	165	30	2
	19		60					
7th	4 W. C.	50	200					
	2 U.	40	80					
	18		840	18	151			
	3 Lav.	3	9	40	28	179	30	$2\frac{1}{2}$
	22		69					
8th	4 W. C.	50	200					
	2 U.	40	80					
	24		1120	15	168			
	3 Lav.	3	9	40	31	199	2	4
	25		78					

tank must be sized on the basis of a drop of 2 lb per 100 ft. Tables 4, 5, 6 and 7 show the schedule for Risers Nos. 1, 2 and 3 with the maximum possible flow taken from Table 1, the percentage of use at the peak taken from Fig. 1 and the maximum probable flow at the peak worked out for each portion of the riser, the riser sizes being taken from Table 2 as far as possible and from Fig. 3 where the amounts exceed the values given in this table; a drop of 30 lb per 100 ft is used except on the riser from the top floor back to the tank where 2 lb per 100 ft is the allowable limit.

The reduction in pipe size which would occur if flush tank water-closets were used on the top floor and only 3 lb pressure used on the fixtures is given in Tables 8 and 9.

This illustrates why flush tank closets so frequently are substituted on the uppermost floor when a house tank is the source of water pressure.

If it is now assumed that Riser No. 1 is to be fed from the bottom and the minimum street pressure is 75 lb with the top fixture of the riser 80 ft above the main, the problem

TABLE 5. TYPICAL CALCULATION OF PIPE SIZES ON DOWN-FEED RISER WITH FLUSH VALVE WATER-CLOSETS AND URINALS

Riser No. 2

FLOOR OF BLDG.	FIXTURES ON FLOOR	GPM PER FIXT.	MAX. FIXT. GPM	PROBABLE USE (PER CENT)	PROBABLE FIXT. GPM	PROBABLE RISER GPM	ALLOWABLE DROP LB PER 100 FT	PIPE SIZE IN.
1st	1 W. C.	50	50	100	50	50	30	$1\frac{1}{4}$
2nd	2 W. C.	50	100					
	1 U.	40	40					
	4		190	50	95			
	1 Lav.	3	3	100	3	98	30	$1\frac{1}{4}$
3rd	4 W. C.	50	200					
	2 U.	40	80					
	10		470	30	141			
	3 Lav.	3	9	70	8	149	30	2
	4		12					
4th	4 W. C.	50	200					
	2 U.	40	80					
	16		750	20	150			
	3 Lav.	3	9	70	14	164	30	2
	7		21					
5th	6 W. C.	50	300					
	22		1050	15	157			
	4 Lav.	3	12	48	16	173	30	2
	11		33					
6th	6 W. C.	50	300					
	28		1350	12	162			
	4 Lav.	3	12	45	20	182	30	2
	15		45					
7th	6 W. C.	50	300					
	34		1650	10	165			
	4 Lav.	3	12	42	24	189	30	$2\frac{1}{2}$
	19		57					
8th	6 W. C.	50	300					
	40		1950	9	175			
	4 Lav.	3	12	40	27	202	2	4
	23		69					

would be solved by determining the maximum rate of flow in each portion of the riser as shown in Table 10 and then finding the allowable drop which can be used per 100 ft. The 80 ft of riser height will use up

$$0.43 \text{ lb} \times 80 \text{ or } 34.4 \text{ lb}$$