One example of how to arrive at the "best" or most economical size, once the flow and yearly operating time is known, is given below:

A pump is to supply water at 100 gpm through a pipe 1,000 ft. in length and which, we will presume, is laid on level ground. While the size and kind of pump will not be considered here, we'll assume its efficiency is 70 per cent.

Size of pipe	cost of pipe installed	10% of pipe cost	Pipe friction in h/ft	KWH per year in pipe friction	Cost of power per year @ 4¢ per KWH	Total cost per year
2 in.	$1150.00	$115.00	358	7715	$308.60	$423.60
2½ in.	$1310.00	$131.00	120	2586	$103.44	$234.44
3 in.	$1630.00	$163.00	49.60	1067	$ 42.68	$205.68
4 in.	$2550.00	$255.00	12.20	263	$ 10.52	$265.52

Explanation: The figure in column 2, the cost of the pipe, pipe fittings, trenching, installation and backfilling, is based on current costs for this type of work in the Chicago area. The interest rate on the initial investment is 5 per cent. The life of the pipe is estimated at 25 years, so that 4 per cent of the initial investment must be laid away each year to take care of depreciation.

Thus a total of 10 per cent as shown in column 3, must be paid out or put aside each year to pay for the use of the pipe.

The pipe friction in column 4 is computed in the usual way and is based on a friction of C 100.

The horsepower required to drive the pump against the head in column 4 is then computed. In column 5 this is changed to kilowatt hours (KWH) by multiplying by 0.746 times the number of hours the pump is in operation each year. In this case the yearly irrigation season is construed to be 100 days at 8 hours per day, or a total of 800 hours. Thus the figures in column 5 come from the formula:

$$KWH = \frac{\text{gpm} \times \text{head in feet}}{3960} \times \frac{1}{0.70 \text{ efficiency}} \times 0.746 \times 800$$

which in reduced form is:

$$\frac{\text{gpm} \times \text{head in feet}}{4.64}$$

With power costs at 4¢ per KWH the figures in column 6 result. The total cost per year for the pipe and the power is the sum of columns 3 and 6, as shown in column 7. In this case 3-in. pipe is the most economical to use.

For a complete picture of all the costs a pump and motor should be selected and about 15 per cent of their cost added to the totals in column 7 for the yearly use of the pumping equipment.

Taking issue with C. E. (Scotty) Stewart's observation that cement-asbestos pipe absorbs water to the extent of 10 per cent by weight, and in time may become flaked (Golfdom, Sept. p 28), C. R. Hutchcroft, research mgr. of Keasbey & Mattison Co., Ambler, Pa., has this to say: Water absorption, it is conceded, may amount to 10 per cent, but exhaustive testing by K & M shows that cement-asbestos pipe remains essentially unchanged in spite of this adverse condition.

The lowest costs of these new totals give the correct size of pipe and pump equipment to use.

All too often cost influences the purchase of pipe. We frequently end up with pipe of too small diameter. This is false economy when we realize that when we double the diameter of a pipe we increase its water delivery by 5.70 times. Under the same pressure, velocity of water flowing in the small pipe is less than it is in the larger pipe and the volume of water delivered varies in about the square root of the 5th power of the pipe dia. The table below is calculated on this basis.

The figures opposite the intersection of any two pipe sizes is the number of smaller pipes required to equal one of the larger pipes; thus one 4 in. pipe equals 5.70 two inch pipes.

Dia. (ins.)	½ in.	¾ in.	1 in.	2 in.	3 in.	4 in.	5 in.	6 in.
2	32.0	11.7	5.7	1.0				
3	88.2	32.0	15.6	2.8	1.0			
4	181.0	65.7	32.0	5.7	2.1	1.0		
5	316.0	115.0	59.9	9.9	3.6	1.7	1.0	
6	499.0	181.0	88.2	15.6	5.7	2.8	1.6	1.0

NOTE: A 1-in. hose will, at equal pressures, deliver slightly more than twice the amount of water delivered by a ¾ in. hose of equal length.

Dawson Now Equipment Sales Engineer

Thomas W. Dawson, jr. has resigned as supt., CC of Virginia, Richmond, to join the Richmond Power Equipment Co. as sales engineer. He is establishing a golf course equipment and supply division for the company. Widely known as a practical authority on golf course maintenance, Dawson was brought up in course maintenance. His father was supt., Fenway CC (NY Met dist.), and now is supt. at Palm Beach (Fla.) CC. Tom attended N.Y. State Agricultural College then went into golf course management work. He was supt. at clubs in the NY Met. district before coming to CC of Virginia in 1951. He is succeeded at the CC of Virginia by Harry McSloy, previously supt., Elizabeth Manor CC, Portsmouth, Va.