

This valuation will represent what the city can afford to pay rather than build its own plant; and it will also show what the water company can afford to ask.

Table II. shows the foregoing method of determining going value, based on an assumed price for the existing plant, to be verified afterward, of \$276,740 and an assumed reproduction cost of \$235,265 for the equivalent plant, and gross revenues and operating expenses of both plants as indicated by the diagram, which assumes that six years after the equivalent plant is completed it will have the same earnings and operating expenses as the present plant. It is also assumed that it will take one year to build the equivalent plant.

The left-hand side of the table shows the principal items, including net return, over and above interest on capital, for each of the next six years. With the equivalent plant we assume that \$235,265 for construction is borrowed uniformly during the first year, and therefore the interest during the year will be 5 per cent. on the total amount for six months. That year there will be no revenues and no operating expenses, and to make up the interest on capital and the net return of the present plant, \$12,945 capital must be added. In the next year there will be operating revenues, but the interest will cover the entire year, so that a slightly larger addition to capital will have to be made to make up deficits. Thereafter each year the necessary capital addition will be less, and in the sixth year it will be zero. The going value will be the sum of these additions, or \$41,479, and the valuation of the plant will be \$235,265 + \$41,479 = \$276,744.

Several trial calculations for the going value will, of course, have to be made, and the table worked out from the existing data in each case until we find the sum that will be just sufficient so that at the end of the six years the two plants will be earning the same without any extraction for capital added to make up deficits.

Market Value for Voluntary Sales

The third important case is where the city has neither the right to condemn, grant a new franchise nor build its own works, so long as the water company furnishes good water and service, and where the rates are established for a long and indefinite term of years. If the city

or some outsider desires to acquire the plant, what should be the process of valuation?

This is a case where the market value applies. The appraiser is not interested in what it will cost to reproduce the plant, but he is interested in what it will cost to operate and maintain it and make the necessary renewals and improvements. He wants to know how the revenue is varying from year to year and what it is likely to be in the future. His inquiry does not extend beyond thirty or forty years, because he recognizes such remoteness to be in the realms of posterity.

He proceeds to draw graphs of the operating expenses during the past years, and extends them forty years into the future. To find out how the plant is likely to grow he makes a similar graph of the plant cost, which aids him in determining depreciation. With a graph for past and future gross revenue he completes the data from which to tabulate the annual net revenues for the next thirty or forty years. This is preferably divided into two parts, one of which applies to the plant as existing at present. The latter figures are determined by taking the earnings in proportion as the present plant cost is to the future total plant costs. If money in the waterworks business is worth 8 per cent., he takes that to reduce the future annual net revenues to present worth, and the sum will be a valuation from which should be deducted the accumulated depreciation up to the present time.

Accumulated depreciation up to the present time must be deducted, for we are starting with a plant that has suffered a certain amount of depreciation. If this be figured from the beginning on a sinking-fund basis, at a fixed per cent. on the cost, we cannot be justified in figuring it in the future at the same rate unless we place the accumulated depreciation up to the present time in a depreciation fund to the credit of the water company—or, what is exactly equivalent, deduct that amount from the price of the plant. Future depreciation, however, must be figured on the plant cost the same as if no deduction had been made.

Table III. shows a calculation for the market value of the property according to this method. At the present time the historical cost of the existing physical plant is assumed to be \$204,000 in round numbers—as derived

Table II.—Calculation of Going Value of Plant to be Acquired

		Given Data, Present Plant					Calculated Data, Equivalent Plant					
Date		Capital Invested to Buy Old Plant	Gross Revenue	Operating Expenses	Interest on Capital	Net Return	Capital Invested in Plant	Capital Added to Make Up Deficits	Gross Revenue	Operating Expenses	Interest on Capital	Net Return
1917												
Jan.	1 ..	\$276,740	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
July	1 ..	276,740	.....	.....	.....	.....	\$235,265	.....	.....	.....	.....	.....
Dec.	31 ..	276,740	\$29,400	\$8,500	\$13,837	\$7,063	.....	\$12,945	.....	.....	\$5,882	\$7,063
1918												
Dec.	31 ..	276,740	30,500	8,700	13,837	7,963	.....	13,733	\$10,800	\$4,160	12,410	7,963
1919												
Dec.	31 ..	276,740	31,700	9,000	13,837	8,873	.....	8,400	19,800	6,240	13,097	8,863
1920												
Dec.	31 ..	276,740	32,700	9,300	13,837	9,563	.....	3,990	27,000	7,910	13,517	9,563
1921												
Dec.	31 ..	276,740	33,900	9,500	13,837	10,565	.....	1,820	31,400	8,940	13,717	10,563
1922												
Dec.	31 ..	286,740	35,100	9,800	13,837	11,463	.....	591	34,300	9,620	13,808	11,463
1923												
Dec.	31 ..	276,740	36,100	10,100	13,837	12,163	.....	.....	36,100	10,100	13,837	12,163

Going value = \$41,479

Valuation of plant = \$235,265 + \$41,479 = \$276,744.