At middle of strip B moment = 50% of $+M = \frac{50}{100} \frac{WL}{62}$ ft.-lbs. $= \frac{WL}{124}$ ft.-lbs.

In strip B at centre line of column moment is the same as at middle but opposite in sign $= -\frac{WL}{124}$ ft.-lbs.

These moments are nearly the same as those called for by the Chicago by-law, so that the computed stresses would be about the same as found before.

(To be concluded in the next issue)

PURPOSES SHOULD GOVERN WATERWORKS VALUATIONS*

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AFTER years of discussion of valuation of public utilities, such as a waterworks property, there is still no unanimity of view, so that each case has to be treated on its merits by the valuator, with a fair chance that the court or commission will discredit the whole argument. The writer believes one reason for this chaos is the frequent attempt to find one valuation only, whatever the purpose. In the writer's estimation there should be several materially different valuations, depending on the purpose. In particular, there are three different bases—original investment, reproduction cost less depreciation, and market value—all of which have their applications in three common cases.

Original Cost for Ratemaking

If rates are to be established, the valuation should be based on the fair and legitimate investment. If the financial transactions have been honest and the works have been built and operated according to average practice, and the book records are in good shape, the historical cost should be taken, and the rates should be such as will enable the utility to receive a fair return on its investment from the beginning. Hence, if the utility has not yet received a fair return past losses must be added to the historical cost.

The logical method of procedure is to tabulate for each year a, plant cost; b, operating expenses; c, estimated depreciation; d, gross revenue; e, fair return; and v, valuation. Then

$$e = (a + b + c - d)\ p/100$$

and

$$v = a + b + c + e - d$$

where p is the fair return decided upon as a percentage on the investment.

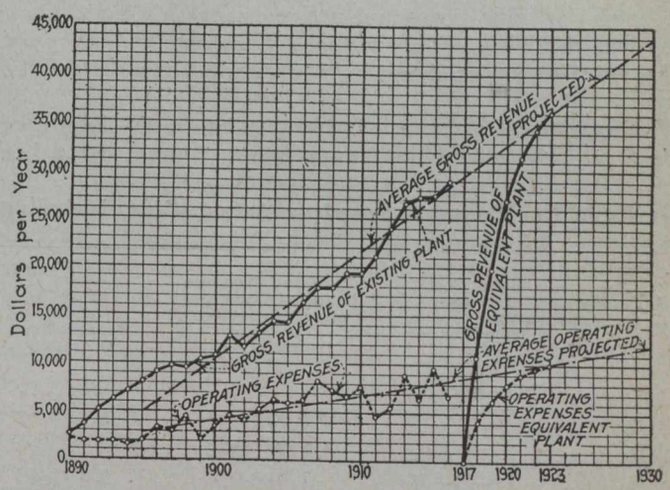
By this process it is seen that if the utility has earned a fair return and no more, $b + c + e = d$ and $v = a$. If it has earned more than a fair return, v will be less than a, and if it has earned less than a fair return v will be more than a.

Under this plan no allowance would be made for accrued depreciation, obsolescence or fluctuation of value of real estate, water rights or other property. Neither would allowance be made for service pipes or street pavements unless their cost were borne by the water company.

*Engineering News-Record, New York.

Following are some of the reasons why the writer believes this method of determining value should be used for establishing rates, or where the property is being condemned by the municipality: Most waterworks systems were established before the advent of state control and regulation of rates. The owners knew there would have to be a development period, but believed the works would eventually pay a sufficient return to make up for early losses. Hence if the city should condemn, the owners should receive the past cost plus a reasonable rate of return on such cost. With proper regulation of rates the public is protected against undue profits to the water company, and the company is protected against loss. Hence, the valuation must be based on investment and not on estimated cost of reproduction at present prices, nor on market value, which cannot be established until the rates have been fixed for a long period in the future.

Where there are difficulties in the way of determining original cost, because of loss of accounts, or mismanagement or extravagance in the construction or operation of



Forecast of Revenues and Expenses of Existing and Equivalent Plants for Determining Going Value

the works, the valuator must use his best judgment to supply proper data for a fair valuation.

What shall be taken for p, the percentage of fair return? A waterworks is one of the most important and vital elements upon which the health and welfare of a community depends. To be operated well and continuously, its financial success must be certain. Because of a tendency on the part of public service commissions to squeeze down valuations to figures that are a grave menace to this class of property, capital is reluctant to invest in it unless earnings are assured far in excess of the legal rate of interest. Men experienced in waterworks management and finances refuse to purchase these properties except on a 9 or 10 per cent. basis, and it would therefore seem that for the present at least 8 per cent. should be taken as a fair return.

Table I. applies the foregoing reasoning and develops the value for rate-making purposes of a typical plant, established in 1889. By this method the valuation as of January 1st, 1917, was $241,170.11.

Reproduction Cost for Forced Sales

Next comes the case wherein a municipality desires to acquire the utility. It may have the option of negotiating with the owners, of exercising its right of eminent domain or of building its own plant. Assuming that the municipality prefers not to condemn, it asks the valuator