

A newly equipped testing plant has been built which includes a calibrated tank of 125 cu. ft. capacity. When the city has been entirely covered and all large meters repaired, indications are that revenue in excess of \$5,000 per year will be added.

The Glen Lewis pumping station, which lifts water from Walden Pond to Breeds Pond, was equipped with a motor-driven centrifugal pump when it was built in 1912, but it had no meter for measuring the water pumped, and no tests had been made to ascertain the efficiency of the pumping unit. After complete tests had been made, it was discovered that the pump was running at an average overall efficiency of 42%, requiring 90 k.w. to pump 14.3 million gallons per day against a 20-ft. head. At a cost of \$10,000 this unit has been replaced by a modern centrifugal unit, which delivers 16.4 million gallons against the same head, requires but 60 k.w., and operates at 72% overall efficiency. The saving in operation by this substitution is \$3,300 per year, or 33% on the investment.

Improvement in Pumping Equipment

The Walden Pond pumping station which pumped water from Hawkes Pond to Walden Pond was built in 1902 and was in operation in 1916, but has now been abandoned. This was a steam station requiring the usual two men per shift to operate it. The water flowed to the suction well of the pump through an open canal about $\frac{3}{4}$ mile in length, losing about 20 ft. of head in this operation. The water was then pumped through a 30-in. pipe about $\frac{1}{2}$ mile long against a total head of 45 ft. Two men on each shift were required to keep the screens clean in the screen house at the end of the canal leading to the suction well, and to operate the gates controlling the supply of water to the canal, making in all 12 men in 24 hours for the running of the station.

The writer has designed a new station to do this work which is so situated that the total length of 36-in. discharge pipe is 540 ft. and the suction is direct from Hawkes Pond. This station is equipped with a motor-driven centrifugal unit, pumping 20,000,000 gals. per day against a 23-ft. head with an overall efficiency of 74%. This unit is so protected by safety devices that the only attendance required is that given by the regular patrolman on the pond. This change has effected a reduction in labor from 12 men per day to none, a reduction in head pumped against from 45 ft. to 23 ft., a reduction in the cost of pumping from \$5.45 to \$1.75 per million gallons, and nets a yearly saving of \$9,600 in the cost of operation, and required a net investment of but \$35,000.

Supply to Adjoining Town

Until recently, the city of Lynn has been compelled to furnish water to the adjoining town of Saugus, on the basis that the city should furnish water, make inspections, read meters and collect the water charges. The town was to maintain its distribution system, for which it was refunded 50% of the receipts. Since the city of Lynn furnished all of the water, any wastage in the town system would yield greater returns to the latter.

The proper remedy was to meter the entire town supply, but the determination of an equitable rate was a very difficult proceeding. A thorough investigation, including a valuation of the town supply system, resulted in a charge of 5.1 cents per cu. ft. for water sold to the town.

In addition to giving up all work included under the old contract, the city of Lynn will receive over \$4,000 more annually for this business than formerly.

Elimination of friction losses on the suction of the pumps in the main pumping station will eventually result in a saving of over \$6,000 per year.

These improvements have resulted in a saving and added revenue in excess of what would have been obtained by a 12% increase in rates and have enabled the city to meet the necessary advance in prices.

The general office of the Standard Chemical, Iron & Lumber Co. has been moved from Toronto to the Drummond Bldg., Montreal.

Letters to the Editor

CHEMISTRY AND ENGINEERING

Sir,—In my article under the above title, of which you published excerpts in your April 22nd issue, I should have corrected the concluding sentence in the manuscript to read as follows:—

"I believe many cases in which the engineer's advice has been over-riden, would have been settled to the better interests of the owner if the engineer had had a fellow scientist to support him."

T. LINSEY CROSSLEY.

Toronto, Ont., April 24th, 1920.

FAILURES IN CONCRETE CONSTRUCTION

Sir,—The writer was much surprised at the "Letter to the Editor" by Mr. Hagarty, published in your issue of April 22nd, regarding "Failures in Concrete Construction." It would seem from the second paragraph of his letter that he has been overawed by a mass of information into which he does not wish to delve, and that he therefore thinks it out of place in building codes, and styles as "so-called specialists" those who care enough about getting at the truth of the subject to spend time enough on it to become specialists.

There has been far too much tendency to assume that all is known about concrete that is worth knowing. For lack of better foundation, certain design assumptions are usually made, from which formulae have been evolved and are in general use. Those who have given great study to the "mass of information" piling up have begun to come to the conclusion that some of the assumptions on which our theory is based are woefully in error, and that in consequence our methods of design may be materially changed. Reinforced concrete is a rapidly developing subject, and as our knowledge of its peculiar mechanics broadens, so does the necessity for acquiring new information.

The man who does not study the data at hand and that which is continuously becoming available, constitutes the real danger in reinforced concrete construction, whether he be the "field expert" who "knows all about concrete" and whose ten chief sins are pointed out, or the designer whose errors are headed and sub-headed.

In the case of building design Mr. Hagarty makes some remarkable statements regarding flat slab construction. Flat slab construction, when designed under any of the recognized building ordinances, does not "produce very high stress in both steel and concrete." If Mr. Hagarty will study the information available in the records of the American Concrete Institute, Bulletin No. 84 of the University of Illinois (Engineering Experiment Station), transactions of the Engineering Institute of Canada, or numerous other publications, he will find that the stresses recorded in extensometer tests are surprisingly low. In the case of the five buildings tested by the writer in the city of Toronto a few years ago, on not over one or two gauge lines in more than one thousand read, did the steel stress reach 16,000 lbs. per sq. in. when the floor was loaded with double the design load, although in design the value of 18,000 lbs. per sq. in. was assumed with the design load in place. These buildings were all of the flat slab type. The writer wonders whether Mr. Hagarty looked up all the available information before he made that sweeping statement regarding flat slab construction.

The same condition exists respecting his statements in regard to the steel ratio used, whether in tension or in shear. The recent tests conducted by the U.S. Emergency Fleet Corporation and Bureau of Standards throw great light on the subject. At the last convention of the American Concrete Institute a number of tests were reported and dis-