

of the tee, with the check valve between Basin 3 and the tee. It was thought possible that river water backed through the check valves, the basis, and into the wells during the period the plant was shut down. An examination showed it was impossible for river water to enter the wells this way, for the well heads were above high water. The check valves were examined, however, and one was found to have a piece of 1 by 8-in. plank about 12 ins. long wedged so as to prevent the check from seating. There can be no doubt that river water entered Basin 2 through this valve.

The two air-lift wells which furnished turbid water and were found to be polluted, are dug on very low ground, which was 12 ft. under water during the flood. An examination showed their construction to be different from that of the other wells. These wells are constructed of three pipes: an outside casing, 8 ins. in diameter in one instance and 14 ins. in the other; a water-lift pipe inside a 5-in. air pressure pipe, the two being supported on the outside casings by bushings bearing on inverted bell shaped castings resting on the casing tops.

At each well there was a space between the bell and the outside casing. Cinders had floated and stuck in this space, which led to the belief that water had been sucked down. A split box, made of 2-in. kiln dried lumber, 2 by 2 by 2 ft., was bolted around the outside casing, so as to submerge any openings. A  $\frac{1}{2}$ -in. stream of water was turned on and the water went in under the bell and around the opening at the bell so fast that the box would not fill. This demonstrated the fact that water entered the well.

To demonstrate the fact that this water was pumped out of the discharge pipe after passing down 400 ft., 12 ounces of chloride of lime were added every 30 minutes for two hours, and the effluent tested. The  $\frac{1}{2}$ -in. stream ran for  $1\frac{3}{4}$  hours, when a very strong test for chlorine was obtained on the discharged water. This demonstrated without a doubt, how and where the muddy river water entered these wells.

The four wells which showed such poor results on the laboratory tests were receiving surface water which was entering directly into the wells as described. As soon as the high water receded, the contamination ceased. No stratum has been or is contaminated, as was at first thought. This is shown by the laboratory findings on the other wells, and also a test made on the eastern wells after three days of chlorinating. The chlorine was shut off, the valve on the discharge set to waste the water, and a sample taken after the chemical test showed the water free of chlorine. The water was very low in bacteria, with colon absent.

The Corporation of Quebec Land Surveyors held their annual meeting in Quebec City last week and elected four directors as follows: Senator P. B. Casgrain (re-elected); F. C. Laberge, Montreal; D. W. Mill, Quebec; and Paul Beique, Montreal. It was decided to hold the next annual meeting in Montreal.

Controller Jutten, of Hamilton, Ont., states that tenders should be called for the construction of the fill across the Valley Inn Ravine, which Chief Engineer Cummingford, of the Toronto-Hamilton Highway Commission, has estimated will cost \$280,000. Controller Jutten says that the Ottawa Construction Co. now has representatives getting data on which to base tenders.

At a joint meeting of the Ottawa branch of the Town Planning Institute of Canada and the Ottawa chapter of the Ontario Association of Architects, held last week in the Carnegie Public Library, Ottawa, Capt. W. L. Symonds criticized the plans of the Federal Planning Commission, published in 1915. He stated that there is 1,500,000 sq. ft. of floor space in Ottawa that is rented by the Dominion government at an annual cost of \$1,000,000. The same amount of space could be obtained by the government for a capital expenditure of not more than \$15,000,000 says Capt. Symonds, or what the government would spend in rent within 15 years.

## SCHEDULES OF ENGINEERING FEES

**A**BSTRACTS from various proposed schedules of fees for engineering services have been compiled by Baar & Cunningham, consulting engineers, of Portland, Ore., as follows:—

### American Institute of Consulting Engineers

A per diem rate of from \$100 and upwards is proposed. On a percentage basis  $1\frac{1}{2}\%$  to 3% is allowed for preliminary surveys, studies, and reports. For preliminary surveys, etc., with the addition of detailed plans and specifications,  $2\frac{1}{2}\%$  to 5%. For preliminary work, plans and specifications, and general supervision during construction, 4% to 5%, or higher on small jobs. For full professional services, including detailed inspection and management, 6% to 10% or more.

### Pacific Association of Consulting Engineers

The minimum per diem rate of this association is \$50 and the percentage fee for preliminary studies, working drawings, specifications and contracts, and general direction of the work is fixed at a 5% minimum. No suggestion is made for full professional services, including inspection.

### Civil Engineers' Society of St. Paul

A percentage fee for a preliminary report with general plan and estimate of cost is fixed at three-quarters of one per cent. For complete plans and specifications, including preliminary report and survey, but exclusive of soundings and borings, the fee is fixed at  $3\frac{1}{2}\%$  for work costing less than \$10,000; 3% for work costing less than \$25,000; and  $2\frac{1}{2}\%$  for work costing less than \$50,000. For consulting superintendence, the charge is  $2\frac{1}{2}\%$  of the cost of the work. This does not include inspection.

### Mahoning Valley (Ohio) Engineers

The per diem rate is \$25. Per diem rates are also fixed for the services of assistants of various classes. On a percentage basis for sewer work, including engineering and supervision, 8% is charged for the first \$15,000, and  $7\frac{1}{2}\%$  for the second \$15,000 of the estimate. For paving work, 7% is charged for the first \$15,000, and  $6\frac{1}{2}\%$  for the second \$15,000. The client is to pay for one inspector on percentage work. It would appear that the intention is that these fees are to cover simply general supervision, but not inspection.

### Iowa Engineering Society

The per diem rate is fixed at \$15 to \$25. The percentage rate for preliminary services is  $1\frac{1}{2}\%$  for these services and in addition the preparation of drawings, specification and contracts, and letting the contract,  $2\frac{1}{2}\%$ . For all preliminary services, and also consulting supervision of the work, 5%. For full responsibility, including inspection and all engineering services, 6%.

### Edmund T. Perkins' Paper before the Illinois Society of Engineers

This is an elaborate schedule, and proposes a sliding scale of charges on work of varying magnitude. The fee for full professional services, including superintendence, varies from  $12\frac{1}{2}\%$  for jobs of less than \$5,000, to 4.2% for jobs of over \$500,000. These percentages do not, however, include inspection. The statement is made that "a schedule rate for superintendence applies when the engineer who has designed and planned the work, or his assistant, superintends construction. All other employees than such assistant or assistants are to be paid by the owner."

### Connecticut Society of Civil Engineers

The percentage fee for preliminary conferences, estimates and reports is from 1% to  $1\frac{1}{2}\%$ . For these services and plans and specifications,  $2\frac{1}{2}\%$  to 5%. For all preliminary services and general supervision of construction, from 4% to 8%. For full professional services, including inspection, from 6% to 12%.