

will be in Trenton.—Building permits have been granted as follows: Caleb Ledrew, two-storey brick and rough-cast dwelling, Hallam street, near Dowercourt road, cost \$2,000; W. J. Robertson, one-storey work room, rear 378 Yonge street, cost \$1,200.

FIRES.

Factory of the Dominion Bag Company, 317 St. Patrick street, Montreal, damaged to the extent of \$4,000.—Building at Lucknow, Ont., owned by Mrs. George Graham, of Goderich.—Dwellings of Joseph Lachance, M. Poulin, and Etienne Provincial at St. Francois, Que., almost totally destroyed.—Coal chutes of the Grand Trunk Railway at Windsor, Ont.—Building at Collingwood, Ont., owned by Charles Cameron, damaged to extent of \$2,000.—Large block on St. Peter street, Quebec, occupied by Dr. Ed. Morin, wholesale druggist, and McCall & Sheyn, wholesale drygoods. The building was valued at \$30,000 and belonged to the Nuns of La Congregation Notre Dame.—Planing mill of T. G. Browning at Aurora, Ont.; loss \$3,000.—Windsor Avenue Methodist church at Windsor, Ont., totally destroyed; loss \$25,000. Rev. A. Brown is pastor.—Post office and Custom house, Ottawa, Ont., completely destroyed; loss \$100,000.—The Berthery building at Carman, Man., owned by C. T. Boulton; loss \$30,000.

CONTRACTS AWARDED.

HALIFAX, N. S.—Reid & Archibald, this city, have secured the contract for the Mainadien breakwater.

SYDNEY, N. S.—The contract for the construction of a wharf at Big Pond has been awarded to Hugh MacDonald, of this town; price about \$9,000.

NIAGARA FALLS, ONT.—The Caledonian Iron Works Co., of Montreal, who have the contract for 3,000,000 gallon waterworks pump, have awarded the contract for foundations to Thomas Munford.

TORONTO, ONT.—The Temiskaming and Northern Ontario Railway Commission have awarded a contract for 6,000 gross tons of 80-lb. steel rails to the estate of the late James Cooper, Montreal, representing Charles Cammell & Co., of Sheffield, England.

WELLAND, ONT.—Contract for removing the centre pier of old bridges over the Welland canal has been let to Phil & Migann. Widdell, Buttle & Manley have secured the contract for deepening the rock cut at Roney's Bend.

COST OF DREDGING WITH DIFFERENT CLASSES OF PLANT.

In a paper read before the International Navigation Congress at Dusseldorf, Mr. John Bogart, M. Am. Sc. C.E., gives some interesting information as to the cost of dredging. The excavations for a large canal were carried out under the direction of Mr. Bogart during the years 1897 to 1901, in which period 5,869,000 cubic yards were moved. Of this material 1,436,000 cubic yards were excavated under water by dredgers of several different types, and 4,432,000 cubic yards were excavated above ground by steam shovels and certain special forms of steam graders and excavators and conveyors, this latter amount including 887,000 cubic yards of rock requiring blasting.

The material excavated was largely alluvial deposit. A soft gray clay, with some sand, gravel and boulders, and with loam at the surface, was found everywhere, except at the two high ridges. At these the material was an indurated clay with gravel and large boulders and very difficult to excavate. It was necessary to excavate by steam shovels and other methods of dry removal for about three-quarters of the total amount moved, and only about one-quarter for dredging under water.

The dredgers used were the centrifugal pump dredge, dipper dredge, vacuum pump dredge. The centrifugal pump dredge was 65 feet long, 30 feet wide, 6 feet deep, and built of southern pine.

The movable frame was 45 feet long, made of two timbers, each 12 x 12 inches, with space between them for the suction pipe, 12 inches in diameter. It was not able to excavate the indurated material above described, but only the soft clay, loam and sand. It was run 22 hours during each 24 hours, except on Sundays.

It was served by two sets of men, each working 11 hours. It excavated and delivered during three seasons 459,800 cubic yards. The cutting was made to a maximum depth of 22 feet below the surface of water in which the dredger floated, and the material was raised an average of 30 feet above that water and deposited an average of 1,200 feet from the dredger. The compensation of the force at the average rates paid during the progress of this work amounted for each shift of 11 hours to \$17.95.

For each day of 22 hours	\$35.90
Oil, waste, etc., 22 hours	5.00
Coal, 9 tons at \$3, for 22 hours	27.00

Total each 22 hours

This amount included the labor required in placing and taking care of the discharge pipe as well as in operating the dredger. The pay of the deck hands, the lowest-priced labor employed on this dredger, was \$1.65 for the 11 hours, or 15 cents per hour. The above cost of \$67.90 thus equals 41.18 days' pay of this class of labor. These laborers were selected as partially skilled men, the pay of common unskilled labor being 12½ cents per hour, or \$1.375 per day of 11 hours.

The cost of this dredger was \$40,000. Interest at 4 per cent. is \$1,600 per annum. The life of the dredger would not exceed about ten years—that is to say, it would not require an expenditure equal to the original cost of the dredger to keep it in constantly good condition, and to have it in that condition at the end of ten years. There must therefore be charged against the work done \$4,000 per annum for repairs and renewals, and \$1,600 per annum for interest.

In the locality of this canal, and generally in the northern parts of the United States, dredging can only be done during about eight months of the year. The annual cost for repairs, renewals, and interest must in this particular case be distributed over the actual working days say \$26.80 per working day. The dredger must be cared for during the winter season, at a cost which, distributed over the actual working days, may be charged at \$1 per working day.

The total cost per actual working day of 22 hours is thus:

Labor and supervision	\$35.90
Coal at \$3 per ton	27.00
Supplies	5.00
Interest, repairs and renewals	26.80
Care during winter	1.00

Total

Very careful observations were made of actual working days occupied in the excavation of 218,250 cubic yards. This amount was excavated and discharged in 194 working days, thus giving for the large volume an average of 1,125 cubic yards per day of 22 hours.

The average cost was thus, with allowance for repairs, renewals, care in winter, coal, supplies, and labor, 8.507 cents per cubic yard.

(To be Continued.)

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