

## OPERATING DATA ON LARGE SHOVELS AT QUEENSTON DEVELOPMENT

By L. C. McLURE

**R**ECORDS made in excavating the Queenston-Chippawa power canal by the Hydro-Electric Power Commission of Ontario have fully shown the value of large electric shovels. Over 20,000 cu. yds. of earth and rock are removed daily in digging this canal, the major portion of this being accomplished by means of three 8-cu. yd. electric shovels.

Not only have the volume records indicated the success of these shovels—which, by the way, are the largest in the world—but the operating economies have also proved conclusively the value of this equipment.

The operating economies were found by making a thorough test on shovel No. 1 while being used as shown in Fig. 1. This Bucyrus shovel is of 300 tons weight, has a 90-ft. boom, uses either 5, 6 or 8-cu. yd. bucket, and works on a 40 to 50-second cycle of operation. There are four Westinghouse 440-volt, 3-phase, 25-cycle motors in this shovel, used as follows: Two 250-h.p. motors for hoist; one 150-h.p. motor for thrust; and one 150-h.p. motor for swing. The controllers are of the master-switch, magnetic type, and the

### RESULTS OF TEST ON WORLD'S LARGEST ELECTRIC SHOVEL, QUEENSTON-CHIPPAWA POWER DEVELOPMENT

Total yards, whole test .....	24,706.5
“ “ day work only .....	15,380.0
“ “ day and night .....	9,326.5
Kilowatt-hours, whole test .....	20,436.0
“ “ day work only .....	12,216.0
“ “ day and night .....	8,220.0
K.w.h. per yard, whole test .....	0.826
“ “ day work only .....	0.794
“ “ day and night .....	0.882

whole operation is handled by two men. This shovel was working 90 ft. below the surface and loading material on cars approximately 70 ft. above its own base when the photograph reproduced in Fig. 1 was taken.

Tests were made with a graphic wattmeter connected in the 4,000-volt circuit near the shovel. A high-speed clock in the meter allowed the chart paper to pass the pen at the rate of about 5.5 ins. per minute. Fig. 2 is a typical load



FIG. 1—BUCYRUS SHOVEL WORKING AGAINST 90-FT. CLIFF DURING POWER-CONSUMPTION TEST

curve of the shovel taken while loading three trains during one morning of the test. A check was made against the chart by noting the starting time of each operation during the entire test. The test covered a period of seven days, work being done only during the day for the first five, and both day and night for the last two.

From the accompanying table it is seen that the power required for each cubic yard dug and lifted 70 ft. and loaded into a car, was approximately 0.8 kw.-hr.

The graphic chart shows the energy consumption under actual working conditions and gives an accurate figure for energy consumption per cubic yard excavated. Fifty seconds were required to make the entire cycle. During this period a maximum power demand of 800 h.p. was reached. The average was 320 h.p. for the entire cycle.

An interesting feature of the operation of these shovels is the fact that regenerative braking is utilized whenever possible. In this particular instance it is used when the

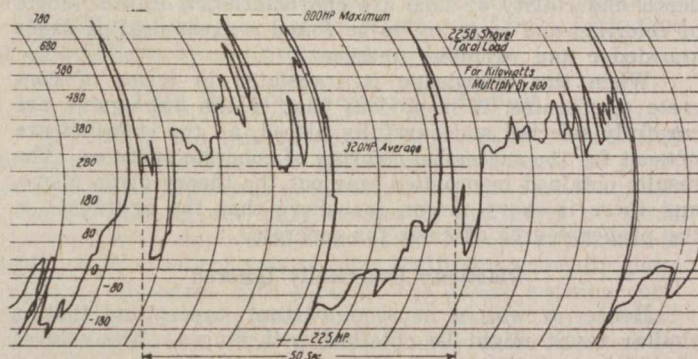


FIG. 2—TYPICAL LOAD CURVE

shovel is lowered the 70-ft. after it has been raised that distance in order to load the cars. This is accomplished as follows: When the operator is ready for the bucket to come down, the motors are connected to the power supply and the bucket falls with the motors running at slightly above synchronous speed. When such a condition is reached, the motors operate as induction generators. Although, as can be seen from the curve, some energy is generated and pumped back into the line, this item is not the main feature of this operation. This method of lowering saves mechanical wear and tear, as the brakes are required only for stopping and holding the bucket, requiring less repair work and making the whole equipment more reliable.

## SUMAS LAKE RECLAMATION PROJECT

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elevation of 25 feet above ground level. Exterior dykes will have a crest width of 8 feet and slopes 2 to 1 on the water side and 2½ to 1 on the land side.

It is estimated that the project will cost \$1,800,000, or an average of \$60 per acre capital charge.

The 10,000 acres of land lying in the bed of Sumas Lake will be sold and the proceeds used to reduce the capital charge, and it is confidently hoped that these rich lands will bring \$150 per acre, thus liquidating the capital cost.

The British Columbia government are acting as trustees for the district, and the project is handled under the land settlement board, department of agriculture; E. D. Barrow, minister of agriculture.

The project was first mooted in 1872, and has been exploited many times since that time, but owing to lack of security it has been found a difficult matter to interest private capital.

This wonderfully rich area lying at the very gate of Vancouver—the Pacific port of Canada—will at last be brought under cultivation, adding millions to the wealth of the province of British Columbia, and developing a valley that will in a short time become the “Garden of Western Canada.”

Thomas Adams, town planning adviser to the Dominion government, spoke last evening on housing and town planning at a mass meeting in the City Hall, Toronto.