the intention to gunite most of the other buildings. The bunk-houses are comfortably arranged upon the cottage plan. Each house has its own garden plot, which the men take care of during the evenings.

The crushing plant is located on the forebay. At the present time there have been erected three gyratory crushers, two No. 7's and one No. 7½, but in the Montrose yard are now the parts for a great 84-inch Traylor jaw crusher which will be erected this summer, and which will have a capacity of 20,000 cubic yards of crushed stone per day. Whether much of the rock will be dumped at St. David's, or whether it will all be crushed for sale to the general public, is a matter of policy that will be determined by the commission.

Building Four Concrete Bridges

The rock will all be drilled with Ingersoll-Rand and Sullivan rock drills and blasted with dynamite. C.X.L. brand, 40% and 60% has been used to date. The rock will be loaded onto the dump cars by steam shovels. At the present time the rock excavation at the forebay is on a very small scale, the stone being quarried merely to provide aggregate for concrete work and to supply ballast for the railways. The rock is loaded into skips which are picked up by a locomotive crane and which dump into a bin. A belt conveyer carries the stone from the bin to the crushers, and there is another conveyer from the crushers to the cars.

The concrete work for which the rock is now being used is in connection with a number of bridges which must be built by the commission. There are four railway bridges to be constructed over the canal, one for the Niagara, St. Catharines and Toronto Railway (electric), one for the Wabash Railroad, one for the Michigan Central Railroad and one for the Grand Trunk and Michigan Central Railroads.

These will be reinforced concrete arch bridges, 36 ft. to 38 ft. in width, 100 ft. clear span. There will also have to be constructed a number of highway and foot bridges to carry the various roads across the canal. In the concrete work to date, both Canada and St. Mary's cement have been used.

Hydraulic Similarity Models

Under the direction of Prof. R. W. Angus, of the University of Toronto, several hydraulic similarity models are being prepared at Dufferin Islands, near the Ontario Power Company's intake in the Niagara River. These models are based on designs prepared by the commission and are for the purpose of studying the conditions at the intake. The design of the intake works will be based upon the results of these studies. The models are being made to a 1/20th scale.

Personnel

Hon. Sir Adam Beck is chairman of the Hydro-Electric Power Commission of Ontario, the other commissioners being Hon. I. B. Lucas and W. K. McNaught, C.M.G. W. W. Pope is secretary, and Frederick A. Gaby, under whose direction the entire work was planned and is being constructed, is chief engineer.

The design and construction of the project are under the direction of the Hydraulic Department of the commission, as were also the studies and surveys for the scheme. Henry G. Acres is hydraulic engineer; Thomas H. Hogg, assistant hydraulic engineer; and Max V. Sauer, the department's designing engineer. E. T. Brandon is electrical engineer.

There is a large staff of engineers and construction superintendents and foremen at Niagara Falls under the direction of J. B. Goodwin as works engineer and of George Angell as general superintendent. A. C. D. Blanchard is field engineer; F. W. Clark, assistant field engineer; R. T. Gent, plant engineer; William Snaith, office engineer; W. S. Orr, resident engineer on Division No. 1 (Welland River section); and George Lowry, resident engineer on Division No. 3 (station 235 to station 438+33, where the forebay begins). No construction work has been done yet on Division No. 2 (from the Welland River to station 235). To date, Mr. Orr has been acting as resident engineer on any work done on Division No. 4 (power house, gatehouse and forebay).

F. W. Scriven is division superintendent on Division No. 3, and C. Anderson acting superintendent on Division No. 1. Nos. 2 and 4 division superintendents have not yet been appointed. Harold L. Bucke is superintendent of railway construction; E. M. McGivern, mechanical superintendent; F. F. Cooper, chief clerk in charge of the accounting, cost-keeping and time-keeping systems.

LESSONS OF THE WAR AS APPLIED TO ROADS AND BRIDGES*

By Walton Maughan

ONE of the revelations of the war is the way in which bituminous-bound or tarred or even ordinary macadam—especially when laid over good foundation layers of Telford pitching—"stands up to its work." More than this need not be said to the able macadam enthusiasts in charge of the rural roads of this country.

On *pavé* roads through or near numerous towns in Northern France and Belgium there may be differences of opinion as to its merits as a lasting surface, but motor and horse transport drivers and hapless pedestrians agree that these merits are more than counterbalanced by its unevenness of contour, its irregularity in wear, causing excessive vibration and noise, and its treacherous slipperiness in dirty weather as compared with good macadam. It is surprisingly common—often in short strips—in lanes and by-roads of minor importance as well as on sections of the great routes nationales.

Footpaths

Regarding footpaths for rural main roads the writer will only state that while he was district road surveyor—(pardon, "inspector")—for the Coventry district of Warwickshire there was added to those roads bearing the heaviest motor traffic an aggregate length of footpaths which in a few years amounted to about 15 miles. For over half of this distance all that was necessary was an opening out of overgrown old-time tracks, and a covering of clinker ashes and screenings. The cost was negligible, for much of the cartage of turf and soil was done free by the farmers of the adjoining land to which this compost was applied during the winter months.

Classification of Road Materials

Such systematic study of the effects of road traffic as I have ventured to plead for naturally brings into prominence the classification of road materials, and particularly road stones, and the urgent necessity for stand-

*Abstracted from a paper read at a meeting of the Institution of Municipal Engineers.