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The application of the original grade profiles eliminated much heavy work, and established on an economic basis a virtual 0.60% profile for eastbound traffic, for a minimum speed of 10 miles per hour, with a train load of 1,630 tons. In extreme cases the above limitations may have been exceeded, depending perhaps on an increased acceleration to overcome some of the higher summits. In order that the effect of such acceleration could be determined the experimental diagram had to be dispensed with and the usual theoretical rule substituted. This necessitated a comparison to be made of the data obtained by experiment with results obtained by theory, in expectation of effecting a change in the 0.60% and 10 mile per hour requirement to embrace the new conditions, but it was impossible to do so with the class of locomotion expected to be put in operation on the division. The requirement had therefore to be departed from in some cases, reducing the speed at summits to 6 miles an hour and even lower. The velocity heads given on speed diagrams were substantially those given in table 118 of Wellington Railway Location, and are derived from the formula for finding force of gravity in falling bodies, $h \frac{v^2}{g}$, to which is added 6.14% for the rotative energy stored in the wheels.

The work of construction on the first 60 miles from Guelph was comparatively of a light character, such as is usually encountered in undulating country; the average quantity of earthwork per mile being 18,300 cubic yards. The work on the last 20 miles was much heavier, the average quantity per mile being 42,000 cubic yards. No rock had been encountered throughout the whole line. The classifications specified were "solid rock," "loose rock," and "common excavation," the latter embracing all materials which could not be classed as loose rock.

To avoid disputes and simplify questions arising from the calculation of overhaul the usual clause was annulled, and a fixed amount included in contractor's tender to cover all overhaul, such amount being previously determined by the extra cost of removing from line excavation the quantity in gullets of sufficient width to permit of the extra widening being done by steam shovel and train haul.

The structures are absolutely of a permanent character, and are built entirely of

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concrete, the only exception being the upstream faces of cutwater piers, which are faced with cut stones. The proportions of concrete used were for piers and abutments one, four, seven, and for arch culverts and foundations under water one, three, five. The C.P.R. standard designs were adhered to as closely as circumstances would permit. The graceful form of the piers of the larger structures evolved from the application of the convexed starlings of cutwaters, it being found that a circular end above the cutwater permitted of a shorter base. This form of cutwater, in addition to being a more massive form for concrete work, is probably the only practicable one which offers least resistance to the current. There are altogether 29 bridges, with steel superstructures, and although four of these are of considerable magnitude, there are no lattice spans, plate girders being used exclusively up to 110 ft. length of girder. This feature in the design of the larger structures imparts to them the appearance of strength and stability.

The station buildings and terminals are built in conformity with the substantial character of the work already described. The entire road is laid with 80-lb. rails, and excellent ballast was available at convenient intervals along the line.

The whole work was carried out under the direction of P. A. Peterson, as Chief Engineer, the organization of the engineering staff being an assistant engineer and accountant at headquarters, one divisional engineer and two residences to each 20 miles of line. For construction purposes the work was divided into 10 mile sections. The contractors for sections 1, 4, 5 and 6 were Campbell & Folinsbell, Strathroy, Ont., and for sections 2, 3, 7 and 8, M. A. Piggott & Co., Hamilton, Ont.—J. Grant MacGregor, C.E., in Canadian Engineer.

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Guelph and Goderich Ry.—The extension of the branch, now under construction from Linwood to Listowel, Ont., as far as Stratford, is under consideration. P. A. Peterson, Chief Engineer, is quoted as stating that the work upon this branch would engage his attention in the future; while no definite decision had been reached with respect to the extension from Listowel to Stratford, the work might be commenced early in 1908.

The plans prepared for the station at Listowel show a building 77 by 30 ft., of red pressed brick, on stone foundations, with a slate roof. A new station at Guelph will be constructed in the spring.

St. Marys and Western Ry.—In connection with the construction of this line be-

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