The first class comprise roads traversing the various parks that afford the chief means of communication with the outer districts, and roads that will eventually form part of the main chain of highways connecting the parks themselves. These highways, being most important, naturally receive first consideration from a location and construction standpoint.

Secondary roads are branches from the main roads to points of interest not touched by the latter. They in-



Switchbacks on the Yoho Valley Road in Yoho Park

clude loop roads and purely scenic routes. These secondary roads correspond in a physical sense to the feeders of a county road system, but their effect is more to distribute traffic than to concentrate it.

Of the total mileage of constructed roads in the Dominion Parks at the present time, approximately 90 miles can be classed as main or trunk roads.

The conditions to be considered in the location of park roads are different to those encountered in highway work in rural districts. Park highway routes are chosen with a view to develop scenic attractions instead of farming areas. The most direct and cheapest route between given points may not be the one that will afford the best road from a park viewpoint.

National park highways have little commercial traffic resulting from industrial production. Travellers of park



Section of Motor Road up Mt. Revelstoke in Revelstoke National Park. This road makes an ascent of 4,800 feet in 16 miles.

routes are generally on errands of recreation and enjoyment, and in a short time there will be employed but two means of locomotion,—the motor car on the highways and the saddle pony on the mountain trails. The requirements of motor traffic is therefore an all-important consideration in road location and construction work. Actual location work in the field is controlled by three factors :---

- (a) Grades and alignment.
- (b) Construction cost.
- (c) Scenic values.

Heavy grades and bad curves will lessen the popularity of a road good in other respects. The object of a proposed road location may not justify a high construction cost. The attractive value of a pretty waterfall may justify a greater expenditure than its value as a source of power. A well-located park road will therefore embody a careful adjustment of these three factors.

Alignment.—Owing to the rugged nature of the country included in the park areas a large portion of every road is necessarily located on mountain slopes and the location line is generally high in curvature. Sharp curves with large intersection angles are sometimes un avoidable, and the alignment problem becomes one of determining the easiest curve with the least grading, or of adjusting the factors of safety and economy. A radius of 25 feet on centre line is the minimum employed on the location of park roads, and this small radius is never utilized unless circumstances demand the use of a switchboard on a steep sidehill slope. In all such cases provision



Section of Motor Road between Banff and Lake Louise, Constructed by Alien Labor,

is always made for the easement of the turn to a forty of fifty-foot radius by additional excavation when this work is justified by traffic. Apart from the case of the switchback no radius of less than 45 feet is employed on any park road, and sharp and abrupt curvature is avoided wherever possible.

Grades.—Considering the character of the country traversed by park roads, remarkably low gradients have been obtained. Main roads are located with a maximum of 6 per cent., and the majority of the grades are considerably less than this. Steady ascents or descents are made on grades between 4 and 6 per cent., and compensation for curvature is allowed on all sharp turns or switchbacks.

Roads of a secondary type usually traverse smaller, steeper valleys and more rugged country than main roads, and often present greater difficulty in location. Higher grades are therefore employed when necessary. Barring one or two cases where there is no alternative, these do not exceed 8 per cent. Generally the ruling grades on secondary roads are between 6 and 7 per cent.

The usual procedure in the location of a new road is, first, a thorough reconnaissance of the country to be traversed for the purpose of determining the general

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