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The Columbia & Western Railway.

The extension of this line from West Robson to Midway, B.C., was inspected on behalf of the B.C. Government by H. B. Smith, M. Inst. C.E., whose reports, which have only just been made public, contain a lot of interesting information about the line. The first report deals with the first section of the line between West Robson & Grand Forks, & it must be borne in mind that it was dated Sep. 29, 1899, when the line was uncompleted & that since that date it has been finished & opened for traffic. Following are extracts:

The West Robson-Grand Forks division of the C. & W. Ry. is an extension westward of the Trail-West Robson division of the same railway. It commences at West Robson, 1,400 ft. above sea level on the south bank of the Columbia River, directly opposite the Columbia & Kootenay Ry. terminus at Robson. From thence it extends westerly along the banks of the Columbia River & Arrow Lake to Brooklyn, 2,750 ft. above sea level, 13 miles from West Robson. From Brooklyn it follows a southerly and westerly course to 22 miles distant from West Robson. Here a tunnel 43,00 ft. long & 3,180 ft. above sea level has been found necessary to reach the valley of Dog Creek. From this tunnel the course is southerly to McRae Creek Pass, 3,990 ft. above sea level, & 30 1/2 miles from West Robson. From McRae Creek Pass the course is southerly & westerly along the valley of McRae Creek to the valley of Christina Lake, 47 miles from Robson. It then follows southerly the valleys of Christina Lake & Christina Creek to Cascade City, 1,650 ft. above sea level, & 54 miles from West Robson. From Cascade City the course is nearly due west along the valley of Kettle River to Grand Forks, 1,700 ft. above sea level, & 67 miles from West Robson. Up to 5 miles from West Robson the railway passes over extensive flats; it then winds along irregular & precipitous & rocky side-hills to Cascade City, where the beautiful & uniform valley of Kettle River is reached, which it follows for 13 miles to Grand Forks. The

railway, therefore, passes over 18 1/2 miles of flats, & 48 1/2 miles of side-hill.

The location of the railway, from an economical point of view, has been unusually skillfully made, & leaves little room for improvement without heavy additional expenditure.

necessitated many long & very high timber trestles, several of which could be dispensed with, but only at considerable outlay. The long tunnel, 22 miles from West Robson, at the head of Bull Dog Creek, has been found necessary in order to avoid the circuitous & much more costly route via Arrow Lake & Dog Creek. In Kettle River valley, the Kettle River is crossed four times. There appear to be no means by which any one of these crossings could be advantageously avoided.

The railway is of standard gauge, 4 ft. 8 1/2 ins. from inside to inside of rail head, except on curves exceeding 4 degrees. The additional width or spread for sharper curves is as follows:—

4 degrees to 6 degrees	1/2 of an inch
6 " 8 "	3/4 "
8 " 10 "	7/8 "
10 " 14 "	1 "

The general curvature is light for a mountain railway. Curves vary from 20 minutes to 14 degrees, or from 17,189 to 410 ft. radius, & cover 32,884 miles of the total length. The combined length of tangent is 34,058 miles. The total curvature is, therefore, 49.12% of the total mileage. The curve of most frequent occurrence is 14 degrees. The total number of curves is 563, made up as follows:

Degree.	No.	Length.	% of Whole.
0.20 to 1.11	11	4,088.5	1.16
1 " 2.45	20	427.0	5.78
2 " 3.44	15	131.0	4.28
3 " 4.54	20	902.2	5.91
4 " 5.55	16	722.2	4.73
5 " 6.42	13	218.7	3.74
6 " 7.49	12	269.7	3.47
7 " 8.26	7	906.4	2.24
8 " 9.31	6	382.0	1.80
9 " 10.13	2	518.1	0.71
10 " 11.57	14	211.7	4.02
11 " 12.13	3	457.3	0.98
12 " 13.39	10	273.7	2.91
13 " 14.4	1	043.9	0.30
14 " 80.	25	076.5	7.09

Totals... 563 173,629.7 49.12

The longest curve is 1 degree & 30 minutes, 2173.3 ft. in length. The longest tangent is 5814.6 ft. in length.

From West Robson to mile 5.4 grades undulate & in no case exceed 0.75 per 100. At mile 5.4 an uniform 2.2 per 100 upward grade, compensated for curvature, begins & continues to the long tunnel at mile 21.9. The grade through the long tunnel rises 1.1 per 100 to mile 22.5. At mile 22.5 an uniform 2.2 per 100 upward grade, compensated for curvature, & broken by a small portion of level grade at mile 24.6, continues to McRae



JAMES DUNSMUIR,

Vice-President of the Esquimalt & Nanaimo Railway & Premier of British Columbia.

The general course is as direct as the rugged nature of the country would permit. Every flat affording suitable grades & alignment has been taken advantage of, & on the side-hills the curvature fits the natural irregularities of the ground with great precision. This has

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