

ravine, and has solid rock foundations. Trestle at mile 73 has three decks, and is on a 10°-curve, with grade rising north 1.80 per 100. It is built across Fisherman Creek, and has solid rock foundations. Both trestles at mile 89.4 are the approaches to a bridge across Boundary Creek. Both have two decks. The first is on a 4°-curve, and the second is on a 10°-curve. Both are on a grade rising westward 1.43 per 100. Both rests on pile foundations. All trestles are excellently designed and well built, strength, rigidity and durability having been obtained.

All trestle foundations, except those of Boundary Creek, being on solid rock ledges, are of the most secure character. If driven according to specification, the pile foundation at Boundary Creek must be of a reliable nature, so long as the upper part of the pile, exposed to atmospheric action, does not decay. The specification for pile-driving required that all piles should be driven with a 2,000 lbs hammer, having a free fall of 20 ft. for the end blow, maximum penetration under the last 5 blows not to exceed 5 ins. One pile is directly under each post of the trestle.

All bents are 15 ft. apart, centre to centre. Caps are 12 ins. by 12 ins. by 14 ft., & are secured to posts by $\frac{3}{4}$ -in. drift bolts, 21 ins. long. In single deck trestles there are 2 vertical posts & 2 raking posts, each 12 by 12 ins. Sway braces & wales are 3 by 10 ins., & are bolted at the ends through posts by $\frac{3}{4}$ by 18 $\frac{1}{2}$ -in. screw bolts, & spiked to intermediate posts by $\frac{1}{2}$ by 7-in. boat spikes. Longitudinals, 8 by 10 ins., are placed above wales & sills, & are secured at the ends by $\frac{3}{4}$ -in. screw bolts, 21 $\frac{1}{2}$ ins. long. In 2-deck trestles the same design & scantling of timber are retained. The sill of the upper deck is separated from the cap of the lower deck by 8 longitudinals, 8 by 12 ins. Connecting the lower half of each deck are four longitudinal diagonal braces, 6 by 10 ins. In 3-deck trestles the same design & dimensions are retained. The number of posts is increased as follows:—Upper deck, 2 uprights & 2 raking posts; second deck, 2 uprights & 4 raking posts; third deck, 2 uprights & 4 raking posts. All substructures are fully completed.

The trestle superstructure will be unusually strong. There are 8 stringers of Douglas fir, 8 by 16 ins. by 30 ft., breaking joint, & bolted together by $\frac{3}{4}$ -in. screw bolts, 25 $\frac{1}{2}$ ins. long. Ties are 8 by 8 ins. by 12 ft., spaced 4 ins. apart, & spiked to stringers by boat spikes, $\frac{1}{2}$ by 12 ins. Guard rails are double, the outside rail is 8 by 8 ins., bolted

to every fourth tie by $\frac{3}{4}$ -in. screw bolts, 18 $\frac{1}{2}$ ins. long. The inside rail is parallel to the outside rail, except for 20 ft. at the ends, where it flares outwards to a junction with the outside rail. It is secured to the ties at intervals of 3 ft. by means of lag screws, $\frac{3}{4}$ by 8 ins. On curves, the superstructure is cant to the required elevation by increasing the length of the outside posts of the superstructure. All washers are of cast iron, $\frac{3}{4}$ by 3 by 1 $\frac{1}{2}$ ins.

Between Grand Forks & Greenwood only one bridge span has been found necessary. This is at the crossing of Boundary Creek, 89.4 miles from West Robson. It is a timber Howe truss deck span of 150 ft., supported on framed timber abutments, each of which consists of 24, 12 by 12 ins., vertical & battering posts resting on 12-ins. piles, enclosed in a rock-filled caisson. Rail level is about 75 ft. above river level. The centre alignment is a 4° curve, & the grade 1.43 per 100. The approaches to the bridge have been enumerated & described under the head of trestles. The length of the north approach, 526 ft., does not appear to be necessary, except as a means of saving embankments & expediting the period of opening the road to traffic.

Ties are of cedar, hemlock, tamarac & fir, both hewn & sawn. They are laid 24 ins. from centre to centre. Faces are from 7 to 8 ins. in width, & the thickness uniformly 7 ins.

The alignment of the rail has apparently been at one time as well done as the character of the rails used would admit of. The sagging of embankments, both vertically & laterally, & the settlement of side ballast, have caused irregularities of contour in many places. Surface-men, however, are now at work remedying these defects. All curves have been eased off at both ends, & the outer rails elevated for velocities varying according to the retardation of the curve, & the particular grade on which the curve is situated. Rails break joint, & are double spiked to each tie.

From Grand Forks, mile 67 to mile 68, rails are 56 lbs. steel, which have been used on other parts of the C.P.R. From mile 68 to Eholt, mile 80.8, rails are new 73 lbs. steel, of a pattern designed by the C.P.R. From Eholt, mile 80.8, to Greenwood, mile 89.7, rails are 72 lbs. steel, which have been used on other parts of the C.P.R. The 56 lbs. rails are provided with 4-hole angle plates, pierced for $\frac{3}{4}$ by 3 $\frac{3}{4}$ in. bolts. The 72 lbs. rails are provided with 6-hole angle plates, 42 in. long, pierced for $\frac{3}{4}$ by 4 in. bolts. The 73 lbs. rails are provided with 4-hole angle plates, pierced for $\frac{3}{4}$ by 4 in. bolts. All nuts are hexagonal; lock washers are positive & national.

A double-wire telegraph has been constructed from Grand Forks to Greenwood. Poles are 25 ft. long, 8 ins. diameter at the top, & from 150 to 200 ft. apart. This work has been well done.

All timber, for 50 ft. on each side of the railway, has been felled. Side tracks from 1,500 to 4,500 ft. long, & aggregating 13,000 ft., have been built. Y's for reversing engines have been constructed at Grand Forks, Eholt & Greenwood. Permanent water tanks of 10,000 galls capacity each have been erected at four points. Several station & section houses have been built.

The Grand Forks-Greenwood division has been easy of construction as compared with the West Robson-Grand Forks division. The first 9 miles north of Grand Forks cover the whole of the heavy work; beyond this point the works are comparatively light.

A map of the C. & W. R. was given in our last issue, pg. 227.

Altering St. Louis Station.—The main hall of the union passenger station at St. Louis, Mo., one of the finest rooms of the kind in America, is going to be altered, experience having shown that passengers do not use it. The large room beneath it, which is nearer the street level & the train platform level, & which contains the ticket offices, is used by the great majority of passengers of all classes, & the main floor is nearly always practically empty. An opening is to be made in the floor, in the centre of the room, & a handsome balustrade put in; so that the ceiling of the main hall will become the ceiling of the lower hall, & the main floor, what is left of it, will become a gallery.

St. Lawrence Terminal & Steamship Co.—The Dominion Parliament last session incorporated a company under this name, with power to construct & operate vessels, elevators, wharves, warehouses & other terminal facilities, also to construct & operate railway sidings or spur lines not exceeding 6 miles in length, to connect the Co.'s property with any railway line incorporated by the Dominion Parliament. The incorporators are H. A. Hodge & F. D. White, Rutland, Vt.; G. C. Dessaulles, St. Hyacinthe, Que., & G. H. Semple, Montreal. The capital stock is \$1,000,000. We are informed that matters of detail have been perfected, but that actual operation under the charter cannot be begun until certain improvements have been made at the port of Sorel.

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