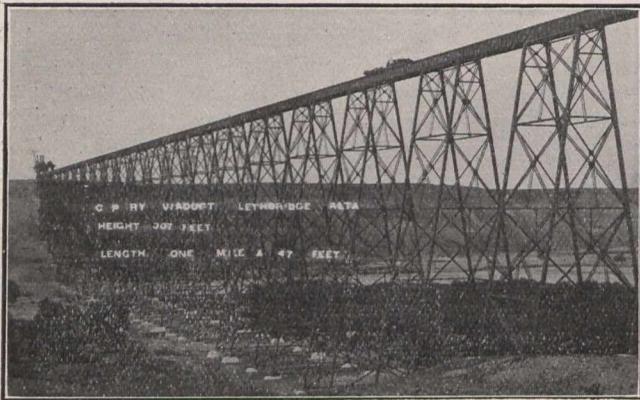


In erecting the bents the traveller is moved to position to bring the hoisting tackle at the end of the traveller directly over the centre line of the bent to be erected, the overhang of the traveller being sufficient to span the maximum space of 100 feet made by the length of the intermediate girder span.

On completion of the lower storey of a bent supporting 100 ft. spans its top is braced back to previously-completed work by an erection strut, and similar struts are placed at each storey of the bent as it is erected, and when the bent is completed the 100-ft. span is put in place, the traveller moved forward, and the remainder of the tower completed, and the tower-span put in place.

All of the transverse connections and splices requiring to be field-bolted were rendered readily accessible to the



Height, 307 feet; length, 1 mile and 40 feet.

workmen by means of a cage suspended from the end of the traveller. On this erection traveller were placed six hoisting-engines, and a system of telephones was installed to establish communication between the men engaged in erecting material and those in charge of the hoisting-engines. The riveting of this bridge was carried on as quickly as possible after the material was put in place, and a separate traveller was used for this purpose, moving along the same track as the erection traveller.

The riveting traveller was built of timber, and high enough to permit of the passage of loaded flat cars beneath it. Riveting platforms were suspended on the sides from this traveller. All the riveting was done by pneumatic hammers. Compressed air of 100 lb. pressure was piped out on the bridge from the air-compressor plant placed on the ground near the Lethbridge abutment.

General.

The raising of steel began about August 15, 1908, and a good deal of time was lost during the winter months on account of extremely cold weather, and two weeks in February on account of a strike of the workmen. During the month of March 1909, bents 37-46 inclusive were completely erected, comprising a tonnage handled during that month of 2,300 tons and about 735 lineal feet of structure.

A serious accident was averted because of the through-girder construction; a heavy derrick car handling some heavy material was accidentally tipped over, but was restrained from falling by the through girders.

The 167-foot span over the west bank was erected in the usual manner by falsework.

Quantities.—The quantities in the structure are approximately as follow:—Dry excavation, 18,110 cubic yards; wet excavation, 4,870 cubic yards; concrete, 17,090 cubic yards; concrete piling, 1,676 piles; riprap, 339 cubic yards; steel, 12,200 tons.

It required 645 cars to transport the steel actually used in the erection of the bridge to the bridge site. Contractor's plant amounted to about forty cars, tie and guard rail fifty-three cars, besides which there would be an additional number of cars for coal used on the work, which would make the total about 900 cars.

It is estimated that in order to give the bridge two coats of paint about 7,600 gallons will be required.

Records.—Throughout the work careful records were kept of all measurements, triangulations, and all other work, the note-books being carefully indexed. In addition to this, weather records were kept, together with notes as to the wind, as on many occasions the wind was so strong that men could not work on the erection of the bridge. In addition to this, records were kept showing progress of work in accordance with form, which is attached. These were sent into the head office twice a month in order that a check might be kept on the progress of the work. Attached are several photographs showing wooden trestles and bridges on the old line, and several photographs showing the pedestals, the river piers, and the steel-work of the new bridge.

High Water.—During high water a new channel was formed about 300 feet east of the old one, and considerable gravel was carried down and deposited in the vicinity of the bridge. This is shown on the counter map marked "C" attached.

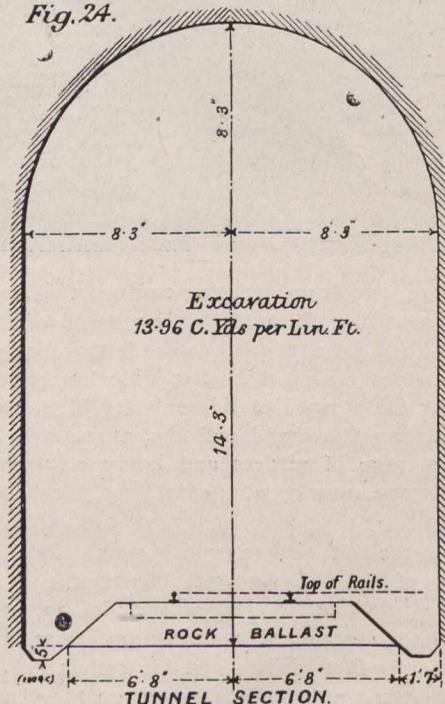
The bridge was designed by the bridge department of the Canadian Pacific Railway at Montreal, while the field work was carried out under the direction of the assistant chief engineer, Western Lines, Winnipeg.

The manufacture, designing of erection equipment, and erection of the steel-work were carried out in a most efficient manner by the Canadian Bridge Company, of Walkerville, Ont., contractors for superstructure. Mr. C. F. Prettie had direct charge of the bridge company in the field, and had a gang of about 100 men.

Reduction of the Kicking-Horse Pass Grade Between Field and Hector on the Canadian Pacific Railway.

The original line of the Canadian Pacific Railway in the Canadian Rockies, between Field and Hector, was constructed for a distance of about 4.1 miles with 4.5 per cent. grade, which was the heaviest grade on the main line of the railway; this, however, answered all purposes until the increasing traffic during the past few years necessitated the consideration of a grade revision at this point, more especi-

Fig. 24.



ally owing to the large amount of passenger traffic and the danger of operating this 4.5 per cent. grade, although on this gradient there were three safety switches, one at mile 10.2, one at mile 11, and the other at mile 12.3. Before passing any of these switches going west on the down grade, all trains had to come to a stop, when a man threw the switch for the main line, allowing trains to proceed. Under an agreement with the Government, this gradient had to be reduced.

Special surveys were made in the years 1902 and 1905 of alternative routes. The different propositions finally resolved themselves into the consideration of three lines, as