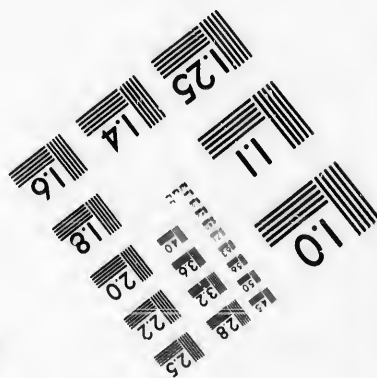
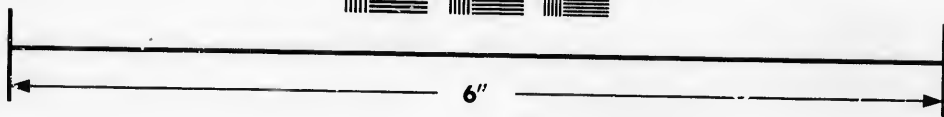
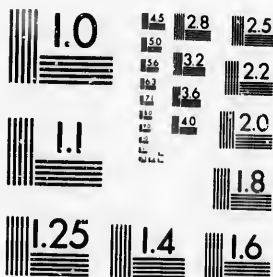


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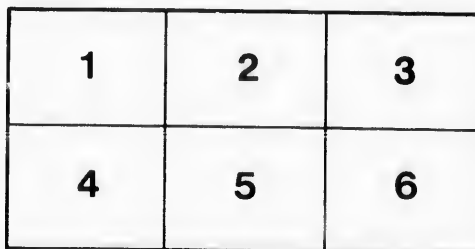
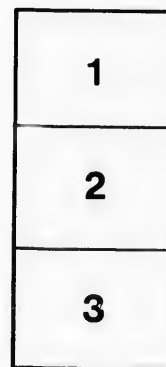
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TEMISCOUATA RAILWAY.

Running from Edmondston, New Brunswick, to Rivière du Loup, Quebec, a distance 81 miles.

By L. ADAMS DAVY, M.Can.Soc.C.E.

To be read Thursday, 18th May, 1893.

This project has formed part of many schemes to build an Interprovincial Railway prior to the construction of the Intercolonial, and was first surveyed by Captain Pipon and Lieutenant Henderson in 1846, acting under instruction from Mr. Gladstone, then secretary of State for the Colonies. Again, between the years 1864 and 1868, when the whole country between Rivière du Loup and Halifax was exhaustively surveyed under the direction of Mr. Sandford Fleming, it received some attention as forming part of the frontier routes which were ruled out in favour of the Shore Line. From that date up to 1886 the ground was generally covered by one or more charters, and a survey was made by one of the companies, but nothing was done beyond this by them. In 1884 when the Dominion Government had the country between Montreal and St. John, N.B., surveyed, in order to decide upon a short line between Montreal and the Atlantic seaboard, Mr. Crawford was sent to survey this route and one from Rivière Ouelle, but their determination was not in its favour. In 1886 the company in possession of the charter had secured bonuses from the Dominion, Quebec and New Brunswick Governments, amounting in all to about \$9000 a mile, which put them in a position to make arrangements with the firm of Messrs. McDonald and Boswell to construct and equip the road. Immediately after this agreement, three engineering parties were organised, and surveys made of alternative routes on each side of Mr. Crawford's line. On the completion of this work it was decided that the Crawford route was the best, taking all things into consideration. A line via the St. Francis River, which is crossed by the present track 16 miles from Rivière du Loup, would have given a summit about 350 ft. lower, but would have increased the distance to Edmondston 14 miles. The Rivière Ouelle route was also considered it would have given a line from Quebec to Edmondston about 24 miles shorter, but would cross a summit about 230 feet higher. As soon as the route was decided, the three parties commenced the location of the 60 miles between Rivière du Loup and St. Rose, and by the 1st of December this was completed, and the parties came in to make up the plans, profiles, etc.

The adopted line crosses the divide between the St. Lawrence and St. John waters several times, the first being only 16 miles from the St. Lawrence River, but the summit is only reached at the 24 miles at an elevation of 1330 ft. above the sea level and 1094 ft. above the junction with the L.C. Ry. With the exception of the Intercolonial Railway this is the lowest summit by about 500 ft. of any crossed by the roads from Ontario and Quebec to the Atlantic seaboard. This summit elevation is kept for three miles, then the line descends 830 ft. to Lake Temiscouata at the 44th mile. From this point to Edmondston at the 81st mile the line follows closely the shores of the

Lake and the Madawaska River, and no great difference in elevation is met with. The Governments limited the grades to a maximum of 81.50 per cent, and the curves to 7 degrees. The line laid down by Mr. Crawford was followed very closely, the greatest deviation being about $\frac{1}{2}$ mile. The ascent to and descent from the summit are very little broken by minor undulations, but the maximum grades are frequently eased off by lighter ones or level stretches. The longest maximum grade is $2\frac{1}{2}$ miles ascending East, whilst ascending West the longest is 1 mile. Four sub contracts were let, covering the 60 miles located, and construction was commenced in October, and during the winter a few of the heavier cuts were commenced, and considerable quantities of timber and ties were taken out, and the order given to Messrs. Cammel & Co. for the requisite quantity of their toughened steel rails weighing 56 lbs. to the yard. In the section chosen the head of the rail is rounded off more than the present ideal calls for, but this is probably an advantage on a road with light traffic and considerable curvature. Owing to the severe winter in this part of the country it was gone before the grading could be pushed forward with rapidity, and up to that time less than 50% of it had been done. From this time on, every exertion was made to complete the grading and lay the track before the close of the season. The rails having arrived, track laying was commenced June 15th, and pushed on from the Rivière du Loup end as fast as the trestling and grading would allow, and whenever delayed from any cause the track laying gang were set to work ballasting.

The balance of the location from St. Rose to Edmundston, 21 miles, was finished in September, and the grading commenced, and by the 23rd October it was sufficiently advanced for tracklaying to be started at the Edmundston end also. By the close of the year only a few miles remained between the ends of the track, and on January 7th the rails were connected, and on January 10th the contractors took the directors of the company and their friends from Rivière du Loup to Edmundston, returning the same evening. The following summer the ballasting was completed; 6 tanks of 21,000 gallons capacity each erected, 5 fitted with Worthington steam pumps and 1 fitted by gravity. All the tanks were at stations. Station buildings, offices, machine shops, engine sheds, turntables, etc., put up and the equipment completed, which consists of 5 locomotives, 3 first and 2 second class cars; 2 combination, 1st and 2nd; 2 baggage; 7 frost proof; 41 box and 54 flat cars; 5 snow ploughs; 2 flangers, etc., all new and equal in construction and fittings to those used on the Trunk lines. Snow sheds and fences were commenced at necessary points and the line was open for traffic in the fall.

Several swamps and muckys were crossed; some had to be crosslaid with timber, others the ties were laid on the original surface and afterwards raised with ballast brought by trains. The use of ditches near the track was avoided in such cases. Ballast of good quality was found at several places along the line. One pit was worked with a steam shovel, the others by hand. The material was ploughed off the cars when used as ballast, but when filling had to be done side dump cars were used. The timber used in temporary trestles was flatted for the stringers, caps and sills and round for the posts and braces, and all put together with spikes and drift bolts.

Across the Madawaska a temporary trestle had been built the first summer. It was 350 feet long and about 32 feet high across the bed of the river, which is here about 280 feet wide and 7 feet deep at the ordinary summer level.

The bents were 12 feet centres, except 4 which were 15 feet, and consisted of 4 piles each from 40 to 45 feet long driven from 7 to 10 feet into the bed of the river. No bracing was used on the lower 16 feet of the structure, but the upper portion was well braced both longitudinally and transversely with 8" x 6" flatted timber spiked to the piles with 12" ship spikes. The caps were of flatted timber 14 feet long, 12" thick and 10" face. The stringers 26 feet long and of the same dimensions, one was used under each rail except for the 15 openings where they were used double. The same class of ties were

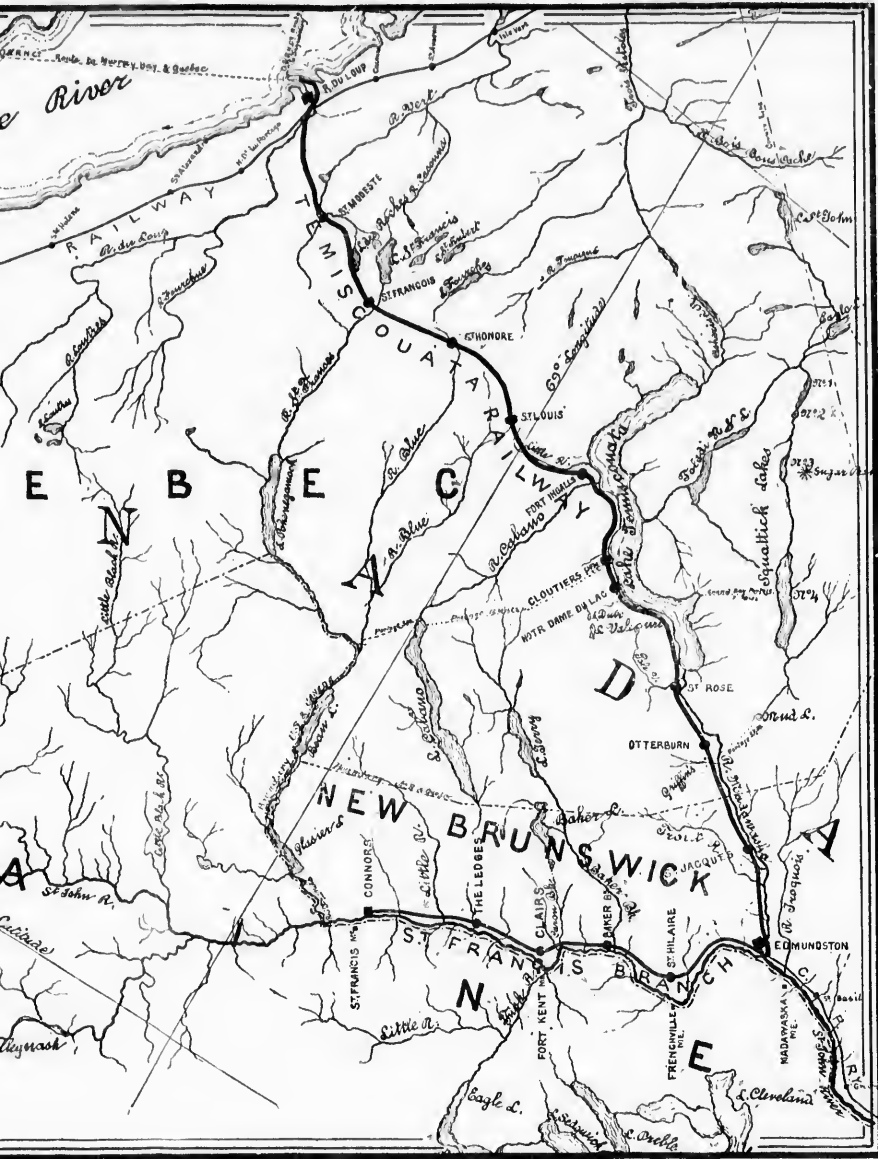
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During construction the Engineering staff consisted of 1 Chief, 1 Division and 5 Assistant Engineers and a Draughtsman. Each engineer was allowed a man and horse and the assistants a rodman in addition, and were furnished with a house and office near the centre of their sections.

Via the Temiscouata and existing Railways the distance from Montreal to St. John, N.B., is 592 miles, and to Halifax 867 miles, all through Canadian Territory.



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used as those in the road beds. The caps, stringers and piles were bolted together with drift bolts 20' long by $\frac{3}{8}$ " square. The river rises about 8 feet during the spring freshets, and has a current of about 6 miles an hour, and this continues for several weeks. During this high period about 13 million feet of timber had to be passed through the structure, and to prevent a jam, piles were driven in W-shaped rows on the up stream side, and boom logs laid against them leading to the 15 feet openings through which was passed the whole drive without trouble or damage to the structure. After the completion of the permanent structure all the piles were cut off close to the bottom with dynamite. The permanent bridge consists of 2 ordinary type through steel spans of 140 feet each, built by the Dominion Bridge Co. The substructure of 2 abutments and 1 pier were built of 18 and 24 inch courses of granite brought from near McAdam Junction and laid with Portland cement mortar. The abutment masonry rested on a grillage of timber supported on piles. As piles could not be successfully driven in the centre of the stream owing to the hard bottom of cemented gravel, a cofferdam was built and the bottom excavated to a depth of 7 feet; on this 4 courses of timber were laid and the masonry built on this. Across the Rivière du Loupuro two 100 feet steel through spans of the same type as the last mentioned, and built by the same company.

The substructure consists of 3 piers of masonry built of field stone found in the vicinity, the courses were 15" and 18" thick and laid in Portland cement mortar. The foundations were of piles driven 25 feet into tough blue clay and cut off level with the bottom of the river, and capped with a grillage of timber on which the masonry rests. All the box and beam culverts except 2 of dry masonry were built of cedar, of which there is an abundance in the neighbourhood, of very good quality. Pile trestles usually had 4 piles to a bent, with bents 12 feet centres, caps 16 ft long 12"x12", stringers double 12"x10" one on top of the other and long enough to span 2 bents so as to break joints; ties 12 ft long 8"x8" placed 8 inches apart; guard-rails 8"x6" notched down on the ties, and the whole structure braced longitudinally and transversely to suit its height. In trestles the bents were placed 15 ft. centres, sills and posts were of 12"x12" timber; stringers double 12"x10" one on top of the other, with blocks between, and bolted; caps 14 ft x 12"x12"; ties, 12 ft x 8"x8"; double guard-rails 10"x6" and 8"x6", the outer one being bolted through to a jack-stringer 8"x8" resting on corbels 5 ft x 14"x8"; vertical braces 9"x4" girts, wallings and horizontal braces 9"x6". The foundations were generally of cedar sills so as to keep the main sills out of the ground. All the timber was of pine procured in Quebec, and was of exceptionally good quality. The longest trestle was 550 ft and 50 ft high in the highest part; it had two decks, the upper part of each bent had 4 posts of 16"x12", 12" and the lower 6 posts of 12"x12" of the required length.

All piles were driven with an 1800 lb. hammer, and an Inspector was put on to record the penetration at each blow. No fixed rule or formula was laid down for stopping the driving, but the nature of the ground was carefully considered after driving a few piles, and the Inspector instructed accordingly. With a drop of 25 feet the penetration at the last blow has been allowed to run as high as 6 inches, and no structure as yet failed. Most of the rock met with was a soft slate which worked badly. The Temiscouata Highway, which was built as a military road, fortunately followed the same general route as the Railway, and afforded an easy means of access to it at many points. During construction the Engineering staff consisted of 1 Chief, 1 Division and 5 Assistant Engineers and a Draughtsman. Each engineer was allowed a man and horse and the assistants a rodman in addition, and were furnished with a house and office near the centre of their sections.

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