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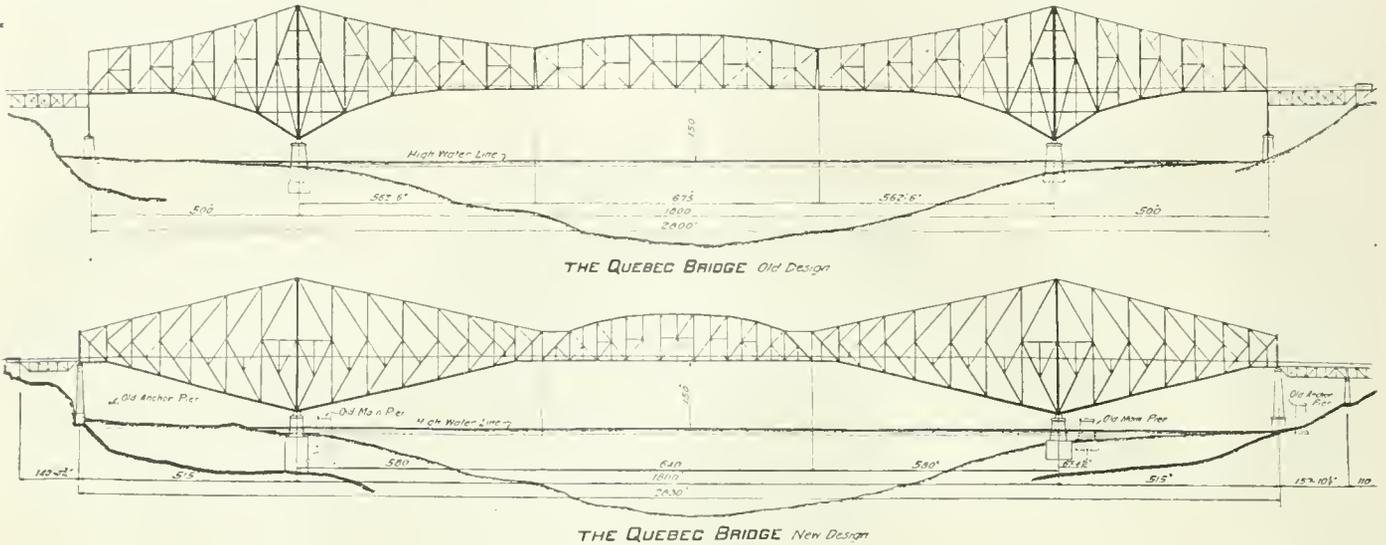
The Quebec Bridge from its Inception to the Placing of the Suspended Span.

The bridge across the St. Lawrence River, near Quebec, is an accomplished fact. The project was first discussed in 1853, but for one reason or another it was not until 1897 that a really serious endeavor was made. It took four years from the reorganization of the old company to the letting of the contracts, and six years later the bridge, when nearly half completed, collapsed. The Dominion Government then took the matter in hand and after nearly three years of investiga-

of the engineers of the then newly completed Forth bridge in the undertaking. The idea then advanced was to erect a bridge on the cantilever plan, which the erection of the Forth bridge had demonstrated to be the last word in big bridge designing. This second proposal also failed to get beyond the project stage.

The third attempt was made in 1887, when the Dominion Parliament incorporated the Quebec Bridge Co., with an authorized capital of \$1,000,000, to build a

railway, and 2 ordinary roads for vehicles and foot passengers. In 1899 the Dominion Parliament granted a subsidy of \$1,000,000 towards the erection of the bridge, and in the following year one-third of this amount was allocated to the substructure and approaches, and two-thirds to the superstructure. On Nov. 12, 1900, a contract under this legislation was signed between the company and the Railways Department. Three tenders were received early in 1900 for the build-



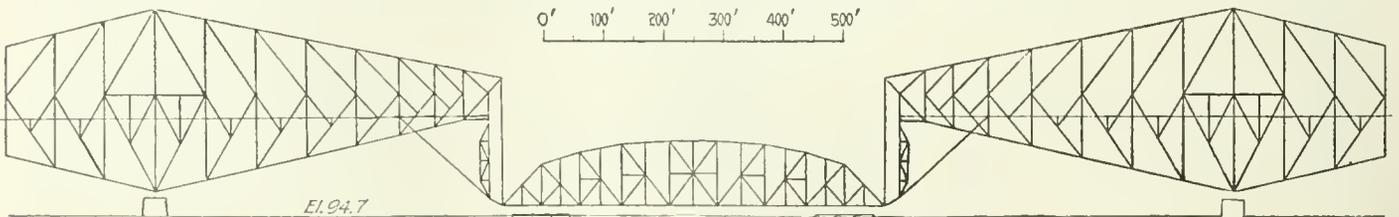
Designs for the Quebec Bridge, for the first one which failed in 1907, and for the second one now erected.

tion, over six years of construction work, and the expenditure of about \$12,000,000, the structure is now in the last stages of completion.

As before stated, the project dates back to 1853, at which date there was no other bridge across the river at any point. A New York engineer, named Serrell, made surveys and prepared plans for a railway bridge, on the suspension principle, to be located somewhere near the site of the present bridge. The estimated cost was \$3,000,000. Whether the cost was considered too great an obstacle, or whether it was a lack of courage on the part of en-

bridge across the St. Lawrence at or near Quebec, to build one or more lines of railway to connect with the bridge, to connect it with existing or future lines of railway, and provide for vehicle and foot passengers crossing the bridge. The provisional directors were: Hon. J. G. Ross, Lieut.-Col. Rhodes, R. R. Dobell, Thos. McGreevy, Lieut.-Col. J. B. Forsyth, G. LeMoine, E. Chimic, H. M. Price, J. I. Tarte and C. Duquet. The company's powers were extended in 1891, and in 1897 they were revived and confirmed, new interests led by S. N. Parent, then Mayor of Quebec, and afterwards Premier of the Pro-

ing of the bridge, that recommended for adoption being for \$3,600,000, exclusive of approaches, which were estimated to cost an additional \$400,000. The contract for the erection of the piers and abutments was let in April, 1900, to W. Davis & Son, Cardinal, Ont., at an estimated cost of \$1,000,000, the work to be completed within two years. Work was started on the substructure in Aug., 1900, the estimated quantity of masonry required to be put in place being 50,000 cubic yards. The preliminary work took up the whole of the summer and the autumn, and it was not until the spring of 1901 that the first



General Scheme for hauling the Suspended Span for the Quebec Bridge.

gineers, nothing further was done, and the first bridge erected across the St. Lawrence was built at Montreal by the Grand Trunk Ry. This was the Victoria tubular bridge, opened for traffic in 1860, and built by Robert Stephenson on the model of one he had previously erected over the Menai Straits, on the line to Holyhead, Wales, and a few years earlier the suspension bridge was built across the Niagara River, also for railway purposes. The project for building a bridge at Quebec to connect that city with the south shore of the St. Lawrence lay dormant until 1882, when M. W. Baby obtained a charter to erect a bridge. He had associated with him A. L. Light, a well known engineer, who interested some

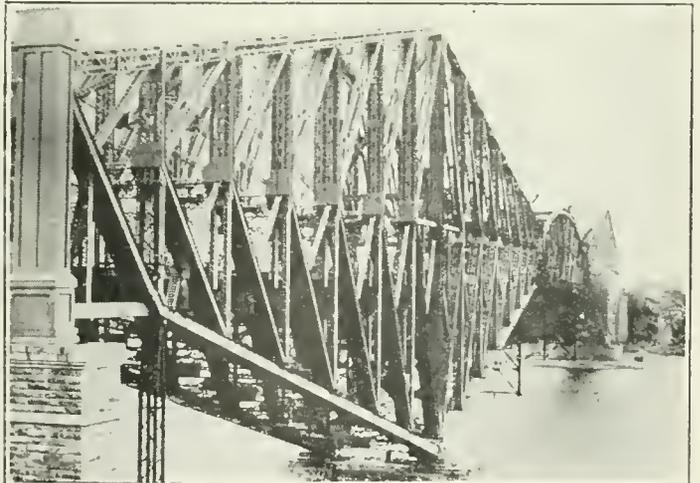
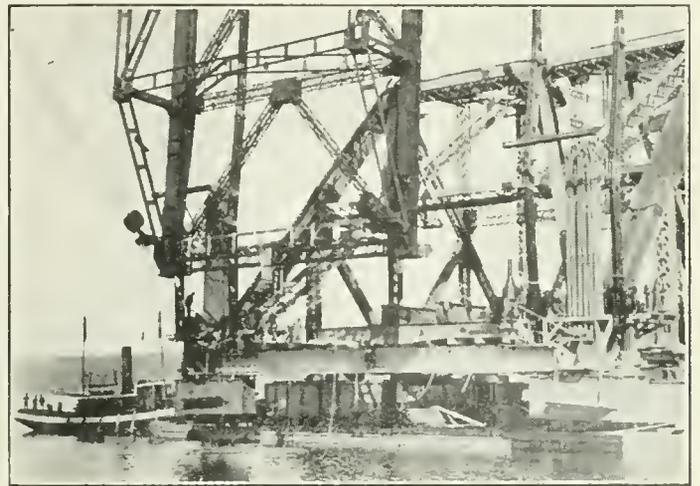
vince, having obtained control of the company. U. Barthe became Secretary of the company, and United States capitalists were interested. A New York engineer undertook the designing of the bridge, and E. A. Hoare was Chief Engineer in charge of all local work. The same site as the present bridge is built on was selected and together with the plans were approved by order in council on May 16, 1898. The plans provided for a cantilever structure, composed of 2 approach spans of 220 ft. each, 2 anchor spans of 500 ft. each, and a centre span of 1,800 ft. from centre to centre of the piers, the underside of the bridge to be 150 ft. above highwater. The bridge was to provide a double track railway, 2 lines of electric

caisson for the erection of the north pier was got into position. The contractors for the superstructure organized the Phoenix Bridge Co., of Phoenixville, Pa., to fabricate the steel work and to erect it. In 1901 that company began operations at the mills in rolling the steel and at the bridge in doing other preliminary work, and the actual construction work was started on the north side of the river in the summer of 1902. During the summer shifting sand was struck at the corner of the caisson for the south pier, resulting in delay to the work owing to the fact that the foundations had to be carried to a greater depth than anticipated in order to secure stability. The substructure work was completed at the end

of 1902, and from that time forward the erection of the steel work went on apace, and was carried on without interruption until Aug. 29, 1907, when over 1,300 ft. of the steel work had been erected from the south end. This comprised the an-

gate the cause of the collapse, and after a lengthened hearing of expert evidence, and the consideration of plans, etc., the commissioners came to the conclusion that the accident was caused by a defect in one of the chords.

Engineer of the London, Eng., County Council, and one of the construction engineers of the Forth bridge; and R. M. Jeski, Chicago, Ill. They prepared plans which were made public in Feb., 1910, and which provided for the reduction of the



Quebec Bridge. The placing of the suspended span

First row: Span being towed up the river. 2, Pinning south end of span to hoisting chain. Middle row: 3, Pontoons floating from under span, during its third lift. 4, Span as suspended at luncheon time, Sept. 17. Lower row: 5, Entire bridge, showing main span as suspended early on Sept. 18. 6, Entire bridge, with span in position, Sept. 20, 3 p.m.

chor span, and practically one-half of the central span, reaching out to within about 100 ft. of what would have been the centre of the completed bridge. The whole of the completed structure collapsed, occasioning the death of 65 men who were working on it. The Dominion Government appointed a commission to investi-

The next stage in the history of the matter was the determination to take over the bridge undertaking and to carry it to a completion as a Dominion Government work. The design of the bridge was placed in the hands of a commission consisting of H. E. Vautelet, a former C.P.R. Chief Engineer; M. Fitzmaurice, Chief

main span from 1,800 to 1,758 ft., with the necessary readjustment of the anchor and shore spans. The new plans necessitated the rearrangement of the substructure, and a contract was let to M. P. and J. T. Davis, details of which were given in Canadian Railway and Marine World for Mar., 1910, pg. 189. Bridge builders

were asked to tender on the engineers' design, but were given permission to submit designs of their own if they so desired. Several alternative designs were submitted, and after some time—the composition of the engineers' commission having been changed by the retirement of Mr. Fitzmaurice, who felt his duties to have been accomplished by the submission of the plan, and the resignation of H. E. Vautelet, who was succeeded as chairman by C. N. Monsarratt, formerly Bridge Engineer, C.P.R.—one of the designs submitted by the St. Lawrence Bridge Co., Montreal, was accepted. This plan provided for a central span of 1,800 ft., carrying a railway track and two 4 ft. side-walks. The cost of this bridge was estimated at \$8,650,000. It is of the K web-system in the cantilever and anchor arms, the suspended span being a modified Pratt. All members in the anchor arm and those immediately over the main pier, as well as the floor system, are carbon steel, the cantilever arms and suspended span being of nickel steel. The top chords are composed of built up riveted members extending over one full truss panel or two floor panels. The design has an 1,800 ft. channel span, as in the old bridge. The suspended span is 640 ft. long, 110 ft. deep

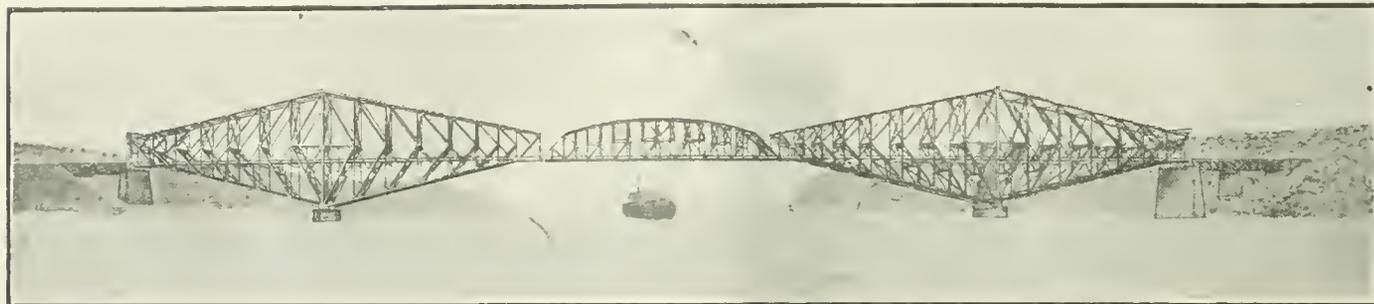
adian Railway and Marine World, Oct., 1916, pg. 417, was not changed except that extra precautions were taken in connection with the manufacture and getting in place of the hoisting apparatus, etc. A larger number of men were arranged for at the lifting jacks and at other points, and it was decided to raise the span only 2 ft. at each lift, instead of 4 ft., as was done in 1916. The scows bearing the span were towed out of Sillery basin on Sept. 17 at 5.10 a.m. and reached the bridge at 7.03, and the lifting operations were begun at 9.45. The span weighed about 5,000 tons, and this weight had to be raised so that there would be a clearance of 150 ft. at high water, thus the height to be raised would be 150 ft., less the height of the scows and the supports thereon. The hoisting proceeded steadily and with but two interruptions, once on Sept. 18 by a slight fog, and again on the following day by high wind. The final lift was completed Sept. 20, at 2.19 p.m., after which the bolting of the span into place was taken in hand. The work of laying the floor of the span and placing the rails for traffic will be proceeded with at once, and it is expected that it will be completed in two months, and the bridge formally opened for traffic about the

to C.N.R. Tariff C.R.C. no. E-860, to become effective Sept. 1st, 1917, be suspended; that cancellation Supplement 1 to C. N. R. Tariff C.R.C. no. E-156, to become effective Sept. 1, 1917, be suspended, and that the rates on pulpwood as published in C.N.R. tariff C.R.C. no. E-156, effective Oct. 2nd, 1912, be continued in effect, pending a hearing by the board.

Canadian Northern Standard Freight Tariff.

26504. Sept. 7.—Re application of Canadian Northern Ry. Company, under sec. 327 of the Railway Act, for approval of its Standard Freight Tariff C.R.C. no. W-1025, cancelling C.R.C. no. W-862. Upon the report and recommendation of the Chief Tariff Officer, it is ordered that the said tariff be approved.

Japan Buys Old Rails. Seattle, Wash., press dispatch, Sept. 19.—Large quantities of old steel rails have been bought in the northwest by Japanese brokers and shipped to Japan. In the last few weeks 2,300 tons have been shipped and additional shipments are being assembled. The brokers are paying \$70 a ton for the rails, which originally cost \$24 a ton. In turn, they are selling them to the Japanese railways for \$100 a ton.



The Quebec Bridge as completed, from the Contractors' Sketch.

at the centre, and 70 ft. deep at each end. The cantilever arms are 580 ft. long, 70 ft. deep at the end, and 310 ft. high over the main post. The anchor arms are 515 ft. long. The trusses are 88 ft. apart, and there is a clear headroom of 150 ft. above extreme high water. The train load allowed for on each track is equivalent to two E-60 locomotives followed by a train load of 5,000 lb. per lineal foot of track. The contracting company was a combination of the Dominion Bridge Co. and the Canadian Bridge Co.

Work was started promptly by the contractors, both for the substructure and for the superstructure, and everything went on so successfully that the St. Lawrence Bridge Co. expected to complete its work at the end of 1916—earlier than was estimated. Sept. 11, 1916, was set for floating out the suspended member of the central span. The first part of this work had been successfully completed, and the 640 ft. long span had been raised several feet when, owing, as was afterwards ascertained, to the failure of a portion of one of the castings in the hoisting apparatus, the span slipped, crumpled up and fell to the bottom of the river. The fullest investigation was made into the matter, and it was found that there was no defect in the span, or in the plan, and that the other sections of the bridge had received no damage from the accident. The company immediately put in hand the fabrication of the steel for a new span and to prepare for its being got into position. This was done and the new span was ready for erection at the time of the September high tides this year. The method of erection, described in Can-

middle of November.

The work of raising the span into position was supervised by Phelps Johnson, President, St. Lawrence Bridge Co.; G. H. Duggan, Chief Engineer; G. F. Porter, Construction Engineer; S. P. Mitchell, Consulting Engineer; W. B. Fortune, General Superintendent, and C. N. Monsarratt, Chairman of the Quebec Bridge Commission.

Traffic Orders by the Board of Railway Commissioners.

Interchange Track at Thorold, Ont.

26465. Aug. 24.—Re application of Niagara, St. Catharines and Toronto Ry., for approval of plan showing interchange track proposed to be constructed between the applicant's railway and the G.T.R. at Thorold, Ont., as required under the order 26186, June 5, 1917. Upon the report and recommendation of an engineer of the board, it is ordered that the plan filed by the applicant, dated July 4, 1917, be approved; the applicant to construct the tracks within three months from date of this order; and the question of the apportionment of the cost of the work to be reserved for further order.

C.N.R. Pulpwood Rates to Campbellford.

26476. Aug. 29.—Re application of Hydro-Electric Power Commission for suspension of proposed increased rates on pulpwood from stations on the Canadian Northern Ry. to Campbellford, Ont. Upon reading what has been submitted in support of the application, it is ordered that the advanced rates on pulpwood, as published on page 3 of Supplement 20

Electric Railway Department Items too Late for Classification.

A Usher, who died in Ottawa, Sept. 19, aged 59, was at one time in the old Canada Atlantic Ry. service and for the last eight years was airbrake inspector, Ottawa Electric Ry.

Joseph Gibbons, Toronto, and F. A. Hoover, Vancouver, B.C., were elected Vice Presidents of the Amalgamated Association of Street and Electric Railway Employees of America, at the annual convention at Providence, R.I., recently.

Sir Adam Beck stated recently that next year a service of hourly limited trains will be put in operation between London and Port Stanley, Ont., on the London & Port Stanley Ry. The present practice is to run every second car as a through car between the terminal points, the other car being for service to all intermediate points. The only intermediate stop made by the through cars is at St. Thomas.

Guelph Radial Ry.—In order to provide accommodation for traffic to the Military Convalescent Hospital at Guelph, an arrangement is reported to have been made with the Toronto Suburban Ry. for running rights over a portion of its line. This will necessitate the making of a connection between the G.R.R. and the T.S.R. and between the latter railway and the hospital grounds. It is proposed to provide a 20 minute service between the city and the hospital. The cost of operating the service is estimated at \$8,000 a year. (Feb., pg. 73.)