CANADIAN RAILROAD HISTORICAL ASSOCIATION
INCORPORATED.

NEWS REPORT NO. 66 — MONTREAL, CANADA — APRIL 1956

Notice of Meeting:

The regular monthly meeting of the Assocation will be held in room 920, Transportation Building, 159 Craig Street West, Montreal, at 8:00 PM on Wednesday, April 11th, 1956. The entertainment will be announced at the meeting.

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Coming Trips

Arrangements have been made with the Montreal & Southern Counties Railway to operate a special trip in car #104, over all lines of the system on the last day of service. The exact date has not as yet been determined, though estimates place it between the 28th of April (time change weekend) and the middle of June. Members and associates who reside out of town, who would be interested in being kept informed as to the last trip, when the final arrangements are made, are asked to drop a postcard to Mr. John Marjoribanks, Chairman, Trip Committee, C.R.H.A., P.O.Box 22, Station B, Montreal. Mr.Marjoribanks will keep this record on file, and should sudden arrangements become necessary, those who have mailed cards will be informed individually, by mail. If time permits, notice will be given in the News Report, otherwise.

AS IT IS ANTICIPATED THAT THERE WILL BE A CONSIDERABLE DEMAND FOR TICKETS ON THIS OFFICIAL LAST TRIP, PREFERENCE IN THE MATTER OF SEATING SPACE WILL BE GIVEN IN THE ORDER IN WHICH RESERVATIONS ARE RECEIVED. IT IS THEREFORE ESSENTIAL THAT YOU SEND YOUR NAME AND ADDRESS TO THE ASSOCIATION, ALSO NOTING WHETHER THE RESERVATION IS FOR YOURSELF, OR WHETHER OTHERS WILL ACCOMPANY YOU.

THANK YOU.

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BACK COPIES OF BULLETINS WANTED

Leonard A. Seton, our Honourary Legal Counsel, is seeking to complete his file of back copies of the News Reports and Bulletins. If any reader has copies of News Report 1 - 5 inclusive and #10 (issued in 1949 and 1950) and Bulletin 10 - issued 1938, which are not required, Mr.Seton would like to purchase them. His address is 354 Notre Dame Street West, Montreal.

INTERESTED IN 8 mm. MOVING PICTURES

Ted Gay, 156 Van Buren Avenue, Teaneck, N.J., U.S.A., would like to contact persons interested in railway moving pictures. He would like to obtain 8 mm. footage of Canadian and US roads and will pay cash, or has PC negatives of all roads, 35 mm. slides and 8 mm. footage to trade. Copies not wanted. Will make titles in exchange. Has many extra titles to give away.

THE SUPERSTRUCTURE OF THE OLD VICTORIA BRIDGE.

The superstructure consisted of square wrought iron tubes, large enough to permit a train to pass through the inside and, being almost entirely enclosed, it was like riding through a long, dar, iron tunnel.

Prior to the building of the Victoria Bridge and the similar but earlier Britannia Bridge, engineers knew very little about stresses in bridges and strength of materials and Robert Stephenson was forced to carry out a long and elaborate series of experiments with scale models. He found that in a hollow beam, supported at each end and sustaining a weight, the upper surface in the centre is exposed to a strain of compression, diminishing to the ends, while for the bottom surface, at the same point, the conditions are the reverse, becoming tensile. -- the sides acting as struts or braces to prevent those opposite strains approaching each other. In a beam of this description, therefore, the excess of strength must, on the top and bottom, be in the centre and diminish as the ends are approached; while on the sides, the conditions are again reversed, the centre requiring the minimum of strength necessary for connecting the top and bottom, with an increase as the ends or bearings were reached. To accomplish the required distribution of material in the different parts of the tube, wrought iron plates of various thicknesses were used: -- 5/8", 9/16", 1/2", 7/16", 3/8", 5/16" and 1/4" -- the thicker parts being used in the parts requiring greater strength, and vice versa.

Each tube was 516 feet long and rested on three piers; it was securely bolyed to the masonry of the pier in the centre, on which it had a colid bearing of 16' x19', and free bearings on each of the two contiguous piers of 7½' x 19'. To provide for expansion and contraction, the ends rested on fourteen rollers, six inches in diameter and three feet in length, with cast iron bearing plates on the top of the piers and similar plates bolted to the under side of the tube.

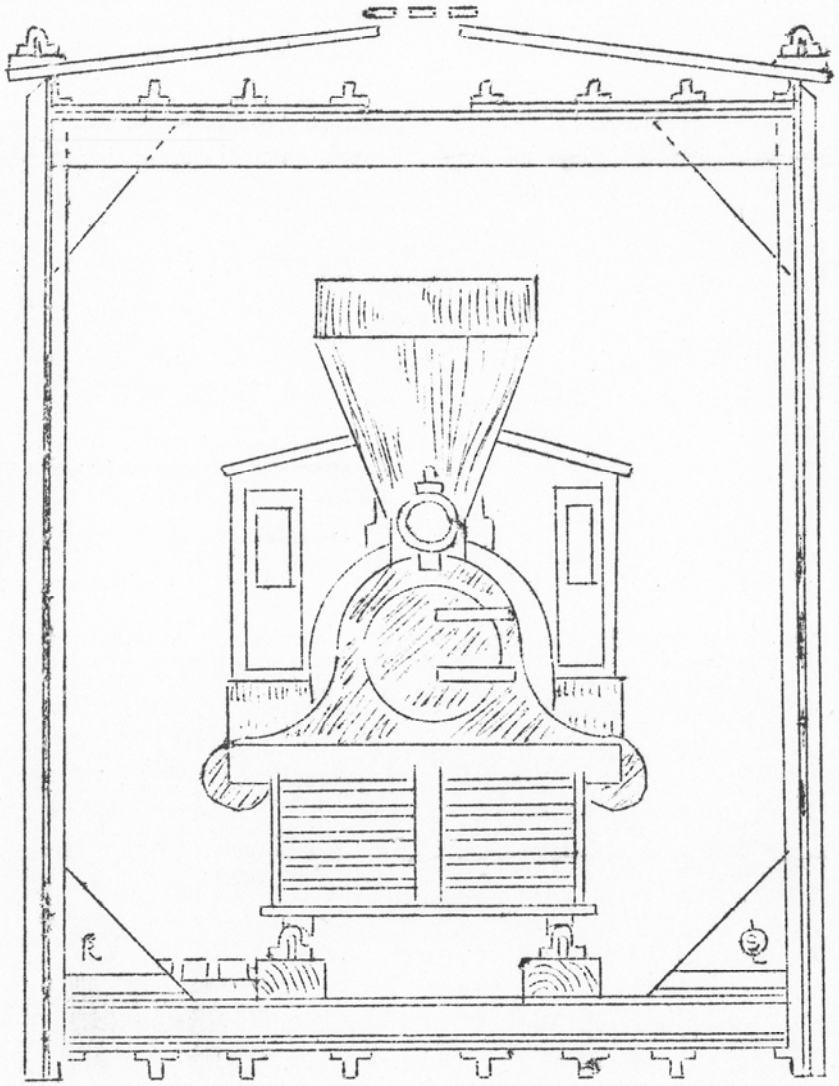
The sides of the tubes were made of wrought iron sheets, 3'6" wide, and put together with vertical spaced butt joints, strengthened by T bars inside and out and rivetted through.

The bottoms of the tubes consisted of iron plates running longitudinally with butt joints reinforced with angle and T bars on the under side. Keelsons, made of 10" I beams, were placed transversely on top of the bottom plates, spaced 7 feet apart, and rivetted through to the reinforcing T and angle bars underneath. The keelsons were also attached to the inner T bars of the sides of the tubes by lap joints and gussets.

The tops of the tubes were supported by transverse 10" T bar keelsons, also spaced 7 feet apart and similarly attached to the T bars of the sides by lap joints and gussets. The top plates were laid longitudinally, rivetted to the transverse keelsons, and the longitudinal butt joints strengthened by inverted T bars. There was a continuous opening, 2 feet wide, along the centre line of the tops of the tubes, to permit the escape of smoke and gases

from the smokestacks of the locomotives. The effectiveness of this vent was, however, nullified by the roof which was built over the top of the tubes. For this reason, the smoke and gases lingered unpleasantly in the Stygian darkness of the interior of the bridge.

To protect the tubes from rain and snow and to prevent oxidization, it was originally intended to cover the top of the tubes with a curved corrugated iron roof but this design was abandoned



and a sloping angular one substituted, composed of tongued and grooved boards, covered with the best quality of tin. A footwalk, 26 inches wide, extended along the top of the roof, and rails along each top edge carried the painting-traveller.

The erection of the superstructure started in the spring of 1857 and was completed in the autumn of 1859; the time required for each span being about ten weeks.

Heavy staging was required for the erection and this had to be very solid to prevent subsidence during the course of the work.

The staging consisted of Howe trusses, the ends of which rested on corbels left for them in the masonry of the piers, and the middle was supported in some cases on scows, 20 x 60 feet, sunk and kept in place by spuds and, in shallower parts of the river, on cribs built up from the river bed. The lower chords of the Howe trusses carried a platform of 3 inch planking, resting on cross timbers. This platform was 39 inches below the line of the under side of the tube to be built thereon. The upper chords of the Howe trusses carried rails on which the erecting travellers moved.

The ironwork was fabricated by Peto, Brassey, Betts and Jackson in the Canada Works, Birkenhead, England. Detailed erection plans were provided and each piece was carefully marked with its location and erection number. On arrival at the bridge, the pieces were stacked in a systematic manner so that needed pieces could be found easily. In each span there were about 5000 pieces and about half a million rivet holes and the fabrication in England was so accurate that the pieces fitted together with only a few minor adjustments. At first, drift pins were used to line up the rivet holes but this was prohibited by Stephenson's inspectors and subsequently all non-fitting holes were reamed. First, the bottom plates were laid, to camber adjusted by oak wedges on longitudinal timbers, and then the erection of the sides followed, starting at the centre; finally the top plating followed the erection of the sides as closely as possible. Large sections were rivetted together on shore, where the work could be done more easily, and then the sub-assemblies were carried out to the spans by the travellers.

Each tube extended over two spans, fixed on the centre pier and having expansion rollers at the ends, and the first few were erected as one, but when the wedges were removed and the tube swung, there was unexpected tension at the top and partial compression at the bottom. Later the spans were erected and swung separately and allowed to settle for ten days before they were joined. They were connected at daybreak when the temperature was uniform throughout.

The camber for span No.1 was set at 3 inches, which left a slight sag when the span was freed, so span No.2 was set at 6 inches which left a rise of 3 inches at the middle when it was swung. Finally $4\frac{1}{2}$ inches was adopted for setting camber, resulting in a perfectly level floor. The permanent track through the bridge was laid with 63-pound "U" rails, resting on 12x14 inch continuous longitudinal timbers, with cross ties every 14 feet. The timbers were bolted to place at the rest piers but elsewhere they were notched over the floor keelsons to allow for expansion. The rails were fasted down with dogs, with 14 lb. rolled iron chairs at the joints. A four-foot footway extended along one side of the track.

Windows were cut in the sides, every 60 feet, but they quickly became covered with soot and the panes were broken too often, so they were removed and the openings covered with removable iron plates having a pattern of round holes drilled in them.

The expansion and contraction in the ironwork, due to changes in temperature, was almost incredible, and careful records were kept for the future guidance of engineers. On hot summer days, the temperature on the top of the tube might be as much as 35^{0} higher

than the temperature underneath and this would cause the tubes to arch their backs like a row of angry cats on a fence. The maximum of such increase in camber observed in one day was 1¼" with a temperature of 124° on top and 90° at the bottom. The maximum observed longitudinal expansion in one tube, with a temperature range of 27° to 128° was ¾ inches, which meant that, in the whole length of the bridge, the length of the ironwork increased by more than 40 inches, in the course of a winter, spring and summer ! The observations were made by T.D.King who made the bridge record its own movements by means of flat strips of metal or wood attached to the end of one tube and extending past the end of the adjoining tube. These strips were calibrated in inches, but Mr.King also calibrated some of them in degrees of temperature and thus claimed that the bridge was an accurate thermometer. Modern meterrologists might think otherwise.

On November 24th, 1859, Vice President Blackwell was on his way back to England to attend a meeting of the Directors of the Grand Trunk Railway of Canada, and, accompanied by a large group of company officials, he crossed the bridge on a work train, and was thus able to report that he had come "via the Victoria Bridge". The last span, No.14, was completed on December 12th, 1859, and the bridge was opened for traffic on December 17th, 1859. On August 25th, 1860, the last stone was laid and the last rivet driven by the Prince of Wales, and the job of creating the eighth wonder of the modern world was completed.

(Next month, that part of the series of "Crossing the River" pertaining to the Victoria Bridge will be concluded, when Mr.Brown recounts a humourous anecdote dealing with it.)

Ed.Note: Some years ago, we carried a verbatim transcription of the original report of the Inspector of Railways, dealing with the testing of the bridge in December, 1859. As a supplement to the foregoing, we are reprinting this report once again, for the benefit of those who may not possess the original News Report carrying this information.

Brockville, December 18, 1859.

J.G. Vansittart, Esq.,
Secretary, Board of Railway Commissioners,
Toronto.

Sir,

I have the honour to report, that in compliance with the instructions from the Honourable the Receiver General, acting Chairman of the Board of Railway Commissioners, conveyed to me in your letter of the 14th instant, I left Quebec on the 15th and made my examination of the Victoria Bridge on the 16th, and of the Branch leading to it from the main line at Charons Station, on the 17 th instant, and finding both Bridge and Branch perfectly safe for public use, the new line across the Bridge was this day opened for public traffic.

The test applied to the tubes of the Victoria Bridge consisted of a train of 18 platform cars loaded with stones as heavily as they would bear, and drawn by two Locomotive Engines coupled. This train was long enough to reach over two spans at one time and weighed, as nearly as could be ascertained without platform scales to weigh the cars, about one ton to the lineal foot. In passing this train over the Bridge, a load of 242 tons was laid on each of the side spans, and 330 tons upon the central span.

The side tubes being in pairs reaching from the abutment to the second pier, from the second to the fourth, and so on; they were submitted to a different test from the central one. The load, or forward part of the train was brought upon the first half, then the whole train covered the whole tube, and lastly the rear part of the train rested upon the second half, and the effect noted each time, both in the middle of each half and at points midway between the middle and bearings, making six observations upon the tube each time of marking.

The tubes covering the 14th and 15th spans being yet unfinished and unconnected over the 14th pier, were, of course, on this occasion, treated like the central one as independent tubes.

A remarkable uniformity was observed in the effect of this load upon all side tubes that were completed. When both halves of the tube were loaded, the deflection in each span was five eighths (5/8) of an inch, but when it rested on one half only, that half sunk three quarters ($\frac{3}{4}$) to seven eighths (7/8) of an inch. The central and separate tubes deflected one inch and a quarter under a load of a ton to the foot.

When the train was sent over at speed, the observed deflections did not exceed those just stated, more than the eighth part of an inch, and in all cases, when the load was removed, the tubes returned immediately to their former position, thus proving in the most satisfactory manner, that they were entirely unaffected by the passing of a load which was double that of the heaviest freight train that will ever cross the Bridge.

It may be here remarked that the tubes of this Bridge were designed to sustain practically, a load of one ton per lineal foot throughout their length, in addition to their own weight, under which load, the horizontal strain was not to exceed five tons of tension to the square inch on the bottom, or five tons of compression to the square inch on the top. The test load applied was as near the intended load as it well could be.

These tubes present the finest specimen of Engineering skill and workmanship to be seen in any part of the world, and the public may have entire confidence in their strength and durability.

The preparations for testing the tubes in the manner before described, had been made by the contractors Agent, Mr.Hodges, at the instance of Messrs. J.D. Bruce and B.P. Stockman, Engineers from the late Robert Stephenson's office, in London, who had been sent out from England to examine and report on the Bridge. The testing was commenced by them on the 15th instant,

accompanied by Mr. A.M.Ross (the Engineer in charge,) and by Mr. James Hodges, and was completed in my presence on the 16th instant. In reporting my entire satisfaction with the test applied and the sufficiency of the tubes, I desire at the same time to express my admiration of the simplicity and accuracy of the means adopted for observing the effect of these weights upon the Bridge, and of that perfection of workmanship in the tubes themselves, which are thus made to shew so slight a deflection, under such heavy loads.

I have the honour to be, Sir,

Your obedient servant,

SAMUEL KEEFER,

Inspector of Railways.

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What was for many years Canada's one-way railway passenger service is no more. The Roberval-Saguenay Railway has now joined the "freight-only" carriers and passenger service on the 21-mile run from Arvida to Bagotville has been discontinued, in spite of the fact that mixed train operation is still shown in table 83 of the Canadian National system folder.

President Donald Gordon of the Canadian National Railways has announced plans to purchase another fourteen Budd-built "Railiner" RDC cars, presumably during 1956. Service in which the cars are to be used, or the individual types has not been disclosed as yet.

Passenger train pool services, long a feature of passenger operations between Toronto and Ottawa, Toronto and Montreal, and Montreal and Quebec on both CPR and CNR lines, are now under review by the Canadian National Railways. Reports indicate that both increases and curtailment of these services have been under recent discussion.

The April 29th timetables will bring a number of drastic revisions in passenger service. Among the most notable on the CPR will be the discontinuance of Montreal-Vancouver local trains 17 and 18, the last remnant of the once-proud "Imperial Limited". To replace them, a hodge-podge of locals will be put on, similar to the service which exists on the CNR transcontinental route. The present Rigaud local trains 516 and 523 will operate to and from Ottawa instead of Rigaud. This will qualify it as the longest suburban run in Canada. Laurentian mountain services will be revamped and operated mainly by RDC units. Passenger service on the St.Lin Subdivision is to be discontinued. Except-Sunday trains 311-312 between Moose Jaw and Macklin, Sask, will run three times weekly.

Canadian Pacific announces that a new wing will be added to the Royal York Hotel in Toronto. The 400-room extension will be built on the present parking lot, at the east end of the present building. Convention and dining facilities will be extended to assure that the Royal York will not lose its place as the British Commonwealth's largest hotel. The new wing is to be ready late in 1958.

CANADIAN RAILROAD HISTORICAL ASSOCIATION, INC.

News Report No. 66
April 1956

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Recent order for equipment for the Pacific Great Eastern Railway includes four 49-passenger RDC3 and three 90-passenger RDC-1 units which will operate between North Vancouver and Prince George, a distance of 470 miles. The RDC3 units will have a small buffet section to provide meal service on the 16-hour run.

★ Canadian Pacific Railway has undertaken an extensive scrapping programme for wooden and steel-sheathed passenger cars. The following cars have recently been scrapped:

21 suburban passenger cars.
11 1st class coaches.
3 second class coaches; 2 second class & smoking cars;
6 QCR first class cars; 6 steel sheathed colonist cars;
1 steel sheathed tourist car; 2 steel-sheathed sleeping cars;
11 steel sheathed dining cars. The same company is also preparing to scrap some of its heavier steam locomotives, such as those in the G3a, G3b, P2a and T1a classes.

★ Meanwhile, the oldest remaining locomotive on the CPR has been given a No.1 repair at Angus Shops. No.136, although the most modern-looking of the three 4-4-0's, is actually the oldest. It was built by Rogers in 1883 and rebuilt in 1914.

★ Two of Canadian National's tank engines have wandered rather far afield in recent months. No.47 has taken over the St.Hyacinthe-StLeonard local passenger trains 241-242-243 while No.48 hauls local passenger trains between London and Sarnia. The latter was assigned to Allandale last summer, but apparently it never saw service at that point.

★ Dominion Steel & Coal Co. has purchased five more second-hand steam locomotives for its railway subsidiaries. Chicago & Illinois Midland Ry. No.541 was sent to the Cumberland Railway & Coal Co. at Spring Hill, NS No.547 went to Old Sydney Collieries at Sydney Mines, while the Sydney & Louisbourg received Pittsburgh & Lake Erie Nos.8011, 8029 and 8040.

★ Canadian National Railways have made a break with former practice by selling at least twelve engines to the Steel Company of Canada at Hamilton, and one to Loudee Steel Co. at Ville St.Pierre, for scrap. No.4200 was the engine scrapped by Loudee.

★ Canadian National's far-flung operations include quite a few oddities and still finds room for a side-wheel carferry. The SS "Lansdowne" is still in regular service between Windsor and Detroit, having been built by Wyandotte in 1884 for the Grand Trunk Railway. It is 294 feet in length, 41'3" in breadth and draws 13feet of water. It is powered by 1000 hp engine

ARTICLE ON CANADA ATLANTIC RY. ENGINES TO APPEAR NEXT MONTH.