

**REPORT ON THE GAUGE  
FOR THE ST. LAWRENCE  
AND ATLANTIC RAILROAD**

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Report on the gauge for the St. Lawrence and Atlantic railroad by A. C. Morton

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**A. C. MORTON**

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REPORT

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ON

T H E G A U G E

FOR THE

ST. LAWRENCE AND ATLANTIC RAILROAD,

BY

A. C. MORTON, Esq.,

CHIEF ENGINEER.

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PORTLAND:  
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1847.



# R E P O R T .

ENGINEER DEPARTMENT, }  
Montreal, Sept. 20, 1847. }

HON. A. N. MORIN,

*President St. Lawrence and Atlantic Rail-Road Company.*

SIR,—The Act to amend the Act incorporating the St. Lawrence and Atlantic Rail-road Company passed at the late Session of the Provincial Parliament, 10th and 11th Victoria, Cap. 65, provides,

“That the Gauge upon which the said rail shall be constructed, and which shall be used in the said railway, shall be four feet eight and one half inches, unless within six calendar months, the Governor of this Province in Council, shall, by Order in Council, determine upon any different Gauge, and that, upon communication to the said company of any Order in Council, establishing any different Gauge, the Gauge so established shall be the one used in the said road as if the same had been established in and by this Act.”

The Charter of your road contemplates a connection at the boundary line with another road belonging to an American Corporation, the two forming a perfect line to the Atlantic coast.

It therefore became necessary in the early stage of these roads that the subject of the Gauge should be jointly considered by the two corporations.

After a careful consideration of the question by a convention of Directors from each corporation, Articles of Agreement were entered into relative to the general plan of construction, &c., dated April 17th, 1846, in which among other things it is provided (Article 5th) “that the Gauge shall be that of five feet six inches in the clear between the rails.”

As this Gauge differs from that embraced in the recent Act of Parliament, it is proper that I should state the reasons which influenced me in recommending its adoption for your road.

The question of the best Gauge for Railways has within a few years, been much discussed, and it is a subject upon which much difference prevails. The agitation of this question did not, however, take place until railway improvements were far advanced, involving a vast expenditure of money; and it is not surprising that under these circumstances, there should be a difference of opinion as to the propriety and expediency of a change.

In an abstract view of the subject, I believe Engineers generally consider that a wider Gauge than the prevailing one is desirable, to meet the requirements of the present advanced state of railway improvement.

With our present knowledge of Railways, were a new system to be commenced free from interest and the prejudices of Engineers committed to a particular width, there can be little doubt but that a different Gauge from that of four feet eight and a half inches would be adopted.

This Gauge had its origin from no scientific investigation of the subject, but from mere accident, it having been in use at a very early date on tram-roads, upon which the ordinary wagons of the country ran.

From these it was copied for several Coal roads, and afterwards for the Stockton and Darlington, and Liverpool and Manchester Railways, which were the first constructed for passengers and general traffic.

This Gauge having been adopted for the first important road in England, was copied or extended by branches or other lines without any investigation of its merits till several hundred miles were built.

In the United States the same Gauge was usually adopted, and not without very good reason, for it was supposed that the experience already obtained in England, from having first introduced Railways generally on this Gauge, was sufficient evidence of its possessing all the requisite advantages.

As the first Locomotive Engines used in the United States were imported from England, it was doubtless considered advisable, both as regards economy and convenience, that they should conform to those already in use in that country, and this may have been a strong reason for adhering to the same Gauge.

The Great Western road in England was, I believe, the first constructed on what is now termed the Broad Gauge, although an increased width of track had previously been proposed in the United States, and in a few instances adopted.

The South Carolina road, which is 136 miles in length, and was completed in 1833, has a Gauge of five feet.

The propriety of an increased width of track was laid before two or three Rail-road Companies, in the State of New York, in 1834 and 1836, one of which adopted a width of track of six feet for its road which extends from New York to Lake Erie, a distance of 450 miles.\*

There are 63 miles of this road in operation, and the construc-

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\* E. F. Johnson, Esq., Civil Engineer, as early as 1834, communicated his views to the Auburn and Syracuse Rail-road Company, as to the propriety of an increased width of track, and subsequently in able reports to the New York and Erie, and the New York and Albany Rail-road Companies, advocating the wide Gauge.



tion of a large portion of the remaining distance is rapidly progressing.

Nearly all the remaining roads in New York have a Gauge of four feet nine inches.

Those of New Jersey, Ohio and Mississippi are four feet ten inches. The New Orleans and Nashville road, Louisiana, is five feet six inches, and all the roads of South Carolina, Georgia, and Florida, of which there are nearly 900 miles now in operation, have a width of track of five feet.

In nearly all the remaining States, the Gauge of four feet eight and a half inches has been adopted.

In considering the question of Gauge for your road, it is important not only to take into view the comparative merits of various widths of track, but the ultimate design of the road, the nature of the country through which it passes, and its connection with other lines; also, the state of railway improvements in the Provinces, the probable effect their construction will have on the business of the Canals, and finally, the position of Canada, commercially, and the benefits that will flow from the adoption of a judicious and well matured system of Railways.

The primary object of your road is to open the shortest and most direct communication between Montreal and the Seaboard, affording facilities at all seasons of the year for the transmission of merchandize, passengers, and the public mails, commensurate with the wants of a great commercial public.

A glance at a map showing the Atlantic coast, the St. Lawrence valley and the upper lakes, will impress the most casual observer with the important position of your road.

In connection with the Portland Road, it forms a continuous line from the St. Lawrence at Montreal to the Atlantic at Portland which is from 70 to 100 miles shorter than any other line of improvement between the points, connecting on the one hand with a long line of inland navigation including a vast and fertile territory, and terminating on the other at one of the best harbors on the Atlantic coast.

These are features in your road which give it a commanding position, and indicate that, ultimately, it must constitute the great thoroughfare and outlet for an immense trade. With a reasonable degree of assurance that these results will be realised, it appeared to me the part of wisdom that you should in determining on the plan of the road avail yourselves of all the improvements which long experience in this species of inter-communication may have suggested.

To keep pace with the increasing facilities of transportation, to meet the demands of a rapidly increasing trade, to compete successfully with rival lines, whose object is to divert trade from the St. Lawrence valley, and the public works of Canada, seemed sufficient reasons for giving to your road an enlarged capacity.

In northern climates it has been found extremely difficult to keep railways in a proper state of adjustment, and various expedients have been resorted to with a view more effectually to guard against the effects of frost.

Efforts to overcome this difficulty have to a limited extent been successful, but it is only by constant attention and great cost that railways are retained in that state of repair required by a proper regard to safety and economy of transportation. Any inequalities in the surface of the rails from frost or other causes communicates to the cars an irregular rocking motion which adds to the resistance to be overcome and the inconvenience of passengers.

The increase of base afforded by a wider track with wheels of given size, lowers the centre of gravity and allows greater ease and steadiness of motion in the cars, and consequently less wear and tear both to the machinery and the road, and less danger of accidents.

With a view to the better accommodation of passengers, many railway companies in the United States have ordered cars of increased dimensions, some of which are  $9\frac{1}{2}$  feet wide, yet this increase is strongly opposed by car builders and is well known to operate unfavorably from the too great overhanging weight.

On long lines it is desirable to have large and well ventilated cars which will permit each passenger to have a separate seat with arms upon which he may lean, and room sufficient to change his position-without incommoding or annoying the person in the adjoining seat; comfortable saloons should be provided for ladies and children, and the passage ways through the car should be sufficiently wide to permit passengers to walk about and pass each other conveniently. With the narrow Gauge these objects cannot be accomplished; but with the width of track adopted for your road, these improvements may be readily made, and still the motion of the cars with this increased width will be easier than that of smaller cars on narrow Gauge roads.

Your road will furnish a cheap and expeditious conveyance for emigrants, by which they will be enabled to reach their place of destination at the most favorable period for securing a crop the first season of their arrival in the country.

The transportation of emigrants will undoubtedly constitute an important branch of business, and for the second class cars the additional width allowed by a wider Gauge, will permit an increase in the number of seats, and the most advantageous arrangement for a larger number of passengers in a given number of cars. The weight of car per passenger carried would in this case be less than on narrow Gauge roads. For first class passenger cars it is preferable to give superior accommodations, which increases the number of passengers and the revenue of the road even though the weight of car per passenger should be slightly increased.

This however with your Gauge remains a matter of choice; for

you may have the same weight of car with the inferior accommodations of the narrow Gauge or by a very small increase of weight furnish the most superior accommodation.

This is not a question whether the company shall construct narrow and inconvenient cars because they may cost or weigh less, but it is a question in which the public are interested and have a right to claim the best accommodations which the Gauge will permit. Besides it is well known that passengers are attracted in greater numbers to that road which gives the greatest accommodations; and therefore it becomes directly the interests of the company to offer every inducement which shall secure the patronage of the public.

On the Great Western Railway in England, which has a Gauge of seven feet, the weight of car per passenger carried, is no greater than the average of the London and Birmingham, Grand Junction, Dover and Brighton, South Western and Midland Company, but affords far superior accommodation to passengers.

On the New-York and Erie Railway, in the state of New-York, which has a Gauge of six feet, the weight of car per passenger carried is 35 pounds less than on the narrow Gauge roads there, and affords equal room for each passenger.

The nature of the business to be done on your road, will undoubtedly nearly resemble that of roads in the northern part of the United States; and it is supposed that first class passenger and merchandize cars of a similar character to those in use there, will be found more appropriate for your road than cars of any other description. In reference to freight cars, it is believed that the wider Gauge of 5½ feet will be found to afford superior advantage to those of the narrow track.

A greater width of car may be adopted, which is better calculated for carrying all kinds of freight: much of which will be bulky.

The articles which would be transported to better advantage on large cars, are various kinds of light machinery, furniture, charcoal, hay, cattle, horses, calves, hogs, sheep, cotton, hops, wool, &c.

From the bulky character of such freight, it will doubtless often be necessary to limit the load below the tonnage which should be carried by each car, for want of space, and in such case a loss of power is sustained; for the number of cars in the train will be increased and their weight will compose a larger part of the gross load. With larger cars a less length of train would be required for the same tonnage, thereby lessening the resistance to be overcome from side winds, which increases with the length of the trains.

The resistance of a train in passing curved portions of a road, is also considerably lessened by diminishing its length.

Increased width of cars, gives greater advantage in hauling a given load under the same circumstances; for it is well known that