

1853.

VICTORIA.

GAUGE OF RAILWAYS.

CORRESPONDENCE WITH REFERENCE TO THE GAUGE OF RAILWAYS.

LAI'D on THE COUNCIL TABLE by THE COLONIAL SECRETARY, by command of HIS EXCELLENCY THE LIEUTENANT GOVERNOR, and ordered by THE COUNCIL to be printed, 31st August, 1853.

[COPY.]

M. 9, 981.
51 | 6.

NEW SOUTH WALES,
Colonial Secretary's Office,
Sydney, 11th July, 1851.

SIR,

Referring to the communication which I addressed to His Honor the Superintendent of Port Phillip, on the 5th July, 1850, No. 404, I have now the honor to state, for the information of His Excellency the Lieutenant Governor of Victoria, that the Governor General has received a Despatch from Earl Grey, in which, in deference to the expressed preference of His Excellency and the Executive Council, His Lordship has stated his intention of no longer opposing the adoption for Railroads in this Colony of the gauge of five feet three inches, prescribed by the Act 9 and 10 Victoria, cap. 57, for Railroads in Ireland, instead of the narrow gauge of four feet eight and a half inches, which had been recommended in a previous Despatch from his Lordship. Copy herewith.

2. As his Lordship states that he has intimated that decision to the Governors of the other Australian Colonies, I need only add, that it is the intention of the Governor General to introduce a Bill into the Legislative Council during the next Session, for the purpose of ensuring the adoption of the Gauge now approved in all Railroads constructed in this Colony.

(Signed) E. DEAS THOMSON.

The Honorable the Colonial Secretary,
Victoria.

No. 13.

[COPY.]

Downing-street, 14th February, 1851.

SIR,

I have received your Despatch, No. 131, of the 12th July last, in which you report the preference given by yourself and the Executive Council to the gauge of five feet three inches prescribed by the 9th and 10th Victoria, cap. 57, for Railroads in Ireland, over the narrow gauge adopted for the English lines.

I have communicated on the subject with the Railway Commissioners, and I transmit to you a copy of their report.

Under all the circumstances of the case, I will not oppose the adoption of the gauge for which both yourself and the Executive Council have expressed a decided preference, and I have intimated that decision to the Governors of the other Australian Colonies.

I have, &c.,

(Signed) GREY.

Governor Sir C. Fitz Roy.

M. 10.630.
No. 52 | 63.

NEW SOUTH WALES,
Colonial Secretary's Office,
Sydney, 23rd August, 1852.

SIR,

Adverting to my letter of the 11th July, 1851, on the subject of the adoption for Railroads in this Colony of the uniform gauge of five feet three inches, I have now the honor, by direction of His Excellency the Governor General, to transmit to you for your further information, two copies of an act which has lately been passed for regulating the gauge of Railways in this Colony. 16 Victoria, No. 5.

I have, &c.,
(Signed) E. DEAS THOMSON.

The Honorable
The Colonial Secretary, Melbourne.
A.—No. 8. c.

M. 10. 983.
No. 53 | 9.

NEW SOUTH WALES,
Colonial Secretary's Office,
Sydney, 2nd February, 1853.

SIR,

Adverting to my letter to you of the 23rd of August last, on the subject of the guage for Railways in this Colony, I have the honor to inform you that a communication has been received from the President of the Sydney Railway Company, enclosing a copy of a letter from the Engineer in Chief to the Company strongly deprecating the introduction of the Broad Guage for Railways in this Colony which has been legalized by the local enactment 16 Victoria, No. 5.

2. It appears from the President's letter that in practice the advantages that were anticipated by the increase of the Guage from four feet eight and a half inches to five feet three inches have not been realised, while the inconveniences of adopting a guage which has very much gone out of favor are stated to be great.

3. Under these circumstances and on a full reconsideration of the matter, His Excellency the Governor General has, under the advice of the Executive Council, directed that the proper steps be taken for a repeal of the Act in question, and I have therefore to request that you will intimate this intention to His Excellency the Lieutenant Governor of Victoria.

I have, &c.

(Signed) E. DEAS THOMSON.

P.S. For your further information I have the honor to enclose an extract from the letter of the Engineer in Chief to the Board of Directors of the Sydney Railway Company, setting forth the reasons which have induced him to request a reconsideration of the subject.

The Honorable

The Colonial Secretary, Melbourne.

Extract referred to in Colonial Secretary's letter of 2nd February, 1853, to the Colonial Secretary, Melbourne.

"When the Commission appointed to enquire as to the best guage to be adopted in Ireland gave the preference to one of about 5 feet 3 inches, it was under the impression that more powerful locomotive engines might be used by giving greater space between the rails for the application of the machinery. In practice it has been found that no advantage commensurate with the increased expense has been attained, and the improvements which have been made in the narrow Guage Engines of late years, have given them ample power for the heaviest traffic in England, as proved in working the London and Western Railway, where the traffic receipts amount to £50,000 per week.

The increase of cost in the 5 feet 3 inches Guage arises chiefly from the Companies being driven into a very limited market for their Rolling Stock, or to becoming themselves manufacturers, in either case at a sacrifice of from 20 to 30 per cent.

The Narrow Guage has been found to combine in a higher degree than any other, the great commercial requisites for a Railway, namely, speed, safety, convenience and economy. For these reasons it has been adopted with little exception throughout Europe and America. And in India and Egypt, where the highest engineering talent has been employed, had a wider guage been considered an improvement it would no doubt have been adopted; but such has not been the case. In both these countries the narrow guage has been determined on."

[COPY.]

G. B. 3199.
53 | 8666.

VICTORIA.
Colonial Secretary's Office.
Melbourne, 28th July, 1853.

SIR,

In reference to your letter of the 3rd February last No. 10,983, to which I did myself the honor briefly to reply on the 11th March, I am now commanded by His Excellency the Lieutenant Governor to inform you that the subject of the width of guage for Railways, therein adverted to, was brought under the notice of the several Railway Companies incorporated in the Colony.

2. His Excellency having given his particular attention to the reports elicited from these and other sources, has directed me to state to you for the information of His Excellency the Governor General, that he cannot feel himself at liberty to advocate the adoption of the narrow guage.

3. This opinion Mr. La Trobe will feel it necessary to communicate to the Secretary of State for the Colonies, and in order to afford to His Excellency Sir Charles Fitz Roy some information as to the reasons which have led the Lieutenant Governor to this conclusion, as well as in accordance with a promise to that effect made to the Chairman of the Geelong and Melbourne Railway Company in his reply to the notification to him of the tenor of your letter above alluded to, His Excellency has instructed me to furnish you with a copy of the Report of the Engineer of that Company on the subject.

I have, &c.,
(Signed) JOHN FOSTER.

The Honorable
The Colonial Secretary,
Sydney, New South Wales.

[COPY.]

GEELONG AND MELBOURNE RAILWAY COMPANY.

Geelong, 26th March, 1853.

SIR,

With reference to your communication of the 11th day of March instant, I have the honor to inform you that the Provisional Committee have directed me to forward to you for the information of His Excellency the Lieutenant Governor, the enclosed copy of a letter addressed to them by the Engineer of this Company, on the subject of the proposed guage to be adopted by Railway Companies in this Colony. As the interests of the Colony at large will be seriously affected by the guage which may be finally chosen by the Government, the Committee request that the enclosed letter may be laid before His Excellency for immediate consideration.

The Committee also respectfully request, that His Excellency will cause a copy of the enclosed letter to be forwarded for the information and consideration of His Excellency the Governor General.

I have the honor, &c.,
(Signed) GEO. KING,
Secretary.

The Honorable
The Colonial Secretary, Melbourne.

Geelong, March 20th, 1853.

GENTLEMEN,

I have received from Mr. King the Colonial Secretary's letter announcing the intention of the Executive to reduce the medium guage of 5ft. 3in. to 4ft. 8½in., and as, in my opinion, this change will be productive of great inconvenience, you will perhaps excuse my troubling you with a letter on the subject.

My opinion will perhaps have some weight when I inform you, that I served my apprenticeship to an eminent manufacturer of both broad and narrow guage locomotives, (Mr. Henry Stothert, of Newark Foundry, Bath, and the Avonside Iron Works in Bristol,) and that afterwards, when in the service of the Great Western Railway Company, I made the drawings and superintended the construction of every engine made by that Company, from their first engine the "Premier" to the "Iron Duke," "Britain," and other mammoth engines, one of which, the "Lord of the Isles," was placed in the Exhibition of 1851. I was also extensively engaged in the experimental trial to ascertain the comparative merits of the Broad and Narrow Guages.

I am by no means an advocate for the extreme Broad Guage of 7ft., for it is found in practice that the engines and carriages on that guage are too heavy in proportion to the weight of the passengers and goods, and that too great a proportion of the power of the engine is consumed in drawing the dead weight of the engine, tender, and train. But, on the other hand, the inconveniences of the extreme narrow guage of 4ft. 8½in. are also very great, and the improvements, so called, in narrow guage engines are but so many attempts to vie with the broad guage in speed and power; placing the driving-wheels behind the fire-box, as in Crompton's patent, using outside cylinders, and making the barrels of the boilers oval to get the requisite amount of flue surface, are not in themselves improvements, but merely the results of being confined by the narrowness of the wheels, and having, for safety's sake, to keep the centre of gravity as low as possible, they are, in short, necessary expedients to meet an unnecessary difficulty; and, if they were improvements, could be adopted on the broad guage with equal facility.

The reasons for the proposed change are given in an extract from a letter written by the Engineer of the Sydney Railways, and are briefly these.

1st. "That the 5ft. 3in. guage is an expensive one, and that the increased cost arises from Companies being driven into a very limited market for their rolling stock, or into becoming their own manufacturers, in either case at a sacrifice of from twenty to thirty per cent."

2nd. "The Narrow Guage has been found to combine in a higher degree than any other the great commercial requisites for a railway, namely,—speed, safety, convenience, and economy."

Now these objections appear to me somewhat absurd, and are, in fact, merely assertions unsupported by proof. Locomotive engines and carriages are not made on speculation and kept in the market until an opportunity offers of selling them; they are usually made to order, and are or ought to be made from drawings and specifications furnished by the Engineer of the Company requiring them, the price depending on the quantity of the material and the quality of the workmanship, and not on such a trifling matter to the manufacturer as the guage or distance between the wheels; it makes no difference to him whether the engines required are of the broad or narrow guage, as precisely the same machinery is used for their construction in both cases. We are not likely to make our own engines for a year or two, so I need say nothing on this subject further than that Railway Companies can, and do, use the same machinery and employ as skilful workmen as the private manufacturer, and they can also save the manufacturer's profit: if it costs them twenty or thirty per cent extra, why do the Railway Companies, both broad and narrow guage, build such works as those at Swindon, Crewe, and Wolverton, for the express purpose of manufacturing their own engines and carriages?

As regards speed, safety, convenience, and economy, it is not to be imagined that a small engine can run faster than a large one, or that any improvement in a narrow guage engine cannot be introduced on the broad guage, in fact the speed of the express trains on the Great Western Railway averages sixty miles an hour while running, and is higher than on any narrow guage Railway in the World.

As respects safety, I do not think you will readily believe that the narrower the distance between the wheels the greater is the stability of a carriage or engine; the reverse is notoriously the case to every one acquainted with the first principles of mechanics, and it is rather an awkward fact, that at the trial of speed between the two gauges in England, the narrow gauge engine ran off the rails, though it was a new one expressly constructed by Stevenson for the occasion, and having all the narrow gauge improvements.

The convenience to the public is a matter of opinion. I should myself prefer a roomy carriage to a small one in a warm climate like this, and I think any person who has ever travelled on English Railways cannot but have noticed the superiority of the Great Western as regards speed, smoothness of motion, and convenience, over any of the narrow gauge lines.

The 5ft. 3in. gauge is, in my opinion, quite as narrow as is consistent with speed, safety and convenience, and is, for the following reasons, preferable to the 4ft. 8½in. gauge.

We can have engines made for a gauge of 5ft. 3in. as light and cheap as any of the narrow gauge engines, and we can increase the power to any extent required without any danger. The extra width of line required, which is not more than eighteen inches, is very trifling, and in a country like this, where so little land requires to be purchased is of no consequence whatever.

When the first English Railway (the Liverpool and Manchester) was constructed in 1829, the conditions under which the engines were built were that their weight should not exceed six tons, and that they should be capable of drawing three times their own weight at a speed of ten miles per hour on a level. The public had no idea that twenty years afterwards engines would be built weighing thirty-five tons and taking one hundred tons with ease at the rate of sixty or seventy miles an hour. The gauge of 4ft. 8½in. was quite wide enough for the first locomotives, and in process of time, the Grand Junction was made to suit the Liverpool and Manchester. The London and Birmingham, Derby Junction, and Midland Counties were all made to suit the Grand Junction, and so on, and thus England became intersected in every direction with the narrow gauge lines, which could not be altered except at an enormous expense, and this is the reason of the perpetuity of the 4ft. 8½in. gauge.

But ever since the establishment of Railways the Companies have gradually increased the weight and power of their engines, and the weight of the Great Western engines has been gradually increased as follows:—

GOODS ENGINES.				PASSENGERS ENGINES.			
	Tns.	Cwt.	Qrs.		Tns.	Cwt.	Qrs.
1840. <i>Aquarius</i> ...	20	6	3	<i>Atlas</i> ...	18	5	3
1842. <i>Hercules</i> ...	22	3	3	<i>Ixion</i> ...	24	3	3
1845. <i>Premier</i> ...	24	19	0	<i>Witch</i> ...	27	13	0
1849. <i>Alligator</i> ...	27	11	0	<i>Lord of the Isles</i> ...	34	19	2

The weight of Crompton's narrow gauge engine is thirty-five tons. Thus clearly showing that the increase of traffic has constantly required more powerful engines, and as the narrow gauge Companies could not increase the width of their wheels to get room for their machinery they have been compelled to use outside cylinders, and to increase the height of the centre of gravity in their engines to a dangerous extent. Australia is, however, a new country, and one that promises to be tolerably flourishing, and to require for the future some considerable travelling facilities, so it would perhaps be as well to enquire a little into the matter before we limit ourselves to a gauge which is, in the opinion of many English engineers, a very great blunder. The mere circumstance of the Railways in Egypt and India being on the narrow gauge arises, I believe, from Mr. Stephenson, the champion of the narrow gauge in England, being their engineer; had either Gooch or Brunell been the engineer they would probably have adopted the broad gauge, and still "the highest engineering talent" would have been employed.

I will now endeavour to prove that powerful narrow gauge engines are dangerous at high speeds, if outside cylinders are used, or if the centre of gravity is not kept low in proportion to the width of the gauge.

All locomotive engines are liable to oscillation at high speeds, and the narrower the gauge the greater is their liability to leave the rails. This arises from the pressure of the motion blocks on the cross head guides, which alters the weight on the wheels during each revolution to a very great extent. I once made a set of experiments with the great engine "Peri" to ascertain the amount, and this I did, by placing her on a very accurately constructed weighing machine, which gave the weight on each wheel separately, and, I found, that with steam admitted to the cylinder at a pressure of eighty pounds to the inch, the weight on the wheels varied with the position of the cranks as follows, the engine being tried both in back and forward gear:—

	Tns.	Cwt.	Qrs.	lbs.
On the driving wheels ...	2	2	3	0
„ „ leading „ ...	1	7	3	0
„ „ tralling „ ...	0	16	3	0

Now if this effect on wheels 7ft. apart was produced by cylinders only 3ft. 8in. from centre to centre, what must it be on wheels 4ft. 8½in. apart, and the oscillating force acting at the extremity of the axles? At all events no harm can arise from our having a little elbow room for our machinery, and if we should only require light engines for our traffic they can easily be made; the lightest engine on the Great Western Railway is the "Fairfield," and she weighs but 9 tns. 10 cwt.

I have thus given my opinion on the proposed change, and it remains for the Company to take such steps as they may think proper.

I am, &c.,
(Signed) EDWD. SNELL.

To the Provisional Committee of the
Geelong and Melbourne Railway.

(COPY.)

Melbourne, Mount Alexander, and Murray River Railway Company,
87, Collins-street east, 29th June, 1853.

SIR,

Referring to my letter of the 17th March last, relative to bringing under the notice of the Board of Directors, when appointed, your communication of the 11th March, No. 53. | 2892, on the "subject of the width of guage of Railways," and stating "that His Excellency the Governor General has resolved upon the repeal of the Act which legalises the adoption of the Broad Guage "for Railways in that Colony:" in connection therewith, the Board of Directors have the honor to forward to you, for the information of His Excellency the Lieutenant Governor, a copy of the report from their Engineer in Chief on this subject, and are desirous of being instructed, as early as convenient, what steps His Excellency will take during the next Session of Council in this matter.

16 Vic. No. 5.

I have, &c.,
(Signed) C. H. EBDEN,
Chairman.

The Honorable
The Colonial Secretary,
Melbourne.

[COPY.]

Melbourne, June 23rd, 1853.

GENTLEMEN,

According to your instructions dated June 15th (which I only received yesterday in consequence of my absence in the country), I beg to lay before you the following report on the subject of the guage question.

The guages already adopted in England are three in number, and are known as—

- 1st. The *Broad Guage* of 7 feet.
- 2nd. The *Irish Guage* of 5 feet 3 inches.
- 3rd. The *Narrow Guage* of 4 feet 8½ inches.

In regard to the first, it is now universally admitted, even by those who were its most strenuous supporters, that seven feet is a guage far too wide for general use. From my own observation, I have not the slightest hesitation in affirming that to be the case; because the great extra expense of the permanent way of the engines, of the rolling stock generally, as well as the additional width required in the bridges and in the line itself of a railway formed on the broad guage principle, far counterbalance any advantage that may be gained in the steadier motion of the trains and in the increased power of the engines and capacity of the carriages and trucks, and though these are advantages of much importance, yet on some occasions the very size of the trucks and carriages becomes an objection on branch lines, where there is but little traffic, and even sometimes on the main line when the traffic slackens; for I have, myself, frequently seen the carriages and trucks nearly empty, and, consequently, causing a heavy and useless load for the engine, and besides, from the extra weight of the carriages, they require more porters to move them—often at the Road stations double the number of those necessary on a narrow-guage Railway.

2. The *Irish Guage* of five feet three inches.

The fact of the Commission appointed to enquire as to the best guage to be adopted in Ireland (before which evidence was given by the most eminent Engineers in England) having recommended this guage speaks strongly in favor of this being the best. My own opinion is decidedly in favor of it, and my reasons are simply these, that it admits of more room for the machinery below the boiler, which, notwithstanding the great improvements in locomotive engines, is still found to be cramped: but a more important advantage gained from the additional width is, that a greater steadiness is obtained than trains running on the narrow guage possess, and the tendency which trains have to oscillate is in a great measure obviated; such is certainly the case on the broad guage, and would be, in a proportionate degree, on the medium guage. The extra expense of this guage beyond the narrow would not be very great—no more land would be required, and the arches of the bridges would only require a few inches additional in width.

The chief additional expense would be in the locomotives and rolling stock, which would be but a small per centage on the whole outlay.

3rd. The *Narrow Guage*.

Although my opinion is decidedly in favor of a guage of 5 feet 3 inches as being the best, I wish to state, distinctly, that I think circumstances are strongly in favor of the narrow guage being adopted in this country. My reasons are—first, I understand that some miles of line in Sydney have been completed, with the exception of the permanent way, which it is intended to lay down with a width of 4 feet 8½ inches. This, of itself, is sufficient to decide upon the adoption of the same guage here, for it is impossible to give any idea of the mischief and expense consequent on a break of guage, and which, though it may be years to come, will sooner or later be felt should a different guage be introduced here to that in Sydney.

No practicable means have yet been discovered of working broad guage carriages on narrow guage lines, or lifting the bodies of the carriages from the trucks of one line to those of the other, although on the Great Western Railway large sums were expended in trying experiments with a

view to effect this object. Knowing the incalculable disadvantages attendant on a break of guage, I would strongly recommend any sacrifice in the first instance being made to obviate such a misfortune.

The second argument in favor of the narrow guage being introduced is, the fact that all the "Plant" of the contractors in England is made for this guage, and as it would be very desirable to allow them to use as much as possible the permanent way in forming the works, the expense of converting the road afterwards to the wider guage would be very great, in addition to this the sleepers would be much damaged in consequence of the spikes being driven into them in so many places.

Finally, there can be no doubt that both engines and carriages can be more readily obtained in England than those for the 5 feet 3 inch guage, and this might be a matter of considerable importance should it be found desirable to procure some of them from home at a short notice.

Hoping the few remarks I have made on this important question may prove satisfactory,

I beg to remain, &c., &c.,
 (Signed) ALFRED R. C. HARRISON,
 Engineer to the Company.

To the Chairman and Directors of the
 Melbourne, Mount Alexander, and Murray River Railway Company.