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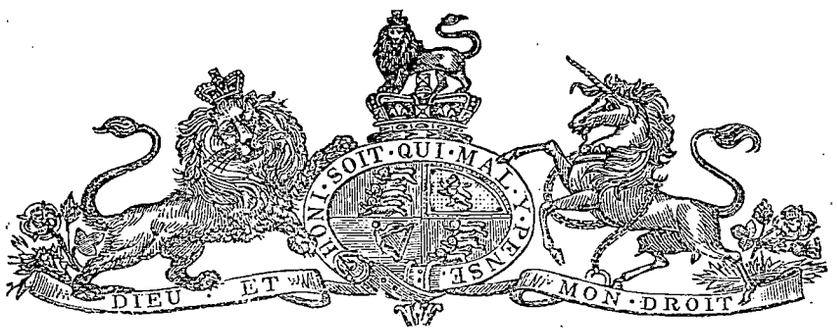
PARLIAMENT OF TASMANIA.

TASMANIAN RAILWAYS—INTRODUCTION OF A SECOND GAUGE:

REPORTS BY THE GENERAL MANAGER AND ALLAN STEWART, ESQ., C.E.

Presented to both Houses of Parliament by His Excellency's Command.



Tasmanian Government Railways,
General Manager's Office, Hobart, October 19th, 1891.

SIR,

IN terms of your instructions, I have the honor to make a few remarks upon the proposal to introduce a second gauge of railway into the Colony.

If the line to be constructed by the Syndicate was to be an isolated line, not junctioning with other lines, it might be very well left to the Syndicate to adopt such gauge as they deemed best: provided also the purchase by the Government at a future date did not enter into the question.

As, however, I understand that the proposed line is to junction with two lines, each of the 3 feet 6 inch gauge, I have no hesitation in recommending that the standard gauge of the Colony be adhered to.

In the interests of the public, the cost and delay of transhipping should be avoided, as well as the difficulty in the matter of interchange of rolling-stock.

The matter of gauges has been well fought out, and, after years of experience, the general consensus of opinion is in favour of a uniform gauge.

The conversion to uniform gauge commenced in England many years ago, and has just been completed by the Great Western Railway abolishing its broad gauge.

The first case of conversion commenced, I think, in 1844, when Robert Stephenson persuaded the Directors of the Great Eastern to alter the line from Colchester to London and Bishop's Stortford to Stratford to a uniform gauge of 4 feet 8½ inches. In 1872, the South Wales Railway (202 miles of double line), originally constructed on the broad gauge, was taken up and altered to 4 feet 8½ inches.

It may be assumed that this great expense was not incurred without very good reason.

I do not concur in the opinion that it is an economy to construct light lines of a narrow gauge, and when traffic increased to strengthen them, and reconstruct on a broader gauge.

We find that last year a branch of the Bengal Nagpur Railway, known as the Nagpur Chatisgarh Line, 145½ miles in length, was altered from the metre gauge to the Indian standard gauge, 5 feet 6 inches. The original cost of the metre gauge was 11,644,910 rupees; the cost of alteration was 5,638,501 rupees; or taking 13 rupees to £1 sterling, the original cost of the line was £818,839; cost of conversion, £433,731.

These figures speak for themselves.

At a discussion lately an eminent engineer, Mr. Barry, stated that, as a member of the Royal Commission on Irish Public Works, it had been his lot with his colleagues to investigate the subject of railway gauge with considerable care. The Commission found that some years ago the Lord Lieutenant of Ireland, led away by an idea of the advantages of narrow-gauge railways, had put a premium upon the formation of those lines rather than of light railways of the Irish standard gauge.

The inducement offered was that the Government would guarantee a percentage upon the cost of narrow gauge lines. Accordingly some lines had been made in Ireland on the 3-feet gauge. The circumstances connected with these railways had been investigated with great care, and it was

found, after careful estimates made by experienced engineers, that the extra cost of about ten contemplated lines, of a total length of 202 miles, if made on the Irish gauge would vary from £300 to £500 per mile. Some portions of these lines were in mountainous districts, where curves were of importance as materially affecting the cost of construction. But, allowing for such circumstances, the Government might safely take it that a broad gauge line would not cost more than £500 per mile in excess of one of the narrow gauge, assuming that the weight to be carried on the engine wheels was the same in both cases. These figures, I find, are fully corroborated, especially in a report presented some time ago to the Government of India by Sir G. Molesworth, K.C.I.E., a member of the Council of Engineers, who stated that a broad gauge line (40lb. rails), with structures designed for the same axle loads as the narrow gauge, will exceed the cost of a narrow gauge railway by £350 to £500 per mile.

In the minutes of the proceedings of the Institution of Civil Engineers for 1889, I find Mr. Barry, an eminent authority, spoke as follows:—

If all this had been gone through in England with the result that the Great Western had almost entirely rejected the broad gauge (which since that day it has done), and if in Ireland the testimony was almost overwhelming against a break of gauge, he thought the case against narrow gauge lines (running in connection with broad gauge lines) was thoroughly established. He hoped that if people wanted a cheap line they would still make it on the existing gauge; let engineers at any rate have the courage of their opinion, and if a cheap line was wanted, not make a break of gauge, but adopt the standard gauge. Let the public be content with a light railway of the standard gauge running at low speeds. Under these circumstances the supposed economies of the narrow-gauge lines would vanish, and a great advantage would be gained in the development of traffic and in saving of working expenses—looking at the railways as a whole, and not cutting the traffic up into fanciful divisions.

When I was in the service of the New Zealand Railways we had for a time two gauges. The inconvenience and expense was found to be very great, and an alteration was effected, and all lines made of uniform gauge.

The subject of break of gauge cannot be exhausted in a short paper. The evidence against it, however, is overwhelming, and I have no hesitation in saying that I look upon the introduction of a break of gauge in our railway system as little short of a national calamity.

I have the honor to be,
Sir,
Your obedient servant,
FRED. BACK, *General Manager.*

The Honorable Minister of Lands and Works.

MOLE CREEK–ZEEHAN PROPOSED RAILWAY.—2 FEET 6 INCH GAUGE.

Hobart, 20th October, 1891.

SIR,

HAVING received instructions on the morning of the 16th inst. to prepare a Report on the saving in construction which would be effected by a change of ruling grade from 1 in 40 to 1 in 33, and of ruling curves from 5-chain radius to 2½-chain radius, I have prepared a contour plan of a portion of the line as laid out from 14 miles to 17 miles along the eastern slope of the River Mersey, which probably contains the largest quantity of earth-work in the same distance of any other portion of the line; also, a section of the same showing in black the line as laid out, the ruling curves being 5-chain radius, and in red the section along the red line on plan, the ruling curves being 2½-chain, which, together with the following remarks, I have now the honor to submit.

Location of Line.—The line for the first 2½ miles is along flat easy ground, for the next 37 miles along sloping ground, for the next 5 miles along flat button-grass plains, for the next 30 miles along sloping ground, for the next 5 miles round Lake Rolleston comparatively flat ground, and for the remaining distance to Zeehan about 21 miles along sloping ground. I mention this, because on the point as to whether the ground is sloping or flat depends the question of comparative cost; and, so far as the question of curves is concerned, any saving depends on whether mountain spurs and gullies form the ground features.

I estimate that 60 miles of the line will be along broken sidling ground, that 28 miles will be along fairly even sidling ground, and that 12 miles will be on flat easy ground.

The length, therefore, upon which the greatest saving would be effected by the adoption of 2½-chain curves would be 60 miles. A much less saving would be effected on 28 miles, and none at all on 12 miles, excepting what will be due to the narrow gauge.

Comparative Quantities.—The following statement of quantities on 1½ miles from 14 miles to 15½ miles, which is as heavy as any other part of the line will be, shows the saving due to 2½-chain curves over 5-chain curves:—

	Cub. Yds.
Cuttings on line as laid out (5-chain radius).....	82·305
Ditto on red line (2½-chain radius).....	18·900
Saving on 1½ miles	63·405
Embankment on line as laid out (5-chain radius).....	89·106
Ditto on red line (2½ chains)	22·500
Saving on 1½ miles	66·606
Concrete culverts on line as laid out, lineal yards.....	289·
Ditto on red line	187·
Saving on 1½ miles	102·

Thus in the main items of construction, by the adoption of the narrow gauge a saving would result in first cost of excavation per mile, 42·270 cubic yards; embankments per mile, 44·404 cubic yards; culverts per mile, 68 lineal yards.

A saving would also be effected throughout the whole length of the line in ballast and other minor details, and, exclusive of permanent way, it may be estimated that the narrow gauge could be constructed for about one-third (⅓) of the cost of the standard gauge.

In the one and a half miles quoted there would be nine curves of 2½-chain radius, the longest being 5 chains, with several curves of 3-chain radius, in lieu of the curves laid out having radii of 5 chains.

Gradients.—With regard to the proposed alteration from the standard gradient of of 1 in 40 to 1 in 33, this would only favourably affect several small cuttings and embankments on the flat ground, and the cuttings on the various summits, which in all cases are light, and I therefore do not see any advantage to be obtained in making any alteration in this respect, but great disadvantage in the working of the line, and very great disadvantage when in the future it is found necessary to resume the standard gauge. I would therefore suggest, in the event of the narrow gauge being determined upon, that the line as laid out be made the base for laying out the narrow gauge line, and that the levels and gradients for the broad gauge line be maintained so that in those places where the line as laid out will apply to the narrow gauge line (and this will extend over many miles) the work already done will be an important contribution towards the construction of the standard gauge line.

Another very important consideration in the matter of levels is the great advantages which would accrue towards the construction of the substituted standard gauge in the delivery of materials all along the line at the levels desired. In broken country such as is represented on the accompanying plan and section, the 2½-chain curves appear to suit the spurs and gullies, and thus the narrow gauge line will throughout be almost a surface line, therefore in many places the cuttings and embankments, and even culverts, would not be applicable to the standard gauge line when constructed; nevertheless, an existing narrow gauge line at the same level as the proposed standard gauge line would reduce enormously the cost of its construction.

Another very important consideration in the comparative merits of the two gauges is, that the narrow gauge might be constructed in a third of the time which would be required for the construction of the standard gauge.

Whilst in the present undeveloped state of the Western mineral fields the advisability of constructing the standard line of the Colony might be matter of grave doubt, a narrow gauge line, constructed for 30 per cent. of the cost, and within 30 per cent. of the time of the former, even although traversing many miles of non-producing country, will no doubt in a few years make a handsome return to the promoters by the development of existing and new mineral fields, of which there is at present great expectations, and also would develop the existing cattle traffic and open the large tract of grazing land lying between the Forth and Mersey, and create a market for the prolific agricultural district of which Deloraine is the centre, and, further, open up scenery of the finest description, hitherto unknown to tourists and others.

I have, &c.

ALLAN STEWART.

The Engineer-in-Chief.

MOLE CREEK-ZEEHAN PROPOSED RAILWAY—NARROW GAUGE.

Hobart, October 20th, 1891.

SIR,

I HAVE the honor to supplement my previous report on a portion of the line from 14 miles to 15½, by stating that, having gone into the next mile and a-half in the same manner, I find that it will be affected even more favourably, not only as regards cuttings and embankments and culverts, but a tunnel 154 yards long on the line as set out will be entirely avoided by the substitution of 2½-chain curves for 5-chain curves.

I have, &c.

ALLAN STEWART.

The Engineer-in-Chief.

WILLIAM THOMAS STRUTT,
GOVERNMENT PRINTER, TASMANIA.