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PARLIAMENT OF TASMANIA.

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FURTHER CORRESPONDENCE.

Laid upon the Table by the Minister of Lands, and ordered by the House of Assembly to be printed, September 9, 1890.



RAILWAY CONSTRUCTION.

Burnie, 3rd September, 1890.

The Hon. the Minister of Lands and Works, Tasmania.

Forwarded through the Engineer-in-Chief.

SIR,

CONSTRUCTION AND MAINTENANCE.

HAVING just received the General Manager's Report on Construction and Maintenance, permit me, as Resident Engineer of the Derwent Valley and Ulverstone Lines, to protest against such sweeping and damaging assertions as appear in same regarding Construction and Maintenance; also to state a few facts and pass a few opinions that may be of service to place this matter on a correct basis.

On page 7 of the first report I find the General Manager states: "I have felt great hesitancy in criticising the construction of our lines, but the disregard of their financial success, the endeavour to force upon my department lines inefficiently constructed regardless of all consequences, has compelled me to refer to the matter in this report. Unnecessarily steep grades, weak section of rails in the case of the Mersey Line, wooden box culverts in bank 15 to 16 feet deep, insufficient waterways, inferior timber work, and a bad class of sleepers, keep our cost of working abnormally high." I beg to dispute any endeavour to force any line I have been connected with upon the Traffic Department, for the lines have been carefully gone over by the General Manager personally, Mr. Dowling, Maintenance Engineer, his Inspector and staff, before taking over the line, and no matter how unnecessary the work asked for by the same, it has been granted by the Construction Department through the Engineer-in-Chief. A very large sum of money has been spent to meet these requirements on the Derwent Valley and Ulverstone Lines not warranted by the quantity of traffic to be obtained at the different localities. The General Manager has been asked to visit the districts and inform the Engineer-in-Chief what his requirements were before the contracts have been let; he has also had plans to go through and decide if satisfactory. All his requirements should have been put forward then, before the final estimates were sent in and the contracts let. At the eleventh hour it is, as you know, very easy to find fault. As an Engineer I contend the whole of the General Manager's requirements should be included in the contract, and not be asked for when the lines are completed practically. It places engineers in a wrong position, as they must apply for funds to complete work never asked for nor intended to be done.

Unnecessarily steep Grades.—I contend that this is wrong. Anyone knows that steep grades are necessary in such a broken country as Tasmania in order to save cost, or most assuredly they would not have been used.

Don Hill.—To have obtained a grade of 1 in 66, the cutting, instead of thirty-five (35) feet, would have been eighty (80) feet deep, besides which the level of the line would have been below the creek, or else a long tunnel would have had to be constructed also below the creek level. If the Colony had plenty of spare capital this expense might have been incurred. I know that Mr. Hargrave, the engineer who located the line, made every effort to overcome the necessity of this grade. I should have myself liked to see the grade done away with, but I am certain you will coincide with me that the Colony cannot afford to open up the country with railway lines without the use of steep gradients and sharp curves. In a broken country like Tasmania, any line crossing watersheds same as the Western and other lines do, situations must be met with where the Parliamentary authorised maximum grades and sharp curves must be used, or they would never be constructed owing to the greatly increased cost. It would have been madness to try to have constructed the Launceston and Scottsdale Line if 1 in 40 grades and five (5) chains radius had not been used. The Main Line is another example of 1 in 40 gradients; the Emu Bay and Waratah another. In fact, nearly any inland line in this Colony must of necessity adopt the ruling grades and curves authorised officially.

Chudleigh Line.—The reason of the grades on this line is owing to our being obliged to cross the high dividing range at the five miles. It is practically an incline from the 2m. 40c. to this point, and a down incline from here to the eight miles. The difference of level at the commencement and the end has no bearing at all on the gradient. These questions I consider should have been brought forward when the plans were adopted, and before the contracts were let—then there might have been a slight chance of the late Minister authorising the extra large expenditure which it would have been necessary to incur. I may say that this line was intended solely for a tramway line, and nearly six miles of the earthworks and culverts were constructed before the class of construction was changed by the order of the Hon. the Minister.

Wooden Box Culverts in 15'-16' Bank.—There are three on the Western Line only, and they are extra strong in their construction. There are two on the Chudleigh Line, put in when it was considered a tramway. Afterwards pile openings were adopted.

Insufficient Waterways.—As regards the Derwent Valley and Ulverstone Lines, this cannot apply, for even after heavy rains it is next to impossible to find any water except that which has soaked into the ground or ballast. Great care was taken regarding this, under my supervision, as a reference to the Report of the Royal Commission will prove. On the Chudleigh Line the waterways leave nothing to be desired—in fact, would carry as much more water as there is.

Inferior Timber Work.—As regards the two lines afore-mentioned, I dispute any inferior timber work. On the Derwent Valley Line the timber work was left in really first-class order, the timber being the best southern timber, and nearly all blue gum. Care was taken to see it cut in the bush. On the Ulverstone Line nearly all the timber was sent from the south, and the workmanship was well and carefully carried out under the daily inspection of Mr. James Bradley. On the Chudleigh Line the timber work was just as well done under daily inspection of Mr. John Smith and visits from Mr. Bradley.

Shortness of Ballast.—On my lines I dispute there was any—in fact, I claim there was far more ballast than required by the contract. The contracts called for 1320 cubic yards per mile. On the first portion of the Derwent Valley Railway, between J. Falkingham, the contractor, and myself, during the time the work was being done by Government day work, over 2000 cubic yards per mile were put on up to the Plenty; from here to Glenora, R. C. Patterson, contractor, put 2 to 3 inches more bottom ballast on than was called for, excepting to keep a good top. On the Chudleigh Line the whole average depth was nearly one inch and a half more than the quantity. On the Ulverstone Line it was the same. These lines were systematically "dipped" three weeks before the General Manager was asked to go through by cutting a trench right across the whole width of ballast every five chains, the outside and centre depths taken, and widths measured top and bottom. The official records are in the possession of the Engineer-in-Chief. On the Western Line after these depths were taken we had some very heavy rains, and during the traffic the formation came through, so that when the Traffic Department examined the line in two of the clay cuttings and on the swamp bank the clay came through, showing a deficiency at these places of about 240 cubic yards. I may inform you that over 1700 cubic yards were put on to my knowledge, besides which the contractors ran out at my request between 600 and 700 cubic yards of ballast for maintenance purposes; so that this cannot apply to my lines.

Timber —I dispute that bad timber has gone in on my line. The precaution taken under the Construction Department of leaving the frame exposed for thirteen weeks, and having all other timber stacked on the ground for the same time before the weatherboards and roof were put on, contradicts the statement made. In justice to our department, I may point out that the very fault the General Manager finds with the Construction Department has occurred (without our precaution) during the construction of the Station Master's Residence, West Devonport, and other buildings on the Mersey Line. It is very easy, Sir, to find fault under this heading; as it is the practice, up to the present, for all works and buildings to be constructed of green timber. The remedy for this question rests entirely with the Hon. the Minister and Parliament—viz., to provide a large construction supply, felling the trees in July and August, cut the logs into general sizes required, and stack same, protecting ends, and allow to season. When properly seasoned supply same to contractors for all contracts, only allowing Government-seasoned timber to be used on any work.

Scottsdale Line.—In dealing with this line as regards maintenance, I see the General Manager omits crediting the large sum obtained from the contractors in ballast, and sum named in the contract for the six months' maintenance by the contractors, and taken over by the Traffic Department; this sum in total value being far more than the cost of maintenance. L, $\mathcal{F} \mid W$. Maintenance.—The General-Manager omits in this instance to state the cost during 1871 for the first twelve months, paid partly by the Company and partly by the contractor, nor does he state that the ballast train was running during the whole of the maintenance of the line.

Sleepers.—This is a vexed question to all concerned... The only way out of the difficulty is for the Government to have a large supply cut and stacked ready, for construction and maintenance purposes, see the timber is fallen in July and August, cut into sleepers and delivered at different appointed depôts throughout the Island, then properly stacked and protected, so that when seasoning the ends cannot split, nor the timber warp and curl. If properly stacked and ends protected, not more than one sleeper out of a thousand would be lost. Until this is done, as well as having some one on the ground to see the trees fallen at the proper time, and sleepers sawn, there will always be trouble, for no expert can decide what class of gum timber is supplied when delivered sawn; the only safeguard being in having a competent man supervising in the bush and at the mill.

Under this heading I may point out that on the Chudleigh and Ulverstone Lines additional sleepers and crossing timbers have been provided by the Construction Department that far more than cover the whole of the sleepers complained of.

Maintenance.—For the first twelve months of a newly constructed line (unless the Traffic Department make similar arrangements as the General Manager made with the contractors of the Scottsdale and Chudleigh Lines, viz., to provide maintenance ballast), it is impossible to keep and maintain the road without running a maintenance ballast train. Until the green earthworks are consolidated thoroughly the ballast must go in the wet cuttings and banks. Whenever a contractor maintains his construction he has always a ballast train in use to provide the ballast that may be required from time to time. As far as I am aware there is not a single newly constructed line that a maintenance ballast train has been run on during the first twelve months of traffic. This period is the most important time of all maintenance, for in most cases the formation and road is fairly-consolidated at the end of that time.

Launceston and Western Railway: Mr. Dowling's Report.—Regarding this line, which I reported upon and recommended expenditure as stated, I find Mr. Dowling omits to state anything referring to speed attained, or the nature of the formation. The Construction Department in justice cannot be held responsible for the strata met with, or for the swampy nature of the ground. It is impossible to say what is under the surface until it is proved. The portions complained of are either pipe-clay or a swampy quagmire requiring extensive drainage. This was only found out after rainy weather and the traffic had proved it. At the same time it is not the fault of the Resident Engineer if such cases occur: he is no more responsible for this than for a huge landslip, that might take place at any cutting.

Derwent Valley Railway: Mr. Dowling's Supplementary Report.—I must take exception to Mr. Dowling's statement, "even the full interpretation of the present construction specification was hardly afforded, &c." Mr. Dowling must have forgotten the fact that the Derwent Valley specification is entirely different to our present construction specification. Sand bottom ballast was specified and used similar to the other Colonies. Owing to clay formation met with, over 2000 cubic yards of ballast per mile was run out between North Bridgewater and the Plenty, instead of 1320 cubic yards. From Plenty to Glenora, Mr. Patterson, contractor, averaged eight to nine, inches bottom ballast instead of six inches, so that a very great deal more than the specification was actually given.

Plenty Bank.—Authority was given the General Manager to pitch this bank at construction cost at my request.

Speed and authorised Construction.—In my opinion the whole of this controversy re Railway construction and maintenance has arisen from misunderstanding. It is a fact that the speed has been repeatedly timed at thirty miles per hour, and, in instances, thirty-two miles per hour, while the lines were never meant to be constructed for the speed attained with the rolling stock in use.

The lines are efficiently constructed for the class of light line originally authorised by Parliament and officially ordered, but they are not strong enough for the speed now attained.

The whole construction should be strengthened if the extreme running is to be above eighteen miles per hour. The light rail on the Mersey and other lines is only adapted to the speed authorised in the first instance.

To all initiated persons it is a fact the lines were never constructed for the present service, only for the authorised service.

Personally, I have repeatedly during the past few years drawn the Engineer-in-Chief's attention and protested against the maximum speed run on the lines I: have supervised, as the same has been sixty-six per centum faster than I was officially instructed to construct them for. This extra speed, any novice or layman must see, strains all the roads, and, through the excessive wear and tear on the permanent way and the rolling-stock, causes increased cost of maintenance, and this is not due to defective construction. As a comparison, supposing you built a trap to carry eight or nine, and instead of doing so you continually carried fifteen, what would be the consequence? You would either be always repairing at the coachbuilder's or you would be experiencing accidents through what the public would call courage without judgment or knowledge. The idea of cheap light lines for the future must be put on one side at once under our present General Manager's requirements.

In the interest of the Resident Engineers and Superintending Engineers of the Government, I sincerely trust you will give my letter the same publicity as all other reports and documents.

I have the honor to be, Sir,

Your obedient Servant,

CHAS. K. SHEARD, Assoc. M. Inst. C.E., Resident Engineer.

CONSTRUCTION OF GOVERNMENT LINES.

Dear Sir,

THE continued reiteration by the General Manager of Government Railways that the new lines are all constructed in a faulty manner will, if not contradicted, cause a general belief that there is truth in what he so persistently asserts.

I, as an officer of the Construction Department, feel that my reputation and ability as an Engineer are being seriously assailed.

To a man who understands the principles of railway maintenance, the object of the General Manager's continued assertions is easily detected; but the public generally do not see that an attempt is being made—and I fear with some success—to prepare them for the time when the want of proper maintenance, or what is generally called the "starving," of the new lines will assert itself, and a vote of money will be asked for to pay for what a Board of Directors would have insisted on being charged to revenue account.

Now, let us examine the construction, in detail, of one of the new lines—the "Mersey Line," for instance; and, beginning with the earthworks and "road-bed," we will go upwards.

The embankments were all honestly made to the full width, and a good allowance made for subsidence; and, wherever there was material to spare from cuttings, the banks were strengthened. In all cases where there was the least chance of flood-waters reaching the embankments, a protection of stone-pitching was provided, reaching above the level of the highest known floods.

The cuttings were all taken out to the full widths, and, wherever the nature of the material rendered it necessary, the slopes were flattened, and in many instances the top portion was benched back, and every care taken to prevent injury from surface water. Wherever a spring of soakage of water showed itself in a cutting, trenches were cut and graded so as to take the water away from the road-bed, and these trenches were filled with broken stone. In cases where the trenches inside the cuttings were not sufficiently effective, large trenches were cut outside of the cuttings and taken down until they intercepted the flow of water : in short, no precaution was neglected to secure a dry "road-bed." Any "railway man" knows what this means in future maintenance.

The cuttings on the old tramway were similarly treated. The embankments on the old tramway were, with very few exceptions, widened, and these few instances seem to have been made the most of by the General Manager. A misunderstanding with the contractors as to where the material should be got from led to these few banks being left. The General Manager omits to state that this widening was all done departmentally shortly after the line was taken over by Government out of capital account, and at a much less cost than if the contractors had done it.

Ballast.

The depth of ballast put below the sleepers on the new portion of the line was ten inches; on the Scottsdale and other lines there is six inches. Not only was the ballast measured on the line, but a careful tally was kept of every truck of ballast taken out of the pit, so that a double check was kept on the quantity put on the line.

The ballast put on to the old Mersey Tramway was measured to the contractors in the trucks, so that they had no *inducement to shimp it*; in fact, the tendency was all the other way. The amount of ballast as measured gave sufficient to put a covering nine feet wide and nine inches deep over the whole seventeen miles; this was exclusive of the ballast already existing on the old line.

Sleepers:

A good deal of capital has been made out of the cry about sleepers. If ever care was taken to secure good sleepers for a railway it was taken on this one. A competent timber inspector was employed doing nothing else but visiting the mills at which sleepers were being cut; every log that showed any signs of bad quality was rejected, and had to be cut into sizes that would not make a sleeper before it was lost sight of; the logs were even traced up to the stump from which they were cut. The sleepers from one mill were condemned *in toto*, because it was found on tracing the logs up to the stumps that they were all stringy gum. This much for inspection at the mill.

When the sleepers were brought to the line side they were stacked so that the air could get the freest circulation amongst them, and they lay thus for months; they were then turned over sleeper by sleeper and carefully inspected both as to size and quality, and all bad or doubtful ones rejected and thrown out and stacked by themselves. Again, when being adzed they were subjected to another overhaul, and any that had been previously overlooked were thrown out and removed; and even again, when the sleepers were being put into the line they were again culled, and those that had shrunk too much or split were thrown out. I ask, could more have been done?

Bridges and Culverts.

The class of bridges and culverts on this line is of a very superior description. There is not a timber box or or a log culvert on the whole length. Every opening up to twelve feet has masonry walls, and the timber tops are of carefully selected material. The culverts under embankments are either concrete arches, stone covers, or earthenware pipes. Where piles have been used in the larger openings the spars are all of sound peppermint, carefully selected, and calculated to last from twenty-five to thirty years, and even longer, if the exceptionally sound condition of the piles in the old bridges is taken into consideration.

Exception has been taken to the manner in which some of the old openings on the tramway have been re-tapped. The course adopted is perfectly legitimate. On examination, some of the old openings, although to all appearance having sound masonry walls, were found not to have sufficiently substantial foundations; they were, however, quite good enough to act as retaining walls for the protection of the banks. Instead of placing the new floors on the top of the old walls a trench was cut behind them, and filled with broken stone. On this stone a strong sawn hardwood sill was laid, and the beams to carry the new floor were laid on these sills and securely fastened, and left riding just clear of the old walls. These openings are every bit as substantial as if new walls had been built and the timbers laid on the walls: there is, however, no comparison in the cost. There are only some four of them, if my memory serves me.

Exception has also been taken to the placing of timber piles under the iron girders on the three Mersey bridges. The piles are all peppermint, and the old piles in the Kimberley and Sherwood bridges were as sound, after being seventeen years in the ground, as they were on the day they were driven, and they were not peppermint. These piles in all these bridges are so arranged that when it *does* become necessary to renew the piers they will form the framework of a cofferdam, inside of which concrete can be cast. In the meantime, the Colony is saved the interest on the cost of expensive masonry or concrete piers.

Rails.

The forty-pound steel rail on this line is the toughest I have ever tested. I tried my utmost to break one of them under the testing machine, but did not succeed; it was bent backwards and forwards with a weight of several tons falling on it each time, but never showed a sign of fracture : and when it is taken into consideration that these rails are supported at every seventeen inches by a sleeper nine inches wide, there is little cause for apprehension as to their carrying power. The statement that the extra sleepers add to the cost of maintenance to any appreciable extent is childish, and shows a want of knowledge of maintenance.

Maintenance.

It is certainly very unfair of the General Manager to try to make it appear that the difficulty in getting the line maintained by the Contractors fell on his department. It was the Construction department that had the trouble. You, Sir, know the fight there was to get the Contractors to make up slacks as the "green" banks settled under the traffic. It was during this time that the Locomotive Superintendent complained about his engine springs giving way. Contractors' ballast trains had to make way for Government passenger trains, and slacks were often left that might have been remedied before a train passed over them. The defects were, however, subsequently remedied, but not at the expense of the Traffic department, as the General Manager's reports would lead couple to infer. All narrow banks, all subsidence in banks and thinness of ballast were made gover out of money specially voted for the purpose, and not out of traffic receipts; and when the line very taken finally out of the Contractors' hands, we find that the thirty-seven miles of line, which, between a new line, should have had at least one man to the maintenance of each mile, was actually kep. a good running order by twenty-eight men. Where does the faulty construction come in?

Renewal of Sleepers.

Has the General Manager any idea of what the average life of a railway sleeper should be? The position is the most trying one in which timber can be placed. My experience—which extends over a period of thirty-four years—is, that the average life of a sleeper of ordinary timber is eight years. I way not in the Colony when the sleepers were laid in the Launceston and Western Railway, and therefore do not know the date, but I can tell from actual experience when they began to decay.

In 1875, when the Main Line was about to be opened to Launceston, it was found that the timbers carrying the third rail between Launceston and Evandale could not be kept in place, and consequently the road could not be kept to gauge. It became my duty, as Engineer in charge of the Main Line works, to inspect this third rail. The secret soon manifested itself. The unfortunate Main Line timbers had been getting all the blame, but the real blame lay in the Western Line sleepers. I found, on inspection, that the majority of them were rotten !---Yes, Sir, actually rotten, and would not hold the spikes which should have kept the Main Line timbers in place. How long had these sleepers been in the ground ?

The Mersey Line sleepers have been in the ground six years, and I see, from the General Manager's Report, that he expects to have to renew ten per cent. next year—no very formidable amount, surely.

I think, Sir, that these few remarks on the construction of Mersey and Deloraine Railway should, in all justice, have as much publicity as is given to the General Manager's disparaging remarks.

I have, &c.

M. CRESSWELL, Resident Engineer, Green Ponds Line.

JAMES FINCHAM, Esq., Engineer-in-Chief.

WILLIAM THOMAS STRUTT, GOVERNMENT PRINTER, TASMANIA.