(No. 76.)

1878.

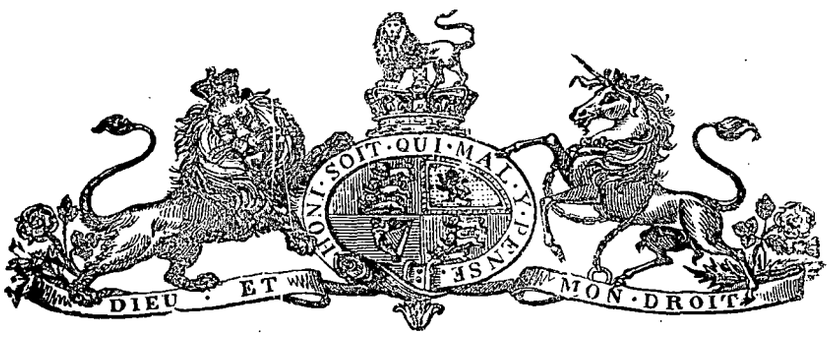
TASMANIA.

LEGISLATIVE COUNCIL.

MAIN LINE RAILWAY:

PROGRESS REPORT OF COMMITTEE.

Presented by Mr. Chapman; and ordered by the Council to be printed, September 17, 1878.



PROGRESS REPORT of the Select Committee appointed to enquire into the present State and Condition of the Main Line Railway, and all other matters in connection with the said Railway and the Tasmanian Main Line Railway Company in respect to its transactions with the Government of this Colony; appointed 3rd September, 1878.

THE Committee have the honor to report that, having taken the evidence of Mr. Solly, Assistant Colonial Secretary, and of Mr. Midelton, the late Engineer and Locomotive Superintendent of the Tasmanian Main Line Railway, they deem it of importance at this juncture to report the same to the Council.

The Committee desire to reiterate the opinion expressed in the Report on this subject during the last Session; viz.—That a Bill should forthwith be introduced into Parliament to provide for the Inspection of the Railway and Rolling Stock.

THOS. D. CHAPMAN, *Chairman.*

MINUTES OF THE MEETINGS.

MEMBERS:

Mr. Chapman.	Mr. James Lord.
Mr. Gellibrand	Mr. Dodery.
Mr. Grubb.	Mr. Aikenhead.
Mr. Robertson.	

WEDNESDAY, 4TH SEPTEMBER, 1878.

Committee met at 12·30 P.M.

Present—Messrs. Chapman, Dodery, Aikenhead, Grubb, Robertson, J. Lord, Gellibrand.

Mr. Chapman was elected Chairman.

Mr. Chapman proposed to call witnesses; viz., Mr. Solly and Mr. Midelton.

The Committee adjourned at 1 P.M. till 10·30 to-morrow.

THURSDAY, 5TH SEPTEMBER, 1878.

Committee met at 10·30.

Present—Messrs. Chapman, Dodery, Gellibrand, Grubb, Robertson, Lord.

The Committee adjourned at 1 P.M. until 10·30 on Tuesday next.

TUESDAY, 10TH SEPTEMBER, 1878.

Committee met at noon.

Present—Messrs. Chapman, Grubb, Gellibrand, Robertson, Dodery, Aikenhead.

Mr. Midelton attended the Committee, and produced a copy of the Report to the Directors of the T.M.L. Railway in London in February, 1877, (see Appendix B.); also a letter from Mr. C. H. Grant, General Manager of the Company, dated 7th February, 1877, requesting him to make a full report of the engines and rolling-stock, (see Appendix C.); also account of three accidents, (see Appendix D.)

The Committee adjourned at P.M. until Thursday, 11·30.

THURSDAY, 12TH SEPTEMBER, 1878.

Committee met at 11·40.

Present.—Messrs. Chapman, Dodery, Aikenhead, Gellibrand, Grubb, Robertson, James Lord.

Mr. Midelton attended the Committee, read, and handed in a Report of T. M. L. R. Carriages asked for in Question 9, Sept. 5th, (see Appendix E.); Report referred to in Question 10, (see Appendix F.); and Report of Locomotives, Question 7, (see Appendix G.)

The Committee adjourned at 1·15 until Tuesday, September 17th, at 11 A.M.

TUESDAY, 17TH SEPTEMBER, 1878.

The Committee met at 11·45.

Present—Messrs. Chapman, Aikenhead, Gellibrand, Grubb.

The Committee decided to report progress to the Council this day.

The Committee adjourned at 12·35, *sine die.*

EVIDENCE.

THURSDAY, SEPTEMBER 5, 1878.

MR. T. MIDELTON *examined.*

By the Chairman.—1. Your name is Thomas Midelton, and you were the Engineer and Locomotive Superintendent to the Tasmanian Main Line Railway? I was.

2. You received that appointment in England? Yes, from the Board of Directors in London.

3. Prior to your appointment to the Tasmanian Main Line Railway, what appointments had you held in England? I served my time on the Great Western Railway in 1864, under Sir Daniel Gooch and his brother W. F. Gooch, and was for five years in the Great Western Works at Swindon. After leaving there I went to Messrs. Beyer and Peacock, Manchester, one of the largest locomotive manufactories in Britain, I was there as a workman in the shops and subsequently in the drawing office, I remained with the firm about eighteen months. After leaving that firm I went to the Vulcan Foundry, about 25 miles from Manchester, which was under the management of Mr. Wm. F. Gooch, one of my former employers at Swindon, and remained there about nine months. After that I went into the service of the Great Eastern Railway Company at their great running sheds at Stratford-le-Bow, as under-foreman, and afterwards as principal foreman, where I remained about 14 or 15 months: these running sheds are the largest in England, about 130 running engines in steam daily, and 22 under constant repair. After that I entered the service of the Vacuum Brake Company, as engineer, at a salary of £400 per annum, and fitted trains on several railways with that brake. While employed on the Vulcan works I extended their workshops, made the drawings, and saw the works carried out. While in the service of the V. B. Company I received a letter from Mr. Davison, the Secretary of the Tasmanian Main Line Railway Company, asking me, by order of the Directors, to take the appointment of Locomotive Superintendent of their works in this colony, and asking me what salary I should require. After that some correspondence took place between me and the Company, and several interviews with Mr. Sheward, the Chairman of the Company, and Mr. Davison, the Secretary, and I then accepted the appointment at £500 per annum for three years as engineer and locomotive superintendent to the Tasmanian Main Line Railway Company, with the distinct promise from Mr. Davison that in the event of Mr. Grant leaving the Colony, which he was expected to do within six months after my arrival here, I should succeed him as General Manager. Mr. Sheward, the Chairman of the Company, gave me a distinct promise that if I remained in the service of the Company and gave satisfaction I should after the first twelve months receive substantial addition to my salary, this was irrespective of my receiving the appointment of General Manager, as promised by the Secretary. I remained in the employment of the Company until the 4th April, 1878. Under my agreement the workshops, permanent way, and rolling stock were under my distinct charge; but I found Mr. Grant, the manager, continually interfering in a most irregular manner, going among the men countermanding my orders, and himself giving direct orders to the men, contrary to recognised rules and discipline in all well-regulated establishments. Under such circumstances I found it impossible to conduct affairs in a proper manner and to discharge my duties satisfactorily. For instance, he would frequently order me to send engines out to work the line which I had previously informed him were unsafe, and in such a state as would not be allowed to run in England; and in several instances engines so sent out came to grief and unable to perform the journey they were sent out to do, and I was thereupon blamed by Mr. Grant for sending them out, although I had previously warned him that they were totally unfit for the work.

4. Under what circumstances did you leave the Company? It was my ordinary practice after an engine had been altered or repaired to take her out for a short trial trip myself, and on the 4th April, about noon, I took No. 2 engine along the line to Risdon Road to try her, and found her perfectly satisfactory. Having previously telegraphed to Brighton to block the line, and received a repeated message by which it gave me the key of the road as far as Brighton, upon returning to the station at Hobart Town in about half an hour I found Mr. Grant had sent a message to Brighton station instructing that station-master that I had been dismissed, and to lock the points and stop my progress, and to repeat that message to Jerusalem and Campania. At 3·30 in the afternoon I received a letter from Mr. Grant dispensing with my services, and subsequently Mr. Grant paid me the sum of £200 and we agreed to cancel the agreement.

5. How many locomotives had you under your charge? Eleven.

6. Can you give the Committee a general or detailed report of the condition of each of those locomotives during the present year? I can; and I will furnish you to-morrow with a copy of the report that I furnished to the directors in London in February, 1877.

7. Can you give the Committee a full report of each engine up to the time you left? Yes, and I will furnish the report from February, 1877, to the present time at the next meeting.

8. Have you furnished the Directors with any report as to the condition of the passenger carriages? Yes, it was embodied in my report to the Directors in February, 1877.

9. Can you furnish the Committee with a report of their condition up to April 4th, 1878? Yes. I can, and will do so.

10. Can you furnish the Committee with a general report of the permanent way up to the same period? I can, and will do so.

11. Can you furnish the Committee with full particulars of the permanent way and rolling stock, and general condition of the Railway when you left the service of the Company? Yes, I can, and will do so.

MR. SOLLY *examined.*

12. Your name is Benjamin Travers Solly and you are Assistant Colonial Secretary? Yes.

13. Can you produce to the Committee any report of Mr. W. Clark on the Tasmanian Main Line Railway? The only document that I am aware of was laid on the Table of the Council by the Honorable Colonial Secretary yesterday, which I hand in. (See Appendix A.)

MR. MIDELTON *re-examined.*

14. Several accidents having occurred on the Line since it has been opened, can you inform the Committee whether those accidents have occurred from the faulty construction of the engines or the permanent way? I can show in three distinct cases where the accidents were from the faulty condition of the permanent way, and numerous instances owing to the faulty construction of the engines. I can furnish full particulars of each of these cases from my papers if required.

15. Will you do so at the next meeting? Yes, I will do so.

THURSDAY, SEPTEMBER 12, 1878.

MR. MIDELTON *examined.*

By the Chairman.—16. By the report handed in you speak of three tons of iron rails being in most of the carriages with a view to steady them? Yes; I presume it was with the object of steadying them.

17. You refer in your report of having fitted them with the usual laminated spring, and the carriages worked well ever since then? Yes.

18. In your opinion are the carriages in safe working order? Yes, as safe as they can be made for the design without reconstruction, but totally unsuitable for the narrow gauge and that class of line that is with the sharp curves and grades.

19. Would the carriages be safer and more suitable for the conveyance of passengers if the seats were transverse instead of longitudinal? Most certainly, as there would be a more equal distribution of weight on the axles.

APPENDIX A.

TASMANIAN MAIN LINE RAILWAY.

MEMORANDUM.

THE opportunity I had of forming an opinion of the line is from having travelled over it as a first-class passenger from Launceston to Hobart Town in February last; and I returned to Launceston in the Guard's van at the rear of the train, standing for the greater part of the distance on the platform, the better to enable me to observe the line. I did that at the request of the Agent to the Company, C. H. Grant, Esq., C.E.

Mr. Grant has also placed in my hands for perusal the Contract between the Government and the Company, and between the Company and the Contractors, together with some voluminous correspondence on the subject of the dispute between the parties. I was asked by him to give my opinion, after the opportunity I had of observing the line, as to its construction and condition; and I may here remark that I am very unwilling to assume what may be considered a partizan view of the subject, for I have no personal interest whatever therein. I do give my opinion, however, with a hope that what strikes an impartial observer may assist in leading to a compromise by all the parties interested.

The Schedule annexed to the Contract between the Governor of Tasmania and the Company, dated the 15th August, 1871, provides that the line "shall be constructed of the best materials and in a thoroughly substantial manner."

Standing alone, and supported by an equivalent price to be paid for it, this might be taken to cover all the conditions which would enable the line when constructed to compare with such a line as the Launceston and Western Railway; but some of the other conditions must be taken to modify this view very considerably, so far as the "thoroughly substantial manner" is concerned, seeing that the rails are 40 lbs. per yard, and the estimated cost of 133 miles, and its equipment, was but little over £4700 per mile.

With regard to the "best materials," the principal item of which is the rail—could this be taken to include *steel* rails? Under the circumstances existing at the time the Contract was made, so very different to the past two years during which it has been opened for traffic, I do not think steel rails could have been required, unless specially mentioned in the Contract.

The ballast, sleepers, &c. may reasonably be considered the best procurable.

The Schedule provides that the route of the line, keeping as near as possible to the existing centres of population, shall be subject to the judgment of the Company's Engineer.

The gauge shall be 3 feet 6 inches; the weight of rails shall average 40 lbs. per yard; the sleepers shall not be less than 6 feet 6 inches long by 8 inches × 4½ inches in breadth and depth, to be half round or square timber.

The bridges shall be constructed of timber or other material as the Engineer to the Company may direct, subject to a condition as to strength.

The ballast to be not less in width than 8 feet 6 inches, and not less than 18 inches in depth from top of rail. Curves not to be less than 4 chains radius; no gradient to be less than 1 in 40.

Station buildings may be of timber or other material, as the Company's Engineer may consider necessary.

The minimum average speed for one train each way daily shall be 23 miles per hour.

Taking into consideration the cost of labour in Tasmania, the high price of rails and rolling stock at the time the Contract was made, and the amount of capital on which interest was guaranteed by the Government, all the conditions, with the exception of the last, would indicate that the line should be economically constructed, suited for light traffic, and also for speed not exceeding an average of 15 to 16 miles per hour.

The very difficult nature of the country through which the line is carried for a considerable portion of its length would involve an unusual amount of study and surveying, and the Contractors had a right to avail themselves—within reasonable limit—of those conditions of the Contract with reference to curves and gradients permitted by the Contract in order to lighten the work as far as practicable; in such a country it would have been easy by small improvements in direction, &c., to have exceeded the contract amount, which could not reasonably be required.

I noticed one or two places where, to a casual observer, some improvement *might* be made in easing the curves; but I would not be positive of this without a better opportunity of judging.

The curves, I believe, are but in few cases less than 5 chains radius; and, so far as I could judge, the limits of the Contract in this respect, and also in the steepness of gradients, do not appear to have been exceeded.

The rails, I am informed, are all 40lbs. to the yard, and therefore fulfil the Contract requirements.

I noticed that several sidings had been put in, which I do not find are required in the Contract.

The rails appeared generally to be in good order, with a few trifling exceptions; laminated or imperfect rails I did not see: and I am informed by the Agent that the hard Belgian rails which were objected to at the time the line was completed, are now standing better than the more approved English rails: this is not incompatible, the imperfect rails would, in the early days of the traffic, speedily become apparent, and would be removed,—the harder character of the iron in these Belgian rails would resist crushing better than the softer material; however that may be, I saw very little in the condition of the rails to indicate any more wear than may be expected under the heavy engines which they are required to pass over them.

The sleepers appeared to be sound and good, and, where I had the opportunity of inspecting them closely, I saw none of the half-round description which are admissible under the Contract.

The ballast appeared to be of good quality throughout the line; for short distances the sleepers were not covered and they could be seen; but, generally, the line appeared to be in good running condition.

The bridges, I observed, are some of them constructed with masonry piers and timber superstructure, some are entirely of timber; in all cases the timber work appeared to be somewhat unusually heavy, due probably to the use of colonial timber; I saw no indication of insufficiency of strength.

The culverts I observed were some of them of masonry, others of timber; so far as the masonry in these and the Bridges is concerned it is in excess of the Contract requirements, and I should think more costly, as they certainly are of more permanent character.

As to the sufficiency or otherwise of the waterways under the line I am, of course, quite unable to give any opinion.

In this matter I should think that the experience of some 5 or 6 years now obtained is better than any opinion; and if—as I am informed—they have been fairly tested by storms and floods during their existence, without failure, I should be disposed to accept this as a proof of their sufficiency.

The Stations (with the exception of that at Hobart Town, which with the shops are of ashlar masonry, and very substantial structures) are of timber; they appeared to be fully sufficient to the first requirements of a line of that character.

Speaking generally it appeared to me, under the circumstances of the case, that the Engineer has completed such a line as I should expect to find under the conditions regulating its construction, and quite suitable to carrying all the traffic, provided only that the one which requires a speed of 23 miles be relaxed; I am of opinion that this speed, which in the practical working of the line means a much higher rate, is quite incompatible with the construction of any line of the light character indicated by the conditions, and traversing the country between Launceston and Hobart Town.

With regard to the Rolling Stock, I cannot speak quite as favourably; some of the engines, I am informed, have a weight of 9 tons on each axle, 4 wheels coupled with bogie in front; these are far too heavy for the 40 lbs. rails on which they run, but experience has proved that engines of this weight or near it are necessary to move the trains at the required speed; it involves, however, not only considerable expense in maintenance, but the early destruction of the line.

The trucks appear to be suitable to the line, and run easily on their 7ft. wheel base; the passenger carriages, which have a wheel base of 10 feet, are certainly unsuited to the line and quick curves: their very light construction, the frequent recurrence of reverse curves, and the rapidity with which first one side and then the other of the carriage mounts the 4 or 5 inches of elevation given to the outer rail, render travelling in them very rough, and, I have no doubt, unpopular with passengers.

I should advise that the passenger carriages be as early as possible replaced by others of the American type, having bogies at each end, and generally of a more substantial character.

The Company, I am informed, have sent out from England 700 tons of 40 lb. steel rails for renewals, and 600 tons of deep heavy rails to match those of the Launceston and Western Railway for the 3rd rail to Junction at Evandale; and, moreover, they purpose sending out 1000 tons of 55 lb. steel rails for renewing the curves and heavy portions of the line, should the Government make friendly approaches.

Several new locomotive engines, I am informed, are also ordered, and from what I hear they are of a different and more suitable type to the necessities of the line. All this is entirely in the right direction, and I should hope that all these concessions, which are not strictly required by the Contract conditions, will induce the Government to relax their position; and the first result of this in the interest of the public and all concerned should be to reduce the speed to 15 miles per hour as an average.

The fact of the train service having for two years complied with the Contract, and happily without fatal or serious accident, should, I consider, fully satisfy the contract condition; and great responsibility attaches to those through whose instrumentality the speed, and consequent danger, is maintained to comply with a mistake in the original agreement. To travel such speed, and carry such weight, the rails, &c. should be of a much heavier character, such as are not comtemplated in the exisiting Contract.

I think that the Government and the Company should make mutual concessions, and terminate as speedily as possible the present dispute, which is not only injurious to the Company but to the Government also, should they contemplate further railway extension with British capital.

W. CLARK, *Mem. Institute C.E.*

Wellington, N.Z., April 10th, 1878.

APPENDIX B.

Tasmanian Main Line Railway Company, Limited,
General Manager's Office, Hobart Town, 7th February, 1877.

MY DEAR SIR,

BY the last Mail I received such very emphatic instructions from Mr. G. Sheward (our Chairman), several times repeated, in a long letter, that I must communicate them, and ask your kind attention thereto.

Referring to the Loan the Company propose raising, and which may be effected within the next two months or so, the Chairman states,—

"Should we get this money we should of course have something to spend on rolling stock. I wish to have a clear and concise detailed account and report of the state of each engine, carriage, truck, &c. you have in use. Tell Mr. Midelton to prepare it, with any notes he may think proper to make; read it yourself, and make any observations you may think proper,—above all I should wish to know what engine is most likely to work your traffic properly."

In commending this matter to your kind and prompt attention, it is necessary I should advise you that only the small sum of £12,000 has been allowed in the estimates of the Company for "Rails, 2 new engines, materials to be sent from England, &c.," which amount would all be well expended in rails only. I would not, therefore, ask you to take the trouble of recommending any expensive alterations or renewals of stock, seeing that it will be long before the Company's means allow of it.

In remarking on the new engines I would also as traffic manager suggest that they should be even more, rather than less, powerful than the present engines; less than 20 vehicles is a poor train to take over any line, and our limit is now 9 loaded trucks, two carriages, and van, which I consider a barely paying road.

Yours very truly,

THOS. MIDELTON, *Esq.* C. H. GRANT.

True copy,

E. F. BARNARD, *Clerk Assistant of the Legislative Council.*

APPENDIX C.

HEREUNDER is copy of my Report, in accordance with instructions received from G. Sheward, Esq., in England, and letters from J. B. Davison, dated 19th January, 1877, 13th April, 1877, to me. He also wrote to Mr. Grant, letter dated 15th March, 1877, again referring to this Report; and Mr. Grant wrote to me on the 7th February, 1877, asking for Report to send home. I arrived in Hobart Town, July 15th 1876, and did not like to venture on making a Report too hurriedly, until I had fully seen the line and rolling stock, so that I should not make any *statement* which I might afterwards regret; consequently I did not commence my Report till the date shown hereunder.

(Copy Report to G. SHEWARD, *Esq.*)

Hobart Town, 19th February, 1877.

DEAR SIR,

I HAVE received instructions from you, through Mr. Grant, in a letter from him dated 7th instant, to prepare a detailed account of the state of the rolling stock on this line; and beg to have the honour of submitting the following Report, in obedience to your commands.

Locomotive Engines.—The first thing to consider in dealing with this subject is the loads to be hauled, rate of speed, gradients, curves, strength of rails. &c.

From Hobart Town to Antill Ponds (68 miles) is the heaviest part of our road, and is full of sharp curves and heavy grades, and I consider to maintain the contract speed of 23 miles an hour on our 40 lb. rails that no wheel should bear on the rail with a greater force than *three* tons; consequently *all* our engines are much too heavy, the seven goods engines especially so, as they have been and still are, unfortunately, running with eight wheels under them, instead of ten. The two eight-wheeled express engines are also far too heavy, and are destroying the rails very rapidly. Besides these engines there are two small six-wheeled contractors' engines, each weighing 20 tons in working order, which are also a little too heavy, but are in every other respect the best engines we have; and before I can say what class of engine is most likely to work our traffic properly one of two questions *must* first be decided.

The weight of the rail *must be increased* or the weight of the engines *must* be reduced; and I should strongly recommend the use of steel rails in the future, of the present section and weight per yard, and *reduce* the weights on the engine wheels to the three tons standard alluded to, as the most economical course to adopt. I should like to have seen at least a 50 lbs. rail used at first, but it is now too late, I think, to increase the weight of rail unless we relay the whole line.

I have put the flangeless wheels under one engine, made great alteration in her springs, bogie, and other gear, reduced the weights to the proper standard, and I am happy to state that she has been working heavy Goods Trains lately very satisfactorily indeed; and I intend altering all the other six sister engines the same, and reduce the weights of the express and contractors' engines as soon as possible, so as to suit our light rail.

It would be well just to sketch the nature of our traffic, to enable you to judge that the engine I am about to recommend will be the best in every way. Our express train never exceeds seven vehicles, and the express engines by very hard pressing will work this through, but it is too much, and the usual train is 3 to 4 vehicles. The freight trains usually consist of 3 carriages and 10 wagons each train, and it takes the two express and two heavy engines to work our present passenger train service. I propose to put all the ten wheels, as aforesaid, under all my heavy engines and keep them for working heavy goods and excursion trains, of say 20 wagons or 17 carriages respectively, and use my two little contractors' engines when altered and a tender put to them for working my present slow passenger trains; then if I have *three* more engines like the last named I shall have enough for working two night (mail) trains and have one spare passenger engine, which is not too much, as I have great difficulty now in keeping both my express engines on the road,—indeed I shall be compelled to run the express soon with one of the little engines, as both the express want heavy repairs. I have no doubt whatever but what I can do this successfully, if we alter our time table slightly. We now allow 3 hours 10 minutes for the first 68 miles, and 2 hours 30 minutes for the other 65 miles, with the same number of stops.

As a standard engine I beg to recommend one having outside cylinders 11 in. by 18 in. and four coupled wheels, each 3 feet or 3 feet 6 in. diameter, with a *four*-wheeled bogie in front, such an engine not to weigh more than 15 tons in full working order, and a tender on four wheels 2 ft. 6 in. or 3 feet diameter, and weighing 5 tons: with the exception of the bogie this class of engine would be a *duplicate* of my present small engines, as altered by me, they would work any of our regular passenger trains, which should never exceed *six* carriages, or 35 tons gross; they would not injure the road one-sixteenth as much as our present engines, be easily handled, want little repairs, and cost perhaps, with tender included, about £1200 each. I am perfectly satisfied that it will be more economical to work passenger and goods trains separate; and if we had a very heavy passenger train to work at any time it would be better to hook on *two* small engines of the class I mention, and run the *extra* one *as far only as was necessary, and then leave her*; or, the same train could be divided, and each engine take half: whereas our present *ten*-wheeled engines are only fit for hauling heavy (20 or 22 wagon) trains at slow speeds of 14 to 16 miles an hour, the size of wheel,

3 feet 6 inches, would be quite suitable at 23 or 30 miles an hour; but the engines being *six* coupled and heavy *are not* suitable for running over 20 miles an hour at the most. I do not *consider it safe to run long* mixed trains on this road, the grades being so great; and we have had cases two or three times since I came here of trains running away—therefore a tri-weekly goods train service, and the passenger kept separate, will, I think, be much the best; and the goods trains could be on the road any length of time to suit the other trains.

TABLE OF ENGINE POWERS, &c.

Class.	*No.*	*Description.*	*Diameter of wheels.* feet.	inches.	*Cylinders.* inches. × inches.	*Power.*	*Weight.* tons.	*Revns. per Mile.*	*Price per Ton.* £
A	7	Goods Engines 10 wheels 6-coupled	3	6	14 × 20	93·0	26	480	65
B	2	Express „ 8 „ 4 „	4	6	12 × 19	50·0	24	373	65
C	2	Contrctrs. „ 6 „ 4 „	3	0	11 × 18	60·0	14	560	65
D	–	Imaginary 8 „ 4 „	3	6	11 × 18	51·0	15	480	65

The above Table shows the C engine to have the advantage as regards price, power, and weight; and two of the C or D engines would have *considerably more power* than *one A*, either coupled together or in separate trains; and I beg to recommend the C engine in preference to any other; and we cannot err much in this, as the present express engines can be kept for the fast running, and the five light engines for the slow day and night trains, and the seven goods engines for heavy goods trains, &c. I will endeavour to send by next mail drawings and specification of the engine I want; and if we adopt *this or the D class of engine* it will not be necessary to have a new and larger *wheel* lathe for the express wheels. What I require most at the present moment is, material for completing 6 Tenders, which is as follows, and like that which the Hunslet Engine Company sent out last:—16 wheels 3 ft. diameter (these might be made lighter in the skeleton), 8 axles, 16 bearing springs to carry 3 tons each, 16 axle boxes, 4 buffers, (to go between engine and tender) 4 spare axle boxes, also a 12-in. Whitworth lathe and a radial drilling machine, one of Messrs. Lowry and Co's. No. 2 size with 5 feet 6 inch jib, or one of Embleton, Mackenzie, and Walton's No 2 size would do, also one of Thomson, Sterne, and Co's. Universal Grinders, No. 4, price £25 10*s*., which would be as good as a mechanic to me at 10*s*. a day; also, one of the same firm's Patent Universal Tool Grinders, which would last out five grindstones, price £18 10*s*. I *can do without* all these tools, but I consider by having them they would save their value in labour in two years, and they are all *most certainly urgently required here*. The No. 3 should have top driving-gear for £25 10*s*., and the Radial Drill (if a Whitworth) will have a vertical sliding motion, which would be a great advantage—this would be the best Drill, but the most expensive.

Passenger Carriages and Break-vans.—These are of a light make, and the most of them require heavy repair and painting. I agree with the lightness of their construction; but, with end entrances, they are very weak transversely, and are shaking to pieces fast. I beg to propose (with your permission) making here at the shops two 36-feet Double Bogie carriages which shall weigh about 9 tons gross, and be capable of carrying 50 passengers. I can also make *all* my new stock here (with the exception of wheels and axles) cheaper than it can be done and sent out from England. The draw and buffing gear to all the stock I consider complicated, heavy, and weak in one of its vital parts; a much simpler, safer, and lighter plan could be adopted. We *must, I think*, use bogie (passenger) carriages as soon as possible, for the tires wear very rapidly, and the engines labour very hard to get along with 6 or 7 carriage trains on our 5-chain curves and grades of 1 in 40, &c.

Covered Goods Wagons.—All these have been running some time, and are much shaken; they will require repairing and painting at once; their construction is weak longitudinally and transversely. I have commenced to make 20 more, one of which is done, which is lighter and stronger in every way.

Open High-sided Goods Wagons.—These are in fair condition (a very nice wagon), but, like the others, have a weakness. Some of these want repairing and painting at once.

Sheep Wagons.—These are a very good class, but require heavy repairs and painting.

Ballast Wagons.—These are the best made wagons here, but have been much used, and require very heavy repairs and painting.

High-side Goods Wagons (made by Vulcan Foundry Company, at Warrington, in 1869) are a very well-made wagon, with good wheels and axles, but fitted with *grease* axle boxes. These wagons require a thorough overhaul and painting.

Small High-sided Goods Wagons.—Similar to the last, but smaller in the bodies, and made by the same firm. These are much out of repair, and to make them accord with the present stock would require new axle boxes, axles, draw-gear and brake-gear. The draw-gear they now have is very simple, but weak in one particular place only, which can be strengthened; which, when strengthened, would be the best draw-gear we have at present. I hardly think these wagons worth such extensive alterations, as they will now do admirably for coal wagons.

The foregoing is the best report I can make under the short notice I have had, and hope it may be the class of report and supply the information you require: if not, I shall use my utmost endeavours to furnish you with a more exhaustive report.

I am, Sir,
Your humble and obedient Servant,
THOS. MIDELTON.

NOTE.—One new horse-box was sent out from England complete. I made five new ones to it in our own shops in January, 1877, in time for the February races.*

The foregoing report was forwarded to the Board through Mr. Grant, who, in all probability, commented on it. Mr. Grant wrote me on the 2nd May, 1877, thus—"The Chairman also writes again about the very detailed report that he expects from you; that you prepared has doubtless reached him ere this." And further on in the same letter he says—"The Chairman requires a *monthly account of the state of the engines*, and really I ought to have one *weekly* from you." In my reply to Mr. Grant's letter on the 4th May, 1877, I stated to him—"Referring to our Chairman's observations on the exhaustive report he wishes me to furnish, I am sorry to hear the one I sent was not sufficient; any further report must be accompanied with drawings and specifications; perhaps you will give me an idea of the kind of report he wishes me to write.—THOS. MIDELTON." Apparently my report and Mr. Grant's comments thereon rather confused the Board, and they thereupon consulted Mr. F. W. Webb, locomotive superintendent of the L. and N. W. R. Hereunder is copy of that gentleman's report, which was handed to me by Mr. Grant on the 30th October, 1877, the day AFTER the English mail left Hobart Town. I had PREVIOUSLY asked Mr. Grant for this report so that I might write by the outgoing mail.

(Copy.)

London and North Western Railway,
Locomotive Department, Crewe, August 20th, 1877.

DEAR SIR,

I HAVE perused the reports of your Locomotive Engineer, and Traffic Manager, relative to the proposed new engines for your line in Tasmania.

Your Engineer takes an engineer's view of the question, and your Traffic Manager a traffic view. I am inclined to think, after reading the Traffic Manager's report of the future prospects of traffic, that he is nearer the mark as to the style of engine required. I do not see how a really effective engine can be designed for such gradients as you have with only a total weight of 15 tons, nor do I think you can get sufficient tractive power on a 4-coupled engine, as you have to limit yourselves, with your light rails, to certainly not more than 3 tons per wheel. There would be no difficulty whatever in having your engines arranged so that when working the slower and heavier trains to work as a 6-coupled engine, and when running your lighter and faster

* This note was not in the original report.

trains a 4-coupled engine, the only condition being that you should be able to disconnect one pair of the coupling rods say from the driving to the pair of wheels in advance of the driving wheels. Had I a section of your line, from end to end, I could go very much more into details than it is possible for me to do without this information, and I can only even gather inferentially from the reports that the gauge of the line is 3 feet 6 inches. I am strongly of opinion from what I saw when over in America, that the American type of engine would suit you far better than the more rigidly constructed English ones, unless you went in for new designs, which, taking the small number of engines you require, would make them cost a great deal more than accepting some style of engine already at work, as new patterns would have to be made. If you concur in these views I do not think you could put yourself in better hands than Messrs. Burnham, Parry, Williams, & Co., Baldwin Locomotive Works, Philadelphia; and if you could send them a section of your line with an outline specification, somewhat in these terms, you would leave them free to work in their own pattern, at the same time give you an engine which I think would be able to work your traffic with much less injury to the road than your present engines, which are excessively weighted on some one pair of their wheels.

Specifications for three engines and tenders for a 3 feet 6 inch gauge to be capable of taking a gross load of at least 50 tons, exclusive of engine and tender, up gradients of 1 in 50, and round curves of 5 chains radius, on iron rails 40 pounds per yard; engine to be 6 wheels coupled with swing truck of, say, two wheels in front to weigh not more than 47,000 pounds in working order, and not to have more than 13,440 pounds on any one pair of the coupled wheels, or a total for traction of 40,320 pounds; the coupling rods to be so arranged that one pair of the coupled wheels can be disconnected, so that in running a quicker and lighter train the engine can be worked as a four-wheeled coupled engine, the coupled wheels not to be less than 40 inches in diameter, and the cylinders to be sufficiently large to do the work named with a cut off of 50 per cent.; the tender to carry 1200 gallons of water with a corresponding proportion of coal on two four-wheeled trucks, and to be fitted with powerful brakes. It will be necessary to state the quality of fuel to be burnt in these engines, whether bituminous, semi-bituminous, anthracite, or wood, if bituminous or semi-bituminous, I would recommend that the internal boxes be made of copper.

I am leaving home to-day for a short time, but if you could in the meantime send me the gradients on your line I should be happy to go more fully into the question, and would let you have a specification for the engines more in detail in accordance with what I recommend.

Yours faithfully,

G. SHEWARD, *Esq.* F. W. WEBB.

I wrote Mr. Webb on the 26th November, 1877, saying I was pleased to find that he, in the main, corroborated what I had said in my report *re* engines, and that I thought he could hardly realise what a succession of 5 chain curves and 1 in 40 grades were, such as I have here, unless he saw them. I informed him that I had by the same mail forwarded *plan* and section of part of my road to our Chairman; as also some *facts* accomplished with a 14 ton engine, asking him to show them to Mr. Webb.

I also wrote to Mr. Sheward by same mail, enclosing facts which showed that I had accomplished *more* up a 1 in 40 grade with a four-coupled 14 ton engine than Mr. Webb proposed (in his Report) to do with a 20 ton 6-coupled engine up 1 in 50, and that I should be sorry to see another *class* of engine introduced, as I had already *three classes* in a total of eleven, and if I had been the original designer I should have had but *one* class, and that the D. Class I recommended.

In January, 1878, Dr. E. H. Williams, (formerly General Manager of the Pensylvania Railroad, but now one of the partners in the American firm of Burnham, Parry, Williams, & Co., referred to by Mr. Webb,) was visiting Hobart Town, and we became acquainted. He informed me that he had ridden over the Tasmanian Main Line Railway as a First Class passenger from Launceston to Hobart Town: we talked over engineering matters freely, and especially that concerning the best class of engine and carriage for this road, and I am happy to state that our ideas were identical on both subjects. Dr. Williams also inspected my workshops, and engines under repair, and expressed himself in favour of all I had altered and accomplished, especially the ten-wheeled 6-coupled Bogie engine, No. 2, and the eight-wheeled Bogie engine No. 8, and the six-wheeled contractors' engines, Nos. 10 and 11.

I received a letter dated Philadelphia, 31st May, 1878, from the firm, (B. P. W. & Co.,) stating that they had in January or February last submitted proposals to our London office for supplying engines, but that their offers were declined; they enclosed photos. and particulars of the "class" of engine submitted, which was almost identical with the No. 2 engine as altered by me, and the six-coupled engine recommended by Mr. Webb, (see photos.), and also photos. of three engines "Delaware," "Schuylkill," and one, as supplied to the Government of Queensland very recently. The three last-named engines are practically identical with the Class C. and D. recommended by me in my Report dated 19th February, 1877, either of which would be delivered here in Hobart Town for £1500 each, with eight-wheeled tender included; the highest price engine mentioned in this letter is £1650.

Mr. J. H. Clarke (who had been 22 years locomotive superintendent of the South Australian Railways) was visiting Hobart Town in March, 1878, for the benefit of his health; that gentleman called on me and made my acquaintance, and after showing him all I could in the shops and what I had done he expressed himself highly satisfied that I had made great improvements, and he was liberal in his congratulations. Latterly I heard from Mr. Clarke, in a letter dated Adelaide, 14th August, 1878; in that he says—"I am quite satisfied in my own mind that it would be very unwise to run your line without the bogie to *all* the locomotives; we are working most of our lines with the bogie engines, and they give great satisfaction, and none of the tires are worn thin-edged like those which you showed me lying in the railway yard.

I most thoroughly agree with Mr. Clarke as regards bogies to engines (and carriages), for this road, and I intended, when time and opportunity occurred, putting bogies under Nos. 10 and 11 engines, and I consider with this alteration these engines would be the best on the Tasmanian Main Line Railway at the present time.

Mr. W. E. Batchelor, in his Report to C. H. Grant on the Main Line Railway engines, dated 12th October, 1874, is of the same opinion as myself, as to the position of the flangeless wheels on the ten-wheeled six-coupled engines, and in it he states that the *leading coupled wheel should have a flange*, and the driving wheels *none*. These engines *had* the reverse of this when sent out, and it is a remarkable fact that I have made this alteration in No. 2 engine, and I most solemnly state I never knew of the existence of Mr. Batchelor's Report till December, 1877, when I first saw it in print. (*Vide* Paper No. 31, 15th November, 1877, L.C.)

After so many minds have been exercised in producing a suitable engine for the Main Line Railway, consisting of no less than 10 men, (Mr. Lee Smith, the Company's consulting engineer), Mr. Cleminson, the designer of Nos. 1 to 9 inclusive, Mr. Batchelor, Mr. Grant, Mr. Hargrove, Dr. Williams, myself, Mr. Webb, and now Messrs. Neilson and Mr. Sheward, jun. I very much regret to see (6th September, 1878), landing some six-wheeled engines four-coupled in front with the trailing axle fitted with the late W. B. Adams's Radial Axle Boxes. These engines have outside cylinders, which are unnecessarily wide apart, caused by the coupled wheels having *outside bearings*, and *overhung* cranks outside these, which is a mixture of German and English practice and not to be admired, an arrangement which will, in my opinion, cause the engines to "wriggle" on the straight road, and being coupled in front and *no* bogie they will be very unsafe on the curves of the Main Line Railway, especially when, after a

little running, the leading tires will get sharp; these engines are too heavy for the 40lb. rail, and it introduces another "class" which is highly costly and objectionable; there will now be 3 ft., 3 ft. 6 in., 4 ft. 6 in., and 3 ft. 9 in. wheels, and 11, 12, 13, and 14 inch cylinders on the Main Line Railway, and *four* classes of engines in a total of 14. The tenders to these engines are of iron and on four wheels, and will in all probability weigh 12 tons each in a road-worthy condition. I really think it would have been difficult to have designed a worse class of engine for this road, and it is not a good design for any road, and I should be very sorry to have to run the express train with one of them: they are a lighter engine than Nos. 1 to 7 class, but they have one pair of wheels *less*, which does not *lessen* the evil. I believe these engines have 13 in. by 20 in. cylinders, and 3 ft. 9 in. coupled wheels, with a trailing wheel 3 ft. diar.; if this is correct, the four coupled wheels should not have a less weight than 15 tons on them, which gives 3·75 tons per wheel, or quite ¾ of a ton *too much* for a 40lb. rail, and I estimate their total weight to be about 20 tons each. I am sorry to see, in Mr. W. Clark's Report, dated 10th April, 1878, that he has been misinformed about these (new) engines; they certainly are of a "*different*" but not *more suitable type* to the necessities of the line; neither do I agree with Mr. Clark as to the Government relaxing their position, in the interest of the public, for reducing the speed from 23 to 15 or 16 miles an hour. The whole substance of his said Report appears to me to be to induce the Government to lessen the speed, and to say all he can for the Railway Company and to leave unsaid all he could for the Colony. He *was* correctly informed that some of the engine axles have a weight of 9 tons on them, (4½ tons per wheel); this, as he truly remarks, involves "not only considerable expense in maintenance (of permanent way) but the early destruction of the line; and I would respectfully inform Mr. Clark that my experience on the Main Line Railway is "that engines of this weight or near to it," as he states, "are NOT *necessary* to move the trains at the required speed. I would also point out that the much desired reduction of *speed* will not *reduce the excessive weights* on the engine wheels, nor very much lessen the danger and risk which is now and has been incurred. The only way to remedy the evil is either to lay down 133 miles of heavier (steel) rails (say 50lbs. per yard) to suit some of the present engines, or reduce the weights on the engine wheels, considering present and reasonable prospective traffic, in tons per year or per train. I should consider it an unwise expenditure of capital to lay down anything heavier than 40lb. steel rails, consequently the latter would be the most economical plan to adopt; and when in office I was making the necessary alterations, and reduced the weight per wheel of Nos. 2, 8, 10, and 11 engines; but I learn that since I left the Company's service, in May, 1878, that No. 2 has been erroneously altered back again to a *four* coupled engine. When I left her she had three tons per wheel on the coupled wheels, and about six tons on the four bogie wheels; now there is, probably, four tons on each coupled wheel, and eight tons seven hundred on the four bogie wheels. If No. 9 engine were altered like No. 8 there would be no advantage in reducing the speed, but I candidly admit that it is highly dangerous to run No. 9 at twenty-three miles an hour. There would be very little advantage either in reducing the slow train speed. *It is the weight per wheel* which MUST be reduced; and when this is done I would still maintain the twenty-three miles an hour, and have *two* expresses instead of *one*, and knock off the two slow trains, giving the same, or more correctly speaking, a *better* train service than the present. I am glad Mr. Clark bears testimony to the "great responsibility on those," through whose instrumentality the speed, and consequent danger, is maintained. I am sure there is no man who has felt this responsibility more than I have, and especially so, for under my agreement with the Company whatever might have happened could have been saddled on me, and I had not the opportunity of defending myself against any charge, however serious it might have been; and feeling this latterly very much I was glad to be relieved. The risk on such heavy grades as are on the Main Line is very much increased (apart from the question of engines) by the practice of running trains (especially the slow freight trains) with but *one* guard; as this man has frequently to be in one or the other of the carriages in the performance of his duties, and as the continuous brake is worked from the brake van at the rear of the train, should the brake be required urgently coming down an incline, or at any other time when the said guard is engaged in either of the aforesaid carriages, there would be *no one* in the van to apply the brake. This source of danger should be remedied by always carrying a brakesman and a conductor or guard, which is the American practice I believe, but common sense dictates this irrespective of practice. It could be remedied also by using a continuous brake (which should come up to all Board of Trade requirements), and which should be worked from the engine by the engine-driver. This is the best, safest, and cheapest mode, as the driver is the first who sees all difficulties. Now, with the hand brakes and a continuous brake worked from the rear, whenever any mishap occurs the driver blames the guard, and the guard throws all the blame on the driver, making it next to impossible to find out *who* is to blame. I could point out numerous accidents on the Main Line which could have been avoided, and much expense saved, if the driver had had the class of brake I refer to. That in use on the Main Line (Clark's chain brake) is not a reliable one for many reasons, and I know it from experience; for further proof see *Engineer* of 15th February, 1878, p. 116, which gives an account of a failure on the L. and N.W.R., on which line it is used as an "emergency brake only." If any justification were required for my alteration of the engines as I have done, it can be found in the cost of maintenance of permanent way on the Main Line Railway for the half-year ending December, 1877. It amounted to 19·30*d.* per train mile run, proving the destruction by the use of heavy engines. The usual cost is from 7*d.* to 9*d.* per train mile; the latter figure is the cost in Victoria for year 1876, which is about the same as some English lines. I adopt the usual Board of Trade train mile factor in this case. I need hardly point out that when suitable rolling stock is placed on the Main Line Railway, which is not the case up to the present time (September, 1878), there is no reason or hindrance to the permanent way charges being the same as other lines; but it cannot be expected that the alteration of four engines only out of eleven would *very much* lessen the cost of permanent way repairs; but if they were all done then a change in the right direction might be expected.

With all due deference to Mr. Webb as a great authority on locomotives, I cannot agree with him in the idea of uncoupling the leading and driving wheels when running fast trains on the Main Line Railway with the six-coupled engines he proposed, I think Mr. Webb would, as a practical man, be the last to inaugurate such a scheme on his own line, and I fear if the coupling rods were *once* taken off it would be a long time before they would be put on again *without lifting the engine*. It will be noticed too that Dr. E. H. Williams preferred the 4-coupled to the 6-coupled engine, like I do myself, and I still adhere to this opinion, as I would rather, for all reasons, run *two* separate trains than *one* long train on such a road as the Main Line; the getting *up* a grade with a long heavy train is not the difficulty, it is the dread of not having *control* of such a train in coming *down* that is the source of danger, cost, and risk, to say nothing about the frictional resistance of a *long* train on reverse curves. Mr. Grant in his letter of the 7th February, 1877, states, in asking me to prepare report—"In remarking on the new engines I would, as Traffic Manager, suggest that they should be even *more* rather than *less* powerful than the present engines," forgetting apparently that it is next to impossible to get *more* power without getting more weight. That gentleman also stated in his evidence on the 6th November, 1877, No. 40, that *any* of our present engines will on emergency perform the express service. I really hope he was not serious, indeed I would not like to make such a statement; and those engines, Nos. 8 and 9, which up to about that time were used for the said express service were the best we had, but bad at that. I was at that time commencing to make No. 8 *as near suitable* for the service as she could be made, without renewing her, for even now her boiler is at least one foot higher than there is any necessity for, and her cylinders are also unnecessarily inclined and too heavy by half; she weighs 19 tons, or 5 tons lighter than she was originally, but too heavy now by four tons or more, and since December 1st, 1877, when she was turned out, she has run constantly 800 miles per week up to, and I believe after June 24th, 1878, and burned three pounds of coal per mile *less* than her sister engine No. 9, doing the same work alternate days, and under the same conditions, and I

have no hesitation in saying that No. 8 is the best engine on the Main Line Railway for working the express trains, but even now she is not what I should have made her when the opportunity occurred. With the alteration of four engines and the construction of three new tenders, the expenses of the Locomotive and Carriage Department was 14·86*d.* per train mile for half-year ending December 1877. Victorian lines equal 14·71*d.* for year 1876, ·15 difference, and the total engine miles run in the year 1877 on Tasmanian Main Line Railway was 261,410, made up thus:—

Number of Engine	1	2	3	4	5	6	7	8	9	10	11
Miles run by each Engine	25,244	7962	*Nil.*	19,507	25,009	31,939	32,436	30,655	55,911	19,192	13,555

This mileage is not excelled in England and especially that by No. 9, she ran 1596 miles per week for 15 weeks and three days, (from August 16th to November 30th, 1877). Previous to her commencing this work I fitted her with new cast-iron eccentric straps (in place of her original brass ones, which gave great trouble). On the 8th October, 1877, she broke an eccentric *sheave* and this caused the *strap* to break on the up journey with the express train; this breakage was remedied that night, and the engine ran again double trips the next and succeeding days, and if any very serious breakage had happened to this engine I had no other but No. 11, one of the small contractors' engines, to run the express with, as No. 8 was in the shop all to pieces, she having run off the road on the 15th March, 1877, and got damaged; was repaired, and ran again up to August 31, when I took her in the shops for thorough repair and alteration, and whilst this was going on No. 9 was running double journeys, and I once had to bring her into the shops on a Saturday night after coming in with the express, lift her with jacks, take out her wheels and line up her axle boxes, and by working without intermission from Saturday, 9 P.M., this job was successfully done, and No. 9 took out the express train in her regular turn on the following Monday morning; this fact and that of *two* engines having worked the express train successfully from 15th March, 1876, to the present time, or an average of 800 miles per week per engine, will go to prove the correctness of the assertion made by Mr. Clark about the great responsibility, &c., and that "happily" it has been accomplished without fatal or serious accident,—and when that gentleman wrote "happily," he was not aware of the fact that on the 24th April, 1877, I had a good engine lying in the Coal Mine Creek at Jerusalem, and on the 9th May, 1877, another lying beside the road (upside down) at Campbell Town.

Through the Chief Accountant not being allowed to have full control of his department, the expenditure has not been placed under the proper headings, and if the Company's books were examined by a railway man, it would be found that one department has been worked at the expense of another; for instance, five ballast wagons, through the breaking of a buffer-head, were allowed to break away on the tunnel incline on the 12th June, 1877, by the guard's negligence in placing the brake-van next the tender, instead of at the rear of the train, thus leaving the said ballast wagons unprotected. Five wagons ran away and got off the road and were very much damaged. The cost of the repairs of these wagons was borne by carriage department, but it should have been borne by permanent way department. A great deal of ballasting too has been done but has not been charged in the regular way; all these irregularities makes it impossible nearly to tell what the line could be worked for, that is to say—"what the *real* working expenses" are: from experience I can safely say that £625 per week would fully cover all working expenses. The total expenses per train mile now under irregularities stands thus—Victorian Railways for year 1876=45·91*d.* Tasmanian Main Line Railway, for half-year ending December, 1877=46·37*d.*, and I see no reason why it could not be brought down to 33·54*d.*,—indeed there is every reason to show that this should be the figure.

I have the honor to be,
Gentlemen,
Your humble and obedient Servant,

THOS. MIDELTON.
9th Sept., 1878.

Appendix D.

The following is an account of three distinct accidents which have happened on the T. M. L. Railway, each of which was caused solely by the bad condition of the rails on the respective curves:—

On the 15th March, 1877, No. 8 engine was working the down express from Hobart Town, and when running round a left-hand curve about half a mile north of the horse-shoe bend, near Jerusalem, at about 12 miles an hour, the engine and one carriage ran off the road and lodged against the side of the cutting, the road was pulled in clear of the said engine, and on my arrival with No. 9 engine, some time after the accident, I saw that the accident had been caused by the presence of bad rail as at the Coal Mine Creek above named; such a rail in either case should not have been in a curve, especially on the outer rail, as these were—the inside edge of which was very bad for about 6 or 7 inches.

On the 24th April, 1877, No. 5 engine was working the up ordinary train from Launceston, and when running round the Coal Mine Creek curve, near Jerusalem, the said engine mounted a bad rail, and got off the road, and rolled down the embankment and finally lodged in the bed of the creek, about 40 feet below rail level. The engine had been recently repaired in the workshops by me, and had been running about three weeks, and was in very good order; no alterations of any kind were made, and I turned her out the same way as I found this class of engine when I came here in July, 1876. I was on this curve on the Sunday morning previous to the accident happening, and in the presence of a witness I remember making the remark, "that rail (pointing to the said bad place in it) ought not to stop in another five minutes." On the following Tuesday I went to the spot and again inspected the bad rail, which bore satisfactory evidence that the accident was caused by its presence in the said curve, and I am prepared to prove this, and that it was no fault of the engine, although I have been distinctly charged with having caused this accident by my alteration of the bogie of this engine. The written records will prove that no alteration was ever made either before or after the accident. The speed of the train at the time was about 12 miles an hour.

On the 15th January, 1878, No. 10 engine was working the down ordinary train from Hobart Town. I was riding in the van at the rear of this train on this occasion, and when passing round a left-hand curve near the *Black Snake Inn*, I saw pieces of about 14 or 18 inches long flying off the inside edge of the outer rail, and immediately felt a jerk which told me the engine was off the road, and upon getting out I found this to be the case; the express train had previously passed OVER this spot, and the results if that train had got off instead of the slow ordinary train might have been very serious, as it was quite close to the water's edge; there was a very badly split rail in the curve, and I saw about 5 feet torn off the inner edge of the outer rail; there was, I found, sufficient evidence left on the rail to prove how this accident happened; the next morning's paper announced that it was caused by one of the engine springs slipping out of its place. This was not the case. There is no doubt whatever of the accident having been caused by the bad rail. On the following day I received a letter from Mr. Grant, in which he (virtually) states that

this accident was caused by my alteration of this engine, even after she had been working since March, 1877, and had run up to 31st December, 1877, 19,192 miles; and even on this occasion the driver and fireman lifted her on the road in about half-an-hour and proceeded on his journey; and she took 14 vehicles from the Corners right into Launceston, and this to time table. I was on this occasion taking an account of the rolling-stock and inspecting the road's condition at the same time, as I usually did, often for my own protection when such accidents as the foregoing happened. I never gave any orders concerning the permanent way, but often made suggestions only; and never interfered, principally out of compliment to Mr. Grant, although it was strictly my department; but I had a great task before me in getting the rolling-stock made suitable for the road, and especially so with regard to the engines; and Mr. Grant in his letter of the 26th July, 1877, distinctly says thus—"Perhaps you would like to turn some attention to the permanent way while matters are so dull." Again, in his letter of the 15 January, '78, he says—"You state or imply that the condition of the road occupies much of your time, but I have repeatedly told you from the time of your arrival that this forms no part whatever of your duty." To prevent this sort of unpleasantness between *two* minds was the only reason why the Chairman gave me control of the permanent way and rolling-stock, as there is more sympathy between wheel and rail when *one* mind controls *both* than there is when two minds control it; and in England on no less than 10 different lines (where the work is not too great for one man) the two departments are controlled by one mind. The foregoing cases are three out of many more which have happened and duly recorded.

THOS. MIDELTON.

9th September, 1878.

APPENDIX E.

REPORT on the T. M. L. Railway Passenger Carriages and Brake Vans.

THERE are eight first-class carriages marked A., there are five first-class smoking carriages marked B., which have a central partition, and were intended for first and second class composite carriages; there are nine second class carriages marked C., or a total of 22. All of them are practically of the same design and make, the only difference being in the cushions, and a slight ornamental panelling and wood-work in the first class. The wheels and axles are a very good design, and the axle-boxes are also very good and simple; they are fitted with pads on the under side for oiling the jormals—an arrangement used in America, and on some lines in England, and works admirably here, and gives no trouble at all; this is really the best part of the carriage and wagon stock. I am sorry I cannot say as much for the under frames, these are not a good or strong design; they are fairly made, but the design is weak; they might have been made twice as strong with one-third less timber. The draw-bar gear and buffing gear (the two are combined) is very complicated and very heavy, and yet singularly enough very weak; the weight of this can be reduced 75 per cent. and a simpler and stronger gear used at one-half the expense of the present gear. I got rubbers out from England to do this job, but never had the opportunity of doing it. The sides and ends of the carriages are badly designed and constructed, and consequently are very weak longitudinally and transversely, especially the latter, as the end doors are a source of weakness, and the ends are not properly "strutted." I did this to one or two which were really falling to pieces. The tram busses in London are much stronger in their bodies than any of these carriages; the street tram-busses carry 22 passengers inside (the same as the Main Line carriages), and they also carry 22 to 24 outside on the roof. I would not like to see 22 people on the roof of any of the Main Line Railway carriages. The end platforms are very badly arranged—being simply bolted on, and are very weak for the strain put upon them. The wheels are placed 10 ft. apart centre to centre, quite correct for this length of carriage, but far too long for 5 chain curves. The brake gear is simple and good, but I do not agree with the chain arrangement for applying it. If the "Westinghouse" or the "Vacuum" arrangement were used with the rest of the brake gear it would be very suitable and a good arrangement, as the brake would then be worked by the engine-driver. Now it is worked by the guard at the rear of the train, which has a great many drawbacks.

The bodies should have been quite separate from the under-frames so as to be easily taken off, but they are really part and parcel of the under-frame. I do not agree with the end entrances, as for several reasons it is to be condemned, and Mr. Higinbotham in his report on "The Railways of the World," which was commented on in the "Engineer" of 26th January and 9th February, 1877, says—"As regards comfort, he holds that the American car cannot compare with the English carriage, more especially for long journeys;" he also advocates uniformity of type both as regards carriages and engines. I entirely agree with Mr. Higinbotham in these remarks. The T.M.L.R. carriages are light, and consequently none the worse for this. A good many of them were weighted with about 3 tons of old rails when I came here. I should like to make them lighter and stronger at the same time if I could. It is a fact that the L.B. & S.C. Railway Company have, for some years, worked trains which do the same work as that on the Metropolitan, although the weight of each train, including engine, is little more than half that of the Metropolitan train, while the consumption of coal per mile is 19 lbs. on the South London section of the L.B. & S.C. against 33 lbs. on the Metropolitan; the former engines weigh 20 tons, the latter 42 tons, each, doing the same work, and I have seen the little one run away from the larger ones (that is to say similar engines on the L.C. and Dover Company); this proves the correctness of the view of keeping down the *dead* weight of trains. I consider bogie carriages necessary on the Main Line Railway. The present ones with new bodies would do well for branch roads on curves of not less than 20 chains radius. All the passenger carriages were fitted with Sterne's patent rubber core spiral springs, which, I have been told, were specially ordered, but when I came here three carriages had been fitted with the usual laminated (steel) springs, and I have made springs for, and fitted them to nearly all the rest; three remained to be done when I left in May 1878.

Passenger Brake Vans.—There are four of these marked E., and are very similar to the carriages in construction; the sole bars have a plate bolted on their outer sides, which is a good plan, and much used at home; these vans have a central partition and door, one end of the van is intended for the guard and passenger luggage, and the other for the mail bags. There is a hand-brake to them, and the handle and gear for working the continuous brake is on this vehicle also, and when the continuous brake is applied it simply puts the blocks against the wheels of the carriages in advance of the van (the van itself runs free): the reverse should be the case, and a good continuous brake is applied to all wheels in a train and commences its action on the last vehicle, and so on gradually towards the engine. Almost all the remarks I have made respecting the carriages are applicable to these vans and also the second class carriages. I have fitted steel laminated springs and hangers to all four of the brake vans, and to two others which run on the ordinary slow trains.

The wagon stock is fair, but as it was designed by the same gentleman as designed the carriage stock (in short all the stock) the same faulty arrangements are introduced. I should prefer double-bogie wagon stock also to what there is at present on the line, or a less wheel base than 7 feet.

I have the honor to be,
Gentlemen,
Your obedient and humble Servant,

September, 1878. THOS. MIDELTON.

APPENDIX F.

REPORT on Condition of Permanent Way and Works of Tasmanian Main Line Railway.

In reporting on way and works I must, of course, be guided by the conditions of the Contract; and I consider, if this had been faithfully and practically carried out, and the line equipped with *suitable* rolling-stock, there would have been no misunderstanding, risk, or difficulty: only the usual reasonable wear and tear in maintaining the stipulated speed of 23 miles an hour; and I take the said Contract to mean that a *few* 4-chain curves would be allowed, where a great outlay would by its use be saved. I have heard there is no curve less than five chains radius, but this assertion I very much doubt; indeed, some *look* rather less than 4 chains, but I never tested any of them nor the grades, both of which look to me to be outside Contract. When I arrived in 1876 I was very much struck with the great depth of the tire flanges. When new, they were 1¼ deep, and, of course, as they wore they gradually got deeper, so much so that they caught very hard against the heads of the fish-bolts at the rail joints; and I have seen several of the heads "sheared" right off, and hundreds of marked heads are now to be seen. The fish-plates, too, are, in my opinion, too weak—for, at all events, the *present* rolling-stock these might do with *suitable* engines; but I fear the last new ones will punish the rail joints more than the present engines. The rail ends are in a great many cases battered out by the heavy engines. "Laminated" and "crystallized" rails are to be found frequently. It could not be expected that Mr. Clark could see these rails in *riding* over the line,—except he happened to see a bad rail at some of the stations where, really, it would not much matter, except at a station where the Express train runs through without stopping; but if he had looked at the "old rail heap" in the Hobart Town yard he would have seen too many laminated rails for only 2½ years' running. I look upon that gentleman's Report as Mr. Grant's views dictated to him. The Main Line rails do not get fair wear; and never will until *proper rolling-stock* is placed on them,—consequently, the rail bill will continue high till the alteration. Past and present experience does not lead me to think there will be an alteration directly. I consider "steel" rails absolutely necessary; and I advised the Secretary thus before leaving London; and also once or twice since in my letters to him; but Mr. Grant I could not convince for a very long time; and even now I think he only wishes for steel for points and crossings. These latter are not well or properly made; and perhaps the Home Consulting Engineer is to blame for this. The stock rails are all unnecessarily bent where the point of the switch rail comes against them. They (the stock rails) should be straight; and the switch blade should start off it from a knife-edge practically, thus making it almost impossible for a tire (flange) to run in between the said blade and stock rail. There are not sufficient chairs either to hold the stock rails; and the bolts used are not the right shape, and give no support for the switch blade, which, of course, wants great support. At present these blades are simply supported at *each end*, and not in the intermediate parts at all. All this I have often pointed out, and have been anxious to remedy, but have not succeeded. The injurious effect of bending the end of the stock rail can be seen on inspection; and the switch blades are much too *thick* in many cases. The said blades should be held over, too, by a weight or a similar contrivance, and not by the very old-fashioned switch-box and lever. Several mishaps have occurred from this fault alone on the Main Line Railway.

Crossings.—These are not well made: at first they were very much worn and soon destroyed by the very badly worn tires I found on the engines when I took charge; this defect I have partly remedied, but there is still room for improvement; they have never been made correctly, neither have the check-rails, which go opposite to the points of the several crossings; many can now, I dare say, be found held in their places by the transverse timbers, and not bolted to the main rail at all; when I left a great many were thus. At one crossing, just after it had been put in new, I measured the gauge and found it 3 feet 5 inches, or one inch *less* than it should have been. I pointed this out to Mr. Grant, and he very kindly tried to put the blame on me by saying the crossing was not made right; I have measured the gauge in several places and found it *all* dimensions between 3 feet 5 inches and 3 feet 7 inches.

Crossing Guard Timbers.—The inside ones were in many cases 1, ⅜, and ½ inch, and even 1¼ inches higher than the main rail, even catching the brake rods of No. 7 engine at that time when her tires were very thin; the said rods were only 1⅛ inches above rail level; the said timbers merely required adzing down, but this was carefully forbidden when I asked that it should be done.

Cattle-guards.—These Americanisms have proved themselves not only expensive but highly dangerous; for on the morning of the 11th January, 1878, a horse got *into* the Cornelian Bay Cattle-guard and stood foul of the main line; *no* cow-catcher on the engine *could* have displaced this animal, and had it not been for the presence of mind of the late unfortunate Gauger Bryce, who saw the horse and ran back towards Risdon to stop the approaching up mail train, which he did, and the horse was extricated before the train passed.

I have frequently expressed myself to Mr. Grant that I think these cattle-guards do not meet the Acts and Contract,—they certainly in some cases assist the drainage, but in some cases they act as tanks,—and I think the whole of them should be filled up (as some have already been) and proper gates put up in their places. Signals should be fixed at places such as Bilton's Crossing, Glenorchy Main Road, and many others, including Bridgewater Bridge. In both directions I think such fixed signals should be erected for safety sake. One was erected at Bridgewater, but I never saw it used. The loops too at various stations have been put on the wrong side. In all cases the through main road should be the platform road, and the loops should be on the other side, as at Campbell Town and Evandale; those at Ross, Corners, Campania, Jerusalem, and others are on the wrong side of the main line: from this cause alone wear and tear is increased, as each train has to run through two pairs of "points" and over two curves and crossings quite unnecessarily, and it is also very inconvenient in many other ways; this, of course, is optional, but, nevertheless, it is a mistake. Some of the cuttings and embankments want widening, and I believe a lot of this has been lately done. Some cuttings were absolutely dangerous: and the general drainage is very much neglected, and doesn't look respectable or efficient. At an embankment near Brighton the water runs right through its base. The wing and abutment walls to a small bridge there (where an arch could have been used most advantageously) seem to me to be yielding to the pressure of the bank; one is certainly not vertical, and there is *no* batter on either which there should have been in this case; neither are there too many weep holes left; and this remark also applies to the arched culvert in the bank at the Coal-mine Creek, there there are *no* weep holes, and the consequence is the masonry has yielded. Some flood-water openings might be introduced near Ross in one or two places. The ballast is so thoroughly mixed—good ballast and bad—that I fear a lot of what has been recently done will have

to be done again, better and properly. I have seen many places where there is not 2 inches of proper ballast *under the sleepers*; and could now point this out. I think the drawing of a few sleepers in many parts of the road would astonish some engineers—unless they would consider *anything* ballast. I fear in no case is there 10 inches of ballast *under* the sleepers as per Contract, but there might be in the neighbourhood of the Corners and through the Forest. But I can point out a score of places south side of Antill Ponds where there is not the Contract quantity of suitable ballast under the sleepers; nor are there many places, except at stations, where it is 8 feet 6 inches wide. A great many bad sleepers also can now be found; some never ought to have been used, and others have of course gone recently, that is to say, they were good when put in. Had the late enormous quantity of ballast which has been put down been done correctly, and carried out over the whole line, this with the present 40lb. Landore steel rails, which have been lately delivered and used, would have made a very good road. The Dowlais Bessemer steel rails delivered in January, 1878, are, in my opinion, wasters, and I thus advised Mr. Grant of it on that date; they are very hard like the I.S.R. brand, and I fear very treacherous. I am of opinion too that a great many curves could, without any extra expense, have been saved; there are twenty curves between Campania station and the top of Broadribb's incline, and several deep cuttings and moderate embankments, but by going to the right of Jordan's house on the down journey and following the road, there the whole or at least 19 of these curves would have been saved, and the grade would certainly not have been greater than at present. We go down 1 in 40 a long way, and then go up, and then down again; the curves at all events I think could have been saved, even if the 1 in 40 grade were maintained. At Corrigan's Creek, too, there is an unnecessary curve, and other places which, I have no doubt, Mr. Clark saw and alludes to. The effect that 5 chain curves have on Nos. 1 to 7 engines must be seen to be believed, axle-boxes and tire-flanges such as these engines have, after a few months' wear, is really astonishing; Nos. 8 and 9 *were* nearly as bad but not quite; Nos. 10 and 11 are unhurt and as good as any boxes I ever saw, the leading tires wore badly but they did good work and ran the regular trains, and thus proved their usefulness.

Stations and goods sheds are all quite large enough, but of too many kinds; *one class* of station and goods shed could have been used right through the line for all intermediate stations, and one drawing would thus have done for all; and as expense seems to have been the uppermost idea in constructing the line, &c., this item alone would have been lessened considerably by adopting a nice suitable design. The platforms at some stations are too short, but this is being remedied, and the water-tank supports at Campania, Corrigan's, Flat Top, Oatlands, and Evandale are too close to the carriages when a train is standing at these places; the same might be said of the Hobart Town and New Norfolk Road cattle fences, where live cattle is loaded and unloaded. A Board of Trade Inspector would not pass this. The Hobart Town Station buildings are very good and suitable, the workshops are fairly built, but badly lighted and not well arranged, but will certainly meet the Contract requirements; the same might apply to the goods sheds also, and the Launceston station, goods shed, and engine house. Some of the goods sheds at the intermediate stations are very moderate in construction as regards strength, but if the money saved in this respect had been put on the road there would have been a greater advantage no doubt.

Bridges.—These are constructed of wood, which though not suitable for the purpose, was probably the best that could be obtained at the time. I fail to see which bridge or viaduct has been constructed consistent with the nature and extraordinary shrinking qualities of Tasmanian timber, indeed there seems to have been an entire neglect of this, no allowance whatever for shrinkage, and an examination of the two outside rows of raking struts in the Risdon and other structures will prove this. Timber has been used wastefully in nearly all the bridges: that at Bridgewater, Risdon, and Clarendon could have been made much stronger, and have had far more stability with 25 per cent. less timber, if properly applied; and an examination will show that the two *centre* rows (looking longitudinally) of piles and uprights, as the case may be, *carry the whole* weight of the rolling loads passing over these bridges, and the two *outside* rows simply do *no* work whatever, except act as wind braces so to speak. I should consider the object of placing piles in is for each to do an equal share of the work, but in most of the Main Line Railway bridges only *one*-half of the piles *work* (or are used) and the other half are practically *useless*. The running beams too are badly arranged, and the struts between them; also the tie-bolts can be screwed up as much as may be desired with no other effect than that of *bending* the timber, for they are placed thus. Imagine a bolt connecting the apex and (centre of) base of an equilateral triangle to be screwed up, the result would be as I state. The diagonal ties too are badly arranged in the Risdon Bridge, and look and act very similar to tying the end of a spring-board. The piles in the Bridgewater Bridge are not properly or well tied for resisting the strains on them, and the tension and compression bars in the iron bridge are not made correctly, they should all have been compression bars, *or stronger tension bars*, as when the bridge is shut the strain is as a girder resting at the ends with the weight in the middle, but when it is open the reverse is the case, consequently the strains are reversed also. I should not like to test the whole line according to the Board of Trade regulations as stipulated in the 8th Clause of the Schedule, AND in bringing No. 4 engine, which ran off at Campbell Town, and No. 5, which ran off at the Coal Mine Creek, with No. 2 engine and tender all coupled together. I left one engine at Jerusalem, and went out for her the next day rather than test the Bridgewater Bridge with *three engines* at walking speed. I do not say the bridge would not stand it, but I do say I would not try the experiment at present according to Board of Trade requirements. The Macquarie Bridge, near Mona Vale, is the best on the road, as far as the stone piers are concerned, but I think there is room for improvement in the arrangement of the woodwork. The Clarendon Bridge is well erected, but the design is very bad, and the road is very elastic there. I do not agree with fastening the rails to the superstructure. Ballast should be used throughout the line everywhere; the same depth, or nearly so, on the bridges as on the formation, and a double row of guard-rails on the Bridgewater Bridge would be safer and not cost much. This has been pointed out long ago, as also the same thing for some of the dangerous curves; at three separate places it is necessary in my opinion. One or two of the embankments have been a source of trouble, but ere this I hope it is all remedied. I thoroughly agree with Mr. Clark that great risk and unnecessary responsibility has been incurred in maintaining the contract speed so long; and a thing that is overworked must yield somewhere, and the risk has been in running totally unsuitable engines on a road certainly not fit for them, or at all well made; and I think no one has been more astonished than the Company's Agent that the train service has been accomplished successfully: indeed, he (as well as Mr. Greene) said it was impossible, and it will be more risky than ever when the new engines are used on the road. The Landore Siemen's steel rails now being used are the best in the market, and I claim the whole credit of having introduced them here; and when the whole road is relaid with these and suitable rolling stock placed on it the line will be a good property. I should consider it an injudicious and wasteful expenditure of capital to put down a heavier or better rail than the 40 lb. steel now being used, as these will certainly safely and economically carry all the traffic for the next 10 or 15 years. I have very often been told by Mr. Grant what he did on the Wellington, Grey, and Bruce Railway in Canada, and he has held that line up as a model to be imitated. I see in *Herapath's Journal* of May 4th, 1878, that the President of the Great Western Railway of Canada, the Right Hon. H. C. E. Childers, M.P., stated at the half-yearly meeting of Shareholders in that Company, referring to the Wellington, Grey, and Bruce line, that "*that line has been a signal failure*, and has added very greatly to your burdens,"—but in what way is meant I do not know; and when considering fully all past experience connected with the Tasmanian Main Line Railway, I very much doubt if this line will be a greater success as things are standing at present; and probably ninety-nine engineers out of every hundred would have said

exactly what Messrs. Greene and Grant did in the earlier days, and the propriety of doing what has been done is very questionable, with such rolling-stock as is on the line. The fixed weighing machines at Hobart Town and Launceston are excellent, but the one at Hobart Town is not in the right position for use. The two iron turn-tables are also very good, but too short for tender engines; that at Antill Ponds is very badly designed and made.

I have the honor to be,
Gentlemen,
Your obedient and humble Servant,
THOS. MIDELTON.

Sept., 1878.

APPENDIX G.

REPORT on each of the Tasmanian Main Line Railway Locomotive Engines.

No. 1 was originally a ten-wheeled six-coupled bogie tank engine, having cylinders 14 diar. by 20 inch stroke, and coupled wheels, each 3·6 diar., and weighed probably 30 to 33 tons in working order. The leading coupled wheels had no flanges, and it was found, after a series of trial trips with these engines at Evandale, that the flangeless wheels crippled the rails very much, and it was decided to take these wheels out altogether, and also take the side tanks off. This was done, and I found this class of engine altered thus when I came here in July, 1876, and running as a *four*-coupled bogie engine, with the coal box on the engine frame, and a wood tank (for water only) placed on some covered goods wagon frames, used for tender to these engines. Nos. 1, 2, 3, 4, 5, 6, and 7 were all like this, and there were five wood tank tenders for seven engines. No. 1 engine had been repaired, and when I left she was in fair working order, but far too heavy for a 40 lb. rail. The bogie had what is known as Baldwin's arrangement of swinging links, but the designer put these links in the reverse way to which they ought to have been, and the action of them on a curve was exactly opposite *to what was intended;* for instance, when the bogie entered a right hand curve these said links gave the engine a canting motion *outwards* (it should cant the engine *inwards*), so as to coincide and act with, and in the same manner, as the superelevation of the outer rail does on curves; the action was this—the leading end of the engine was *twisted one way* by the links, and the trailing end of the engine was *twisted* the *opposite way by the superelevation* of the rails. The cylinders and steam chests to these engines are unnecessarily heavy, and very complicated, and it is necessary to take a good many cylinder bolts out and a part of the smoke-box front before the front steam-chest covers can be got at at all. The link motion is too light, and the eccentric straps, which were of brass and of a very antiquated design, gave a lot of trouble and wore away very quickly, but I replaced these with new cast-iron straps, which run quite ten times as long as the brass and give no trouble. The valve spindles to these engines were very ill constructed, and gave a lot of trouble, as also did the valve rod-guides which were of brass; these I replaced with cast-iron, and welded up the valve-rods so as to dispense with one joint and cotter. These defects are now remedied in all these engines except No. 7, that is to say, Nos. 1, 2, 3, 4, 5, 6 are done and working. The bogie spring-beams were too weak (when these engines were altered to 4-coupled ones) and did not carry the extra weight thrown upon them; I altered this by placing the spring-links much wider apart and thus relieving the beams considerably; these engines after the side tanks were taken off were thus very much weakened, and I had to put on wrought iron foot-plates, made out of plates which were on the front and back sides of the wood buffer planks, which thus strengthened the foot-plates very much; these engines are very destructive to the road, as they have 4½ tons on each coupled wheel, and 8 tons 7 cwt. on the four bogie wheels; the distribution of steam in these engines, by the link motion, is not good and far from economical, not to be compared with Nos. 10 and 11 engines in this respect. No. 1 ran from January to October, 1877, 25,244 miles. The great fault of all these, No. 1 to 9 inclusive, is in the design, which is utterly unsuitable and far too heavy for such road as the Tasmanian Main Line Railway. The workmanship is very good, and the engines were very well put together by the builders.

No. 2 engine was like No. 1, but as no one ever succeeded in running one of the 10 wheel and 6-coupled engines right through to Launceston, and I knew that the running of them as 4-coupled engines was highly injurious to the road, I set to work to properly place the flangeless wheels and bogie, and succeeded in getting this No. 2 engine to run well with all 10 wheels under her, but much to the surprise of Mr. Grant she ran for some time and was used by nearly all the drivers at various times. I made a suitable tender for this engine out of a pair of iron-side tanks, and this engine and tender, especially the former, ran quite satisfactorily to me, and I intended altering the six sister engines the same. This engine when I left was in moderate repair, and ran from January to September, 1877, a distance of 7962 miles. The tender draw-gear I could not get it quite to my satisfaction on account of the engine being away so much; I never hardly had an opportunity of doing the work properly, but I should when the opportunity occurred have put this satisfactory; the engine I only completed on the 30th of March, 1877, and the whole alteration was done piecemeal, having often to take her out of the shop to run a train from sheer necessity.

No. 3.—This engine never ran at all whilst I was in the Company's service, and when I came here nearly all her gear that was to be had had been taken off to repair other engines with, and there was practically nothing left except boiler and frame; I did, however, manage to get this engine down on her wheels before I left, but there was then quite six months work on her to put her right, and I intended altering her the same as No. 2 exactly, and make her into a 10-wheel 6-coupled bogie engine. Pistons, cylinder-covers, valves, link, motion, axle-boxes, regulator, safety-valves, chimney, dome, bogie-wheels, side-rods, and all brasses, injectors, and everything was gone from this engine for repairs.

No. 4 engine is similar to No. 1, and was under repair when I left. The fire-box was cracked along the top of the tube-plate for about 16 inches, and wanted patching; this crack is, in my opinion, caused by the faulty design and construction of the box, and the mode of staying the same. The bogie to this engine I had altered to a plan which is known as the "Adams" bogie, and which worked very well indeed. This engine ran from January to December, 1877, 19,507 miles, and when turned out of the shop would be in good working order.

No. 5 engine is similar to No. 1, and is the one that ran off the road at the Coal Mine Creek just after having been thoroughly repaired; she was after this again repaired and set to work, and ran from January to December, 1877, 25,009 miles, and was again under repair when I was leaving. The fire-box tube-plate was cracked, like No. 4, and had been patched; and when this engine was finished she would be in good working order. I have been charged with causing the said accident at the Coal Mine Creek by my alteration of this bogie, but the written records of repairs done to this engine by me, will show that I made *no alteration at all in the said bogie*, like I did, subsequently, to No. 4; and it is probable, in my mind, that if I had done so the said accident might *not* have happened,—the canting motion of the bogie referred to, in describing No. 1, was the best possible help to an engine getting off on a bad curve such as this was when the accident occurred.

No. 6 is of the same type as No. 1. This engine was undergoing thorough repair when I left, and she ran from January to December, 1877, 31,939 miles.

No. 7 engine had been very hard worked, and had been lately out ballasting, and by using very bad water at Campania was in a very bad state, and wanted a thorough and very heavy repair; the fire-box tube-plate was cracked, like Nos. 4 and 5. I took her off the road as unfit for work, but Mr. Grant would have an engine out ballasting, and I was compelled to send this one, under protest; she did go out, and leaked so much at the cracked place in the fire-box that it was almost impossible to keep up steam, or keep water in the boiler. This engine ran, from January to December, 1877, 32,436 miles, but had to be brought home as she was no use at ballasting.

No. 8 engine and tender, when I left, was in first-rate working order, and had been running the express train very successfully for five months; she and No. 9 were tank engines, having 8 wheels (four coupled), with a bogie in front, cylinders 12 × 19 stroke, coupled wheels—each 4 ft. 6 in. diameter, and when roadworthy was much too heavy for the 40 lb. rails, and destroyed them very rapidly; these engines were top-heavy, and required lessening in weight as soon as possible. No. 8 ran from January to December, 1877, 30,655 miles, and this includes one month of running (December, 1877) after my alteration of her; she is now 19 tons total weight in working order, and she has run regularly since the 1st December, 1877, up to 24th June, 1878. She had new cast-iron eccentric straps, new side and connecting-rod ends, tanks and coal-box taken off, frames cut off, and several other alterations. Neither the eccentric straps nor side rods have been repaired during this time, and she has run very successfully, but even now her cylinders are much too heavy, and her boiler is quite 12 inches too high. The tender is made out of the old side tanks, and the under frame is of wood, and was made in the shops. The wheels and axles are the same as the carriages and wagons. This engine is *now* able to run right through to Launceston without taking coals at Antill Ponds (as she used to do before the alteration). She can also carry sufficient water to run from Ross to Launceston, and from Flat Top to Hobart Town, and from Brighton to Flat Top. Through the alteration I made in her link-motion reversing gear, this engine burns 14·60 lbs. of coal per mile, or about 3 lbs. per mile *less* than her sister engine (No. 9) and does the same amount of work; she has as near the correct weight on her coupled wheels as can be got, and the bogie *now* carries about 4 tons too much, which is caused by the bad design of the cylinders; this engine had the Baldwin links in her bogie. I completely stopped this action, and the engine now runs very satisfactorily indeed in every way, and is in good repair.

No. 9 is still running as sent out with tanks and coal-box on her frames, I have replaced her old brass eccentric straps with new cast-iron ones, and altered the valve-rod guides, and other things about her, but have not had the opportunity of lessening her total weight yet. This engine ran from January to December, 1877, the enormous distance of 55,911 miles; she is far too heavy for the road and traffic, and is very destructive on the permanent way. When I left this engine was in very moderate condition, and wanted repair. The mileage made by her is equal to 1075 miles per week of six days, and this was done and the engine was repaired three times in the twelve months.

No. 10 was, when I came here, a six-wheeled four-coupled tank engine used by the contractors in making the line, and was built by Messrs. Fox and Walker, of Bristol, in 1871; this and her sister No. 11 were both alike, and wanted very heavy repair. Consequently I operated on No. 10 first, and as she was too heavy, I took off her side-tanks and coal-box, and made a tender out of these and reduced the weight of the engine to the proper standard (3 tons per wheel on each of the four-coupled wheels, the remainder of the weight (34 cwt.) rested on the leading wheels; these said wheels *had* what is known as Cartazzi axle-boxes, that is double inclines which allowed these axle-boxes to move about 3 inches laterally; the lids of the boxes remain free *only* to move vertically, the *boxes only* can move laterally, this causes all the strain to be thrown on the thin edge of the axle-box lid when passing round curves, and is not a good plan. The double incline too, combined with the super-elevation of the outer rail on curves, throws an undue weight on the wheel which (on a right or left curve, as the case may be) has to guide the engine. Another objection to this scheme is that as the weight is on the axle-box lid (instead of on the box direct) the oiling arrangements are not so easily got at; knowing all this and the trouble these boxes were from (home) experience, I altered them to a new arrangement, where I introduced rubbers to take up the lateral strain on passing over curves, which acted much better than the double inclines above referred to ever did: and I never had any trouble with *hot* boxes as I understood my predecessors had. I also put new crank-pins in the coupled wheels, and made new connecting-rod ends, and also heated and twisted one of the axles which was out of square (that is to say, the crank pins were not square with one another) and made *straight* valve-rods in place of the two *cranked* ones originally sent out. When all this was done these engines were the best we had. The link motion gives a beautiful distribution of steam. They were well designed and well built engines, and if I had (as I intended) put a four-wheel bogie under the leading end, these would be the best class of engine for the M.L.R. I should have preferred a 3 ft. 6 in. wheel to a 3 ft., but with a bogie, and to prevent the introduction of another "class" of engine, this would not have mattered. The only fault I found in them as turned out by the makers, was in the crank pins, &c., things which I altered and which I am happy to state worked admirably and to my most sanguine expectations; this and Nos. 11, 2, and 8 engines can now run right through to Launceston without taking coal, but these and all the others had at one time to take coal at Antill Ponds. Nos. 1, 3, 4, 5, 6, 7, and 9 have to do this now. The cost of keeping these small engines in repair is very trifling now, and they burn less coal than any of the others in doing the same amount of work; they also use less oil: the tubes and fire-boxes of this and No. 11 engine are much worn, as they have both done a lot of very hard work, therefore they want repair. This engine ran regularly for 10 months, and worked the ordinary day and night mail trains alternately in the regular way with the other engines. She ran from March to December, 1877, a distance of 19,192 miles; and she ran the express train on the 24th March, 1877, and when I left she wanted repair and tubes *taking* out.

No. 11.—The same remarks apply to this engine as I have made on No. 10, and the same alterations were made. The tender-frames in each case were made in the shops, and the wheels, axles, and boxes are the same as are under the wagons. She ran, after my alteration and a thorough repair, from August to December, 1877, a distance of 10,676 miles; and she also ran the express train on the 26th September, 1877, and was running the ordinary trains up to April, 1878. When I left she was in very fair repair (tubes and fire-boxes excepted, as said about No. 10).

Nos. 12, 13, and 14, are three new six-wheeled, four-coupled in front, tender-engines, now (September, 1878) being delivered. They have outside cylinders, which are, I believe, 13 × 20 stroke; the four-coupled wheels (the leading and driving) are each 3 ft. 9 in. diameter, and the trailing-wheels are 3 ft. diameter, and are fitted with the late W. B. Adams's patent radial axle-boxes, which work almost exactly the same as my alteration of the leading axles Nos. 10 and 11 engines, except that in *my* case the engine is *checked* laterally with rubbers; but these new engines have nothing whatever to check them; the axle can, therefore, on a straight road, slide about, or, correctly speaking, the engine can slide laterally on these axle-boxes as it may. The total wheel base is the same as Nos. 10 and 11, viz. 11 feet; the coupled wheels have *outside* jormals and overhung cranks and pins outside these, which necessitates placing the cylinders very wide apart (they cannot be much less than 6 feet). The transverse distance between the

cylinders being 6 feet, and the longitudinal distance between the driving and leading wheels being *less* 5 ft. 3 in., will cause these engines, in my opinion, to "wriggle," and very much cripple the rails on the straight running, like the six-coupled outside cylinder engines did on the light lines in Victoria (see evidence of Thos. Higinbotham, Esq., and others, in "Report of Railway Enquiry Board," Victoria, 1877, No. 8). I estimate the total weight of these engines to be 20 tons each, and there ought to be 15 tons on the four-coupled wheels. The tenders are of iron and on four wheels, and will probably weigh, when full, 12 tons each. I consider that a much more unsuitable class of engine than these could not be designed for the Main Line Railway, and they are really much worse than the present engines, and I should be sorry to have such a class as this on any road. It would be well to point out the great disadvantages under which the main line engines were repaired up to the present time. There was but *one* wheel-lathe, which was always fully occupied, and was too small for the three pairs of 4 feet 6 inches express wheels, and was only fit to turn up 3 feet 6 inch engine tires with, a 3 feet 6 inch tire even could not be comfortably *bored* in this lathe, the carriage and wagon tire turning would keep this said lathe always going; eccentric-straps and other similar sized work had to be bored in this lathe, which hindered the progress of the repairs very much, as one thing had to be taken out to make room for another. There was only *one* small drilling machine to do all the locomotive, carriage, and wagon, and permanent way, work ; this latter department alone requires the entire use of one machine. The screwing machine was a very poor and almost useless tool, and the 9-inch lathe was very much overworked. I asked my Directors for a new radial drilling machine, a 12-inch Whitworth lathe, a Seller's screwing machine, all of which have recently been delivered, the use of which will be much appreciated no doubt. I could also have found use for a larger shaping machine, but was content with the small one I had. All the lifting of engines had to be done with screw-jacks and several men, and took up a very great deal of time ; this lifting is now done by one man with the use of a screw and wood tressel, which I have erected in the shop, and another smaller one outside in the yard for lifting carriages and wagons, which I need hardly say saves a lot of time and labour in each case, indeed the engines have been so altered lately that they now run successfully, and do not break down on the road as they formerly did, for some time after my arrival ; the eccentric straps, valve rods, &c., were very badly arranged, now all this is remedied, and the only fault now is the great and unnecessary weight of some of the engines ; this, of course, can be now remedied more expeditiously by the use of the extra (new) tools I have ordered and are now delivered.

I have the honor to be,
Gentlemen,
Your obedient and humble Servant,
THOS. MIDELTON.

Sept. 1878.

JAMES BARNARD,
GOVERNMENT PRINTER, TASMANIA.