SOUTHLAND PROVINCIAL GOVERNMENT GAZETTE.

Published by Authority.

VOL. 2.] WEDNESDAY, 13TH APRIL, 1864. [No. 13.

REPORT OF COMMISSION ON BLUFF HARBOUR AND INVERCARGILL RAILWAY.

Invercargill,
2nd April, 1864.

SIR,—We have the honor to report that in compliance with your Honor's request, we have held an inquiry into the alleged deviations from the specification in contract No. 1, on the Bluff Harbour and Invercargill Railway. In the course of the enquiry we have examined Mr. E. Elliot, Mr. T. B. Cameron, Mr. J. R. Davies, the contractor, Mr. James Bailey, the inspector of the works, Mr. R. M. Marchant, the railway engineer, and Mr. J. F. Dundas, the consulting engineer; and have, with Mr. Heale, whom we requested to accompany us, inspected the works on that portion of the line known as No. 1 contract.

We append hereto the evidence taken, and also the report which Mr. Heale, at our request, has made upon the questions raised. We propose to notice the objections taken, commencing with those which apply generally to the work, the cuttings or the embankments, and passing to those which are more particular.

FENCING.

It is objected that the fencing is not according to the contract. 1st, that there are no intermediate or prick posts; 2nd, that the timber is not of the description specified; and 3rd, that the timber is not of the sizes specified. The specifications and drawings require the fencing to consist of split posts of Black Pine, or Totara, 7 feet in length, with 16 inches cross section and 3 rails, 10 feet in length with 5 inches of sectional area; to be supported by an intermediate or prick post, firmly nailed to each and fixed one foot in the ground. The stipulation for prick posts appears to have been inadvertently copied from the specification of a railway in England, where the fences are made of sawn timber, as it is manifestly inapplicable to a fence made of rails split from New Zealand wood, the deviations of

which from a straight line would render the fastening of prick post to the *three* rails, if not a practicable impossibility, a matter of very tedious fitting, involving a great waste of labor. To avoid this, a judicious alteration has been made, by which the prick posts have been omitted, and to insure an equal strength, the length of the rails or panels has been reduced from 10 feet to 8 feet. We do not find that the description of timber for the rails is specified; they are, however, mostly, of Red Pine, and of good quality. The posts are required to be of Black Pine or Totara, and are according to specification in this respect. With respect to size, the posts and rails are also correct; the objection taken in this particular, appears to have arisen from a misconception of the meaning of the term "cross section," the objector reading it as synonymous with diameter, whereas the *area* of the cross section is intended.

HARBOUR SHEETING OF THE EMBANKMENTS.

This appears to have given way during the late gales, where the work was incomplete; it is, however, being strengthened; when complete it is considered that it will be quite sufficient for some time, and when the railway shall be in operation it may, if required, be replaced by stone at a cost for both works very much less than that which would have been incurred by facing with stone in the first instance.

BRIDGES.

The bridge over the Waimatua Creek was, by mistake, made 20 inches too high; it has been reduced and is now at its proper height. According to the specification, the timber for this and the Mokotua Bridge should have been Kauri, Black Pine, Totara, or Blue Gum. When inspecting the line we found that the bridges had been tarred and therefore we could not fully satisfy ourselves about the description of timber used, but on cutting the edges of two or three of the stringers we found that they were Miro, and we consider it, if sound (which it appeared to be), a good timber for the purpose; we do not, however, know, what particular wood is meant by the term Black Pine, and we believe it is applied to more than one kind. Mr. Bailey, the inspector on this contract (who gave his evidence in a very straight forward and intelligent manner), evidently calls Miro Black Pine; for he says—"The timber used in the culverts and bridges is all of the description specified. If this should not be considered sufficiently satisfactorily it will be necessary to institute an inspection by a party properly provided with the requisite tools."

CULVERTS.

In Mr. Cameron's evidence he describes a culvert which he considers objectionable in embankment No. 5. As we found no such culvert we believe this to be an error, and that Embankment No. 7 is intended, where there is a culvert somewhat of the description he notices, which is also noticed by Mr. Elliot. Mr. Marchant appears to have authorised this departure from the specification as the construction in the specification was not necessary on this good ground.

PEAT FOR EMBANKMENTS FROM SIDE DITCHES AND SIDE CUTTINGS.

Messrs. Elliot and Cameron object to the use of peat, more especially in its wet state, in which state, it is said, some of it has been used. On our inspection we were unable to detect any instance in which the peat had been so used, and we noticed the side cuttings and ditches from which it had been taken, judging that they would afford the best index to the state in which it had been employed; and we considered that it was in every case, in which it had been used for embankment, sufficiently dried for the purpose; and were fortified in this opinion by observing that in no place had the slopes of the embankments bulged out. We noticed no objectionable peat or vegetable matter anywhere but on the Mokomoko Branch, and here it had been removed from the seat of the embankment, and the material supplied from cuttings.

It is admitted in the evidence taken that apart from the consideration of its lightness, that peat does not form an embankment of the same quality that the material from the cuttings would have done; but the objections, as far as we can ascertain, apply principally to the subsidence which may occur in the first few months after the completion of the line, and as the contract provides for the maintenance of the line by the contractor for 6 months after its completion, the question is one in which he is more particularly interested than the public.

The reasons assigned by Messrs. Marchant and Dundas for the use of material from side cuttings for embankments, instead of that from cuttings, are, we consider, very satisfactory.

For we estimate that the loss to the Province, (by delaying the completion of the railway for 6 or 8 months to enable

the contractor to lead all the material from cuttings to embankments), in interest on the outlay alone, irrespective of the postponing of the advantages which the railway is expected to confer, would very far exceed any extra expense which the peat embankment is likely to cause after the expiration of the period for which the contractor has to maintain the line

It has been supposed that as the contractor has been allowed to form some of the embankments from side cuttings, he has thereby effected a saving of which the Province should have the advantage; the supposition is erroneous, as the contractor has satisfactorily shewn to us that he has actually paid on the average 2s. 10d. per cubic yard, whereas the average rate at which he is paid by the Government is only 2s. 5½d., cuttings only being paid for where they are run to embankments.

The embankment which appears to us the most objectionable, is that near the Mokotua, which is formed nearly entirely of sand, but in this case it has been run from cutting according to specification; it is to be feared that the strong westerly winds will remove considerable portions unless the slopes are protected.

ALTERATION OF LINE.

No alteration has been made since the contract for the work was entered into.

ROOTS OF TREES.

In Embankment No. 3 we saw that the peat preserved butts of a few trees had been used in the embankment. Mr. Heale does not consider them objectionable where used. There were no roots, properly so called, attached to them; in other places we noticed that the roots had been thrown aside.

EXTRA WORK.

Under this head we may include the cutting of grass and flax, on the seat of the embankment, the fascines, and side-ditches; the former of these works, although required to be done in the specification, is not included in, or covered by, the lump sum estimated for this contract; and as the contract is made for certain works, (more or less) at scheduled prices, it may conveniently be included amongst the extra works, as like those scheduled as such, if performed, it would have to be paid for; but unlike them, as no provision is made for this work, the contractor is subject to no deduction in cases where the work has not been performed; the other extra works, if in excess of the quantities stipulated, are to be paid for as extra, and if in diminution, they are to be deducted from the quantities for which the contractor is to be paid. To have performed any of these works where they are not required, would have been a wasteful expenditure of public money.

We are satisfied that wherever these works were necessary, they have been executed.

CUTTING NO. 2.

The material from this cutting (with the exception of some lignite thrown to spoil) is gravel, reserved for ballast, and has been temporarily placed on the bank.

CUTTING NO. 3.

Has been run to embankment.

CUTTING NO. 4

Objection has been made that the material from this cutting has been thrown to spoil, where the side-drains should be. A considerable portion of this long cutting has been run to spoil, for reasons before given; the rest is gravel reserved for ballast; only a short side-ditch has been required during the progress of this work, the road-drain generally answering the purpose; no portion of the spoil bank is placed where the side-ditches should be. The gravel for ballast is placed on the side of the banks. There is little fear of land slips now, and there will be none when the gravel ballasting shall have been removed.

EMBANKMENTS NOS. 5, 6 AND 7.

These are all upon the large swamp, beyond West's. The swamp in the neighborhood of the railway has been efficiently dried by the outfall-drains, executed before the commencement of the railroad, and by the side-ditches. For a detailed description, we refer to the evidence of Messrs. Bailey and Marchant, and to the report of Mr. Heale, contenting ourselves with expressing our great satisfaction with the present state of the swamp, and embankments in this very difficult ground.

PITCHING AND METALLING OF ROAD.

The objections taken to these are full answered in the report of Mr. Heale's, with which we entirely concur.

Before closing our report, we have to notice the questions specifically raised in your Honor's letter of March 23.

1stly. If there have been deviations from the contract.

2ndly. Whether the reasons for permitting them are sufficient and satisfactory.

3rdly. Whether such deviations alter the permanent value of the work; and if so, to what extent. And we reply that deviations, properly so called, have been

made in the fences, and in making embankments from side-cuttings; the fence put up is an improvement upon that described in the specification.

The making of embankments from side-cuttings was necessary to expedite the work, and though the material may not be so good as that from the cuttings for lines where great speed is required, we believe that the permanent character of the work is not thereby altered, for the embankments will be kept dry by the side-ditches and outfall-drains, which on a swamp of the character of that in question are essential to the construction, whether it be formed of peat, or material from cutting.

In concluding this report, we desire to thank Mr. Heale for his courtesy in accompanying us upon our inspection, and affording us his valuable assistance: we desire also to state our opinion that the works on this contract are highly creditable to the designer, the engineers and contractor, and that they present an instance of great difficulties overcome for an outlay, viewed with that on English and Australian Railways, comparatively trifling.

We should have been glad if we could have concluded our report with the above expression of our general satisfaction, but we feel that we should not be discharging the duty which we have undertaken, if we neglected to state that we are of opinion that the necessity for the present enquiry would not have arisen if the Railway Engineer when he found, for reasons quite unconnected with his special duties and qualifications, reasons involving questions of public policy only, if necessary to depart materially from the specifications, had before so doing referred the the matter to the Provincial Government, or if he had furnished it with a proper report on the subject.

Some excuse, however, may be found for this apparently independent action, in the evidence of Mr. Dundas where he says, that from the commencement it was well understood by the engineers that the works were, if practicable, to be completed by the 22nd of June next.

It was not therefore considered necessary to submit the deviation from the contract made with that object, for any further approval of the Government.

We have the honor to be,

Sir,

Your Honor's most obedient sevants,

Signed ALFRED SHEATH.
I. N. WATT.

To His Honor the Superintendent,
Invercargill.

EVIDENCE TAKEN BY COMMISSION ON BLUFF HARBOUR AND INVERCARGILL RAILWAY.

Examination of Mr. Edward Elliot.

Invercargill,
Thursday, March 24, 1864.

I am a Civil Engineer, Architect, and Building Surveyor; I have examined the specifications for No. 1 contract, Bluff Harbour and Invercargill Railway.

In passing along the works I have made observations on the way in which the works are being carried out. I have noticed deviations from the specifications at No. 2. Cutting; a considerable portion of the stuff from the cutting has been put upon the bank instead of being carried to the north to form a double line of railway over the swamp. The fencing at the cutting is not correct, the intermediate posts are wanting. In No. 3 cutting I have not observed any deviations excepting that the side drains to catch the surface water have not been carried on in advance of the work, in fact, had not been made at all on or about the 18th February last; and on the 25th February I was down the line with Mr. McKay and Mr. Wilson, when the side drains had not been made then.

In No. 4 Cutting by West's a large portion of the stuff from the cutting has been thrown on the bank to spoil, instead of being used to fill in the swamp towards the Bluff. In the swamp beyond No. 4 cutting (embankment No. 5) I saw, both on the 18th and 25th February, several parties of men wheeling wet peaty substance from the sides into the centre of the embankment. At the same place, in forming the side ditches, the peaty surface had been thrown upon the sides of the line and then covered up with grey sand that underlies it, giving the sides a nice solid appearance. After this was done the peaty wet stuff from the adjoining surface of the swamp was thrown in between the two drains, and likewise covered immediately with sand, without affording any opportunity for the stuff to dry.

The fencing of cutting No. 4 is likewise deficient in the intermediate posts, and the timber is not good or according to specification; a large proportion of it is red and white pine.

In embankment No. 3 I saw the men tipping in the roots of trees to form the embankment, (at the three-mile peg).

I could only see three lines of fascines across the embankment when I went down the line on the 25th of February, and I looked specially for them. There should be by specification one at the end of every chain.

I also notice that in preparing the seat of the embankment in the swamps that the grass (maori heads) and flax had not been cut and spread on the surface on any part that was open to my observation.

In embankment No. 7, about eight miles from Invercargill, I noticed a culvert of a cross drain very inefficiently constructed, the timbering of the sides not being carried to the bottom of the drain; the water flow will be apt to undermine the timber and let the logs down.

These are all the deviations from the specifications of the railway that I noticed. On the 18th February I was upon the road specified to be constructed in connection with the railway across the swamp beyond West's. In pitching the road I saw that the axes of the stones were placed longitudinally with the line of road, instead of transversely, and that the stones were placed upon their natural bed flatways, instead of upon their edges; many of the stones are likewise too large, and not according to specification. I noticed also a large quantity of the metalling that would not pass through a 2½-inch ring; some of it would not go through a 4-inch ring.

In embankment No. 5, about six and a half miles from Invercargill, I noticed that the depth of the wet peaty substance forming the embankment was about two and a half to three feet deep; the peat was in a wet state at the time, and had not been dried at all. If it were necessary to employ more men than could work upon the face of the cutting, they might have been employed upon the east side of the cutting, but this would have required another line of rails.

I am of opinion that the contractor by making a spoil bank on the side of the cutting with the material taken therefrom, and by using the peat from alongside that part of the line where the stuff from the cutting should have been deposited, has saved money, for the removal of the stuff from the cutting and placing it on the bank would be done at eightpence per cubic yard, and the embankment from the peat alongside could be formed at sixpence; besides which he saves in the length of the lead, averaging about one mile.

The spoil-bank near the Mokotua Creek is gravel; but that towards the Bluff end of No. 4 cutting is loamy clay. The embankment between the Mokotua Creek and No. 4 cutting is pretty generally composed of sand. A large part of the embankment No. 3, to the north of the Waimatua Creek, is likewise composed of sand.

In cutting No. 4 the quantity of earth taken out of the cutting and placed where the ditches to catch the surface water should have been, will have a tendency to cause land slips, both by the additional weight and by the stopping of the drainage. I think that the principal objection to the use of the peat is its being wet; but independently of that the material from the cutting would have been preferable to dry peat.

Examination of Mr. T. B. Cameron.

Invercargill,
Thursday, March 24, 1864.

I am an Engineer, Surveyor, and Architect. I was instructed by Mr. Wilson, Mr. M'Kay, and Mr. Calder, on the 18th of February, to examine the Railway works from the Mokomoko towards Invercargill.

On the road beyond West's, to be made in conjunction with the railway, I noticed that the pitching was not according to contract; the stones were too large, some being 1 foot 9 inches long by about 18 inches wide, and generally laid on the flat, the stones being laid longitudinally instead of transversely, where there had been any attempt at properly pitching them on their edges.

I next noticed several chains of the metalling complete, ready for blinding, of which a large portion of the metal would not pass through a four-inch ring, 2½ inches being the contract size. There was at this time about half the road (1½ miles) finished.

On Nos. 5 and 6 embankments I observed from 25 to 30 men employed forming the embankment, with wheelbarrows, from the stuff from the side drains, consisting of peat and mossy boggy substance quite wet; the whole width of the embankment was being formed of these materials; the embankment varies in height from 2 feet to 3 feet, increasing towards West's; several chains of the embankment were completed with ballast (material taken from No. 5 cutting probably); and the embankment was being finished, as the same was formed, contrary to specification.

The larger portion of the material taken from No. 4 cutting by West's is placed on the sides where the drains should be forming a spoil bank; the material is good for an embankment, and

consists of sand and gravel which would make a splendid embankment. I also noticed one culvert in embankment No. 5, in which there was no timber, either on the sides or the bottom, timber being only placed on the top, and running parallel with the line of railway.

In embankment No. 4 the line of railway has been altered, the curve increased, and the radius of the curve diminished; this brings the line of road upon higher ground, and consequently diminishes the height of the embankment; and in addition thereto the line enters the bank in cutting No. 3, a distance of about 150 yards nearer the Bluff than is specified in the contract, whereby also work is saved.

In the fencing cutting No. 3 the posts are not according to specification, the cross section in some of the posts exceeding 12 inches.

The distance between the posts is 8 feet, and there are no intermediate posts.

At the same cutting there is a large portion of the material put on the side as a spoil bank.

In embankment No. 3, north of the Waimatua Creek, the embankment is being formed out of the material taken from the side ditches, and from a side cutting alongside the line. The top surface is soft peaty stuff, and under it is soft sludgy sand. At the time of my seeing it the whole body of the embankment was being formed of these materials, the sand being used as ballast; the height of the embankment here would be from 3 to 5 feet. The bridge over the Waimatua Creek has, since it was finished, been lowered 20 inches, or 2 feet, thus decreasing the height of the embankments and increasing the gradient, unless the cuttings have also been lowered.

The principal portion of material taken from cutting No. 2 has been made a spoil bank; and embankment No. 2 is principally formed from material taken from the side drains; but a very small portion of this embankment has been completed.

A considerable quantity of the timber used for the bridges and drains is not of the description specified, viz., black pine or Totara. The peat that I have seen used in the embankment was used wet, and no attempt was made to dry it.

I consider the use of peat for an embankment very objectionable, even if properly dried, especially for a low embankment.

The cost of making spoil banks from the cuttings would be about 1s. to 1s. 3d. per yard; the formation of the embankment from a spoil cutting alongside the line might be done with the material at hand at 1s. per cubic yard.

The timber harbor facings for the embankments are of a very insufficient character, and are not calculated to retain the bank in its place. I have never seen the plans of the railway until now, and the distances mentioned by me may not be absolutely correct.

Examination of Mr. J. R. Davies.

Invercargill,
Thursday March 24th, 1864.

I am contractor for the portion of the railway works called No. 1 contract.

A large portion of the stuff from No. 2 cutting has been placed aside on the bank, most of it being gravel reserved for ballast, the rest, being principally lignite, has been thrown to spoil.

Throughout the line the side drains have been made sufficiently forward to protect the works in their progress, except at and near West's, where the road drain answers the purpose; and in No. 3 cutting also, which is temporarily made on the incline to drain itself.

Cutting No. 4 being a very long one, for the sake of getting the work done in time a portion of the cutting has been thrown to spoil; some other portions of the material are gravel reserved for ballast, and where the cutting passes through gravel the slopes have been left temporarily for ballasting the line.

In both cases in which material from the cuttings has been thrown to spoil, I have had the permission of the Railway Engineer. I think that in both cases this authority has been given verbally only. The peat or surface from the side cuttings which has been used in forming a portion of No. 5 embankment, has not been used wet, but has been used with the sand that underlies it, and which is mixed with it in excavating it, the peaty surface being there only about a foot deep.

The side drain stuff has been turned into embankment according to specification. In cutting No. 6, the material for about 16 chains is quite unfit for the embankment, being nothing but sludge, and this is thrown out to spoil; the whole of this cutting was to have gone into embankment No. 7, but the deficiency caused as above has been supplied from side cuttings.

The material from the side ditches has been turned out and put to dry in the seat of the embankment throughout the line.

Roots of Trees have not been used in embankment No. 3.

Fascines have been used along the line wherever they have been ordered, or were necessary.

We have passed very little flax on the line, but what we have passed of flax or grass has not been cut. I had no authority to omit so doing, but have never been required to do it by the Engineer or the Inspector, excepting on the Mokomoko Branch, where there was a lot of moss and this was taken off. I do not consider that it was necessary in any other portion of the line.

The permanent culverts are all correct according to specification, but there are temporary culverts which have to be replaced.

The road is incomplete and has not been handed over; the pitching is done as well as it can be done, and according to specification, the stones are laid on their edges.

With respect to the metalling, it is open to inspection, and has to be broken to the proper gauge before it is blinded over.

No. 4 cutting is 1 mile and 20 chains long, and to have led all the material out from the two ends would have taken 18 months.

The material from No. 3 cutting has all been used upon the embankments.

With respect to the spoil banks at No. 4 cutting the works are unfinished; in the meantime the surface drainage is carried off by the road drain which runs parallel with the line.

In embankments Nos. 5 and 6 no part is yet ballasted that has been formed from wet stuff.

I know nothing about the line of railway being altered at embankment No. 4.

The Waimatua Bridge was made too high; it has been reduced 20 inches and is now at its right height.

All the culverts are made of Black Pine and Totara, and the piles of the bridges are all of Totara and Black Pine.

In cutting No. 4 the rates paid for excavation and throwing to spoil have been from 1s. 1d. to 1s. 4d. according to the depth.

The embankments from side cuttings have cost from 1s. to 1s. 6d., the greater portion at the former price.

Where the embankments have been formed from the cuttings, the cost has been in most cases 1s. 8d. per cubic yard for both works, the cuttings only being measured. A small portion of No. 3, being very deep, has cost 1s. 11d.; I produce my books to verify these statements.

The fencing is not according to specification, but the alteration was made by the Engineer. The wood of the fence, both in description and quality, is according to specification, to the best of my belief.

It was sublet, and I had an inspector over it besides the Government inspector.

Examination of Mr. James Bailey.

Invercargill,
Saturday, March 26th, 1864.

I am inspector, under the Railway Engineer, upon No. 1 Contract. I have been so employed from the commencement of the works. At No. 2 cutting not much of the material is led to the embankment, but is thrown out for ballast; it is chiefly good gravel; there is a little lignite at the south end of the cutting, and that is thrown to spoil.

No. 3 embankment is composed chiefly of sand from side cuttings, there being no other material for the purpose, the stuff from No. 2 cutting being reserved as ballast. I received instructions from Mr. Marchant to allow this. I receive my instructions from him only. There has been an alteration in the Waimatua Bridge; it was made too high by an error of the sub-contractor, and had to be reduced about 22 inches, to its proper level.

In cutting No. 3 side drain is not required, as the road drain carries off the surface water, and protects the works. No portion of the material has been thrown to spoil; it has been all run to embankment. Embankment No. 4, to the north of the Mokotua Creek, is composed of sand; from No. 3 cutting, south of the creek, it is composed of side cuttings and gravel, from No. 4 cutting. The material of the side cutting is sand, taken from a side hill. In No. 4 cutting, a considerable part is run out to spoil, and some is gravel, reserved for ballast. No side drain is required on the bank of this cutting (excepting about 9 chains, which was made in January last), the road drain serving the purpose. The cutting is not finished; a great distance of it has merely had a gullet run through it, leaving the slopes in, temporarily, to facilitate the removal of the stuff, both from the banks and the slopes.

In No. 4 cutting, the material is nearly all gravel. The top of the cutting was run away to spoil, the gravel having been kept separate for ballast. No part of the material intended to remain as

spoil bank has been placed where any side drains will be necessary.

No. 5 embankment is chiefly composed of stuff from side cuttings, but it is all good material, and the bank is shallow; the material is chiefly sand, and the remainder is vegetable loam, the depth of which varies from 12 to 18 inches. At the time of making these side cuttings, the surface was dry; it had been dried by making large drains. The carts and horses were travelling over it. In forming the embankment, the sand and loam have been mixed, the side cutting having been taken right down, about 4 feet deep; this would give about 3 feet of sand to 1 foot of loam; no portion of the surface is completed, it is to be ballasted from No. 4 cutting. The vegetable loam has not been thrown up to dry, it was sufficiently dry when cut. No. 5 cutting is being used to form the embankment, and for ballasting some of it has been used upon the road.

Embankment No. 6 is very shallow, and formed with the stuff out of the drains; the stuff was dry when the road was formed; very little of this bank is yet formed. Between Nos. 4 and 5 cuttings, and near No. 5, several chains of the line are ballasted, no bank being required, the ground being upon the level of the line; after this part of the line was formed, it was eight or ten days before it was ballasted.

In no part of the line have I seen any roots of trees placed in the embankment. Fascines have been used in three instances where they were required, and no where else; in every other place the drainage is complete without them; the specification says they are to be used where required, that is, where there is any soft bottom or formation. There has been very little flax on the seat of formation, none higher than about 15 inches; it has not been cut anywhere but on the Mokomoko branch, because it did not require it; on the Mokomoko branch, the top surface, the vegetation has been removed altogether. All the permanent culverts have been properly made, according to specification, but temporary bridges have been made over drains for the contractor's convenience. On the road to be made in connection with the railway, a great portion of the pitching is with large stones, some 18 inches long, and 12 inches wide, but in these cases the depth is much beyond that required in the contract, being from 12 to 15 inches, the pitching is laid longitudinally according to my instructions, the smaller stones are all pitched upon their edges.

The metalling has been broken by the machine; flat stones pass though; but they have been rebroken on the ground; very few stones would not pass through a $2\frac{1}{2}$ inch ring.

I consider the stipulation with regard to the gauge has been fairly fulfilled.

There are few, but very few, red pine rails used in the fencing; and there are no white pine rails; the sizes of the timber are also correct.

I was instructed to allow the fencing to be put up as it has been; it is a superior fence to that contracted for.

The timber used in the culverts and bridges is all of the description specified.

The Examination of Mr. Robert Mudge Marchant.

Invercargill,
Saturday, March 26th, 1864.

I am Railway Engineer. The works of the Bluff Harbour and Invercargill Railway are under my superintendence and control. The works are regularly inspected by me. Mr. Bailey is an inspector under me, and is employed on No. 1 contract. I do not remember that he has called my attention to any deviation from the contract; but he called my attention to some fencing, and a lot of rails were condemned in consequence; this was in the months of October and November last. He reports to me weekly; his reports, with the above exception, have always been satisfactory to me; no portion of the work liable to injury from such cause has been conducted in wet weather. Peat has been used to some extent in the formation of embankments Nos. 5 and 7, embankment No. 6 being merely surface forming. When the peat was wet and required it, it was first run into the seat of the embankment loosely, and left there to dry. It is specially provided in the contract that the material taken from the side drains shall be turned into embankment. Some of the embankments have been formed from side-cuttings instead of from the cuttings, in order to enable the contractor to complete the contract within the time specified, and to give the Province the benefit of the use of the railway at as early a date as was practicable. I do not consider the material that has been used equal in quality to that which might have been obtained from the cuttings. The cost of the maintenance of the line for the first six months may considerably exceed that which it would have been had the embankments been formed of the stuff from the cuttings; but after that

period I do not think there will be much extra expense. The contractor has to maintain the roadway for the first six months, and what is more than an equivalent to the Province for what extra expense there may be after that time, is that the outlay on the railway will become productive at least six months sooner than it otherwise would, independently of the consideration that it will by that period also sooner advance the commercial interests of the Province.

I would also observe that where an embankment goes over swampy ground, it is a question whether the lightness of the embankment is not a consideration of more consequence than the relative durability of different materials. In every case in which peat has been used the seat of the embankment is swampy, the surface of which has by draining been formed into a crust of from two to three feet thick. Peat placed upon this tends to prevent the superincumbent weight of the bank from breaking through it.

In cutting No. 2 the material has been placed on the bank, the greater portion being reserved for ballast; the rest is lignite run to spoil.

Embankment No. 3 is principally formed from cutting No. 3, but north of the Waimatua Creek it was formed from side cutting. The material from the side cutting is peat sand and loam, and one-third peat.

The Waimatua bridge was constructed too high by mistake of the contractor, and he had to alter it.

There has been no alteration in the line, either at embankment No. 3 or anywhere else, since the contract was let.

Side drains have not been made at cutting No. 3, because they are not required. There is no drainage to be cut off from the slopes of the cutting.

No portion of cutting No. 3 is thrown to spoil, all the material will be used upon the embankments. Embankment No. 4, between cutting No. 4 and the Mokotua Creek, is formed of gravel and sand, some from the cutting and some from the side cutting in the place of that run to spoil.

In cutting No. 4 a great quantity of the material has been placed on the bank; more than half of this is ballast, and the rest has been run to spoil, in order to facilitate the completion of the work for the reasons before stated.

The drain for the road here answers the purpose of a side drain for the line, and this has been deepened.

A very large proportion of No. 5 embankment is formed of peat, and the topping is sand and gravel. The bank has been properly formed, and the materials employed are very suitable for a swampy foundation. All the peat used upon the work has been taken from parts contiguous to the drains commenced in August last, and completed before the embankment was formed, and was of the character of the crust before mentioned.

In embankment No. 7 there is a culvert not made in the manner described in the drawing. It goes through a small bit of good ground, and the timber sides are not necessary; the expense is thus saved to the Province.

I authorised the alteration made in the fencing, because I consider the substituted fence the better one, in the place of prick posts. The main posts are placed two feet nearer each other, giving five main posts in the space which according to specification would have been occupied by only four. There is no saving either in timber or labor. The sizes of the posts and rails are according to contract, and also the description of the timber. Fascines have been used in every place where required; to have placed more would have increased the expense of the works, as the contractor is paid for the quantity used. The fascines are to be placed only where it is ordered.

There was very little flax or grass on the line, and it was not necessary to cut it; and although it is mentioned in the specification, not being scheduled it would have to be paid for as an extra.

On the Mokomoko branch, where the surface was moss, it was all removed. There have been no other deviations from the contract that I am aware of.

I have seen the pitching of the road; it is incomplete and in progress. I do not object to the size of the stones; I consider them suitable for the purpose; there are a few stones laid on the flat, but where so laid they are not objectionable.

The stones are laid longitudinally, and correctly so in this instance.

None of the metalling is completed or finally passed yet.

The harbour sheeting of the embankments near the New River has given way where the work was incomplete; but when completed it will be strong enough.

I think the railway would have taken at least six months longer to complete if several of the embankments had not been made from side cuttings, for the following reasons:—

1stly. The necessary quantity of plant to lead the whole of the material from the cuttings is not in the country, or procurable.

2ndly. That only a limited number of

men and waggons can be employed upon the face of a cutting; and to have finished the work within the time specified the face of the cutting would have had to have been increased by five times its present size, would have necessitated a double bank to carry a double length of rails for the whole length of the lead, besides several sidings leading to the additional face area of the cutting.

The Consulting Engineer, Mr. Dundas, has been cognisant of all my proceedings with regard to the railway, and especially of the formation of the embankments from side cutting; but I am not quite certain that I mentioned the fencing to him.

I have had occasional correspondence in writing with him, but our communication has principally been personal.

He has several times inspected the line in company with me.

I have authorised no deviation from the contract without his knowledge and consent.

Invercargill,
Thursday, March 31, 1864.

Examination of Mr. John Francis Dundas.

I am consulting Engineer of the Bluff and Invercargill Railway.

I have from time to time, inspected the works on No. 1 contract, since their commencement. I have not had any occasion to find any fault with the general conduct of the works.

I am aware of the contents of the specifications for the railway. I have seen deviations from the strict letter of the contract, as I have seen also in every work with which I have been connected.

I was not consulted on the alteration made in the fencing, but I approve of the alteration, as I consider that the shortening of the length of the rails from 10 feet (the specified length), to 8 feet, insures as good a fence as that contracted for, and the difficulty in fitting prick posts to rough split rails is avoided. Prick posts are only used with sawn timber.

My attention has not been called to the description of wood used in the fence, or bridges.

The forming of a portion of the embankments from side-cuttings was done without my having been consulted upon the matter, but I consider the alterations made judicious, and approve of them. The work is to be completed within a very short period of time, and where the work can be facilitated by a departure from the letter of the contract, without prejudice to its sufficiency, I consider such alterations should be permitted and even encouraged.

I have had great experience in making railways on peat bogs, and where properly used, I see no objection, in such situations, to the use of peat for embankments. I am not aware of peat in the present instance having been improperly used. The principal objection to peat in a high embankment is its undue elasticity, when not covered with a sufficient superincumbent weight; this objection applies principally where great speed is required. I consider sand an admirable topping for a peat embnakment, and the fibrous peat ensures good drainage, should the sand have been put on wet.

I do not consider that there need be any anxiety that the spoil bank on No. 4 cutting will cause land slips; the cutting is protected by the road-drain.

I do not consider it necessary to cut the grass and flax on the seats of the embankments, when they are of any height.

From my general observation of the surface of swamp, I should say that the peat has been sufficiently dried, by the action of the drains, to be immediately used for embankment.

I consider that the material from the cuttings would have been preferable to the peat, as it would more immediately have assumed its permanent form, but I apprehend that the embankments will have assumed their permanent form before the expiration of the six months, during which the contractor is bound to maintain the line. I have noticed no place in which fascines have been required, excepting where they have been used.

I have not paid any attention to the portion of the road now being made alongside the railroad.

I consider the harbour sheeting of the embankments will, when completed, be sufficient. Works of this description, when in course of formation, are subject to accidents, but the expense of these fall upon the contractor.

I have read the evidence of Mr. Marchant, I am not of course so well acquainted with the detail as he is, but so far as my information goes, I entirely corroborate it, excepting that I have not always been consulted prior to alterations being made, but where they have been made, I have approved of them.

During the whole progress of the works, I have had reason to put trust and confidence in the judgment of Mr. Marchant. In the drawing up of railway specifications, large powers are always reserved to the superintending engineer, and some clauses inserted, which are not intended to take effect, unless in case of special necessity; the operation of these clauses, and the manner in which the engineer

will exercise his authority, are matters well understood by the profession and contractors generally, to the effect that they shall not be enforced to the prejudice of the contractor, unless the nature of the work should require it; they are meant to cover unforeseen contingencies, and are always liberally interpreted.

With respect to the works generally, I desire to add that they have been carried on by the contractor with energy, good faith, and judgment, and I think his efforts should be met by support and encouragement on the part of the Government.

On commencing the work it was well understood from the Government, by the engineers, that the works were, if practicable, to be completed by the 22nd of June, it was not therefore considered necessary to submit the deviation from the contract made with that object, for any further approval of the Government.

Invercargill, 26th March, 1864.

Sir,—Having been appointed by His Honor the Superintendent to enquire into the particulars of alleged deviations from the specification in contract No. 1, of the Bluff Harbour and Invercargill Railway, and having taken certain evidence therein, we intend to inspect the line on Monday next. We shall feel obliged to you if you could make it convenient to accompany us, as there are some points on which we require professional assistance, and we believe that we can apply in no better quarter, whether we regard your extensive experience, or the fact that being the designer of the line, you are somewhat individually interested in the proper conduct of the works.

At the same time, we beg to hand you copies of the evidence taken, which will inform you of the points on which we are desirous that you should report,

We have the honor to be,
Sir,
Your most obedient servants,

Alfred Sheath.
J. Newton Watt.

Theophilus Heale, Esq.,
&c., &c., &c.,
Invercargill.

Mr. Heale's Report.

Survey Office, Invercargill,
31st March, 1864.

In the rapid examination which I made, in company with yourselves, of that portion of the Bluff Harbour and Invercargill Railway, which lies between the Green Hills and Invercargill, my attention was specially directed to the following points —

1st. The soundness of the embankments.
2nd. The stability of the sides of cuttings, and their efficient drainage.
3rd. Spoil banks, and the question whether they injure the work.
4th. The construction of bridges and culverts.
5th. The timber facing of embankments reached by the tide.
6th. The fencing.

I also looked, but cursorily only, to the construction of the highway by the side of the railway across the Mokomoko Flat.

The first point was that over which, at the time of issuing the railway contracts, the greatest risk appeared to impend. The great peat swamp extending from Green Hills to the terraces near West's, was so wet and unsound that it was quite impossible to carry the surveys over it, until several outfall-drains had been cut; and even after this had been done many months, and down to the time at which the contracts were made, the surface was still so tremulous that no satisfactory levels could be taken over about two miles of the line.

In order to obtain sound embankments over this quaking bog, great precautions were taken in drawing up the specification.

It was provided that all the drains should be first cut and completed within three months after the acceptance of the tender, so as to complete the desiccation of the ground, before commencing the embankments; fascines were to be laid wherever required, and no sludgy matter was to be placed in that condition in the embankments.

The result of these precautions, especially of the first, has been, that both the embankments and their seating are now in the best possible conditions, not the slightest bulging or spreading of any embankment having shown itself; and the subsidence having been everywhere moderate and uniform. The excellent and early drainage has in fact completely altered the character of the ground for some distance on either side of the line. The upper three feet of peat, formerly mere sludge, has now shrunk down into a tough fibrous mass, which has in most cases rendered unnecessary the use of fascines (which would, if used, have been a large additional expense); and the material from the side of the ditches is the very best which, on such a foundation, could be used for forming the lower part of the shallow embankments. It is almost impossible that sludge could have been used

injuriously, for in fact there is no sludge now to be found near the line, except in the very bottom of the ditches, and there the sand is in most instances reached; and even if the last few inches were wet the prism of peat standing between the ditches is so dry and so thoroughly porous, that in embankments of such small depth formed not by waggon tip, but in most cases cast, and when deepest, wheeled in by barrows, it must have had abundant opportunity to dry.

The only objection I find to any of the embankments is, that the slopes are in some parts so sandy, that I apprehend it may be found necessary to face them, or at least top dress them with peat, in order to induce grass to grow, which will be requisite to secure them from being injuriously acted on by the wind.

The cuttings call for little remark: they are nowhere heavy, and slips to any considerable extent need not be apprehended. There may, I think, be some slight ones of the alluvial soil lying on the gravel in No. 2; but if this takes place at all it will be in the course of the ensuing winter, when the risk, such as it is, will still be that of the contractor.

I understand that some exception has been taken to the material from No. 4 cutting being turned to spoil, instead of being run into the embankments. This cutting is generally shallow, and is about one and a half miles long; to lead it all to bank would have necessarily been a very long job, and the rails furnished to the contractor by the Government would have been quite insufficient for the work.

As the contractor is only paid for the excavations, his turning it to spoil and making up the embankments from side cutting at his own expense, appears to me a very handsome concession on his part; he must be a loser by it; and the gain to the Province by the time saved is very great. I consider the work quite as good as if made from cutting. Peat and sand mixed in good proportions make a most excellent embankment, the only objection to it being some subsidence; but as that has to be made up by the contractor the public cannot lose. The low spoil bank by the side of the line is no disadvantage whatever, and much of the material may yet be required on the line.

A still more frivolous complaint has been made, that side drains were not carried along the side of this cutting in advance of the work; that is, that a particular provision adopted in order to dry very wet ground, was not also employed on a perfectly dry and sound terrace. As any length of drains cut in diminution or in excess of those contained in the schedule will be allowed for in the payment. any Engineer who should permit drains to be cut, where they would be evidently useless, would be guilty of great dereliction of duty.

The bridges and culverts are, in every respect, excellent, both in material and construction.

The timber facing of those portions of the embankments which are washed by the tide is *not*, in my opinion, a very satisfactory work. When designed it was, I presume, duly considered by those responsible for it; and as executed, it is better than the design.

The difficulty was great, as no stone was available at any practicable cost. The present plan was, I believe, adopted as a make-shift, and it is quite premature to say that it will not succeed; at all events, should it become necessary to adopt any other plan hereafter, it will certainly be much easier to do so when the completion of the line will facilitate the carrying of material.

The fence is put up at variance with the terms of the specification, and is a decided improvement upon it. It is a very good three-rail fence: posts of Totara or Matai, eight feet apart, rails of sufficient dimensions, generally of Rimu, but occasionally of Kahikatea.

The road across the Mokomoko Swamp will, when finished, be apparently equal to specification. The pitching is very good indeed; many large stones have been bedded flat at the sides of the road. as was necessary to afford some abutment for the pitchers. Whether the seating will prove to be sufficient, is a matter on which opinions may differ; but everything provided for by the specification seems to me to have been effectually done. The metal is still being broken over by hand, and therefore cannot yet be finally judged of; but it seems to me to be good and sufficient.

I have the honor to be,
Gentlemen,
Your very obedient servant,
THEOPHILUS HEALE.

J. N. Watt, Esq.,
A. Sheath, Esq.

IT is hereby notified, that

EDMUND ROGERS, ESQ.,

has resigned the office of interim Provincial Treasurer of the Province of Southland.

J. A. R. MENZIES,
Superintendent.

Superintendent's office,
Southland, 1st April, 1864.

CATTLE BRANDS REGISTERED DURING THE MONTH OF MARCH, 1864.

Date.	Name of Owner.	Residence.	Brands and Descriptions.	Remarks.
March 1	A. M'Naughton	Wild Bush, Riverton	AM conjoined	
March 3	William M'Michael	Bluff Harbor	AD. G W. & D	
March 3	J. V. Burton	Riverton	O B	
March 14	John Ward	Springwood, Jacob's River	JW	
March 16	James Allan	Maple Bush	JA conjoined	
March 16	Angus Cameron	Glendoo, Hokonui	AC	
March 19	William Hopcroft	Gummie's Bush	WH	
March 19	Henry B. Wood	Birch Bush	BW	
March 19	Mabelle Wood	Wild Bush	W	
March 19	John Grieve	Branxholme	J G	
March 19	Adam Grieve	Branxholme	G in triangle	
March 23	Thomas Wilson	New River	TW	
March 26	James Allison	Steven's Bush	JA	

J. F. KELLS,
Registrar of Brands.

IN pursuance of the power vested in me, in that behalf, by the "Vaccination Act, 1863," I hereby appoint the following gentlemen to act as Vaccinators in the several districts set opposite their names:—

Invercargill District Hospital—J. P. Murray, Esq., M. D.
Dacre—J. F. Deck, Esq., M.D.
Campbelltown District—J. F. Deck, Esq., M.D.
Riverton District—J. H. Martin, Esq., F.R.C.S.E.
Oreti District—Charles Scott, Esq., M.D.

The gentlemen appointed as Vaccinators in the several districts will be in attendance at the times and places mentioned below, for the purpose of vaccinating children.

Invercargill District—Provincial Hospital every Monday between 10 and 12 a.m.
Dacre District—Police Station, Dacre. two p.m., on third Monday of May, August, November and February.
School House, Long Bush, at ten a.m., on first Monday of May, August, November and February.
Campbelltown District—Police Station, Stanley, at noon, of first Monday in May, August, November and February; and at the Court House, Bluff, at 3 p.m. of first Monday in May, August, November, and February.
Riverton District—Police Station, every Monday, between 10 and 12 a.m. School House, Gummie's Bush, noon of first Monday of May, August, November and February.
Oreti District—School House, Waianiwa, noon of first Monday of May, August, November and February.
Police Station, Winton, noon of second Tuesday of May, August, November and February.

J. A. R. Menzies,
Superintendent.

Superintendent's Office,
Southland, 12th April, 1864.

IT is hereby notified that the following gentlemen were appointed to the offices named below, at the dates set opposite their names; but, owing to an oversight, their appointments have not previously been gazetted:

Engineer's Department.

John Findlayson, Esq., appointed Road Inspector, October 6, 1862.

George Cozens, Esq., appointed Clerk, December 27, 1862.

Edward Villiers Briscoe, Esq., appointed Draughtsman, April 15, 1862.

Survey Department.

James A. M'Arthur, Esq., appointed Assistant Surveyor, April 1, 1864.

Edmund H. Butler, Esq., appointed Sub-Assistant Surveyor, September 15, 1863.

Thomas Smith Wright, Esq., appointed Accountant, March 2, 1864.

Provincial Council Department.

Mr. William Henry Aylmer, appointed Clerk of the Provincial Council, 10th October, 1863.

By order,

W. H. AYLMER,
Clerk to Superintendent.

IT is hereby notified that I have appointed

JOHN FEILD DECK, Esq.,

as Health Officer for the Province of Southland. The appointment to date from the 11th inst.

J. A. R. MENZIES,
Superintendent.

Superintendent's Office,
Southland, 9th April, 1864.

RETURN OF CATTLE Slaughtered in the Province of Southland, from 1st to 31st March, 1864.

DISTRICT IN WHICH SLAUGHTERED.	GREAT CATTLE.	SHEEP.	PIGS.	TOTALS.	REMARKS.
Invercargill	114	474	11	599	
Campbelltown	—	98	—	98	
Riverton	16	86	—	102	
Winton	21	—	—	21	
Lowther.....	1	4	—	5	
Totals	152	662	11	825	

J. F. KELLS,
Registrar of Brands.

Treasury, Southland,
11th April, 1864.

Printed for the Provincial Government by HARNETT & Co., Dee-street, Invercargill.