



S O U T H L A N D  
P R O V I N C I A L G O V E R N M E N T  
G A Z E T T E .

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[No. 62.]

ROAD REPORT OF WORKS COM-  
PLETED AND IN PROGRESS,  
ETC., ETC., ETC.

Engineer's Office,  
Southland, 21st Sept., 1863.

SIR,—I have the honour to forward for your information a Report of Road and Public Works completed, and others now in progress, in the Province of Southland, commencing on the 31st September 1862, to the date of this Report.

I have also, in accordance with your Honor's instructions, specified the works absolutely necessary to be carried out in the ensuing summer, and other works not so immediately needed, but still desirable that they should be executed as early as possible.

In anticipation that it would be found necessary to construct the leading roads in accordance with a system adapted to meet the wants of the rapidly increasing traffic, I have procured levels and cross sections sufficiently accurate in detail to enable me at any moment to issue specification for work on the Great North Road, the Mataura Road, the Riverton *via* Wallace-town Road, and the Bay Road. It was my intention also that a complete set of

levels should have been taken of the whole of the Riverton and Aparima line lying between that town and the Otatau stream. This, I regret, so far has been found impracticable, owing, in the first place, to a constant press of work in this department, and an inadequate staff to perform it; and, secondly, to the weather being unfit for field work.

The levels of the different roads above mentioned are now plotted, and have undergone a careful examination. The gradients are as good for dray traffic as I could wish. There are a few places where earthworks will be necessary, but not to so great an extent as to involve a serious expenditure.

After carefully going over each main line, I have ascertained that the drainage is in many places defective. In most instances this arises from insufficient outfall, and although in all cases the outfall has been carried long distances, they stop short of perfect drainage. To remedy these defects, it will be necessary to take careful levels, in order to ascertain with accuracy the points where drainage may cease. Hitherto it has been found impracticable to do more than procure the level of the main roads. To these I

hope to be able shortly to add a complete system of drainage, with the longitudinal and lateral datum—the former at every five chains, the latter at every twenty chains, or as near these distances as the nature of the country will admit.

With regard to the practice hitherto adopted of using gravel for road covering, and where heavy traffic has to be sustained, I beg to signify my thorough disapproval. It must be obvious to any observer that it has proved totally unsuited for the requirements. Had it been possible to have gravelled the roads at the early season of the year, so as to have given them a summer's consolidation, I think there can be no doubt that they would have held their condition much better during the wet season. Without going into the question of the defects or merits of gravel, I think it sufficient to say that wherever used it has signally failed. Beyond temporary purposes, or roads of light traffic, I entirely condemn its use for the future.

It is generally admitted that to make efficient and durable roads, a large expenditure is absolutely necessary, and that any curtailing of the sums required proportionally lessens their permanent usefulness. It has long been proved by the most eminent engineers that it is better, in constructing a new road, to commence with the best system known, without any reference to expenditure. This carried out under the eye of properly qualified men, and once placed in proper position, will, as has been proved in many instances, need little or no repairs for the next two years. A cheap road, on the contrary, will, owing to the necessity for constant maintenance, prove itself in a comparatively short period the most expensive, and after all will never be a permanent one. It will always be causing thereby discomfort to travellers, and necessitating the expenditure necessary to overcome the heavy friction. I have therefore selected a plan of construction, not so much in reference to expenditure as permanent utility, although the former has been kept in sight as far as I could see.

Immediately the contract is taken off the hands of the contractor, the maintenance is the next thing to be attended to. This item of road expenditure I look to as equally important with the first construction. It is desirable that I should send in, among other estimates, the probable cost per mile for this branch of the service; but I have found that impossible until I have had sufficient experience in arriving at the adaptability of the stone to be used for road purposes. If the stone turn out good, it may be found that one man will be sufficient to

the mile; if not good, it may require two, three, or four, or even more men, for the same distance. I have examined the stone at the Mokomoko, from whence it is probable that the greater portion of the supply will come, and I am of opinion that the quality cannot be objected to. When I say quality, I must particularly refer to its hardness. This, however, is not the only requisite necessary. The other quality I allude to is toughness. If deficient in this, it most essentially is deficient in quality *par excellence* for road metal. I have, up to the present, had but limited opportunities of judging of the latter quality of the Mokomoko stone. It has been laid down in short distances in two or three places on the Campbelltown Road; but the traffic over it has not only been small, but also confined to light carriages. With this evidence only before me, I hesitate to give an opinion. The opportunities for forming a judgment will shortly be quite sufficient to arrive at a conclusion. A heavy traffic will have to be sustained from the railway contractors' drays in transit of plant, conveying supplies, &c.; and if the metal is found to bear this without any serious deterioration, I think it may safely be pronounced as capable of meeting all requirements.

The necessity cannot be too strongly urged for keeping an adequate number of efficient men spread over the roads. This once neglected, and hollows will in a very short time form to such a magnitude as to require a large outlay, and at the same time these patched parts will be in inferior keeping with the rest of the road for some months.

The estimates appended hereto are intended to apply to a road of 16 feet width of paving and 17 feet of covering, including the man, throughout in this town. On measurement and inspection, I think it indispensable that the pitching and metalling of the latter line should extend from one kerb to the other, leaving sufficient distance, say 18 inches, on either side for channels. My reason for this conclusion is, that the traffic necessarily will constantly turn off the metalled line to deliver or take away goods to or from the stores, and every such turning off causes a loosening in the first place of the covering, followed by a displacement of the pitching. This destructive process will not be confined to one or two places, but will follow throughout the street wherever the stores may be built. Under these circumstances, I recommend that the whole face of the street be properly pitched and metalled.

On every road, the progress on which will be hereafter described, I have ap-

pended the quantities of works required, together with their nature, also, a separate estimate of the cost of the whole of each line in detail. These estimates have been carefully compiled and arrived at from precedent experience. I confidently give them in not only as the closest approximation to prices hitherto going, but also in accordance to prices likely to obtain some time for the future. Therefore, no doubt, will be thought large; but a careful examination assures me that any curtailment will but tend to injure the permanent usefulness of the works.

I beg to remain,

Sir,

Your most obedient servant,

HAROLD H. FENTON,

Provincial Engineer.

#### GREAT NORTH ROAD BETWEEN THE TOWN BELT AND THE WAIHOPAI BRIDGE.

The works performed since the 31st September 1862, are as follows:—

That part of the road passing through the ridge of sand hills, and south of the Waihopai Bridge, has been cut down to proper levels, and the sand operations cut over the surface of the road and the bridge approaches.

The old side drains, cut under the Otago Government, have been filled in, and new ones cut of larger dimensions. The bush immediately behind the Town Belt has been cut down and widened, and new side drains and outfalls cut and culverts constructed.

Other cuttings have been completed, and the soil therefrom used in making up the cross section as far as it would go. A culvert near Mr. Blacklock's Estate is in progress of formation, and is placed sufficiently deep to remedy the defect hitherto complained of—that of bad drainage. Two coats of gravel have been spread on the road, the latter of which has stood remarkably well. I attribute this in a great measure to the constant employment of road parties to maintain the surface.

In parts near the bridge clay has been laid on one foot deep. This was found necessary in order to protect the sand from the action of the high winds. The approaches to the bridge have been made up, and now only need the carrying out of adjoining estimate, to make this portion of the road equal to any in the colony. A landing stage has been constructed on one side of the Waihopai Bridge for the convenience of crafts discharging.

A road has been made from near the bridge leading to Grayal Pita. This was found essential, as hitherto a private road had been used.

From Waihopai Bridge to Makarewa River, several earthworks have been executed. New culverts have been constructed, and old ones have been lifted and repaired. New ditches have been cut in the Waihopai Bush, in accordance with prepared levels, and the drainage (so far as the level nature of the country would admit) is efficient.

The portion between the Waihopai Bridge and the Bush, about twenty chains, has been gravelled. The gravel in this instance broke down at the early part of the winter, and has needed constant repairing since. And here I may remark, that in the use of gravel my experience in this Province has taught me that a road made of this material cannot with any advantage be repaired during the moist season. The best screened gravel may be used for filling in holes, &c.; but if the foundation is wet, the addition only tends to fatten the quagmire, and increase the difficulties of traffic.

It was intended to lay baulkways through the Walkiwi Bush, and to a certain extent the plan was carried out. It soon, however, became obvious that the experiment (for such it was) fell short of the anticipation of the designer. It is not necessary, I apprehend, to enter into the reasons of such failure, as they were apparent to anyone who inspected the portions completed and in operation. The necessity for making this part of the road viable was imperative, and it was as clear that to lay down gravel was to incur a useless expenditure of money. The only plan open was to construct a line of timber. A plank road was at first thought of, but for two reasons abandoned, viz.—the great expense, and the difficulties of obtaining timber in sufficient quantities. The baulkway design which followed was adopted, not only that it had the elements of success, but combined economy, with all material requisites growing on the spot. The contractor, at some loss to himself, gave up the contract, and substituted a fascine covering. This he did at a price very little over the average tenders of works of a similar description in other localities.

All the bad places as far as the Makarewa have been fascined and maintained during three of the worst winter months under the same contract.

The southern approaches to the Makarewa Bridge for about thirty chains have been drained on both sides, and outfalls cut. An embankment has been made up in accordance with cross sections

supplied from the Engineer Department, and the whole distance laid down with fascines.

A bridge on the truss principle has been thrown across the Makarewa River, after the design and under the superintendence of T. Heale, Esq., Chief Surveyor. It has now been available for all description of traffic for some time, and has proved itself one of the most useful and best-designed bridges in the Province. The northern approach has been cut and formed, and needs only metalling to make the whole work perfect.

Between Wallacetown and Winton Bush three well-constructed bridges have been completed: one over the Tomoporakau stream, one over the Haugh-meadow Burn, and the other over Winton Creek.

Culverts have been placed on every swamp and small creek, and their approaches and drainage adequately attended to. Several portions of the road not hitherto touched require forming and draining. These and the remainder of the line are provided for in the annexed estimate.

The Winton Flat has been gravelled, and for a time sustained the traffic better than could be expected. It has now, however, broken down in many places, and fallen beyond repair until the dry season sets in. The approaches to the culverts have for some time been almost impassable. To remove this difficulty, I have instructed Messrs. M'Neil and Wilson to lay down fascines on the narrowest crossings of the swamps. This has been done accordingly, and materially assisted the traffic.

The Winton Bush has proved the greater difficulty to this Department of any work on the whole line. It was the first contract issued, and stands likely to be the last completed. Four contractors have had it in hand, three of whom abandoned it at different stages; the present contractors, Messrs. M'Neil and Wilson (who, I feel it but just to remark, have always given satisfaction to this Department) are progressing very favourably considering the bad state of the weather. Another six weeks I estimate will be sufficient for entire completion.

The next contract following Winton, as far as Mr. M'Lean's Run, has been throughout the whole distance in the hands of Messrs. Campbell, Robertson, and Co. These gentlemen have laboured under great disadvantages. They undertook the contracts (which were serious) without any knowledge or experience of either the peculiarly unfavourable climate of Southland for engineering purposes, or the fluctuating state of the labour market in a locality bordering on rich gold diggings. I believe they have done their

best to complete the works in accordance with the specified terms, but have been prevented from so doing from causes not under their control. The items of their contracts consist of ditching, forming, and metalling, covering a line of something near ten miles. The drainage in places is deficient; but this is owing more to the outfalls not having gone through a process of careful levelling. This, as I stated in my preliminary Report, I hope to remedy in the ensuing summer.

The works performed under the above contracts are something near as follows, viz.—thirty miles of ditching and outfalls. Between ten and twelve miles of forming, about 7000 cubic yards of cutting, 3000 cubic yards of filling, ten culverts, and ten miles of gravelling. The curving of the most acute angles is now in hand, and a bridge across the Cabbage-tree Creek is completed. The cuttings through the forest (which I have hitherto omitted to mention) were in another contract, and anterior to the works of Messrs. Campbell, Robertson, and Co., the whole consisting of Winton Bush, Centre Bush, and Last Bush, amounting in all to three miles. The width cut was sixty-six feet, and the whole of the timber or scrub, &c., on the line to be burnt or otherwise disposed of, and thirty-three feet in the centre to be grubbed. This preliminary work was in progress when I took charge of the Department.

I have now enumerated the works completed and in progress on the Great North Road for your Honor's information. At the northern extremity of works above described, there is a patch of country two miles in extent (or perhaps less, for we have made no survey of it). It runs through the swampy part of M'Lean's run. This requires ditching, forming, and metalling. I have not described it in the estimate annexed, as T. Heale, Esq., Chief Surveyor, has stated to me, from information lately acquired, that he thinks it desirable to cross the river Oreti, immediately at the completion point of Messrs. Campbell and Co.'s contract at the Cabbage-tree Creek, and follow a line on the west side on the Dipton Flat, which line is good throughout, and requires little or no outlay. I have not examined it myself, but the Chief Surveyor has done so carefully. I have, therefore, omitted to give an estimate of the two miles mentioned until I have made a personal examination of the whole country on both sides.

From Benmore (Mr. M'Lean's) to Messrs. Holmes and Barnhill's (Castle Rock), a distance of about fourteen miles, but two points of difficulty occur—one the Sheepwash Creek, and the other a swamp about five miles to the southward of Castle Rock. Both of these have been

attended to, and are now in passable condition. Beyond the Elbow, considerable works have been executed under the immediate attention of Mr. Inspector Finlayson. Owing to press of work in my Department, I have hitherto been unable to take this continuation of the Great North Line under my surveillance. This portion has been under the superintendence of Mr. Heale, and has, from all I can hear, been efficiently attended to.

I have subjoined hereto a rough estimate made by Mr. Inspector Finlayson of works required in the neighbourhood of Dome Pass, and extending in an easterly direction as far as the third crossing of the Mataura River. I have not had the opportunity to verify or otherwise the estimate here given; but from estimates before of works carried out under this gentleman's direction, I believe him generally to be accurate.

The detailed estimates of the Great North Road appended hereto, and commencing at Oreti River, near Mr. McLean's leading towards Wallacetown, shew two modes of procedure. The one consists of forming, pitching, and metalling throughout; the other simply pitching and gravelling the culverts and approaches between Winton Bush and Wallacetown. I have thought it necessary to propose to the Government a continuous metalling, &c., between Winton and Wallacetown, from the probability that the settlers' sections abutting on this part of the line will be fenced in during the ensuing summer. If it should so turn out, I am of opinion that the confined limit of roadway (sixty-six feet) will not be sufficient to sustain the traffic less the works recommended in annexed estimates.

#### RYAL BUSH.

Forty chains of bush cutting, sixty-six feet wide, have been completed; thirty feet of the centre has been stumped. Two culverts have also been constructed, and the necessary earthworks and drainage. Settlers can now pass through.

#### RIVERTON.

A part of the Beach near the Custom House has been filled in. Kerbing and forming footpath on east side of Palmerston-street is now in progress, and will shortly be completed. The drainage of the principal streets has been improved, and other works executed.

#### RIVERTON AND OTAUTAU ROAD.

The works completed on this line are as follows: Eight bridges, 210 chains of embankment and approaches, 500 chains of side drains and outfalls, 24 culverts, and 4000 yards of cuttings. Contracts have been set for gravelling the whole of the embankments. In some instances they have been suspended owing to bad weather, and in three cases the contractors have failed to comply with the terms of the specification. These latter contracts have been cancelled. A cutting, nine chains long, has been excavated across an elbow of the river, in order to divert the Aparima into a new channel. This became necessary, as the river was making rapid inroads into the bank near the main thoroughfare. The object of this diversion has answered all calculations, and the original channel has now blocked up.

Other works have been executed north of the Otautau, including one bridge and two culverts. A line has also been opened for dray traffic as far as Hamilton Burn. This contract was under the superintendence of the Riverton Road Committee, the specification being drawn under its supervision. Estimates are enclosed for the proper completion of the line lying between Riverton and the Otautau.

#### RIVERTON VIA WALLACETOWN ROAD.

This line branches off from the Great North Road at Wallacetown. The works completed are as follows:—

A bridge over the lagoon near Wallacetown of one bay of fifteen feet span, extended on sleepers and piers. Southern approach cut down one chain and gravelled. Northern approach made up for five chains; side drains, ten chains in extent, cut; and five chains of gravelling.

Over the Tomoporakau, a bridge has been constructed of four bays, fifteen feet span each, resting on either end on piers. Approaches made up and gravel spread over the whole.

Between the Tomoporakau stream and the river Oreti, an embankment, twenty chains long, has been completed across a bad swamp. Also, one culvert, sixty chains of side and outfall drains, and gravel spread from one end of the embankment to the other.

Over the Waianawa, a bridge, of one bay, with eight feet on either side, extending to rest on piers. A similar work has been completed over a swamp

immediately west of the above, and embankment made up a few chains to both approaches of each bridge.

Between the Oreti and Wainawa several culverts have been constructed. Embankments, with side drains, outfalls, &c., have been completed across the swamp, and one bridge thrown across a small creek. Gravel has been spread over the worst places.

An embankment has been thrown across a swamp near Wright's Bush ten chains long, one culvert constructed, and forty-eight chains of ditching cut. Two other swamps close by have been improved by adding eighteen inches of soil to the top of the original embankment.

A bad portion of the road extending round both sides of Wright's Bush, about thirty chains, has been embanked, fenced, and drains and outfall cut. A very bad swamp, about a mile beyond Wright's Bush, has been embanked and culvert constructed. This swamp was impassable, and travellers had to head it a distance of nearly two miles out of the road.

Between the Waimatuku stream and Harrier Bridge, a distance of about five miles, the whole of the swamps have been made viable. The works completed between these two points are seven culverts, two bridges, thirty chains of embankment, and about seventy chains of ditching. Drains, &c., now commonly use the road; and excepting a little punching caused by the traffic in wet weather, the whole is in tolerable condition.

The Harrier Creek, about five miles from Riverton, has been bridged. The construction consists of one bay of twelve feet span, and two of six feet span (built on the skew), approaches, &c., made up. This has been an accommodation to travellers, as the old bridge was not safe for heavy burthens.

The remaining five miles between this point and Riverton have been during the winter kept in order by the employment of day labour, under the superintendence of Mr. Overseer Langlands. Culverts have been laid down, and all the swamps fascined. This five miles of road passes over the old track. The surveyed road lies about a quarter of a mile to the south. The latter road requires making; no levels of it have yet been taken, and therefore not provided for in the annexed estimates. I recommend that this work be executed during the ensuing summer. An estimate will be sent in for your Honor's information, as soon as one of the staff can be spared to prepare the different sections.

#### UPPER FORD ROAD.

On this line, between the Harrier Bridge and the Upper Ford, one bridge on the skew similar to the Harrier Bridge, has been constructed, and approaches thereto completed. Several other works have been executed by day labour. The whole is now in passable condition. These improvements have been of great assistance to draymen, as the Riverton road, via Aparima Bridge, became impassable at an early period of the winter. Between the Upper Ford and the junction near Groper's Bush, other improvements are very much required. An estimate hereafter will be given, included in the works desirable for execution in the coming summer.

#### YELLOW BLUFF ROAD.

Commencing at the junction of the Riverton and Waimatuku Roads, near Waimatuku stream, and in a north-westerly direction as far as the junction with the Riverton and Otautau road, the following works have been completed:—Approaches to the Waimatuku cut down and levelled, one bridge constructed over the Tunamai, 5 culverts, 5½ chains of embankment, and 25 chains of side ditching and outfall. This branch is now viable for day traffic in dry weather.

#### MATAURA ROAD.

In the month of March last, contracts were set for the whole of the line lying between the Town Belt and Mavis Bridge. The nature of the work was as follows:—

The first 100 chains from the Town Belt were let in one contract. The drainage, where incomplete, had to be remedied. The whole line to be properly formed, in accordance with cross section supplied; several hollows to be filled in, two new culverts, old ones to be lengthened, all channels to be pared, and cleaned out, and proper fall for drainage observed; and the whole line to be gravelled.

The next 200 chains consisted principally of the same description of work as that on the first 100 chains. Shortly after setting these contracts, the weather set in bad, and it was found necessary, therefore, to suspend operations for a more favourable season. The contractor has now resumed operations, but too recently to be able to make a report on the progress.

The remainder of the line between the

end of the 300 chains and the Mavis Bridge was contracted for by Mr. Plunket. The works, which were of a very similar character to those just described, were completed before the winter set in. The bad weather, however, followed so closely after completion as to poach up all the embankment and earthwork. It will be necessary to re-form the whole previous to pitching and metalling.

A large portion of the line between Mavis Bridge and the Long Bush has been formed and ditched, the works consisting of 5½ miles of ditching, including sixteen culverts, raising dunes and repairing same, half mile of forming, half mile of gravelling, and 1000 yards of earthwork. This contract has since been very much cut up, and the whole will require re-forming previous to laying on the metal.

From Long Bush to M'Gibbon's Ferry, culverts are constructed on every swamp, and approaches, with one or two exceptions, made up. A few of the approaches on the plain have been gravelled, but generally the earthworks only have been completed. Straggling parties of road men have been employed on this line during the winter. To some extent this has been the means of opening up the traffic, but generally there is but little to be seen as return for the labour expended.

Over the Waimea stream a bridge of three bays has been constructed. The approaches also, which required in places retaining walls and filling, have been duly executed. The remainder of the line as far as the junction of the North Road at the Elbow has been under the charge of Mr. Overseer Finlayson. Day labour has been generally employed, and where contracts have been set, they have generally been given to travellers passing to and fro.

#### MYROSS BUSH.

The road through this bush has been cleared of stumps, &c., for sixteen feet in the centre and forty-four chains long. Formation has been completed for the same distance. About eighty-eight chains of ditching has been cut for the proper drainage of the above formation. It is now a very good summer road, but unfit for winter traffic until the embankment has properly consolidated.

#### LONG BUSH, NEAR MR. TROTTER'S.

One culvert has been constructed and three chains forty-nine links of approaches

made up. Seven chains of ditching and about one chain of forming. This work has been of considerable convenience to the settlers.

#### MABEL DISTRICT ROAD.

ORDER 964 OF 1870 OF THE DISTRICT ROAD BOARD, INCLUDING WORKS REQUIRED ON MABEL DISTRICT ROAD VIA THE RACECOURSE.

The works consist of four bridges, fourteen culverts, seventy-one chains of embankment and approaches, 174 chains of side drains and outfalls.

The bridges are very similar in size and construction, being principally of three bays, two of twelve feet and one of twenty-four feet. Machines are now being laid over the worst places. This road has been of considerable service to the diggings during the last winter. The embankments being new a considerable amount of poaching has resulted.

A road, seventy-three chains long and one chain wide, has been cut, stumped, and cleared through the Titipua Bush, and is now open for traffic.

#### BAY ROAD.

The works on the above roads are as follows:—Pitching 200 chains; culverts, 6; widening drains, 100 chains; formation and spreading, 352 chains; graveling, 100 chains. The latter contract was suspended in consequence of the bad weather. Notice has now been given to the contractor to recommence operations; large ditches are being cut on both sides of the road between the Ferry and Mitchell's Inn, and the soil therefrom used in raising the crown of the road. A bridge over the Waimea will be shortly completed, and the ditching and formation between the bridge and the ferry are nearly finished.

#### MATAURA.

#### GAMBRELLSTOWN ROAD.

The Chief Surveyor has had charge of this line. His report is in process, and will shortly be sent in for your Honor's information.

#### INVERCARGILL.

CLYDE STREET.—One culvert and side drains have been completed. On east side the drains have been cut throughout; and the west between the Point Creek and Tweed side only. Twelve inches of gravel has been laid on between these two latter points, and the whole fascined.



## GREAT NORTH ROAD.

## ESTIMATE OF THE COST OF VARIOUS WORKS PROPOSED TO BE EXECUTED ON GREAT NORTH ROAD, BETWEEN THE ORETI, AT M'LEAN'S, AND WALLACETOWN.

The dimensions assumed are:—For pitching, 20 feet wide, 9 inches deep in centre, 5 inches at sides—28 cubic yards per chain; gravel, 22 feet wide, 6 inches deep—27 cubic yards per chain.

1st. From Oreti for 70 chains to southward; limestone for pitching to be obtained north end of centre bush; average lead, 200 chains.

Leading 1960 cubic yards, pitchers		
Quarrying " " "		
Filling " " "		
Discharging and setting " "		
Gravel, 1890 cubic yards, removing and re-spreading		
Trimming road, &c., &c.		
Contractors' profit and contingencies		
		£2,048 14 5

2nd. 50 chains immediately north from Last Bush; limestone for pitchers to be obtained at north end of Centre Bush; average lead, 150 chains.

Leading 1,400 cubic yards, pitchers		
Quarrying " " "		
Filling " " "		
Discharging and setting " "		
Forming road, &c., &c.		
Contractors' profits and contingencies		
		£1,134 3 9

3rd. Through Last Bush, 23 chains.

Constructing corduroy

4th. Between Centre and Last Bush, 110 chains; limestone for pitching to be obtained at north end, Centre Bush; average lead, 40 chains.

Leading 3080 cubic yards pitching		
Quarrying " " "		
Filling " " "		
Discharging and setting		
		£3,196 1 3½

Gravel to be obtained from Oreti Plains; average lead, 150 chains.

Leading 2970 cubic yards gravel		
Setting and filling		
Discharging and spreading		
Forming road, including ditches, culverts, &c.		
Contractor's profits and contingencies		

5th. Through Centre Bush, 70 chains.

Constructing corduroy

6th. From Centre Bush for 84 chains to southward. Limestone for pitching to be obtained at north end of Centre Bush. Average lead, 140 chains.

Leading 2352 cubic yards pitchers		
Quarrying " " "		
Filling " " "		
Discharging and setting		
Gravel, 2268 cubic yards; removing and re-spreading		
Trimming road, &c., &c.		
Contractor's profits and contingencies		
		£2,086 6 5

7th. From 84 chains southward from Centre Bush to Hill's Accommodation House, 180 chains. Limestone for pitching to be obtained from near Hill's. Average lead, 110 chains.

Leading 5040 cubic yards pitchers		
Quarrying " " "		
Filling " " "		
Discharging and setting		
Gravel, 4860 cubic yards; removing and re-spreading		
Trimming road, &c., &c.		
Contractors' profits and contingencies		
		£3,633 0 6



## WALLACETOWN AND WINTON BUSH.

ESTIMATE OF THE COST OF CONSTRUCTING ROAD BETWEEN WALLACETOWN AND WINTON BUSH, 14 MILES, INCLUDING COST OF CONSTRUCTING TRAMWAY, FOR TRANSPORTING RUBBLE FOR PITCHING, AND TOP METAL.

In this Estimate it is assumed that Mokomoko stone can be discharged from Lighters at Upper Ferry, New River.

The dimensions assumed are—Pitching 20 feet wide, 9 inches in centre, 5 inches at sides, top metal and gravel, 6 inches x 22 feet.

TRAMWAY.					
14 miles ...	...	...	...	...	} £10,930 0 0
16 trams ...	...	...	...	...	
FORMATION.					
920 chains ...	...	...	...	...	}
200 chains ...	...	...	...	...	
PITCHING.					
31,360 cubic yards, average lead, 7½ miles	...	...	...	...	}
Loading ...	...	...	...	...	
Discharging and setting	...	...	...	...	
					£21,000 0 0
TOP METAL.					
26,460 cubic yards, average lead 6 miles 50 chains	...	...	...	...	}
Loading	...	...	...	...	
Discharging and spreading	...	...	...	...	
GRAVEL.					
3,780 cubic yards removing and respreading	...	...	...	...	}
Contractors' profits and contingencies	...	...	...	...	
Rubble for pitching, delivered at New River Upper Ferry, 31,360 cubic yards	...	...	...	...	} £56,635 0 0
Top metal, ditto ditto ...	...	...	...	...	

If this is adopted a sum of £13,722 13s must be deducted from Estimate for Great North Road from Wallacetown to Oreti, part of road being mentioned in both Estimates.

## MABEL DISTRICT ROAD.

ESTIMATE OF THE COST OF MAKING VIABLE FOR NEXT WINTER'S TRAFFIC THE MABEL DISTRICT ROAD VIA RACE COURSE, COMMENCING AT WALLACETOWN ROAD JUNCTION WITH THE NORTH ROAD, AND RUNNING EAST AS FAR AS THE WHEETWOOD CREEK, AND FROM THENCE RUNNING SOUTH TO THE MATAURA ROAD.

I am of opinion that it would be judicious to pitch and metal the approaches to culverts on this road as far as the Waikivi Creek, and that the material for same be conveyed as far as the junction of this with North Road by tramway, where it should be deposited, and carted from thence to where it may be required. The other approaches to culverts beyond this, I would suggest they be all re-formed and gravelled (with clean gravel), giving the road a good crown.

Pitching, metalling, and re-formation of road as follows, not including cost of materials delivered at Jetty :

## CULVERTS AND BRIDGES.

Forming 5 chains	...	...	...	...	...	...	...
Re-forming 18 chains	...	...	...	...	...	...	...
Pitching 23 chains, 14 feet by 6 inches	...	...	...	...	...	...	...
Metalling 23 chains, 14 feet by 5 inches	...	...	...	...	...	...	...
Re-forming 2 chains	...	...	...	...	...	...	...
Pitching 2 chains, 14 feet by 6 inches	...	...	...	...	...	...	...
Metalling 2 chains, 14 feet by 6 inches	...	...	...	...	...	...	...
Re-forming 6 chains	...	...	...	...	...	...	...
Pitching 6 chains, 14 feet by 6 inches	...	...	...	...	...	...	...
Metalling 6 chains, 14 feet by 6 inches	...	...	...	...	...	...	...
Re-forming 3 chains	...	...	...	...	...	...	...
Pitching 3 chains, 14 feet by 6 inches	...	...	...	...	...	...	...
Metalling 3 chains, 14 feet by 5 inches	...	...	...	...	...	...	...
Embanking, &c., 24 chains	...	...	...	...	...	...	...
Pitching 24 chains, 14 feet by 6 inches	...	...	...	...	...	...	...
Metalling 24 chains, 14 feet by 5 inches	...	...	...	...	...	...	...
							£642 7 3

Re-forming 1 chain	...	...	...	...	...	...	...
Gravelling 14 feet by 9 inches	...	...	...	...	...	...	...
Re-forming 2 chains	...	...	...	...	...	...	...
Gravelling, 14 feet by 9 inches	...	...	...	...	...	...	...
Re-forming 2 chains	...	...	...	...	...	...	...
Gravelling 14 feet by 9 inches	...	...	...	...	...	...	...

## ROAD FROM WHEETWOOD CREEK.

Re-forming, 10 chains	...	...	...	...	...	...	...
Gravelling 14 feet by 9 inches	...	...	...	...	...	...	...
Re-forming 6 chains	...	...	...	...	...	...	...
Gravelling 14 feet by 9 inches	...	...	...	...	...	...	...
Re-forming embankment, 19 chains	...	...	...	...	...	...	...
Gravelling 14 feet by 9 inches	...	...	...	...	...	...	...
Re-forming 2 chains	...	...	...	...	...	...	...
Gravelling 14 feet by 9 inches	...	...	...	...	...	...	...
Constructing new culvert	..	..	..	..	..	..	..
Formation, &c., 1½ chains	...	...	...	...	...	...	...
Gravelling 14 feet by 9 inches	...	...	...	...	...	...	...
Re-forming 8 chains	...	...	...	...	...	...	...
Gravelling 14 feet by 9 inches	...	...	...	...	...	...	...
Re-forming 2 chains	...	...	...	...	...	...	...
Gravelling 14 feet by 9 inches	...	...	...	...	...	...	...
Re-forming 1½ chains	...	...	...	...	...	...	...
Gravelling 14 feet by 9 inches	...	...	...	...	...	...	...
Re-forming 2 chains	...	...	...	...	...	...	...
Gravelling 14 feet by 9 inches	...	...	...	...	...	...	...
							£481 2 6

## WALLACETOWN AND RIVERTON ROAD.

ESTIMATE OF THE COST OF MAKING VIABLE THE ROAD FROM  
WALLACETOWN TO RIVERTON.

Between Bridge No. 1 across the Tomoporaka Creek and gravelled road near River Oreti, the road is fearfully boggy, and I would suggest that the same be drained, formed, and gravelled for some 60 chains ... ..  
 Forming, gravelling, bridging, and ditching beyond Oreti, as per estimate supplied ... ..  
 First culvert (beyond Fraser's Paddock): approaches have been formed for about 12 chains; this portion will require to be re-formed and gravelled ...  
 Second culvert: Approaches have been formed for about 4½ chains; the same require to be re-formed and gravelled ... ..  
 Third culvert (large): Approaches partially embanked; will require re-forming and gravelling for 15 chains ... ..  
 Fourth culvert: Approaches, about 18 chains in length; require to be raised and gravelled, and the ditches cleaned out ... ..  
 Fifth culvert: Approaches, about 20 chains; require re-forming and gravelling  
 Sixth culvert (at Bush): Approaches, about 10 chains; should be re-formed and gravelled ... ..  
 First Culvert (beyond Bush, between fences): Approaches, about 3½ chains; it would be advisable to clean out the drains, re-form, and gravel for that distance ... ..  
 Second culvert: Approaches, about 8 chains in length (formed 5 chains and embanked 3 chains), require to be re-formed and gravelled ... ..  
 Flat between Terrace and the Waimaituku River is crab-hole, consequently very dangerous to travel upon, and should be drained, formed, and gravelled for about 12 chains, and a bridge built across the River of a span of say 50 feet ... ..  
 First culvert (beyond River): Approaches, about 3 chains; require to be embanked and gravelled ... ..  
 Second culvert: Present approaches, about 3½ chains, require to be raised and extended for a distance of say 20 chains, and gravelled ... ..  
 Third culvert (across Creek): Requires to have approaches raised, and gravelled for about 6 chains ... ..  
 Fourth culvert: Approaches, about 5 chains, require to be raised and gravelled ... ..  
 Fifth culvert: The approaches, some 6 chains in length, should be raised and gravelled ... ..  
 Sixth and seventh culverts: Approaches, about 20 chains, ought to be re-formed and gravelled ... ..  
 Eighth culvert: Approaches (cutting and embankment), for some 8 chains, should be re-formed and gravelled ... ..  
 Ninth culvert (near Bush, bottom of Terrace): Approaches, about 1½ chains, ought to be re-formed and gravelled ... ..  
 Bridge at Harrier Farm: This has lately been constructed, and I think it advisable to extend the approaches for say 20 chains, and gravel the same  
 First culvert: The crossing has been laid with timber and fascines for about 2 chains, which should be gravelled ... ..  
 Second culvert: Approaches, for about 1½ chains, have been fascined, and now require gravelling ... ..  
 Third culvert (gateway): Approaches have been fascined for about 2½ chains and should be gravelled... ..  
 Fourth culvert: Approaches for some 4 chains, require gravelling ... ..  
 Fifth culvert: 1 chain requires to be gravelled ... ..  
 Sixth culvert (near Riverton): Approaches require to be raised and a new culvert constructed, and the same gravelled for a distance of 4 chains ...  
 Add for unforeseen contingencies ... ..

£7,027 12 4

ESTIMATE OF THE COST OF CONSTRUCTING 132 CHAINS 45 LINKS OF  
ROADWAY, NEAR THE ORETI RIVER (TOGETHER WITH THE  
NECESSARY BRIDGES, CULVERTS, &c.) ON THE RIVERTON ROAD  
VIA WALLACETOWN.

96.50 chains of formation and ditching, including the necessary embankments (swampy ground)	-	-	-
36.95 chains of formation and ditching (on high ground)	-	-	-
One bridge having a span of 39 feet in the clear, constructed of two bays, 19 feet each clear	-	-	-
One bridge, having a span of 31 feet in the clear, constructed of two bays, 15 feet each clear	-	-	62,746 12 4
One culvert, 41 feet in length, 3 feet by 2 feet	-	-	-
132.45 chains gravelling, to be thoroughly cleaned (and taken from the Oreti River), and laid on the road 14 feet wide by 9 inches in depth, equal to 25 yards 18 feet cube per chain, with an average lead of 66.28 chains, requiring a total quantity of 3,335 cubic yards	-	-	-



ESTIMATE OF COST OF CONSTRUCTING ROAD FROM BRIDGE WEST  
END OF WAKIWI BUSH, TO CLARK'S CROSSING.

NOTE.---Material can be conveyed from the Mokomoko as far as Clark's Bridge by  
Punts.

Formation, including culverts, &c., 80·44 chains	-	-	} £2,548 11 1
Quarrying 1580 yards rubble	-	-	
Quarrying and breaking 1400 yards metal	-	-	
Conveying by Punt from Mokomoko to Clark's Bridge, 2980 cubic yards	-	-	
Discharging and filling 2980 cubic yards into drays	-	-	
Setting pitchers, 1580 yards	-	-	
Spreading metal, 1400 yards	-	-	

If this road be gravelled, I estimate the cost at---

Formation, &c., 80·44 chains	-	-	} £1,287 0 9
Gravelling (screened), 80·44 chains	-	-	

ESTIMATE OF COST OF CONSTRUCTING ROAD FROM CLARK'S CROSSING  
TO THE ORETI RIVER, SHOULD THE MATERIAL BE OBTAINED  
FROM THE MOKOMOKO.

NOTE.—The formation and ditching are now under contract.

Quarrying 1699 yards rubble	-	-	-	-	-	}	£2,691 3 8
Quarrying and breaking 1508 yards metal	-	-	-	-	-		
Conveying material from Mokomoko, 3207 cubic yards	-	-	-	-	-		
Carting 3207 yards stone	-	-	-	-	-		
Discharging and filling 3207 yards	-	-	-	-	-		
Setting 1699 yards pitchers	-	-	-	-	-		
Spreading 1508 yards metal	-	-	-	-	-		

If road be gravelled, I estimate the cost—

3207 chains of gravelling, same to be thoroughly screened - - - - - £1,042 8 9.

The road beyond Oreti River to Mitchel's is now under contract.

ESTIMATE OF THE COST OF MAKING VIABLE THE ROAD FROM  
RIVERTON TO THE OTOUTOU.

1st. Bridge from Riverton. Approaches require to be made up and gravelled for six chains	-	-	-	-	-	}	£2,228 0 0
2nd. Bridge. Approaches, 10 chains, require to be reformed and gravelled.	-	-	-	-	-		
About 10 chains on the made road, near river, to be made up and gravelled	-	-	-	-	-		
Approaches on both sides of Aparima River—about sixty chains in all—require to be reformed, pitched, and gravelled. The material can be brought up in punts, and discharged near bridge	-	-	-	-	-		
At Gummie's Bush, 12 chains forming, ditching, and gravelling	-	-	-	-	-		

The road from Gummie's Bush to the Otoutou is now under contract, Messrs. Jamieson and Cameron having it as far as Mount Pleasant, and Messrs. M'Neil and Wilson from there to the Otoutou.

**ESTIMATE OF THE COST OF PITCHING AND METALLING THE  
MATAURA ROAD FROM TOWN BELT TO MAVIS BRIDGE WAIOPAI  
RIVER.**

**NOTE.**—It is proposed to pitch the road 16 feet wide with 6 inch pitchers, and metal same 17 feet wide with  $2\frac{1}{2}$  inch gauged metal, to be laid 5 inches thick: viz., 2 stones thick for first coating. These calculations are arrived at in the following manner: That two horses will travel 25 miles, and cost 50s. per day; two horses in drays to take  $1\frac{1}{2}$  yard per load, two horses on tramway to take 10 yards each trip.

Cost of constructing road, if stone is carted with drays:

<i>Pitchers.</i> —Filling and discharging 7492 cubic yards	-	-	-	}	£11,088 5 6
Carting 7492 cubic yards	-	-	-		
Setting pitchers, 7492 cubic yards	-	-	-		
<i>Metal.</i> —Filling and discharging 6650 cubic yards	-	-	-	}	
Spreading metal, 6650 cubic yards	-	-	-		
Carting 6650 cubic yards	-	-	-		
Formation of road, including all culverts, drains, &c., 383 chains	-	-	-		

Cost of constructing road, if stone be conveyed by tramway:

<i>Pitchers.</i> —Filling and discharging 7492 cubic yards	-	-	-	}	£8,572 5 11 $\frac{1}{2}$
Hauling 7492 cubic yards	-	-	-		
Setting pitchers, 7492 cubic yards	-	-	-		
<i>Metal.</i> —Filling, 6650 cubic yards	-	-	-	}	
Discharging and spreading 6650 cubic yards	-	-	-		
Hauling 6650 cubic yards	-	-	-		
Formation of road, including all culverts, drains, &c., 383 chains	-	-	-		
Constructing tramway, 6 miles	-	-	-		
Trams, 20 No.	-	-	-		

Balance in favour by conveying stone by tramway, including cost of same

---

£2,335 19 6 $\frac{1}{2}$





ESTIMATE OF THE COST OF CONSTRUCTING ROAD FROM MAVIS  
BRIDGE (WAIOPAI RIVER), AS FAR AS THE 15<sup>TH</sup> MILE POST ON  
MATAURA ROAD, IF TRAMWAY BE CONSTRUCTED.

<i>Pitching</i> .—Filling and discharging 14,926 cubic yards	-	-	-	-	} £18,944 19 2½
Setting pitchers, 14,926 cubic yards	-	-	-	-	
<i>Metal</i> . — Filling into trams, 13,247 cubic yards	-	-	-	-	
Discharging and spreading 13,247 cubic yards	-	-	-	-	
<i>Pitching and Metal</i> .—Hauling 28,173 cubic yards	-	-	-	-	
Formation of road, including all culverts and drains, 768 chains	-	-	-	-	
Constructing tramway, 9 miles 43 chains	-	-	-	-	
Trams, say (No. 20)	-	-	-	-	
Note.—If the pitchers and metal be carted, the cost will be	-	-	-	-	£55,498 11 4

ESTIMATE OF COST OF WORKS REQUIRED ON ROAD FROM INVER-  
CARGILL TO BLUFF, FROM TOWN BELT, INVERCARGILL, FOR  
ABOUT SEVEN MILES SOUTH.

About 60 chains formation, including culverts, &c.	-	-	-	-	} £1,520 0 0
" " gravelling	-	-	-	-	
About 15 chains constructing corduroy	-	-	-	-	
" " gravelling	-	-	-	-	
About 60 chains formation, including culverts, &c.	-	-	-	-	
" " gravelling	-	-	-	-	
About 10 chains constructing corduroy	-	-	-	-	
" " gravelling	-	-	-	-	
Other works, say £980	-	-	-	-	980 0 0
					<u>£2,500 0 0</u>

ESTIMATE OF WORKS REQUIRED BETWEEN LAKE WAKATIP AND  
THE ELBOW, TOGETHER WITH A PORTION OF THE MATAURA  
ROAD LYING BETWEEN THE ELBOW AND THE THIRD CROSSING  
OF THE MATAURA, BETWEEN SULLIVAN'S ACCOMMODATION  
HOUSE TO THE CROSSING OF THE IRTHING RIVER.

Probable expense of repairing and contingencies	-	-	-	-	£380 0 0
SECTION 2 <sup>ND</sup> .					
From Irthing River to Dome Pass.					
Probable estimate of repairing and keeping road in repair	-	-	-	-	£620 0 0
SECTION 3 <sup>RD</sup> .					
From Dome Pass to third crossing of the Mataura River.					
Probable expense of repairing and keeping in repair	-	-	-	-	£870 0 0
Total	-	-	-	-	<u>£1,870 0 0</u>

THE FOLLOWING IS A LIST OF ROADS THE WORKS ON WHICH ARE RECOMMENDED FOR THE IMMEDIATE ATTENTION OF THE GOVERNMENT.

AN ESTIMATE OF EACH, WITH SCHEDULE, IS HEREWITH ENCLOSED.

The Great North Road,  
 ,, Mataura Road.  
 ,, Riverton and Otantau Road.  
 ,, Bay Road, as far as the Beach.  
 ,, Campbelltown Road.  
 ,, Dome Pass Road, north as far as Rodgers' Station, and south to the third crossing of the Mataura.  
 Dee-street, Clyde-street, and portion of Tweed-street.  
 The Riverton and Wallacetown Road.

THE FOLLOWING IS A LIST OF ROADS, THE WORKS ON WHICH ARE RECOMMENDED AS DESIRABLE FOR EXECUTION, BEFORE THE ENSUING SUMMER.

AN ESTIMATE, WITH SCHEDULE, IS HEREWITH ENCLOSED.

The Mabel District Road.  
 Diversion of the Puni Creek. Estimates not yet calculated.  
 The line of road lying between the Upper Ford of the Aparima and the junction near Groper's Bush. No accurate estimate has yet been made, but from rough calculation £500 is thought will be sufficient.

**LIST OF CONTRACTS WHICH HAVE BEEN LET FOR PUBLIC WORKS  
(EXCEPTING ROADS AND BRIDGES), IN THE PROVINCE OF SOUTH-  
LAND, N.Z., DURING THE YEAR ENDING 31st SEPTEMBER, 1863.**

No.	Description.
91.	Police Station, Dacre.
102.	Powder Magazine, Invercargill.
128.	Paddock clearing, Agricultural Association.
129.	Fencing Government Buildings, Invercargill.
148.	Lock-up and Stable at Dacre.
149.	" " at Riverton.
152.	Fencing Cemetery Reserve, Riverton.
153.	Government Offices, Invercargill.
164.	Post Office, Invercargill. Additions.
169.	Interior Fittings, Court House, Riverton.
170.	" " Campbelltown.
174.	Brick Safe, Invercargill.
175.	Government Offices, Invercargill. Additions.
173.	Police Barracks, Invercargill.
178.	Store Room, Survey Stable, Invercargill.
179.	Six-stalled Stable, Invercargill.
	Pilot House. Repairs.
183.	Filling Police Section, Esk-street.
186.	Pant, New River.
189.	Ditching Cemetery.
192.	Removing Jetty-keeper's Hut.
196.	Fencing Police Section, Invercargill.
	Signalman's Box, Bluff. Repairs.
200.	Fender Piles, Invercargill Jetty.
219.	Cemetery Ditch.
223.	Police Stables, Riverton.
218.	Goal Yards, Invercargill.
223.	Stables, Riverton.
224.	Police Barracks, Winton.
219.	Cemetery Ditches.
215.	Jetty Works, Invercargill.
232.	Temporary Goods Stage, Jetty, Invercargill.
235.	Well at Pound, Invercargill.
222.	Police Barracks, Campbelltown.
	Makerwa Bridge.
246.	Beacon, New River.
243.	Court House, Campbelltown.
225.	Police Barracks, Gore.
249.	Cemetery, Invercargill.
250.	Fittings, Supreme Court.
247.	Boat for Oreti.
254.	Fittings, Police Barracks, Invercargill.
255.	Fencing Government Buildings, Invercargill.
256.	Beacon, New River.
262.	Cook House, Police Barracks, Invercargill.
252.	Privies, &c., Government Buildings, Invercargill.
243.	Telegraph Posts.
270.	Cemetery Ditch.
272.	Signalman's Box, Bluff.
274.	Box Drain, Police Barracks, Invercargill.
281.	Fencing Hospital Reserve, Invercargill.
285.	Pilot House, Bluff.
286.	Custom House, Invercargill.
283.	Platforms for Metal, Great North Road.
290.	Removing Earth Cemetery.
291.	Wells and Pumps, Government Offices, Invercargill.
292.	Platform for Goods, near Jetty, Invercargill.
295.	Well-sinking, Government Offices, Invercargill.

NOTE.—An estimate of Public Works required to be executed in the ensuing year will be furnished on information being given by the Government as to the nature and extent of such works.

HAROLD H. FENTON,

Provincial Engineer,

Southland.

31st September, 1863.

## SURVEY REPORT.

SIR---I have the honour to submit herewith a tabular return, showing the nature and amount of the work performed by this Department, and under its direction, since October 30th, 1862, with the cost of the several blocks as far as it is possible to make them up. The *remarks* in the last column will, in a great measure, explain the differences in the expense of the blocks; thus the heavy cost of Mr. Weetman's Block, in the New River Flat, is by no means to be laid to his charge. The survey was necessarily tedious and expensive from its nature.

There are an unusual number of Blocks in an unfinished state, of which the cost cannot yet be ascertained. Every effort was made to continue the surveys in the field throughout the winter, and three officers continued in the uninterrupted pursuit of their duties: but in the month of July several districts became so flooded that survey was impossible, and two surveyors had of necessity to come in, and another to shift to higher ground. The former officers, Messrs. Baker and M'Arthur, were immediately employed on other work, in situations less dependent on season, namely, the survey of the New River Harbour, of the Township of Stanley at Mokomoko, and of the townships and reserves on the road to the Lake. These interim works are not yet finished; thus they have both two sets of incomplete surveys on hand.

I am convinced that the quality of the work performed will compare favourably with any ever executed in the colony. The cost may be thought rather high; but when due allowance has been made for the high price of labour, provisions, and supplies of all kinds and of carriage, I trust that it cannot be considered extravagant; still, I hope that in future years some improvement may be effected under this head.

It will be seen that a large amount of work has been done by contract. For reasons which I explained in a previous report, I think that it is very undesirable to perform survey work by contract, unless the whole were so done on a regularly organised system; but under the circumstances which occurred in the past year, it was found impossible to avoid it. I had always hoped to be able to employ a senior member of the staff in extending the triangulation, but towards the end of summer I found that none of the officers could possibly be spared from the occupations they then had in hand, while it became daily more urgently necessary to push forward the surveys, in

order to meet the constantly increasing demand for land, which could only be satisfactorily done by extending the triangulation to the slopes of the Hokanui Hills before winter.

I felt that it would not be proper to subject work of so much trust to the chance of public competition by tender. I, therefore, reluctantly, but fortified by your Honor's approbation, engaged Mr. G. Müller, in whom I possessed great confidence, to execute the work at 2d. per acre. Its performance has been on the whole excellent; it is not yet quite closed, some of its details being now under examination and discussion; but I have no doubt that the minor exceptions I have taken will be satisfactorily dealt with by Mr. Müller.

This triangulation has not only allowed the block surveys to proceed satisfactorily in the Winton, Mabel, Lothian, and Lindhurst Districts, but it has made a most satisfactory closure with three former triangulations, and cleared up a perplexing difference of meridian which existed between them.

The section surveying, which has been done by contract made since October last, is limited to three small blocks, comprising many sections which had been sold long ago, and of which the owners could not obtain satisfactory possession from want of survey. It was felt to be unjust to postpone their claims any longer, and the surveying these blocks was advertised for tender. The prices demanded were high, and the delay in executing the work has been considerable.

Three other blocks at Campbelltown, and three at Jacob's River, also consisting chiefly of sold land, are now under survey, and I trust in less than two months to have all these old arrears cleared off. One block at Jacob's River, Block VI., was entered in the return to my last report as re-surveyed, but the survey has proved to be too incomplete to be final, and it still has to be finished by another officer.

The *personnel* of the staff has undergone considerable changes in the course of the year. One member of it, Mr. Gamlen, was drowned in Jacob's River in April; an irreparable loss to myself, and a sensible one to the Department, as he was an officer of great promise and trustworthiness.

It was necessary that the work left by Mr. Gamlen should be immediately proceeded with, and I was fortunate in obtaining the services of Mr. J. Haughton, a surveyor of great experience. He

afterwards became particularly valuable in the preliminary reconnaissance for the Northern Railway. While engaged in this, he received the offer of an appointment in another colony, and to my great regret he left the Department in August, as soon as he had finished the flying levels for the railway.

Mr. C. Maling joined the staff in November, 1862, and Mr. S. Weetman in February, 1863. Both have proved useful and valuable officers.

Mr. Clement Johnston has joined quite recently, and the necessity of pressing on the Northern Railway and other works has made it desirable further to strengthen the staff. Mr. Butler and Mr. Brown have accordingly been employed on the railway survey within the last few days; and if that work goes forward, the former will probably be continued for some time at least as an engineer on it.

Mr. Aitken has been so long detached from the Department that it is not desirable that his name should any longer be retained on its apparent strength.

The office establishment of senior and junior draughtsmen remains the same, with the addition only of a lithographic printer. The two first are very heavily pressed with work, and occasionally further assistance is required. The efforts now being made to supply the public with lithographic maps throws much additional work on the office. Mr. M'Gowan has also undertaken to record the meteorological observations, but it has been found that to work out all the results, and to fill up all the papers supplied by the General Government, would, in fact, occupy several hours in each day, and this, with the other duties of the office, is absolutely impossible. He has been obliged, therefore, to limit his duties under that head to simply recording the reading of the various instruments twice in each day. I should be very glad if he could be relieved altogether from this duty, and, if it could be, transferred to some one having time to devote himself to the subject, and to follow it up with undivided attention and interest.

The office department will undoubtedly require to be strengthened this year. I think that the way to do so will be to add to it a clerk, so as to leave Mr. Stevens and M'Gowan free to attend solely to the survey work, which they have thoroughly mastered.

The necessity of supplying the public with maps, especially of the new surveys, involves the establishment of a litho-

graphic press. I was fortunate in being able to do this very satisfactorily, and to obtain the services, as printer, of Mr. James Hughes. It will take some time before complete district maps can be issued, owing to the many changes in the surveys; but the maps of the blocks and of the hundreds which are now issuing, will, I think, be a great convenience to the public. The spare time of the printer will be fully occupied in printing forms and documents for other Departments, which will effect so considerable a saving that I hope that the establishment will be nearly self-supporting. A map of the Province was sent some time since to Melbourne to be lithographed, and one on a large scale, embracing a radius of twenty miles round Invercargill, was sent to London to be engraved. The copies of both are now nearly due.

The work which the Department has now before it consists of:

1st. The survey of the blocks and broken remnants of land which have been left unsurveyed within the settled districts, especially on the Bluff Road, and the re-survey of Jacob's River Hundred. These will, as I before said, be completed in about two months, for which time they will occupy three surveyors.

2nd. The continuation of the triangulation, on which I propose that one surveyor at least, with a strong party, be permanently employed.

3rd. Blocks of new land, of which at least 100,000 acres ought to be laid off in the course of the ensuing year. This will include the greater portion of the new Hundreds of Aparima and Mataura, both consisting of exceedingly choice land, likely to be eagerly demanded by the public; several blocks at the north extremity of Jacob's River Hundred, and beyond it on the east bank of the Aparima River; some also at the other end of the Oreti Plain, north of Spar Bush. These, with the remainder of the Winton and Mabel Districts, and portions of the Lindhurst and Lothian, will more than make up the area I have designated.

Lastly. And, lastly, it is likely that townships and small detached agricultural settlements may be demanded towards the north of the Province, and many miscellaneous works connected with the survey are certain to arise from time to time; such, for instance, as the Northern Railway at the present time.

To keep pace with this large amount of work, it will be necessary that at least seven surveyors should be constantly in the field; and it may,

therefore, be well to make provision for eight on the staff. Of these, it is desirable that three at least should be of the grade of assistant surveyors.

There is at present no member of the staff on this senior grade, but there are several whose experience well fits them for it. By being able from time to time to promote those officers who show most aptitude, I hope to sustain and increase that spirit of perseverance, of energy, and of good feeling, which are essential to the well-being of such a Department, and which I am happy to think has hitherto characterised the staff.

I have the honor to be, Sir,

Your most obedient servant,

THEOPH. HEALE,  
Chief Surveyor.

#### PROVINCIAL HOSPITAL, INVERCARGILL.

Sir—I have the honour to forward for your Honor's information, the Second Annual Report of the Medical Department for the year ending 30th September, 1863, with the returns of the number of out-door cases, and the patients who received medical treatment in the Provincial Hospital and Invercargill Gaol, during that period.

In making this report, I must, in justice to myself, call your Honor's attention to the very limited accommodation that has been at my disposal for the in-door treatment of the sick during the past year: a room of the Immigration Barracks, with space for four beds, being my only permanent ward, in which had to be transacted all the duties connected with an Infirmary. Occasionally I have had the use of the single men's compartment, but it was, from its interior arrangements, of very little service for the majority of the cases seeking admittance, as I have appropriated the beds chiefly for surgical cases; it was also objectionable as, being part of the Barracks, the patients were subjected to numberless inconveniences, when the main building was occupied by the immigrants; a large number of whom have arrived in the Province within the last twelve months. The ground in the vicinity not having been properly drained until lately, the *scourage* accumulated around the building, emitting gases most prejudicial to the sick under my care, so much so, that a tent erected during the fine weather for extra room I was forced to remove, as my utmost efforts could not prevent an in-

crease of mortality. From many causes now ended, I have not been able until now to procure proper Hospital attendants, and have had to select them from the list of convalescent patients. The present cook was a patient, whom I trepanned for fracture of the skull some eighteen months ago.

The number of patients, both in-door and out-door, who received medical treatment since September, 1862, greatly exceeds that of the preceding year, attributable to the large increase of the population, both settled and in transitu to the goldfields. The impediments I have enumerated in connection with affording requisite Hospital aid, will shortly be at an end; the new Institution being nearly completed, will contain all the requirements of a home Infirmary. It will give accommodation to forty patients in large well-ventilated wards; have a matron and dispenser's rooms, dispensary, baths, operating theatre, and the necessary out-offices. Surgical instruments and medicines have been ordered from England, it being my intention to dispense in the Hospital, for the reasons I submitted to your Honor, and which received your approval. I have engaged a dispenser, who has had eleven years' hospital experience, and is competent to perform all the minor operations should the occasion require it. A matron is engaged for the female wards.

I have much pleasure in stating that the year just ended has been very healthy, no epidemic having appeared in the town, contrary to expectations, the two last immigrant vessels having arrived with typhoid fever and small-pox respectively on board. The prophylactic and successful means used to stay the spread of these maladies I have already detailed in my reports as Health Officer.

I have to acquaint your Honor that my duties are daily increasing, and the greatest part of my time is engrossed by them, to the injury of my private practice, and would respectfully request that a Resident Surgeon be appointed to relieve me of part of them; no other alteration is necessary at the present time. I would also propose that in case the question of a Benevolent Asylum should arise, it be a distinct and separate charity, as its amalgamation with the Hospital would materially interfere with its efficiency.

I have the honour to be, Sir,

Your Honor's most obedient

Servant,

WILLIAM GEORGE M'CLURE, M.D.,  
Provincial Surgeon.

**Return of the Number of Patients Treated in the Provincial Hospital, Invercargill,  
for the Year ending 30th September, 1863.**

Race.	In Hospital, 30th September, 1862.	Admitted from 30th Sept., 1862, to 30th Sept., 1863.	Discharged from 30th Sept., 1862, to 30th September, 1863.	Died from 30th Sept., 1862, to 30th Sept., 1863.	In Hospital, 30th September 1863.
European and others.	Males ..... 3	Males ..... 92	Males ..... 82	Males ..... 8	Males ..... 6
	Females ..... 0	Females ..... 1	Females ..... 1	Females ..... 0	Females ..... 0

**Total Number of Patients Treated in Hospital from 30th September, 1862, to 30th  
September, 1863.**

In-patients .....	95
Out-patients .....	64
<b>Total</b> .....	<b>159</b>

**Return of Names and Diseases of Patients who died in the Provincial Hospital,  
Invercargill, during the Year ending 30th September, 1863.**

Names.	Date of Admission.	Date of Death.	Observations.
Harry Bridge .....	March 14th, 1863.	April 25th, 1863.	Dysentery.
John W. Bridge .....	March 25th, ..	April 25th, ..	Ascites and Hepatitis. F. N. G.
William Harrison .....	June 18th, ..	July 15th, ..	Dysentery and General Debility. Sent by steamer from Riverton in a very low state.
Leslie Warner .....	June 18th, ..	June 18th, ..	Hæmatemesis. No history of case. A Negro.
Frederick Bird .....	June 20th, ..	August 31st, ..	Phthisis Pulmonalis, in last stage. Sent by Dr. Des- sham, of Riverton.
George Lewis .....	July 25th, ..	August 4th, ..	Hepatitis.
Wm. McClenahan .....	August 3rd, ..	August 8th, ..	Admitted Comatose, with Paralysis of lower extremities.
Edward M. Loughlin .....	July 25th, ..	Sept. 29th, ..	Phthisis Pulmonalis. Seaman from T. E. Millidge. Ill since leaving Scotland.

**Return of the Number of Prisoners Treated in Invercargill Gaol, from the 30th  
September, 1862, to 30th September, 1863.**

Males .....	76	Females .....	3	Total .....	79
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**Return of the Total Number of Patients who received Medical Treatment during  
the Year ending 30th September, 1863.**

Provincial Hospital - In-patients .....	95
Out-patients .....	64
Invercargill Gaol .....	79
<b>Total</b> .....	<b>238</b>

WILLIAM GEORGE MCCLURE, M.D.,  
Provincial Surgeon.

Harbour Office, Invercargill,  
23rd September, 1863.

Sir—In accordance with your Honor's instructions, I now beg to send the following statement of the improvements made in the Harbour during the last twelve months.

*Signal Staff (outer).*

A Signal Staff, ninety feet in length, erected on Steep Head, and a weather-board house for the Signalman, twenty feet by twelve, having two apartments: Signalman provided with Marryatt's code and signals, tidal signals, and telescope.

*Inner Flagstaff.*

An Inner Flagstaff, seventy feet in length, for transmitting signals from Steep Head to Pilot Station, and the contrary; provided likewise with Marryatt's signals, book, and spyglass; a small house, six feet by six, as a temporary shelter for the Signalman.

*Triangular Beacons.*

Two triangular beacons for leading vessels over the bar, thirty-two feet in length, side of square at base, thirteen feet, at top three feet.

*Pilots' House.*

Pilots' house re-built, twenty-three feet by fifteen, having two apartments.

*Boatmen's House.*

Boatmen's House enlarged, fifteen feet by thirteen.

*Cook-house.*

A cook-house, fifteen feet by ten.

*Boat-shed.*

A boat-shed, thirty-six feet by twenty-two.

*Pilot Boat.*

A new pilot boat, twenty-eight feet.

*Buoy Boat.*

A carvel-built boat, capable of carrying six tons, for the purpose of laying down and lifting anchors, &c.

*Beacon.*

An iron beacon, fifteen feet high, on Bantley rock (not entirely completed).

*Buoys.*

Nineteen additional buoys have been placed on the sides of the channel between the bar and anchorage for large vessels (i.e. red buoy); seventeen of these are of iron, moored to mushroom anchors, and two of wood, moored to pieces of kentledge.

*Piles.*

Six piles, twenty-two feet by ten inches, driven into the sand, showing the line of channel round the Mokomoko Bend.

*Wooden Buoys.*

Seven buoys of wood, placed on the sides of the channel above the red buoy, and the mid-channel buoys from sea upwards removed to the sides, and painted black or white, as the other buoys.

*Dolphins.*

Three dolphins, placed at low-water mark on the west bank, have been erected for the purpose of mooring vessels to while being discharged at the upper anchorage (the Pool).

Six dolphins, of similar construction to the above-mentioned have been placed in situations convenient for vessels in being hauled to and from the wharf, anchors and kedges having been formerly used for that purpose.

*Wharf.*

The platform at the outer end of the wharf has been extended, making at present the outer frontage ninety-two feet, in place of forty-two, as formerly. The doing of this has necessitated the removing of one hundred and fifty tons of mud from the east side of the platform to make a passage for lighters to the wharf, through a bank of mud formed along its south side.

The wharf itself, along its whole length, has been extended in breadth ten feet; two T's of about fifty feet by twenty-eight each, run out on its south side; the available frontage for vessels faced with fender piles; and three lamp-posts, with lamps burning kerosene oil, erected on it, besides various other improvements of minor importance.

The other alterations on the wharf, such as the store at its inner end, a double line of iron rails, and additional waggons, I shall only thus advert to, as these do not properly come within the compass of this report.

*Pilots.*

Three Assistant Pilots have been appointed: one at the lower station, and two at the Upper Harbour, and an Assistant Harbour-Master, who, having been formerly an Assistant Pilot, can act as Pilot in case of need.

*Boatmen.*

Five Boatmen have been appointed, four of whom are stationed at Upper Harbour, and one at Pilot Station.

The following items are in the course of construction:—

*Semaphores.*

Three Semaphores, to establish a line of communication between Steep Head Flagstaff and the town; one to be placed at Inner Flagstaff, one at Sandy Point, and one at reserve southward from the wharf.

*Boats.*

A new Pilot Boat, of same construction as is used on the coasts of Northumberland and Yorkshire, North of England.

*Piles.*

Eighteen piles, cut for the purpose of being driven into the bank along the sides of the channel, Upper Harbour.

*Anchors.*

Twelve mushroom anchors, with chains, reserved, and forthwith to be made use of.

*Buoys.*

Six iron buoys ordered, but not yet delivered, which will be sufficient to complete the buoying of the channel.

I have the honour to be, Sir,

Your obedient servant,

J. B. GREIG,  
Harbour-Master.

Invercargill, 23rd Sept., 1863.

Sir—I beg thus to lay before your Honor, as directed, a statement of the further improvements which I think this Harbour stands in need of, viz. :—

*Additional house room for the Pilots.*

At the Station, four Pilots are living in one house (23 feet x 15 feet—two apartments), two of them having wife and family each, although these do not yet reside at the Station.

House at Sandy Point to accommodate Signalman, two Pilots, and two Boatmen.

House on reserve below the Jetty to accommodate Signalman, one Pilot, and two Boatmen.

Breakwater run out at Pilot Station about seventy feet, with curve at outer end to protect the boats from the surf while being hauled up or launched.

Moorings laid down above Pilot Station, in consequence of the shallowness of the channel, a little further up, not admitting a vessel drawing over fifteen feet to pass at high water ordinary tides. Such vessel could remain at the moorings until lightened. It would likewise be a convenience for the mail steamer until the channel got deepened. The moorings

would consist simply of a chain stretched across the channel, the inner end secured to a rock, the outer end to an anchor embedded in the sand, backed by a strong framework loaded with stones. At mid-channel, made fast to this chain, would be a short piece of chain, of about ten fathoms in length, to which the vessel would ride. To get hold of the end of this chain, a small chain would be made fast to it, the end of which would be floated up by a small buoy. A hundred and fifty fathoms of two-inch chain, strong swivel, and two-ton anchor, would be required.

The old channel is now closed up a little below the Bombay Rock. No channel through the sandspit, were such to form, could remain permanently open; and even the old channel, were it to open of itself again, could it be counted on to remain so for twelve months, unless the whole current of water downwards was caused to pass through it. This, so far as my judgment goes, can only be effected by making an obstruction to the water passing out to sea between that part of the channel opposite the Bombay Rock and the point of sand above it. Could this be done, it is obvious that a permanent channel would be opened of not less depth than eighteen feet at low water, and from twenty-nine to thirty feet at the highest tides along its whole length to the bar. The effect this would have on the bar I will not pretend to determine, but I do not see that it could in any way tend to lessen the depth of water there: rather, I should think, the contrary.

The insufficiency of berthage room at the wharf for vessels drawing eight feet water, is a source of great inconvenience. The steamers *William Miskin* and *Titania* take up nearly the whole face of the platform, which is only ninety-two feet, and there is scarcely a vessel which comes to the wharf but has to be removed for the convenience of these steamers. In place of ninety-two feet, a hundred and eighty feet of available frontage for vessels drawing eight feet would be quite little enough, as it sometimes happens that vessels over a hundred feet in length are discharged at the wharf.

The mud bank formed along the south side of the wharf is a serious obstruction to lighters in getting to it; but it would be an expensive matter getting it removed, and I believe money would be spent to better purpose in extending the platform downwards in the line of the deep water channel.

The necessity for having a powerful steam-tug will increase as the trade to

the port increases, independent of the state of the channel. A tug of eighty or a hundred horse-power would certainly answer better than one of less power, as it could tow two or three vessels at one time; but I do not here so much recommend having a powerful tug (looking at the present commerce of the port) as having a handy tug to tow vessels into and out of the harbour in calm weather, which, with few exceptions, is the only time there is really any danger in coming into or going out of New River.

The Pilot Service (viz., at Pilot Station, senior Pilot and three assistant Pilots, nine Boatmen, and three boats; at Upper Harbour, two assistant Pilots and Assistant Harbour-Master, who acts as Pilot in case of need, four boatmen and two boats), as it is, should be—having the services of a steam-tug—sufficient for the present trade in shipping; but any important increase in this, would necessitate an increase in the number of Pilots; probably not over three additional Pilots and two Boatmen.

The idea of having a Pilot Cutter cruising in the Straits, is, I think, premature. It would be found to be a very expensive and a not very efficient piece of machinery in so far as regards New River.

It will be necessary to appoint two Signalmen, one at Sandy Point, one at Upper Semaphore.

I have the honour to be, Sir,  
Your obedient servant,

J. B. GREIG,  
Harbour-Master.

To His Honor the Superintendent.

Sir—The Campbelltown Road having by your desire remained under my general direction, I beg now to report progress upon it.

The works executed and in progress consist—

1st. Of a number of outfall and other drains which were cut last year under sundry contracts, numbered in the margin, having for their object the drainage of the great swamp through which the Bluff and Invercargill Railway, as well as the high road, eventually to run between West's Reception House and Mokomoko. It was absolutely necessary to cut these drains before even the survey could be properly executed. They have answered the purpose well, and the

Railway Contract, now in course of execution, includes the making of this portion of road, and of all further drains and culverts required.

2ndly. The Contract (No. 196) of Messrs. Greville, Whiting and Co. for constructing the road over the Mokomoko Hills.

This Contract involved a great deal of heavy work; all the more serious from its having been the first of the kind ever undertaken in the Province. A great portion of the road is carried over peat moss, and part was in deep rock cutting. On the whole, the work has been satisfactorily performed—very much so, considering its cost. A balance of £150, claimed for sundry extras in cutting additional outfall drains, making temporary road for Campbelltown traffic, &c., &c., remains still unpaid in consequence of the omission of the contractors as yet to cut proper side drains. It should be understood that this contract only included rough bottom metal. When the road is opened throughout, it will be necessary to re-metal this contract with a light coat of fine metal.

3rdly. Contract (No. 203) set to Messrs. Campbell and Co., extending from M'Hardies's Cove to Archie's Bay.

The contractors pushed the work on this contract with great rigour at first, but when the wet weather of winter set in it became obvious that any attempt to proceed with the work would permanently injure it. I therefore, readily assented to its postponement until spring. I have had a good deal of correspondence with Messrs. Campbell, Robertson and Co., and have lately called upon them immediately to make good some defects in parts of the work performed. It will make an excellent road when finished, though some portions of the work performed are not in a very satisfactory condition.

4thly. Contract (No. 278) recently set, continuing the road from the end of Contract (No. 203) to where the present temporary road from Campbellton meets the beach.

This work is in active progress, and will probably be completed as soon as the last-named contract, say three months. There will be then a continuous metalled road from the head of the Bluff Bay to within a little more than a quarter of a mile from Campbelltown, this latter part being quite passable for wheeled vehicles.

In the town of Campbelltown a good deal of work has been done, partly by contract and partly by working parties of the newly-arrived immigrants. By the last a great part of Gore-street was formed, including some considerable sand raising. They have also made and from time to time repaired the temporary track on the beach by which the mail has been enabled to continue running without interruption.

It was found, however, that these road parties are very undesirable, and on the arrival of the New Great Britain, I gladly engaged with Messrs. Berndtson & Ott for them to metal ten chains of the road at £13 per chain, taking all the immigrants off the hands of Government. The same party has now contracted for the remainder of the metalling (Contract No. 296), with the same condition of employing those of the newly arrived immigrants who require work.

Another working party was hastily sent, in the course of the winter, to repair the road at the rising from the Mokomoko

Beach, where it had become so bad as to be unsafe. It was found necessary to extend the work far beyond what was contemplated, so that the party has been only very recently discharged.

These, with one small contract (No. 236) for improving the temporary road from the Terrace to the New River Beach, and one (No. 198) for diverting the road where an angle of it crossed the railway, embrace all the work which has been performed. The contracts now existing provide for the completion of the road from the point to which it is already formed and gravelled, namely, beyond West's down to Campbelltown, with the exception of M'Hardie's Cove, and the small portion at the Campbelltown end. The former will require an embankment, the latter is on perfectly easy ground with abundance of stone at hand.

I have the honour to be, Sir,  
Your most obedient servant,

THEOPH. HEALE.

