1908

NEW ZEALAND.

OPUNAKE-ELTHAM AND OPUNAKE-STRATFORD RAILWAY ROUTES

(REPORT OF ENGINEERS WHO SURVEYED THE).

Return to an Order of the House of Representatives dated the 21st August, 1908.

Ordered, "That there be laid before this House a report of the Engineers who surveyed the Opunake-Eltham and Opunake-Stratford Railway routes."—(Mr. OKEY.)

REPORT.

Public Works Department, Wellington, N.Z., 30th July, 1907.

Opunake Branch Railway.

Under-Secretary.

THE country between the railway-line from Hawera to Stratford and Opunake consists of a plain sloping down from the mountain. Where the several routes cross it this slope will average perhaps 1 ft. per chain. There are a great many watercourses, as might be expected, rising on the slopes of the mountain and falling into the sea. These streams converge in their courses so that the nearer any road or line is situated to the mountain the more numerous will be the bridges and culverts required. Near the sea-coast the plain has not very much fall, and ends in cliffs. The rivers have cut down through the cliffs to sea-level, so that it is not easy to construct a line anywhere near the coast-line on account of these rather deep valleys. The same thing happens towards the mountain, where the rivers run in gorges formed by spurs rising towards the mountain from the flatter country. In between these two belts there is a belt in which the rivers have very shallow valleys, and it is across this belt that the Eltham and Te Roti routes have been surveyed. The best country is near the sea, the quality deteriorating towards the mountain. It is therefore from the coast belt that the most traffic for a railway will be derived.

Many years ago, when the country was being laid out as a settlement, a reserve for a railway was made, extending from near Eltham right through to Opunake in almost a straight line. This route is situated a little too far to the north to serve the country generally in the most efficient manner; accordingly another route about a mile and three-quarters to the south has been surveyed, which is known as the Te Roti route, as it joins the present open line at Te Roti Station. This route is the most central, it is the shortest, and it is also the cheapest, and, besides, as the bulk of the carting which will be derived along the sea-coast will be uphill, the line should be to the southward rather than to the northward, in order to shorten the carting-distance. Any produce to be carted from the country north of the line will be on a descending grade, and can therefore be carted further at the same cost.

The Te Roti route, being on all points the most suitable to serve the interests of the district, and the one most likely to receive the greatest amount of traffic, is recommended for adoption.

There is only one feature about the route that might call for amendment, and that is, the line where it joins the open line should tend to convey produce by the shortest route to the nearest main seaport, which is New Plymouth.

A line could be run from the 20-mile point at the crossing of Hastings Road northwards towards Eltham; but it would entail an additional mile of new line, and, besides, would run nearly parallel to the present open line. The junction should therefore be formed at Te Roti Station in such a manner that trains could run towards New Plymouth and Hawera without the necessity of shunting.

30th July, 1907. R. W. Holmes.

The estimates of the various routes should be increased by 15 per cent. to allow more for contingencies and for engineering and management. They will then stand in round figures as follows:—

	£
Stratford route	222,000
Hawera ,, ...	183,000
Eltham ,, ...	173,000
Te Roti ,, ...	153,000

Public Works Department, Stratford, 19th July, 1907.

Proposed Opunake Branch Railway.

Memorandum for Engineer-in-Chief, Public Works, Wellington.

I have to report as follows on the above railway. Three routes have been surveyed and one examined, descriptions of which and estimates of cost, together with map of district showing location of lines, are attached.

Route.	Length.	Estimated Cost. £
Stratford	About 26½ miles	192,900
Hawera	,, 26 ,,	158,670
Eltham	,, 23 ,,	150,000
Te Roti	,, 22 ,,	133,000

The land bounded by the main line of railway, the slopes of Mount Egmont, and the sea, is the area a branch railway to Opunake is required to serve. It is mostly of excellent quality, and capable of being highly cultivated. Generally it may be said to be richest near the coast, and to gradually diminish in quality towards the mountain. As this country is most suitable for dairying it is principally being used for that purpose, and is closely settled. Hence the location of a railway should be such as to be as nearly as possible within reach of all of it.

This the Te Roti route fulfils, and on reference to the map herewith it is seen by the zone-lines in dotted sienna that nearly the whole of the country is within six miles of it or the main line.

It appears to me therefore that it would be the best line to construct. Furthermore it is the shortest, involves less haulage than the others, junctions with the main line at a station, and would cost the least of all the routes. If it is desired to duplicate the main line to Hawera, it could be done at small cost, the formation-work required being mostly light.

The townships of Manaia, Kaponga, Makaka, Punehu, Pihama, and other closely settled parts could be connected with the line by light horse-tramways along the road-lines, if found desirable, and dairy-factories and creameries located or removed as would be most suitable.

By constructing either the Stratford or Hawera routes a large area of the country which is already within easy access of the main line, and which is the best-roaded, would be gone through, and much of the best land either to the north or the south would not be served.

The Eltham route is located too far north to bring all the country within equal distance of a railway. It may be objected that a reserve for this route has been made; but I think it would be readily sold to adjoining landowners, and thereby reduce the cost of the land required for the Te Roti route to £275 (as per my estimate).

G. L. Cook,
District Engineer.

Opunake Branch Railway.

Te Roti Route.

This route branches off the main line at the Te Roti Railway-station, situated about seven miles north of Hawera Township, and about four miles and a half south of Eltham, and traverses the country due west for a distance of about 14½ miles, where it curves slightly northwards, and thence runs in a straight line to Opunake Township. The line for the most part is located parallel to the Eltham route, about a mile and three-quarters further south.

A trial survey was made under the direction of Mr. Furkert, traverse-lines being run and levels taken along them throughout, also cross-sections in places. The plans have been graded and prepared by me.

The permanent location would be mostly straight, and the levels would not differ materially from those for the trial line. From Te Roti for a distance of about two miles the location would be approximately as shown by a full burnt-sienna line on plan and section. Between 14 m. 30 ch. and 15 m. on the survey chainage a departure from the straight as shown might be necessary, but further survey would show if the straight line need be departed from. Between 0 m. 15 ch. and 0 m. 65 ch. the dotted line would give a better section than the trial survey, and between 12 m. 10 ch. and 12 m. 57 ch. the straight line can be adhered to.

The country which the line traverses is of the same formation as described in my report for the Eltham route, and the remarks made in it *re* waterways apply equally to this route, the same streams being crossed, but for the most part with lower heights between stream-beds and formation-level.

The estimate herewith is based on the quantities supplied from Wellington; but allowances and various amendments have been made, as was necessary in the case of the Eltham route. Provision is made for the purchase of land, credit being taken for the sale of the reserve for the Eltham route. The length of the line is about twenty-two miles, and generally the earthworks are considerably lighter than those of the Eltham route.

Stratford Route.

This route branches off the main line about three-quarters of a mile south of Stratford Railway-station, near the boundary of the township, and traverses the country in a south-westerly direction in a direct line for about eleven miles, where it joins the Eltham route.

A trial survey was made under the direction of Mr. Furkert, traverse-lines being run and levels and cross-sections taken. The plans have been graded and finished by me. The permanent location would be a straight line or nearly so, and the levels would not differ materially from those of the trial line, as there is little or nothing to be gained by departing far from the surveyed lines.

The country traversed, being closer to the base of Mount Egmont than the Eltham route, becomes undulating and ridgy owing to the convergence towards the mountain of the numerous streams which are crossed by all the lines. Hence the earthworks are of a heavier character than on the Te Roti and Eltham routes, necessitating longer culverts and higher bridges. The cuttings would be of the same nature as on the Eltham route, but probably harder materials would be met with in the larger ones.

The estimate herewith is based on the quantities supplied from Wellington, but amendments have been made as was necessary. Provision is made for the purchase of land, credit being taken for the sale of the reserve for the Eltham route.

It would probably be necessary to duplicate the line from the railway-station to the junction, a distance of about 60 chains. The work would be light, excepting the crossing of the Patea River, which, however, might not be necessary, being situated close to the station points.

The length of the line from Opunake to Stratford Station is about 26½ miles, and the earthworks on the eleven miles between Stratford and the junction with the Eltham route are mostly heavy.

Hawera Route.

This route branches off the main line at Hawera Railway-station, and traverses the country in a north-westerly direction and nearly in a direct line for about twelve miles, until it joins the Te Roti route.

A trial survey has not been made, but the line has been examined and sufficient survey made to ascertain the feasibility of crossing the Waingongoro River, which would be done somewhat as shown on plan. The formation would be of much the same character as the Te Roti line between the main line and junction with this route, but there would probably be some heavy earthworks involved for a mile or more in crossing the Waingongoro Valley. The bridges and culverts would be much the same as for the Te Roti route, and the cost per mile of constructing the line might be estimated at the average cost of that route, excepting as to the cost of land, which would be greater, as the line goes through some of the best land in the district, and involves compensation for severance, and for which a sum of £1,500 is added.

The length of the line from Opunake to Hawera Railway-station is about twenty-six miles.

ELTHAM ROUTE.

(Copy of my report of the 18th April, 1907.)

This route branches off the main line at a point about a mile and a half south of Eltham Station, and thence traverses the country in a straight line due west, along a reserve made when the land was being surveyed into sections, to Opunake, a township on the west coast.

A survey was made under the direction of Mr. Furkert, traverse-lines being run and levels taken along them throughout, also cross-sections in places. The plans have been graded and finished by me. The traverse-lines shown in black on plans zigzag about the 2-chain reserve, instead of being run parallel to the boundaries—which was done to avoid the felling of trees and cutting of scrub—and in places where any difficulties appeared to be likely the traverse was made outside the reserve in view of avoiding them.

The line as located on plans is a straight line coloured red along the centre of the reserve throughout. The section along this line is indicated in black where there is no material difference in levels of the ground as taken along traverse-lines and those of the location-line; but where difference occurs the section is shown in red. Between 20 m. 13 ch. and 20 m. 68 ch. an alternative line is shown in green located outside the reserve, which might be cheaper to construct than the red line, but requires more survey and examination on ground to decide upon. From 21 m. 40 ch. to about 22 m. 50 ch. another alternative is shown, by which the line is continued along the centre of the reserve to where it (the reserve) ends, and thence along same straight line to curve to left for entering station ground. This would probably be slightly cheaper to construct than the red line, would avoid purchase of land outside the reserve, and is a better alignment. Other than the alternative above mentioned (from 20 m. 13 ch. to 20 m. 68 ch.), which is of doubtful advantage, there appears to be no sufficient reason to locate the line outside the reserve.

The country which the line traverses is volcanic formation, and probably it will be found that the materials in the cuttings will be tufa and trachytic boulders, grit, and cement. The earthworks generally are light, and present no particular difficulty, but owing to the numerous streams which cross the line, and which mostly have their origin in Mount Egmont, and to the heavy rainfalls which frequently occur on and around it, extraordinary provision for waterways is necessary. Hence the construction of bridges and culverts is a very large item of the cost.

Herewith is estimate of cost of constructing the railway. In regard to this estimate the quantities sent from Wellington have been revised carefully.

Provision is made for the purchase of land at the junction and Opunake ends of the reserve, also for the contingency of land being required outside the reserve for creek-diversions, roads, &c.

The fencing has been reduced in quantity, as one side of the reserve is fenced, and a sum has been put down to put it in good order.

The earthwork quantities sent here have been taken out on the section of the traverse-lines instead of on the red or location line, but the difference has been adjusted. In the rough estimate sent the cuttings only were put down, whereas the quantity should be the number of yards required to form the embankments, with allowance for shrinkage and loss through washing away, &c., which would be from 8 to 10 per cent. This has also been adjusted.

Provision has been made for earthworks in station grounds and service tracks, and for grubbing, stumping, &c., which was not included in quantities supplied.

Another station, making seven in all, has been estimated for, as one will be required at about 19 m. 55 ch. when the Waiteika Road is formed.

Culverts and bridges are put down as per quantities supplied, an item for protection of toe of slopes at bridges being added.

In quantities supplied for ballasting and metalling no provision was made for the work at station sidings, grounds, and approaches. This item has been increased accordingly. The quantity of ballast for the main line makes no allowance for extra required through subsidence of earthworks, &c., but the price put on would probably cover this

Provision is made for carriage of permanent-way materials, and for a telegraph-line.

Provision is not made for a station at the junction with main line, as, the distance to Eltham being about a mile and a half only, and the construction generally light, it would probably be best to duplicate the main line, and work the branch from Eltham. The item put down for contingencies would cover the cost.

Te Roti Route.—Trial Survey (Length of Line, about 22 miles).—Estimate of Cost.

——	Item.	Quantity.	Rate.	——	——
			£ s. d.	£ s. d.	£ s. d.
Purchase of land (total)	..	..	..	7,275 0 0	
Credit by sale Eltham Railway Reserve	..	..	..	7,000 0 0	275 0 0
Fences, gates, cattle-stops, &c.,—					
Erecting new fencing	Chains	2,500	1 5 0	3,125 0 0	
Repairing present fence ..	,,	960	0 5 0	240 0 0	
Station gates	Each	12	20 0 0	240 0 0	
Private-crossing gates	,,	24	12 0 0	288 0 0	
Cattle-stops	,,	32	22 0 0	704 0 0	
					4,597 0 0
Grading,—					
Felling, clearing, and grubbing ..	Chains	1,720	0 12 6	1,075 0 0	
Cutting	Cubic yards	211,000	0 1 4	14,066 13 4	
Forming line 1 ft. deep and under	Chains	561	1 5 0	701 5 0	
Guard-rails, notice-boards ..	Sets	16	10 0 0	160 0 0	
Trimming line	Chains	1,760	1 0 0	1,760 0 0	
Stream-diversions	Cubic yards	10,300	0 1 4	686 13 4	
Earthworks in station-yards (seven)	,,	13,000	0 1 4	866 13 4	
Service roads and tracks ..	..	..	..	350 0 0	
					19,666 5 0
Culverts (from Head Office estimate)					6,730 0 0
Bridges					23,188 0 0
Bridge-approaches: Pitching and protecting foot of banks					200 0 0
Ballasting and platelaying, main line and seven stations					23,998 0 0
Station buildings (seven stations)					12,250 0 0
Permanent-way (rails, sleepers, &c.)					32,976 0 0
Carriage on permanent-way					3,150 0 0
Equipment					1,100 0 0
Telegraph-line					1,100 0 0
					129,230 5 0
Contingencies, 3 per cent. (approximately)					3,769 15 0
					£133,000 0 0

Average cost per mile, £6,045.

Stratford Route.—Trial Survey (Length of Line, about 26½ miles).—Estimate of Cost.

——	Item.	Quantity.	Rate. £ s. d.	—— £ s. d.	—— £ s. d.
Purchase of land (total)	..	..	..	3,607 10 0	
Credit by sale Eltham Railway Reserve	..	..	..	1,340 0 0	2,267 10 0
Fences, gates, cattle-stops, &c.,—					
Erecting new fence	Chains	2,952	1 5 0	3,690 0 0	
Repairing old fence	,,	1,084	0 5 0	271 0 0	
Cattle-stops	Each	34	22 0 0	748 0 0	
Station gates (nine stations) ..	,,	18	20 0 0	360 0 0	
Private-crossing gates	,,	62	12 0 0	744 0 0	
Grading,—					5,813 0 0
Felling, clearing, and grubbing ..	Chains	2,058	0 12 6	1,286 5 0	
Cutting	Cubic yards	454,694	0 1 4	30,312 18 8	
Forming line 1 ft. deep and under	Chains	340	1 5 0	425 0 0	
Guard-rails and notice-boards ..	Sets	17	10 0 0	170 0 0	
Trimming line	Chains	2,058	1 0 0	2,058 0 0	
Stream-diversions	Cubic yards	23,478	0 1 4	1,565 4 0	
Earthworks in station-yards ..	,,	7,500	0 1 4	500 0 0	
Service roads and tracks ..	..	..	..	600 0 0	
Road-diversion (Kaponga Station)	..	..	..	125 0 0	
					37,042 7 8
Culverts and pipes		..	..	.. ..	13,272 0 0
Bridges		..	..	.. ..	37,918 0 0
Pitching and protecting bridge-approaches ..		..	..	.. ..	200 0 0
Platelaying and ballasting		..	..	.. ..	28,770 3 0
Station buildings (nine stations) ..		..	..	.. ..	14,750 0 0
Permanent-way		..	..	.. ..	38,940 0 0
Carriage on permanent-way		..	..	.. ..	3,927 18 0
Equipment		..	..	.. ..	1,280 0 0
Telegraph-line		..	..	.. ..	1,280 0 0
					185,460 18 8
Contingencies, 3 per cent. (approximately) ..		..	..	.. ..	5,639 1 4
					£191,100 0 0

Average cost per mile, £7,418.

Eltham Route.—Trial Survey (Length of Line, about 23 miles).—Estimate of Cost.

——	Item.	Quantity.	Rate. £ s. d.	—— £ s. d.	—— £ s. d.
Purchase of land,—					
Land at junction with main line	..	..	..	1,070 0 0	
Fences, gates, cattle-stops,—					1,070 0 0
New fencing	Chains	2,000	1 5 0	2,500 0 0	
Repairing existing boundary-fence	,,	1,760	0 5 0	440 0 0	
Gates for private crossings ..	Each	12	12 0 0	144 0 0	
Gates for station-yards ..	,,	14	20 0 0	280 0 0	
Cattle-stops	,,	34	22 0 0	748 0 0	
Grading,—					4,112 0 0
Felling, clearing, and grubbing ..	Chains	1,800	0 12 6	1,125 0 0	
Cutting	Cubic yards	256,000	0 1 4	17,066 13 4	
Forming line 1 ft. deep and under	Chains	402	1 5 0	502 10 0	
Guard-rails and notice-boards ..	Sets	17	10 0 0	170 0 0	
Trimming line	Chains	1,850	1 0 0	1,850 0 0	
Stream-diversions	Cubic yards	37,700	0 1 3	2,513 6 8	
Earthworks in station-yards (seven)	,,	10,000	0 1 4	625 0 0	
Service tracks	..	..	..	500 0 0	
					24,352 10 0
Carried forward				.. ..	29,534 10 0

Eltham Route—continued.

	£	s.	d.
Brought forward	29,534	10	0
Culverts	10,338	0	0
Bridges	28,058	0	0
Pitching and protecting bridge-approaches	200	0	0
Platelaying and ballasting	24,911	0	0
Station buildings (seven stations)	12,700	0	0
Permanent-way	34,484	0	0
Carriage on permanent-way	3,200	0	0
Equipment	1,150	0	0
Telegraph-line	1,150	0	0
	145,725	10	0
Contingencies, 3 per cent. (approximately)	4,274	10	0
	£150,000	0	0

Average cost per mile, £6,500.

Hawera Route.—Examined (Length, about 26 miles).—Estimate of Cost.

	£
Purchase of land: extra allowance for land required, 100 acres at £15 per acre ...	1,500
Cost of line at average cost per mile of Te Roti route, 26 miles at £6,045 per mile ...	157,170
Total	£158,670

Average cost per mile, £6,100.

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