As to the land opened out by the Palmerston–Strath Taieri line, all the good country is on the western watershed, and within 8 miles of the Dunedin–Strath Taieri route, consequently it will not want for railway communication if the latter is constructed; and when the importance of the district calls for it, a branch can easily be made from Blair Taieri up the Moonlight Valley as far as required.

Route No. 6.—Palmerston to Cromwell, *viâ* Shag Valley, joining No. 4 on the Maniototo Plains.

A detailed survey was made by the Provincial Engineer in 1875 of about 15 miles of this route, and in the same year Mr. Coyle made a reconnaissance survey of the remainder for the Provincial Government, a report on which appears in the "Votes and Proceedings of the Provincial Council, Session 34." Mr. Coyle's survey embraces the most important part of the route, and his report fairly describes the line obtainable, so it is not necessary for me to enter into so much detail as I have done with some of the others.

The line follows generally the direction of the coach road from Palmerston up the Shag Valley and over the Pigroot Range to the Kyeburn, thence in a straight course to the centre of Maniototo Plain, where it joins Route No. 4.

For the first 10 miles, Route No. 6 is through level country presenting no engineering difficulties whatever, but between that point and the summit, which is 2,100 feet high and 20 miles distant, the ground is very rough indeed. It is necessary to have gradients of 1 in 40, and 5 chains curves on the eastern side, but the western one is much easier. There will be at least five tunnels, as well as other heavy works on this portion of the line.

There is a considerable quantity of good low country on this route, and even the tops of the ranges are better than usual. Still I do not consider the advantage to be gained in opening it up by a railway to be at all commensurate with the enormous outlay required in doing so. I believe, however, that a branch up to the head of the level part of Shag Valley will be found necessary and advantageous at no distant date.

Route No. 7.—Duntroon to Cromwell, *viâ* the Kyeburn Pass, joining No. 4 on the Maniototo Plain.

This line, which is intended to connect Oamaru with the interior, leaves the Awamoa Branch Railway at Duntroon and, following up the Maerewhenua River to within a mile of the saddle. Instead, however, of going through the saddle in the direction of the present bridle track, it turns sharply northward, and pierces the range at what is known as the Kyeburn Pass, at the head of the Otekaik River. It then returns to the direct course by a tributary of the Kyeburn, and follows the Kyeburn Valley to the Maniototo Plain. The plain is crossed in a westerly direction to a point opposite Naseby, where a junction is made with Route No. 4.

There are three other alternative lines between Oamaru and the Kyeburn Pass. One contemplates the extension of the Awamoko Railway to the Otekaik River, up which the line runs to the pass where it joins the Maerewhenua route; the second is an extension of the Waiareka Railway through the Tables to a junction with the Maerewhenua Valley line, 2 miles below Livingston; and the third leaves the Waiareka Railway at the Teneraki Station, 7 miles from Oamaru, then keeps about 4 miles more to the south than the last, but joins it before entering the Maerewhenua Valley.

Messrs. Thornton and Bull have, at the request of the residents of Oamaru and Naseby, made a reconnaissance survey of this route. I enclose a copy of their report, which gives a fair description of the line obtainable. I do not, however, agree with their estimates and some of the other conclusions they have arrived at.

The valley on the Maerewhenua line, which is the one recommended by Messrs. Thornton and Bull, is quite open up to Livingston, a distance of 10 miles; but between that point and the watershed, 12 miles further, the river runs in a very rough and precipitous gorge. Sometimes the cliffs rise quite perpendicular from the water's edge. The formation between the Waitaki and Livingston is all soft limestone, but after that right to the Maniototo Plain it is clay slate. Although there is a considerable distance to rise between Duntroon and the summit, it is not all available for easing the gradient or reducing the length of tunnelling at the top. The slopes of the valley below Livingston are too much cut up by lateral gullies to admit of the adoption of a high level line; consequently a gradient of 1 in 73 must be taken up to that point, and 1 in 45 afterwards, instead of 1 in 50 throughout. By the barometer I make the summit of the horse track 2,830 feet high, but the saddle through which the line is taken is upwards of 3,000 feet. It is proposed to pierce this at a level of 2,600 feet by a tunnel a mile in length. Although the earthwork will be generally heavy, there is no special work between the pass and the Maniototo Plain—the valley on the western side being tolerably open. A gradient of 1 in 55 and downwards can be got down this side. The Kyeburn tunnel would be through clay-slate of the newer formation. The beds are running parallel with the line, but tilted up westwards, at an angle of from 50 to 75 degrees. Where visible, the rock is so much shattered that heavy timbering and lining would be required to support it. There is a probability of meeting more solid material in the heart of the mountain; still it would not be wise to calculate on this. We are therefore committed to the construction of a mile tunnel through hard rock, that cannot stand without heavy timbering and lining, in a country where neither timber nor material for lining can be obtained. Such a work is, in extent, far beyond anything hitherto undertaken by this department.

The other works on this route are also of a heavy character, the formation on the 12 miles up the Maerewhenua Gorge would be heavier than any equal distance on the other routes; and, as already explained, every obstacle must be gone through or over, it being impossible to alter the gradient.

The first 8 miles of the line *viâ* Otekaik would be surface-forming, but the remainder of the distance to the pass is similar to the Maerewhenua Gorge, and the tunnel at the top is 1½ miles long. The proposed gradient is 1 in 38, but possibly this might be improved a little by commencing the assent sooner.

Both these lines must of necessity have very sharp curves.

The second alternative line, that from the terminus of the Waiareka Railway, at Ngapara, to Livingston, has a tunnel through the "Tables" 1¾ miles long, so it is unnecessary to consider it further.