

Railway Billie's Tunnel

By *Barrie Woods*



The early settlers of Christchurch were faced with a dilemma. There were only two ways to get from the port of Lyttelton to the new town of Christchurch. One was by “scrambling over the hill, either by line of the bridle path, or by Cass’ Bay to Riverlaw”. The other was by “taking a boat and going round by Sumner and up the Avon to the Bricks Wharf”.

There are many still among us who can recall the feelings of dismay and disappointment with which the lofty hills surrounding Lyttelton were first regarded. Beyond lay an almost interminable plain, which, even to the unpractised eye of the new comer, gave promise of full return for the labour that might be expended upon it. But before this could be reached a barrier of formidable dimensions interposed in the shape of lofty abrupt hills, and no available means existed of overcoming the difficulty.

Lyttelton Times, 25 May 1867

A commission was appointed which duly recommended the building of a railway via Sumner, with a tunnel below Evans Pass to Gollan’s Bay, or, if that scheme proved beyond the resources of the province, to construct a cart road via Sumner with a tunnel through the top of Evan’s Pass. The cost of the railway option was estimated at £155,000 and was strongly opposed

by the then Superintendent, Mr James Fitzgerald, who preferred a road option.

After consideration the government decided on the road option via Evan’s Pass and work commenced around 1855. Four years later, on 24th August 1859 the road was formally opened by the Superintendent, Mr Fitzgerald, who drove a dog cart over it, arriving in Lyttelton without damage.

Whilst the new road formed a link between the port and Sumner it proved unsuitable for heavy cart traffic. Consequently, the only way to move freight between the plains and the port remained by sea, via the Sumner bar.

Various efforts were made to improve the sea route, and wharves were built on the Heathcote river to receive and discharge cargo arriving and departing by steamer. The Heathcote river was considered unnavigable past Ferrymead and only light craft could venture up the Avon. The arrangement was far from ideal, as freight needed to be transferred between cart and coastal steamer for the trip to Lyttelton, then transferred again to larger vessels to go further afield. The reverse was required for incoming freight. Worse still, the Sumner bar was perilous, and a number of vessels came to grief attempting the crossing. A more efficient means of communication between the port and plains was essential.

A second commission was appointed in 1858 to consider rail routes between Christchurch and Lyttelton. William Moorhouse, who had replaced Fitzgerald as Superintendent of the province, exhorted the council to “consider and determine the best method of securing safe and expeditious transit of our marketable productions to the place of export”. He was passionate about the railway proposal, which earned him the nickname ‘Railway Billie’.

The commissioners considered two routes. One would run between Sumner and Gollan’s Bay, and the other via a tunnel under the hill from Heathcote Valley. The



An early sailing vessel at the Ferrymead Wharf

Sumner route was felt unsuitable due to the sharp curves and steep gradients, but the tunnel proposal, while more direct, presented its own challenges. This would be the first time, anywhere in the world, that a railway tunnel had passed through the wall of a volcano, and the nature of drilling volcanic rock for such an undertaking was unknown.

Near the same time, another commission was established in London to investigate the technical aspects of the proposals and consult with railway experts. Mr Robert Stephenson, son of George Stephenson, renowned as the 'Father of Railways') was asked for advice and deferred the matter to his cousin, Mr George Robert Stephenson. He recommended the direct route, via Heathcote, and also recommended the London civil engineering firm Smith and Knight to do the work. A sum of £235,000 was allowed for the project, with the work to be completed over five years.

The contract awarded to Smith and Knight was subject firstly to the government securing the funds, and secondly to the contractors examining the site in Canterbury to determine if the work could be done for the money. The government would pay for making trial shafts at each end of the tunnel, and a decision on whether to proceed would be made within four months. As the first railway tunnel to be built in New Zealand, this would also be the country's biggest engineering feat of the time.

Messrs McCandish and Baines, agents for Smith and Knight, arrived at Lyttelton on Christmas Eve of 1859 with a team of workers, and immediately began exploratory work.

Bureaucracy got in the way, and the Provincial Government was unable to confirm the funding for the

project by the due date of 24th April, and an extension was requested. It was not until November that the government signalled that funds were available, but in the meantime Smith and Knight had become disillusioned and abandoned the project, citing that it was too difficult.

The Provincial Council was faced with a dilemma as there was pressure from both the port and the plains for the project to proceed. Edward Dobson, the Provincial Engineer, proposed that work continue to open out the ends of the tunnel using local labour while the tenders were requested for the remainder of the work. The Council would not commit, and a long delay ensued, though Dobson, with the help of the remaining Smith and Knight workers, negotiated with Moorhouse for some work to continue on a day-work basis. This was justified on the grounds that the Council had promised to look after and provide work for the Smith and Knight immigrant workers if the project did not proceed.

Keen to get the project back on track, Moorhouse travelled to Melbourne to recruit new contractors. He received interest from three firms and in May 1861, the government accepted a tender from George Holmes and Co. They were awarded £240,500 to complete the line from Christchurch to Lyttelton, with the exception of the stations. Of this £195,000 was for the cost of the tunnel, estimated at 2838 yards long. The project was expected to take five years.

A ceremony to commemorate the official start of the project was held at Heathcote on 17 July 1861, at which Mr Moorhouse cut the first sod. Dobson and his team had already made some progress, so work by the new contractor could begin in earnest almost immediately. However, problems were soon met when the Otago gold rush broke and many of the new workers recently employed left for the goldfields. Tunnelling work was undertaken from both ends making progress at a rate of about three yards a day. At the Heathcote end the digging was initially through clay and sand which, despite being wet during the winter months, made for reasonably fast progress. The tunnel was shored up using timber to begin with, then a brick lining was commenced the following year. Mrs Moorhouse laid the first stone on the 29th of September 1864. In all 1.5 million bricks were used in the construction of the

tunnel, and they were all made in Heathcote, at the site of the old malt works (known at the time as The Kilns). The tunnel is lined up to the point where solid rock is encountered, with a thickness of five bricks. The original bricks are still in place after more than 150 years.

The tunnelling work was done by pick and shovel, with the help of gunpowder to fracture the rock. Water was a big problem during construction. It was estimated that as many as 50,000 gallons per day needed to be removed. To begin with large wooden vats were used, but then a new solution was found for the Heathcote workings. A syphon system was designed to draw water from a sump, then discharge it into ditches some 600 yards down the valley. At the Lyttelton end, the water simply ran out of the tunnel and into the sea, but there was more of it, and it rained down from above. An iron shield on runners was devised to keep the workers dry. The downpouring water at times extinguished the lights, and played havoc with the explosives, meaning misfires were common.

At the Lyttelton end eels and whitebait made their appearance within the drains far up into the tunnel. Rats also abounded, feeding on leftovers from the workers' meals, horse feed and candles.

Fumes and smoke from the blasting also presented problems and a ventilation system needed to be contrived. To begin with fans were used, somehow driven by horses, then later by a steam engine, but as the tunnel progressed further this became ineffective. The solution came by building a wooden floor or partition to divide the tunnel along its length. A furnace was then positioned above the tunnel head, which pulled its air from the top partition, so drawing a steady current of air from within the tunnel.

The tunnelling work was interesting from a scientific perspective, particularly as this was thought to be the first time a volcano wall had been tunnelled in such a way, from the outside through to the crater. The geologist Dr Julius von Haast was involved from early in the project and made a detailed study of the strata as work progressed.

It was not just the scientists and engineers who were interested either. The public were invited to inspect the workings of the Moorhouse Tunnel on Boxing Day of

1863. Around 2000 people attended the 'Illumination' on the Heathcote side, and another 400 at Lyttelton, with detailed descriptions printed in the newspapers. Candles were used to light the interior of the tunnel, and festivities were held on the outside at each end.

Also of interest, was how the engineers lined up the two portions of the tunnel to meet perfectly in the middle. Here is how they did it, as described in the Lyttelton Times:

The system employed to secure the correctness of the alignment of the two ends of the tunnel was very simple. A permanent mark was fixed in the centre line of the tunnel, on a tower built on the dividing range, nearly midway between the two ends. A transit instrument being placed on the meridian of the tunnel as well as of the tower on the hill, it could be seen at once whether the flame of a candle placed in the centre line of the work inside the tunnel was in a vertical plane with the mark on the tower. But it was also desirable, in case of error, to have the means not only of correcting but of calculating the amount of such error, and this could be readily done. The permanent mark on the central tower, consisted of a batten six inches wide, with a black stripe one inch wide down the centre. The eye-piece of the transit instrument being furnished with five vertical wires placed at equal distances apart, the value of the space between any two wires at a distance equal to that of the mark on the tower can be ascertained by reference to the width of the batten, which thus gives a scale by which the error in the position of a light placed in the tunnel under the tower can be rated with great exactness. It has been by this means that the alignment has been tested from time to time, and the proof of the correctness of the system has been established by the present results.



Pilgrim, aka No. 1 —the first locomotive in New Zealand, which worked the Christchurch to Ferrymead and then the Christchurch to Lyttelton line.

perseverance of key figures such as Railway Billie (William Moorhouse) and Edward Dobson, the tunnel still provides a reliable and efficient communication between Port and Plains. As most locals will no doubt be aware, it is used by several freight trains each day and is operated by KiwiRail.

If you want to learn more about the history of the Moorhouse Tunnel, David Welch has written an excellent book on the subject called 'Port to Plains'. You will find a copy at your local library.

Hole-through, the technical term of the day, was achieved in the morning of 24 May 1867 when an iron rod was able to be passed through from one section to the other. It took a further four days for the full width and height of the tunnel to be excavated. To celebrate, the public were invited to walk through the length of the tunnel on 10 June 1867. Can you imagine that being allowed today?

Temporary rails were laid through the tunnel enabling the passage of the first locomotive on 18 November 1867, followed by the first goods train a week later.

However, the tunnel was not considered complete until June of 1874, as work continued for further widening and drainage. The trains would run through during the day and the tunnel work would continue at night.

These days the tunnel is officially known as the Lyttelton Rail Tunnel. The Moorhouse Tunnel name dropped from common usage way back in the 1920s. Thanks to the foresight of the early colonists, and the

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