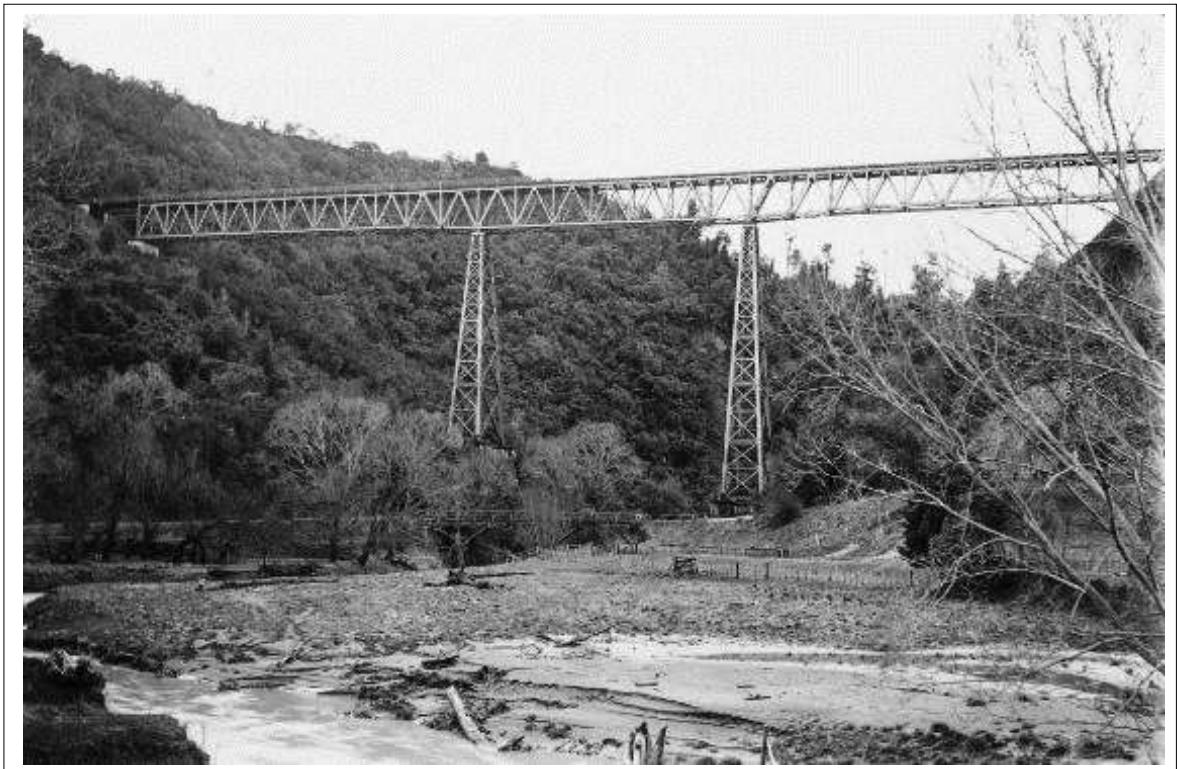


IPENZ Engineering Heritage Register Report

Makohine Viaduct

Written by: C. McPherson and K. Astwood
Date: 31 January 2012



Makohine Viaduct, ca. 1953. Alexander Turnbull Library Pictures (ATL), ID: PAColl-0077-02

Contents

A. General information	3
B. Description	5
Summary	5
Historical narrative	7
Social narrative	8
Physical narrative	16
C. Assessment of significance	18
D. Supporting information	19
List of supporting documents	19
Bibliography	19

A. General information

Name: Makohine Viaduct

Alternative names: Makohine Railway Viaduct; (former) Bridge 157 North Island Main Trunk; Bridge 120 North Island Main Trunk

Location:

North Island Main Trunk railway

Near Ohingaiti

Rangitikei

Geo-reference: Latitude: -39.869 Longitude: 175.682 (centre of structure)

Legal description: *NZ Gazette* 1898, p.1583

Access information: The viaduct is best viewed from the valley below. There is a picnic/rest stop on State Highway 1 where traffic can stop safely. The North Island Main Trunk Railway also crosses over the structure.



Location map courtesy of GoogleMaps

City/District Council: Rangitikei District Council

IPENZ category: Engineering Work

IPENZ subcategory: Rail Transportation

IPENZ Engineering Heritage number: 2175

Date registered: 24 April 2012

Other IPENZ recognition: Plaque: Engineering Heritage (unveiled August 2008, installed March 2011)

Other heritage recognition:

- *New Zealand Historic Places Trust:* Category 1 historic place (Register no. 32)
- *Local Authority District Plan:* Rangitikei District Plan Proposed 28 October 2010. No. H1 in Schedule C3- Historic Heritage (Last Amended: 28 Oct 2010)

B. Description

Summary

The Makohine Viaduct is an impressive engineering achievement. It was one of many viaducts designed by engineer Peter Seton Hay (1852/53-1907) in the central part of the North Island Main Trunk (NIMT) railway. The Makohine Viaduct overcame the first major natural obstacle to the NIMT's completion, spanning a bush-clad gorge, approximately two kilometres (km) south of Ohingaiti.

In 1870, earnest planning began for a railway to connect Auckland and Wellington, the two main centres in the North Island. However, the topography of the central North Island caused a headache for surveyors and Public Works Department (PWD) engineers trying to finalize a route. In 1887, the railheads stood just south of Te Kuiti and at Marton. Conquering the difficult terrain would involve various earthworks and tunnels, bridges and viaducts.

The Makohine Viaduct was constructed across the 228 metres (m) of bush-clad Makohine Stream valley. Built between 1896 and 1902, the Makohine Viaduct project suffered numerous delays due to soil conditions, flooding, inclement weather, and a steel strike in England. However, the experienced engineers and builders involved in its construction, such as Alexander Buchan (1845?-1905), George Leslie Cook (1851-1942), Samuel John Harding (1861-1948) and Walter Sneddon (1837-1925), had to persevere, under considerable pressure from the public and the Government, in order for the NIMT to progress.

The steel was eventually fabricated in the PWD's nearby Mangaonoho workshops. These were located on Ironworks Road and fabricated the steel for many NIMT construction era bridges which followed the Makohine Viaduct. The Makohine Viaduct was under the co-operative system. This was the one of the first major PWD projects in New Zealand to be started under a directive to favour this approach to construction, and it was subsequently used on much of the rest of the NIMT.

At 72 metres (m) high the Makohine Viaduct was, when completed, the tallest viaduct in New Zealand. Subsequently overtaken by its NIMT younger sibling, the Makatote Viaduct, for several decades the Makohine Viaduct was the second highest railway bridge in New Zealand. The structure has not been significantly modified since construction, although it has been upgraded and strengthened in conjunction with

changes to NIMT operational requirements, such as *circa* 1932 when heavier locomotives were introduced, and around 1984 in preparation for the railway's electrification.

Historical narrative

The North Island Main Trunk (NIMT) railway's completion in late 1908 is arguably the most significant example of New Zealand engineering success during the late 19th and early 20th century.¹

In 1863, with the railway from Auckland to Drury, preliminary work began on what would evolve into the arterial rail route through the North Island.² In 1870 the Public Works Department (PWD) was established, and under this department the direct rail link between the North Island's two main centres, Auckland and Wellington, was to become a reality, albeit over a prolonged period. Progress from Auckland coincided with construction north from Wellington. By 1880 the railheads approached Te Awamutu and Marton. The approximate 322 kilometre (km) section between these towns crossed the King Country and the central plateau.³ This section proved the most problematic to traverse with a railway because of its terrain which included frequent deep valleys, unstable grounds, and the numerous rivers crisscrossing the area. This contributed to the NIMT not being completed until decades later.⁴

Construction work towards Ohingaiti began in 1892.⁵ By March 1894 the formations had progressed up to the first of many significant obstacles in the central North Island; the Makohine Stream.⁶ Therefore, Peter Seton Hay (1852/53-1907) who was called upon to develop plans for a large viaduct to traverse the stream valley, proposed a steel trestle bridge. Alternatives to this viaduct, which would be the highest in New Zealand at that point, had been considered. However, these would require extensive earthworks, have a steeper gradient, and include tighter curvature in the tracks, all of which were undesirable. Therefore, Hay's viaduct design was settled upon and preparatory site construction work eventually began in mid-1896.⁷

¹ Roy Sinclair, *Journeying with Railways in New Zealand*, Auckland, 1997, p. 253

² Roy Sinclair, *Rail: The great New Zealand Adventure*, Wellington, 1987, p. 16

³ Neill Atkinson, 'Railways - Main trunk lines', Te Ara - the Encyclopedia of New Zealand, URL: www.TeAra.govt.nz/en/railways/2 (updated 30 June 2011)

⁴ Robin Bromby, *Rails that Built a Nation: An encyclopedia of New Zealand railways*, Wellington, 2003, p.21; A. L. R. Merrifield, 'New Zealand's North Island main trunk railway: 1870-1908,' *Proceedings of the Institution of Civil Engineers, Engineering History and Heritage*, Vol. 162:4 (2009), p.207

⁵ Bill Pierre, *North Island Main Trunk: An illustrated history*, Auckland, 1981, p.50

⁶ R. J. Meyer and P. J. Moyes, 'The Rise and Fall of the Makohine Tunnel,' *New Zealand Railway Observer*, Vol.42:183 (Spring 1985), p.90

⁷ David Leitch, *Railways of New Zealand*, Auckland, 1972, p. 55; Makohine Viaduct – General Evaluation and Elevation of Piers – [Unnumbered]. Archives New Zealand (ANZ), AADX W3774 15/17207. This drawing is Sheet 1 of PWD 17207, signed and dated P. S. Hay 29.7.95

A gifted mathematician, Hay joined the PWD as an engineering cadet in 1875, and was soon involved in surveys and railway construction across New Zealand. Progressing through the ranks of the PWD, Hay became Superintending Engineer in 1896 and was often asked to assist the Engineer-in-Chief with any tricky problems.⁸ Hay designed the Makohine Viaduct, and also five other viaducts in the final stage of NIMT's construction: Mangaweka, Hapuawhenua, Taonui, Manganui-a-te-ao and Makatoke Viaducts.⁹ His work on the Makohine Viaduct was duly acknowledged by the Minister of Public Works, William Hall-Jones (1851-1936), at the Makohine Viaduct's opening ceremony. Hall-Jones paid "high tribute to Mr P. S. Hay, the Engineer of the Public Works Department, for his skill in designing such a structure."¹⁰ Soon after the completion of the Makohine Viaduct, Hay became the PWD Engineer-in-Chief, succeeding William Henry Hales (1830-1909). However, this lead role was short-lived because Hay died of pneumonia in 1907, a disease which is said to have developed as a result of exposure while he was inspecting NIMT works.¹¹

Tenders for the construction of the Makohine Viaduct had been called for in February 1896. The lowest tender was in excess of what the Government had expected, which was a motivating factor for the PWD putting the work under co-operative contract.¹² This concept was first introduced in New Zealand when Richard John Seddon (1845-1906) was Minister of Public Works.¹³ The co-operative system sectioned the railway into small parts, which groups of six to 12 men would complete, using materials and equipment provided by the PWD, and supervised by an elected headman.¹⁴ An advantage of the co-operative system was that the PWD had tighter control over the quality of work and the work was generally completed comparatively cheaply. In the early 1890s contractors were still widely used for constructing government buildings and structures. However, in 1896 "a departmental circular reminded all engineers that wherever practicable works were to be carried out on the co-operative principle."¹⁵ Therefore, the Makohine Viaduct was a test case for the co-operative system's

⁸ Peter Lowe, 'Hay, Peter Seton, 1852/3-1907, Civil engineer, Public Servant,' Te Ara- the Encyclopedia of New Zealand- Dictionary of New Zealand Biography, URL: www.teara.govt.nz/en/biographies/2h24/1 (updated 1 September 2010)

⁹ Pierre, p.36

¹⁰ *Evening Post*, 17 June 1902, p.5

¹¹ Lowe; F. W. Furkert, *Early New Zealand Engineers*, Wellington, 1953, p.185

¹² F. K. Roberts, *A Compendium of Railway Construction, Part Two: North Island Main Trunk*, Wellington, 1990, p.46

¹³ Pierre, p.40

¹⁴ Geoffrey Thornton, *Bridging the Gap: Early Bridges in New Zealand 1830-1939*, Auckland, 2001, p. 146

¹⁵ Rosslyn Noonan, *By Design: A brief history of the Public Works Department Ministry of Works, 1870-1970*, Wellington, 1975, p.78

effectiveness, as it was one of the first major structures to be initiated under this directive nationally.¹⁶

However, circumstances out of the workforce's control plagued the Makohine Viaduct construction project. Adverse weather conditions caused work to stop in the early constructions period. Heavy rain affected the unstable papa-origin soil, impeding the pier foundations' construction in 1897. This, combined with preparation of the concrete for the footings being delayed because of flooding in the gravel pit, work on the pier footings did not begin again until the following year.¹⁷

In 1896 the Mangaonoho Public Works shop was established, near the Makohine site, to fabricate the steel for the Makohine Viaduct.¹⁸ However, delays were caused through manufacturing plant not being forthcoming because of British steel strikes.¹⁹ Once fully operational, in late 1898 and throughout 1899 the workshops ran on a 16-hour a day system to try and catch-up with steel fabrication. Electric lights were used to light the track and the workshop so work could continue into the night.²⁰ In this way all the steelwork for the Makohine Viaduct was ready in 1900 and pier construction was begun.²¹ It has been said that the "resources and inventiveness of New Zealand engineers and workmen were evoked, tested and developed by challenges of this sort."²²

With pressure mounting on the Government to complete the NIMT's drawn out construction, the Makohine Viaduct's completion became a priority because it was seen as the main hurdle to progressing the works. Fortunately, construction was only held-up for a prolonged period once more, in 1901 due to unfavourable weather.²³ The public all over New Zealand were kept well-informed of the structure's progress with regular updates in the newspapers from 1896 until its completion.

¹⁶ Noonan, pp.78-79; Pierre, p.40

¹⁷ Pierre, p.56

¹⁸ The Mangaonoho workshops also fabricated steel for all subsequent original NIMT viaducts, with the exception of the Makatote Viaduct. Meyer, p.90

¹⁹ Roberts, p.46

²⁰ Pierre, p.56; Thornton, p.146

²¹ Pierre, p.56

²² Gordon Troup (ed.), *Steel Roads of New Zealand: An illustrated survey*, Wellington, 1973, p.145

²³ Roberts, p.46



Figure 1: View of the Makohine Viaduct under construction, ca 1900. Godber, Albert Percy, 1875-1949: Collection of albums, prints and negatives, ATL, APG-0021-1/2-G

The general labourers employed as part of the co-operative system were overseen by a hierarchy of Government engineers and experienced contractors. In the especially trying early stages of the build between 1896 and 1898, Samuel John Harding (1861-1948) was involved with the project in his capacity as Assistant Engineer to Hunterville. After being transferred to work on the railway south from Blenheim, Harding was to return to the NIMT in 1903, this time as the Local Engineer at Taihape.²⁴ In this senior role he is credited with being the creator of the section between Taihape and Waiouru, and the success of components such as the Turangarere Horseshoe.²⁵

After the difficult beginning to the project, the bulk of the Makohine Viaduct's on-site construction seems to have been under the supervision Walter Sneddon (1837-1925) who was variously described as "overseer to the works", "mechanical engineer", and "engineer in charge" at the Makohine Viaduct.²⁶ Sneddon, who immigrated to New

²⁴ Furkert, p.182; Pierre, p.63

²⁵ Furkert, p.182; Pierre, p.66

²⁶ 'Makohine Viaduct Works,' *Wanganui Chronicle*, 25 October 1898, p.2; *Evening Post*, 19 February 1901, p.6; *Marlborough Express*, 5 November 1901, p.2

Zealand in the 1860s, had been employed with prominent Christchurch construction firm, J and A Anderson, and gained important experience in construction contracting. While in the employ of Andersons, Sneddon headed construction projects such as the Beaumont Bridge (completed 1887) across the Clutha River, and then the first part of the construction of the nearby Miller's Flat Bridge (1897-99).²⁷ However, from mid-1898 Sneddon was engaged on the Makohine Viaduct project and moved to the North Island as a result.²⁸ At the time of the Makohine Viaduct's construction Sneddon was said to be "the most experienced iron bridge builder in New Zealand."²⁹ Sneddon also fulfilled similar roles at other nearby structures, namely the Mangaweka Viaduct and Toitoti Bridge.³⁰ Alexander Buchan (1845?-1905), who was the Government overseer at the Makohine Viaduct is also mentioned as ably assisting Sneddon.³¹

From 1898 the Resident Engineer to Hunterville was George Leslie Cook (1851-1942). He was ultimately responsible to his national office PWD superiors for the progress of the works in the Makohine section and subsequent works further north.³² Cook also had a wealth of experience, and being put in charge is perhaps reflective of the importance completing the Makohine Viaduct. Cook who had risen through the ranks of the PWD, began as a cadet in 1872. Prior to his work on the NIMT he had been the Resident Engineer on the Otago Central Railway, and in Wellington, before being placed in charge of the Eketahuna to Woodville Railway in the early 1890s.³³

The Makohine Viaduct's eventual completion was marked with a celebration on 17 June 1902. The long project's completion was significant because it meant the NIMT was an important step closer to realisation. The *Evening Post* reported that during the official opening Hall-Jones praised the construction and design of the viaduct, stating:

...there was no doubt they [the engineers and construction team] had been engaged upon a work the like of which did not exist in the Southern Hemisphere, and he had no hesitation in saying that there had never been a better piece of work turned out in any part of the world.³⁴

²⁷ 'Mr Walter Sneddon,' *The Press*, 28 March 1925. M. Holmes to K. Astwood, 9 June 2011. IPENZ

²⁸ *Otago Witness*, 19 May 1898, p.30

²⁹ 'Mr A. E. Remington at Hunterville,' *Wanganui Chronicle*, 18 March 1899, p.3

³⁰ 'Mr Walter Sneddon'

³¹ *Manawatu Times*, 3 November 1903, p.2; 'Obituary,' *Wanganui Herald*, 25 April 1905, p.5; 'Our Mangaweka Man,' *Manawatu Times*, 18 February 1904, p.3

³² Pierre, pp.64-66

³³ Furkert, pp.143-44

³⁴ *Evening Post*, 17 June 1902, p.5

No doubt the hard-pressed Mangaonoho workshops employees were pleased with this praise, but perhaps more happy that their reward was a day off of work. Buchan, Cook, and Sneddon were also lauded enthusiastically in the lead-up to, and at, the opening ceremony.³⁵

The Makohine Viaduct's completion combated a major obstacle and allowed for the NIMT's construction north from Wellington to push forward. When it was eventually completed in 1908, the NIMT became a crucial part of the New Zealand transport system. The railway quickly became the main arterial route through the North Island, having an important social and economic impact.³⁶

The NIMT has been the subject of much literature and admired as an engineering achievement. Official heritage recognition has come in the form of the New Zealand Historic Places Trust (NZHPT) registration of the railway's components, such as the Makohine Viaduct 's1985 Category I historic place registration. In 2009 the Makohine Viaduct was also included in the NZHPT's NIMT Historic Area.³⁷ In 2011, IPENZ unveiled a plaque at the Makohine Viaduct, site to commemorate its engineering significance.³⁸

³⁵ Examples include: 'The Makohine Viaduct,' *Wairarapa Daily Times*, 10 June 1902, p.4; 'A Trip to the Makohine Viaduct,' *Taranaki Herald*, 13 June 1902, p.1; 'Evening Post', 17 June 1902, p.5

³⁶ Pierre, p.139

³⁷ Makohine Viaduct, New Zealand Historic Places Trust Register, www.historic.org.nz/TheRegister/RegisterSearch/RegisterResults.aspx?RID=32 (accessed 28 November 2011); North Island Main Trunk (NIMT) Historic Area, New Zealand Historic Places Trust Register, www.historic.org.nz/TheRegister/RegisterSearch/RegisterResults.aspx?RID=7793 (accessed 28 November 2011)

³⁸ 'Commemorating a Railway Icon,' *Engineering Dimension*, Iss.103 (May 2011), p.5. URL: www.ipenz.org.nz/ipenz/publications/dimension/2011/Dim_May11.pdf

Social narrative

At the height of construction, between 1906 and 1908, the NIMT's workforce consisted of around 2,500 people.³⁹ As the NIMT building progressed temporary work camps were established close by construction sites, moving on as the work did. However, whenever there was a major component in the railway that took several years to build, such as large viaducts, semi-permanent or permanent facilities usually coincided, such as shops and even schools.⁴⁰

Unusually, the Makohine camp does not seem to have evolved into a settlement of any particular permanence, scale, or longevity after the viaduct construction was complete. However, there were workers who settled for a prolonged period at the Makohine construction site. In 1898, for example, it was recorded that many workers with families were squatting on the Railway Reserve, a practice that was allowed to continue while construction was underway.⁴¹ One of these men was James McDonnell who worked at the Mangaonoho workshops. By 1902 he had set up a home, fenced it off, and was applying to the Government to lease the land.⁴² However, it is generally thought that the lengthy duration of irregular construction at the Makohine Viaduct prohibited the formation of an enduring settlement founded as a direct result of the railway work.⁴³ At various points in the construction the estimated number of workers seems to have fluctuated between about 30 to 300 people specifically working on the Makohine Viaduct project.⁴⁴

Work upon the railway was hard and the frontier nature of living conditions was not the only hardship faced by the Makohine Viaduct workers. There are inherent dangers associated with constructing large engineering structures and the Makohine Viaduct was no exception.⁴⁵ During the viaduct's construction, fatalities did happen; on 18 October 1900 it was reported that "Robert Lyons, one of the men working on

³⁹ Bromby, p.21

⁴⁰ Kate Hill, *Raurimu Frontier Town 1900-1925: A Social Archaeological Perspective*. Auckland, 1999, p. 19

⁴¹ H. Lundius to Commissioner of Crown Lands, 2 July 1898; Commissioner of Crown Lands to H. Lunius, 15 July 1898. ANZ, AFIE 619 137/13/120 pt1

⁴² James McDonnell to A. W. Hogg, 6 December 1902. ANZ, AFIE 619 137/13/120 pt1

⁴³ Thornton, p.146

⁴⁴ 'The Makohine Viaduct,' *Star*, 12 May 1897, p.1; 'The Makohine Viaduct,' *Manawatu Herald*, 7 December 1897, p.3

⁴⁵ Atkinson. Although not directly related to the construction of the Makohine Viaduct it should be noted that in 1893 preparatory works for the tunnel which opened onto the viaduct destabilised the hillside, causing a massive landslide. This buried a mother, her three children and niece, and they died as a result. 'The Mokohine [sic] Fatality,' *Wanganui Chronicle*, 15 November 1893, p.2

the principal pier, was killed by falling from the scaffolding, a height of about 80 feet.”⁴⁶ There was reportedly one other on-site fatality.⁴⁷



Figure 2: Makohine Viaduct Workers, between 1898-1902. Cameron, R A: Photographs of Ohingaiti, ATL, ID:1/2-094227-F.

The completion of the Makohine Viaduct, and later the entirety of the NIMT, benefitted New Zealand economically and had a substantial social impact. Travel was improved between the North Island’s two major centres, cutting down travel times and assisting with communications nationwide. Auxiliary roads, telegraph wires and settlements developed because of the railway.⁴⁸

The Makohine Viaduct was acknowledged as a landmark structure from the time of its completion.⁴⁹ This was enhanced as road traffic increased because there was a good view of the structure for traffic passing on the main highway. The Scenic Reserve in the gully north of the viaduct formed a dramatic and picturesque bush backdrop. This Reserve was established just prior to the NIMT’s completion, and was preserved because the land, not suitable for settlement, had a good selection of native trees which inhibited erosion.⁵⁰ In the mid-twentieth century the original road was straightened south of the viaduct and the land in between became a popular road-

⁴⁶ ‘Accidents and Fatalities,’ *Evening Post*, 18 October 1900, p.5

⁴⁷ ‘Our Mangaweka Man’

⁴⁸ Hill, p.3.

⁴⁹ ‘*Evening Post*, 17 June 1902, p.5

⁵⁰ Reserve for Inspection and Report – Sc. Reserve Makohine S.R., 1977. ANZ, AFIE 619 137/13/120 pt1

side picnic area and rest stop.⁵¹ Recently another realignment of State Highway 1 was completed, but the rest stop, which features the Makohine Viaduct IPENZ Engineering Heritage plaque with the viaduct in view behind, is still accessible to the public.⁵²

⁵¹ Copy of plan with memo 12/2/62; Makohine Deviation Picnic Area land to be taken [n.d.], ANZ, AATC 5114 W3457 152/8/1/5/11

⁵² Terry Karatau, 'Project to save lives,' *Manawatu Standard*, 22 March 2011. URL: www.stuff.co.nz/manawatu-standard/news/rangitikei-mail/4795553/Project-to-save-lives (accessed 6 December 2011)

Physical narrative

When the NIMT was completed, the Makohine Viaduct was the highest viaduct both on the railway, and nationally, at 72 m high.⁵³ It has concrete abutments and footings. The superstructure consists of two steel trestle piers, two 75 m steel Warren trusses and a central 53 m truss.⁵⁴ The viaduct is 228 m long. The 1,272 tonnes of steel used in the Makohine Viaduct's construction was acquired from England and fabricated close to the viaduct site.⁵⁵

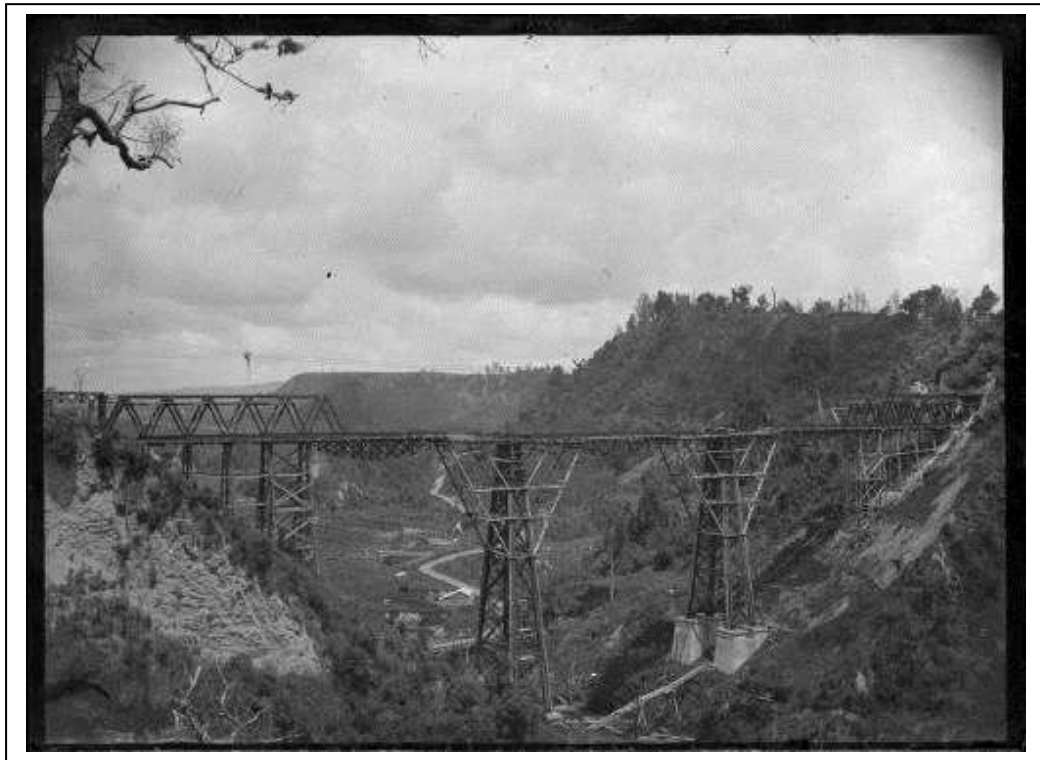


Figure 3: View of the Makohine Viaduct under construction, ca 1900. Godber, Albert Percy, 1875-1949: Collection of albums, prints and negatives, ATL, ID: APG-0055-1/2-G

It has been noted that the Makohine Viaduct's spans were longer than those of its NIMT construction-era counterparts.⁵⁶ Having relatively long spans meant costly additional piers were avoided in a valley that became known as a difficult place to create satisfactory footings.⁵⁷ The form of the viaduct is unique in New Zealand: "The central Warren truss is cantilevered across two towers, each carrying a simply supported similar truss span back to the abutments."⁵⁸ The viaduct was also

⁵³ Troup, p.300

⁵⁴ Thornton, p. 145

⁵⁵ Bromby, p. 132

⁵⁶ Pierre, p.53

⁵⁷ Ibid., p.35

⁵⁸ Merrifield, p.214

individual in its construction method because framing was used to support the cantilevered spans as they were constructed. For the other final stage NIMT viaducts, prefabricated trusses and girders were launched into place.⁵⁹

Since the viaduct's completion in 1902 it has been modified on several occasions to make it compatible with the NIMT's changing operational needs. The viaduct was first strengthened around 1932 to allow heavier locomotives to safely cross. This work involved adding intermediate vertical members to the Warren trusses of the two main spans.⁶⁰ The viaduct was again strengthened in the early 1980s to prepare for the NIMT's electrification, which entailed replacing the smaller end spans.⁶¹ It also included "replacing wooden way-beams directly under the track with steel, and providing linkages to transmit traction and braking forces into the main structure."⁶² During this period the tunnel immediately adjacent to the viaduct was opened into a cutting, or daylighted, and the curve of the track on the eastern side opposite was also eased.⁶³

Key physical dates

Mid-1896	Site preparation begins
1897	Excavations continue (with delays) and foundations and footings begins
1900	Construction of piers
1901	Construction of girders
1902	Viaduct complete
<i>circa</i> 1932	Strengthened
<i>circa</i> 1934	Strengthened
1982- <i>circa</i> 1984	Strengthened

⁵⁹ Roberts, p.46

⁶⁰ 'Electric Welding,' *Evening Post*, 7 August 1937, p.11; Pierre, p.156

⁶¹ 'First step in Main Trunk Change,' *Auckland Star*, 18 January 1982. ANZ, AAEB W3438 56/22/247/10 pt4; 'Main Trunk to close again,' *Wanganui Herald*, 18 April 1984. ANZ, AAEB W3438 56/22/247/10 pt5

⁶² R. Merrifield to K. Astwood, 22 December 2011. IPENZ

⁶³ 'Main Trunk Electrification Progress,' *New Zealand Railway Observer*, Vol.42:181 (Autumn 1985), p.27

C. Assessment of significance

The Makohine Viaduct overcame the first significant physical obstruction in the final phase of the North Island Main Trunk (NIMT) railway's construction and is an outstanding engineering feat in itself. As the highest New Zealand viaduct at the time of its construction in 1902, the Makohine Viaduct is a lasting tribute to Peter Seton Hay's engineering achievements and initiative. It is also a testimony to the skill and management of numerous other engineers involved in the project, such as Buchan, Cook, Harding, and Sneddon.

Physically impressive, the Makohine Viaduct also has further importance within the socially and economically significant NIMT, and was one of the first major test cases under a Public Works Department 1890s directive to favour the co-operative construction system. Therefore, the Makohine Viaduct set the construction framework for completing the majority of the remaining NIMT structures.

Heralded as an engineering triumph upon completion, the Makohine Viaduct has continued to be a NIMT icon and a key landmark in the central North Island.

Therefore, the Makohine Viaduct is of sufficient engineering heritage significance to warrant inclusion within the IPENZ Engineering Heritage Register.

D. Supporting information

List of supporting information

Link to: Commemorating a Railway Icon, *Engineering Dimension*, Iss.103 (May 2011), p.5. URL:
://www.ipenz.org.nz/ipenz/publications/dimension/2011/Dim_May11.pdf (accessed 6 December 2011)

Link to: Makohine Viaduct, New Zealand Historic Places Trust Register,
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AADX W3774 15/17207

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