

IPENZ Engineering Heritage Register Report

Taipo River Bridge Piers, SH73

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The Taipo River Bridge. November 2014. IPENZ.

Contents

A. General information	3
B. Description	5
Summary	5
Historical narrative.....	6
Social narrative	15
Physical narrative.....	17
C. Assessment of significance.....	21
D. Supporting information.....	22
Bibliography	22

A. General information

Name: Taipo River Bridge Piers

Alternative names: Taipo

Location:

Between Jacksons and Kumara

State Highway 73

Taipo River

West Coast

Geo-reference: Latitude -42.755, longitude 171.403

Legal description: No legal description.

Access information: The piers are structural elements in the existing Taipo River single-lane bridge on State Highway 73 (Otira Highway). They can be viewed from the roadside and from the river bank.



Location map (courtesy of GoogleMaps)

City/District Council: Westland District Council

IPENZ category: Engineering Work

IPENZ subcategory: Infrastructure - Bridge

IPENZ Engineering Heritage number: 2348

Date registered: 8 June 2018

Other IPENZ recognition: Plaque 1994 – IPENZ engineer heritage importance

Other heritage recognition:

- *New Zealand Historic Places Trust: N/A*
- *Local Authority District Plan: N/A*
- *Other: N/A*

B. Description

Summary

The Taipo Bridge Piers are concrete-filled cast-iron cylinder piers that support the bridge crossing the Taipo River on the West Coast. The bridge was originally completed in 1886 with eight cylinder piers and timber superstructure. The bridge was re-created in 1936, retaining and modifying four of the piers to carry a new steel-plate girder superstructure. The bridge continues to be used as part of State Highway 73 and therefore the piers continue to serve as an important link to the West Coast.

Taipo River was an inconvenient and dangerous obstacle for people travelling to the West Coast, particularly following the creation of the West Coast Road in 1865-66. This particularly affected communication, as it was the mail route between Christchurch and West Coast settlements. The Taipo was initially bridged in 1866 but the river course shifted, rendering the bridge useless. A wire suspension bridge was constructed to allow coach passengers to cross on foot while the coach forded the river. In 1886 the bridge with concrete-filled cast iron cylinder piers removed this obstacle.

The new Taipo River bridge was designed by Francis William Martin (1855-1895). It has association with Charles Yelverton O'Connor (1842-1902), a prominent engineer who probably determined the location of the bridge. It has been suggested that he determined the design of the piers, intending it to carry the future West Coast rail line. The timber superstructure had to be repaired a number of times and in 1935 the entire superstructure was replaced with a steel-plate girder deck. New abutments were created and four of the original piers were modified to carry the new design. This unusual modification as it exists today demonstrates a creative engineering design solution in the face of limited financial resources.

The piers serve as a physical reminder of two engineers who were prominent locally, nationally, and internationally. The continuing use of the piers in the flood-prone and swift-flowing Taipo River demonstrates the robust and enduring qualities of a once-popular pier design.

Historical narrative

The Taipo River on the West Coast flows through the Southern Alps into the Taramakau River. The name is not a unique one as 'Taipo' means 'demon' or 'devil' in Maori.¹ Gold was discovered in the Taramakau valley in 1864, prompting a gold rush to the West Coast and the rapid founding and boom of Hokitika in 1865.² The West Coast road was built in 1865-66 to connect the West Coast gold fields with Christchurch, in an attempt to draw some of that wealth eastward.³ A bridge over the Taipo formed the final link in the West Coast road, which allowed coaches to travel between Christchurch and Hokitika. The Taipo was considered dangerous to cross and initially a flat-bottomed boat was operated, charging two shillings per crossing.⁴

The first bridge across the Taipo River was a timber beam-and-girder bridge with eight stringer spans of about 9 meters (m) (**Error! Reference source not found.**)⁵ Tenders for construction of the bridge were called by the Christchurch Public Works Office (PWO) in December 1865.⁶ However, that month there were heavy floods that caused the river to divide into two channels.⁷ The planned bridge crossed only one of these channels. It was decided to persist with construction and divert the river back into the original channel.⁸ In March 1866 Christchurch's *The Press* reported that "...work is now complete as far as that coaches can pass from end to end, except over the Taipo River, where a boat is still used and the coach has to be changed. In a few weeks hence a bridge will complete the whole line."⁹ The bridge was opened in late June 1866.¹⁰

¹ Dianne Bardsley, "Rural language - Sheep and dairy farming," *Te Ara - the Encyclopedia of New Zealand*, updated 13 Jul 2012, accessed 28 Mar 2108, <http://www.TeAra.govt.nz/en/rural-language/page-5>. There is another Taipo River further north on the West Coast, which flows into the Karamea River, and a number of Taipo streams and creeks. See <http://www.topomap.co.nz/NZTopoMap/nz39870/Taipo-River/>, accessed 3 May 2016.

² Simon Nathan, "West Coast places – Hokitika," *Te Ara - the Encyclopedia of New Zealand*, updated 15 June 2015, accessed 28 Mar 2018, <http://www.TeAra.govt.nz/en/west-coast-places/page-12>.

³ John Wilson, "Canterbury places - Porters Pass to Arthur's Pass," *Te Ara - the Encyclopedia of New Zealand*, updated 12 Aug 2015, accessed 28 Mar 2018, <http://www.TeAra.govt.nz/en/canterbury-places/page-14>.

⁴ "From Christchurch to Hokitika," *The Press*, January 11, 1866, 2.

⁵ Geoffrey Thornton, *Bridging the Gap: Early Bridges in New Zealand 1830-1939*, (Auckland: Reed Books, 2001), 35.

⁶ *Lyttelton Times*, December 9, 1865, 3; C.f. Thornton, *Bridging the Gap*, 35, which states that the bridge was built 1864-65.

⁷ "Extracts from Mr E. Blake's Report," *Lyttelton Times*, January 9, 1866, 2.

⁸ William Wilson, "Christchurch Impressions of Westland," *The Press*, May 12, 1866, 2.

⁹ *The Press*, March 23, 1866, 2.

¹⁰ *Ibid*; "The West Canterbury Goldfields," *Lyttelton Times*, June 21, 1866, 2.



Figure 1: First Bridge over the Taipo River, March 1868. Auckland War Memorial Museum (AM), PH-ALB-86.

The plan to divert the river back under this bridge did not succeed. Efforts were described as an “endeavor for more than two years, at the cost of the County, to divert the river under the bridge, where at times a considerable number of men, horses, and drays were employed, all to no purpose.”¹¹ The Taipo River continued to represent an inconvenience and danger for travellers. In October 1866 it was reported that floods had caused the second stream to become “as full as the main stream, thus rendering the passage difficult.”¹²

Following flood damage in March 1868, tenders were called in August 1868 for an addition (also reported as repairs) to the bridge.¹³ This was narrower than the original structure, with piers 12m apart rather than 9m as before.¹⁴ In July 1869 councillors of the Westland County Council said the Taipo Bridge was “nearly useless in the first place” and “dangerous on frosty mornings through its slipperiness.” It represented a huge maintenance cost, crossed only the smallest of five forks and one councillor

¹¹ “The Taipo Bridge,” *West Coast Times*, June 29, 1871, 2.

¹² “Town and Country,” *Lyttelton Times*, October 18, 1866, 2.

¹³ *West Coast Times*, March 19, 1868, 2; *West Coast Times*, August 8, 1868, 3; *West Coast Times*, August 10, 1868, 2.

¹⁴ “The Taipo Bridge,” *West Coast Times*, June 29, 1871, 2.

“believed it would soon be swept away.”¹⁵ It appears the river diverted entirely into the second channel, as in 1871 it was reported that “the main body of water [of the Taipo] had found a more convenient channel, and now the bridge ... is high and dry.”¹⁶ It was washed away completely by floods in late October 1872.¹⁷ Note that there is conflicting information on this – some recollections of travel after this date do include this bridge, and in 1873 a correspondent to the *West Coast Times* fervently insisted that the bridge had never been washed away.¹⁸

Other measures were taken to facilitate continued movement over the Taipo. In December 1868 it was reported that “there had been a very neat wire bridge erected across the Taipo, for the convenience of foot passengers.”¹⁹ (Figure 2) Passengers would cross on this suspension bridge while the coach forded the river. This bridge formed an essential link in the West Coast but was inconvenient and dangerous for travellers and was damaged or washed out multiple times (and presumably repaired/re-built).²⁰ A Canterbury Schoolmaster described his Christmas vacation 1872-1873 experience of the Taipo:

There are three streams to be crossed; the first is by a substantial wooden bridge, the second is easily forded, and for the third the passengers alight and walk across a wire suspension bridge which, though not pleasant, is exceedingly convenient; whilst the driver fords the stream with the empty coach. Two smaller streams are soon afterwards crossed, the Wainini and the Rangiriri, whose waters are very clear, and then the road becomes very rough from the effect of floods.²¹

¹⁵ “The County Council,” *West Coast Times*, July 24, 1869, 2.

¹⁶ “The Arahura Suspension Bridge,” *West Coast Times*, June 21, 1871, 2.

¹⁷ NZ Press Association Telegrams, *Evening Star*, November 1, 1872, 2.

¹⁸ “The Traveller: My Holiday Trip,” *Press*, March 14, 1873, 6; “The Taipo Bridge,” *West Coast Times*, June 29 1871, 2; “The Taipo Bridge,” *West Coast Times*, June 30, 1871, 2.

¹⁹ “Hokitika Election,” *West Coast Times*, December 2, 1868, 2.

²⁰ “Local and General – Serious Flood,” *Star*, February 26, 1870, 2; *West Coast Times*, October 10, 1870, 2; *West Coast Times*, December 1871, 2.

²¹ “The Traveller: My Holiday Trip,” *Press*, March 14, 1873, 6. It is sometimes difficult to determine exactly which structure is being discussed in primary material, as the suspension bridge was also referred to as the ‘Taipo Bridge’ or ‘bridge over the Taipo River.’



Figure 2: Wire Suspension Bridge over Taipo River. Taipo River, wire bridge, by Burton Brothers studio. Te Papa (C.025195)

The Taipo River remained a dangerous hurdle for travelers to and from the West Coast, along with the poor state of the road. In May 1876 drovers and the Provincial Engineer agreed that “[a] bridge across the Taipo is very much wanted.”²² In April 1877 the Westland County Council included the construction of a new bridge over the Taipo in their estimate for new works and, on the motion of Cr. Richard Seddon, resolved to call tenders for the same.²³ However in June the Resident Engineer Charles Yelverton O’Connor (1842-1902) reported that it would be necessary to bridge the whole span of the river, rather than just the site of the existing suspension bridge, and probably to move the road as well.²⁴ This would cost £3000-£3500 against a budget of £1400 and the Council decided “to take no action in the matter of a bridge for the present.”²⁵

In February 1881 The Waste Lands Board created an 18 acre bridge and ferry reserve at the Taipo, as recommended by the Chief Surveyor.²⁶ The issue of a bridge was mentioned to central government at various times but it was not until 1882 that any funding was made available.²⁷ In January of that year the Minister of Mines

²² “The Christchurch Road,” *West Coast Times*, May 2, 1876, 2; “The Hokitika and Christchurch Road,” *West Coast Times*, May 4, 1876, 2; “The Christchurch Road,” *West Coast Times*, May 6, 1876, 2.

²³ “Westland County Council,” *West Coast Times*, April 11, 1877, 2; “Westland County Council,” *West Coast Times*, April 12, 1877, 2.

²⁴ “Westland County Council – Consulting Engineer’s Report,” *West Coast Times*, June 20, 1877, 2.

²⁵ “Westland County Council,” *West Coast Times*, June 23, 1877, 2.

²⁶ “Waste Lands Board,” *West Coast Times*, February 17, 1881, 2.

²⁷ *West Coast Times*, July 20, 1878, 2; “Westland County Council – Ordinary Meeting,” *West Coast Times*, May 16, 1879, 2; “Visit of the Minister of Public Works to Hokitika – County Council,” *West Coast Times*, March 16, 1880, 2.

William Rolleston was asked for funds for the bridge by the Westland County Council.²⁸ Although it was reported in May that construction was to be undertaken,²⁹ it was not until September that the requested £6000 was granted for the bridge by parliament in the Public Works Estimates.³⁰ In March 1883 it was reported that the Minister of Public Works had decided to construct a timber bridge with cylindrical piers.³¹ Calls for tenders for the Taipo Bridge timber contract appeared in April 1883.³² Milling of the timber began in July 1883.³³

In September and October 1883 there was dispute, relayed through the newspapers, as to whether the Taipo was the best route to take the road. Those petitioning for a change in route were motivated by those landowners and residents who would personally and economically benefit from the train running via their properties to Greymouth rather than Hokitika. Debates about the suitability of each route and the cost of alternatives featured in the newspapers.³⁴ Most of the criticism for a change appeared in the Hokitika newspaper *West Coast Times*, so many correspondents will naturally have opposed a scheme to divert the highway from their town.

Work on the timber contract stalled in December 1883 when it became mired in litigation.³⁵ The bridge was further delayed by the non-arrival of the iron cylinders for the piers from England.³⁶ Work on the timber contract proceeded but after the pier cylinders arrived from London there were further delays in tendering the contract for moving them from Wellington to Hokitika, and then to the construction site.³⁷ After four months in Wellington they arrived in Hokitika in January 1885.³⁸ Work was again delayed by no availability of air-compressing equipment, which was to be used to drill

²⁸ "Visit of the Minister of Mines – Westland County Council – New Works," *West Coast Times*, January 24, 1882, 2.

²⁹ *Grey River Argus*, May 31, 1882, 2.

³⁰ "West Coast Times" and "Parliamentary News," *West Coast Times*, September 9, 1882, 2.

³¹ *West Coast Times*, March 2, 1883, 2.

³² *Grey River Argus*, April 16, 1883, 1.

³³ *West Coast Times*, July 3, 1883, 2; "Enterprise," *The Press*, July 17, 1883, 2.

³⁴ *Grey River Argus*, September 4, 1883, 2; *West Coast Times*, September 27, 1883, 2; *West Coast Times*, October 18, 1883, 2.

³⁵ *West Coast Times*, December 4, 1883, 2.

³⁶ *West Coast Times*, February 7, 1884, 2.

³⁷ *West Coast Times*, February 28, 1884, 2; *Grey River Argus*, March 1, 1884, 2; "Taipo Bridge Timber Contract," *West Coast Times*, March 4, 1884, 2; *West Coast Times*, March 14, 1884, 2; "Parliamentary News," *West Coast Times*, August 12, 1884, 2; "Notes from Wellington," *West Coast Times*, August 18, 1884, 2; "From our Correspondent," *West Coast Times*, August 18, 1884, 2.

³⁸ *West Coast Times*, January 31, 1885, 2; "Local Public Works," *West Coast Times*, March 25, 1885, 2.

the cylinders into the riverbed and which was to be loaned to the contractor by the Government as per the contract.³⁹

The bridge was designed by Francis William Martin (1855-1895), Resident Engineer at the PWO in Greymouth from 1880-1887.⁴⁰ The contract specifications under his name were dated 28 November 1884 and his signature appears on the plans.⁴¹ Tenders were called through April 1885⁴² and the contract was awarded to John Murray Watson of Greymouth for the sum of £5,972-3-0 and accepted on 8 May 1885.⁴³ The completion date was to be 8 March 1886.⁴⁴

Work was underway in December 1885 when gear was lost in a sudden flood and a carpenter was injured by a falling tree branch in a separate incident.⁴⁵ The air-compressor and other machinery arrived in January 1886, at which point sinking of the piers commenced.⁴⁶ However this precipitated a strike, as the use of the machinery was used to justify a reduction in wages.⁴⁷ The piers were completed in April 1886.⁴⁸ Although the contractor had filed for bankruptcy in May the bridge was swiftly completed.⁴⁹ It was crossed by the coach for the first time on 16 June 1886.⁵⁰

The *Grey River Argus* concluded:

...one more dangerous crossing-place has been disposed of ... The footbridge by which passengers used to cross was a poor sort of an affair, though it was an immense improvement upon passengers taking the risk of crossing in the coach.⁵¹

³⁹ "Westland County Council," *West Coast Times*, February 19, 1885, 3; "Bridge, with approaches, over the River Taipo: Specifications," 1. Archives New Zealand, ACHL 19111 W1/1479 70/12/57/2 pt 2 [R21070659].

⁴⁰ F. W. Furkert, *Early New Zealand Engineers*, (Wellington: A. H. & A. W. Reed, 1953), 221-222.

⁴¹ "Specifications," 3. Archives New Zealand, ACHL 19111 W1/1479 70/12/57/2 pt 2 [R21070659]; "Hokitika-Christchurch Road: Bridge over River Taipo," Drawings No. 1-4. Archives New Zealand, CABA CH86/18 GR1580 [R20231592].

⁴² "Tenders – New Zealand Roads," *Grey River Argus*, April 6, 1885, 1.

⁴³ "Taipo Bridge Contract," *West Coast Times*, May 13, 1885, 2; "Taipo River Bridge with Approaches Contract." Archives New Zealand, ACHL 19111 W1/1479 70/12/57/2 pt 2 [R21070659].

⁴⁴ "Taipo River Bridge with Approaches Contract." Archives New Zealand, ACHL 19111 W1/1479 70/12/57/2 pt 2 [R21070659].

⁴⁵ *West Coast Times*, December 15, 1885, 2; *West Coast Times*, December 21, 1885, 2.

⁴⁶ *Grey River Argus*, January 20, 1886, 2.

⁴⁷ *West Coast Times*, February 23, 1886, 2.

⁴⁸ *West Coast Times*, April 24, 1886, 2.

⁴⁹ "District Court," *Grey River Argus*, May 10, 1886, 2.

⁵⁰ *West Coast Times*, June 17, 1886, 2.

⁵¹ *Grey River Argus*, June 17, 1886, 2.

There were conflicting reports as to whether the approaches were damaged in heavy rains in November 1886.⁵² It did sustain damage in July 1887, and again in April 1889.⁵³ The timber work was renewed in 1906-1907, and the timber trusses underwent repairs in 1926 and 1932.⁵⁴ In 1934 an inspection found that large parts of the timber work were in urgent need of replacing.⁵⁵ However it was decided not to proceed and instead to replace the entire deck with a steel plate girder deck supported on the existing piers.⁵⁶ Re-construction started in November 1935 and the new bridge was opened in September 1936.⁵⁷

The bridge piers may have extra significance due to association with the engineer Charles Yelverton O'Connor (1842-1902) (Figure 3). O'Connor was an Irish engineer who immigrated to New Zealand in 1865 and was soon Assistant Engineer to the Canterbury Provincial Council, working under Edward Dobson. He spent the better part of 15 years as an engineer on the West Coast, mostly under the PWO. His projects included laying out the Otira Gorge section of the West Coast road.⁵⁸ He became Under-Secretary of the PWO in 1883 and transformed the position into one of significant power.⁵⁹ In 1891 he moved to Western Australia where he designed the Fremantle Harbour extension and the Coolgardie Water Supply, both hugely significant works of engineering.⁶⁰

⁵² *West Coast Times*, November 12, 1886, 2; "Telegrams – United Press Association," *Evening Post*, November 13, 1886, 2.

⁵³ *West Coast Times*, July 11, 1887, 2; *West Coast Times*, April 12, 1889, 2.

⁵⁴ "Arthurs Pass-Kumara Main Highway: Taipo River Bridge." Letter from Chairman, No. 12 District Highways Council, Greymouth, to the Chairman, Main Highways Board, Wellington, 14th December 1931. Archives New Zealand, CABA 3140 CH130/Box77 18/57/4 [R20477854].

⁵⁵ "Arthurs Pass-Kumara Main Highway: Taipo River Bridge." Letter from Acting Chairman, No. 12 District Highways Council, Greymouth, to the Chairman, Main Highways Board, Wellington, April 9, 1934. Archives New Zealand, CABA 3140 CH130/Box77 18/57/4 [R20477854].

⁵⁶ "Arthurs Pass-Kumara Main Highway: Taipo River Bridge." Letter from Acting District Engineer, Greymouth, to Overseer Cooper, Public Works Department, Hokitika, May 2, 1934, "Taipo River Bridge." Letter from Acting District Engineer, Greymouth, to the Permanent Head, P. W. Wellington, February 5, 1935. Archives New Zealand, CABA 3140 CH130/Box77 18/57/4 [R20477854].

⁵⁷ "Taipo Bridge Completed," *Press*, September 26, 1936, 7.

⁵⁸ John Pollard, "O'Connor, Charles Yelverton," Dictionary of New Zealand Biography, first published 2010, *Te Ara - the Encyclopedia of New Zealand*, updated 10 Dec 2013, accessed March 28, 2018, <https://teara.govt.nz/en/biographies/2o1/oconnor-charles-yelverton>

⁵⁹ Pollard, "O'Connor, Charles Yelverton,"; Rosslyn J. Noonan, *By Design: A brief history of the Public Works Department Ministry of Works 1870-1970*, (Wellington: A. R. Shearer, Government Printer, 1975), 42-44.

⁶⁰ Furkert, *Early New Zealand Engineers*, 235.



Figure 3: Charles Yelverton O'Connor, ca.1897. State Library of Western Australia [8292B/A/25623-2].

O'Connor was indirectly involved with the bridge construction, as he was Under Secretary of the PWO at the time. He communicated with the Westland County Council on issues concerning the timber contract and the pneumatic equipment transfer.⁶¹ Authors Frederick Furkert and Geoffrey Thornton state that O'Connor choose the site of the bridge and determined that the bridge should be designed to carry railway because he believed that the proposed West Coast railway should and/or would take that route. On this basis the IPENZ plaque recognizes the piers as a 'memento' to O'Connor.

O'Connor did not directly design the bridge, although in 1882 a Westland County Councillor said that "[i]n 1878 Mr O'Connor the District Engineer had plans prepared; and the bridge at that time, was to be immediately constructed."⁶² However, according to the newspapers in 1878, O'Connor had considered the site and proposed with estimates three possible sites for a bridge spanning the whole river.⁶³ It was on the strength of O'Connor's estimates (which were more than twice the Council's budget) that the project was abandoned until funding could be procured from central government.⁶⁴ It does not appear that any plans were made at that time. Comparing the (abridged) report on possible sites that O'Connor made to the County Council in 1877, and the site plan on the 1885 drawings it is possible that the site of

⁶¹ *West Coast Times*, February 14, 1884, 4; *Grey River Argus*, March 1, 1884, 2.

⁶² "Visit of the Minister of Mines – Westland County Council – New Works," *West Coast Times*, January 24, 1882, 2.

⁶³ "Westland County Council – Consulting Engineer's Report," *West Coast Times*, June 20, 1877, 2.

⁶⁴ "Westland County Council," *West Coast Times*, June 23, 1877, 2.

the bridge is that which O'Connor recommended.⁶⁵ It is also possible that O'Connor directed or influenced Martin's design as Martin was under O'Connor's direction at the PWO, although they worked in separate offices at the time. The two were associated on several projects and Martin was later O'Connor's senior assistant in Western Australia.⁶⁶

The West Coast railway only became a possibility in 1884, and it would not be completed until 1925.⁶⁷ O'Connor was the inspecting engineer on the Royal Commission on the West Coast railway, appointed 1883. It reported that Arthur's Pass was the only possible route but also that the railway should not proceed as it would not be profitable.⁶⁸ The rail line does go through Arthur's Pass but passes through Inchbonnie rather than crossing the Taipo.

⁶⁵ "Westland County Council – Consulting Engineer's Report," *West Coast Times*, June 20, 1877, 2; "Hokitika-Christchurch Road: Bridge over River Taipo," Drawing No. 1. Archives New Zealand, CABA CH86/18 GR1580 [R20231592].

⁶⁶ Furkert, *Early New Zealand Engineers*, 222.

⁶⁷ Ivan D. Taylor, *The Road to the West Coast: A history of the road over Arthur's Pass*, (Palmerston North: Heritage Press Ltd, 2005), 86.

⁶⁸ Taylor, *The Road to the West Coast*, 87.

Social narrative

The Taipo Bridge is socially significant because of its place on the highway between the East and West Coasts of the South Island. The West Coast road, as built in 1865-6, was intended to be an economic, political and social link between the two areas.⁶⁹ However, the road did not succeed in diverting the wealth of the coast through Christchurch as was hoped. Most settlements continued to deal directly with Australian ports due to lower shipping costs and the hazardous nature of the road.⁷⁰ The Taipo Bridge piers were built long after the gold rush had dissipated. However, the road remained an important connection for produce, passengers, and mail.⁷¹

The lack of a reliable bridge over the Taipo was a significant obstacle to travel and transportation. There were two recorded drownings in the Taipo in the 1860s.⁷² The Taipo River is a wide, fast flowing river with large boulders in the river bed. It was difficult to ford and flooded frequently. In 1866 it was said that “travellers of every class will have lately been pleased to observe an advertisement calling for tenders for a bridge...”⁷³ The danger of the Taipo was often commented on in newspaper travel logs, especially noting the name meaning ‘demon’ or ‘devil’ in Maori.⁷⁴ It was said: “[The Taipo] river is considered the most dangerous in the whole journey from the rapidity of its current and the roughness of its bottom.”⁷⁵

Before 1886 other solutions to crossing the Taipo failed to mitigate the danger and inconvenience. Before the first bridge, the two shillings to cross on the postman’s flat-bottomed boat was a literal (and resented) cost to travellers.⁷⁶ The first bridge represented a significant cost to the local district, as maintenance by Westland County Council was said to be “about £20,000” or more by 1871.⁷⁷ The construction

⁶⁹ *The Press*, March 23, 1866, 2.

⁷⁰ Carl Walrond, “Roads - Why roads were built”, *Te Ara - the Encyclopedia of New Zealand*, updated 13 Jul 2012, accessed March 28, 2018, <http://www.TeAra.govt.nz/en/roads/page-2>

⁷¹ *Ibid.*

⁷² “Return of the Names of Persons Drowned in New Zealand from the 1st January 1840,” Appendix to the Journals of the House of Representatives, 1870 Session I, D-46.

⁷³ “From Christchurch to Hokitika,” *The Press*, January 11, 1866, 2.

⁷⁴ “A Trip to the West Coast,” *Otago Daily Times*, October 14, 1876, 1; “A Trip across the New Zealand Alps,” *Auckland Star*, January 3, 1885, 4; “Christmas on the West Coast Road,” *Star*, January 21, 1885, 3.

⁷⁵ “The Traveller: My Holiday Trip,” *Press*, March 14, 1873, 6.

⁷⁶ “From Christchurch to Hokitika,” *Press*, January 11, 1866, 2.

⁷⁷ “The Arahura Suspension Bridge,” *West Coast Times*, June 21, 1871, 2; also see “The Taipo Bridge,” *West Coast Times*, June 29, 1871, 2; “The County Council,” *West Coast Times*, July 24, 1869, 2.

of the wire bridge, though preferable to the dangers of fording in the coach, also presented a hassle and danger to passengers.⁷⁸

Delays in the Christchurch to Hokitika mail were the most frequent and wide-spread social impact of the unbridged Taipo River.⁷⁹ As the bridge was being completed in April 1886 the *Grey River Argus* commented, almost wryly:

The overland mail from Christchurch did not arrive last evening. No doubt some of the rivers are up. It cannot be the Taipo this time, as that bridge is now across, and out of hand.⁸⁰

When the bridge deck was being replaced it was apparent that the bridge was still critical for the transport of mail, and still extremely difficult and dangerous to ford. Indeed it was considered that “the use of a ford is out of the question in this river.”⁸¹

The construction of the 1886 bridge had a social impact. As a source of employment, it was hoped that the construction would attract new people to the area.⁸² Construction damaged the road considerably, thus hindering travel that would eventually be assisted.⁸³ There was also an incidence of strike during the driving of the cylinders for the piers, as workers objected to a deduction in wages when the pneumatic machinery arrived.⁸⁴

The social significance of the Taipo Bridge is that it provided safe and reliable crossing over the river for people, produce, and communications, a function that it continues to serve.

⁷⁸ *Grey River Argus*, June 17, 1886, 2.

⁷⁹ For example: *West Coast Times*, March 19, 1868, 2.

⁸⁰ *Grey River Argus*, April 22, 1886, 2.

⁸¹ “Arthurs Pass-Kumara Main Highway: Taipo River Bridge.” Letter from Board’s Representative, Greymouth, to the Chairman, Main Highways Board, Wellington, February 25, 1935. Archives New Zealand, CABA 3140 CH130/Box77 18/57/4 [R20477854].

⁸² *West Coast Times*, May 20, 1885, 2.

⁸³ “Westland County Council,” *West Coast Times*, August 14, 1884, 2.

⁸⁴ *West Coast Times*, February 23, 1886, 2.

Physical narrative

The existing Taipo River bridge is a single-lane steel plate girder bridge that rests on four of the original eight concrete cylinder piers. Geoffrey Thornton, engineering historian, describes this as ‘a most unusual arrangement.’⁸⁵ The bridge is still used by road traffic on State Highway 73, meaning that it continues to form a critical link for travel to and from the West Coast.⁸⁶



Figure 4: Taipo River Bridge, November 2014. IPENZ.

The Taipo River Bridge piers are concrete-filled cast iron cylinders. Only four of the six sets of piers were concrete-filled cylinders, the two extreme piers being bed logs with a concrete foundation at pier number 1 and four timber piles, capped and hooped with iron, at pier number 6.⁸⁷

The cast iron cylinders were 11m tall and specified to be 25mm thick. From top to base, each cylinder consisted of:

- one moulded cap of cast iron 2.3m diameter and 16mm thick

⁸⁵ Thornton, *Bridging the Gap*, 100.

⁸⁶ NZ Transport Agency, "Media Releases: Short term roadworks – Taramakau, Taipo and Rough Creek bridges," January 27, 2016, accessed March 28, 2018, <http://www.nzta.govt.nz/media-releases/short-term-roadworks-taramakau-taipo-and-rough-creek-bridges/>

⁸⁷ "Specifications," 1-2. Archives New Zealand, ACHL 19111 W1/1479 70/12/57/2 pt 2 [R21070659].

- three 2.4m lengths of cylinder with 1.8m diameter
- one taper ring 1.2 m deep (changing the cylinder diameter between 1.8m and 2.4m); and
- one bottom ring 2.4 m deep with a 2.4 m diameter.⁸⁸ (Figure 4)

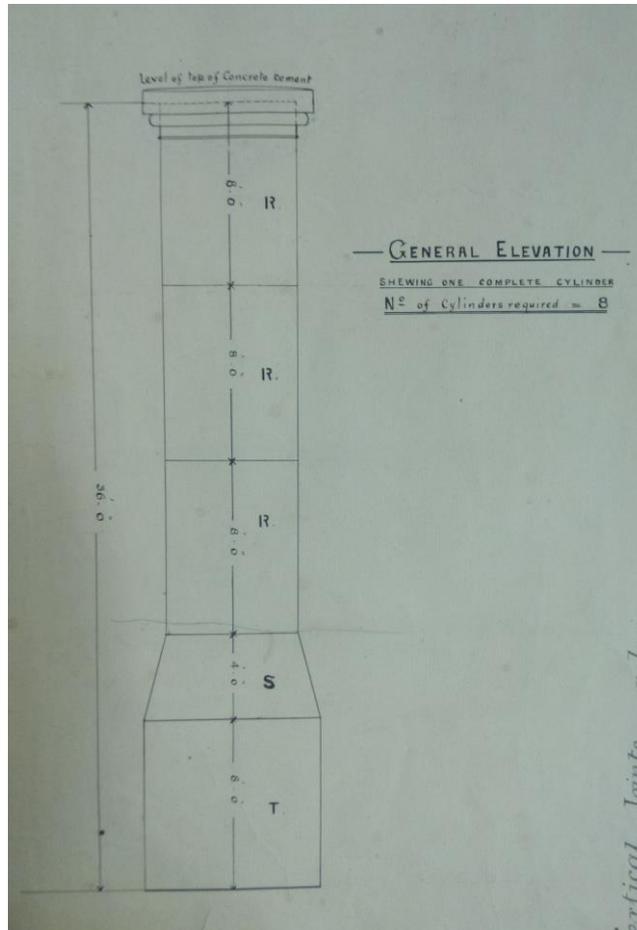


Figure 5: Detail of pier plan, 1885. 'Hokitika-Christchurch Road: Bridge over River Taipo,' Drawing No. 2, Archives New Zealand/Te Rua Mahara o te Kāwanatanga Christchurch Regional Office [Archives Reference: CABA CH86/18; R20231592].

The cylinders were sunk with pneumatic equipment (air lock, receiver, and pumps) that was lent to the contractor by the government.⁸⁹ The cylinders were to be excavated of material and then filled with concrete.⁹⁰ The specifications state that “[c]ement concrete shall consist of 5 parts approved stone, broken to pass through a 50mm ring, 2 parts clean, sharp river sand, and 1 part approved Portland cement.”

⁸⁸ “Specifications,” 1-2. Archives New Zealand, ACHL 19111 W1/1479 70/12/57/2 pt 2 [R21070659]; “Hokitika-Christchurch Road: Bridge over River Taipo,” Drawing No. 2, Archives New Zealand, CABA CH86/18 GR1580 [R20231592].

⁸⁹ “Specifications,” 1-2. Archives New Zealand, ACHL 19111 W1/1479 70/12/57/2 pt 2 [R21070659]; *Grey River Argus*, January 20, 1886, 2.

⁹⁰ “Specifications,” 1-2. Archives New Zealand, ACHL 19111 W1/1479 70/12/57/2 pt 2 [R21070659].

The concrete was to be rammed to ensure that the concrete became flush with the cylinder interior.⁹¹ An archived drawing suggests that the cylinders were filled with two classes of concrete, although it is not clear what these were.⁹²

The iron cylinders were imported from England and caused significant delays to the project. In February 1886 it was reported that two of the eight cylinders had been sunk into the river stream and filled with concrete. The depth was extended by 0.6m when the specified depth only hit shingle and wash-dirt.⁹³ The piers were reported to be finished in mid-April 1886.⁹⁴

Following the reconstruction of the bridge in 1935-1936, only four of the original eight concrete-filled cast-iron cylinders remain. Two sets of piers were assimilated into the new abutments and the four remaining piers were modified to hold the steel plate girders. Each segment had two 2'6" by 5'6" segments cut out with oxygen flame (Figure 6).⁹⁵

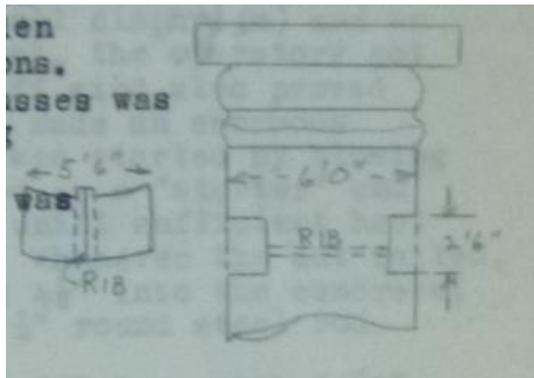


Figure 6: Detail of report on cutting of piers, 1936. 'Cast Iron Cutting Helps Bridge Alterations,' Archives New Zealand/Te Rua Mahara o te Kāwanatanga Christchurch Regional Office [Archives Reference: CABA 3140 CH130/Box77; Archives New Zealand, R20477854].

Concrete-filled cast-iron cylinders were not an uncommon form of bridge pier in this period. Thornton says that "at the very least ten bridges were built in New Zealand using this method between 1869 and 1885."⁹⁶ One such bridge was the Cobden Road Bridge, a PWO project with which O'Connor and Martin were also involved. It

⁹¹ "Specifications," 3. Archives New Zealand, ACHL 19111 W1/1479 70/12/57/2 pt 2 [R21070659].

⁹² "Hokitika-Christchurch Road: Bridge over River Taipo," Drawing no. 2. Archives New Zealand, CABA CH86/17 GR1456 [R20231544].

⁹³ *West Coast Times*, February 23, 1886, 2.

⁹⁴ *West Coast Times*, April 24, 1886, 2.

⁹⁵ "Cast Iron Cutting Helps Bridge Alterations," attachment to "Re Taipo River Bridge," letter from District Engineer to F. D. Tonkin, the Acetone Illuminating & Welding Co. Ltd., Christchurch, 28 September 1936. Archives New Zealand, CABA 3140 CH130/Box77 18/57/4 [R20477854].

⁹⁶ Thornton, *Bridging the Gap*, 98.

was built at approximately the same time as the Taipo Bridge. Cobden Road Bridge suffered a major mid-construction collapse due to flood in January 1885. It was opened and stood alongside the Cobden Rail Bridge until both were replaced and demolished in the early 2000s.⁹⁷

Key physical dates

1885	Construction began
1886	Construction completed
1935	Re-construction began
1936	Re-construction completed

⁹⁷ "Borough Council," *Grey River Argus*, January 9, 1885, 2; *Grey River Argus*, January 30, 1885, 2; "Borough Council," *Grey River Argus*, June 26, 1885, 2; "Borough Council," *Grey River Argus*, November 21, 1885, 2; see picture, West Coast New Zealand History, "Photograph: The demise of the old Cobden Bridge," accessed May 3, 2016, <http://westcoast.mobile.recollect.co.nz/nodes/view/5689>; see IPENZ Engineering Heritage New Zealand, "Cobden Railway Bridge (demolished)," accessed May 3, 2016, <https://www.engineeringnz.org/our-work/heritage/heritage-records/cobden-railway-bridge/>

C. Assessment of significance

The Taipo River bridge piers are a tangible reminder of bridge engineering development in New Zealand. They are remnants of concrete-filled cast iron cylinder piers, a popular bridge construction method from 1869 to 1885. The modification and incorporation of the piers into the existing bridge structure is an unusual example of adaptation demonstrating resourcefulness and lateral thinking.

The piers are significant because they remain in continued use for their original purpose: For over 120 years they have performed their structural function to provide a safe crossing for vehicles over the fast-flowing flood-prone Taipo River, demonstrating design endurance and achievement.

The piers are also significant for the social impact they had in connecting Christchurch with the West Coast. Travel and communications between these centres were reliant on this route and the Taipo River bridge piers afforded enduring safe passage over a dangerous and changeable river.

Therefore, the Taipo River Bridge Piers are of sufficient engineering heritage significance to merit inclusion on the IPENZ Engineering Heritage Register.

D. Supporting information

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