OLD MĀNGERE BRIDGE

HERITAGE MANAGEMENT PLAN AND SALVAGE PLAN

17 June 2019

Old Māngere Bridge

HERITAGE MANAGEMENT PLAN / SALVAGE PLAN

Final: 17 June 2019

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For

New Zealand Transport Agency

Cover photograph: *Looking south from just west of Māngere Bridge showing Māngere Mountain (right background) and the bridge (left) Auckland Libraries Heritage Collections, 4-2646, photographer JD Richardson.*

Document History

Draft Revision 1- Oct 2018- Draft Historic overview

Draft Revision 2- 7 March 2019-Revisions based on initial feedback from Matt Felgate and Ann Neil. Draft policies and salvage recommendations included.

Draft Revision 3 -26 March 2019- Revisions based on comments from Ann Neil.

Draft Revision 4-17 June 2019 – Revisions to include photographic record.

Final Revision: 17 June 2019

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1.0 INTRODUCTION

1.1 Project Overview

The Old Māngere Bridge is over 100 years old and has been deteriorating for some time. As the bridge has aged, the New Zealand Transport Agency (NZTA) has monitored its condition closely and undertaken measures to keep it open for use while reducing risks to public safety. Ongoing inspections have shown that there is continuing deterioration in its condition and that mitigation measures are no longer sufficient to be confident about the bridge's condition. To ensure the safety of people, the Old Māngere Bridge was permanently closed on 25 November 2018. The Old Māngere Bridge is a much-loved facility and an important link between the Onehunga and Māngere Bridge communities and this decision has not been taken lightly.

New Zealand Transport Agency (NZTA) is replacing the Old Māngere Bridge to provide the community with a safe, high-quality walking and cycling connection between the Onehunga and Māngere Bridge communities and a safe place for fishing. The new bridge was consented in mid-2016 and involved significant community involvement. Retaining and fixing the old bridge was considered, however this was not possible due to the age of the structure and the degree of deterioration. The Old Māngere Bridge will be demolished during the construction of the new bridge. Leaving it in the harbour is not an option as it poses a risk to people passing underneath it.

The historical significance of the Old Māngere Bridge and the surrounding area has been a key influence in the design of the new bridge. In recognising the historical significance of the old bridge NZTA has worked closely with Heritage New Zealand Pouhere Taonga (HNZPT).

It is intended to recycle materials from the old bridge to be used as design and interpretive features on the new bridge and the abutments of the old bridge will be retained as a memory of the structure.[1]

This Heritage Management Plan and Salvage Plan has been prepared to guide the salvage process for parts of the bridge structure to be demolished, and conservation and management of the abutments which will remain.

1.2 Purpose of this Heritage Management Plan/ Salvage Plan

The purpose and scope of the Heritage Management Plan and Salvage Plan is to:

- Undertake further targeted research to understand repairs and changes made over time to the bridge and causeways.
- Carefully inspect, photograph and record the existing Old Māngere Bridge
- Summarise the history and significance of the Old Māngere Bridge, based on existing research reports, the targeted research and inspection to understand components that are important to the historic significance of the structure.
- Identify sections or components of the bridge that could potentially be salvaged and integrated into new design concepts to commemorate the bridge and assist with understanding and interpreting the significance of the structure.
- Develop policies for the conservation and management of the abutments which will remain and be integrated into the approach to the new bridge.

The bridge structure is in a deteriorated and fragile condition and therefore the salvage strategy will need to be developed iteratively in conjunction with recording work and demolition work, and with involvement of heritage agencies, to identify elements of the structure that are sufficiently robust to be feasibly salvaged.

It is intended that Draft Heritage Management Plan/ Salvage Plan will be included with tender documentation for the project, to ensure that the contractor makes appropriate allowance for the skills and time required to further develop this strategy and undertake the demolition and salvage works, and relocation of salvaged items to their final locations after any interim storage.

Further to the proposed demolition of the OMB, the stone and concrete Railway Overbridge at the northern (Onehunga) end of the bridge is also to be recorded.

1.3 Methodology

The Heritage Management Plan and Salvage Plan has generally been prepared in accordance with International Council on Monuments and Sites (ICOMOS[2)] New Zealand Charter guidance on documentation and archiving and recording.

Documentary and physical research have been undertaken to provide a basis for understanding the history of the structure and changes made over time.

A staged approach is required because, while research, recording and inspection will identify components recommended for salvage, the feasibility of salvaging components will need to be discussed with the Contractor, and agreed with New Zealand Transport Agency, Heritage advisors and the design team for the New Old Māngere Bridge.

Stage 1 includes preparation of an archaeological Authority application to HNZPT, targeted research, site inspection, visual survey and recording, preparation of measured drawings, photographic record and preparation of the Draft Heritage Management Plan/ Salvage Plan report to summarise significant components, and identify elements recommended for potential salvage.

Stage 2 includes review of recommendations with New Zealand Transport Agency, the Project Team, heritage advisors, and Contractor to consider feasibility of recommended extent of salvage and amending report to reflect the agreed approach.

Following the appointment of contractor requirements for intrusive investigation and materials sampling, appropriate storage, and the detailed methodology for salvage and demolition are to be developed.

The Heritage Management Plan and Salvage Plan will be further developed after the appointment of a contractor. It is intended that HNZPT, Auckland Council, key consultants, and the contractor (including relevant subcontractors) will all be involved.

1.3 Re-use of elements and Interpretation

Salvaged elements from the OMB are to be potentially reused as landscape features and furniture, providing an ongoing tangible connection with, and commemoration of, the structure. Providing interpretative material for the salvaged elements will be a key aspect of their reuse.

The development of interpretive material relating to the OMB should be consistent with interpretive material developed as part of the Onehunga Foreshore Restoration, and that the salvage strategy and interpretive material should be reviewed by HNZPT and Auckland Council before finalisation.

1.4 Identification of Contributors

The Heritage Management Plan/ Salvage Plan has been prepared by Dr Matthew Felgate, Mātai Taonga Ltd, Historic Heritage and Archaeology Services in conjunction with Matthews & Matthews Architects Ltd. Research has been carried out by historian Lisa Truttman.

Reference has been made to *The Old Māngere Bridge Replacement Project Archaeological and Heritage Assessment* prepared by Dr Matthew Felgate, Opus International Consultants Ltd, April 2015, and the *Addendum OMB Heritage Assessment S92 Response* by Dr Matthew Felgate (January 2016).

1.5 Acknowledgements

The assistance of the following people and organisations in the preparation of this report is gratefully acknowledged:

Sir George Grey Special Collections, Auckland Libraries

Auckland Council Archives

Archives New Zealand

New Zealand Transport Agency

2.0 HISTORICAL ACCOUNT

2.1 History of the site

Figure 1:Looking south along Māngere bridge towards Māngere Mountain. Photograph by CT Wilson. Auckland Libraries Heritage Collections, 7-A17765.

Māori settlement was extensive in this part of Auckland, especially along the northern banks of the Manukau Harbour at Onehunga.[3] The Onehunga shoreline was an important location for food gathering, seafaring activity, occupation and recreation.[4] The colonial township was established at Onehunga in 1847 as a 'fencible' settlement, intended to control movement between the north and south shores of the Manukau as part of the strategy for the defence of Auckland. Other Fencible settlements were established at Howick, Panmure and Ōtāhuhu.

Onehunga beach was an important early trading location. Infrastructure including jetties, wharfs, port facilities, and industries were established in Onehunga during the nineteenth century. A wharf was established off the south-west side of Te Hōpua ā Rangi in the late 1850s.[5] 'A more substantial timber wharf was built in 1865, replacing the original wharf. Subsequently an all-tide wharf was built at the southern rim of Te Hōpua ā Rangi. [6] Residential, commercial and industrial development gradually replaced earlier agricultural land uses. The port at Onehunga rivalled that of Auckland Waitematā Harbour facilities.

Roads to Auckland were very basic from the 1840's but after the introduction of the Highways Act in 1862, improvements were undertaken. The main routes were tar-sealed by the 1870s. Horse-drawn buses began service in the 1870's, with more extensive motorised bus services available by the 1920s. The connection of a rail line in 1873, and later the tram service to the city also encouraged growth and change.[7]

In 1875 the first Māngere Bridge was opened, linking Onehunga to Māngere.[8] Onehunga was proclaimed a borough in 1877.[9]

By the early 20th century the population of Onehunga was around 3000. Industries included a woollen factory, tanneries, sawmills, iron foundries as well as a branch on the Auckland Kauri Timber Company.[10] In 1901 a new Post Office was being built and there were a number of churches and schools in Onehunga.

At that time there was considerable shipping at the port, even though the wharf accommodation was described as insufficient. Steamers and other vessels operated constantly from Onehunga to other New Zealand ports. [11] The Auckland Harbour Board took control of the Onehunga port in c.1912.[12]

In 1915, the first wooden Māngere Bridge was replaced by a new concrete bridge. Later expansion of the rail network and construction of roads and motorways diminished the importance of the port at Onehunga, although it remained an important stop on the main overland route.

Figure 2:View of Māngere Bridge looking towards Onehunga, 1930, Auckland Libraries Heritage Collections, FDM-0475-G, photographer F D Mill.

Māngere was the location of a significant Māori population during the 1840s, and through to the 1860s. There were a number of Māori living at Ihumatao where the Wesleyan mission station was established. European settlement at Māngere appears to have begun in the 1840s when the government began dividing land in the Manukau area into farms for sale.[13] The first public transport service at Māngere was a ferry that connected the area with Onehunga from 1847.[14]

In the late 1840s Sir George Grey encouraged Te Wherowhero, chief of Ngati Mahuta from the Waikato, to settle with his people at Māngere. In 1849 Te Wherowhero and 120 of his people signed an agreement with Grey to provide military protection for the city of Auckland from the Māngere base. Similar to the other Fencible settlements, Māori fencibles received land to live on and cultivate, and after seven years' service were given a title to the property. Te Wherowhero relocated to Ngaruawahia in 1858 when he was appointed the first Māori king. The Māori fencible settlement at Māngere continued in Te Wherowhero's absence for another five years.[15]

Around the mid-1850s the Māori population of Māngere was around three or four times larger than the European.[16] However, within a decade that would all change; the rise of the Māori King movement was seen as a threat to British sovereignty. In July 1863 Governor Grey demanded that all Māori living between Auckland and Waikato take an oath of allegiance to Queen Victoria or face expulsion to the south of the Mangatawhiri stream.[17] Few Māori stayed at Māngere, and within days the invasion of the Waikato by imperial forces had begun.[18] After the Waikato War some Māori returned to the area and settled at Pukaki and Ihumatao.[19]

Figure 3: View north form the foot of Māngere Mountain across the Māngere area in c.1910. Shows Māngere Bridge and the rural character of the area at that time. Auckland Libraries Heritage Collections, 35-R235, photographer FG Radcliffe.

Māngere was largely a farming community in the late nineteenth century and for the first half of the twentieth century. The grid of streets at Māngere Bridge is associated with the Fencible settlement and is shown on a map of confiscated land, dating from 1868. (SO 234). The original large blocks were progressively subdivided over time.[20]

The Māngere Bridge area was an early locale of suburban development. The opening of the first Māngere Bridge in 1875 provided a good link between the northern part of Māngere and Onehunga which had a busy port and was a centre of industry that was well-connected with the city by rail.[21]

The connection to Onehunga was improved when the second Māngere Bridge was opened in 1915 providing a connection for vehicular traffic.

Aviation at southern Māngere dates back to 1928 when the Auckland Aero Club was established on a Māngere farm.[22] In 1955, Māngere was announced as the location for Auckland's new domestic and international airport.[23] Work commenced in October 1960[24]

Māngere Bridge was an important part of the road connection to the airport from Auckland City. However, by the early 1960s it was considered that the 1915 bridge would not cope with increasing volumes of traffic. [25] Plans for a new bridge were drawn up in 1964 and a decade later work finally began. Work was hampered by industrial disputes resulting in the contractor being declared bankrupt. It was with considerable relief that the bridge was finally opened on 19 February 1983.[26] The existing bridge was retained for pedestrian traffic.

In 1951 work began on the southern motorway and in 1955 the section connecting Redoubt Road with the city was opened.[27] Māngere, however, was located some distance from the southern motorway route. In the 1990s an airport branch of the south-western motorway was built. [28]

2.2 Construction of the 1875 Māngere Bridge

Figure 4:View of the first Māngere Bridge, looking across the harbour from Onehunga, ca 1907. Auckland Libraries Heritage Collections, Footprints 01128, photographer WT Wilson.

The Onehunga and Māngere Company was formed in 1866, for "the erection and maintenance of a Bridge across the Manukau from Onehunga to Māngere and the Conveyance thereby of Passengers with or without horses Cattle Carriages and other Vehicles and the Carriages of all other sorts and descriptions of goods and chattels between Onehunga and Māngere and the adjacent Districts …" [29]

Designs were called for by public competition, won by James Stewart who proposed two designs: a wooden girder bridge on piles, and an iron girder bridge on stone piers. [30] The company lapsed however, and the project was abandoned at least in part due to lack of firm commitment from the Auckland Provincial Council in the form of a grant or subsidy towards the cost of the bridge at that time. [31]

A 300-signature petition by both Onehunga and Māngere residents in 1869 to the Provincial Council led to the formation of a select committee into the matter of a bridge across the harbour. The committee recommended that a causeway be constructed, and that funding for ongoing maintenance should come from the granting of the freehold of 375 acres of land in Māngere that had been confiscated from local Māori during the Waikato War, so that the ensuing sale of the land could fund the bridge's construction. They also suggested that Māngere Mountain be made endowment land to fund ongoing maintenance of the bridge. [32] In place of the suggestion of retaining the confiscated land for sale, however, the Colonial Secretary pledged £15,000 under the Public Works Act toward the cost of the Māngere Bridge and urged in 1872 that the construction commence as soon as possible. [33]

In December 1872, the easternmost part of Allotment 17 of Section 30, Village of Onehunga [34] and the westernmost part of Allotment 16 [35] were transferred to the Crown for the northern approaches to the prospective bridge.

On James Stewart's 1872 plan for the Public Works Department, a preferred approach from the Onehunga side just to the west was indicated (which would have used the future Clyde Ironworks site), but the line chosen ran parallel to that on the existing stonework wharf further west. [36]

Tenders were advertised in January 1873, and the following description of the prospective bridge appeared in the newspapers:

"The bridge will cross the Manukau by a total length of 2,680ft (over half a mile). On the Onehunga side there will be an embankment 540 ft. long, and on the Māngere side there will be an embankment, run out to deep water, 1,340ft, long. Both these embankments will be substantially constructed and faced on each side with stonework 6 feet thick. Between the extreme end of each embankment there will be an intervening space of 800ft, which will have to be bridged over, the depth of water being too great to permit the embankments being continued at a reasonable cost.

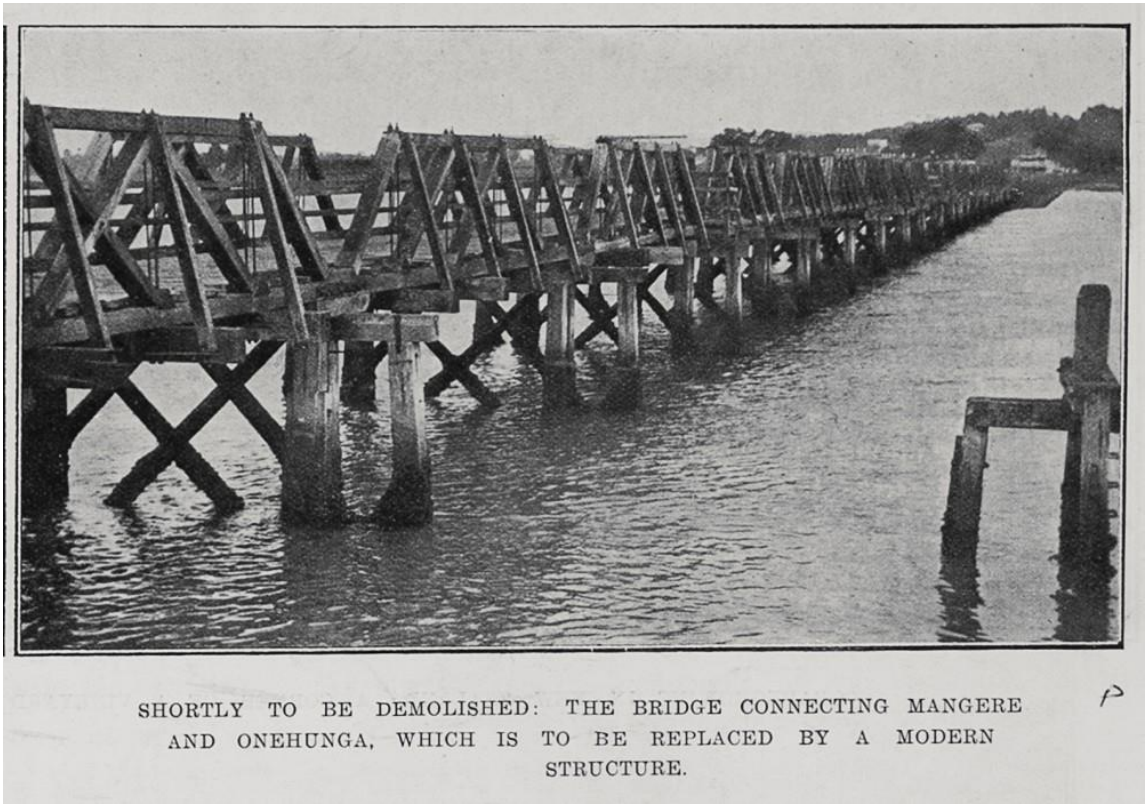
This space will be spanned by 20 arches, each having a span of 40ft. This portion of the bridge will be supported on 21 rows of piles of jarrah timber. The width of the bridge will take five piles at each row, so that 105 jarrah piles will have to be used, many of which will require to be over 30ft in length. The tops of these piles will be about level with low water, and truss-work will be constructed on the top of them, and the roadway of the structure raised to about 5ft. above high water. The roadway on the top of the bridge and embankments will be 20ft broad. On the Onehunga side the grade to the timber portion of the bridge will be 1 in 25. The approach to the bridge on the Onehunga side will cross the railway line with an iron bridge, having three spans, one of 17ft and two of 21ft each." [37]

The line of the prospective bridge was officially proclaimed a road under the provisions of the Immigration and Public Works Act 1870 on 21 April 1873. [38] Construction of the approaches to the bridge on the Onehunga side began in June that year. [39]

According to a correspondent for the *NZ Herald*, light scoria "*from the Government Reserve at the back of the Telegraph Office*" was dumped *"into the harbour below high-water mark."* [40] By February 1874, the stonework for the approaches from both shores had reached low water mark, [41] and the construction of the first bridge was completed by early January 1875, [42] with traffic allowed on it from 14 January. [43] A wire post-and-rail fence was erected on the approaches to the bridge from late March that year. [44]

Figure 5:View of the first Māngere Bridge taken from the Onehunga side, c. 1907. Ernest Auckland Libraries Heritage Collections, Footprints 01120, photographer E De Tourret.

Figure 6:Crossing Māngere Bridge. New Zealand Graphic, 12 September 1903. Auckland Libraries Heritage Collections, NZG-19030912-760-4.



SHORTLY TO BE DEMOLISHED: THE BRIDGE CONNECTING MANGERE AND ONEHUNGA, WHICH IS TO BE REPLACED BY A MODERN STRUCTURE.

Figure 7:Auckland Weekly News 24 July 1913. View of the timber Māngere Bridge 'shortly to be demolished.' Auckland Libraries Heritage Collections, AWNS-19130724-42-4.

2.3 The Second Bridge- Opened 1915

By 1906, the wooden bridge was in a state of disrepair, and with the loss of what land the government had provided as an endowment towards the costs of maintenance, this burden fell equally onto both the Onehunga Borough Council and the Māngere Road Board.

At a conference of representatives from the two authorities held in November 1906, it was decided to seek a report from the Onehunga Borough engineer, H H Metcalfe, on the bridge. [45]

Metcalfe found that the bridge's superstructure *"was very much decayed"* and unsafe for loads of over two tons to be taken across. [46] Over the course of more conferences between the two authorities over the next few years, it was decided that a preferred option was the construction of an embankment bridge across the harbour, which had been approved by engineers, but a detailed report by Metcalfe in 1910 put the total cost of such a proposal at £103,000.

This proposal was then abandoned by the two authorities, [47] but remained preferred by others, until May 1911 when Māngere ratepayers adopted a resolution that the design of a ferro-concrete bridge by engineer Robert Forbes Moore (c1865-1938) be accepted.[48]

> *"THE MĀNGERE BRIDGE.*
> *As the result of a conference between the Onehunga Borough Council and the Māngere Road Board, it was decided last September to approve, of Mr. Moore's (engineer) plans, etc., for a new ferro-concrete bridge to replace the present wooden structure connecting' Onehunga with Māngere. The estimated cost of the proposed 30ft wide bridge was £13,000, plus £500 for contingencies and £1000 for engineering fees. …… The plans for the structure were approved of by the Minister, but provision had to be made for a lifting span in the bridge [49]. The deputation was informed that it was probable that the Government would assist in building the bridge. Since then plans have been prepared to be submitted to the various local bodies interested in the Māngere Bridge, and whom it is proposed to cite as parties who should contribute towards the cost of the new structure. On Tuesday evening a deputation of the Māngere Road Board, headed by Mr. Mackenzie, waited upon the Council and discussed the position, when a suggestion was approved of that the stone-work approaches to the bridge should be widened at an estimated cost of £2000. Finally, it was decided that the solicitors to the Onehunga Borough Council and Māngere Road Board should be supplied by Mr. Howe and Mr. Mackenzie with all the information available, so that everything may be placed in order for the Commission to deal with the allocation of the cost of the bridge between the various local bodies to be named, the latter to be placed also in possession of copies of the bridge plans and the estimate of cost. " [50]*

The addition of a swing-span, to accommodate marine traffic from both the proposed Tamaki Canal and Otahuhu, was abandoned at a commission of inquiry into distribution of costs held in March 1913. [51]

At this time, it appeared that the new bridge was intended to incorporate the existing embankment/causeways constructed in the 1870s.

> *"The approach to the Māngere Bridge from the southern side is now being widened to the full width of 50ft preliminary to the reconstruction of the bridge in ferro-concrete. A filling of scoria and soil is being used, and already four or more chains have been widened. The building of the new bridge will not be started for some weeks yet. When the work is finished, the approaches and the deck of the main structure will follow one easy grade from the Māngere side to the level of the railway bridge at the Onehunga end, and the present steep grade from the latter point to the entrance to the bridge will be obviated."* [52]

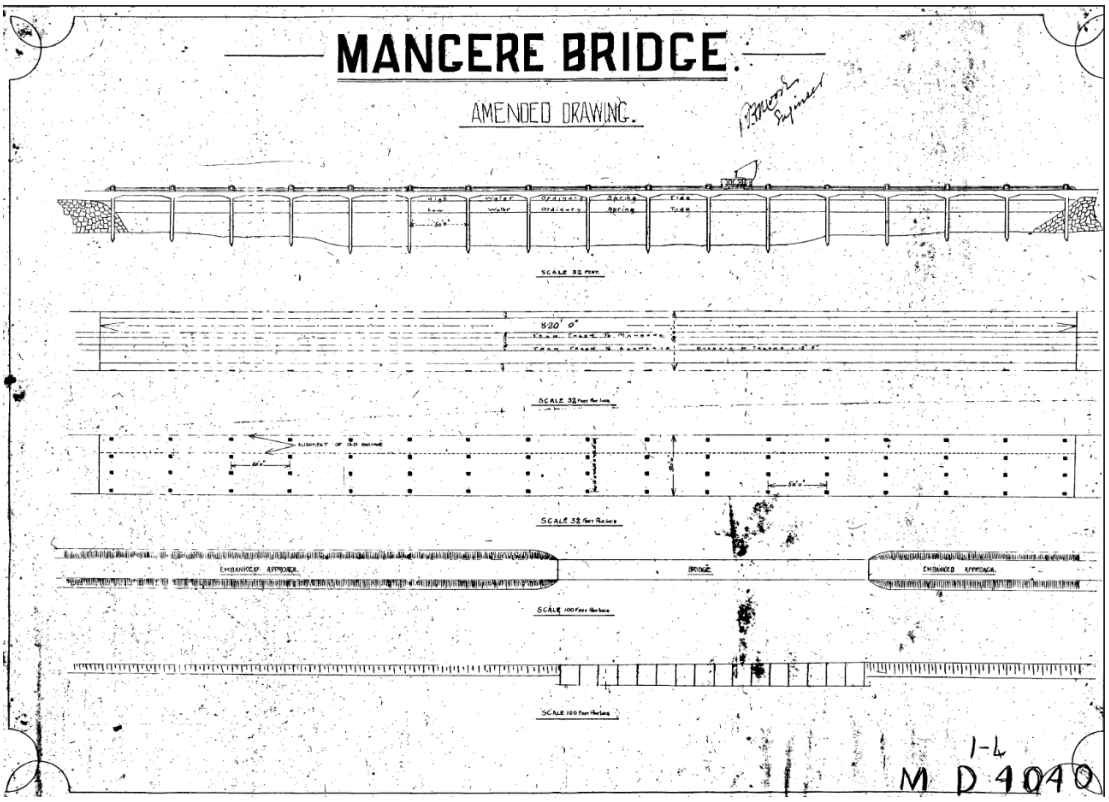


Figure 8: Drawing for the Māngere Bridge by RF Moore, Engineer. Marine Department (MD), courtesy Auckland Council Heritage Unit.

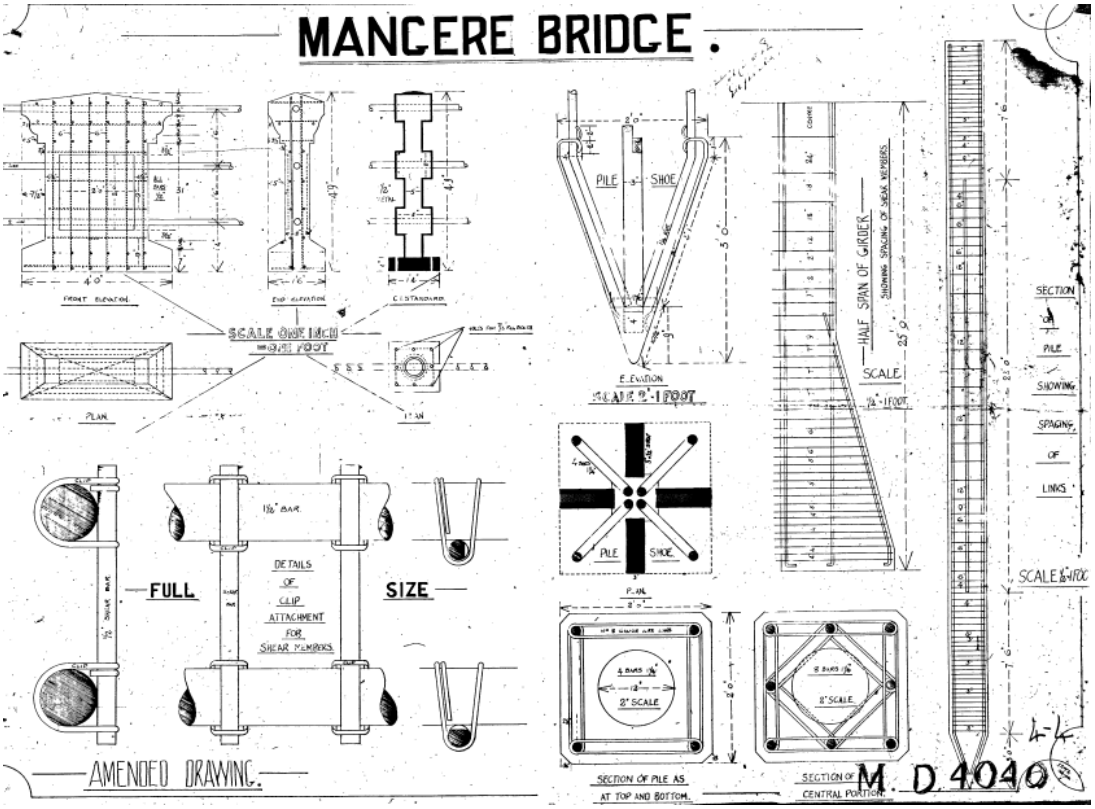


Figure 9: Details for the Māngere Bridge by RF Moore, Engineer. Marine Department (MD), courtesy Auckland Council Heritage Unit.

Moore, now acting as engineer for the Māngere Road Board who were the controlling authority for the bridge, advertised tenders for the bridge in August 1913. [53] Ship-builder, owner and marine contractor George Niccol (1860-1940) was awarded the contract for £22,574. [54] Niccol was also the contractor for the later second Panmure Bridge, also designed by Moore.[55]

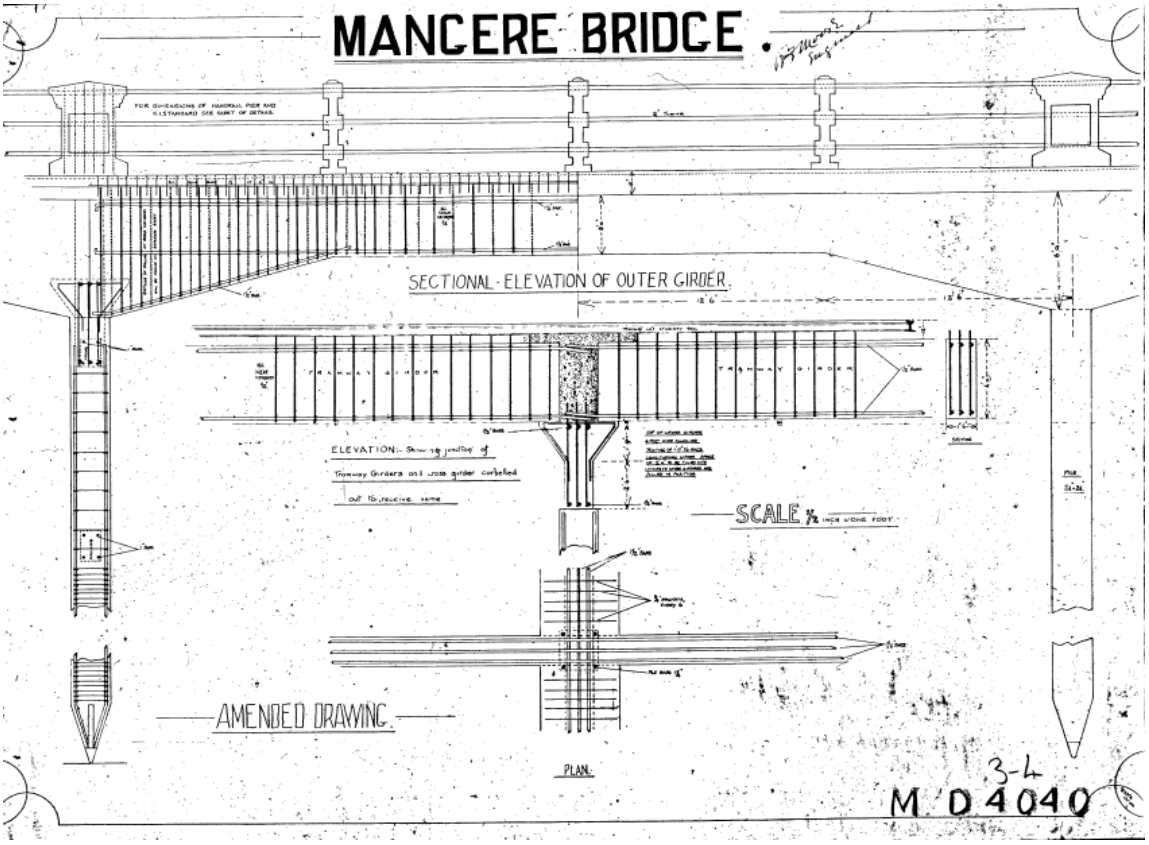


Figure 10: Details for the Māngere Bridge by RF Moore, Engineer. Marine Department (MD), courtesy Auckland Council Heritage Unit.

The prospective new bridge was described in June 1914:

"The new bridge will be built in reinforced concrete. It will be 820ft long and 50ft wide, and will have approaches of the same width, filled with scoria, from each end. That at the Onehunga end will be 300ft long, and that on the Māngere side 1500ft in length. The total length of the bridge and approaches will be 2670 ft. Unlike the present bridge, which is flat, the new structure will have a slope of 1ft in 100ft from the Onehunga railway bridge to the Māngere shore.

"The main structure will be built in spans of 50ft, the girders being 8ft deep and 15in wide, carried by columns 24ft square at the top and half that size at the base. The decking will be 12in thick, and provision will be made for a double tramway track and a footway 6ft in width on each side of the carriage-way. The balustrading will be formed of concrete piers and iron piping.

In order that traffic across the present bridge may not be interfered with during the construction, the new bridge will be built in two sections. The portion above the present wooden structure will be completed first, and the old bridge will then be demolished and the new one completed." [56]

A span of 75 feet was allowed for, in case the Tāmaki canal to the Manukau Harbour eventuated. [57]The bridge design was described as 'exceedingly handsome', with reinforced concrete balustrades lining the whole length of the approaches.[58]

2.4 Railway Overbridge

It was initially planned not to widen the Onehunga-side approach to the bridge, but the Auckland Harbour Board advised that with the new bridge being 50 feet wide on completion, the existing 40 feet wide approach (the old bridge being 20 feet wide) would prove too narrow for expected traffic.

Accordingly, the railways department were approached with regard to widening the overbridge. [59] Filling for the widening of the approach was underway by April 1914, [60] but work came to a standstill while negotiations proceeded regarding the work across the railway. [61] Eventually the Minister for Railways agreed to transfer a strip of land to the Māngere Road Board, who were then able to gain control of the northern approach to the new bridge. As well, the Board came to an agreement with Mrs Margaret Johnstone, whose store obstructed the top corner of the approach from Queen Street.[62] The Board purchased her interest in Allotment 16, and agreed to remove her store, as well as other buildings on the site, [63] for which they obtained full title in 1915. [64] This also allowed for the approaches to the bridge at the Onehunga end to be sweeping curves from off Queen Street. [65] The Board built a new shop for Mrs Johnstone, [66] which she and succeeding proprietors leased from the Board (and later Manukau County Council).

When the Railways Department came to an agreement regarding the bridge over the railway line at Onehunga in September 1914, they settled on a new ferro-concrete bridge, 50 feet wide and 3 feet higher than the existing. [67] Plans for the overbridge were approved by Māngere Road Board in January 1915. [68]

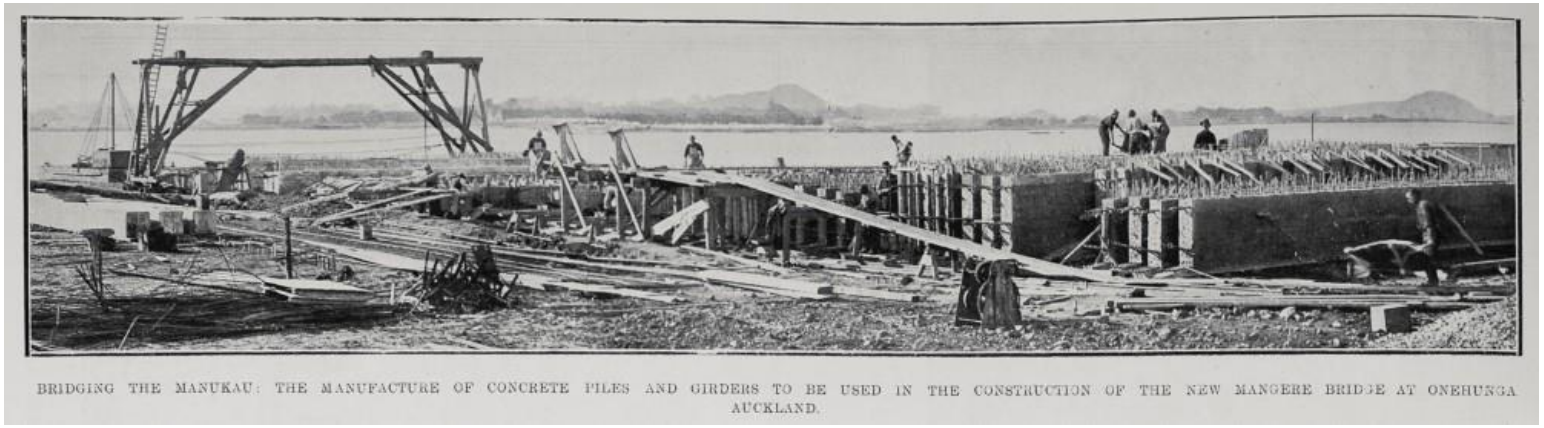
2.5 Construction of the Māngere Bridge 1914-1915

The first pile for the new bridge was driven at the Onehunga end on 20 June 1914. By October 1914 construction was well underway. 72 piles were required to support the bridge, and these were driven by a 4 ½ ton hammer around 25-30 feet into a hard, composite base. After the piles were driven, the cross heads were formed and allowed to remain for a period before the girders were placed on them.[69]

The bridge was constructed in two sections; the first section comprising the full length and a width of 35 feet, ran parallel to and within a few feet of the old structure. When this was complete, traffic was to be diverted to the new structure allowing the old structure to be demolished and the concrete bridge built to its full width of 50 feet. The bridge, with its reinforced concrete balustrades, was described as ‘exceedingly handsome’.[70]

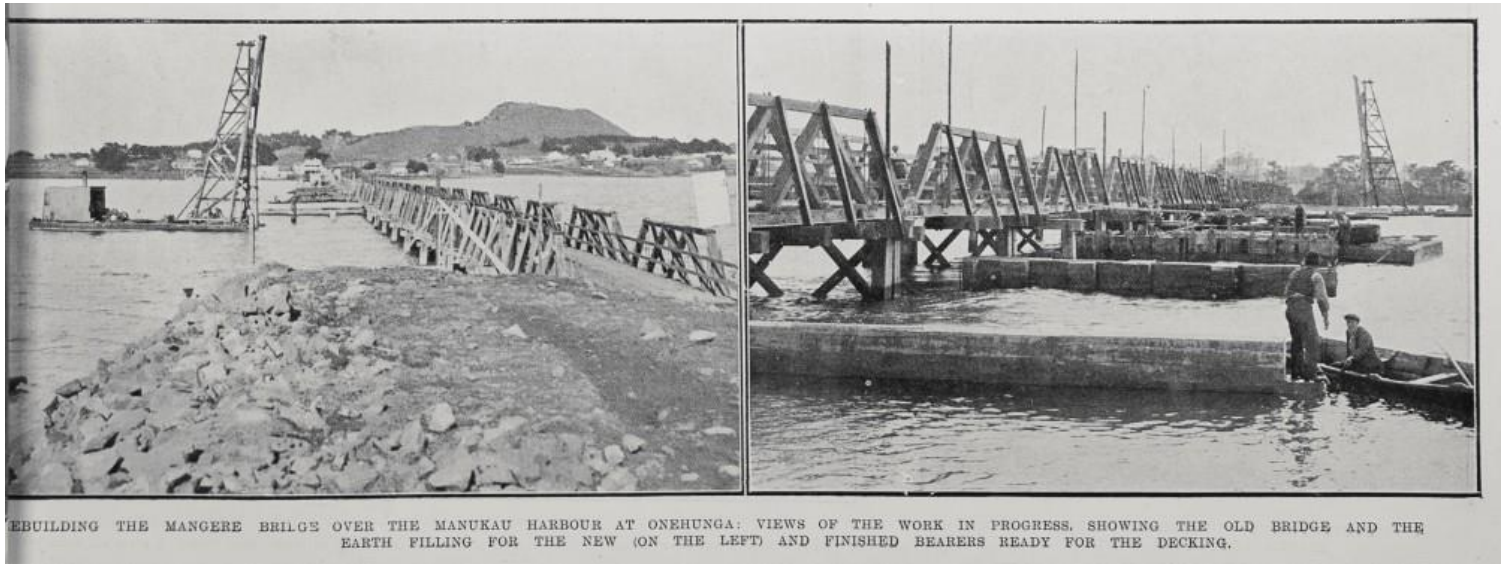
By early January 1915 the first half was complete, along with breastwork on the northern side, and the old wooden bridge was closed on 5 January. Filling for the approaches at Onehunga was still continuing, some of the material coming from an existing embankment.[71]

The cement used in the structure was supplied by Wilson’s Portland Cement Co. Ltd of Auckland.[72]



BRIDGING THE MANUKAU: THE MANUFACTURE OF CONCRETE PILES AND GIRDERS TO BE USED IN THE CONSTRUCTION OF THE NEW MANGERE BRIDGE AT ONEHUNGA AUCKLAND.

Figure 11:View of concrete piles and girders to be sued in the construction of the new Māngere Bridge, Auckland Weekly News, 11 June 1914. Auckland Libraries Heritage Collections, AWNS-19140611-42-1.



EBUILDING THE MANGERE BRILGE OVER THE MANUKAU HARBOUR AT ONEHUNGA: VIEWS OF THE WORK IN PROGRESS, SHOWING THE OLD BRIDGE AND THE EARTH FILLING FOR THE NEW (ON THE LEFT) AND FINISHED BEARERS READY FOR THE DECKING.

Figure 12: Auckland Weekly News 30 July 1914 Showing the rebuilding of the Māngere bridge over the Manukau Harbour at Onehunga with the old bridge and the earth filling for the new (left) and finished bearers ready for the decking. Auckland Libraries Heritage Collections, AWNS-19140730-51-6

Dismantling of the old bridge, sold to the contractor Niccol for £150, proceeded after its closure.

"The decking is first removed, and then the stringers are cut through immediately above the piles. The bridge is removed in sections by aid of a derrick, capable of lifting 18 tons. The balustrading is taken off from each side, and then the frame, or trestle, with its cross pieces, is lifted bodily off the piles and placed on a punt. The piles are then removed, and the whole of the timber is being removed to the Māngere beach. It is estimated that the whole structure could be removed in a week in this way if the work continued without interruption." [73]

2.6 Opening of the Bridge - May 1915

By the end of April, all but 300 feet of the western side of the new bridge at the Māngere end had been completed. [74] It was officially opened 31 May 1915 by the Prime Minister, William Massey. [75]

Figure 13: Second Māngere Bridge at the time of its opening in May 1915. Courtesy Māngere Bridge Library Collection, Auckland Libraries Heritage Collections, Footprints 01132, photographer W T Wilson.

Figure 14: The scene after the opening of the second Māngere Bridge by Prime Minister William Ferguson Massey on 31 May 1915. Auckland Libraries Heritage Collections. Footprints 04404, photographer F Clayton.

Within two weeks of the opening, *"serious settling of the abutment pier at the Onehunga end"* of the bridge, as well as abutment cracking at that end, and settling of piers at the Māngere end were noted in a report by the overseer for the Public Works office in Auckland. [76] A letter dated 14 August 1915 to the District Engineer suggested Moore be asked why diagonal bracing of the piles as designed had been omitted[77]. Moore responded to say the diagonal bracing was left out due to the short vertical distance between the bottom of the cross head and the bottom waling. As the cross head was so deep, Moore considered bracing would serve no useful purpose.[78]

Moore assured the office that all cracks and defects had been fixed; however, in September, more defects and cracks in the decking were noted by the department. [79] In July 1916, the Public Works engineer-in-chief recommended inspection checks of the bridge *"to catch any increase in cracks or alteration of level."* [80]

By June 1917, it was noted that the Onehunga end of the bridge was continuing to sink, with the eastern side sinking more than the west. [81] Parts of the eastern embankment at the Onehunga end were damaged by a winter storm in 1918 and had to be repaired by refilling with spalls. [82]

The Māngere Road Board merged with Manukau County Council in the middle of 1919; the County Engineer approached the Public Works office with his own concerns about the uneven sinking of parts of the Māngere Bridge in September 1921. [83]

2.7 Subsequent Repair and Change

In 1925, another of the County Council's engineers reported that the condition of the bridge's structure was not satisfactory. He detailed the break-up of the seawalls on the eastern side of both approaches, as well as the flaking away of concrete from the structure itself, exposing reinforcing rods which were rusting. [84] Two years later, the County engineer repeated his views, adding that now, in his opinion, the abutments were failing badly. Repairs to the deck, abutments, handrails and treatment of exposed reinforcement was urgently required. [85] These repairs were underway as at April 1928.[86]

In 1936, after a number of instances of other temporary repairs, the County Council engineer once again alerted the Council that the Māngere Bridge required extensive maintenance. He recommended considerable re-concreting of some parts of the structure.[87] By April 1937, the County engineer advised the Council that 75% of the main longitudinal girders of the bridge had been affected by deterioration caused by concrete spalling away from and exposing the reinforced steel.

Efforts up to that point to repair this using bitumastic material were now no longer practical in his opinion.[88] Repairs valued at £4500 to the bridge's under-structure began at the Onehunga end in March 1939.

Scaffolding was erected underneath the bridge to provide working platforms for two spans so that the failing concrete could be chipped away, and the steel work cleaned so that the girders could be rebuilt.

Concrete was stripped back to bare the steel, which could be cleaned back as required. Concrete patch repairs were then undertaken to provide a dense cover to the cleaned steel. Where required for repairs to the beams, boxing was framed up in order to cast the concrete repairs. [89]

The handrail generally required repairs including scraping back and covering of steel in the concrete posts and some renewal of the galvanised pipe rail. The surface of the bridge was also repaired where steel was showing and the whole bridge resurfaced with bitumen.

Scouring had occurred at 4 piers at the northern end of the bridge and also at the base of the southern abutment. It was proposed to fill the hollows with large bluestone boulders dumped from a barge into the required position.

The embankment facings were described in 1938 as having been comprehensively repaired a few years prior and remained in good order. [90]

At this point as well, any possibility for the bridge to be used also as a tramway was abandoned, due to structural and traffic concerns.[91] A photograph of repair work in progress featured in the New Zealand Herald in March 1939.[92] By October 1939, repair work had reached the southern end of the bridge, with around two-thirds of the work completed.[93] By February 1940 however, after delays caused by bad weather, there were still three spans to go before repairs were completed.[94]

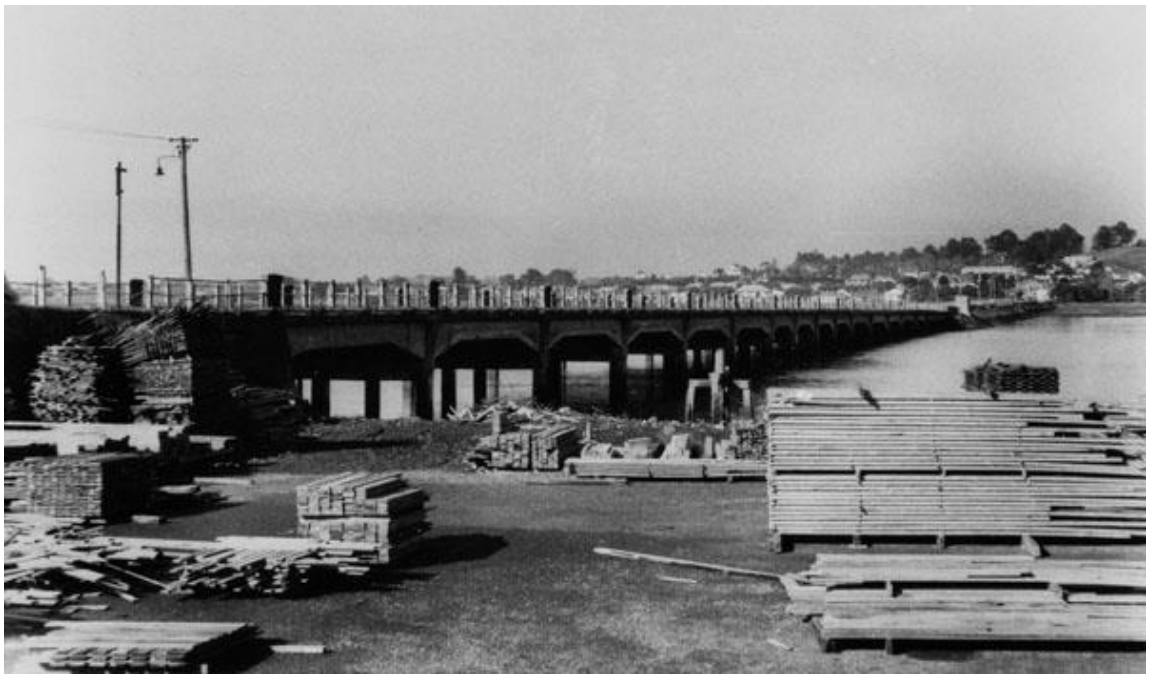


Figure 15: View of the second Māngere bridge taken from the Onehunga side, ca 1955. Auckland Libraries Heritage Collections, photographer unknown, Footprints 04409.

During World War II an anti-tank road block and sentry shelter was established on the OMB, which was part of the nation's defence strategy of protecting key bridges in case of attack and/or invasion. It consisted of slotted concrete pillars either side of the road to take lengths of railway track, and a one-man concrete shelter nearby.[95]

In 1960, the bridge and causeway were designated as part of State Highway 20, and effectively came under the control of the National Roads Board. [96] By 1961, it was increasingly felt that the bridge could no longer cope with increasing traffic levels. [97] Staff from Manukau City Council regularly checked levels at the bridge from 1964. By 1970, a new bridge to replace it had been proposed. [98]

Figure 16: The third Māngere Bridge during construction, 1977. Auckland Libraries Heritage Collections, photographer unknown. Footprints 04411.

Bridge weight restrictions were in force by January 1980, due to weakness in the bridge because of deterioration of some beams caused by corrosion of the reinforcement and spalling concrete.[99] In June repairs to cracks which had opened up in the bridge deck over the beam haunches were undertaken.[100] A report on the live load capacity of the bridge in 1980 noted that the bridge had suffered a history of deterioration throughout its life through the corrosion of reinforcement in the beams and deck and subsequent spalling of concrete. It had also experienced some settlement of piles, possibly during construction and had periodically been struck by ships manoeuvring at the wharf. It received major repairs in 1939-40 which included removal of spalling concrete and corrosion products and addition of new cover concrete. Around 1960 some new piles were installed and further work to repair spalling concrete was commenced. However, this work was stopped as it was considered in too poor condition to repair, and instead a new bridge was to be constructed. [101]

In 1980, with the replacement bridge still not completed due to industrial disputes, 120m long bailey bridges were erected across the badly decaying parts of the old Māngere Bridge to keep traffic flowing via that route until the new bridge was finished. [102] With the bridge finally closing, local residents in 1982 petitioned for its retention for a trial period as a preferred walkway. [103] The old bridge's demolition was postponed indefinitely by the National Roads Board in 1983 due to cost, [104] but various proposals to replace the old bridge with a new pedestrian link have been made since that point.

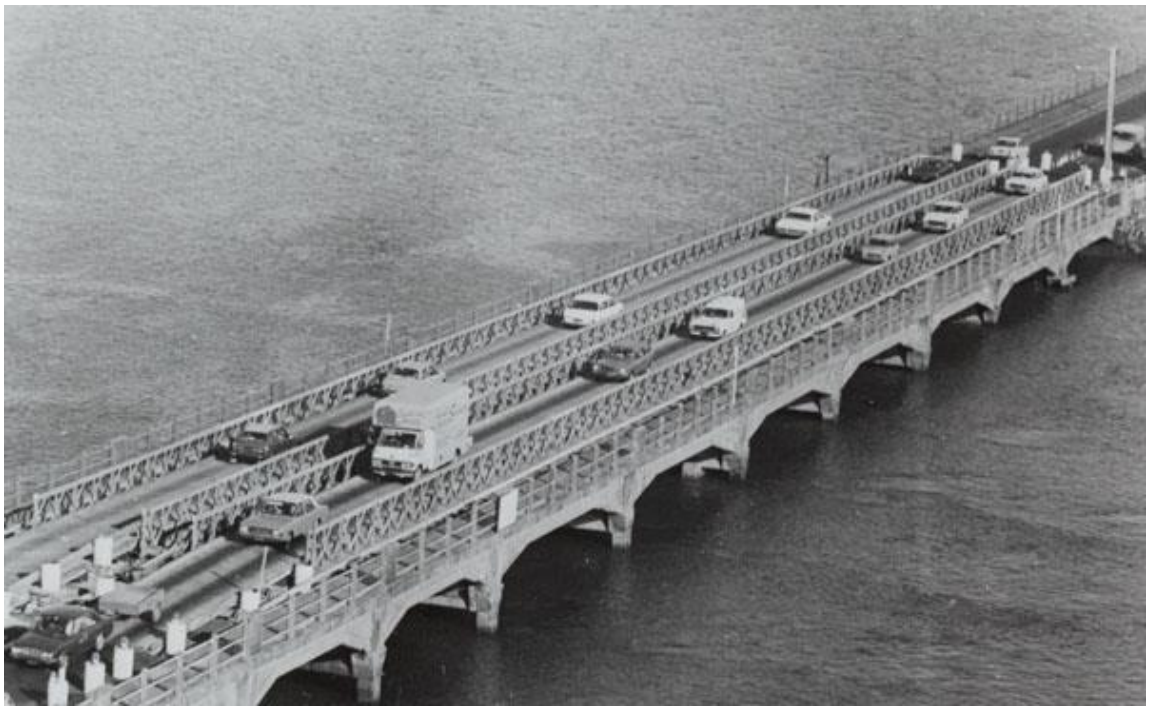


Figure 17: View of the second Māngere Bridge from the third bridge under construction, ca 1980. Note the temporary 'Bailey' bridge over the central span. Auckland Libraries Heritage Collections, photographer unknown. Footprints 01142.

The third Māngere Bridge was officially opened on 19 February 1983.

Figure 18: A group of local residents peruse the display at the opening of the new Māngere Bridge, 19 February 1983. Auckland Libraries Heritage Collections, photographer unknown. Footprints 01148.

2.8 The approaches from Onehunga

The Onehunga end of the first Māngere Bridge (constructed 1874-1875) and the second Māngere Bridge (constructed 1914-1915) involve Allotments 16 (eastern) and 17 (western) of Section 30 of the Village of Onehunga.

Section 30 is the eastern arm of the volcanic basin Te Hopua, and belonged by Crown Grant to Alexander Geddes, after whom the basin was named until it was transformed by reclamation into Gloucester Park in the 20th century.

The road leading first to the ferry landing at Ferry Street in the 1850s, [105] was known as Niger Place in the early 1860s, then Geddes Point Road. In the late 1850s, Geddes subdivided and sold his land there, and Congregational Church minister Rev. Richard Laishley became the owner of Allotments 16 and 17 in 1861. [106]

Part of the land in the middle of the two allotments was taken by the Crown for the approaches to the first Māngere Bridge in 1872, and the foreshore was taken for railway purposes in the 1870s-1880s. [107]

Figure 19:SO 3636 LINZ, Crown Copyright Reserved.

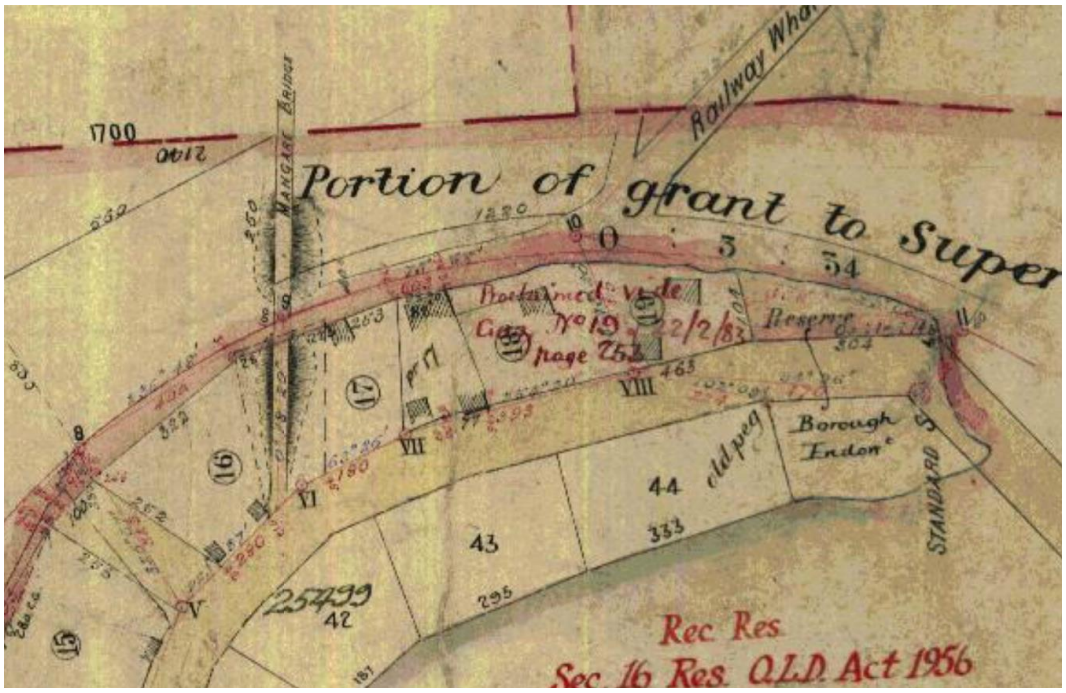


Figure 19:Part of SO 3636, showing Lots 16 and 17. LINZ, Crown Copyright Reserved

In 1879 Laishley, by now a solicitor, divested his interest in the land. Laishley transferred the remainder of Allotment 16 to the east of the bridge to entrepreneur George Vause, added a small angle of Allotment 17 that was on the same side. Vause sold the property to Robert Preston Hollis in 1884, who appears to have been the one who constructed at least three buildings on the allotment, one of which was likely his own home.

By 1915, there was a store, two dwellings and a plumbers' workshop there. [108] Hollis was bankrupt from June of 1886, [109] and the property went through a number of changes of ownership until by 1914 Margaret Johnstone who operated the refreshment kiosk and store at the bridge corner of the property, appears to have had possibly an agreement to purchase with the owner at that time. Māngere Road Board purchased her interest in order to widen the approaches to the new bridge, removed all the buildings, and rebuilt her store at the corner with Ferry Street to the east. [110]

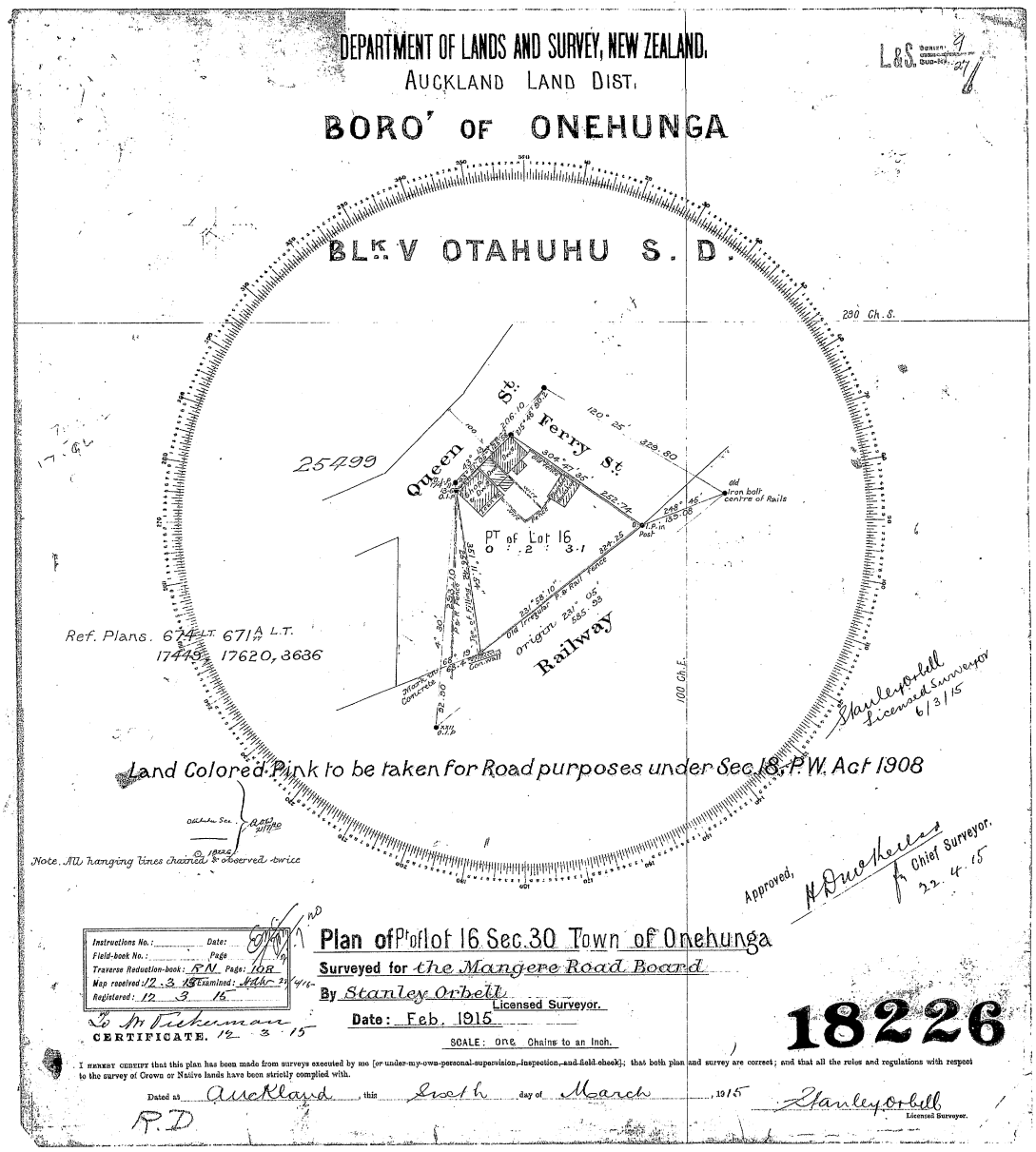


Figure 20: SO 18226 dated 1915. LINZ, Crown Copyright Reserved.

To the west, Allotment 17 was divided in three parts. Next to a strip of land taken in 1872 for part of the bridge abutments [111] the remainder of the allotment was divided in two. Nearest the bridge, Laishley sold land directly to Onehunga boatbuilder Matthew Sims in 1879, [112] but this was not used by Sims himself. His yard appears to have been on Water Street in Onehunga (now known as Wharangi Street). [113]

He leased the property to storekeeper John McMahon, whose shop and dwelling there caught fire and was destroyed in February 1883, along with all buildings used by John McIntyre immediately to the east (the Clyde Ironworks, since around 1870), and a four-storey factory building on Allotment 18 originally built by George Vause in 1875 as a oilskin factory but, at the time, used as offices by the Manukau Steam Ship Co Ltd. [114] The fire completely cleared all three sites; the one just west of the ironworks, site of Vause's factory, appears to have remained vacant into much of the first half of the 20th century. [115]

By December of 1884, at least one dwelling and a small shop had appeared on the Sims site, and McIntyre had rebuilt his ironworks, as well as constructed a dwelling on part of land purchased from Sims. [116] Aerial photos in the mid-20th century show a row of three houses on the Sims property, fronting Queen Street, beside the ironworks property.

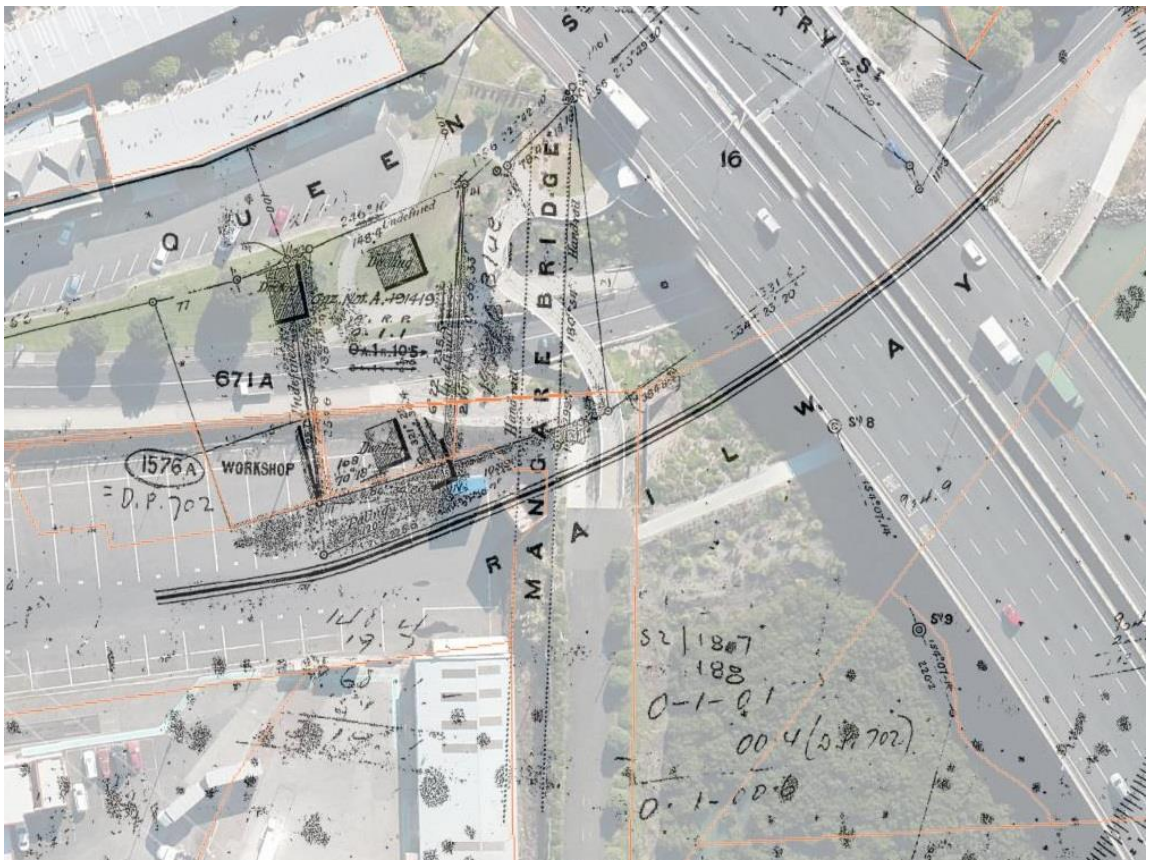


Figure 21: DP 674 dated 1884 showing the location of dwellings and a shop in relation to the 1875 Māngere Bridge, overlaid over an aerial photo.

"Ferryman's house"

There is a contemporary reference to a "ferry house" in 1861, [117] but despite the fact that it is known that the ferry contractor at the time, John McGhee, had property just across the road from the future ironworks site, [118] before his death in 1863, and that Ferry Street to the east of Allotment 16 was said to have been the official ferry landing from 1858, no firm indication has been found as to the location of the "ferryman's house".

"Hutchinson's Shipyard"

No indication has been found of a shipyard adjacent to the Onehunga approaches to the Māngere Bridge. There could be confusion with an unnamed shipyard shown on the reserve land in an 1862 plan, on the other arm of the Te Hopua crater, leading to the old coal wharf.[119]

2.9 Construction Professionals associated with the 1915 Bridge

Onehunga Borough engineer, Henry Hulbert Metcalfe

Henry Hulbert Metcalfe, who was the Onehunga Borough Engineer at the time the Māngere Bridge was being planned was originally from England and was educated at Cheltenham College in Gloucestershire and Kings College, London. He gained experience in civil engineering in South America, South Africa and Australia before moving to New Zealand in the 1880s.

In 1887 he became connected with the flax industry in Hamilton. He undertook work for many local and public bodies including many substantial waterworks and drainage projects. He carried out a contract for a section of the North Island main trunk railway line between Hamilton and Te Awamutu. He was a consulting engineer to Hamilton until 1905 and laid out the initial water supply system. In the early 1890s competitive designs were invited for a water supply for Devonport. Henry Metcalfe's design was accepted and he designed the Takapuna Pumphouse on Lake Pupuke which opened in 1906. In 1899 he prepared plans for the Calliope Road dockyard workshops and equipment. In 1901 he undertook a drainage installation for Devonport. Henry Metcalfe designed the Onehunga Pumphouse built in 1908-1909.

He carried out a scheme for the water supply and drainage for Whangarei. He advised Gisborne on water supply schemes in 1911-12 and was engineer for sewerage schemes in Gisborne, 1916 and Napier.[120] He built the swimming bath at Auckland Technical College. In May 1918 he was engaged in carrying out improvements to for the Whakatane Harbour Board when he died suddenly at the age of 67. He was survived by his wife, four daughters and two sons. His eldest son, who had been in business with him, was killed in France in 1917.[121]

Engineer Robert Forbes Moore

Engineer Robert Forbes Moore, of the Ferro-Concrete Company of Australasia and designer of the renowned Grafton Bridge in Auckland, was also responsible for the Māngere Bridge.

Heritage New Zealand Pouhere Taonga include the following information about Moore on their website record for Grafton Bridge:

'Robert Forbes Moore (c.1865 -1938) was born in South America and educated in England, later joining the Royal Engineers. After moving to Australia, he became involved in mining engineering. In the early 1900s he was employed by the Ferro-Concrete Company of Australasia, becoming its engineer-in-chief based in Auckland.

While in this position, Moore was responsible for overseeing the company's construction of extensive works along Auckland's waterfront, including the Railway (later King's) Wharf extension in 1904-8, the Ferry Jetty in 1907, and early parts of the Queens Wharf in 1907-9. He also oversaw the construction of early reinforced concrete buildings in Auckland such as the Northern Roller Mills building (1907-8), and a breakwater extension and new wharf for the Napier Harbour Board (c. 1906).

Prior to the liquidation of the Ferro-Concrete Company in 1909, Moore was also responsible for the design and initial construction of the Grafton Bridge, Auckland, which had the largest reinforced concrete span in the world when built in 1907-1910.

He later oversaw construction of the first Māngere Bridge, built in reinforced concrete in 1914-15, and undertook other work in the Auckland region. He died in Auckland in 1938, aged 73.'[122]

3.0 DESCRIPTION

Figure 22: View of the Old Māngere Bridge Looking towards Māngere. Matthews & Matthews Architects Ltd 2014.

3.1 The Bridge

The OMB crosses Auckland's Manukau Harbour and connects Onehunga Harbour Road to the north (Onehunga) with Coronation Road to the south (Māngere).

The OMB is a reinforced ferro-concrete multi-span bridge with an overall length of approximately 240 m. The bridge has 16 (check) spans, each span consisting of 8 parallel girders approximately 50 feet in length supported on reinforced concrete beams supported on regularly spaced rows of four piles. It has a width of 12 m. The handrails consist of three galvanised steel pipes spanning between shaped concrete piers and intermediate concrete posts. The bridge is surfaced with concrete and asphalt.

Bluestone-faced abutments are located to both the north and south embanked approaches.

Figure 23:View of the Old Māngere Bridge Looking towards Onehunga. Matthews & Matthews Architects Ltd 2014.

Figure 24: View of a typical concrete pier. Matthews & Matthews Architects Ltd 2014.

Figure 25: View to Old Māngere Bridge from the Onehunga approach. Matthews & Matthews Architects Ltd 2014.

The Use of Reinforced Concrete Construction in 1915

While early concrete buildings and structures had been built in New Zealand typically using mass concrete, after 1900 reinforced concrete construction became more widely used.[123] The earliest concrete used in New Zealand was made using natural cement or hydraulic lime. From around 1860 imported Portland cement began to replace lime as the preferred active agent.[124] In 1883, Wilsons produced the first true Portland cement in New Zealand and by the late 1890s Portland cement manufacturing was well-established in New Zealand and competing with imported cement.[125]

The terms *reinforced concrete*, *ferro-concrete*, and *concrete-steel armoured concrete* were originally applied to systems where steel was inserted into concrete to improve its strength. *Reinforced concrete* became the term commonly used to define the use of mild steel bars, wire and stirrups encased in concrete, formed to make columns, beams floor and wall slabs.

Prior to the introduction of patented reinforced concrete construction systems, reinforcement used was generally wrought iron, which although resistant to corrosion, did not have the tensile strength of mild steel. Innovative engineers and designers at the time were keen to construct in concrete due to its perceived advantages including its resistance to fire and earthquake.

A very early Auckland example of concrete construction is the Congregationalist Church, later known as St James Presbyterian Church, built in 1876. In 1884 the former Synagogue in Princes Street in Auckland was built of mass concrete. [126]

The 18m high water tank at the New Zealand Railways workshops in Addington, Christchurch, built in 1883 was seen as the first real reinforced concrete construction.[127] By the late 19th century a number of patented systems of reinforced concrete were being used, such as the Hennibique, Coignet, and Considere systems.[128] Reinforced concrete came into common use in New Zealand from the 1900s onwards.[129]

An early use of reinforced concrete in Auckland was in the construction of the Auckland Harbour Board wharves beginning in 1903 with the extension of the Railway Wharf in ferro-concrete.[130] Grafton Bridge constructed in in 1907-1910 was at the forefront of construction technology at the time, having the world's largest single span of reinforced concrete.[131]

The use of reinforced concrete for the construction of Māngere Bridge in 1914-1915 followed reasonably soon after the opening in 1910 of the Grafton Bridge.

By the 1920s the use of reinforced concrete construction was well-established in New Zealand.[132]

Repairs to the Bridge

Structural repairs to the bridge have been undertaken at various stages.

1921

Storm damage in 1921 washed out much of the filling to the causeways/ embankments. Options for repair including re-pitching or repair with a heavy cement grouting were considered.133

1928 Repairs

A report on the bridge was prepared in 1927 by Manukau County Council. The deck was wearing badly in places and in the main beams and haunches at the Māngere end large reinforcement rods were exposed to the action of salt water and concrete was flaking off. The abutments were described as failing badly, the stone facing collapsing and the backing washing out leaving cavities. The approaches were also deteriorated with the facing opening up particularly on the eastern sides of both approaches.[134]

Repairs were undertaken in 1928 including to the deck, abutments, handrails and treatment of exposed reinforcement was urgently required. [135]

1939 -1940 Repairs

Repairs valued at £4500 to the bridge's under-structure began at the Onehunga end in March 1939.

Where deteriorated, concrete was stripped back to bare the steel, which could be cleaned back as required. Concrete patch repairs were then undertaken to provide a dense cover to the cleaned steel. Where required for repairs to the beams, boxing was framed up in order to cast the concrete repairs. [136]

The handrail generally required repairs including scraping and re-covering of steel in the concrete posts and some renewal of the galvanised pipe rail. The surface of the bridge was also repaired where steel was showing and the whole bridge resurfaced with bitumen.

Scouring had occurred at 4 piers at the northern end of the bridge and also at the base of the southern abutment. It was proposed to fill the hollows with large bluestone boulders dumped from a barge into the required position.

The embankment facings were described in 1938 as having been comprehensively repaired a few years prior and remained in good order. [137]

1959 Repairs

B& H Construction Company undertook concrete repairs to Māngere Bridge for Manukau County Council in mid-1959. The work included piling to replace a broken pile in Pier 16, and general cleaning down cracked concrete on the bottom of beams in spans 12,14 and 16 and protective work including mesh and 'gunniting' and other necessary treatment. Gunniting (a sprayed concrete repair technique) was carried out with equipment from Fletcher Construction Company. [138]

1980 Repairs

In 1980 120m long bailey bridges were erected across the badly decaying parts of the old Māngere Bridge to keep traffic flowing via that route until the new bridge was finished. [139]

Figure 26: View to underside of the bridge showing the parallel girders spanning between the main beams, supported on four piles. Cross bracing added to strengthen the piles is visible. Dr Matthew Felgate 2017.

Figure 28:View to underside of the bridge showing the parallel girders spanning between the main beams. Strengthening to the girders is visible. Dr Matthew Felgate 2017.

Figure 29:View to underside at north end. Fraser Newman Photography Ltd

Figure 27:View of steel bracket repairs, date not confirmed. Fraser Newman Photography

Figure 28:Bracket and tension wire repairs. Fraser Newman Photography

Figure 29: Repairs to support beams. Fraser Newman Photography

Figure 30:Repairs to column caps and beams and deterioration to beams and underside of deck. Fraser Newman Photogrpahy.

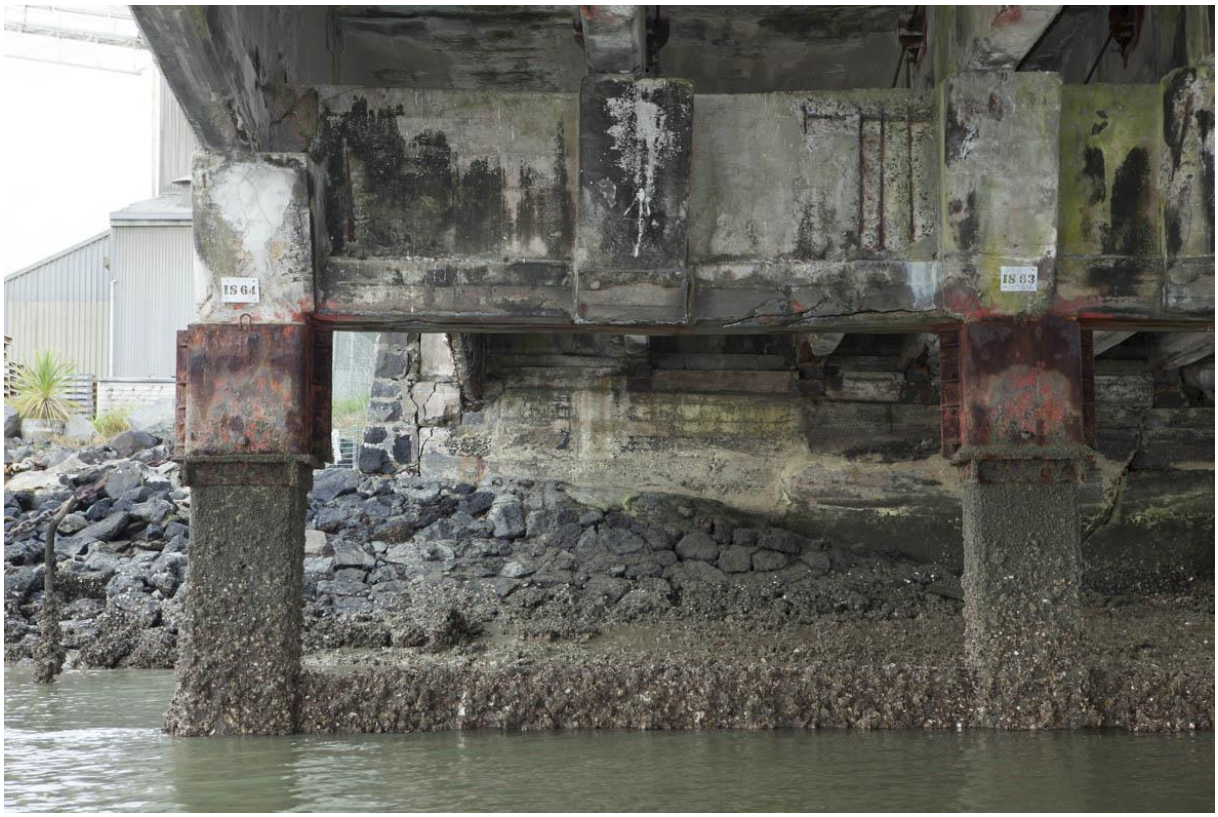


Figure 31: View to north end, showing significant deterioration and various repairs. Fraser Newman Photography.

Figure 32:View towards north end showing significant deterioration to side beams. Fraser Newman Photography.

Figure 33:Photo showing vessel strike damage to Span 17 of the bridge. Fraser Newman Photography.

Figure 34:View of some of the repairs undertaken to the underside of the bridge. Fraser Newman Photography.

3.2 North embankment

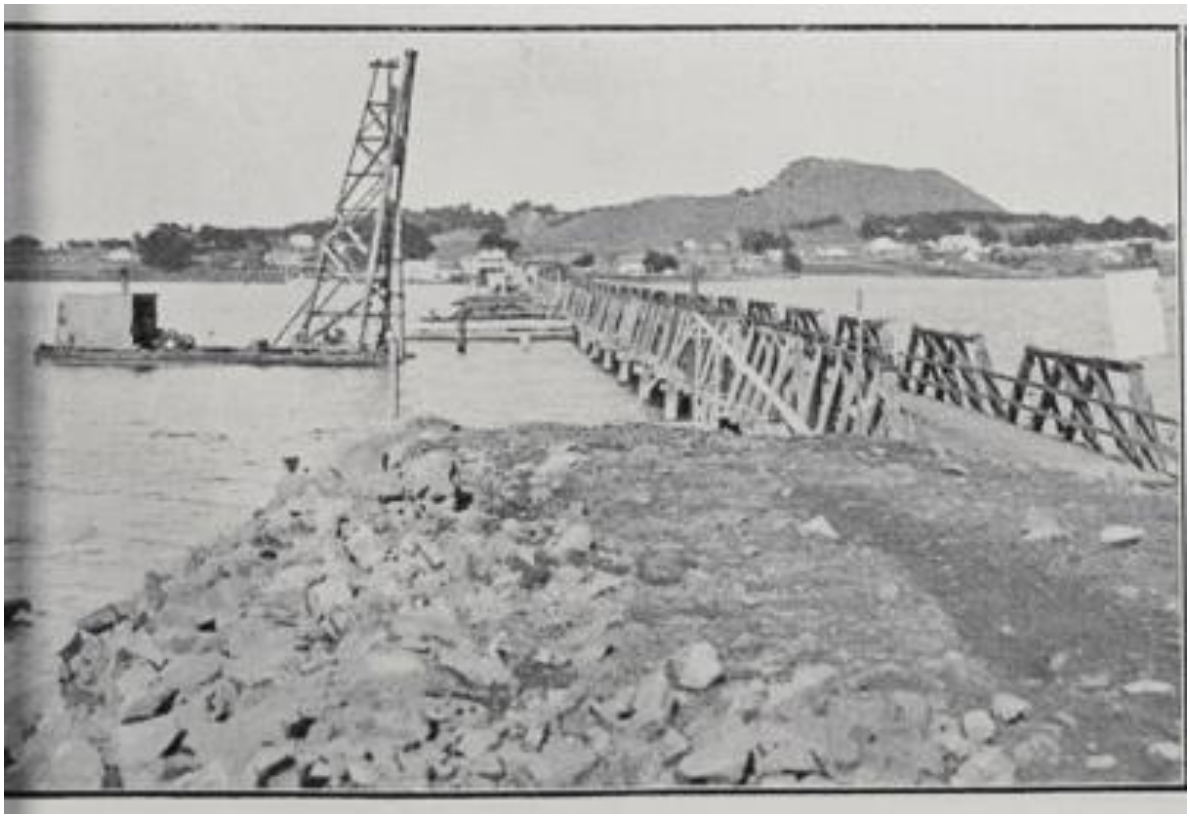


Figure 38: Auckland Weekly News 30 July 1914 Showing the rebuilding of the Māngere bridge over the Manukau Harbour at Onehunga with the old bridge and the earth filling for the new (left) and finished bearers ready for the decking. Auckland Libraries Heritage Collections, AWNS-19140730-51-6.

The 1915 bridge was constructed in sections, commencing to the east of the 1875 bridge. A new rubble causeway extension was built at the northern end, to the east of the extant causeway/ embankment. (Refer fig. 31).

Parts of the eastern embankment at the Onehunga end were damaged by a winter storm in 1918 and had to be repaired by refilling with spalls.[140] Storm damage in 1921 washed out much of the filling, with the wall collapsing. On the west side of the Māngere end, the wall was described as having a reasonable batter. However, the water had washed up over the wall and had carried out much of the filling. On the eastern side the stone facing was much steeper and had been badly damaged, especially at the Onehunga end, where it was higher. Options for repair including re-pitching or repair with a heavy cement grouting were considered.[141]

In September 1927 the County engineer noted the abutments were failing badly.[142] Extensive repairs were undertaken in 1928. The embankment facings were described in 1938 as being comprehensively repaired a few years prior and remained in good order. [143]

The Heritage and Archaeology s92 Addendum report prepared by Opus International Consultants Ltd includes the following description of the north embankment (p.16):

The west side of the northern embankment has vertical or near-vertical basalt facing work that is most likely a retaining wall instituted to make best use of land reclaimed in this area for the port operations. It does not match a 1900s photograph of the original embankment, which was a sloping bank, nor does it match the bulk of the facing of the remainder of the causeways/embankments.

The east side of the northern embankment has masonry facing that matches the east side of the southern embankment, and matches the west side of the southern embankment, and the north side of the southern abutment. It may have undergone maintenance and repair but may well be primarily 1914-1915 original fabric.

Additional research undertaken for this report reveals that the stone embankments have been periodically repaired, with extensive repair required at some stages.

Figure 39: The east side of the northern embankment. Photo Matthew Felgate.

Figure 40: The western side of the northern embankment has a more vertical basalt/scoria retaining wall. Photo Matthew Felgate.

3.3 South Embankment

The south embankment was widened, commencing in 1913 to meet the full width of the new bridge. The New Zealand Herald reported in October 1913:

> *"The approach to the Māngere Bridge from the southern side is now being widened to the full width of 50ft preliminary to the reconstruction of the bridge in ferro-concrete. A filling of scoria and soil is being used, and already four or more chains have been widened. The building of the new bridge will not be started for some weeks yet. When the work is finished, the approaches and the deck of the main structure will follow one easy grade from the Māngere side to the level of the railway bridge at the Onehunga end, and the present steep grade from the latter point to the entrance to the bridge will be obviated."* [144]

The current southern causeway/ embankment aligns with the 1915 replacement bridge over most of its length, with the exception of the recently modified boat ramp area.

As noted above, repairs have been periodically undertaken to the stone embankments.

Figure 35: the eastern side of the southern abutment/causeway/embankment. Photo Matthew Felgate

Figure 36: the southern abutment looking north from the boat ramp. Photo Matthew Felgate.

Figure 37: The southern abutment looking east. Photo Matthew Felgate.

3.4 Railway Overbridge on North side

Figure 38: View of the railway overbridge. Matthews & Matthews Architects Ltd 2017.

The construction of the Māngere Bridge required widening of the railway overbridge by the railways department.[145] By April 1915 the reinforced concrete railway overbridge was being constructed, to replace an existing timber one Additional space was allowed for trains to pass under the new bridge.[146]

The extant rail overbridge structure (now retired from use as a rail bridge) is of Ferro-concrete construction with basalt facing retaining within the structure, consistent with construction circa 1915, and is in alignment with the 1915 bridge and its causeways/embankments.

The 1914 Plans and elevations for a replacement rail bridge are held at National Archives in Wellington[147]. (Refer Figures 38 and 39).

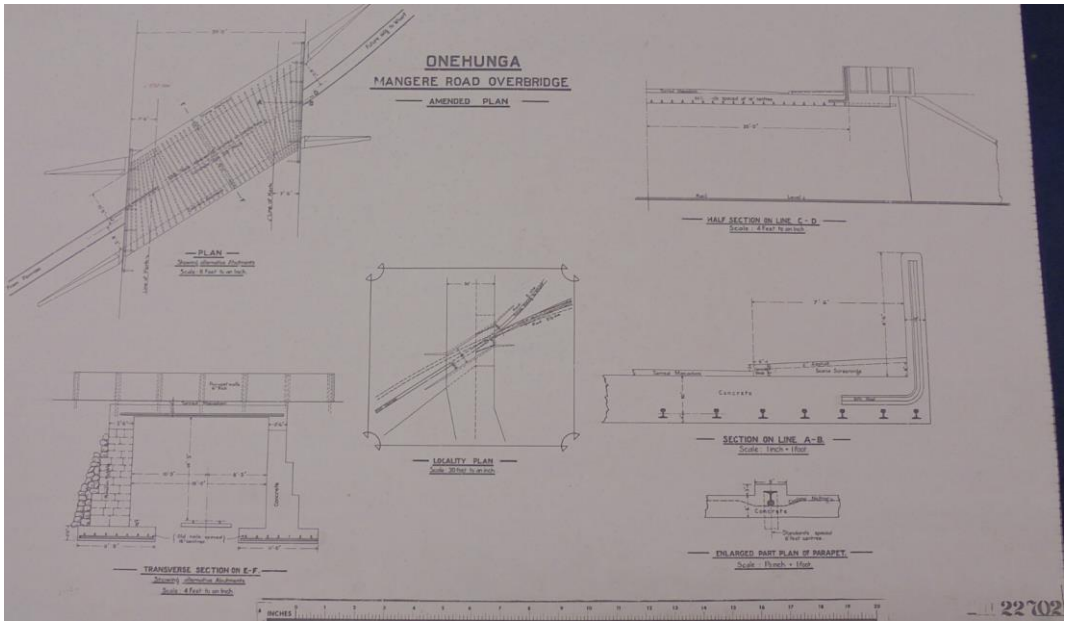


Figure 39: National Archives, Wellington, Sheet 22 702, BABJ A681 14406 Box 46, Record Number 3350, Overbridge at Māngere Road, 1914.

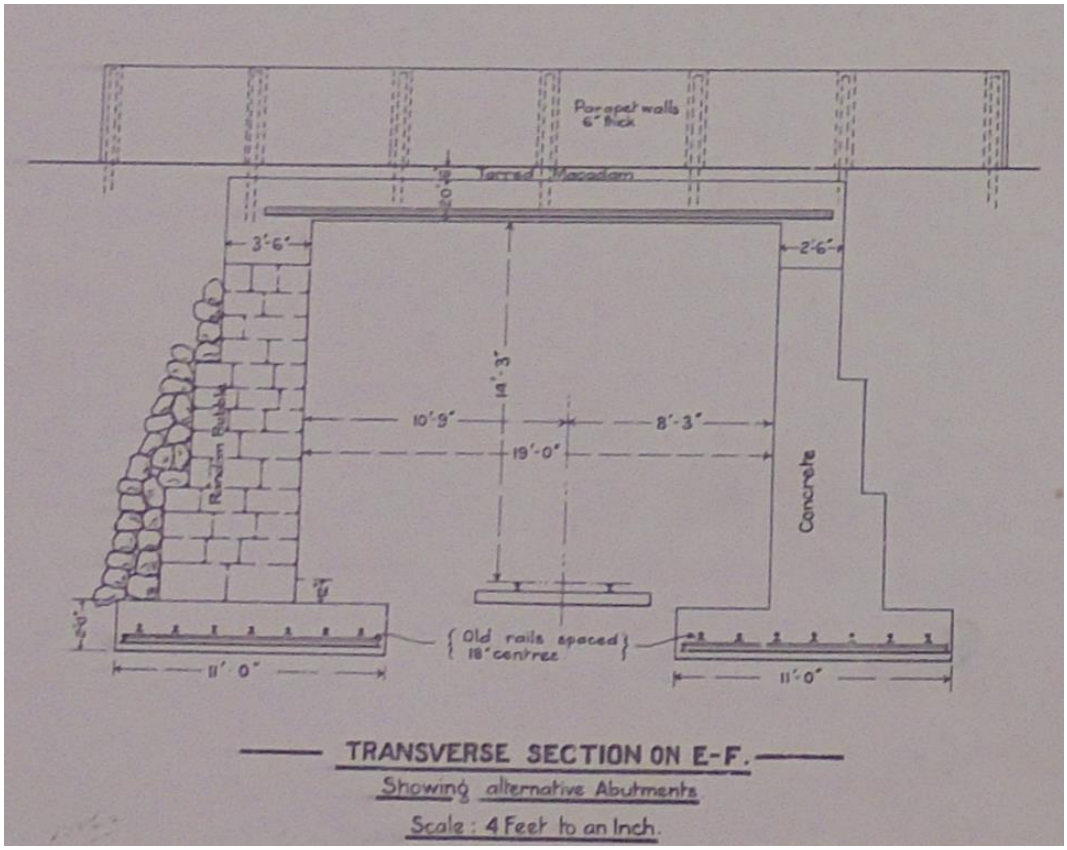


Figure 40: Cross Section through overbridge. National Archives, Wellington, BABJ A681 14406 Box 46, Record Number 3350, Overbridge at Māngere Road, 1914.

3.4 Comparisons

The 1915 Māngere Bridge was constructed at a similar time to other bridges designed in ferro-concrete by engineer R F Moore at Panmure and Papakura-Karaka.

Moore was commissioned to designed two bridges for the Karaka Road Board in 1913, crossing the Hingaia River and Whangamairie River.[148] Both bridges were opened in March 1916.The Hingaia Bridge was 375 feet long and the Whangamairie bridge was 220 feet long. Both were supported on ferro-concrete piles.[149]

As the Manukau County Council engineer, Moore also recommended a design for a ferro-concrete bridge over the railway line at Otahuhu in 1914.[150]

The Panmure Bridge which was opened in 1916 was also designed by R F Moore and built by GT Niccol.[151]

Figure 41: View towards the 1916 reinforced concrete Panmure Bridge 12 October 1927. Auckland Libraries Heritage Collections, 4-5866, photographer J D Richardson.

The new concrete bridge was formally opened on 14th August 1916 by the Prime Minister the Right Hon. William Massey. Manukau County Council were praised for having constructed four concrete bridges including at Māngere, Panmure and two at Karaka.[152]

However, by 1930 serious faults in the Panmure bridge were reported when a large crack across the full width of the bridge at the southern end was discovered. The County engineer, Mr L E Utting, said the crack was caused by sinking of the first pier at the Pakuranga end. He reported that reinforcement was very badly placed with too little concrete covering and the shingle used caused very porous concrete causing the steel to rust badly.

It was pointed out that there were similar problems with other concrete bridges at Māngere, and Karaka constructed at the same time as the Tāmaki Bridge. The Council decided to immediately put a load limit of six tons and a speed limit ten miles per hour on the bridge. [153] This bridge was demolished in 1959 after the present Panmure bridge was opened.

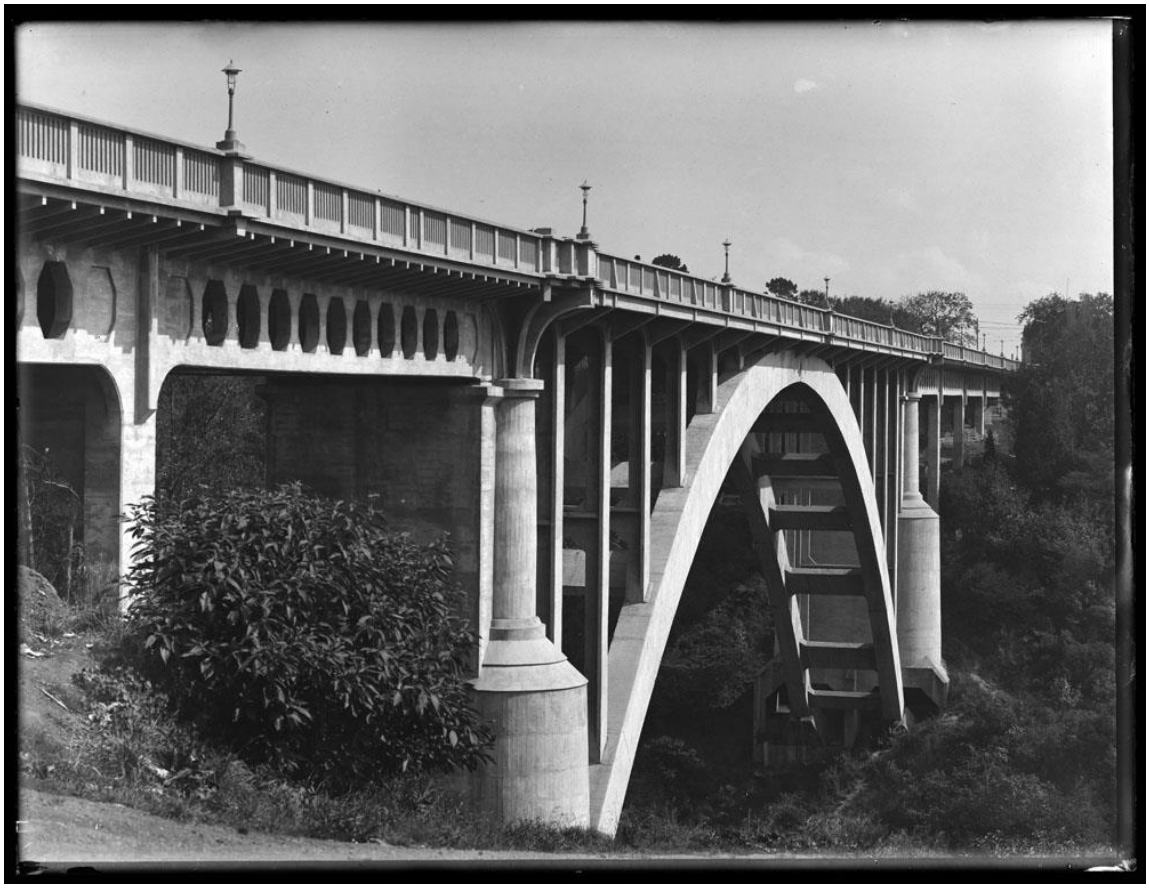


Figure 48: Grafton Bridge 3 April 1913, Auckland Libraries Heritage Collections, 1-W1400, photographer Henry Winkelmann.

The tender for construction of the Grafton Bridge by the Ferro-Concrete Company of Australasia was accepted on 4 July 1907. All of the plans for the Grafton Bridge were prepared in Auckland under the supervision of R F Moore who was the Chief Engineer to the Ferro-Concrete Company of Australasia until November 1909, supervising construction of the bridge until that date. The ferro-concrete bridge, which had the widest arch span in the world at that time, was officially opened on 28 April 1910.[154]

4.0 HERITAGE SIGNIFICANCE

This summary of the historic heritage significance of the Old Māngere Bridge has been prepared based on the range of values that make this place significant. The general approach to assessing the cultural significance of a place comes from an understanding of the historic development, physical character, uses, relationships, and associations of the place over time.

Summary Statement of significance

Built in 1914-1915, the Old Māngere Bridge is of significance in the Auckland region as an example of a major transport infrastructure project undertaken by local government in the early 20th century. It replaced the 1875 bridge in this location which had provided an important connection between the settlements at Onehunga and Māngere and was part of a wider programme of concrete bridge construction at the time by Manukau County Council which included the 1916 Panmure Bridge as well as two bridges at Karaka.

Māngere Bridge has important associations with engineer R F Moore who was the Chief Engineer to the Ferro-Concrete Company of Australasia until November 1909, supervising construction of the Grafton bridge until that date. The 1915 Māngere Bridge was constructed at a similar time to other bridges designed in ferro-concrete by engineer R F Moore at Panmure and Papakura-Karaka.

The place is significant as part of a wider historical and cultural context associated with transport in this locality.

4.1 Assessment of Significance

The following assessment of the significance of the Old Māngere Bridge has been prepared based on the schedule of historic heritage criteria set out in the Auckland Unitary Plan. These criteria are generally similar to those in the Heritage New Zealand Pouhere Taonga Act 2014.

(a) Historical

The place reflects important or representative aspects of national, regional or local history, or is associated with an important event, person, group of people or idea or early period of settlement within the nation, region or locality.

Replacing the earlier 1875 Māngere Bridge, the 1915 Māngere Bridge has historical significance for its associations with the development of Onehunga and Māngere, providing an important transport connection across the Māngere Inlet. The bridge has significance as being a major early 20th century infrastructure project undertaken by the Onehunga Borough Council and Māngere Road Board.

As a consequence of the construction of the Māngere Bridge, the railway overbridge was required to be widened and was replaced at the same time.

The continued importance of this bridged connection within the Auckland region is evident in the series of bridges built in this vicinity including in 1875, 1915 and 1983.

Māngere Bridge was an important part of the road connection from Auckland Airport and Auckland City; the availability of this connection would have aided development of the airport at Māngere with its significant effects on the social and economic development of Auckland.

The 1915 Māngere Bridge has historical associations with notable people and organisations, including Henry Hulbert Metcalfe, who was the Onehunga Borough Engineer at the time the Māngere Bridge was planned, Engineer Robert Forbes Moore of the Ferro-Concrete Company of Australasia and designer of Grafton Bridge in Auckland as well as the bridges at Māngere and Panmure, and ship-builder, owner and marine contractor George Niccol who was awarded the contract for the construction on Māngere Bridge.

(b) Social

The place has a strong or special association with, or is held in high esteem by, a particular community or cultural group for its symbolic, spiritual, commemorative, traditional or other cultural value.

The Māngere Bridge is recognised as part of the historic development of the area. It is a well-used community facility and provides an important connection between the Onehunga and Māngere Bridge communities. Its value to the community is evident in the inclusion of information in the heritage section of the Onehunga Business Association website, and in the book *Celebrating Māngere Bridge* (2005) published by Val Payne, Māngere Historical Society. Its important role as a vehicle transport connection has been replaced by its role for recreation and as a pedestrian and cycle connection.

(c) Mana whenua

The place has a strong or special association with, or is held in high esteem by, mana whenua for its symbolic, spiritual, commemorative, traditional or other cultural value.

Cultural Impact Assessments have been prepared by Mana whenua to inform the Assessment of Environmental Effects for the proposed new Māngere Bridge.

(d) Knowledge

The place has potential to provide knowledge through scientific or scholarly study or to contribute to an understanding of the cultural or natural history of the nation, region or locality.

The place has potential to provide knowledge through further study and investigation.
Archaeological investigations may reveal further information about the bridge approaches; part of the causeways may incorporate 19th century material.

Archaeological and/or historic remains may still exist. The north end of the OMB is considered to have high archaeological values for both early Maori and European activity. (Refer Old Māngere Bridge Heritage Assessment April 2015).

(e) Technological

The place demonstrates technical accomplishment, innovation or achievement in its structure, construction, components or use of materials.

The bridge has significance for its technological values, being a reasonably early example of major reinforced concrete bridge in Auckland, and an early example of a reinforced concrete bridge crossing a harbour. An early use of reinforced concrete in Auckland was in the construction of the Auckland Harbour Board wharves beginning in 1903 with the extension of the Railway Wharf in ferro-concrete. Grafton Bridge constructed in in 1907-1910 was at the forefront of construction technology at the time, having the world's largest single span of reinforced concrete. The use of reinforced concrete for the construction of Māngere Bridge in 1914-1915 followed reasonably soon after the opening in 1910 of the Grafton Bridge. Reinforced concrete came into common use in New Zealand from the 1900s onwards. By the 1920s the use of reinforced concrete construction was well-established in New Zealand. The railway overbridge was also constructed using reinforced concrete in 1915.

The structural failures of the Old Māngere Bridge are also of technological significance, demonstrating understanding of reinforced concrete construction at that time, the types of deterioration that occurred in the marine environment and the regular inspections and range of repairs required.

(f) Physical attributes

The place is a notable or representative example of a type, design or style, method of construction, craftsmanship or use of materials or the work of a notable architect, designer, engineer or builder.

Māngere Bridge is important as a representative example of the work of engineer R F Moore who was the Chief Engineer to the Ferro-Concrete Company of Australasia until November 1909, supervising construction of the Grafton Bridge until that date. The 1915 Māngere Bridge was constructed at a similar time to other bridges designed in ferro-concrete by engineer R F Moore at Panmure (opened 1916) and Papakura-Karaka (opened 1916). The Panmure Bridge, which opened in 1916, no longer remains.

(g) Aesthetic

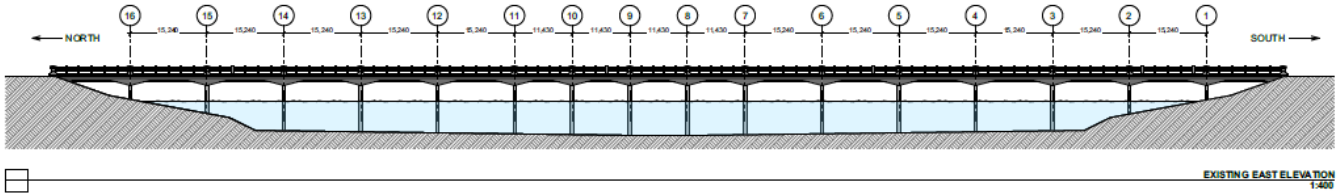
The place is notable or distinctive for its aesthetic, visual, or landmark qualities.

The 1915 Māngere Bridge was noted as being ‘exceedingly handsome’ at the time of its construction, with its continuous balustrade of concrete piers, intermediate posts and rails. It is a local landmark, visually and physically connecting Onehunga and Māngere.

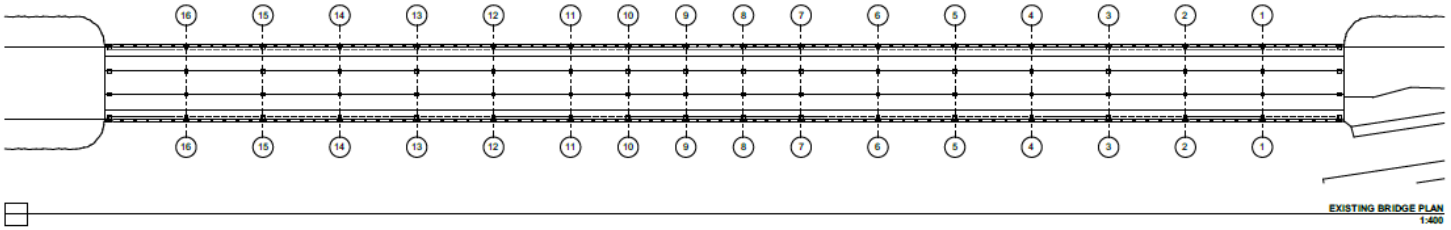
(h) Context

The place contributes to or is associated with a wider historical or cultural context, streetscape, townscape, landscape or setting.

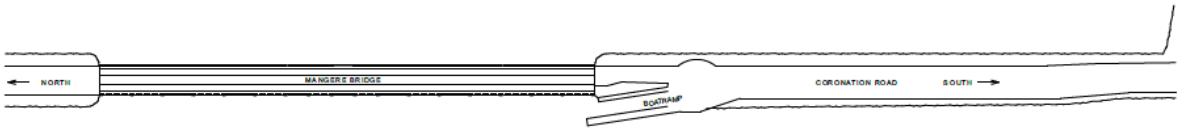
The bridge is significant as part of a wider historical and cultural context associated with road transport across the Māngere Inlet between the communities at Onehunga and Māngere. Early connections provided by ferry services were replaced by first timber bridge at Māngere in 1875 and subsequently by the bridges built in 1915 and 1983.



EXISTING EAST ELEVATION
1:400



EXISTING BRIDGE PLAN
1:400



LOCATION PLAN
1:1000

ELEVATION AND PLAN VIEWS SHOWING THE GENERAL ARRANGEMENT OF MANGERE BRIDGE

THESE DRAWINGS DO NOT SHOW AREAS OF SUBSIDANCE OR OTHER DETERIORATION OR REPAIRS,
THESE ARE RECORDED ON THE POINT CLOUD RECORD DRAWINGS PREPARED BY ASBUILT IN 2017

M M A

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PROJECT
EXISTING RECORD

OF
HISTORIC MANGERE BRIDGE

FOR
MAATAI TAONGA HERITAGE

DRAWING TITLE
EXISTING BRIDGE PLAN

DO NOT SCALE. CONTRACTOR TO VERIFY ALL DIMENSIONS ON SITE

JOB NO. 711
DATE: 28/02/2019
ISSUE: PRELIMINARY
CAD FILE: MMA - MANGERE BRIDGE.PLN

SCALE: 1:400, 1:1000 @ A1
DRAWING NO. 101

4.2 Summary of key components

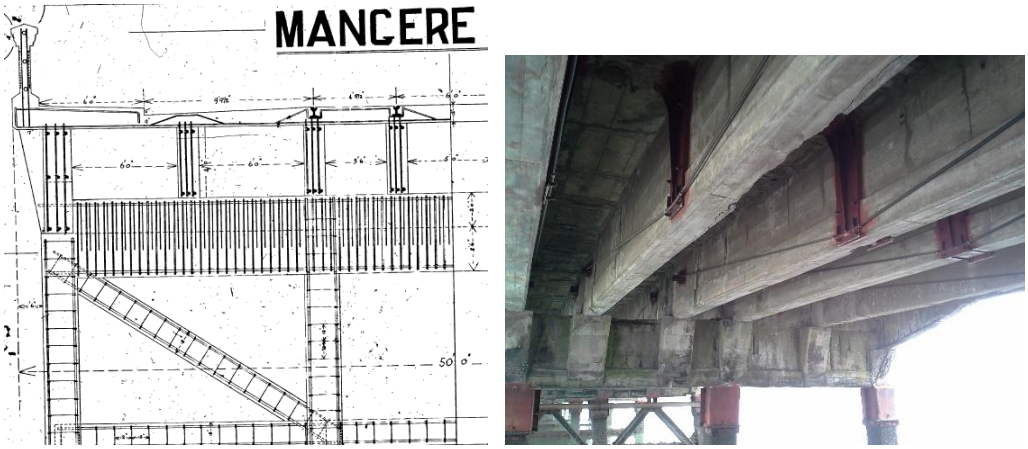

Figure 49: Part of original cross section and photo showing underside of the structure. Designed diagonal bracing is not evident beneath the bridge.

(Based on original drawings and historic description: NZ Herald 31 May 1915, p. 5)

The bridge measures 820 feet (250m) in length, excluding the approaches. The approach at the Onehunga End is 300 feet in length and the embankment at the Māngere end is 1500 feet long. The approaches are constructed of rock and scoria.

The bridge has a uniform width of 50 feet. The bridge slopes form the Onehunga end to the Māngere end with a fall of 1 foot in 100 feet. It has 16 supporting arches, as shown on the original elevational drawing. Its height above high-water level varies from 8 feet to 16 feet.

The original drawings show 17 rows of 4 piles (68), which were hammer-driven into place. The reinforced concrete piles were 2-foot square, with pointed ends. (Refer drawings). Diagonal braces were shown on drawings but do not appear to be evident.

The main balustrade piers are located above the column lines, with three posts in between. The piers and posts were shown as 4 foot 9 inches high on original drawings. (1.45m - check on site)

Cross heads support concrete girders, connected with in-situ reinforced concrete. The (concrete) decking was 12 inches thick. Balustrades and railings are of concrete and galvanised piping.

The haunched girders along the sides of the bridge were 6 feet deep above the piles, tapering to 3 feet deep, beneath the deck thickness. Girders running in the direction of the bridge were 4 feet deep and the main girders across the width of the bridge were 4 feet 6 inches deep.

Overview of Significance Fabric

In general, the whole of the original 1915 reinforced bridge structure, including its component parts with repairs made over time, is assessed as having considerable significance because they contribute to an understanding of the historic, physical and technological values of this comparatively early reinforced concrete bridge structure. Original components of the bridge deck, including the concrete balustrade piers, are also of considerable significance because these were the visible features of the historic structure experienced by people when using it. The basalt faced abutments are of considerable significance, forming the approaches to the 1915 bridge.

Elements assessed as having considerable significance make an important contribution to the overall understanding of the significance of the place.

Recording of the whole structure and its setting is required.

For elements of considerable significance that are to be retained, including the abutments, any change should be the minimum necessary and not detract from heritage values or affect condition or constrain maintenance. The processes of maintenance, stabilisation, restoration, reconstruction and reinstatement are appropriate for these elements.

For elements of considerable significance that are to be demolished, forming part of the bridge structure, recording and documentation is required and salvage of some elements is proposed.

Items of little or no significance or not relevant

In general, the components added later that have completely replaced original components or been built over the structure such as the galvanised steel tube to the balustrade, bollards, and the concrete and asphalt surface of the bridge deck are assessed as having low heritage value. Salvage or removal of such items are options.

	Old Māngere Bridge	
Element	**Photo, Description and notes**	**Assessed significance**
North approach road	 The north approach road was described in 1915 as requiring a great deal of filling to raise the approach to the level of the new bridge, by 6 feet or more. Material for the	Considerable

	filling work was taken 'from an embankment in Onehunga'. [1]	
North Embankment Onehunga	 **West side** The west side of the northern embankment has vertical or near-vertical basalt facing work. Storm damage in 1921. Comprehensive repairs were undertaken to the abutments in 1928.	Considerable
	 **East Side** The east side of the northern embankment has sloped masonry facing that matches that on the southern abutment. Storm damage in 1921. Comprehensive repairs were undertaken to the abutments in 1928.	Considerable
	 South face under north end of bridge	Considerable

[1] NZ Herald 6 Jan 1915, p.9

South approach road	 The south approach road was described in 1915 as having a firm foundation of blue metal, covered with scoria and a fine coating of shells. Footpaths extended along this approach.[2] The road has been re-built/ resurfaced with new footpaths.	Considerable
South Embankment Māngere	  **West Side** Sloped masonry facing. Storm damage in 1921 washed out much of the filling with the wall collapsing. Comprehensive repairs were undertaken to the abutments in 1928.	Considerable
	  **East side** Sloped masonry facing The east side of the Māngere embankment was described as steeper than the west in 1921 and had also suffered damage. Re-pitching the slope of the wall was considered too costly. Repairs with a heavy cement grout was proposed. [3]	Considerable
	Base of south abutment	

[2] NZ Herald 6 Jan 1915, p.9
[3] NZ Herald 10 Aug 1921, p.6

	In 1939 scouring had occurred at the base of the southern embankment. [155]	
Bridge deck	 The bridge originally had raised concrete pedestrian footpaths of 6 feet 6 inches wide along each side. (See *Footprints 04404)*[4] The bridge deck has been re-surfaced a number of times, including in 1928, and bitumen re-surfacing in 1939. Additional concrete strips have been added along both sides (date not confirmed), with a central bitumen surface.	Considerable
Balustrade piers	 **Balustrade Piers** Reinforced concrete piers with sloped capping, inset panel on face and simple base. As constructed, the piers vary from the original drawings, being a simpler form (evident in historic photos). Repairs have been periodically undertaken to the piers, including repairs to concrete work from as early as 1939. A number of the piers are now missing (in 2018)	Considerable

[4] NZ Herald 6 Jan 1915, p.9

Balustrade posts	 Simple reinforced concrete intermediate posts. The existing posts are a simpler form than shown on the original drawings. Historic photos show they were built in this simple form. A number of the posts are now missing (in 2018)	Considerable
Balustrade rails	Three galvanised steel rails span between the balustrade posts. These have been periodically repaired or replaced from as early as 1939.	Low
Main haunched edge beams and longitudinal beams	 Reinforced concrete structure with repairs undertaken in 1928, 1939, and to some spans in 1959.	Considerable
Cross girders	 Reinforced concrete girders described as being 8 feet deep and 15 inches wide. [5] Repairs undertaken to the concrete supporting structure in 1928, 1939, and to	Considerable

[5] NZ Herald 20 June 1914, p.9

	some spans in 1959. Other repairs evident, date not confirmed; part of the history of the structure.	
Concrete piles	 Reinforced concrete piles hammer-driven into place. Various repairs to pile caps are evident, date not confirmed; part of the history of the structure.	

Railway Overbridge

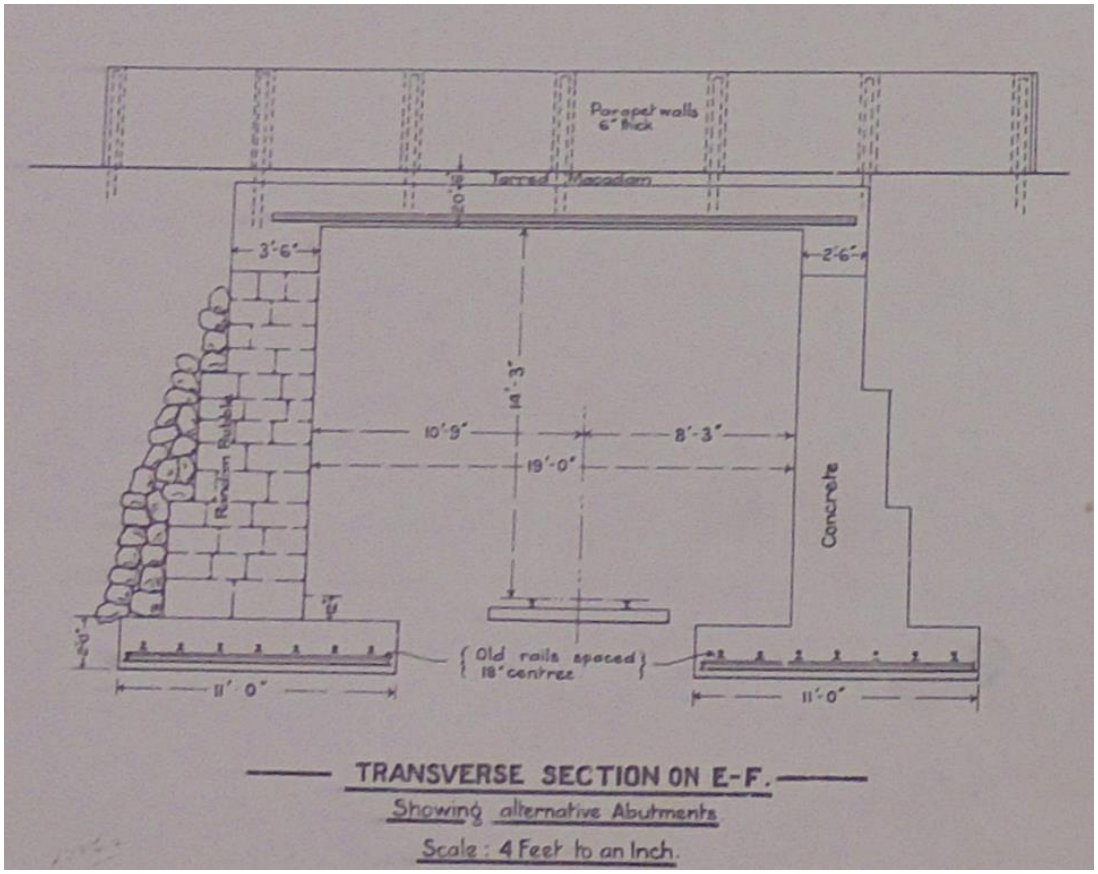

Figure 42: Cross Section through overbridge. National Archives, Wellington, BABJ A681 14406 Box 46, Record Number 3350, Overbridge at Māngere Road, 1914.

	Railway Overbridge	
Element	**Photo, Description and notes**	**Assessed significance**
		
Reinforced concrete walls		considerable
Random rubble stone facing		considerable
Reinforced concrete parapet walls		considerable

5.0 CONSERVATION OJECTIVES AND SALVAGE STRATEGY

Due to ongoing deterioration and its now fragile condition, the Old Māngere Bridge was permanently closed on 25 November 2018 and will require demolition. Retaining and fixing the old bridge was considered, however this was not possible due to the age of the structure and the degree of deterioration. Leaving the bridge in the harbour is not an option as it poses a risk to people passing underneath it. Retaining parts of the bridge, such as a bay at either end, is also not possible due to the degree of deterioration that has occurred.

New Zealand Transport Agency (NZTA) is replacing the Old Māngere Bridge to provide the community with a safe, high quality walking and cycling connection between the Onehunga and Māngere Bridge communities and a safe place for fishing. The new bridge was consented in mid-2016 and involved significant community involvement. The Old Māngere Bridge will be demolished during the construction of the new bridge. The Old Māngere Bridge is an important link between the Onehunga and Māngere Bridge communities and decision to remove it has not been taken lightly.

Built in 1914-1915, the Old Māngere Bridge is of significance in the Auckland region as an example of a major transport infrastructure project undertaken by local government in the early 20th century. It replaced the 1875 bridge in this location and provided an important connection between the communities at Onehunga and Māngere. Designed by engineer R F Moore who was the Chief Engineer to the Ferro-Concrete Company of Australasia, it was part of programme of concrete bridge construction at the time by Manukau County Council which included the 1916 Panmure Bridge as well as two bridges at Karaka. It has significance as a comparatively early example of a major reinforced concrete bridge in Auckland, and an early example of a reinforced concrete bridge crossing a harbour.

In consideration of the heritage significance of the Old Māngere Bridge, heritage management objectives and policies include those for recording and documenting the structure, retaining the values of the parts to be retained (the embankments), considering a strategy for salvaging some components of the fabric of the bridge when it is demolished for integration as part of the design for the new bridge and developing interpretive signage in consultation with Auckland Council.

Heritage New Zealand Pouhere Taonga's *Sustainable Management of Historic Heritage Guidance Information Sheet 15 - Demolition of Historic Buildings* notes that demolition of historic buildings and structures is not a desired heritage outcome. However, it may be necessary when a structure is considered to be beyond repair and structurally unsafe. Where this is the case, demolition proposals should be informed by professional advice and it is recommended that any structure to be demolished be fully recorded and documented both prior to and during demolition. Objectives and policies for recording are set out below.

Salvage of components of the historic bridge structure is another method that can assist with interpretation and retaining tangible fragments that help to understand the structure. Draft recommendations for salvage are set out below.

Objectives and Policies for Recording and Documentation

Objective: Consistent with the principles of the ICOMOS New Zealand Charter for Conservation of Places of Cultural Heritage Value, the Old Māngere Bridge should be fully documented and recorded, and the information made available through an appropriate archival repository.

Policy 1 Recording should be carried out to archival standards before, during and on completion of any works to the structure and site surrounds, including as appropriate:

- Photographic records
- Written records
- Site survey plans,
- Measured drawings and drawing of details,
- Samples of materials or components
- Point cloud scans of the structure.

Policy 2 Recording is to be in accordance with Heritage New Zealand guideline AGS 1A: Investigation and Recording of Buildings and Standing Structures for assessing and recording built heritage dated 4 July 2014 (or any subsequent revision).

Photography should be carried out to archival standards, using 35mm cameras and good quality lenses at a minimum.

Fine grained black and white and colour slide film (125 ISO or less) should generally be employed. Where better quality resolution is required, medium or large format cameras and film are preferred.

Colour digital photography, while currently not considered to be archivally stable, are also useful as an additional record. Views should include:

- Perspective views showing relationship of the bridge to the setting, other buildings and significant viewpoints including the context at either end
- Principal elevations
- Significant features (structural components and evidence of modification and strengthening etc)
- Typical details (columns, girders, balustrade, deck)

The photographic record is to be provided to the New Zealand Transport Agency and, if possible, archived at Heritage New Zealand Pouhere Taonga and Auckland Council.

Policy 3 Further recording work should be undertaken during demolition and construction of the new bridge. This will need to be carried out under the direction of the project heritage architect or archaeologist and managed by the project and construction managers.

Discussion: Recording work has been undertaken in conjunction with the preparation of this Heritage Management and Salvage plan including:

Archival photographic recording of the structure by a professional photographer with access alongside and under the structure by boat.

A point-cloud scan of the structure has been undertaken. This has provided a more accurate record of the repairs and deterioration of the structure than can be achieved by drawings, with limitations on accessing the structure over the water. Drawings have been generated from this scan including elevations and cross sections which show sagging and deflection of parts of the bridge structure, for example due to historic vessel strike.

Conservation Policies for the Bridge approaches and embankments.

The abutments (also described as the embankments) of the old bridge are to be retained.[156]

Views to north and south embankment. Photos Matthew Felgate.

Policy 4 The existing form and fabric of the embankments should be retained as far as practicable, with an overall aim of minimum intervention into the historic fabric. Areas of deterioration should be repaired rather than replaced.

Policy 5 Specialist advice should be obtained to understand the reasons for any failure before undertaking repairs, the extent of and appropriate materials for any repairs required, and to document and specify the works

Policy 6 Ensure that any work is overseen and carried out by people who are skilled and experienced in repairing historic masonry structures in marine environments. Repairs should be carefully undertaken to minimise physical and visual impacts.

Policy 7 Ensure that the design for the proposed new bridge carefully considers the relationship to the embankments to minimise physical and visual impacts as far as possible.

Policy 8 Ensure that proposed landscape design, planting and any new structures on, or adjacent to the embankments won't lead to deterioration or adversely affect their ongoing maintenance.

Principles for Salvage

It is intended to recycle materials from the old bridge to be used as design and interpretive features on the new bridge as a memory of the structure.[157]

The salvage of items will aim to

- recycle components and materials for re-use
- provide inspiration for the contemporary design
- retain a tangible connection with the Old Māngere Bridge as part of story-telling and place-making

An iterative approach to the salvage of components will involve practical considerations such as:

- the condition of elements and how fragile they are
- the method to deconstruct and collect components
- temporary storage of salvaged items
- how and where elements can be integrated into the design for the new bridge and its approaches and other places in the local area
- integration with interpretive panels telling the story of the historic crossings and bridges at this place.

Elements proposed for Salvage include:

Elements for salvage	Photo and Notes
concrete balustrade piers	 Salvage as many as possible (Estimate of the number of these to salvage based on those remaining and in reasonable condition based on site visits and photos.) These may be able to be integrated for use displaying interpretive information, or as part of seats or other features in the new design.

	 Photo (J Matthews) showing historic steel artefact integrated with new seat in front of Aecom House in lane off Mahuhu Crescent, Auckland.
Pier, and beam connection	Components which explain in cross section the historic reinforced concrete structure including piles, piles to beam connection, beam and deck, as well as potentially a series of cross sections through elements such as the piles showing the reinforcing. The historic reinforced concrete elements could be laid out in sections as in the Cross Section and integrated as seats or to tell the story of the bridge design.
Cross sectional details and components	Components that could be mounted and set out in a similar way to the original detail drawings sheet, eg a cross section through a pile, a pile cap, a half section of a girder, a balustrade pier, balustrade post, balustrade rails.
General salvaged materials as mementos	In addition to specific elements that could be integrated in the design of new bridge, salvage of parts of the concrete structure could be considered as mementos for the community.

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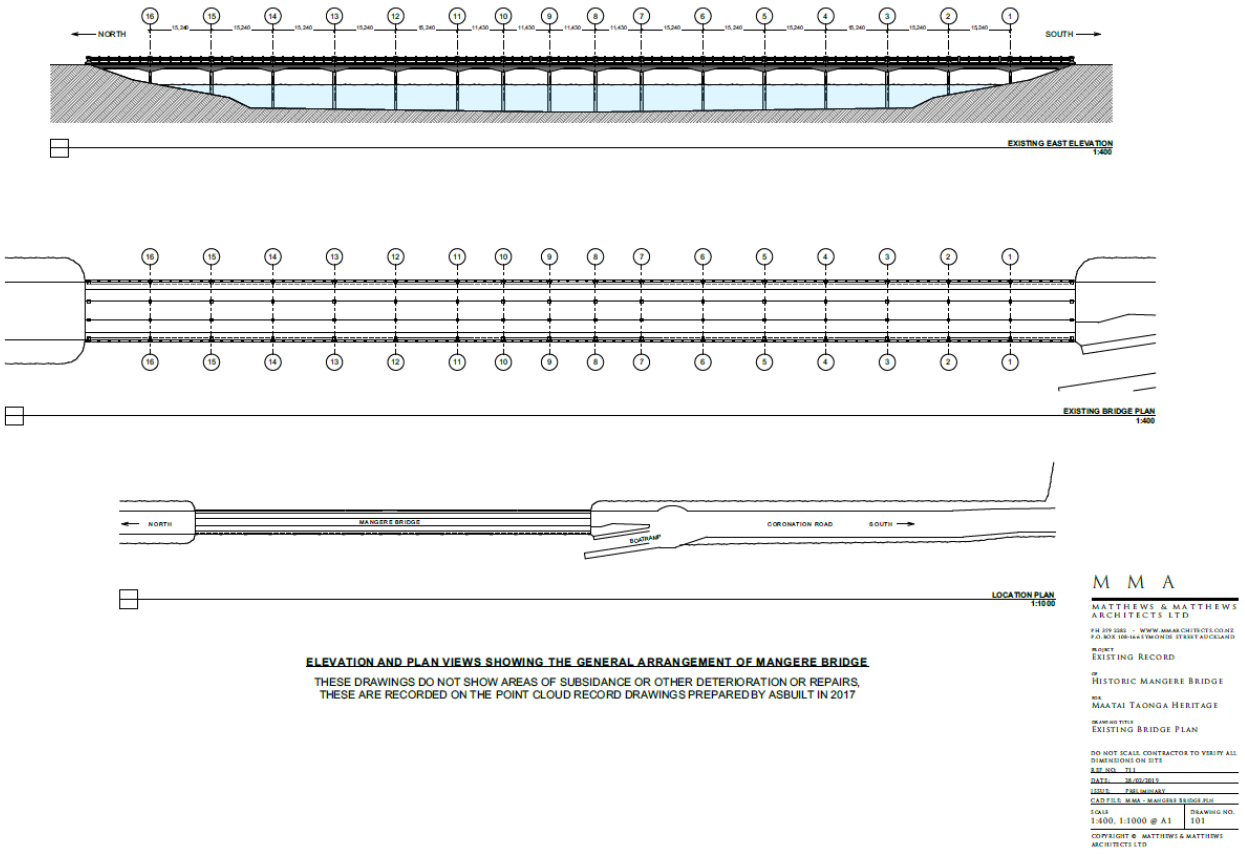
Appendix 1: Measured Drawings



ELEVATION AND PLAN VIEWS SHOWING THE GENERAL ARRANGEMENT OF MANGERE BRIDGE

THESE DRAWINGS DO NOT SHOW AREAS OF SUBSIDANCE OR OTHER DETERIORATION OR REPAIRS, THESE ARE RECORDED ON THE POINT CLOUD RECORD DRAWINGS PREPARED BY ASBUILT IN 2017

Diagrammatic Plan and Elevation

As Built Records

Preparation of measured drawings is constrained by limited access to safely measure underneath the bridge from the water. Therfore records of the existing bridge have been prepared by AsBuilt Ltd, generated from a point cloud scan. These record images show the structure overall as well as repairs to structural elements as well as deflection and subsidance that has occurred in places. The electronic files are able to be viewed at a closer scale and it is not practical to include the as built scan drawiungs in this report as the image quality at reduced scale is not clear. A list of the sheets in the Point Cloud record set is included below with thumbnail views as reference.

As Built Ltd Old Māngere Bridge As-Built Records

MTRN407-01 Sheet 100.; Overall Layout 1:1000, Rev 1, 23 11 2017

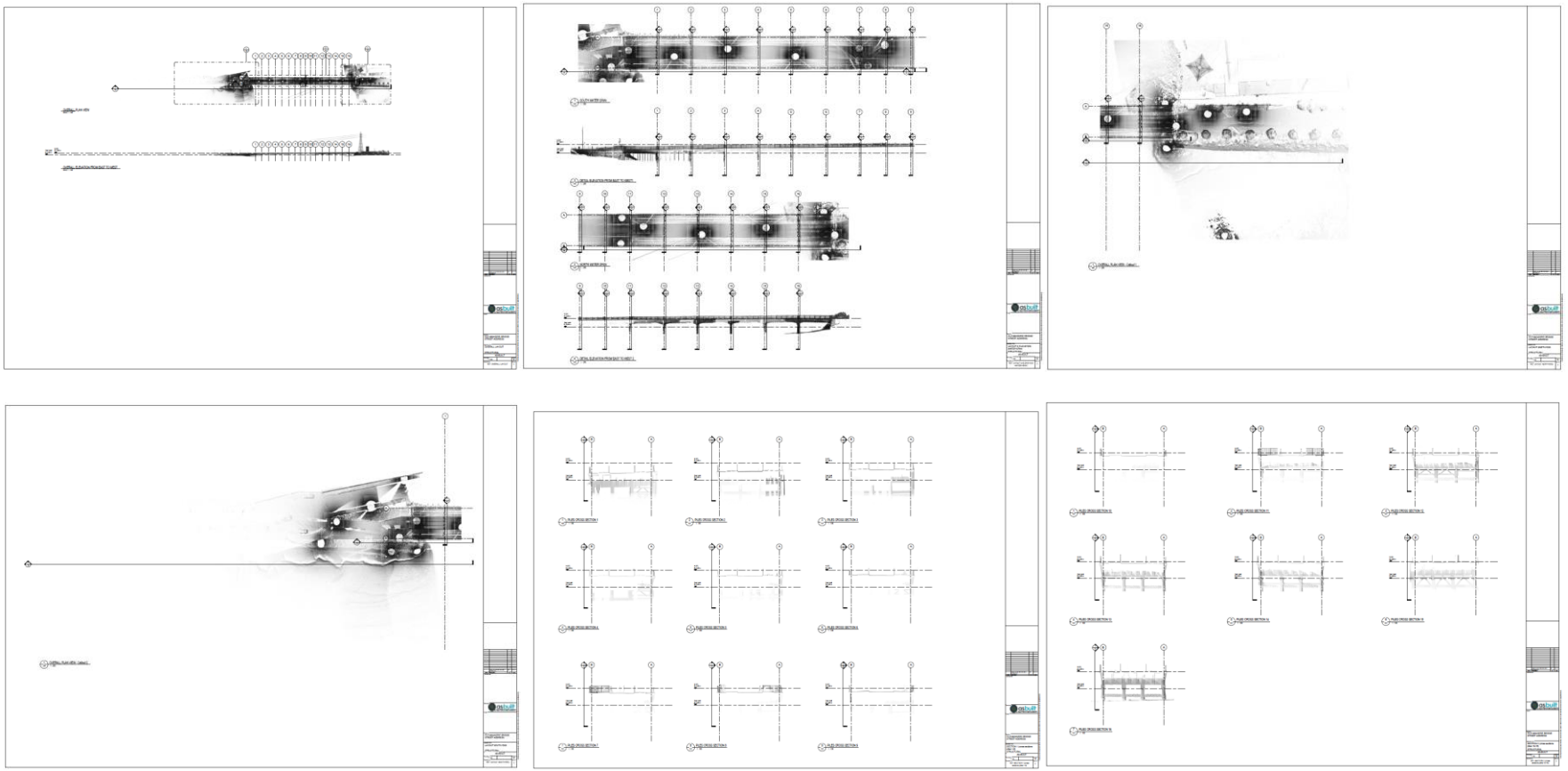
MTRN407-01 Sheet 101.; Layout and Elevation Water Span, Rev 1, 23 11 2017

MTRN407-01 Sheet 102.; Layout North End, Rev 1, 23 11 2017

MTRN407-01 Sheet 103.; Layout South End, Rev 1, 23 11 2017

MTRN407-01 Sheet 201.; Cross Section piles 1-9, Rev 1, 23 11 2017

MTRN407-01 Sheet 202.; Cross Section Piles 10-16 Rev 1, 23 11 2017



As Built Ltd Old Māngere Bridge As-Built Records Thumbnail views of Point Cloud Record Set

Appendix 2: Chronology

Date	Event	Source
1840s-1860s	Māngere was the location of a significant Māori population during the 1840s, and through to the 1860s	A.E. Tonson, *Old Manukau*, Auckland, 1966, p.47, 48, 49 and 96-7
1840s	European settlement at Māngere appears to have begun in the 1840s when the government began dividing land in the Manukau area into farms for sale.	Tonson, p.57 and Margaret Hargreaves, 'Early Manukau 1820-1865', Unpublished Thesis, University of Auckland, 1943, p.24.
1847	Colonial township was established at Onehunga in 1847 as a 'fencible' settlement.	Onehunga Heritage Survey, December 2013, Auckland Council Heritage Unit
1847	The first public transport service at Māngere was a ferry that connected the area with Onehunga from 1847.[158]	Val Payne, *Celebrating Māngere Bridge*, Auckland, pp.5 and 6.
1850s	A wharf was established off the south-west side of Te Hōpua ā Rangi in the late 1850s	Onehunga Heritage Survey, December 2013, Auckland Council Heritage Unit
1863	In July 1863 Governor Grey demanded that all Māori living between Auckland and Waikato take an oath of allegiance to Queen Victoria or face expulsion to the south of the Mangatawhiri stream.	James Belich, *The New Zealand Wars and the Victorian Interpretation of Racial Conflict*, Auckland, 1986, p.133
1873	Rail connection from Onehunga to Auckland	Onehunga Heritage Survey, December 2013, Auckland Council Heritage Unit
1875	In 1875 the first Māngere Bridge was opened, linking Onehunga to Māngere.[159] The bridge provided a good link between the northern part of Māngere and Onehunga which had a busy port and was a centre of industry that was well-connected with the city by rail.	A.E. Tonson, Old Manukau, Auckland, 1966, pp.112-3 Daily Southern Cross, 9 January 1875, p. 3 Val Payne, *Celebrating Māngere Bridge*, Auckland, 2005, p.6.
1877	Onehunga was proclaimed a borough	Cyclopedia of New Zealand, Vo.2: Auckland Provincial District, Christchurch, p.648
1906	By 1906 the wooden bridge was in a state of disrepair. A report was sought from the Onehunga Borough engineer, HH Metcalfe, on the bridge.	*NZ Herald*, 17 November 1906, p. 6

1907-1910	Grafton Bridge, also designed by R F Moore, was built by the Ferro-Concrete Company of Australasia in 1907 to 1910. It was officially opened on 28 April 1910.	Auckland Star, 28 April 1910, p.2
1910	A preferred option was the construction of an embankment bridge across the harbour, which had been approved by engineers, but a detailed report by Metcalfe in 1910 put the total cost of such a proposal at £103,000.	*NZ Herald*, 26 July 1910, p. 6
1911	In May 1911 Māngere ratepayers adopted a resolution that the design of a ferro-concrete bridge by engineer Robert Forbes Moore (c1865-1938) be accepted.	*NZ Herald* 29 September 1910, p. 7, and 8 May 1911, p. 6
1913	Moore, acting as engineer for the Māngere Road Board who were the controlling authority for the bridge, advertised tenders for the bridge in August 1913.	*NZ Herald*, 12 August 1913, p.12 (3)
1913	Ship-builder, owner and marine contractor George Niccol (1860-1940) was awarded the contract for £22,574.	*NZ Herald* 10 September 1913, p. 10
1914	The first pile for the new bridge was driven at the Onehunga end on 20 June 1914. By October 1914 construction was well underway.	NZ Herald 31 October 1914, p.10
1915	By early January 1915 the first half was complete, along with breastwork on the northern side, and the old wooden bridge was closed on 5 January.	*NZ Herald,* 6 January 1915, p 9
1915	The old wooden bridge was dismantled by Niccol commencing in January 1915.	*NZ Herald*, 14 January 1915, p. 7
31 May 1915	Māngere Bridge was officially opened 31 May 1915 by the Prime Minister, William Massey.	*NZ Herald*, 31 May 1915, p. 5
1915	Within two weeks of the opening of Māngere Bridge, *"serious settling of the abutment pier at the Onehunga end"* of the bridge, as well as abutment cracking at that end, and settling of piers at the Māngere end were noted	Memo by T J James to the District Engineer, Public Works, Auckland, 11 June 1915, BBAD A463 1054 R22458292, Archives New Zealand
March 1916	two concrete bridges were designed by RF Moore for the Karaka Road Board in 1913, crossing the Hingaia River and Whangamairie River. Both bridges were opened in March 1916.	Pukekohe & Waiuku Times, 22 July 1913, p.3 NZ Herald 22 March 1916, p.4
14 Aug 1916	The Panmure Bridge which was opened on 14 Aug 1916. It was also designed by R F Moore and built by GT Niccol.	
1917	By June 1917, it was noted that the Onehunga end of the Māngere Bridge was continuing to sink, with the eastern side sinking more than the west.	Memo dated 2 June 1917, BBAD A463 1054 R22458292, Archives New Zealand

1918	Parts of the eastern embankment at the Onehunga end were damaged by a winter storm in 1918 and had to be repaired by refilling with spalls.	Memo dated 9 June 1919, BBAD A463 1054 R22458292, Archives New Zealand
1919	The Māngere Road Board merged with Manukau County Council in the middle of 1919	Letter from Manukau County engineer W J Lopdell, dated 15 September 1921, BBAD A463 1054 R22458292, Archives New Zealand
1921	Storm damage in 1921 washed out much of the filling, with the wall collapsing. Options for repair including re-pitching or repair with a heavy cement grouting were considered.	NZ Herald 10 August 1921, p.6.
1921	The County Engineer approached the Public Works office with concerns about the uneven sinking of parts of the Māngere Bridge in September 1921	Letter from Manukau County engineer W J Lopdell, dated 15 September 1921, BBAD A463 1054 R22458292, Archives New Zealand
1925	County Council's engineers reported that the condition of the bridge's structure was unsatisfactory, with a break-up of the seawalls on the eastern side of both approaches, as well as the flaking away of concrete from the structure itself, exposing reinforcing rods which were rusting.	*Auckland Star*, 17 November 1925, p. 8
1927	In September 1927 the County engineer noted the abutments were failing badly. Repairs to the deck, abutments, handrails and treatment of exposed reinforcement was urgently required.	*NZ Herald*, 21 September 1927, p. 12
1928	repairs were underway as at April 1928.	*NZ Herald* 18 April 1928, p. 13
1936	The County engineer reports that extensive maintenance is required.	*NZ Herald*, 16 December 1936, p. 12
1939	Repairs valued at £4500 to the bridge's under-structure began at the Onehunga end in March 1939.	Letter from the City Engineer's Office to the Town Clerk re Māngere Bridge Repairs 18 Nov 1938, Auckland Council Archives
1939-40	By October 1939, repair work had reached the southern end of the bridge, with around two-thirds of the work completed.	*NZ Herald*, 18 October 1939, p. 10
1959	B& H Construction Company undertook concrete repairs to Māngere Bridge for Manukau County Council in mid-1959.	Letter B&H Construction Ltd to Manukau County Council 17 June 1959.

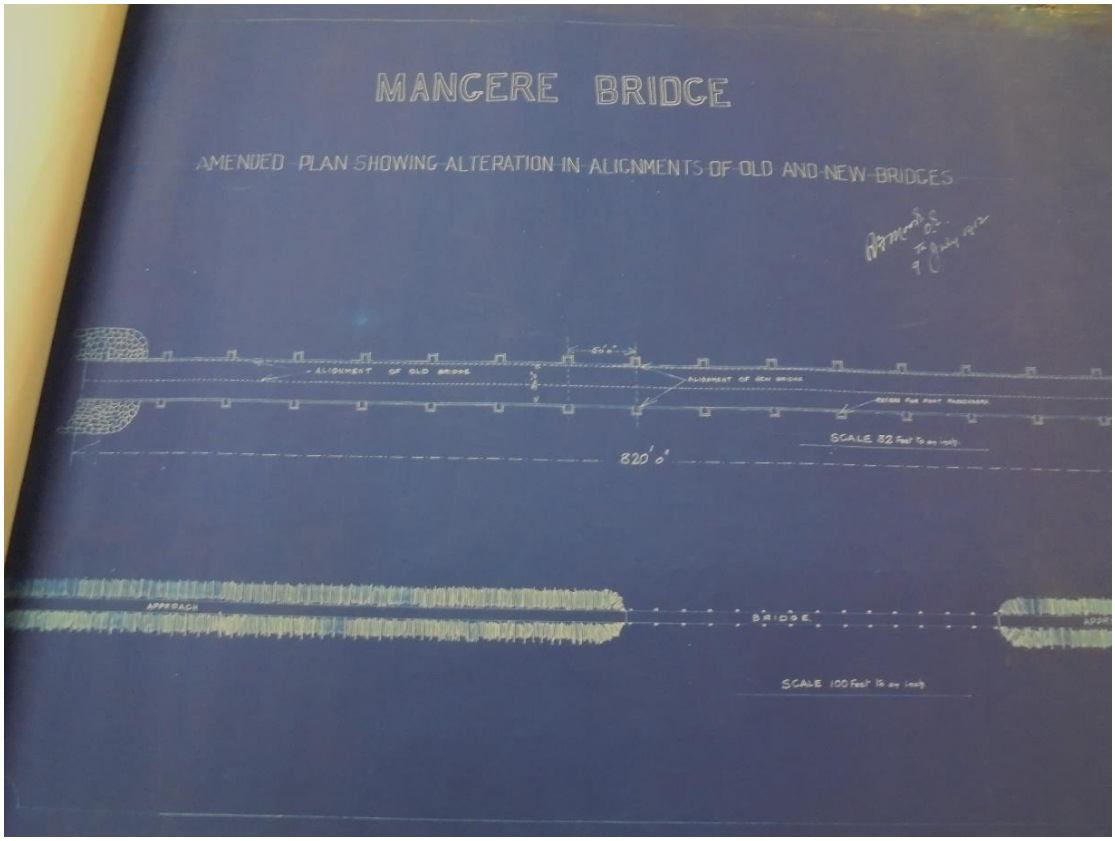
		Auckland Council Archives MKA010, Item 8 Box 5
1970	A replacement bridge is proposed	*South Auckland Courier*, 22 July 1970
1970s	The third Māngere Bridge is under construction	*The third Māngere Bridge during construction, 1977. Photographer unknown. Footprints 04411.*
1980	In 1980, 120m long bailey bridges were erected across the badly decaying parts of the old Māngere Bridge to keep traffic flowing via that route until the new bridge was finished.	*Central Leader*, 19 August 1980, p. 2; *NZ Herald*, 17 July 1980, p. 1
1982	Local residents petitioned for retention of the old Māngere Bridge for a trial period as a preferred walkway. [160]	*Auckland Star*, 19 August 1982; *NZ Herald* 27 August 1982, Section 1 p. 8
1983	The third Māngere Bridge was officially opened on 19 February 1983.	Manukau Courier, 15/2/1983, p. 1
1983	The old bridge's demolition was postponed indefinitely by the National Roads Board in 1983 due to cost	*Auckland Star*, 8 July 1983
2005	'Transit New Zealand announces plans for an upgrade of SH20, or the southwestern motorway, between Walmsley Road and Queenstown Road, to include a new bridge over the Māngere inlet between Māngere and Onehunga. Work on the new bridge begins on 9 April 2008 (see also 25 July 2010). Plans include preserving the old Māngere bridge - i.e. the second Māngere bridge - for its heritage and recreational value (see also 16 September 2015). '	*Manukau's Journey12 Oct 2005*
2010	'The new Māngere motorway bridge across the Māngere inlet between Māngere and Onehunga is formally opened. This supplements the existing Manukau Harbour Bridge and is a vital step towards completion of the western ring route. The bridge is opened to vehicles on 27 July 2010.'	*Manukau's Journey* 25 July 2010
2013	'Tenders close with the New Zealand Transport Agency for design proposals to replace the old Māngere bridge - the 'second' Māngere bridge - with a new pedestrian bridge across the Māngere inlet between Māngere and Onehunga'	*Manukau's Journey* 11 Sept 2013

Appendix 3: Supporting Information

Historic drawings MD4040 Auckland Council Heritage Unit, Marine Department files.

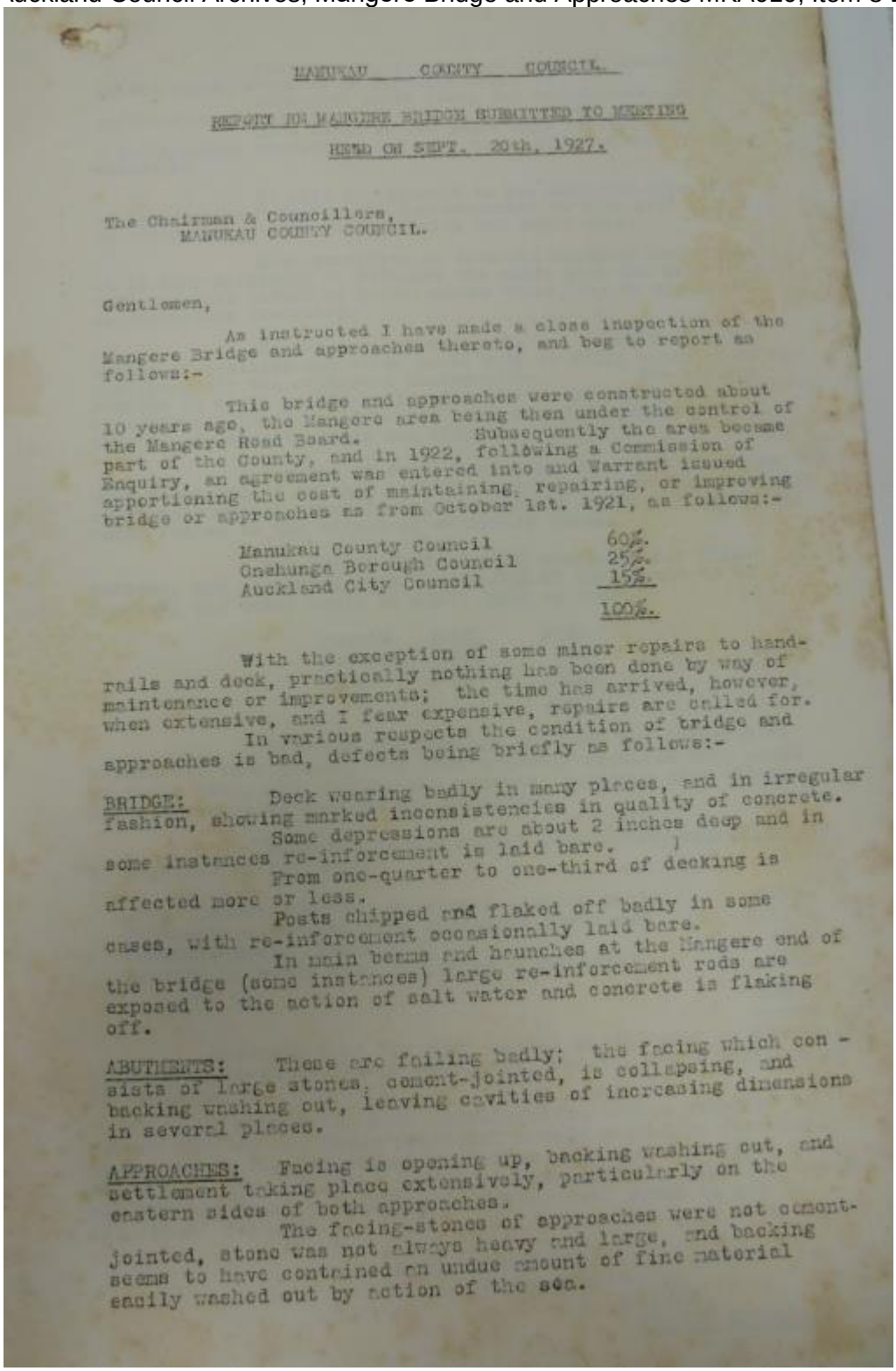
Newspaper Articles 1914-1915

New Zealand Herald 31 October 1914, p.10
New Zealand Herald 6 January 1915, p.9
NZ Herald 14 January 1915, p.7



Auckland Council Archives ELB 003 Roading and Reserves Plans
Māngere Bridge Amended plan showing alteration in alignments of old and new bridges, 1912. Item Number 35. Record Number B. Record ID 140108. Storage Location: Central-ACL-LB-M5-07-05.

Māngere Bridge Repairs 1927-28. Report by County Engineer, JR Page 1927. Auckland Council Archives, Māngere Bridge and Approaches MKA010, Item 8 Box 5



MANUKAU COUNTY COUNCIL.

REPORT ON MANGERE BRIDGE SUBMITTED TO MEETING HELD ON SEPT. 20th. 1927.

The Chairman & Councillors,
MANUKAU COUNTY COUNCIL.

Gentlemen,

As instructed I have made a close inspection of the Mangere Bridge and approaches thereto, and beg to report as follows:-

This bridge and approaches were constructed about 10 years ago, the Mangere area being then under the control of the Mangere Road Board. Subsequently the area became part of the County, and in 1922, following a Commission of Enquiry, an agreement was entered into and Warrant issued apportioning the cost of maintaining, repairing, or improving bridge or approaches as from October 1st. 1921, as follows:-

Manukau County Council	60%.
Onehunga Borough Council	25%.
Auckland City Council	15%.
	100%.

With the exception of some minor repairs to hand-rails and deck, practically nothing has been done by way of maintenance or improvements; the time has arrived, however, when extensive, and I fear expensive, repairs are called for.

In various respects the condition of bridge and approaches is bad, defects being briefly as follows:-

BRIDGE: Deck wearing badly in many places, and in irregular fashion, showing marked inconsistencies in quality of concrete. Some depressions are about 2 inches deep and in some instances re-inforcement is laid bare.

From one-quarter to one-third of decking is affected more or less.

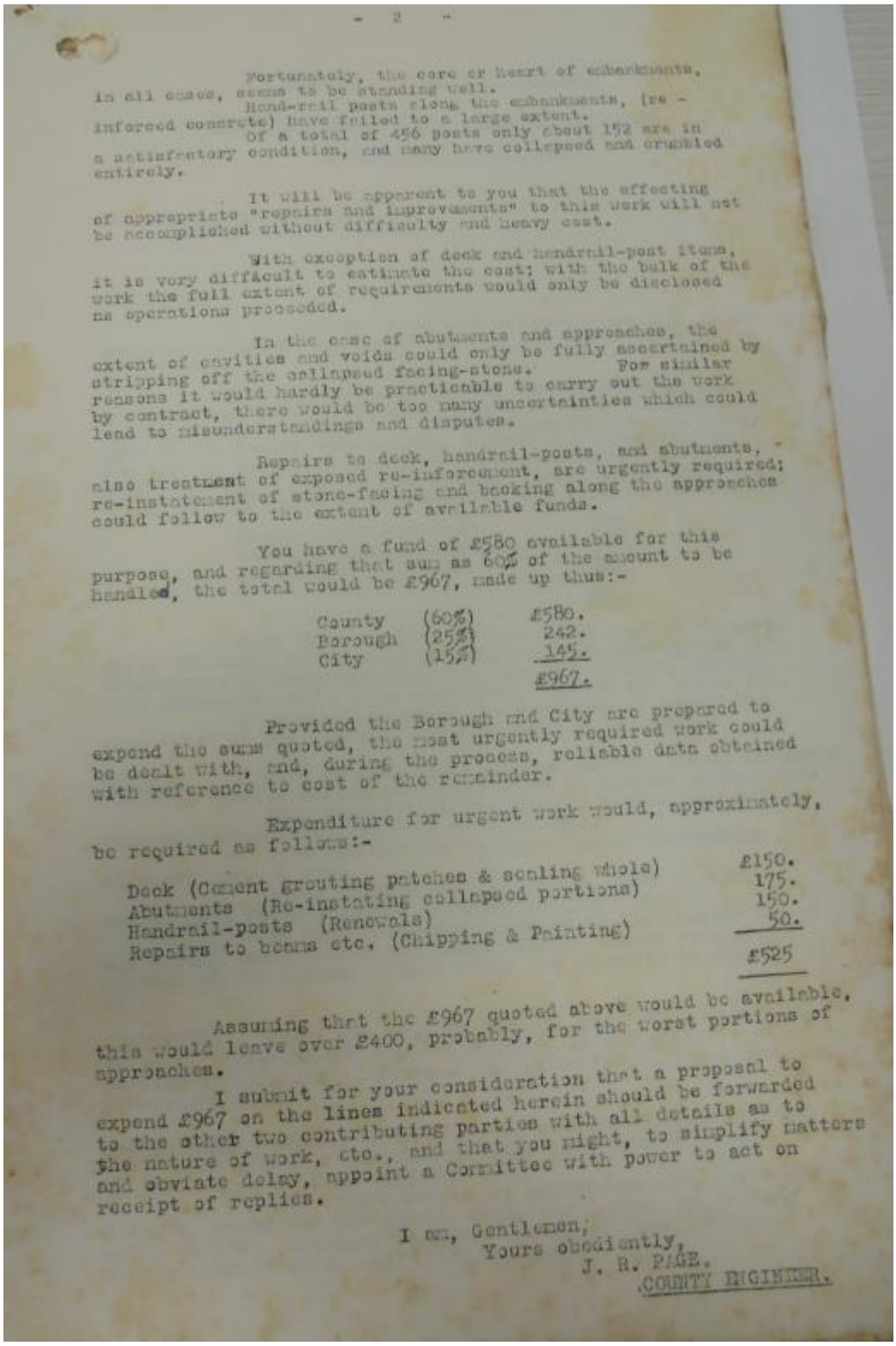
Posts chipped and flaked off badly in some cases, with re-inforcement occasionally laid bare.

In main berms and haunches at the Mangere end of the bridge (some instances) large re-inforcement rods are exposed to the action of salt water and concrete is flaking off.

ABUTMENTS: These are failing badly; the facing which consists of large stones, cement-jointed, is collapsing, and backing washing out, leaving cavities of increasing dimensions in several places.

APPROACHES: Facing is opening up, backing washing out, and settlement taking place extensively, particularly on the eastern sides of both approaches.

The facing-stones of approaches were not cement-jointed, stone was not always heavy and large, and backing seems to have contained an undue amount of fine material easily washed out by action of the sea.



- 2 -

Fortunately, the core or heart of embankments, in all cases, seems to be standing well.

Hand-rail posts along the embankments, (re-inforced concrete) have failed to a large extent. Of a total of 456 posts only about 152 are in a satisfactory condition, and many have collapsed and crumbled entirely.

It will be apparent to you that the effecting of appropriate "repairs and improvements" to this work will not be accomplished without difficulty and heavy cost.

With exception of deck and handrail-post items, it is very difficult to estimate the cost; with the bulk of the work the full extent of requirements would only be disclosed as operations proceeded.

In the case of abutments and approaches, the extent of cavities and voids could only be fully ascertained by stripping off the collapsed facing-stone. For similar reasons it would hardly be practicable to carry out the work by contract, there would be too many uncertainties which could lead to misunderstandings and disputes.

Repairs to deck, handrail-posts, and abutments, also treatment of exposed re-inforcement, are urgently required; re-instatement of stone-facing and backing along the approaches could follow to the extent of available funds.

You have a fund of £580 available for this purpose, and regarding that sum as 60% of the amount to be handled, the total would be £967, made up thus:-

County	(60%)	£580.
Borough	(25%)	242.
City	(15%)	145.
		£967.

Provided the Borough and City are prepared to expend the sums quoted, the most urgently required work could be dealt with, and, during the process, reliable data obtained with reference to cost of the remainder.

Expenditure for urgent work would, approximately, be required as follows:-

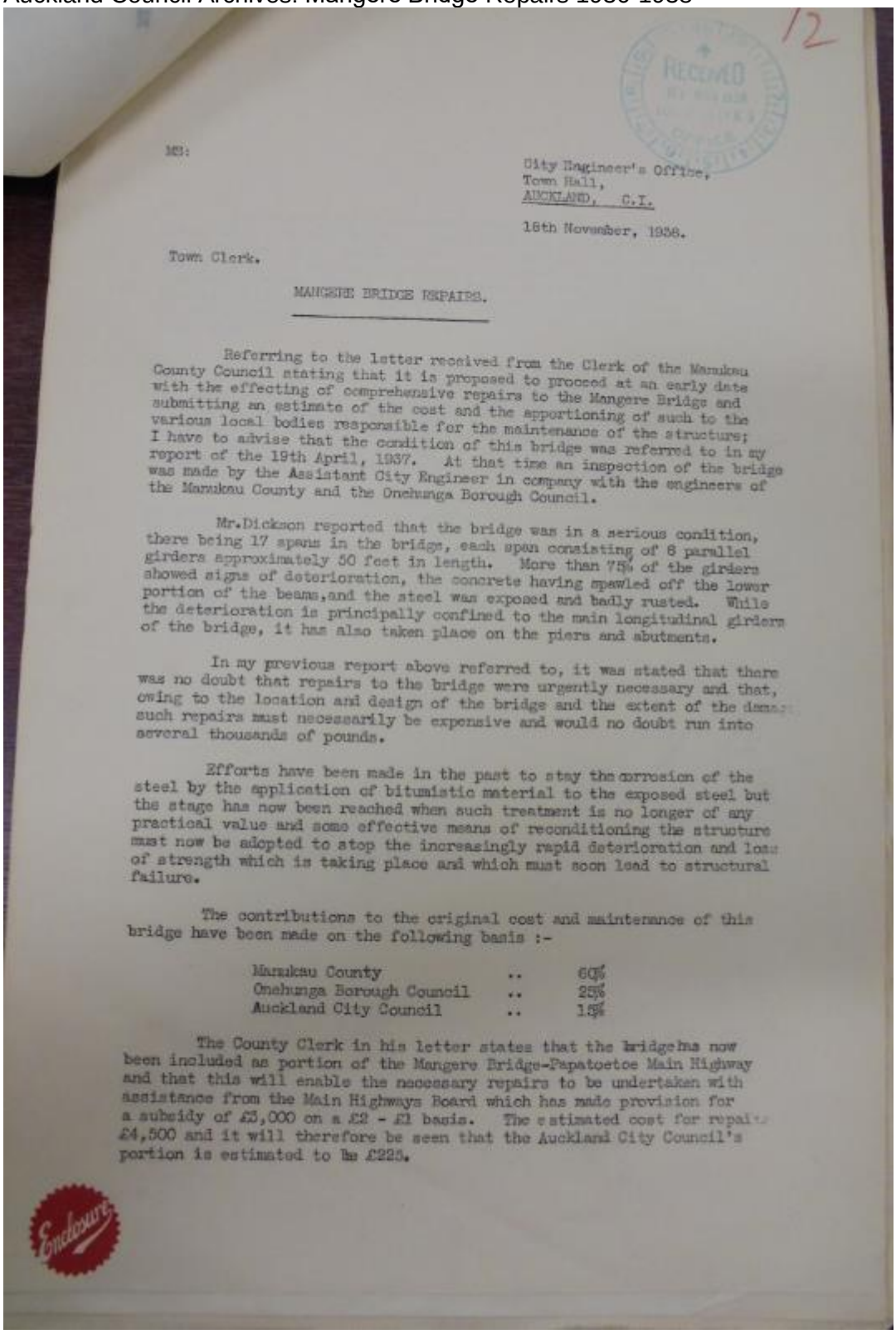
Deck (Cement grouting patches & sealing whole)	£150.
Abutments (Re-instating collapsed portions)	175.
Handrail-posts (Renewals)	150.
Repairs to beams etc. (Chipping & Painting)	50.
	£525

Assuming that the £967 quoted above would be available, this would leave over £400, probably, for the worst portions of approaches.

I submit for your consideration that a proposal to expend £967 on the lines indicated herein should be forwarded to the other two contributing parties with all details as to the nature of work, etc., and that you might, to simplify matters and obviate delay, appoint a Committee with power to act on receipt of replies.

I am, Gentlemen,
Yours obediently,
J. R. PAGE.
COUNTY ENGINEER.

Auckland Council Archives: Māngere Bridge Repairs 1936-1938



12

RECD

MS:

City Engineer's Office,
Town Hall,
AUCKLAND, C.I.

18th November, 1938.

Town Clerk.

MANGERE BRIDGE REPAIRS.

Referring to the letter received from the Clerk of the Manukau County Council stating that it is proposed to proceed at an early date with the effecting of comprehensive repairs to the Mangere Bridge and submitting an estimate of the cost and the apportioning of such to the various local bodies responsible for the maintenance of the structure; I have to advise that the condition of this bridge was referred to in my report of the 19th April, 1937. At that time an inspection of the bridge was made by the Assistant City Engineer in company with the engineers of the Manukau County and the Onehunga Borough Council.

Mr.Dickson reported that the bridge was in a serious condition, there being 17 spans in the bridge, each span consisting of 8 parallel girders approximately 50 feet in length. More than 75% of the girders showed signs of deterioration, the concrete having spawled off the lower portion of the beams,and the steel was exposed and badly rusted. While the deterioration is principally confined to the main longitudinal girders of the bridge, it has also taken place on the piers and abutments.

In my previous report above referred to, it was stated that there was no doubt that repairs to the bridge were urgently necessary and that, owing to the location and design of the bridge and the extent of the dama such repairs must necessarily be expensive and would no doubt run into several thousands of pounds.

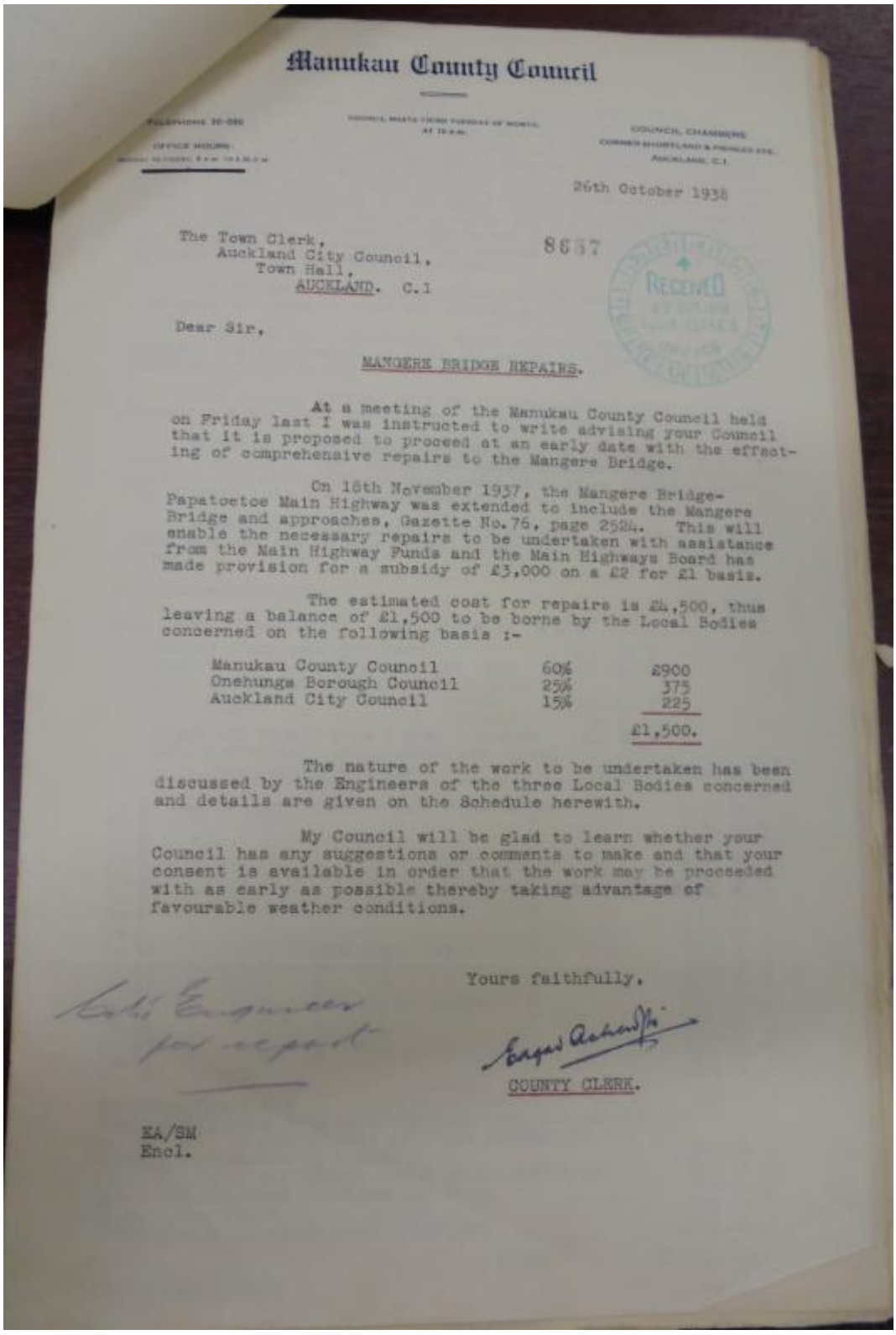
Efforts have been made in the past to stay the corrosion of the steel by the application of bitumistic material to the exposed steel but the stage has now been reached when such treatment is no longer of any practical value and some effective means of reconditioning the structure must now be adopted to stop the increasingly rapid deterioration and loss of strength which is taking place and which must soon lead to structural failure.

The contributions to the original cost and maintenance of this bridge have been made on the following basis :-

Manukau County	..	60%
Onehunga Borough Council	..	25%
Auckland City Council	..	15%

The County Clerk in his letter states that the bridge has now been included as portion of the Mangere Bridge-Papatoetoe Main Highway and that this will enable the necessary repairs to be undertaken with assistance from the Main Highways Board which has made provision for a subsidy of £2,000 on a £2 - £1 basis. The estimated cost for repairs £4,500 and it will therefore be seen that the Auckland City Council's portion is estimated to be £225.

Enclosure



Manukau County Council

COUNCIL CHAMBERS

26th October 1938

The Town Clerk,
Auckland City Council,
Town Hall,
AUCKLAND. C.1

8837

RECEIVED

Dear Sir,

MANGERE BRIDGE REPAIRS.

At a meeting of the Manukau County Council held on Friday last I was instructed to write advising your Council that it is proposed to proceed at an early date with the effecting of comprehensive repairs to the Mangere Bridge.

On 18th November 1937, the Mangere Bridge-Papatoetoe Main Highway was extended to include the Mangere Bridge and approaches, Gazette No.76, page 2534. This will enable the necessary repairs to be undertaken with assistance from the Main Highway Funds and the Main Highways Board has made provision for a subsidy of £3,000 on a £2 for £1 basis.

The estimated cost for repairs is £4,500, thus leaving a balance of £1,500 to be borne by the Local Bodies concerned on the following basis :-

Manukau County Council	60%	£900
Onehunga Borough Council	25%	375
Auckland City Council	15%	225
		£1,500.

The nature of the work to be undertaken has been discussed by the Engineers of the three Local Bodies concerned and details are given on the Schedule herewith.

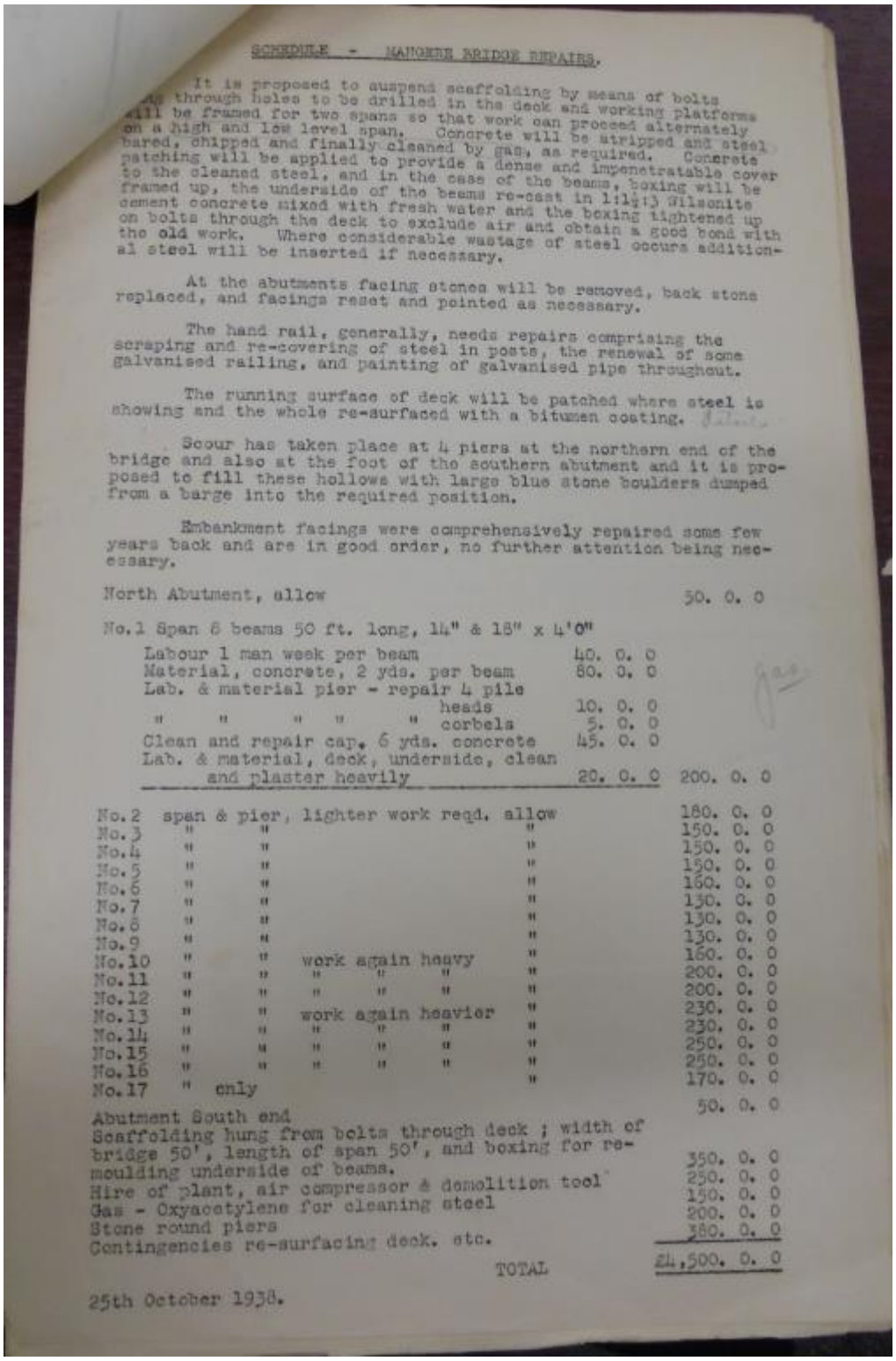
My Council will be glad to learn whether your Council has any suggestions or comments to make and that your consent is available in order that the work may be proceeded with as early as possible thereby taking advantage of favourable weather conditions.

Yours faithfully,

Engineer for report

COUNTY CLERK.

KA/SM
Encl.



SCHEDULE - MANGERE BRIDGE REPAIRS.

It is proposed to suspend scaffolding by means of bolts ... through holes to be drilled in the deck and working platforms will be framed for two spans so that work can proceed alternately on a high and low level span. Concrete will be stripped and steel bared, chipped and finally cleaned by gas, as required. Concrete patching will be applied to provide a dense and impenetratable cover to the cleaned steel, and in the case of the beams, boxing will be framed up, the underside of the beams re-cast in 1:1½:3 Wilsonite cement concrete mixed with fresh water and the boxing tightened up on bolts through the deck to exclude air and obtain a good bond with the old work. Where considerable wastage of steel occurs additional steel will be inserted if necessary.

At the abutments facing stones will be removed, back stone replaced, and facings reset and pointed as necessary.

The hand rail, generally, needs repairs comprising the scraping and re-covering of steel in posts, the renewal of some galvanised railing, and painting of galvanised pipe throughout.

The running surface of deck will be patched where steel is showing and the whole re-surfaced with a bitumen coating.

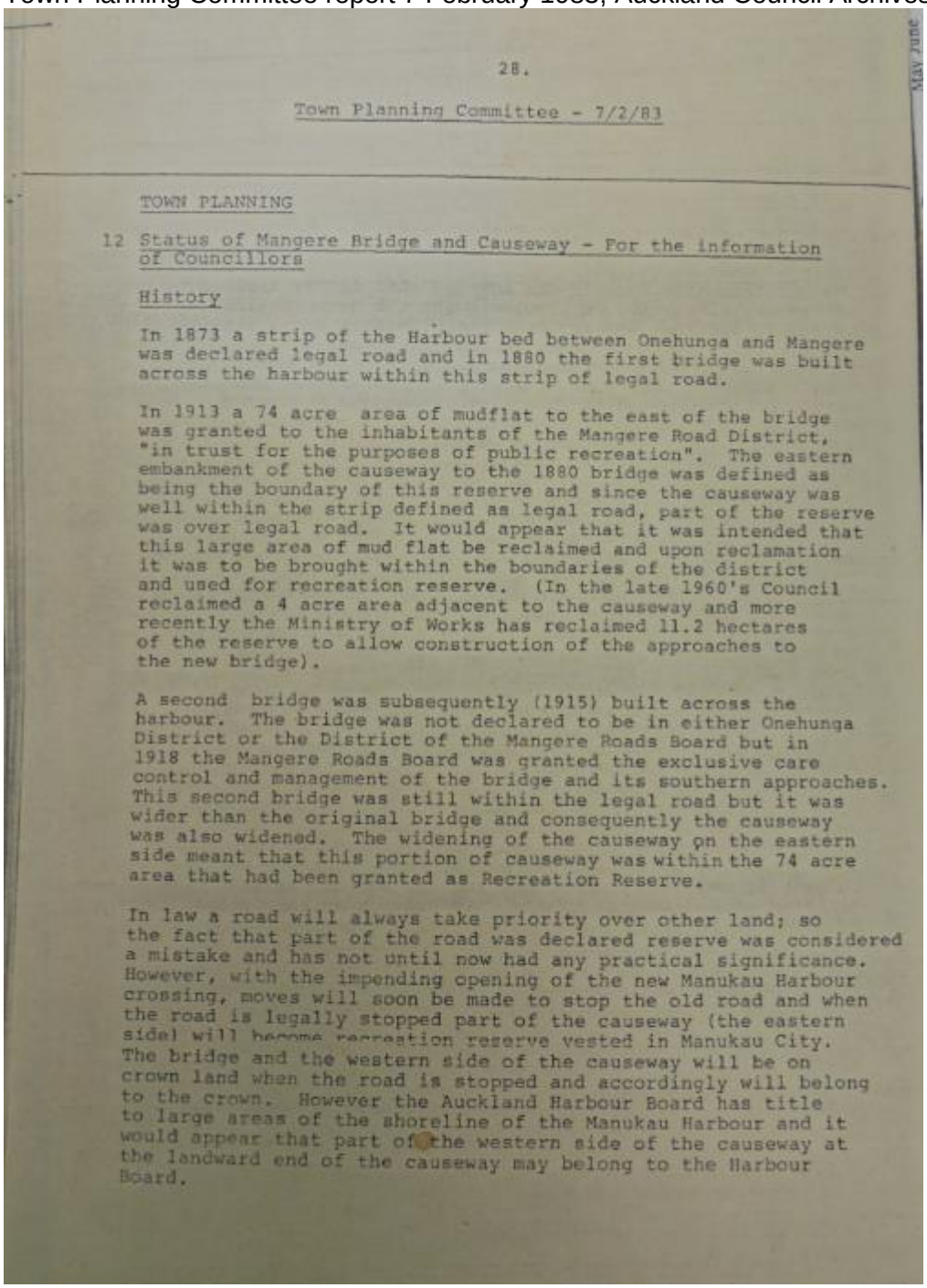
Scour has taken place at 4 piers at the northern end of the bridge and also at the foot of the southern abutment and it is proposed to fill these hollows with large blue stone boulders dumped from a barge into the required position.

Embankment facings were comprehensively repaired some few years back and are in good order, no further attention being necessary.

North Abutment, allow		50. 0. 0
No.1 Span 6 beams 50 ft. long, 14" & 18" x 4'0"		
Labour 1 man week per beam	40. 0. 0	
Material, concrete, 2 yds. per beam	80. 0. 0	
Lab. & material pier - repair 4 pile heads	10. 0. 0	
" " " " " corbels	5. 0. 0	
Clean and repair cap, 6 yds. concrete	45. 0. 0	
Lab. & material, deck, underside, clean and plaster heavily	20. 0. 0	200. 0. 0
No.2 span & pier, lighter work reqd. allow		180. 0. 0
No.3 " " "		150. 0. 0
No.4 " " "		150. 0. 0
No.5 " " "		150. 0. 0
No.6 " " "		160. 0. 0
No.7 " " "		130. 0. 0
No.8 " " "		130. 0. 0
No.9 " " "		130. 0. 0
No.10 " " work again heavy "		160. 0. 0
No.11 " " " " " "		200. 0. 0
No.12 " " " " " "		200. 0. 0
No.13 " " work again heavier "		230. 0. 0
No.14 " " " " " "		230. 0. 0
No.15 " " " " " "		250. 0. 0
No.16 " " " " " "		250. 0. 0
No.17 " only "		170. 0. 0
Abutment South end		50. 0. 0
Scaffolding hung from bolts through deck ; width of bridge 50', length of span 50', and boxing for re-moulding underside of beams.		350. 0. 0
Hire of plant, air compressor & demolition tool		250. 0. 0
Gas - Oxyacetylene for cleaning steel		150. 0. 0
Stone round piers		200. 0. 0
Contingencies re-surfacing deck. etc.		380. 0. 0
TOTAL		£4,500. 0. 0

25th October 1938.

Town Planning Committee report 7 February 1983; Auckland Council Archives.



28.

Town Planning Committee - 7/2/83

TOWN PLANNING

12 Status of Mangere Bridge and Causeway - For the information of Councillors

History

In 1873 a strip of the Harbour bed between Onehunga and Mangere was declared legal road and in 1880 the first bridge was built across the harbour within this strip of legal road.

In 1913 a 74 acre area of mudflat to the east of the bridge was granted to the inhabitants of the Mangere Road District, "in trust for the purposes of public recreation". The eastern embankment of the causeway to the 1880 bridge was defined as being the boundary of this reserve and since the causeway was well within the strip defined as legal road, part of the reserve was over legal road. It would appear that it was intended that this large area of mud flat be reclaimed and upon reclamation it was to be brought within the boundaries of the district and used for recreation reserve. (In the late 1960's Council reclaimed a 4 acre area adjacent to the causeway and more recently the Ministry of Works has reclaimed 11.2 hectares of the reserve to allow construction of the approaches to the new bridge).

A second bridge was subsequently (1915) built across the harbour. The bridge was not declared to be in either Onehunga District or the District of the Mangere Roads Board but in 1918 the Mangere Roads Board was granted the exclusive care control and management of the bridge and its southern approaches. This second bridge was still within the legal road but it was wider than the original bridge and consequently the causeway was also widened. The widening of the causeway on the eastern side meant that this portion of causeway was within the 74 acre area that had been granted as Recreation Reserve.

In law a road will always take priority over other land; so the fact that part of the road was declared reserve was considered a mistake and has not until now had any practical significance. However, with the impending opening of the new Manukau Harbour crossing, moves will soon be made to stop the old road and when the road is legally stopped part of the causeway (the eastern side) will become recreation reserve vested in Manukau City. The bridge and the western side of the causeway will be on crown land when the road is stopped and accordingly will belong to the crown. However the Auckland Harbour Board has title to large areas of the shoreline of the Manukau Harbour and it would appear that part of the western side of the causeway at the landward end of the causeway may belong to the Harbour Board.

Town Planning Committee - 7/2/83

TOWN PLANNING

12 Status of Mangere Bridge and Causeway

Road Stopping

In 1960 the bridge and causeway became part of State Highway 20 and consequently control of the bridge and causeway went to the National Roads Board. Council has no power to stop road that is State Highway.

Presumably when the new crossing is opened it will be declared a State Highway and the declaration that made the existing causeway and bridge a State Highway will be revoked. If this happens the control of the causeway will revert to Council (as the successor of the Mangere Roads Board).

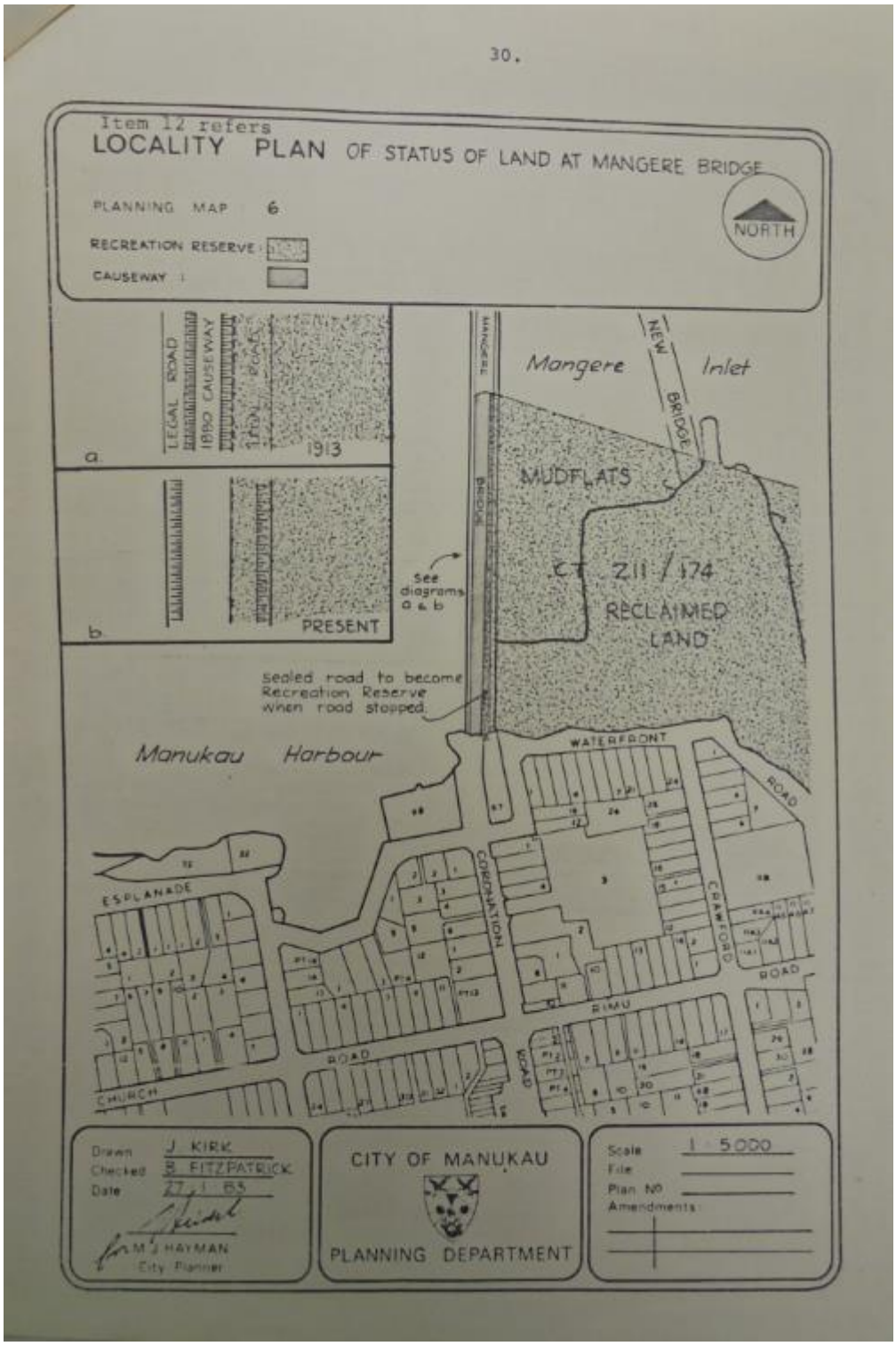
As mentioned above, the causeway was not brought within the boundaries of the Mangere Roads Board District, and the Chief Surveyor has recently confirmed that the causeway is still outside the City boundaries. Unfortunately Council's power to stop roads under the Local Government Act 1974 is limited to roads that are "in the district" so that even if Council regains control of the bridge when its State Highway status is revoked it will be powerless to stop the road.

The Minister of Works and Development has power by virtue of Section 116 of the Public Works Act 1981 to declare any road or part of a road to be stopped by notice in the Gazette, and provided Council consents the Minister may stop this area of road.

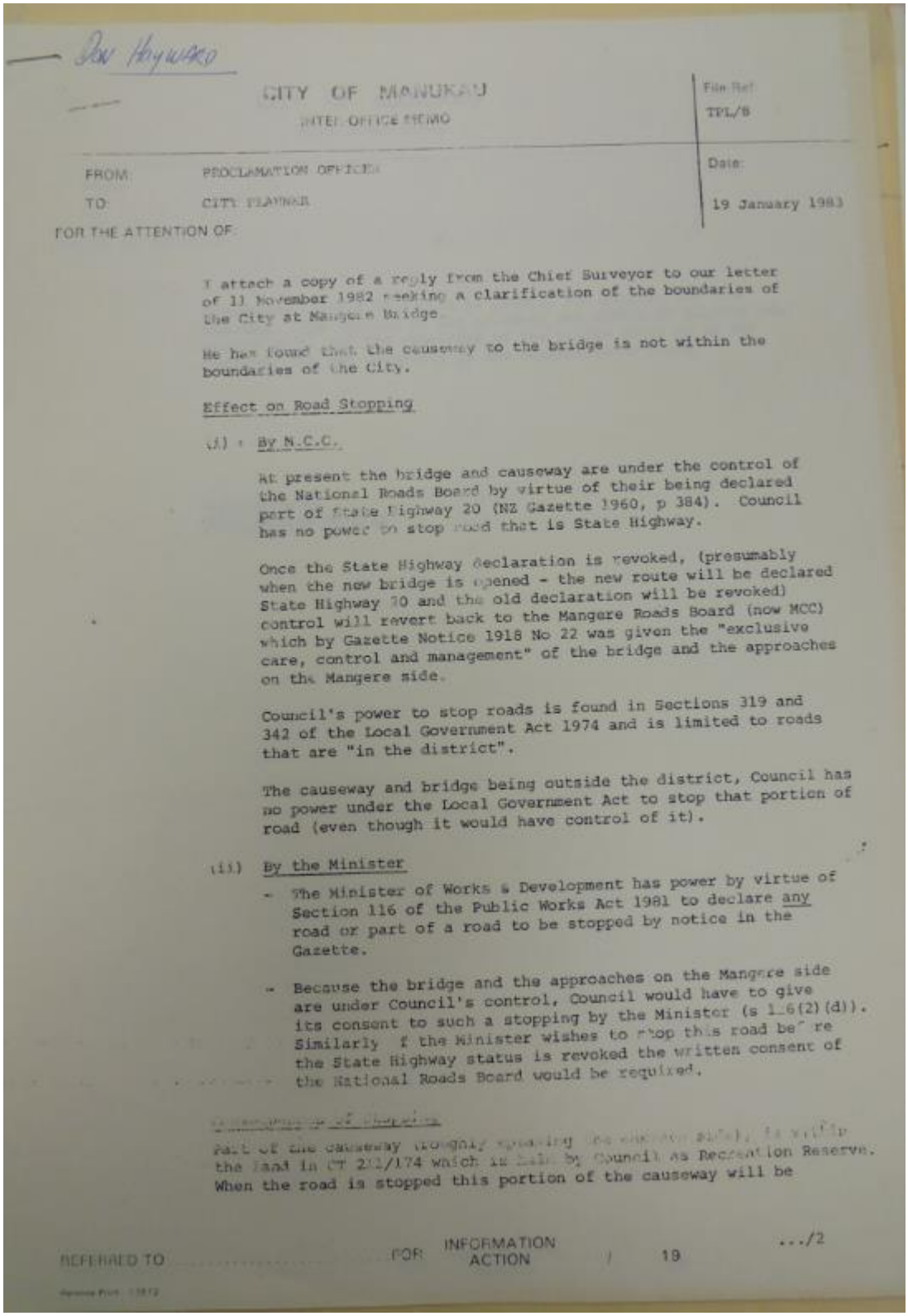
It is considered that the entire causeway to the bridge should be vested in Council and to that end a meeting is being arranged between Council officers and officers of the Ministry of Works and Development, the Auckland Harbour Board and the Department of Lands and Survey at which the plans of the various interested parties for the causeway and the question of the acquisition of the causeway by Council can be discussed. A further report will be submitted after these submissions have taken place.

Recommendation

That this report be received.


30.
Item 12 refers
LOCALITY PLAN OF STATUS OF LAND AT MANGERE BRIDGE
PLANNING MAP 6
RECREATION RESERVE
CAUSEWAY
NORTH
LEGAL ROAD
1890 CAUSEWAY
1913
a
b
PRESENT
See diagrams a & b
MANGERE BRIDGE
NEW BRIDGE
Mangere Inlet
MUDFLATS
CT 211/174
RECLAIMED LAND
sealed road to become Recreation Reserve when road stopped
Manukau Harbour
WATERFRONT
ROAD
ESPLANADE
CORONATION
CRAWFORD
RIMU
CHURCH
Drawn J KIRK
Checked R FITZPATRICK
Date 27.1.65
M J HAYMAN
City Planner
CITY OF MANUKAU
PLANNING DEPARTMENT
Scale 1:5000
File
Plan NO
Amendments

Auckland Council Archives; General Manukau archive records.



Doc Haywards

CITY OF MANUKAU

INTER-OFFICE MEMO

File Ref: TPL/8

FROM: PROCLAMATION OFFICER

TO: CITY PLANNER

Date: 19 January 1983

FOR THE ATTENTION OF:

I attach a copy of a reply from the Chief Surveyor to our letter of 11 November 1982 seeking a clarification of the boundaries of the City at Mangere Bridge.

He has found that the causeway to the bridge is not within the boundaries of the City.

Effect on Road Stopping

(i) By N.C.C.

At present the bridge and causeway are under the control of the National Roads Board by virtue of their being declared part of State Highway 20 (NZ Gazette 1960, p 384). Council has no power to stop road that is State Highway.

Once the State Highway declaration is revoked, (presumably when the new bridge is opened - the new route will be declared State Highway 20 and the old declaration will be revoked) control will revert back to the Mangere Roads Board (now MCC) which by Gazette Notice 1918 No 22 was given the "exclusive care, control and management" of the bridge and the approaches on the Mangere side.

Council's power to stop roads is found in Sections 319 and 342 of the Local Government Act 1974 and is limited to roads that are "in the district".

The causeway and bridge being outside the district, Council has no power under the Local Government Act to stop that portion of road (even though it would have control of it).

(ii) By the Minister

- The Minister of Works & Development has power by virtue of Section 116 of the Public Works Act 1981 to declare any road or part of a road to be stopped by notice in the Gazette.

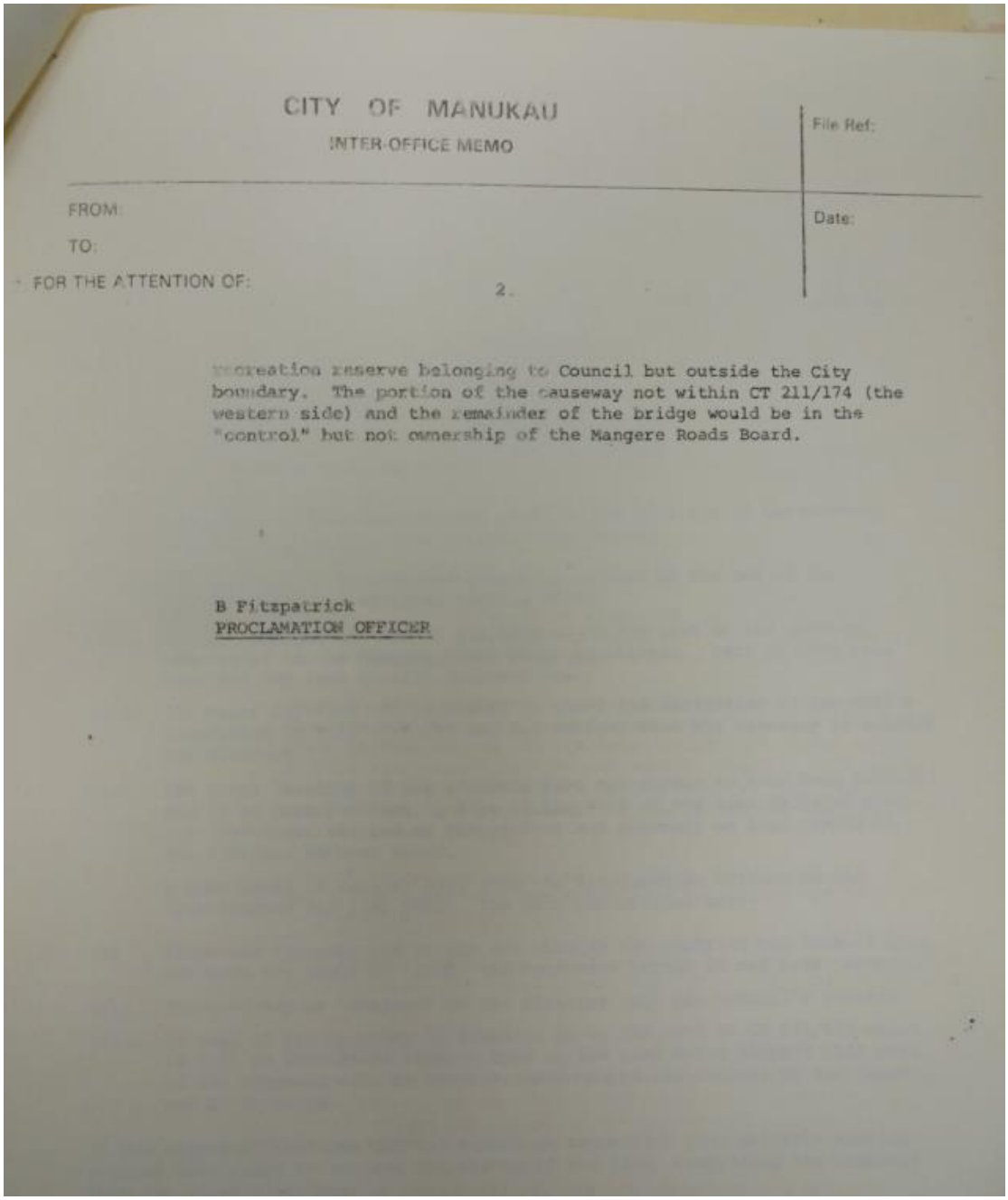
- Because the bridge and the approaches on the Mangere side are under Council's control, Council would have to give its consent to such a stopping by the Minister (s 116(2)(d)). Similarly if the Minister wishes to stop this road before the State Highway status is revoked the written consent of the National Roads Board would be required.

[illegible]

Part of the causeway [illegible] is vested by Council as Recreation Reserve. the land in CT 211/174 which is [illegible]
When the road is stopped this portion of the causeway will be

REFERRED TO ..... FOR INFORMATION / ACTION / 19 .../2

Auckland Council Archives; General Manukau archive records.



CITY OF MANUKAU

INTER-OFFICE MEMO

File Ref:

FROM:

Date:

TO:

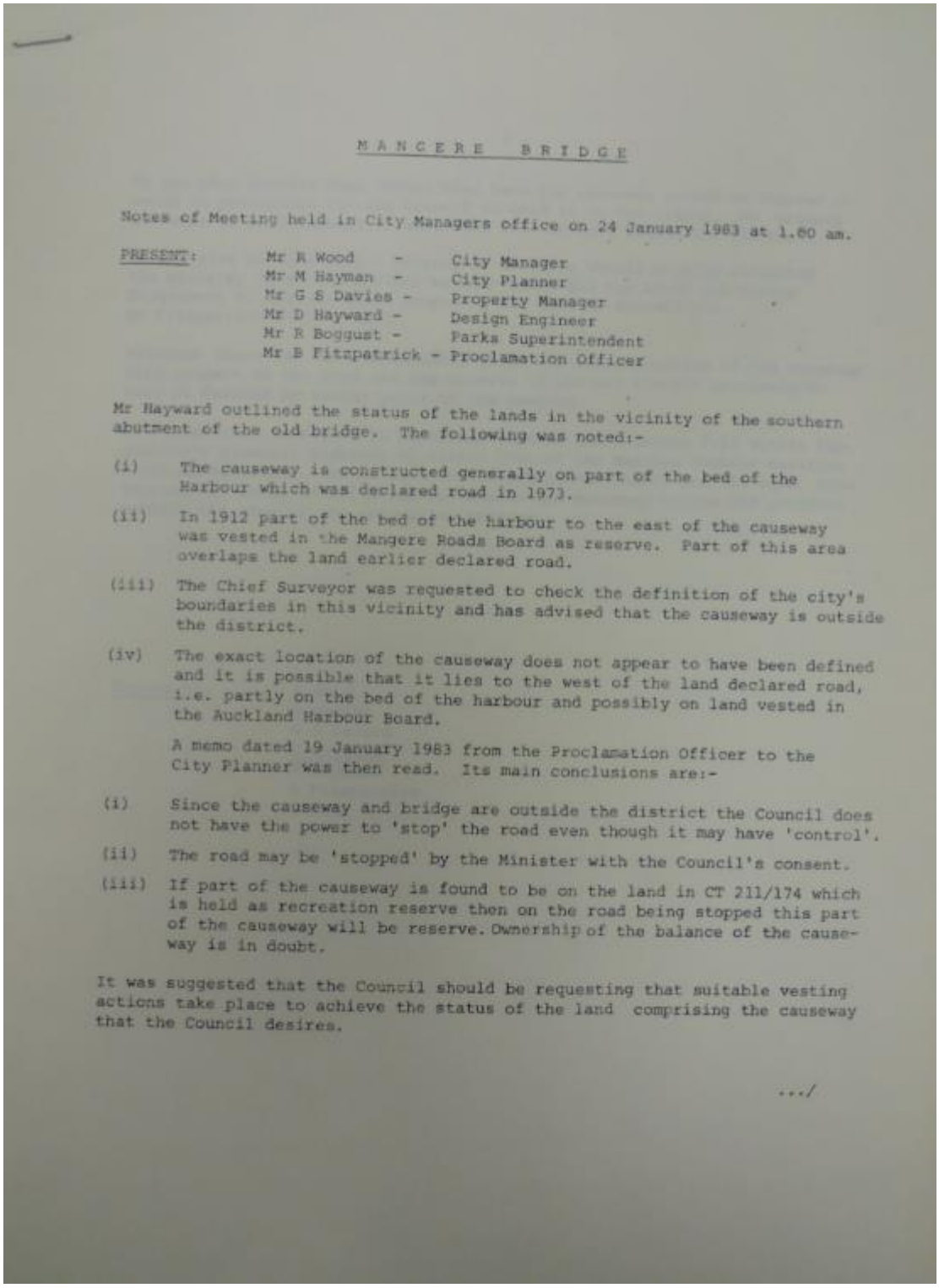
FOR THE ATTENTION OF:

2.

recreation reserve belonging to Council but outside the City boundary. The portion of the causeway not within CT 211/174 (the western side) and the remainder of the bridge would be in the "control" but not ownership of the Mangere Roads Board.

B Fitzpatrick
PROCLAMATION OFFICER

Auckland Council Archives; General Manukau archive records.



MANGERE BRIDGE

Notes of Meeting held in City Managers office on 24 January 1983 at 1.60 am.

PRESENT:

Mr R Wood	-	City Manager
Mr M Hayman	-	City Planner
Mr G S Davies	-	Property Manager
Mr D Hayward	-	Design Engineer
Mr R Boggust	-	Parks Superintendent
Mr B Fitzpatrick	-	Proclamation Officer

Mr Hayward outlined the status of the lands in the vicinity of the southern abutment of the old bridge. The following was noted:-

(i) The causeway is constructed generally on part of the bed of the Harbour which was declared road in 1973.

(ii) In 1912 part of the bed of the harbour to the east of the causeway was vested in the Mangere Roads Board as reserve. Part of this area overlaps the land earlier declared road.

(iii) The Chief Surveyor was requested to check the definition of the city's boundaries in this vicinity and has advised that the causeway is outside the district.

(iv) The exact location of the causeway does not appear to have been defined and it is possible that it lies to the west of the land declared road, i.e. partly on the bed of the harbour and possibly on land vested in the Auckland Harbour Board.

A memo dated 19 January 1983 from the Proclamation Officer to the City Planner was then read. Its main conclusions are:-

(i) Since the causeway and bridge are outside the district the Council does not have the power to 'stop' the road even though it may have 'control'.

(ii) The road may be 'stopped' by the Minister with the Council's consent.

(iii) If part of the causeway is found to be on the land in CT 211/174 which is held as recreation reserve then on the road being stopped this part of the causeway will be reserve. Ownership of the balance of the causeway is in doubt.

It was suggested that the Council should be requesting that suitable vesting actions take place to achieve the status of the land comprising the causeway that the Council desires.

.../

It was then decided that rather than have the causeway vested as reserve it would be preferable for the Council to hold it in fee simple. No urgency was seen to be necessary to have this land brought within the district.

It was also decided that a meeting of officers should be held including the Ministry of Works, Auckland Harbour Board and the Lands and Survey Department to discuss these proposals and that Mr Hayward and Mr Fitzpatrick would attend.

Although there was some uncertainty about the exact location of the causeway with respect to the road and the reserve it was not thought necessary to have it defined by survey prior to the meeting.

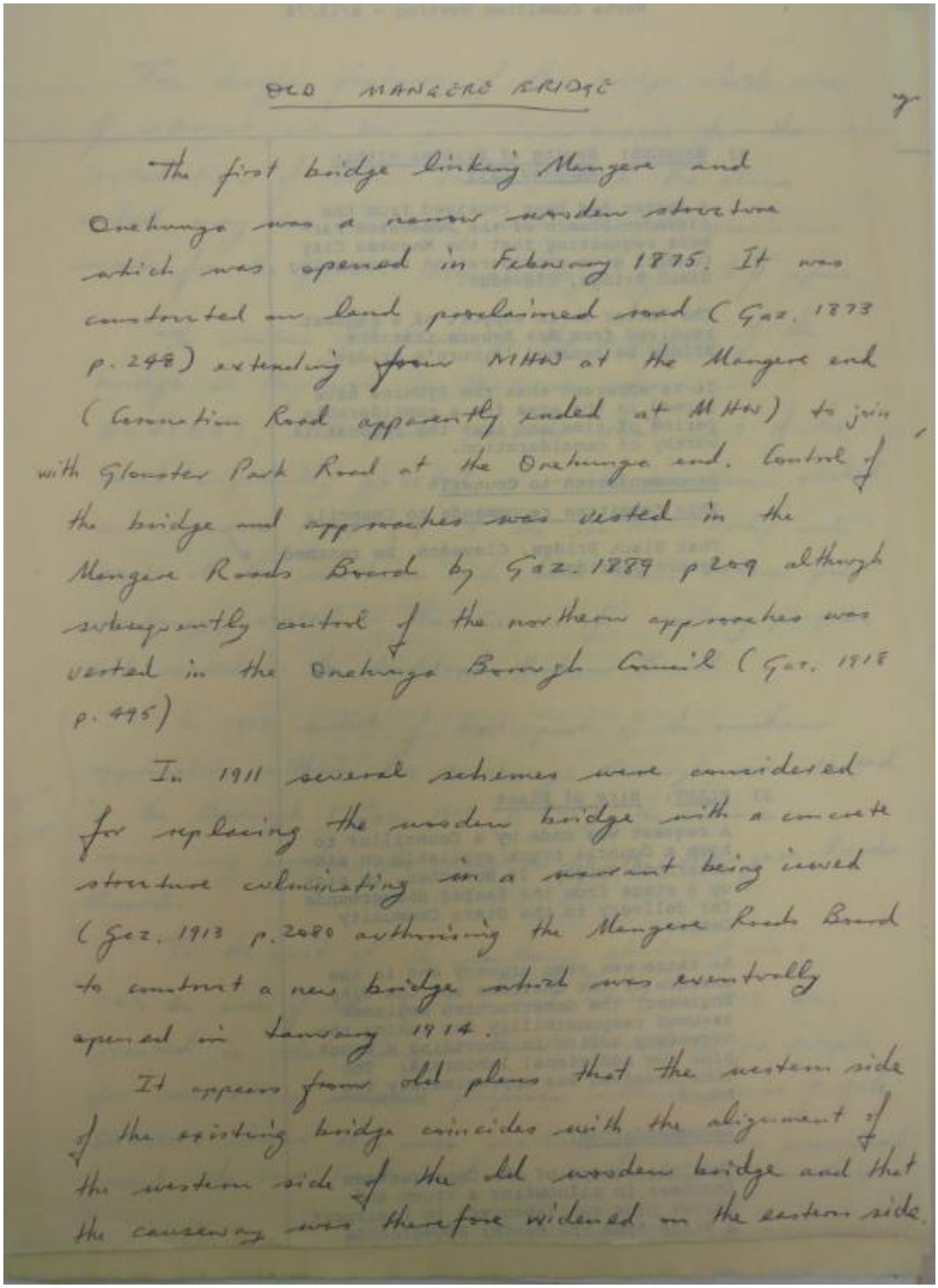
Mr Fitzpatrick undertook to ascertain whether the causeway fell within the Council's planning district or within that of the Manukau Harbour Maritime Planning Authority. He is also investigating ownership of the 700 sq.m. area (marked "C" on SO 54520) which is beneath the motorway bridge and projects outside the edge of the recreation reserve.

******

Copies to:

R Wood
M Hayman
G S Davies
D Hayward
R Boggust
B Fitzpatrick
J Weir

Auckland Council Archives; General Manukau archive records.



OLD MANGERE BRIDGE 7

The first bridge linking Mangere and Onehunga was a narrow wooden structure which was opened in February 1875. It was constructed on land proclaimed road (Gaz. 1873 p. 248) extending from MHW at the Mangere end (Connection Road apparently ended at MHW) to join with Gloucester Park Road at the Onehunga end. Control of the bridge and approaches was vested in the Mangere Roads Board by Gaz. 1889 p 209 although subsequently control of the northern approaches was vested in the Onehunga Borough Council (Gaz. 1918 p. 495)

In 1911 several schemes were considered for replacing the wooden bridge with a concrete structure culminating in a warrant being issued (Gaz. 1913 p. 2080 authorising the Mangere Roads Board to construct a new bridge which was eventually opened in January 1914.

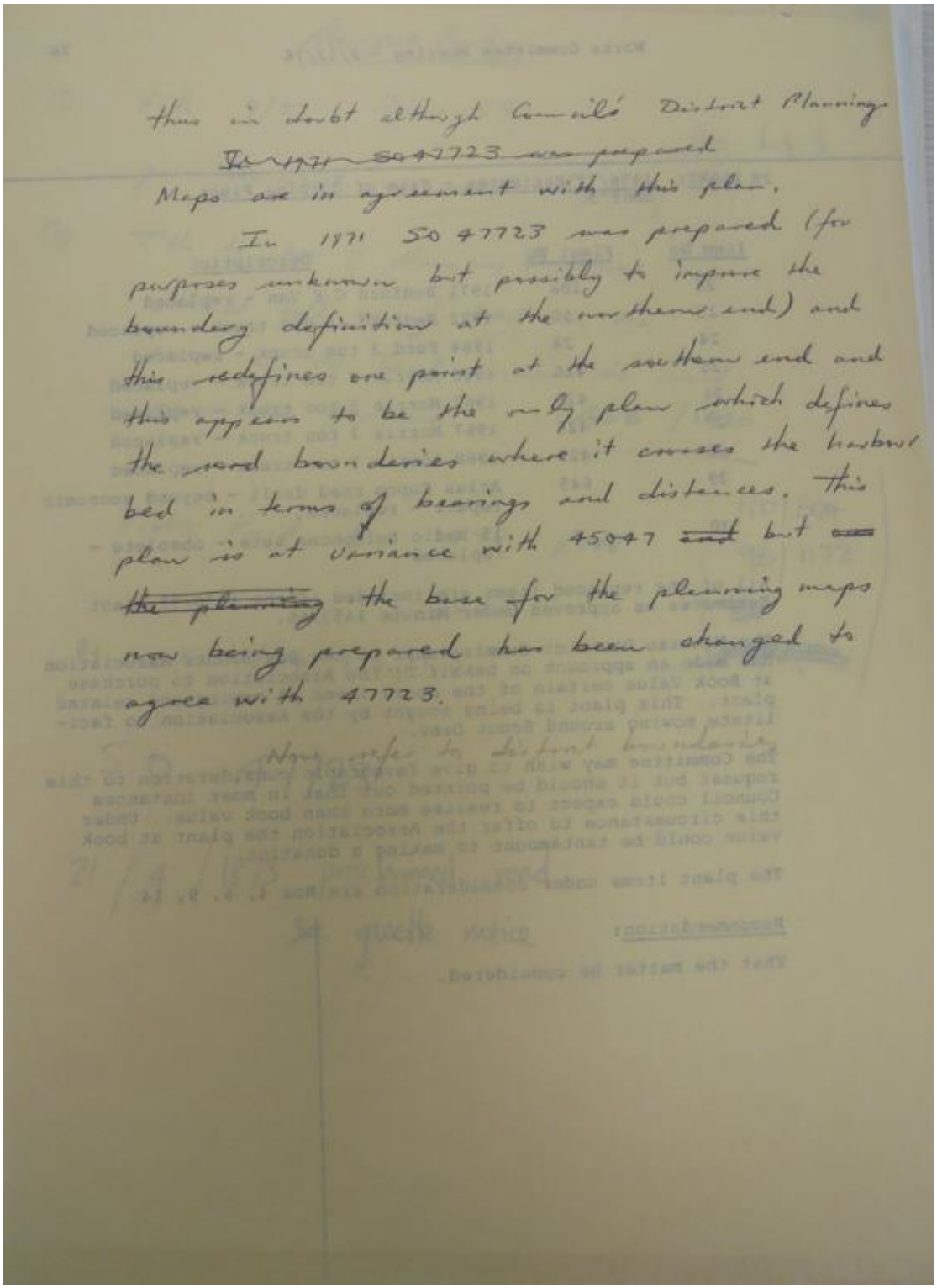
It appears from old plans that the western side of the existing bridge coincides with the alignment of the western side of the old wooden bridge and that the causeway was therefore widened on the eastern side.

Two design features of the bridge which are of interest are the provisions made for the installation of tram tracks, which the plans noted may be omitted, and also the provisions made for the future incorporation of a lift span.

The status of the lands in the vicinity of the bridge as they were in 1965 is shown on SO 45047. This plan records that part of the land originally gazetted as road has been vested as reserve (lot 67 at the southern end) and parts at the northern end have been taken for railway, vested in the Crown for railway purposes and vested in the Auckland Harbour Board.

In 1918 control of that part of the northern approaches within the Onehunga Borough was vested in the Borough (Gaz. 1918 p. 495), the balance remaining under the control of the Mangere Roads Board.

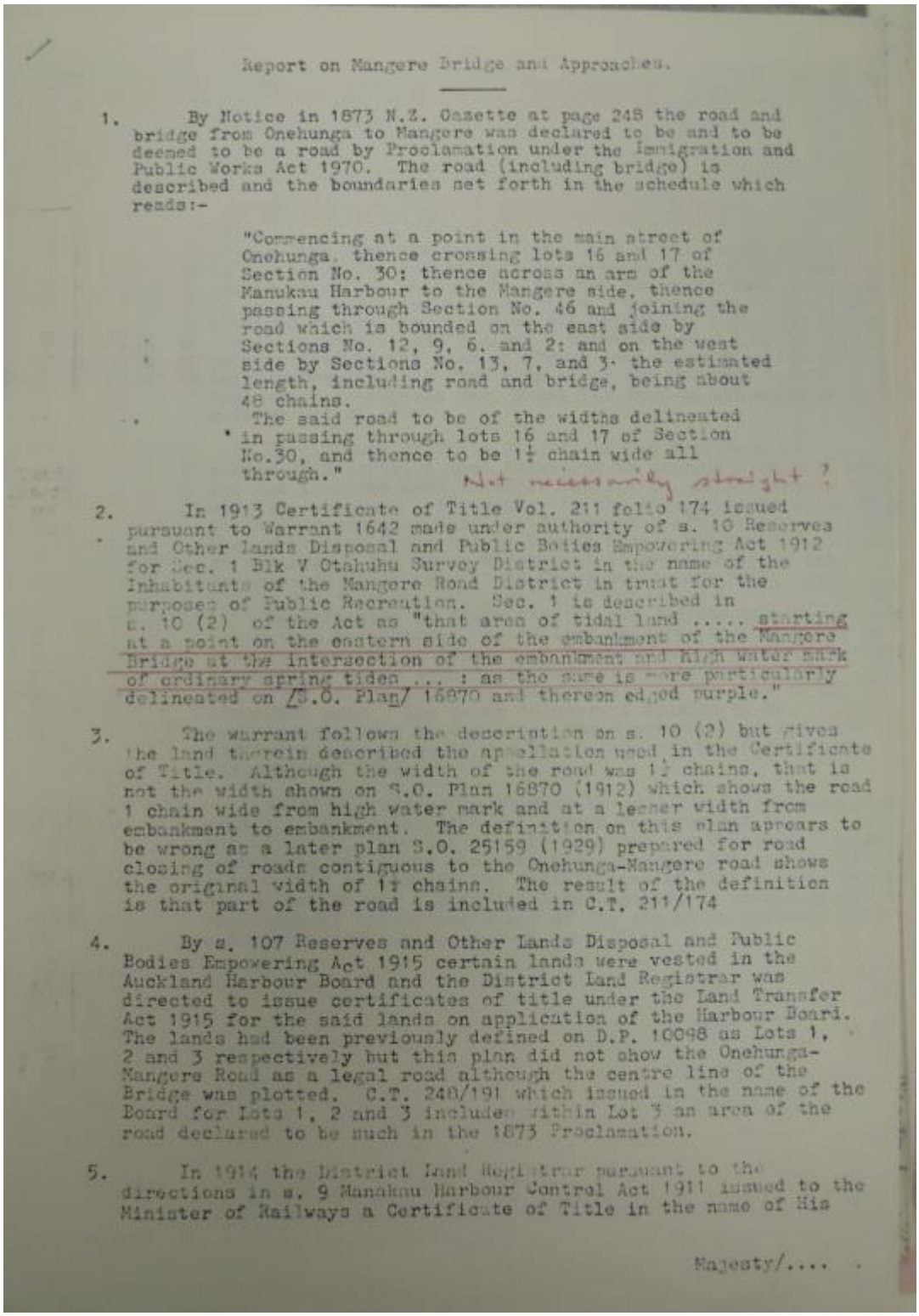
To the east of the southern abutment is a 74½ ha area of the harbour bed, defined on SO 16870, which in 1912 was vested in the Mangere Road Board in fee simple for recreation purposes without power of sale. SO 45047 shows this area overlapping the area proclaimed road. The true location of the area proclaimed road is



there is doubt although Council's District Planning
~~In 1971 SO 47723 was prepared~~
Maps are in agreement with this plan.

In 1971 SO 47723 was prepared (for purposes unknown but possibly to improve the boundary definition at the northern end) and this redefines one point at the southern end and this appears to be the only plan which defines the road boundaries where it crosses the harbour bed in terms of bearings and distances. This plan is at variance with 45047 ~~and~~ but ~~the planning~~ the base for the planning maps now being prepared has been changed to agree with 47723.

1973 Report on Māngere Bridge Approaches, Auckland Council Archives, File: Auc 2014-100, Folder 100 General Manukau Archives.



Report on Mangere Bridge and Approaches.

1. By Notice in 1873 N.Z. Gazette at page 248 the road and bridge from Onehunga to Mangere was declared to be and to be deemed to be a road by Proclamation under the Immigration and Public Works Act 1870. The road (including bridge) is described and the boundaries set forth in the schedule which reads:-

"Commencing at a point in the main street of Onehunga, thence crossing lots 16 and 17 of Section No. 30: thence across an arm of the Manukau Harbour to the Mangere side, thence passing through Section No. 46 and joining the road which is bounded on the east side by Sections No. 12, 9, 6, and 2: and on the west side by Sections No. 13, 7, and 3· the estimated length, including road and bridge, being about 48 chains.

The said road to be of the widths delineated in passing through lots 16 and 17 of Section No.30, and thence to be 1½ chain wide all through."

Not necessarily straight ?

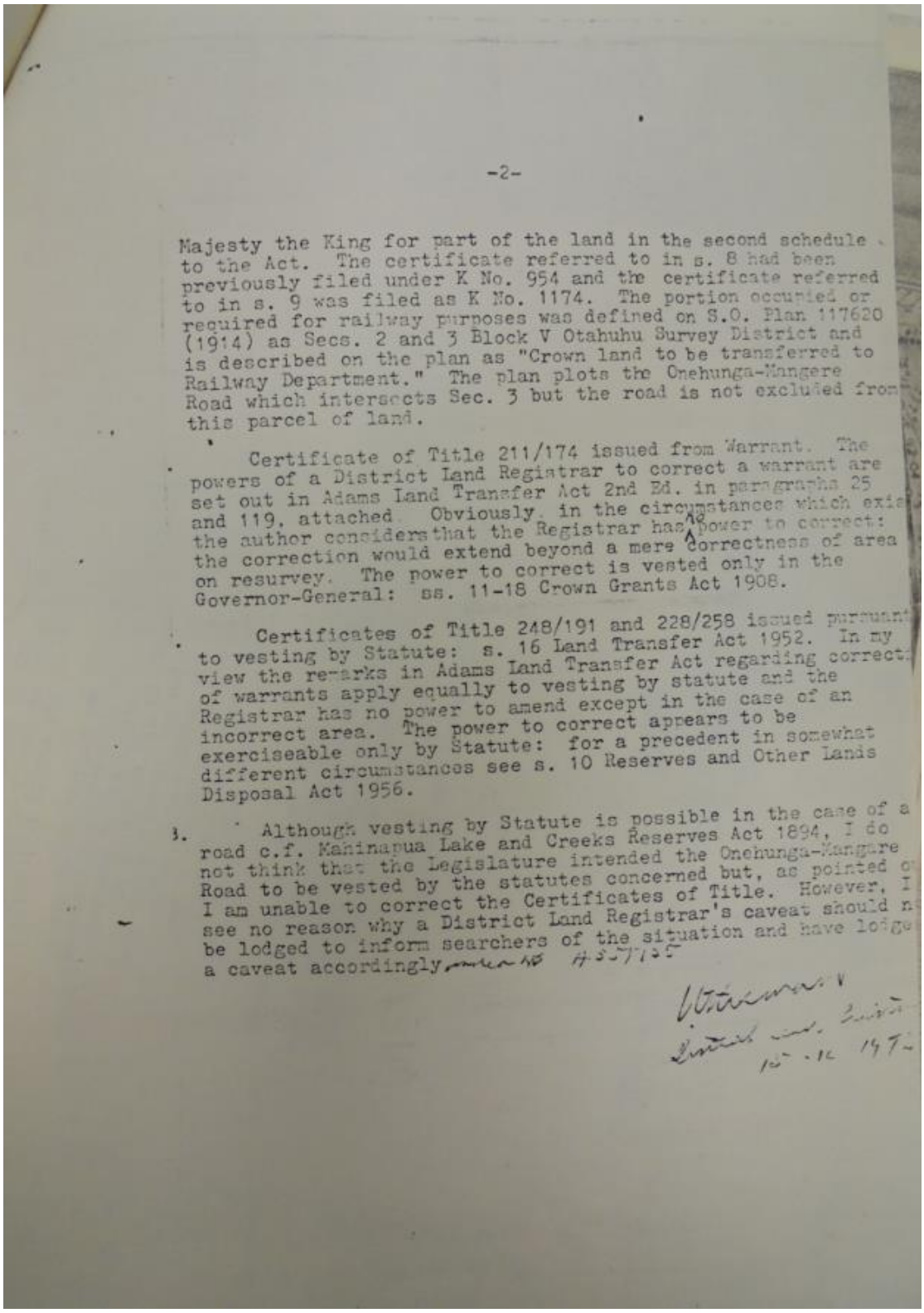
2. In 1913 Certificate of Title Vol. 211 folio 174 issued pursuant to Warrant 1642 made under authority of s. 10 Reserves and Other Lands Disposal and Public Bodies Empowering Act 1912 for Sec. 1 Blk V Otahuhu Survey District in the name of the Inhabitants of the Mangere Road District in trust for the purposes of Public Recreation. Sec. 1 is described in s. 10 (2) of the Act as "that area of tidal land ..... starting at a point on the eastern side of the embankment of the Mangere Bridge at the intersection of the embankment and high water mark of ordinary spring tides ... : as the same is more particularly delineated on /S.O. Plan/ 16870 and thereon edged purple."

3. The warrant follows the description on s. 10 (2) but gives the land therein described the appellation used in the Certificate of Title. Although the width of the road was 1½ chains, that is not the width shown on S.O. Plan 16870 (1912) which shows the road 1 chain wide from high water mark and at a lesser width from embankment to embankment. The definition on this plan appears to be wrong as a later plan S.O. 25159 (1929) prepared for road closing of roads contiguous to the Onehunga-Mangere road shows the original width of 1½ chains. The result of the definition is that part of the road is included in C.T. 211/174

4. By s. 107 Reserves and Other Lands Disposal and Public Bodies Empowering Act 1915 certain lands were vested in the Auckland Harbour Board and the District Land Registrar was directed to issue certificates of title under the Land Transfer Act 1915 for the said lands on application of the Harbour Board. The lands had been previously defined on D.P. 10098 as Lots 1, 2 and 3 respectively but this plan did not show the Onehunga-Mangere Road as a legal road although the centre line of the Bridge was plotted. C.T. 248/191 which issued in the name of the Board for Lots 1, 2 and 3 includes within Lot 3 an area of the road declared to be such in the 1873 Proclamation.

5. In 1914 the District Land Registrar pursuant to the directions in s. 9 Manukau Harbour Control Act 1911 issued to the Minister of Railways a Certificate of Title in the name of His

Majesty/....



-2-

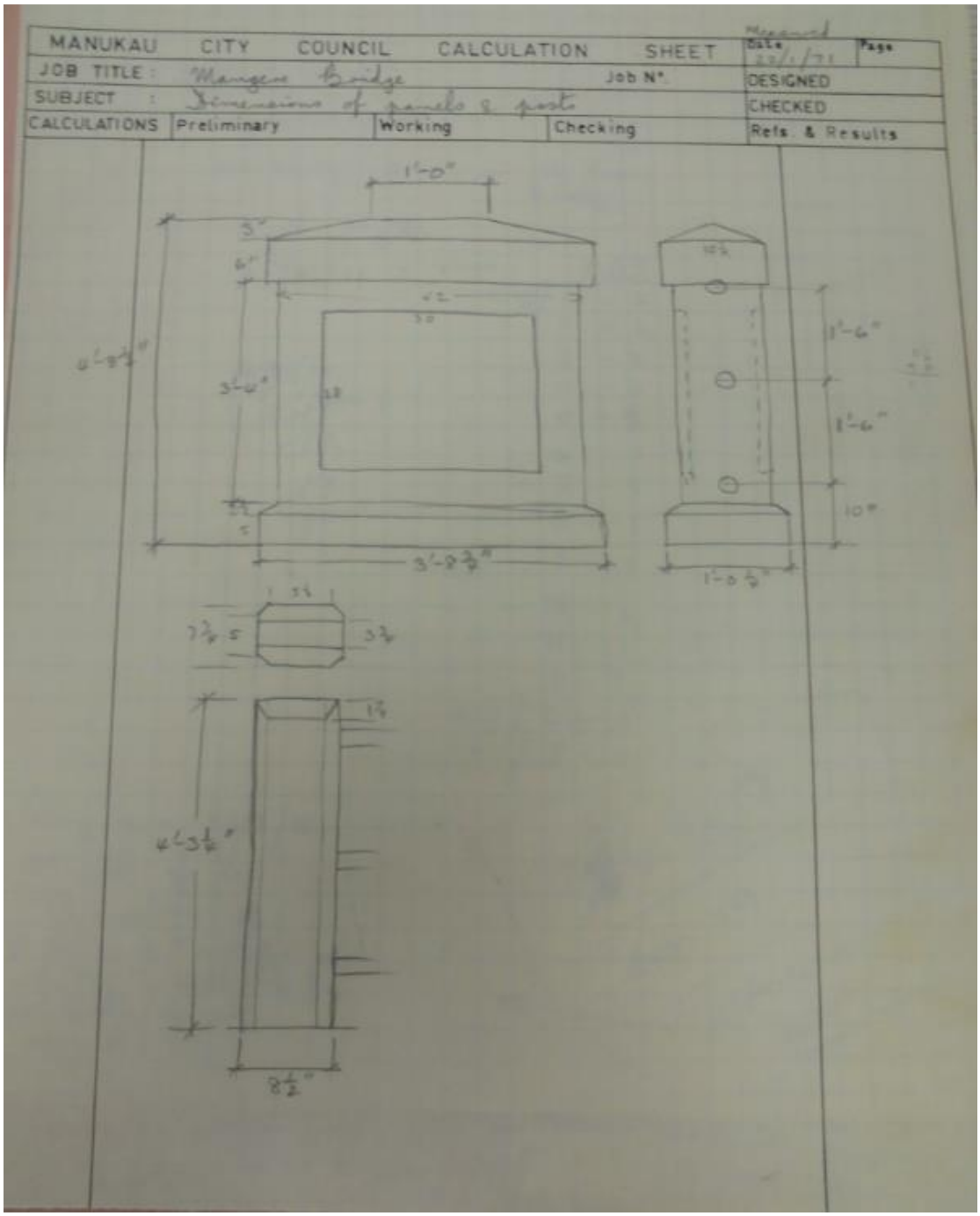
Majesty the King for part of the land in the second schedule to the Act. The certificate referred to in s. 8 had been previously filed under K No. 954 and the certificate referred to in s. 9 was filed as K No. 1174. The portion occupied or required for railway purposes was defined on S.O. Plan 117620 (1914) as Secs. 2 and 3 Block V Otahuhu Survey District and is described on the plan as "Crown land to be transferred to Railway Department." The plan plots the Onehunga-Mangere Road which intersects Sec. 3 but the road is not excluded from this parcel of land.

Certificate of Title 211/174 issued from Warrant. The powers of a District Land Registrar to correct a warrant are set out in Adams Land Transfer Act 2nd Ed. in paragraphs 25 and 119, attached. Obviously in the circumstances which exis the author considers that the Registrar has power to correct: the correction would extend beyond a mere correctness of area on resurvey. The power to correct is vested only in the Governor-General: ss. 11-18 Crown Grants Act 1908.

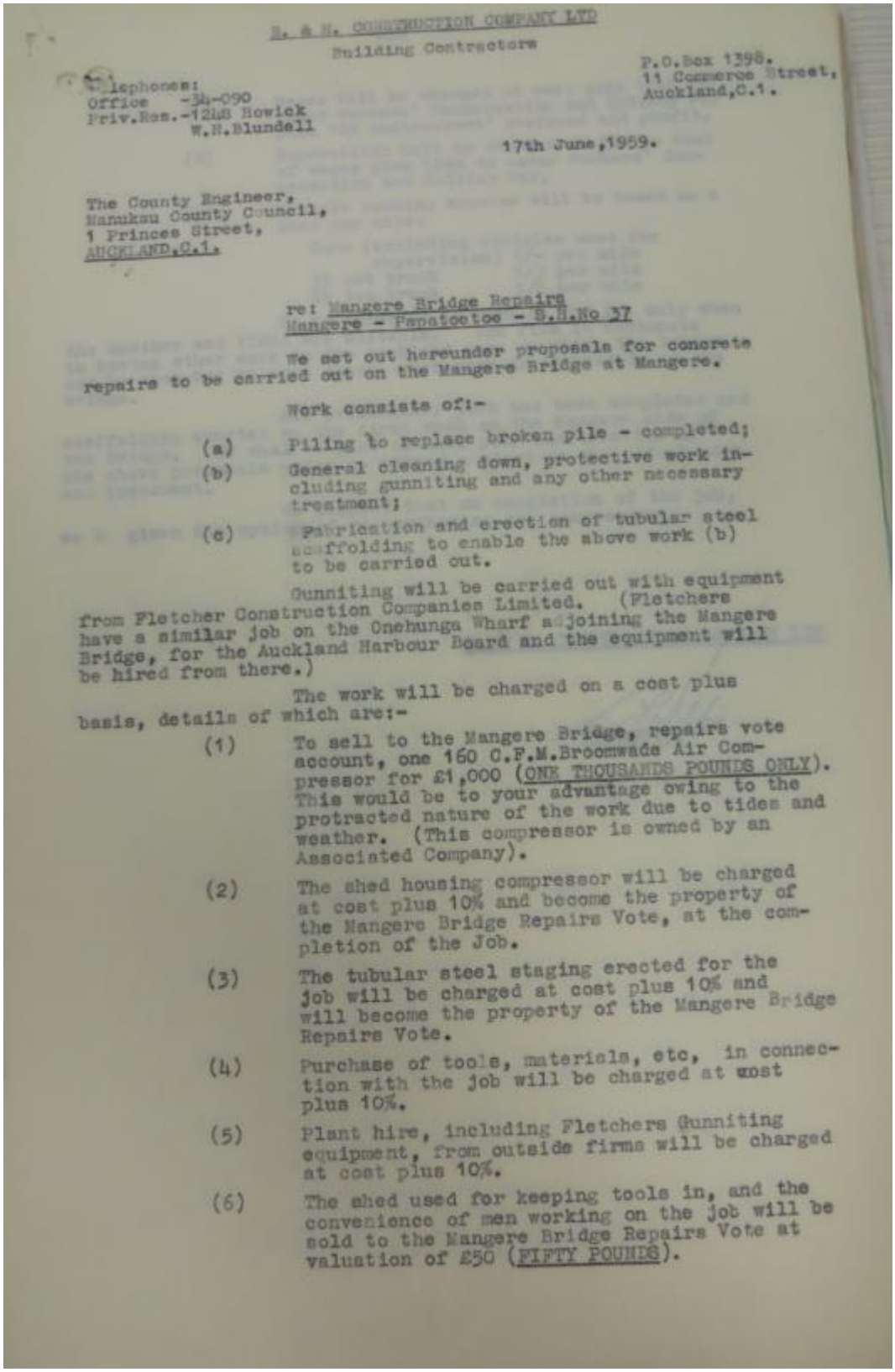
Certificates of Title 248/191 and 228/258 issued pursuant to vesting by Statute: s. 16 Land Transfer Act 1952. In my view the remarks in Adams Land Transfer Act regarding correct of warrants apply equally to vesting by statute and the Registrar has no power to amend except in the case of an incorrect area. The power to correct appears to be exerciseable only by Statute: for a precedent in somewhat different circumstances see s. 10 Reserves and Other Lands Disposal Act 1956.

3. Although vesting by Statute is possible in the case of a road c.f. Manukapua Lake and Creeks Reserves Act 1894, I do not think that the Legislature intended the Onehunga-Mangere Road to be vested by the statutes concerned but, as pointed o I am unable to correct the Certificates of Title. However, I see no reason why a District Land Registrar's caveat should n be lodged to inform searchers of the situation and have lodge a caveat accordingly.

Measured Drawing of Māngere Bridge balustrade piers and posts Manukau County Council, 1971. General Manukau Archives.



Letter from B&H Construction Ltd to Manukau County Council 17 June 1959 re Repairs. Auckland Council Archives, Māngere Bridge and Approaches MKA010, Item 8 Box 5.



B. & H. CONSTRUCTION COMPANY LTD
Building Contractors

P.O.Box 1398.
11 Commerce Street,
Auckland,C.1.

Telephones:
Office -34-090
Priv.Res.-12GB Howick
W.H.Blundell

17th June,1959.

The County Engineer,
Manukau County Council,
1 Princes Street,
AUCKLAND,C.1.

re: Mangere Bridge Repairs
Mangere - Papatoetoe - B.H.No 37

We set out hereunder proposals for concrete repairs to be carried out on the Mangere Bridge at Mangere.

Work consists of:-

(a) Piling to replace broken pile - completed;
(b) General cleaning down, protective work including gunniting and any other necessary treatment;
(c) Fabrication and erection of tubular steel scaffolding to enable the above work (b) to be carried out.

Gunniting will be carried out with equipment from Fletcher Construction Companies Limited. (Fletchers have a similar job on the Onehunga Wharf adjoining the Mangere Bridge, for the Auckland Harbour Board and the equipment will be hired from there.)

The work will be charged on a cost plus basis, details of which are:-

(1) To sell to the Mangere Bridge, repairs vote account, one 160 C.F.M.Broomwade Air Compressor for £1,000 (ONE THOUSANDS POUNDS ONLY). This would be to your advantage owing to the protracted nature of the work due to tides and weather. (This compressor is owned by an Associated Company).

(2) The shed housing compressor will be charged at cost plus 10% and become the property of the Mangere Bridge Repairs Vote, at the completion of the Job.

(3) The tubular steel staging erected for the job will be charged at cost plus 10% and will become the property of the Mangere Bridge Repairs Vote.

(4) Purchase of tools, materials, etc, in connection with the job will be charged at cost plus 10%.

(5) Plant hire, including Fletchers Gunniting equipment, from outside firms will be charged at cost plus 10%.

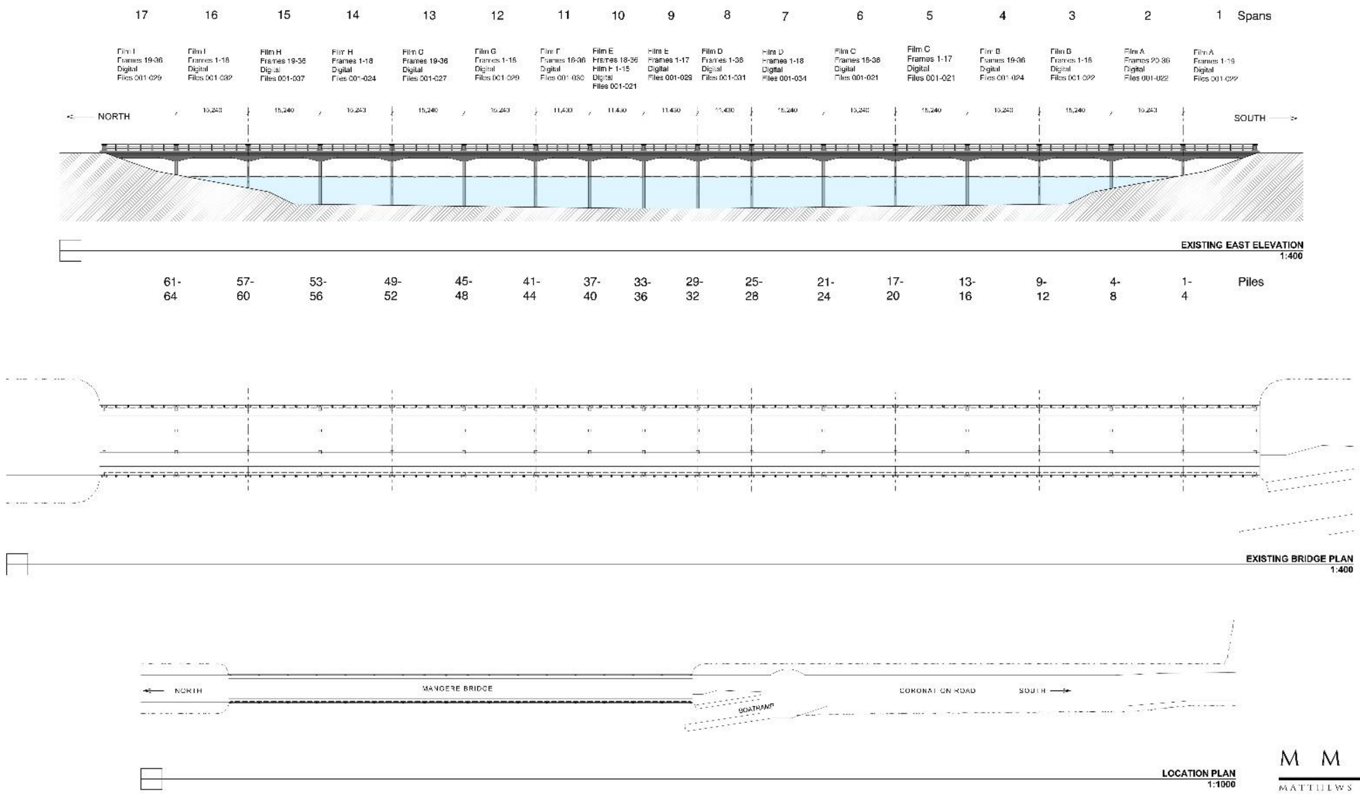
(6) The shed used for keeping tools in, and the convenience of men working on the job will be sold to the Mangere Bridge Repairs Vote at valuation of £50 (FIFTY POUNDS).

Appendix 4 Photographic Record

An archival photographic record was made of Old Māngere Bridge in 2019 by photographer Fraser Newman. Photographs were taken on land from both ends of the bridge and from a boat, to photograph each span and the underside of the structure.

The following drawings and plans record the photo locations and films used to record each span of the structure. To provide an overview of the photographic record made, the black and white photo proof sheets are included in this document. Photographic negatives and high-resolution digital photographs (in black and white and colour) are to be archived by the New Zealand Transport Agency.[6]

[6] Auckland Libraries is the recommended repository for the archival photographic record.



M M A

MATTHEWS & MATTHEWS ARCHITECTS LTD

PROJECT
EXISTING RECORD

OF
HISTORIC MANGERE BRIDGE

FOR
MAATAI TAONGA HERITAGE

DRAWING TITLE
EXISTING BRIDGE PLAN

DO NOT SCALE. CONTRACTOR TO VERIFY ALL DIMENSIONS ON SITE

REF NO: 7.1

DATE 28/03/2019

SCALE 1:100, 1:1000 @ A1

DRAWING NO 101

Photo Location of:
Black and White Images, 35mm Film A-I, Spans 1-17
Digital Images Spans 1-17

Fraser Newman Photography

75 Warner Park Avenue
Laingholm
Auckland 0604
frasernewman@orcon.net.nz
Ph/Fax 09 817 9890 Mobile 021 971 538
frasernewman.com


Old Mangere Bridge, Auckland
February 2019
Onehunga Harbour Rd
120 Film A
Frames 10-12
120 Film A
Frames 8-9
120 Film B
Frames 1-8
120 Film B
Frames 9-11
120 Film A
Frames 6-7
120 Film A
Frames 4-5
120 Film A
Frames 1-3
120 Film B
Frames 12
120 B&W Film A&B.
Frames 1-12
Coronation Rd
Waterfront Rd
Crawford Ave
Bridge Ct
Kiwi Esplanade
Ngalo Ave
Woodward Ave
Rimu Rd
Mahunga Dr
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frasernewman.com


Old Mangere Bridge, Auckland
February 2019
Onehunga Harbour Rd
B&W Film M
Frames 1-5
B&W Film M
Frames 17-19
B&W Film M
Frames 10-11
B&W Film M
Frames 6-9
B&W Film M
Frames 12-14
B&W Film M
Frames 15-16
B&W Film M
Frames 24-28
B&W Film M
Frames 20
B&W Film M
Frames 21-23
20
Coronation Rd
Coronation Rd
B&W Film M
Frames 35-36
B&W Film M
Frames 29-30
Waterfront Rd
B&W Film M
Frames 31-33
Kiwi Esplanade
Kiwi Esplanade
Bridge Ct
Mahunga D
35mm B&W Film M. North/South End.
Frames 1-36
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Old Mangere Bridge, Auckland
February 2019
arbour Rd
B&W Film J
Frames 12-16
B&W Film J
Frames 16-17
B&W Film J
Frames 10-11
B&W Film J
Frames 19-20
B&W Film J
Frames 8-9
B&W Film J
Frames 21-22
B&W Film J
Frames 17-8
B&W Film J
Frames 5-6
B&W Film J
Frames 3-4
B&W Film J
Frames 23-28
20
B&W Film J
Frames 29
B&W Film J
Frames 30-33
B&W Film J
Frames 34-36
B&W Film J
Frames 1-2
Coronation Rd
Coronation Rd
Waterfront Rd
35mm B&W Film J. East Side.
Frames 1-36
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frasernewman.com


Old Mangere Bridge, Auckland
February 2019
arbour Rd
B&W Film K
Frames 4-6
B&W Film K
Frames 14
B&W Film K
Frames 7-8, 15-16, 25-27, 29-30,32-35
B&W Film K
Frames 28, 31, 36
B&W Film K
Frames 9-11, 20-22, 24
B&W Film K
Frames 1-3
B&W Film K
Frames 19
B&W Film K
Frames 12-13, 17-18,23
20
Coronation Rd
Coronation Rd
Waterfront Rd
35mm B&W Film K. East Side.
Frames 1-36
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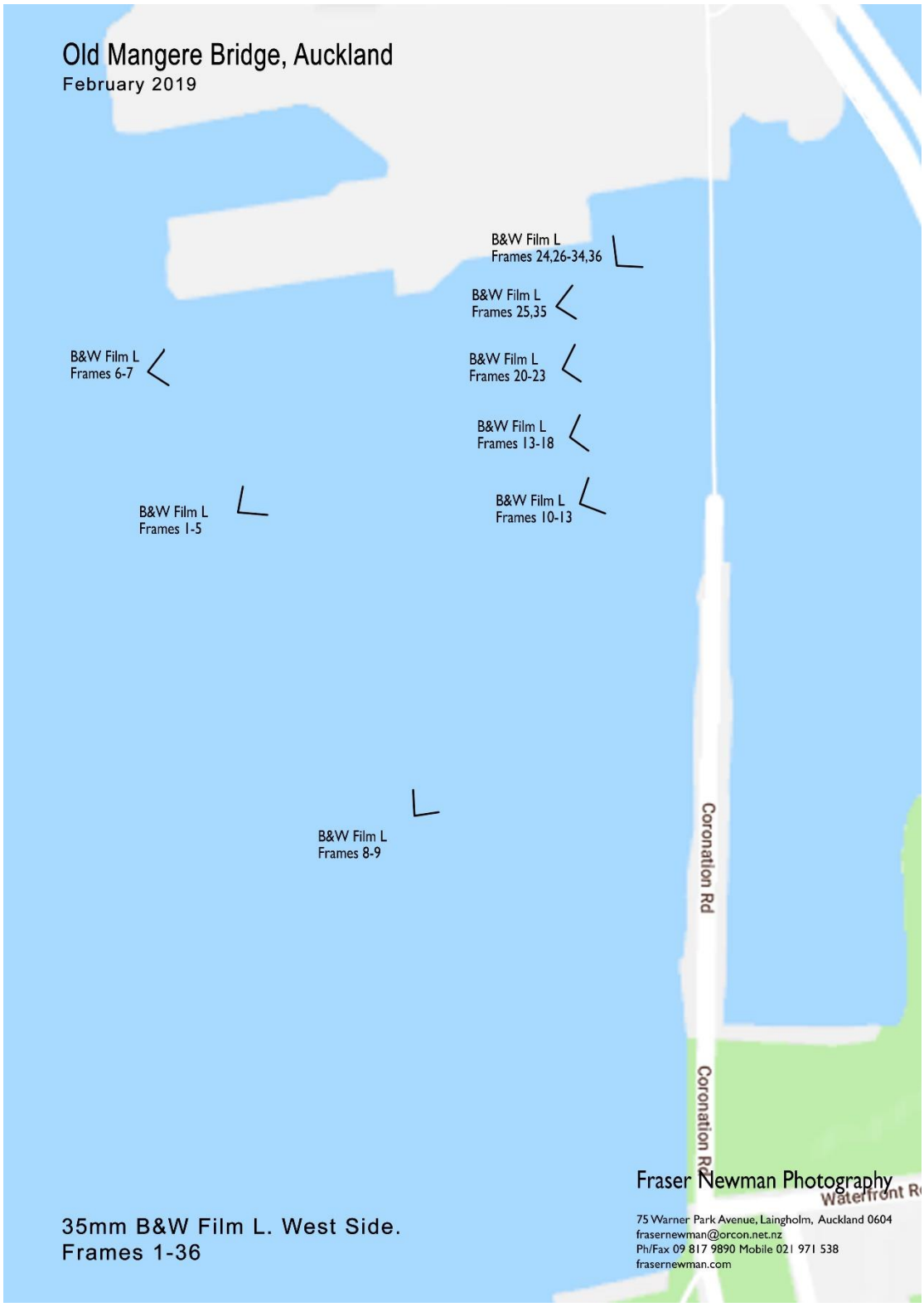
Old Mangere Bridge, Auckland
February 2019
B&W Film L
Frames 24,26-34,36
B&W Film L
Frames 25,35
B&W Film L
Frames 6-7
B&W Film L
Frames 20-23
B&W Film L
Frames 13-18
B&W Film L
Frames 10-13
B&W Film L
Frames 1-5
B&W Film L
Frames 8-9
Coronation Rd
Coronation Rd
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35mm B&W Film L. West Side.
Frames 1-36

Old Mangere Bridge, Auckland

February 2019

120 B&W Film A. Frames 1-12

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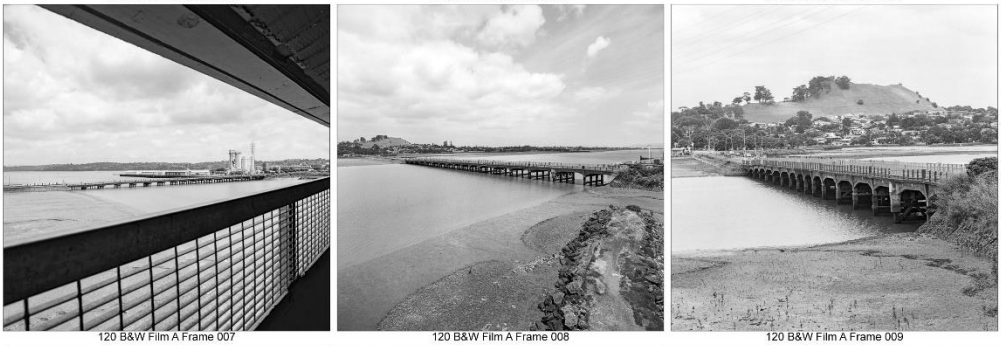
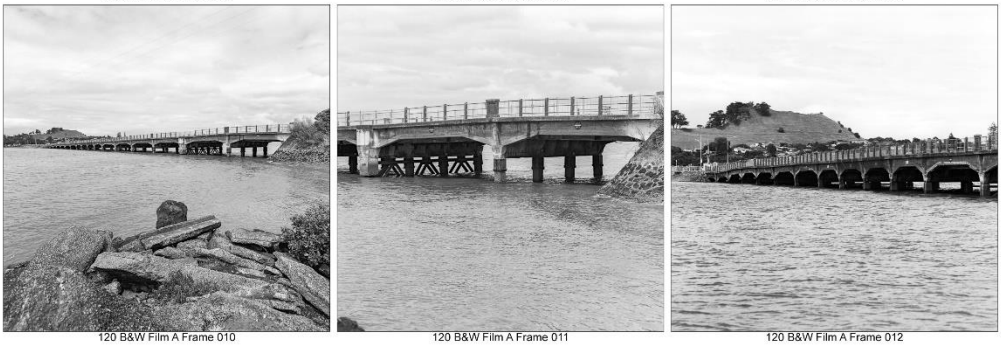
120 B&W Film A Frame 001 | 120 B&W Film A Frame 002 | 120 B&W Film A Frame 003

120 B&W Film A Frame 004 | 120 B&W Film A Frame 005 | 120 B&W Film A Frame 006



120 B&W Film A Frame 007 | 120 B&W Film A Frame 008 | 120 B&W Film A Frame 009



120 B&W Film A Frame 010 | 120 B&W Film A Frame 011 | 120 B&W Film A Frame 012

Old Mangere Bridge, Auckland

February 2019

120 B&W Film B. Frames 1-12

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120 B&W Film B Frame 001 | 120 B&W Film B Frame 002 | 120 B&W Film B Frame 003

120 B&W Film B Frame 004 | 120 B&W Film B Frame 005 | 120 B&W Film B Frame 006

120 B&W Film B Frame 007 | 120 B&W Film B Frame 008 | 120 B&W Film B Frame 009

120 B&W Film B Frame 010 | 120 B&W Film B Frame 011 | 120 B&W Film B Frame 012

Old Mangere Bridge, Auckland

February 2019

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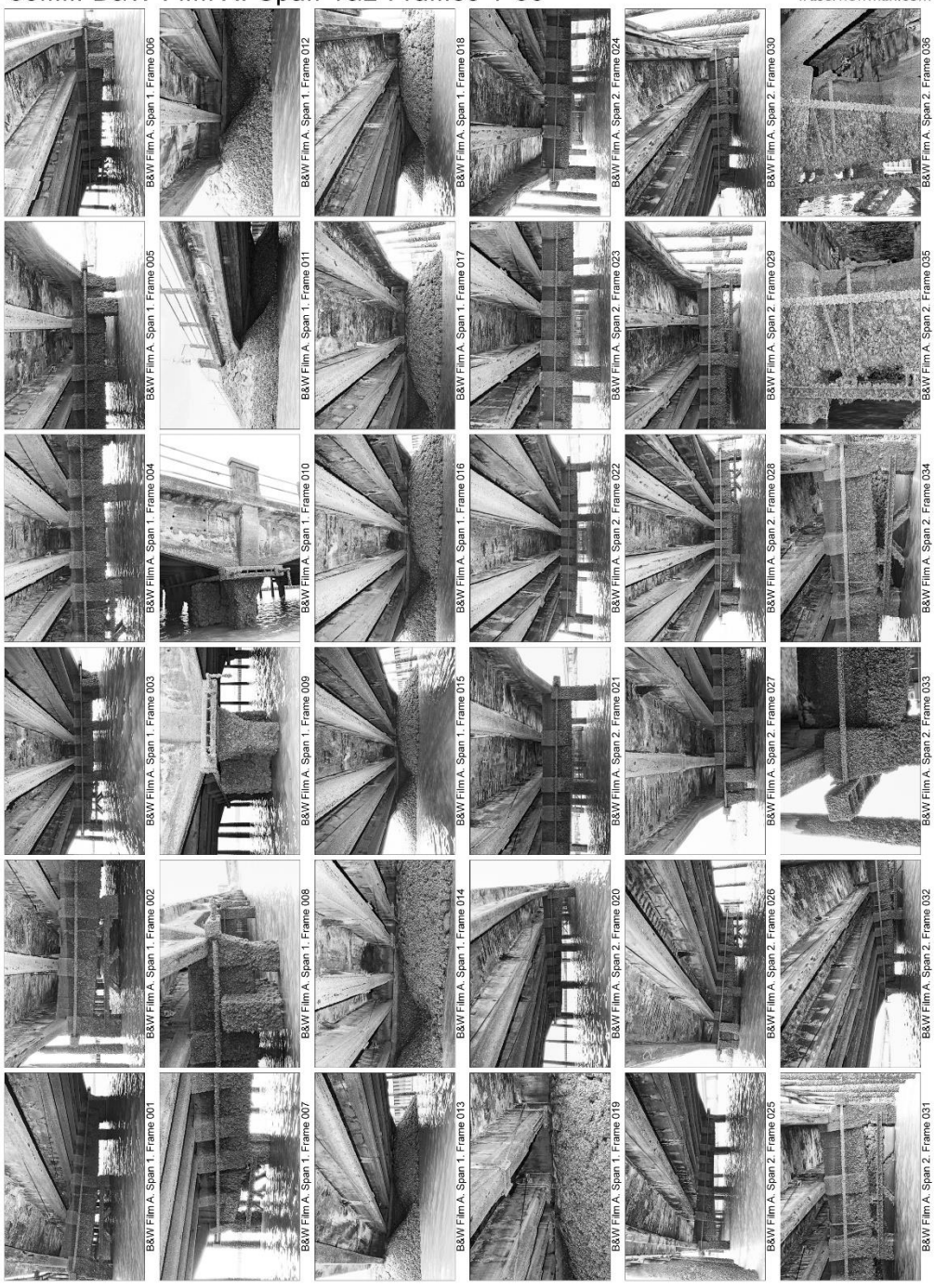
35mm B&W Film A. Span 1&2 Frames 1-36



Old Mangere Bridge, Auckland

February 2019

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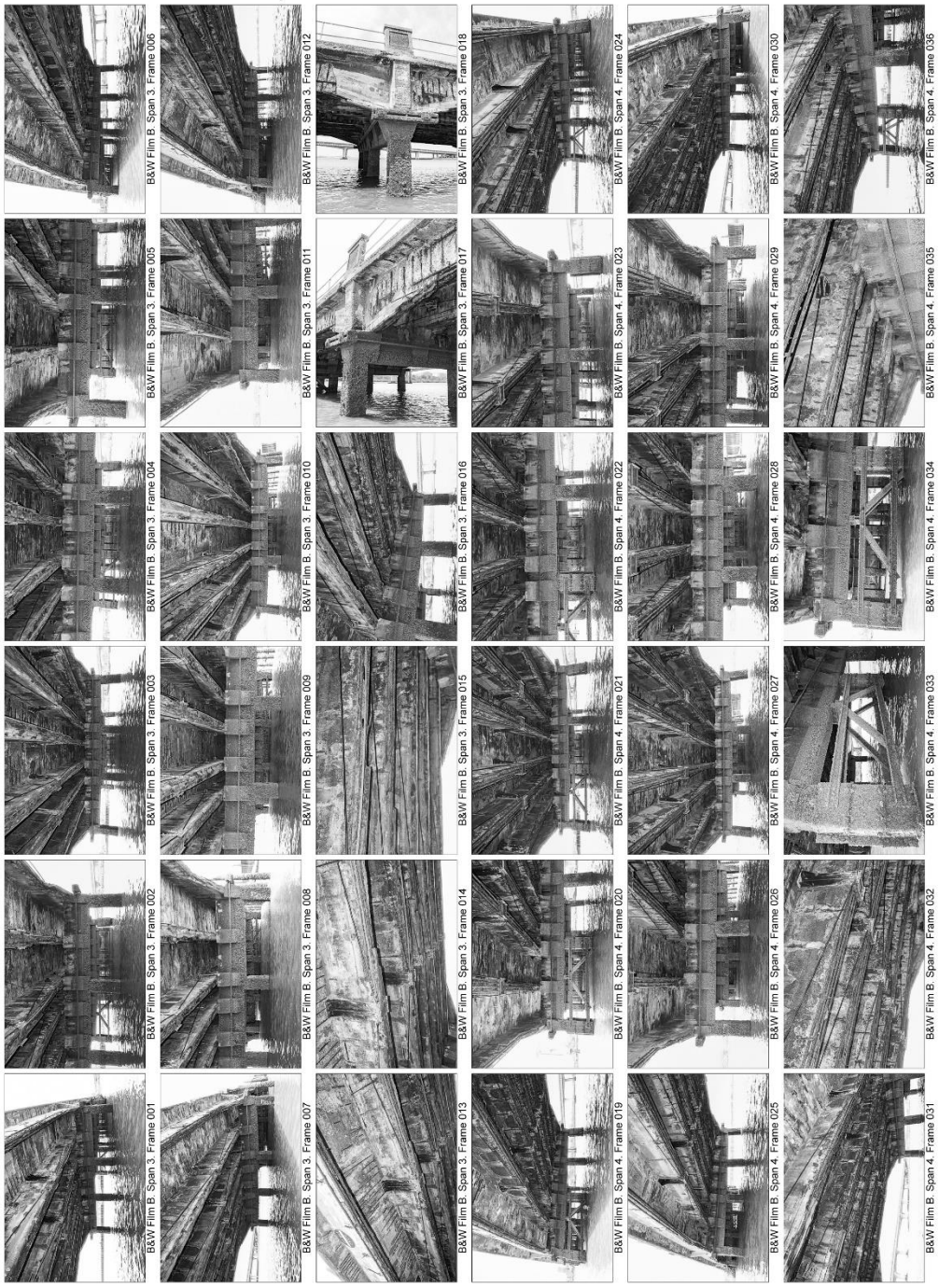
35mm B&W Film B. Span 3&4 Frames 1-36



Old Mangere Bridge, Auckland

February 2019

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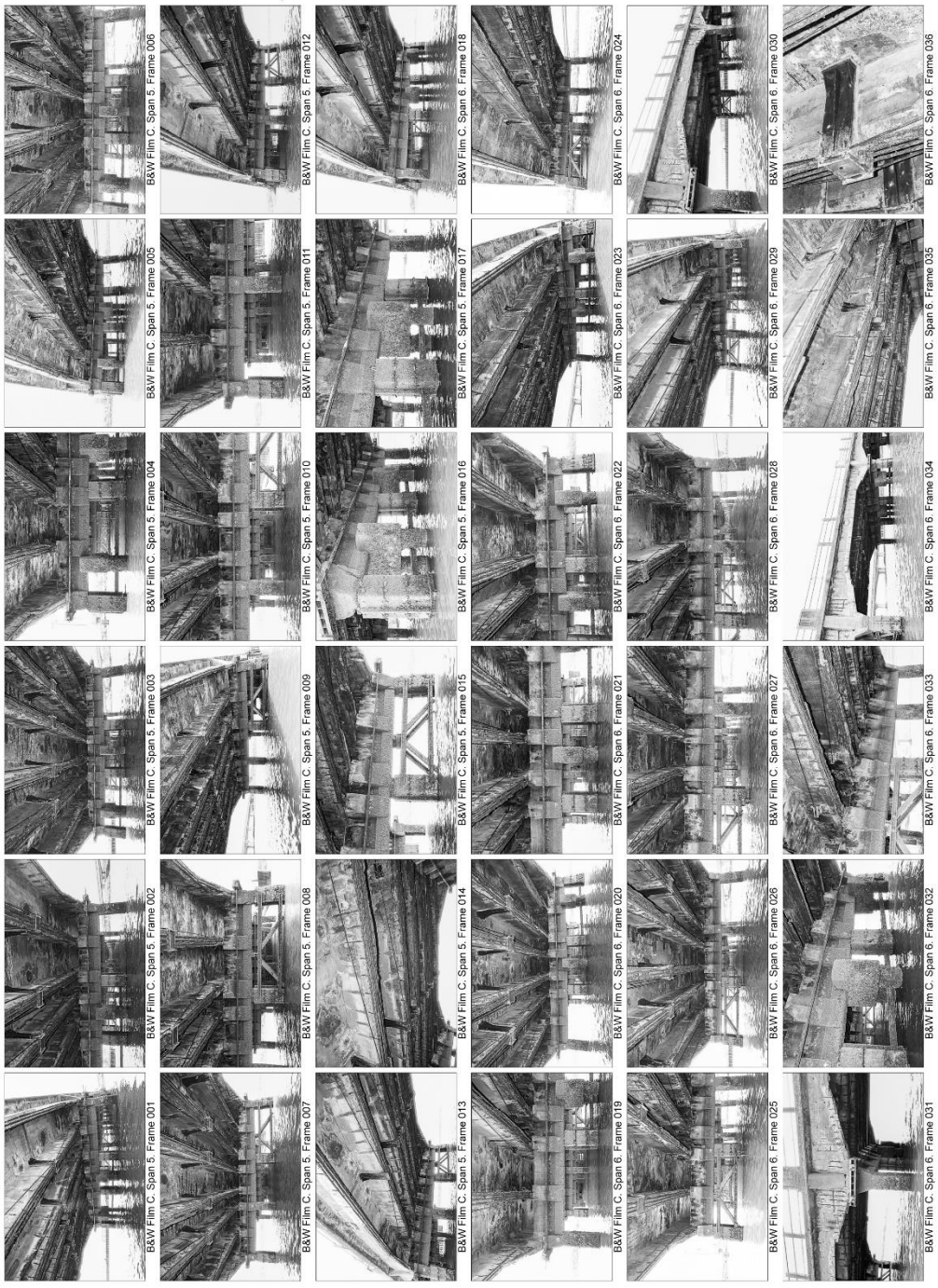
35mm B&W Film C. Span 5&6 Frames 1-36



Old Mangere Bridge, Auckland

February 2019

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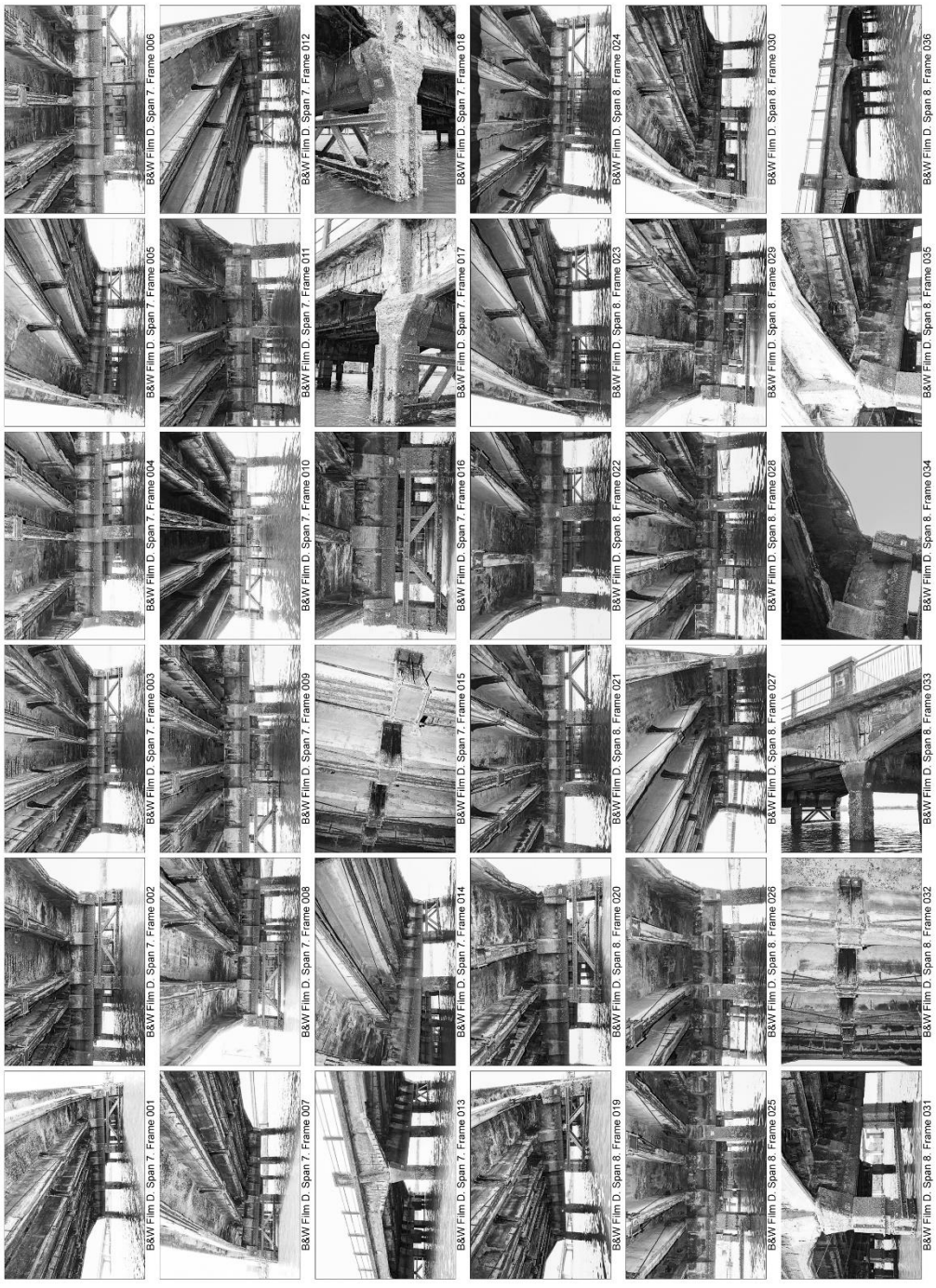
35mm B&W Film D. Span 7&8 Frames 1-36



Old Mangere Bridge, Auckland

February 2019

Fraser Newman Photography

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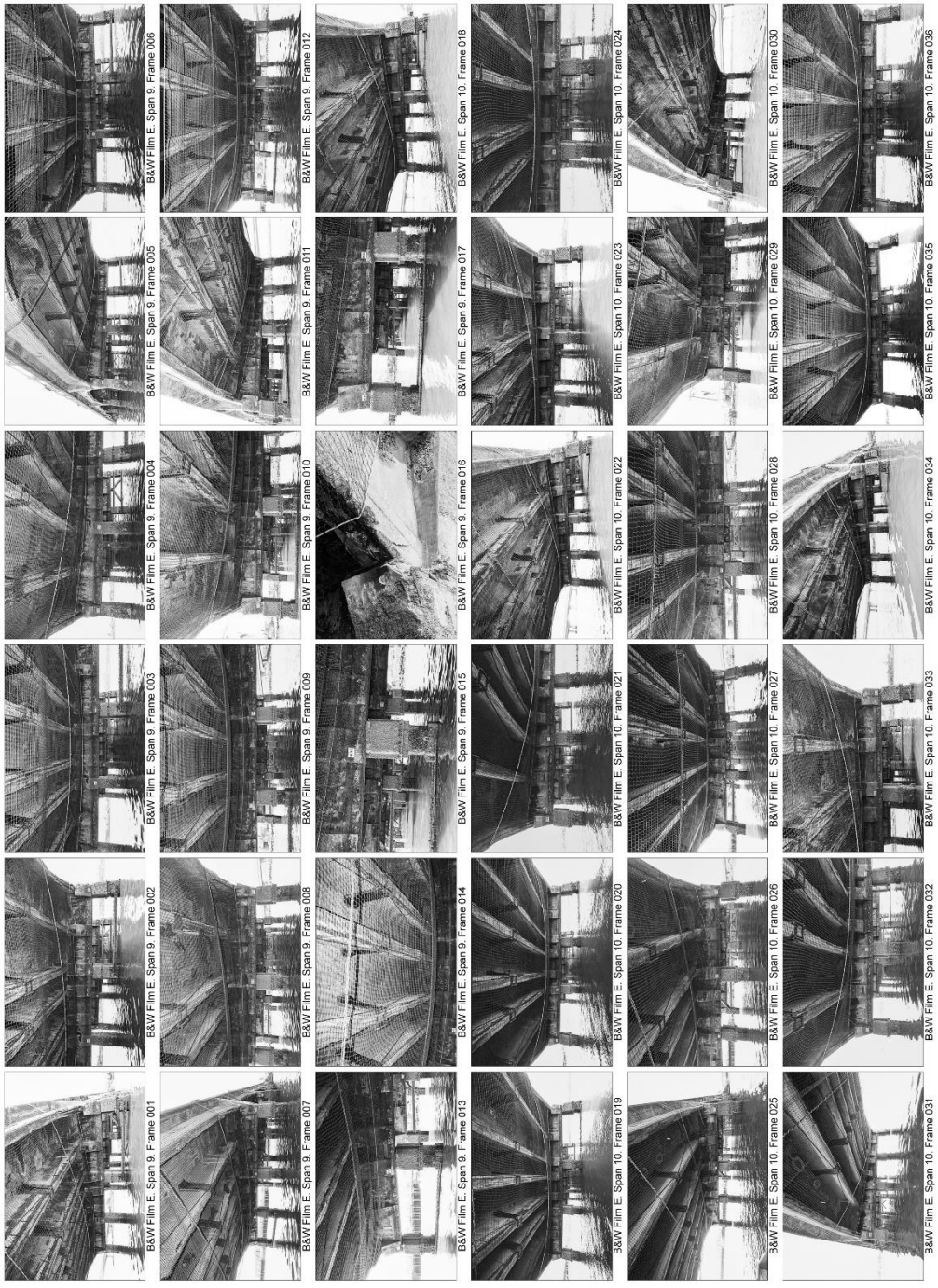
35mm B&W Film E. Span 9&10 Frames 1-36



Old Mangere Bridge, Auckland

February 2019

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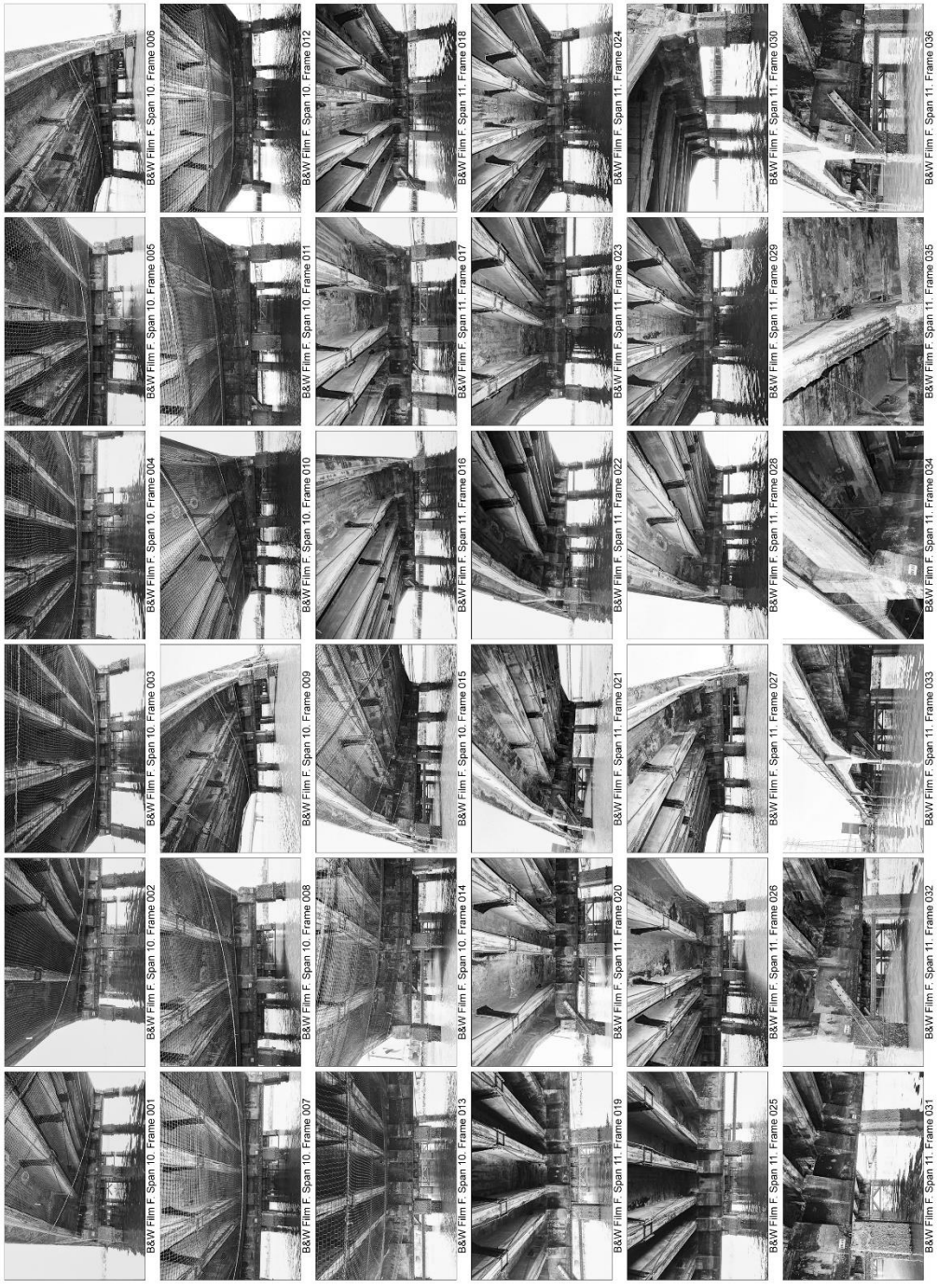

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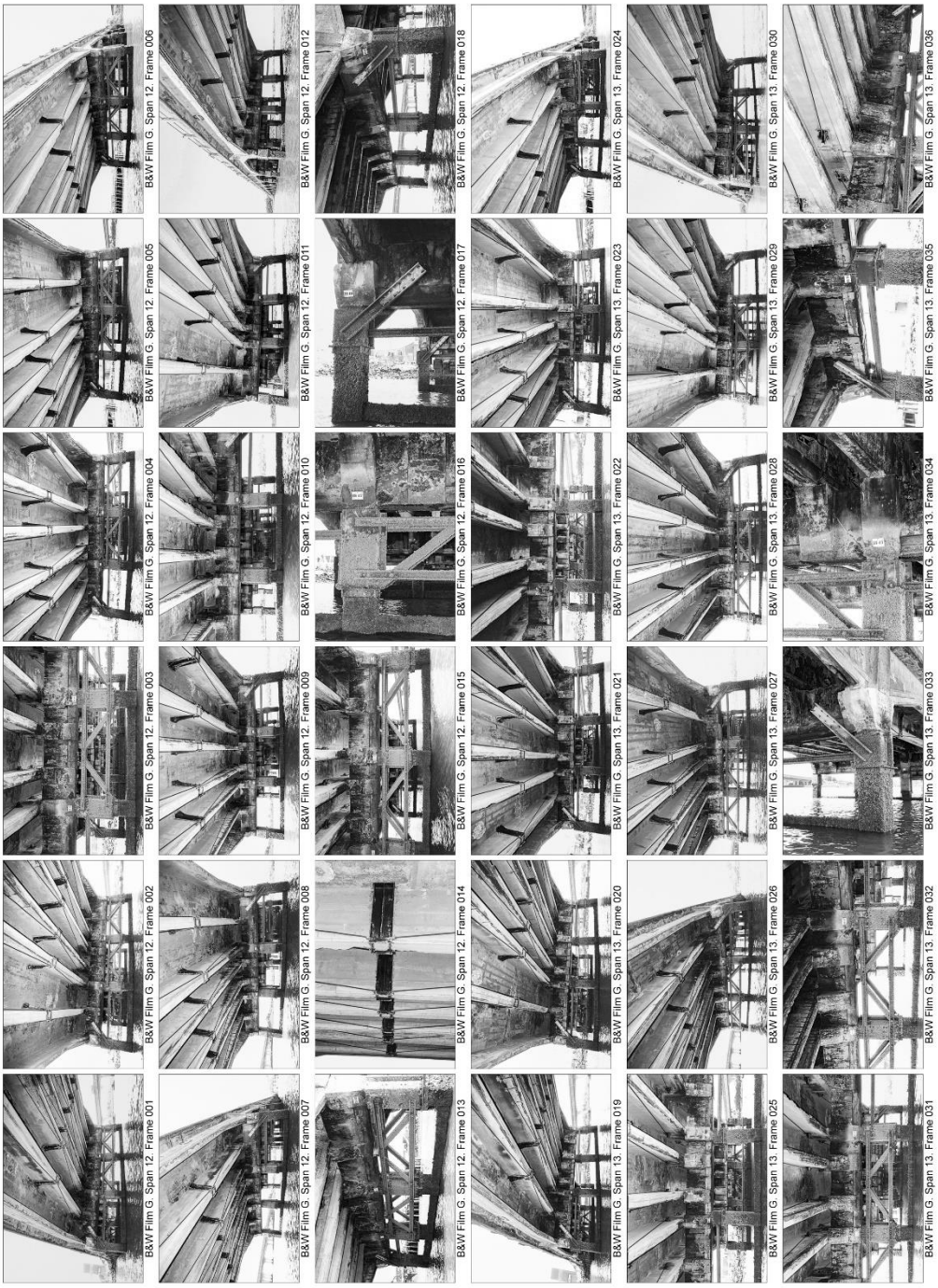

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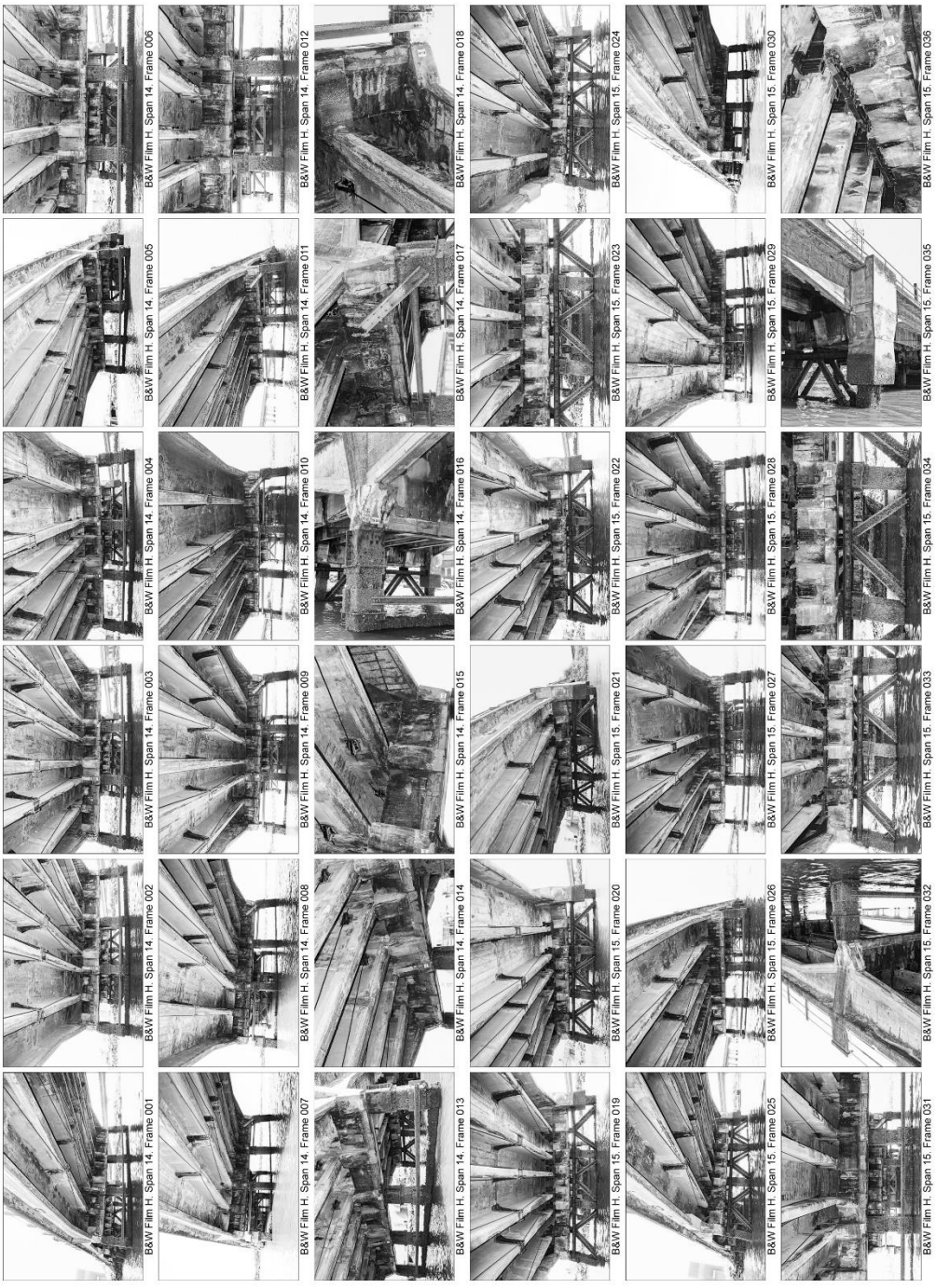

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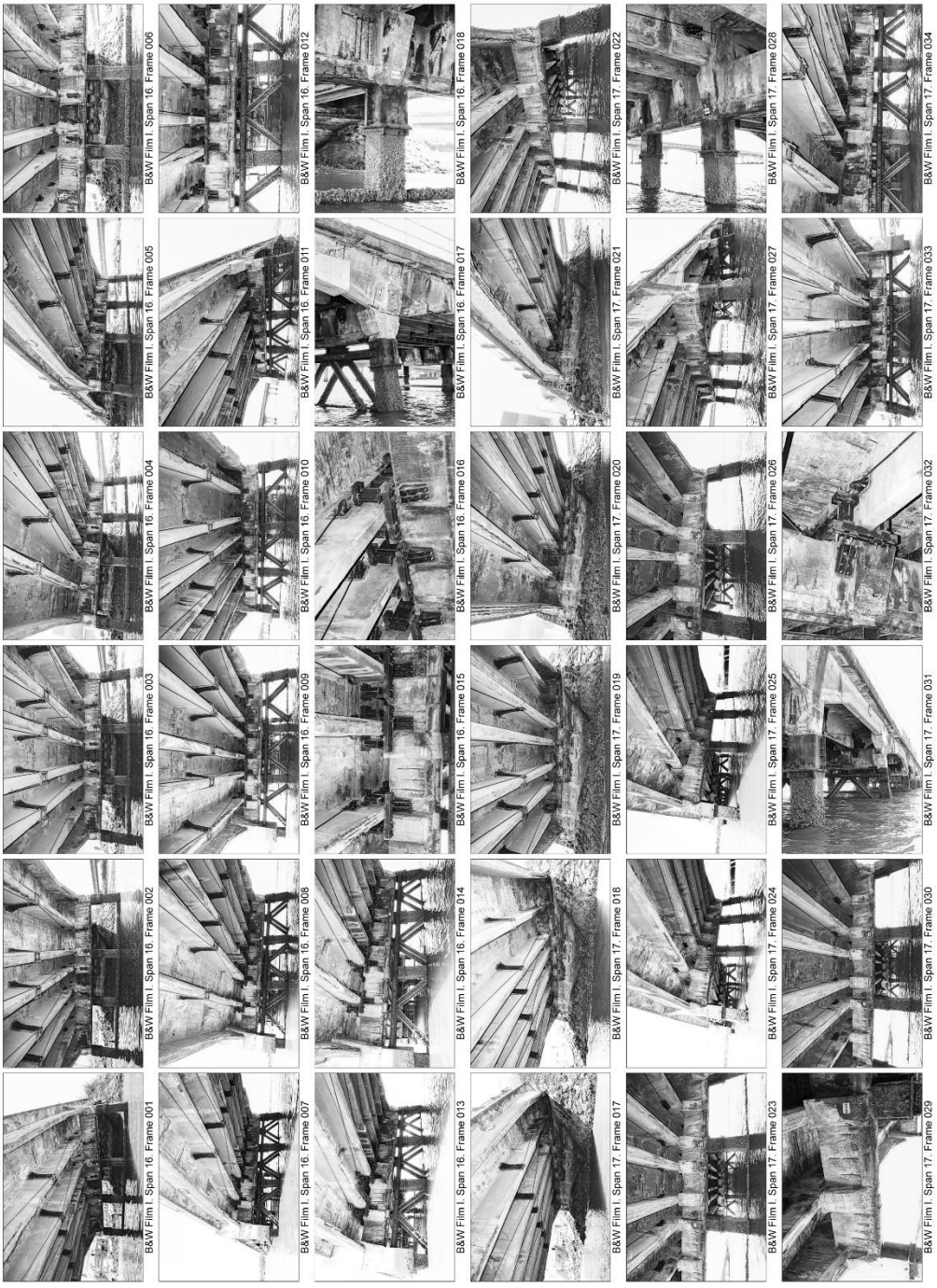
35mm B&W Film I. Span 16&17 Frames 1-36



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35mm B&W Film J. East Side. Frames 1-36

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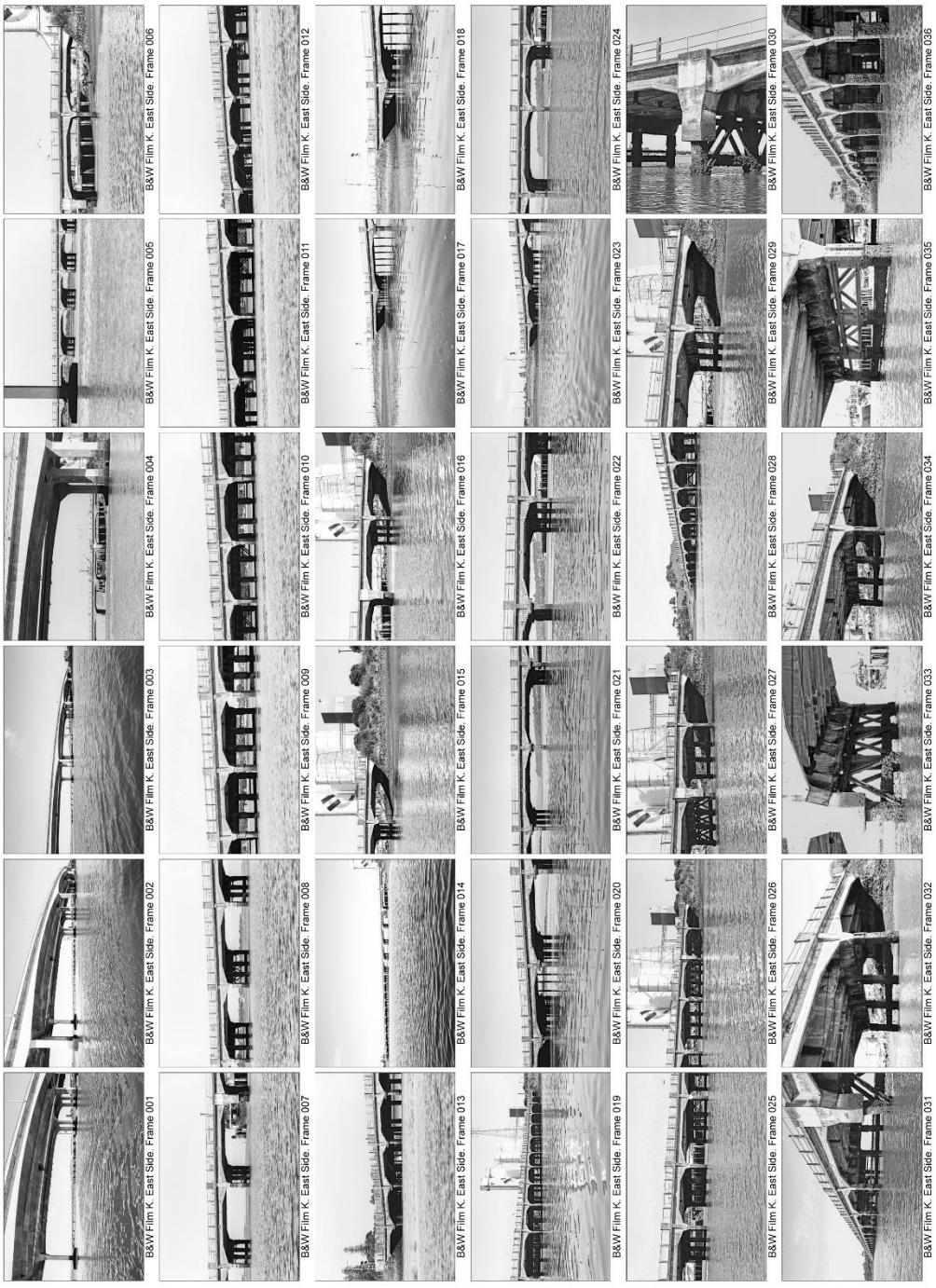
35mm B&W Film K. East Side. Frames 1-36



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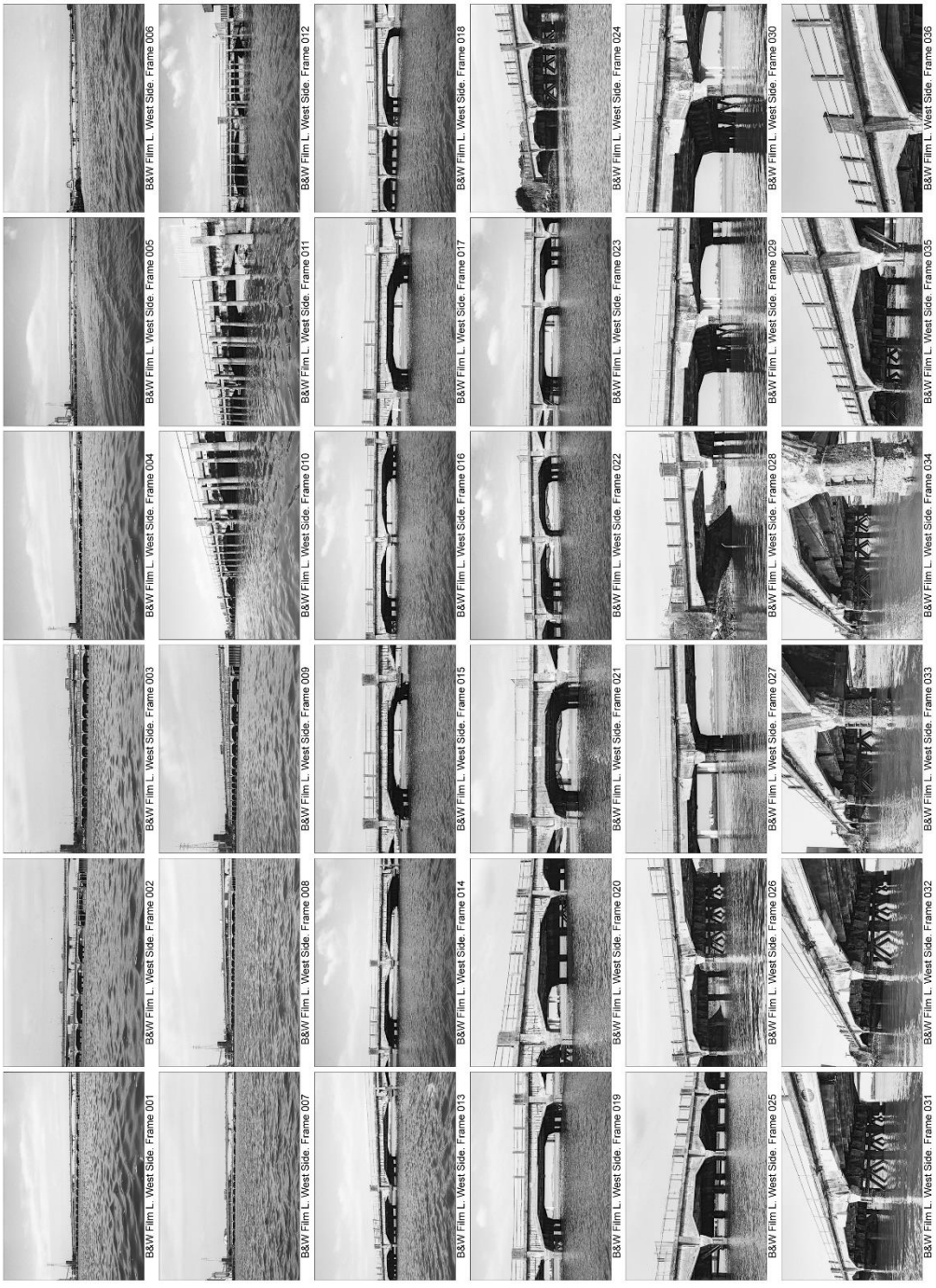
35mm B&W Film L. West Side. Frames 1-36



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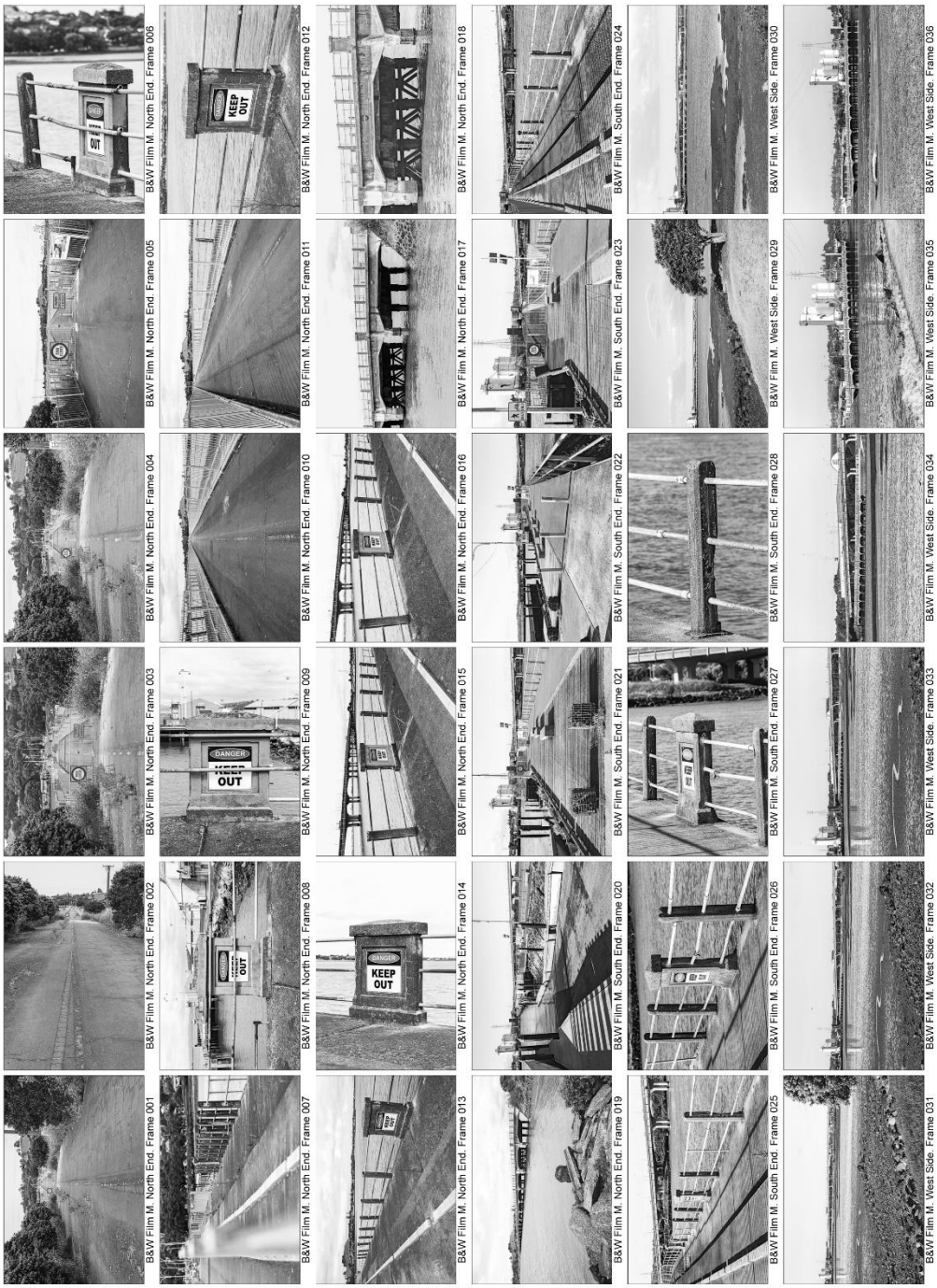
35mm B&W Film M. North/South End. Frames 1-36



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