

Lessons learned from one of New Zealand's most challenging civil engineering projects: rebuilding the earthquake damaged pipes, roads, bridges and retaining walls in the city of Christchurch 2011 - 2016.

Gloucester Street bridge, Christchurch - report on archaeological monitoring

Story: Heritage Bridges

Theme: Construction

A report which details the archaeological monitoring carried out during the course of SCIRT project 11136, repairs to the Gloucester Street bridge.

This document has been provided as an example of a tool that might be useful for other organisations undertaking complex disaster recovery or infrastructure rebuild programmes.

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GLOUCESTER STREET BRIDGE, CHRISTCHURCH (M35/1317): REPORT ON ARCHAEOLOGICAL MONITORING

NZHPT AUTHORITY 2012/321EQ

SCIRT 11136

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THE FLETCHER CONSTRUCTION COMPANY

INTRODUCTION

Subsequent to the 2011 Canterbury earthquake and aftershocks, the Gloucester Street bridge over the Avon River in central Christchurch was damaged. On 26 September 2011 the New Zealand Historic Places Trust issued an emergency authority (2012/321eq) under Clause 11(1) of the Canterbury Earthquake (Historic Places Act) Order 2011 to the Christchurch City Council. This authority was issued to allow the Christchurch City Council, in conjunction with the Stronger Christchurch Infrastructure Rebuild Team (SCIRT), to undertake various earthworks to repair the horizontal infrastructure in Christchurch. The Gloucester Street bridge came under this authority as it was constructed in 1886 and a standing structure built before 1900 has the same protection as a subsurface archaeological site. As per condition 3 of the authority, earthworks for the repair of the Gloucester Street bridge were monitored by an archaeologist.



Figure 1. Central Christchurch, showing the location of the Gloucester Street bridge. Image: Google Maps.



Figure 2. The Gloucester Street bridge, Christchurch. Image: Google Earth.

HISTORICAL BACKGROUND

The current Gloucester Street bridge was erected in 1886, but a footbridge at this location, crossing the Avon River from Oxford Terrace to the Provincial Government buildings, was built around 1862 (Ince 1998:51, *Lyttelton Times* 25/7/1863:4). The first bridge was a timber suspension bridge situated slightly downstream from the current bridge that crossed the river at an angle, rather than following the alignment of Gloucester Street (Ince 1998:51-52, *Press* 11/8/1886:3; Figure 3 and Figure 4). By 1884 the Christchurch City Council responded to calls from local residents and businesses to replace the footbridge with a cart bridge to enable easier access to properties on either side (*Press* 9/12/1884: 2). A sum of £2,500 was voted for construction of the bridge – a greater sum than for most other city bridges on account of the winding nature of the river at this location. The lack of a vehicle bridge over Gloucester Street was stated by the council to have contributed to a reduction in property values in this area (*Press* 9/12/1884: 2)

The bridge was designed by city surveyor Charles Walkden, on a similar plan to the Armagh Street bridge at Victoria Square (NZHPT 2004, *Press* 9/12/1884: 2). Tenders were invited in July 1886 and that of stonemason William Stocks was accepted at £1,888 (*Press* 27/7/1886: 2). Work commenced immediately, with clearing trees on the riverbanks (*Press* 11/8/1886: 3). Excavations for the abutments were undertaken in September 1886 with a temporary dam constructed on the eastern side of the bridge to protect the concrete work (*Press* 18/9/1886: 3).

By October 1886 the concrete foundations for the bridge were being laid (*Press* 5/10/1886:4). However, the Clerk of Works for the bridge construction, Mr Wood, resigned from his position in response to the assistant engineer instructing a deviation from the specifications for laying the foundations (*Press* 19/10/1886: 4). Mr Wood alleged that the foundations had been laid 2 feet above

the riverbed, which would undermine the stability of the structure. The council called a consultant engineer, Edward Dobson, to inspect the foundations, who reported that although the “spirit” of the specifications had been departed from, this had not “endangered” the stability of the bridge. He also found that in many places the foundations were below the riverbed, contrary to Wood’s advice (*Press* 19/10/1886: 4).

The Gloucester Street bridge was completed in early December 1886 (*Press* 13/12/1886: 3). A ceremony to lay the cap stone and formally open the bridge was held on 14 December 1886 (*Star* 14/12/1886: 3). The laying of the cap – or pedestal – stone by Mayor A. Ayers was commemorated by a plaque on the northeast pedestal, also bearing the names of the engineer, contractor and town clerk. Beneath the cap stone was laid a bottle containing copies of current newspapers. The footbridge was retained in its location until the completion of the new bridge and was then removed (*Press* 13/12/1886: 2; Figure 5).

The finished structure was a single span bridge of 50 feet (12 m) in length and 40 feet (12 m) wide (*Press* 13/12/1886: 3). The bridge was supported by eight cast and wrought iron girders over which a bed of concrete was laid with metal over that (*Press* 13/12/1886:3). A 6 feet (1.83 m) wide footpath was laid on each side with ornamental cast iron railings. The wing walls and abutment piers were constructed from Mt Somers limestone, although earlier newspapers had stated incorrectly that Oamaru stone was used (*Press* 13/12/1886: 3, *Star* 14/12/1886: 3). It was a source of pride for the council that the Gloucester Street bridge was constructed from Canterbury materials, with ironwork fabricated locally by the Scott Brothers (*Star* 14/12/1886: 3).

The Gloucester Street bridge was widened in 1936 as part of roading changes in the central city intended to divert traffic from Cathedral Square (*Press* 17/7/1936: 10). The bridge was widened 14 feet (4.27 m) on the southern side to provide a carriageway of 42 feet (12.8 m; *Press* 9/9/1936: 4). Tenders for this work were invited in July 1936 and that of V. J. Moir Ltd. was accepted, with work commencing in September 1936 (*Press* 20/7/1936: 15, 1/9/1936:8). The widening involved the construction of new concrete piers and two additional steel girders to carry new concrete decking (*Press* 9/9/1936: 4). The original stone wing walls and end pillars were also replaced with concrete at this time (Ince 1998:55; Figure 6). The widening was completed in December 1936 and is commemorated with a plaque on the southeast wing wall (*Press* 30/12/1936: 10).

The bridge is a Category 2 historic place in the New Zealand Heritage List and a heritage item in the Christchurch City Plan.

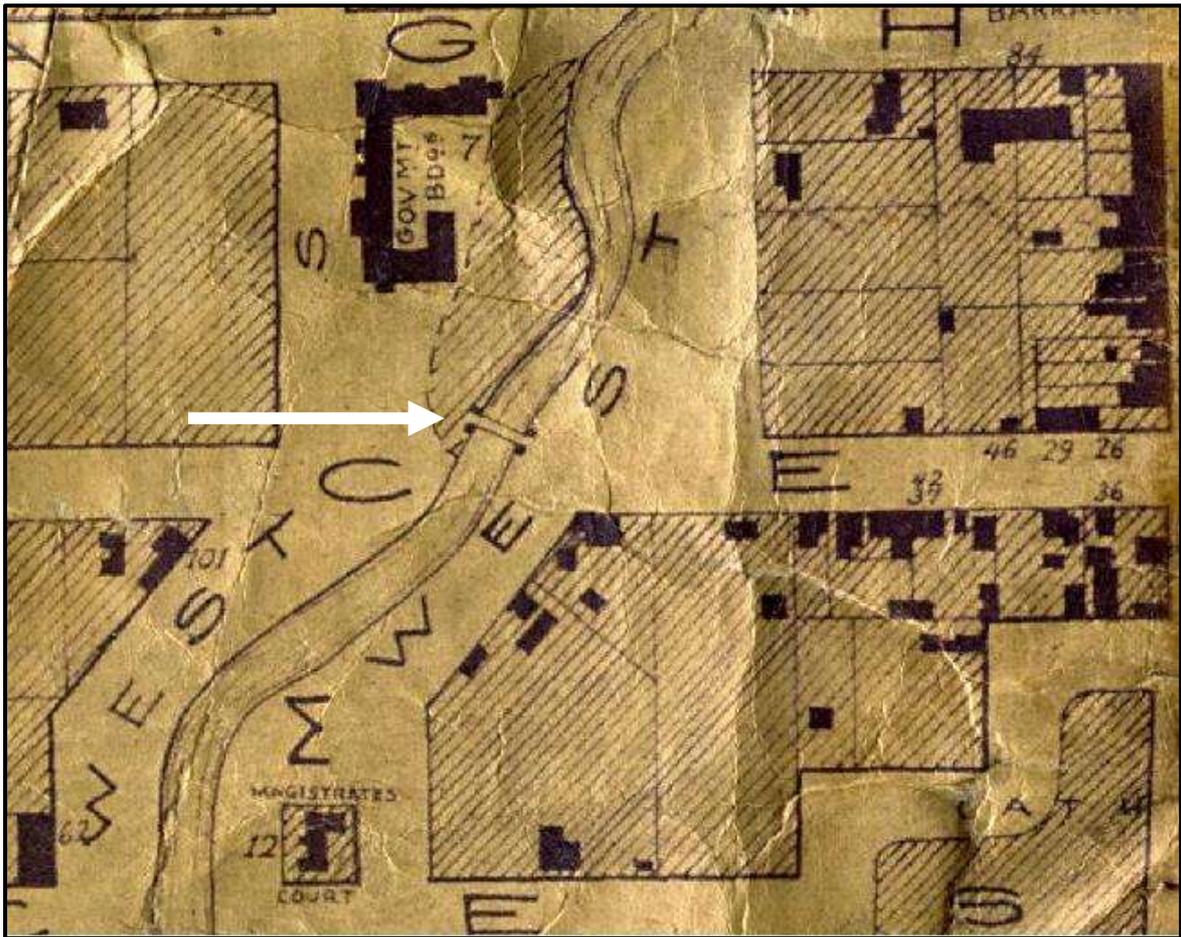


Figure 3. Gloucester Street footbridge, 1862 (identified by white arrow. Image: Image: Fooks 1862.

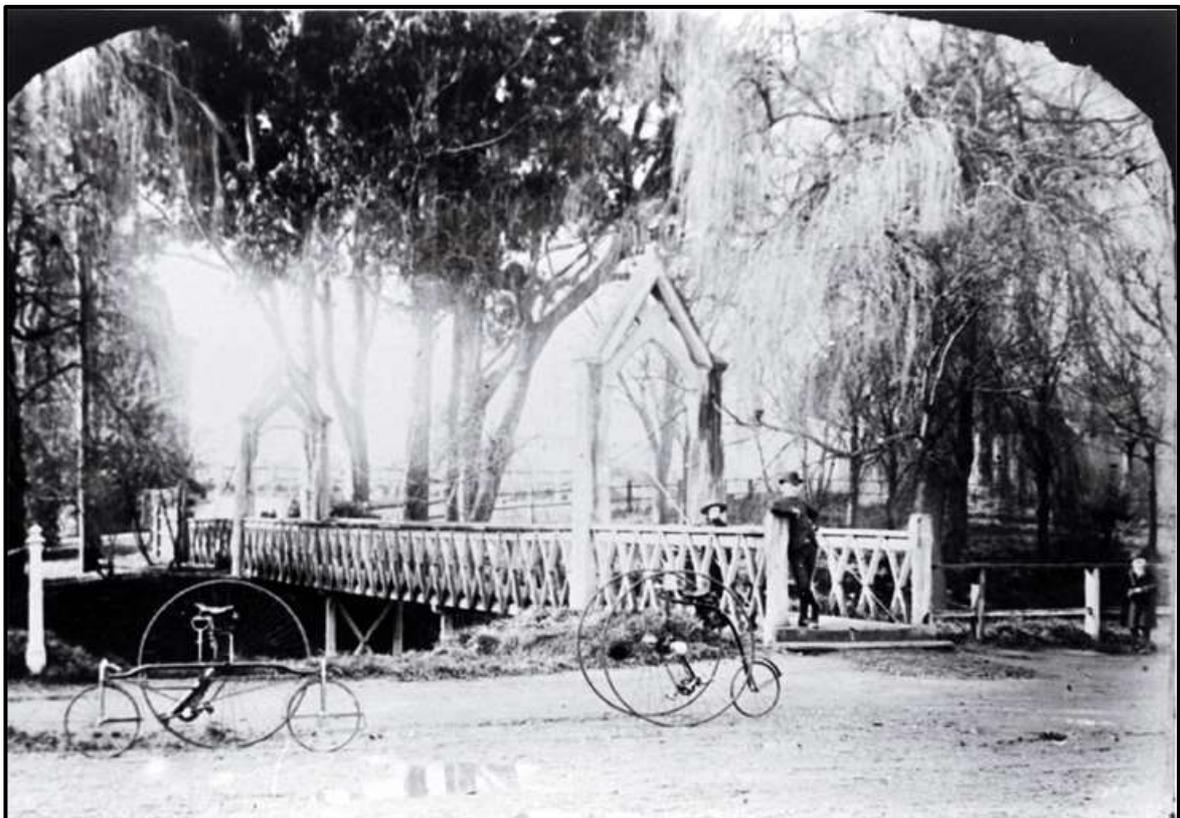


Figure 4. Gloucester Street footbridge in 1885, prior to the construction of the later bridge. Image: CCL 1885.

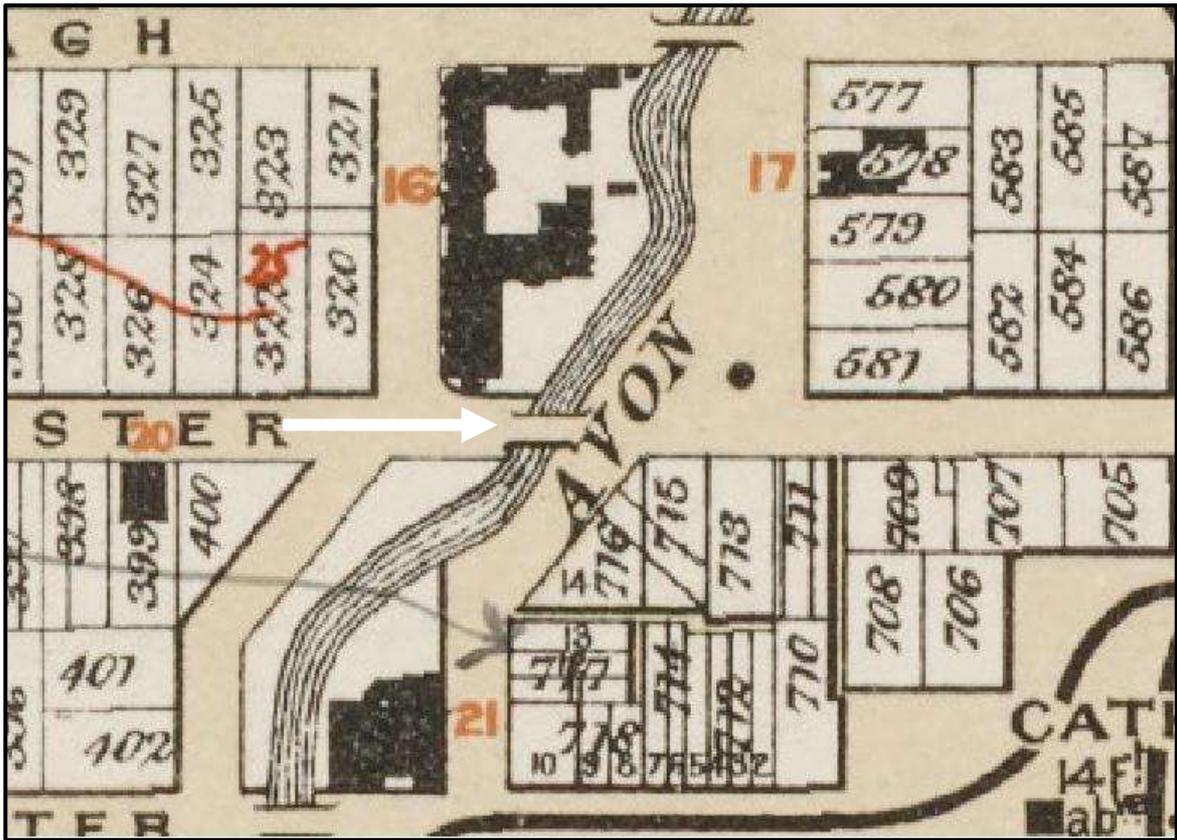


Figure 5. Gloucester Street bridge, 1897 (identified by white arrow). Image: Wilson 1897.



Figure 6. Gloucester Street bridge, c.1886-1920s, showing original stone wing walls and end pillars. Image: Christchurch Press photograph, Alexander Turnbull Library, 1/2-040981-G.

PREVIOUS ARCHAEOLOGICAL WORK

Prior to the renovation of the Gloucester Street bridge, nine test pits were excavated on the bridge deck to inform repair design. The excavation of the test pits were monitored by Hamish Williams (Underground Overground Archaeology). A clay and gravel layer, interpreted as a 'macadamised' early road surface, laid atop the concrete bridge deck was exposed, capped by a layer of coal tar (Williams 2015). As a result of this work, the bridge was recorded as archaeological site M35/1317.

THE ARCHAEOLOGY

During the 2011 Canterbury earthquakes and aftershocks, cracks formed in the wing walls of the Gloucester Street bridge (Figure 7 and Figure 8). The Fletcher Construction Company and subcontractors undertook earthworks to repair and renovate the bridge from February to December 2016. Shana Dooley and Hamish Williams (Underground Overground Archaeology Ltd) monitored and inspected the earthworks for the redevelopment. A plan of the site showing the location of the monitored or inspected hydro-excavated holes and trenches was prepared (Figure 9).



Figure 7. The Gloucester Street bridge, showing a crack that formed during the 2011 earthquake, looking southwest.



Figure 8. Cracks that formed during the 2011 earthquake in the northern wing wall, looking north.

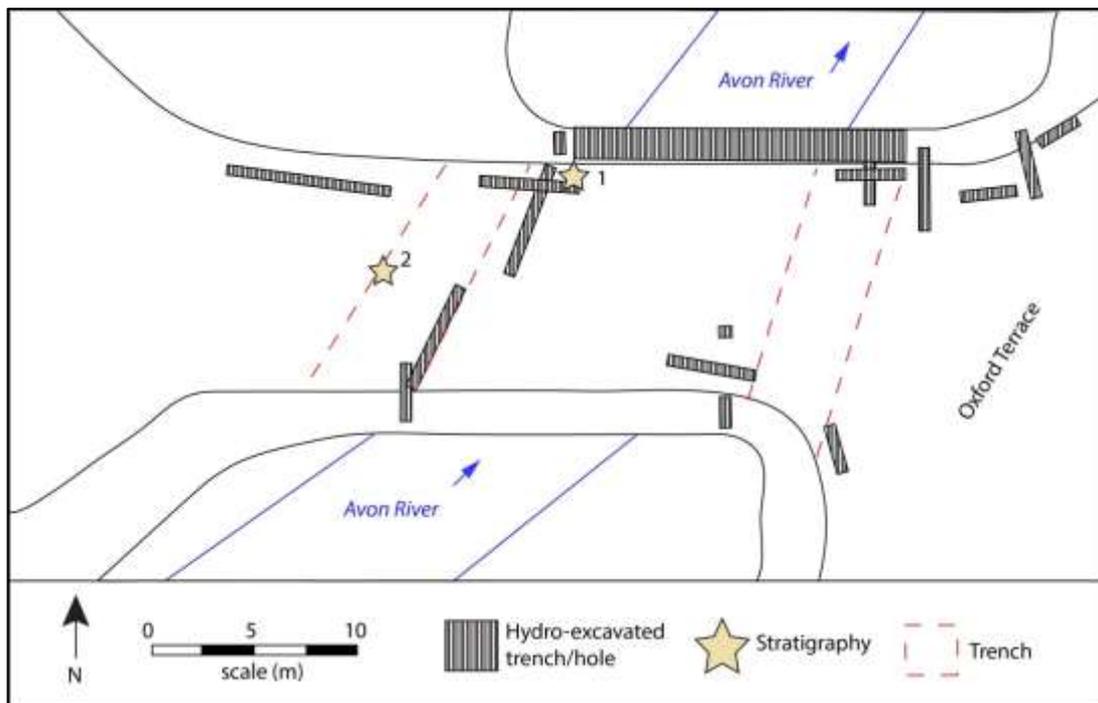


Figure 9. Plan showing the location of the monitored or inspected hydro-excavated holes and mechanically excavated trenches.

The first stage of earthworks for the redevelopment and repair of the bridge consisted of hydro-excavation to determine the depth and location of the existing services. The holes and trenches varied in dimension, but were generally 700-1200 mm in depth (Figure 10, Figure 11, Figure 12, and Figure 13). Earthworks also consisted of two mechanically excavated trenches on either side of the bridge

abutments/approaches. The trenches were 4.3 and 4.9 m wide and 1.5 to 1.6 m in depth. Original bridge features were exposed in the trenches and artefacts were recovered from the fill layers that were exposed in both in the trenches and hydro-excavated holes.



Figure 10. Hydro-excavated holes by the north footpath, looking east.



Figure 11. Hydro-excavation for services on the north footpath, looking west.



Figure 12. Hydro-excavated hole.



Figure 13. Overview of the site, showing the trenches on either side of the bridge, looking northeast.

During the early phase of earthworks for the project, the modern asphalt road surface was removed, exposing a layer of coal tar with a clay surface underneath, this being the 'macadamised' layer observed during the test pitting phase (Figure 14, Williams 2015). The removal of these layers exposed the original concrete decking with the buckle plates (Figure 15). The concrete deck was later removed but the buckle plates were left in place (Figure 16 and Figure 17). The bridge railings were removed to repair and re-paint them (Figure 18).



Figure 14. Layer of tar exposed with a clay layer after the removal of the modern road surface, looking west.



Figure 15. Bridge deck after the removal of the asphalt with the concrete and buckle plates exposed, looking east.



Figure 16. The buckle plates after the removal of the concrete decking, looing southwest.



Figure 17. The buckle plates under the bridge after repair, looking north.



Figure 18. The railing on the north end of the bridge after repair, looking north.

Stratigraphy

The stratigraphy of the site was recorded in two places, the northern baulk of a hydro-excavated hole on the bridge (#1) and part of the western baulk of a trench on the approach to the bridge (#2). The stratigraphy on the bridge (#1) was as follows (Figure 19 and Figure 20):

1. The first stratum was a layer of asphalt that was 50 mm thick.
2. The second stratum was a layer of greyish brown gravelly sand, hard fill introduced into the site. This layer was 150 mm in depth.
3. The third stratum was a layer of yellowish brown sand that was 650 mm in depth. Artefacts were interspersed through this layer.
4. The fourth stratum was a layer of brown sandy clay that was at least 75 mm in depth. This layer appeared to be natural. The base of this layer was not reached.



Figure 19. Baulk of hydro-excavation trench, looking north.

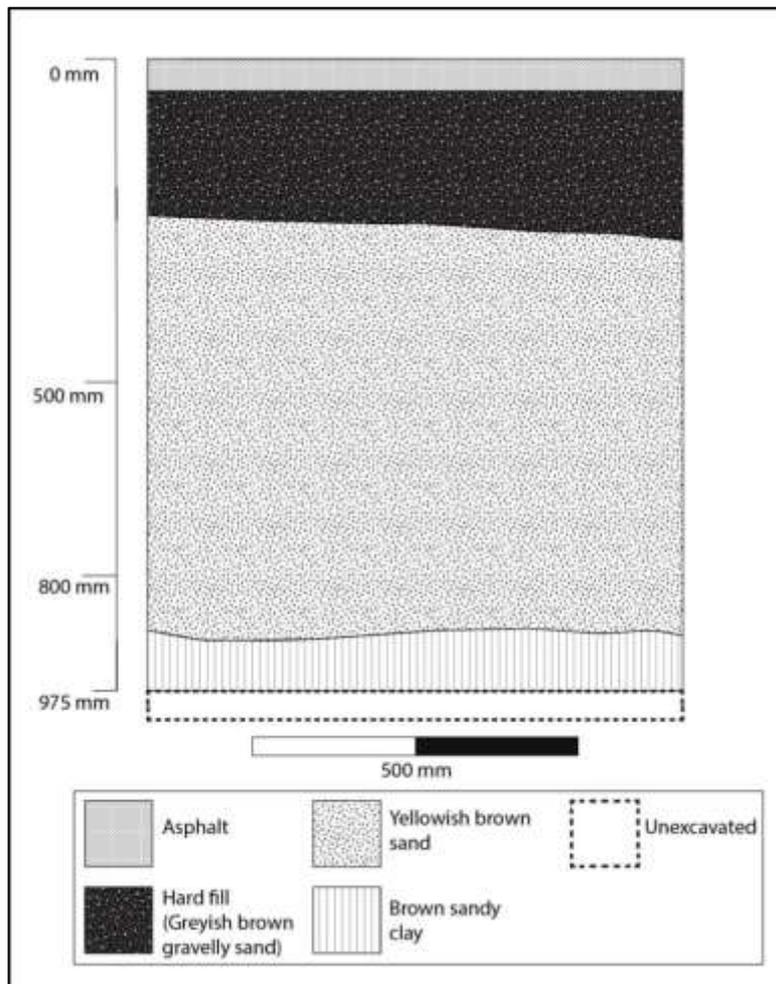


Figure 20. Stratigraphic drawing on the bridge (#1).

The stratigraphy of part of the western baulk of the trench on the approach to the bridge (#2) consisted of the following strata (Figure 21 and Figure 22):

1. The first stratum was a layer of concrete that was 150 mm thick.
2. The second stratum was a layer of yellowish brown sand that was 500 mm thick. Artefacts were scattered throughout this layer.
3. The third stratum was a layer of brown sandy clay that was at least 850 mm in depth. This layer appeared to be natural. The base of the layer was not reached.



Figure 21. Part of the western baulk of the western trench (#2), looking northwest. The layer of fill is indicated by the arrow.

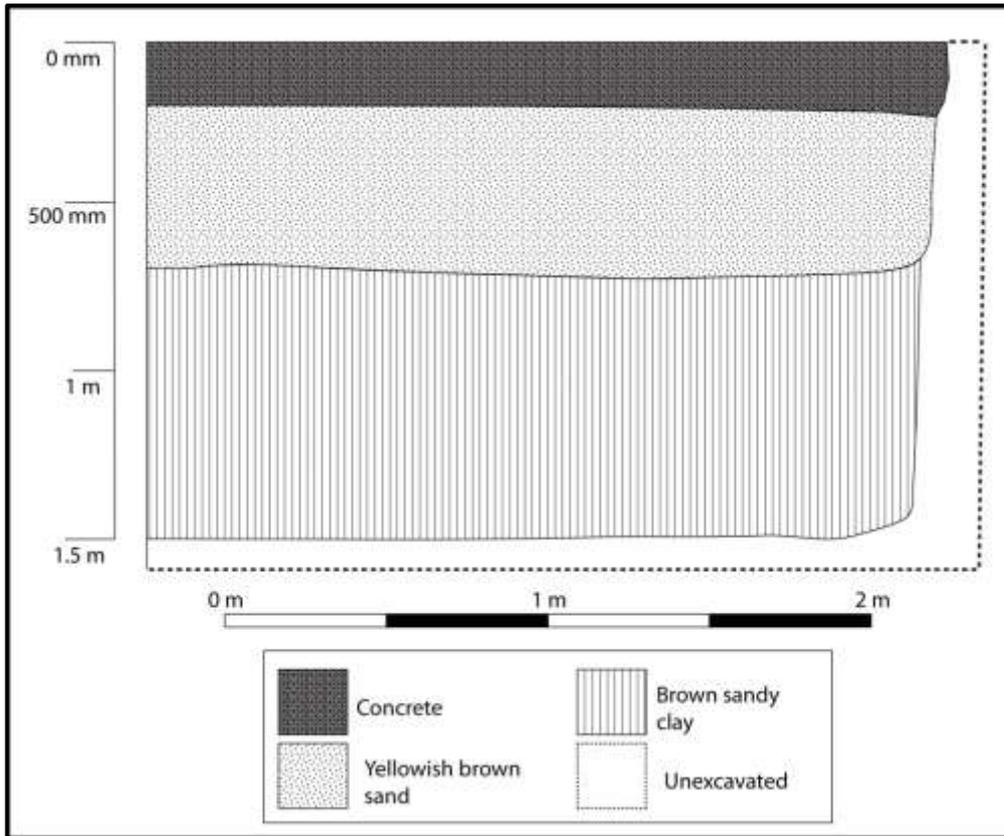


Figure 22. Stratigraphic drawing of part of the western baulk of the trench (#2).

Features

A total of eight archaeological features were identified during earthworks (Figure 23). Feature 1 was a layer of fill containing artefacts. Features 2-4 and 7-8 were structural elements from the original 1886 bridge (Figure 24). Features 5 and 6 were 20th century structural elements associated with the 1936 bridge widening. The bridge features were recorded using a Trimble M3 DR 5" total station.

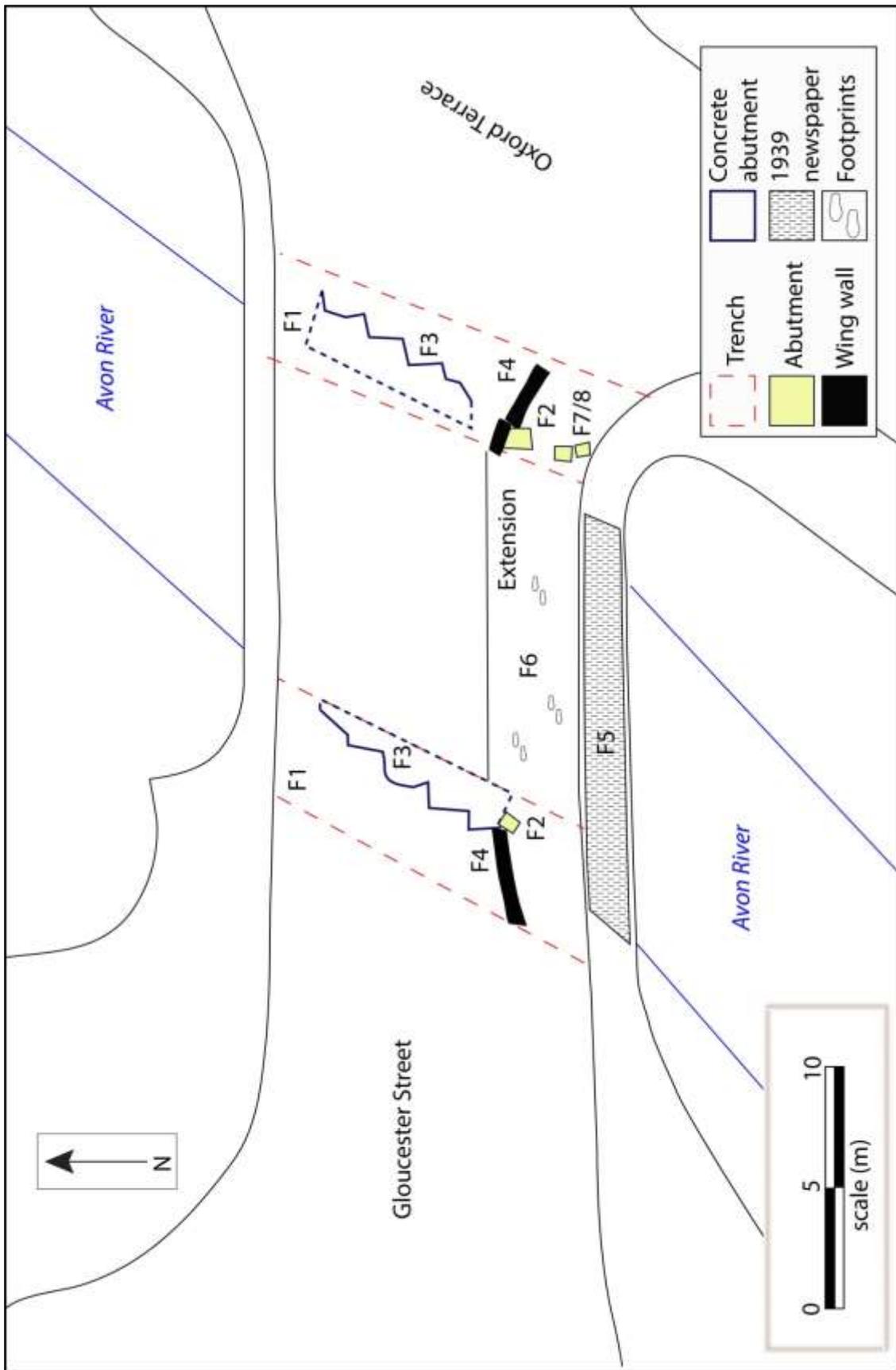


Figure 23. Plan of site showing the archaeological features recorded on the Gloucester Street bridge.



Figure 24. Overview of Features 1-4 exposed in the trench on the western end of the bridge, looking north.

Feature 1

Feature 1 was a fill layer that contained 19th century artefacts. It was exposed in both the north-south orientated trenches dug to expose the bridge abutments, in the fill layer exposed next to and around the original bridge substructure and in several of the service location test pits (Figure 25, and Figure 26). This layer may be a ground levelling fill imported to the site at the time of bridge construction or later when the bridge approaches were formed. The artefacts were collected for analysis.



Figure 25. Trench 1, the trench excavated on the west side of the bridge in which the artefact bearing fill layer was exposed, looking southwest.



Figure 26. Baulk of a hydro-excavated pothole, looking west. Artefacts were found in the fill layers.

Feature 2

Feature 2 consisted of two individual Mt Somers limestone blocks that had made up part of the lower portions of the stone piers that flanked the wing walls of both the eastern and western bridge approaches prior to the 1936 widening. Both of these were exposed on the southern side of the concrete foundations of each wing wall (Feature 4), which were also left in situ when the bridge was widened. That exposed on the western side of the bridge (at the eastern end of the wing wall foundation) measured approximately 1.2 m by 1.2 m and was exposed at a depth of 800 mm (Figure 27). That exposed on the eastern side of the bridge (at the western end of the wing wall foundation) measured approximately 1.3 by 1.2 m and was exposed a depth of 800 mm (Figure 28 and Figure 29). It was approximately 800 mm in depth. The maximum height of both stone blocks could not be established as they were not able to be fully exposed during the works. Both of these were able to remain in situ. The upper edges of both finely dressed stone blocks were bevelled at a 45 degree angle.



Figure 27. At left, Feature 4, the concrete foundation of the wing wall of the western bridge approach, and at right, Feature 2, the stone block from one of the piers (white arrow), looking north.



Figure 28. Feature 2, the stone block from the pier on the eastern side of the bridge.



Figure 29. Feature 2, the stone from the pier on the eastern side of the bridge, and associated concrete wing wall foundation (Feature 4), looking north.

Feature 3

Feature 3 consisted of concrete abutments that were exposed on both sides of the bridge. The top of both of these were exposed at a depth of approximately 300 mm below the road surface, and were of concrete that contained rounded greywacke rocks as the aggregate component. Larger rocks were also observed in the concrete, but the exact rock type could not be identified.

The western abutment was 1 m wide, 8 m long, and extended to a depth of approximately 1 m (Figure 30). The eastern abutment was 1 m wide, 7.5 m long, and extended to a depth of 1 m (Figure 31 and Figure 32). The western abutment was in a much more degraded condition than the east. Whether either of these concrete abutments contained any reinforcing was not able to be confirmed.

Feature 3 was reduced in height during the course of the project, but most of the feature remains in situ.

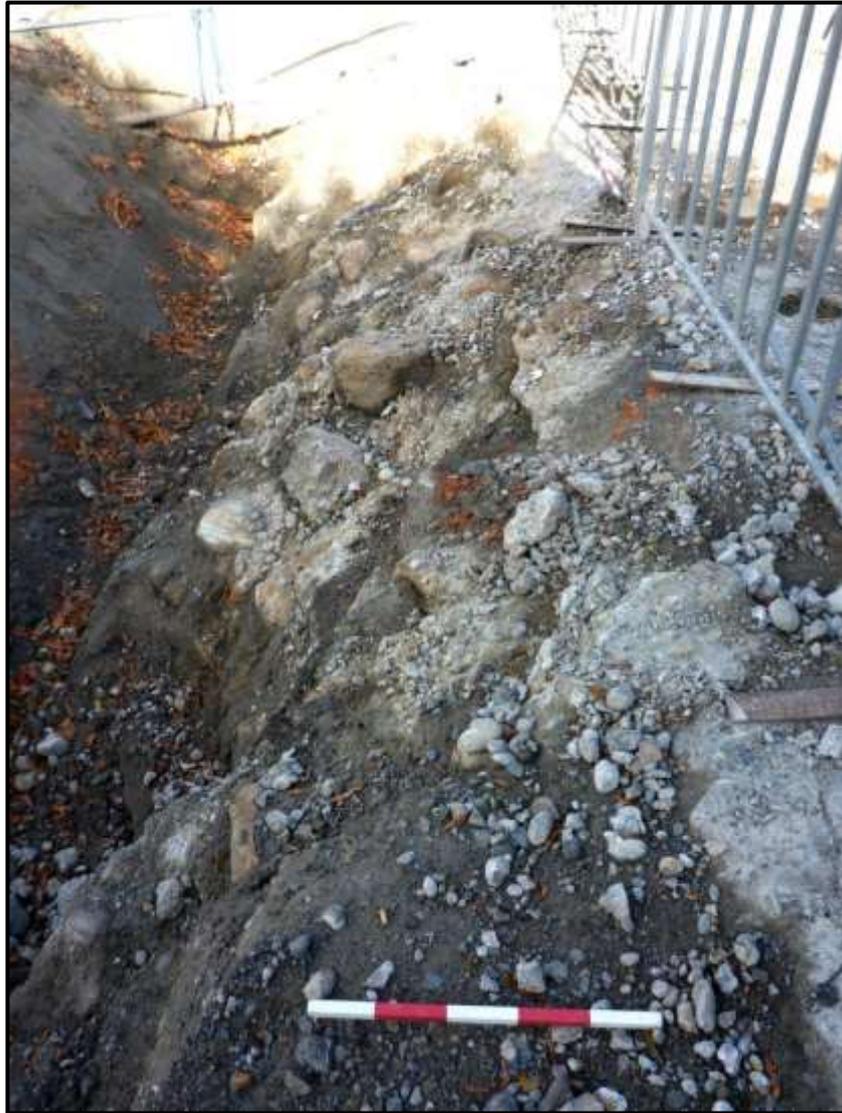


Figure 30. Feature 3, concrete abutments on the western side of the bridge, looking north. Note the cobbles incorporated into the concrete.



Figure 31. Detail of a section of the concrete abutment from the eastern side of the bridge, looking north.



Figure 32. Concrete abutment exposed on the eastern side of the bridge, looking north.

Feature 4

Feature 4 consisted of the concrete wing walls on both the eastern and western bridge approaches on the south end of the bridge, adjacent to the 1936 extension. The western wing wall was approximately 4 m in length, 500 mm in width, and extended to a depth of 1.3 m (Figure 33 and Figure 34). The wall was slightly curved and appeared to be truncated or disturbed at the eastern end as it did not extend all the way to the bridge deck. The eastern wing wall was 650 mm in width and was broken into two sections divided by Feature 2, the block from the stone pier (Figure 35 and Figure 36). As such, it appeared the second or easternmost section of this wing wall had been disturbed, likely during the course of the widening works. The first section next to the bridge was 1.25 m long and the second section was 2.5 m in length. The eastern wing wall was 1.3 m in depth. A large crack had also formed in part of this wall. Both wing wall foundations were constructed using concrete with pebble or river cobble aggregate. Whether either wing wall contained any reinforcing could not be confirmed.

Feature 4 was reduced in height during the course of the project, but most of the feature remains in situ.



Figure 33. Feature 4, the wing wall on the western end of the bridge, looking north-northeast.



Figure 34. Feature 4, the wing wall on the western side of the bridge, looking north.



Figure 35. Feature 4, part of the wing wall at the eastern end of the bridge, looking east.



Figure 36. The wing wall at the eastern end of the bridge, looking north.

Feature 5

During the removal of the footpath on the bridge extension, newspaper dating to 1939 (Feature 5) was uncovered (Figure 37). The feature was located underneath a 25 mm thick asphalt layer and was affixed to the underside of pre-cast concrete panels that formed the footpath deck (Figure 38). The concrete had probably been poured in newspaper lined moulds. A date of 27 October 1939, near the outbreak of World War II, was visible on one newspaper, confirmed by a search in Papers Past (Figure 39 and Figure 40). The feature likely extended the length of the footpath, around 17 m, but earthworks were not monitored as the feature dated after 1900. The 1939 date of the newspapers places the construction of the footpath about three years after the completion of the bridge extension. The footpath that existed until the 1939 footpath may have been of a temporary nature or else the footpath was not constructed until 1939.



Figure 37. Footpath on the bridge extension during removal, looking west.



Figure 38. Profile of the footpath, showing the modern asphalt and pre-cast concrete panels, looking west.



Figure 39. Detail of the 1939 newspaper on one of the pre-cast concrete panels.



Figure 40. Newspaper concrete advertising 'October Specials' at Millers Emporium on Tuam Street.

Feature 6

Feature 6 consisted of the footprints of shoes or boots on the concrete deck of the 1936 bridge extension (Figure 41, Figure 42, and Figure 43). The footprints were haphazardly placed across the

extension and appeared to originate from different shoes. The feature was probably created during the construction of the concrete deck in 1936 by the workers.



Figure 41. Overview of the bridge extension (right) with the 1886 concrete decking (left) where Feature 6 was located, looking east.



Figure 42. Footprints in the bridge extension.



Figure 43. Detail of footprint in bridge extension.

Features 7 and 8

Features 7 and 8 were additional blocks of Mt Somers limestone from the pier that stood adjacent to the eastern wing wall. Both were uncovered later on in the project when additional earthworks to expose the abutment and approaches of the 1939 extension were carried out on the eastern side of the bridge (Figure 44 and Figure 45). The features were located immediately south of Features 2 and 4. Both features were in a secondary context as they were located outside the boundaries of the 1886 bridge and next to the 1936 bridge extension. It is likely that both formed part of the same stone pier that was demolished at the time of the widening. Rather than being removed from site at the time of widening, these displaced stone blocks were buried or backfilled into the adjacent area excavated to form the abutments of the extension. Both were tapered in form and had bevelled edges.

The features were not able to be left in situ and were carefully removed to the Christchurch City Council's Pages Road storage yard for potential adaptive reuse.

Feature 7 was similar to Feature 2 where it was located. It measured 1.1 m by 900 mm and approximately 850 mm in depth.

Feature 8 was a small concrete abutment located immediately southeast of Feature 7. The feature measured 600 mm by 600 mm and was approximately 500 mm in depth.



Figure 44. Features 7 and 8, Mt Somers stone pier units in a secondary context, looking northwest.



Figure 45. Features 7 and 8, looking north-northwest.

ARTEFACT ANALYSIS

A total of 68 artefacts were excavated from the fill on the Gloucester Street bridge (M35/1317) represented by 112 fragments, including ceramic, glass, faunal material, metal, shoes and other items. Artefacts were initially sorted according to material class (ceramic, glass, faunal, metal, shoes and miscellaneous) before being identified to individual types and forms (Table 1). Details of the analytical methods used during the process are provided in Appendix 1. The assemblage was then quantified by the number of individual specimens present (NISP), from which a minimum number of vessels (MNV) or individuals (MNI) was calculated (there is a full list of the artefacts in Appendix 2).

Table 1. Total NISP and MN of artefacts from Gloucester Street bridge, listed according to material.

Material	NISP	MN
Ceramic	29	22
Faunal	34	8
Glass	28	25
Metal	7	7
Miscellaneous	5	2
Shoes	9	4
Total	112	68

Ceramic

Twenty-two ceramic vessels were recovered, represented by 26 fragments. This ceramic assemblage consisted of tea and table wares as well as stoneware bottles associated with household or storage functions. A fragment of a coarse earthenware tile was also found (Table 2).

Table 2. Ceramic artefacts from Feature 1, according to body type, ware, functional class and artefact form.

Body Type	Ware	Function	Form	MNI
ew-c	rce	interior	tile	1
ew-r	ww	table ware	bowl	1
			dinner plate	2
			plate	2
			plate?	1
			unid hollow-ware	2
		tea ware	saucer	1
spp	bc	tea ware	saucer	1
st	bgst	household/storage	jar	1
			stout bottle	1
		household	wide mouth jar	1
	pgst	household	bottle/jar	1
		household/storage	jar large	1
		unid	unid hollow ware	1
	sgst	household	blackening bottle	2
			ink bottle	1
		household/beverage	ginger beer bottle	2
Total				22

Tea and table wares consisted of one bone china saucer and a whiteware saucer, and a range of plates and hollow-ware vessels (Table 3). Several recognisable patterns were identified: the Albion, Fibre, Holly and Willow patterns (Figure 46). The Albion was a romantic pattern relatively common on Christchurch archaeological sites and it is known to have been used by several different pottery firms (Coysh and Henrywood 1982). The Willow pattern is probably one of the most ubiquitous ceramic patterns found on 19th century archaeological sites and was developed at the end of the 18th century in response to the popularity of Asiatic designs during this period (Coysh and Henrywood 1982: 402). The Willow fragment also had a printed mark on the base [...] E [...] N [...] / [WA]RRANTED /

[STAFF]ORDSHIRE, which could not be identified to manufacturer. Many potters used the Willow pattern to decorate their wares, most of whom were based in Staffordshire, England, the area to which this mark refers.

With the exception of one hollow-ware vessel decorated with the flown blue Holly pattern, all the tea and table wares were transfer printed (Table 3 and Figure 47). Unidentified patterns included a blue transfer print decoration displaying acanthus leaves combined with geometric designs and vignettes across the marly. The design is very similar to other known romantic and pastoral patterns, such as the Lucerne pattern. Other unidentified patterns featured floral and foliage motifs and romantic themes with a building in the middle of the scene, around which botanical designs were detailed.

Table 3. Decorated vessels, listed according to decorative technique, pattern name/motif, artefact form and ware type.

Decorative technique	Pattern Name/Motif	Form	Ware	MNI
edge-moulded/ogtp	Fibre	saucer	ww	1
edge-moulded/ugtp	unid: romantic/pastoral	plate	ww	1
flow blue	Holly	unid hollow ware	ww	1
	unid: bnd/fruit-foilage	bowl	ww	1
ugtp	Albion	dinner plate	ww	1
	unid: floral/foilage	unid hollow ware	ww	1
	Willow	plate	ww	1
		plate?	ww	1
Total				8

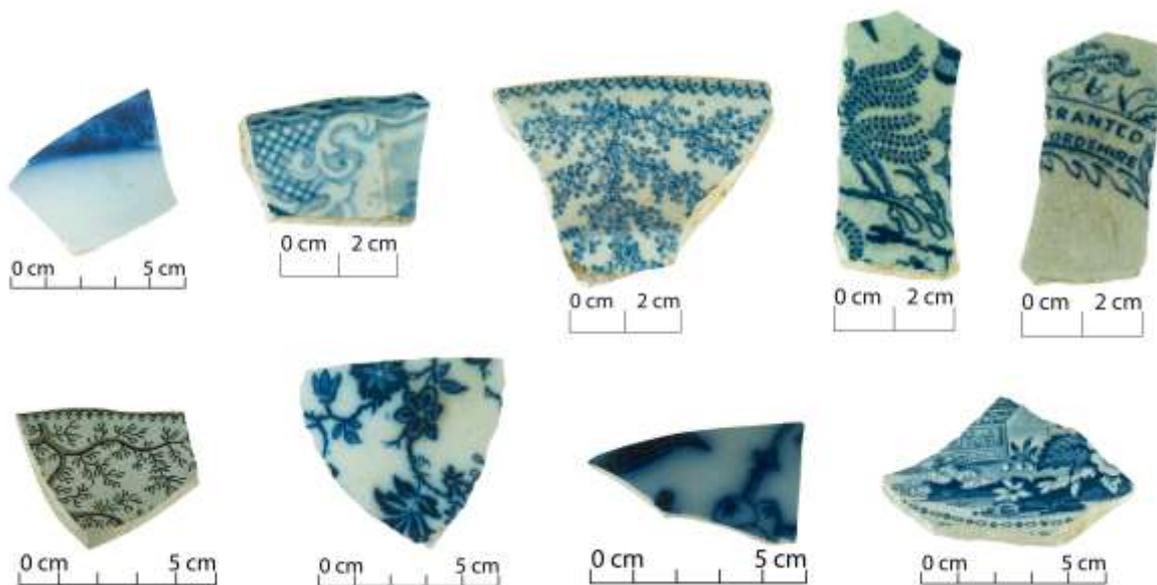


Figure 46. Tea and table wares. Top row from left: flown blue bowl (GSB-EQ653-C-9), blue transfer printed vessel (EQ654-C-17), and Willow plate with printed mark (EQ654-C-17). Bottom row: Fibre patterned saucer (EQ654-C-14), floral and foliage decorated hollow-ware vessel (EQ654-C-16), Holly patterned hollow-ware (EQ654-C-15) and plate displaying a romantic scene (EQ653-C-18).

Stoneware vessels included plain, salt and Bristol-glazed containers (Figure 47). At least one ginger beer and one stout bottle were identified, both of which are likely to have been used for beer (Tasker 1989: 38). One blacking bottle was also collected. Blacking was used for a variety of activities, including the treatment of leather, and is easily identified by the wide mouth stoneware bottles used to contain

it. The wide mouth was necessary to allow the use of a cloth or sponge, likely attached to the end of a stick, to get the blacking out of the bottle (Lindsey 2017).

Several stoneware vessels were marked. The Bristol glazed jar had an impressed mark that read STEPHEN GREEN *LAMBETH* / IMPERIAL POTTERIES. Stephen Green was an earthenware manufacturer from 1828, who began producing stoneware vessels from 1831 onwards, including blacking bottles, porter bottles, jam jars and moulded flasks and jugs (Oswald et al. 1982: 74-76). His business was purchased by John Cliff in 1858 (Godden 1991: 289).

One of the brown salt-glazed containers was identified as an ink bottle based on the impressed mark on the bottom part of its body. The mark read ENCRE JAPONAISE / N. ANTOINE & FILS. N. Antoine et Fils (Antoine and Sons) were Parisian ink manufacturers with premises at 62 Rue des Marais, Paris. By at least the 1870s the company were also located at 1 Prior Street, Greenwich, London. They were first referenced in a New Zealand context in 1874 (*Daily Southern Cross* 4/7/1874: 4). They made a variety of inks, although their Encre Japonaise, a dark violet to black coloured ink (Carvalho 1904: 158), seems to be the type most often found on archaeological sites in New Zealand. Their mark is usually found on bottles with a distinctive dark brown glaze, flared rim and three thin bands incised on the shoulder as this case

The third marked stoneware vessel was identified as a ginger beer bottle. The mark read E. FOWLER / POTTER / SYDNEY, referring to Enoch Fowler, who arrived in Australia from Tyrone, Ireland, and established in 1837 a pottery on a lease in Parramatta Street West, Sydney. In 1848 the pottery was moved to the Glebe, first in Queen Street and then in Bay Street, where they were producing ginger beer bottles and kitchenware. From 1860 the manufacture of drainpipes gradually became the mainstay of the works. In 1865 the pottery moved to Parramatta Road, Camperdown. Business expanded rapidly. When Enoch Fowler died in 1879, his son Robert Fowler inherited the firm (Australian Dictionary of Biography 2006-2017).



Figure 47. Stoneware vessels. Top row from left: blacking bottle (EQ653-C-1), ginger beer bottle (EQ654-C-11) and tile fragment (EQ653-C-7). Bottom row: Bristol glazed jar (EQ654-C-19), E. Fowler Potter ginger beer bottle (SCIRT55-C-24) and Encre Japonaise Antoine & Fils ink bottle (SCIRT55-C-22).

Faunal

Thirty-two faunal elements were recovered, identified as cow and sheep bones, all of which are likely to have been food waste (Table 4). These bones represented 14 butchery units: cow and sheep leg were the most common, although no whole legs were present (Table 5). The fore and hindshanks were relatively cheap cuts of meat, typically used for soups, stocks or stew (Colley 2004). Bones from a sheep skull were present, suggesting the consumption of cheaper cuts of meat. Most of the sheep bones had been sawn. Butchery marks in the form of small cuts were also noted on some of the bones, consistent with removing meat from the bone. One cow femur was also sawn. At least one of the sheep legs was from an animal more than 3.5 years old.

Table 4. Total NISP and MNE of faunal material, listed according to species and element.

Species common name	Element	MNE
cow	astragalus	1
	calcaneus	1
	carpal/tarsal	1
	femur	2
	humerus	3
	metatarsus	3
	pelvis	2
	phalanx	5
	radius	2
	rib	1
	scapula	1
unid	1	
sheep	femur	1
	mandibula-mental foramen	1
	metacarpal	1
	metatarsus	1
	radius	3
	tibia	2
Total		32

Table 5. Faunal material, listed according to species and butchery unit.

Species common name	Butchery unit	MNE	MNBU
cow	foreshank	6	2
	hind/foreshank	7	0
	hindshank	7	3
	loin	1	1
	rump	2	2
sheep	foreshank	4	2
	hindshank	4	3
	skull	1	1
Total		32	14

Glass

Twenty-five glass artefacts were recovered, most of which were alcohol bottles (Table 6).

This assemblage was dominated by the presence of black beer shapes in several sizes, including pint and quart sized bottles¹ (Figure 48). Such differences in bottle size correspond directly to the quantities in which beer and spirits were sold, both wholesale and in a retail context (Illinois Glass Catalogue 1906: 250, Lindsey 2017). Newspaper advertisements from the 1870s and 1880s suggest that quarts of beer were sold for approximately 6-9 pence per bottle, depending on the variety of beer, the quantity purchased and the place wherein it was sold. ‘Pint’ bottles appear to have cost roughly half that of quarts (*Evening Post* 8/6/1871: 3; 10/5/1880: 4). Black beer, case gin and spirit bottles are all associated with alcohol, particularly beer, whisky, gin and rum, but it is likely that these bottles were reused frequently for a variety of purposes.

One of the black beer bottles was embossed with the letters C W & Co on the base (Figure 49). This may refer to Cooper and Wood, a Scottish glassmaking company based at Portobello from 1859 until 1866/68 when the partnership of Thomas Wood and Richard Cooper came to an end (Toulouse 1971: 141-143, 524-526).

¹ Size measurements are provided in Appendices 1 and 2.

Table 6. Glass artefacts, listed according to functional class and common name.

Class	Common name	MNV
alcohol	black beer	4
	case gin	1
	large squat black beer	1
	large squat bottle	2
	small black beer	3
	small ring seal beer/wine (champagne)	1
	small squat bottle	1
	spirit/beer bottle	2
food	catsup	1
	bevelled pharmaceutical	1
non-alcoholic	torpedo	1
	oval pharmaceutical	1
unid	ro c/s bottle	3
	unid bottle	1
Total		25



Figure 48. Alcohol bottles from Feature 1. Clockwise from top left: large squat and small squat black beer bottles (EQ653-G-4 and SCIRT55-G-27), spirit bottle (EQ653-G-2), case gin bottle (EQ563-G-1) and 'pint' sized black beer bottle (EQ653-G-8).



Figure 49. Embossed black beer bottle with the letters C W & Co (EQ653-G-10)

Non-alcoholic bottles and bottles with other purposes were also recovered (Figure 50). These vessels included one rectangular bevelled bottle with a long neck, a shape usually associated with catsup, and a square sectioned aqua green bottle. The latter may have contained gloss or formed the base of a wide mouth pickle jar. One torpedo bottle was also found, which was embossed with the partial words [...]*E SUPER*[*IOR*]. It was not possible to identify the manufacturer based on the partial embossing, but the bottle would have originally contained aerated water. A light aqua blue oval bottle was also identified, which is likely to have contained any of a variety of pharmaceutical products.



Figure 50. Other bottles. Clockwise from top left: catsup bottle (EQ653-G-9), food related bottle/jar (EQ653-G-17), oval pharmaceutical bottle (EQ653-G-18) and partial embossed torpedo bottle (EQ653-G-7).

Metal

Metal artefacts consisted of seven individual objects made of iron, including fasteners, several oval rings or links as part of a chain, one rectangular cross sectioned strip, one file and one curved rod (Table 7 and Figure 51). The ferrous item in the form of a curved rod, was slightly flattened and oval cross sectioned, and tapered towards one end. A rounded object was attached at the tapered end. This could not be identified to a specific function. The cross section of the file recovered was half-rounded. The tang would have been inserted into a wooden handle.

Table 7. Metal artefacts, listed according to material, functional class and artefact form.

Material	Class	Form	NISP	MNI
ferrous	fastener	bolt	2	2
		chain	1	1
		roofing nail	1	1
	strip	strip	1	1
	tool	file	1	1
	unid	unid	1	1
Total			7	7

Most of the fasteners present were fragmentary or rusted, making it difficult to see details of form or function. However, it was possible to identify a few fasteners among the assemblage such as one

roofing nail, with the typical rounded head and lead collar, one chisel pointed spike, although the head form could not be determined, and one bolt.



Figure 51. Metal artefacts. Clockwise from top: file (GSB-EQ653-M-2), roofing nail (EQ654-M-6), chain (EQ653-M-5), spike (EQ653-M-1) and bolt (EQ654-M-7).

Miscellaneous

Several pieces of leather were recovered, identified as a belt. These measured approximately 40 mm in width, but the length could not be determined, due to its incomplete condition. The belt was missing the buckle, but had at least four buckle holes on two of the fragments. Based on the thickness and width of the leather, it seems likely that this was a man's belt or one used for the harnessing and/or care of horses. In addition, a piece of concrete in a circular shape made of small stones, clay and sand was also found. It has been hardened with a binder such as cement or lime, suggesting a structural use (Figure 52).



Figure 52. Other items recovered: leather fragments of a belt (EQ653-MC-1) and Piece of concrete (EQ654-MC-1).

Shoes

Several sole and heel fragments of shoes/boots were recovered. With the exception of one hobnailed boot, the rest of the shoes/boots were constructed using pegs between the soles (Figure 53 and Figure 54). The use of wooden pegs was particularly prevalent during the first half of the 19th century, after the development of hand-operated machines for pegging shoes and boots together. Automated pegging machines were invented in the 1850s, although these were soon made obsolete by other developments in the 1860s and 1870s (Anderson 1968: 59-61). Consequently, pegged shoes and boots are usually dated to the early to mid-19th century, although it is possible that individual shoe-makers may have continued to use the method as late as the 1880s and 1890s. Reinforcing was noted on the fragments, through the use of extra pegs to hold the soles of the shoe/boot together.



Figure 53. Several leather shoes fragments from left (SCIRT55-S-2, S-3 and S-4).

The hobnailed boot was identified as an Oxford boot. Hobnailing was a utilitarian style of manufacture commonly found on men's and work boots from the 19th century (Anderson 19868, Stevens and Ordonez 2005). This sturdy manufactured footwear seems to have been suitable for dealing with harsher terrains, with added hobnails for grip or heel rands and metal plates to aid stability and strength (Dickson 2014).

The use of vertical attachment methods – such as nailing – was the most common method for attaching outsoles and insoles together. Anderson gives an average date of pre-1862 for hand-nailed footwear,

although it is possible that the manufacturers continued to use this technique after the introduction of automated nailing (Anderson 1968: 59).

The upper was attached using machine stitching. Sewing machines were first patented in 1846 by Elias Howe Jr. and were quickly integrated into the footwear industry: by the 1850s and 1860s nearly all uppers were machine stitched (Anderson 1968: 59). Stitched shoes, including both hand and machine stitched examples, are difficult to date due to the long use of the method within the field of footwear construction (Anderson 1968: 59).

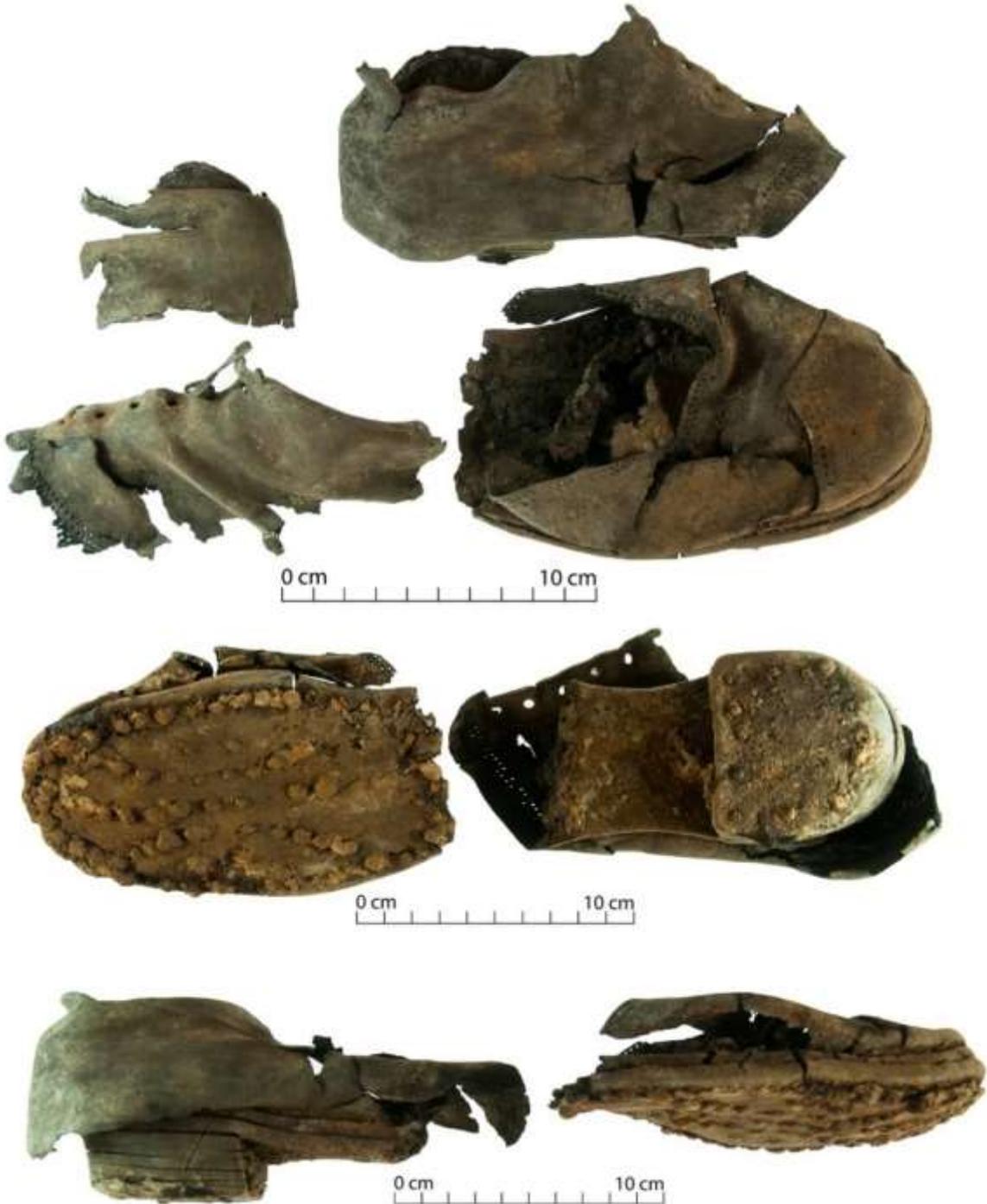


Figure 54. Oxford boot (GSB-EQ653-S-1).

Discussion

The assemblage recovered from Feature 1 consisted primarily of black beer bottles in several sizes and stoneware vessels related to household and storage functions, some of which were also identified as probable alcohol containers, such as ginger beer or stout bottles. Tea and table wares were scarcely represented among the assemblage and they were small fragments and incomplete vessels, supporting the fact that this is not a typical domestic or household assemblage.

The artefact material has a TPQ of 1870 (Table 8). The date ranges, along with the archaeological context, suggested that the material may have been deposited as ground levelling fill for the construction of the bridge. Alternatively, these artefacts could have been the result of a surface accumulation. In the latter case, the material may have belonged to the workers constructing the bridge between October and December of 1886. However, the early manufacturing dates for some items, such as the Enoch Fowler and Stephen Green bottles, may indicate that the redeposited fill theory is more likely. These possibilities are not mutually exclusive: it is possible that some of the material recovered was from a ground levelling fill and that some of it was opportunistically discarded by the workers.

Table 8. Artefact manufacturing date ranges for the assemblage, listed according to date and artefact.

Date	Artefact
1870s onwards	Antoine et Fils Encre Japonaise. Ink bottle.
1837-1865	Enoch Fowler Potter from Sydney. Ginger beer bottle.
1859-1866 (or 1868)	Cooper and Wood. Black beer bottle.
1831-1858	Stephen Green Lambeth Imperial Potteries. Bristol glazed wide mouth jar.

It is interesting to note that no local products were present among the assemblage. With the exception of one ginger beer bottle from Enoch Fowler, a potter from Sydney, the assemblage is dominated by objects and products manufactured in England. This is not completely surprising, given the early manufacturing dates for the assemblage and the heavy reliance young colonial settlements like Christchurch had on the trade and industry of their parent country during the first decades of colonisation.

Overall, the assemblage is considered to be of low significance, based on the criteria outlined in Table 9, although this may change if more material is recovered from the site.

Table 9. Assessment of significance for artefact assemblage recovered from Gloucester Street bridge, according to archaeological criteria.

Criteria	Value
Condition	Low. Material fragmented and uncomplete vessels, especially ceramic artefacts.
Context	Low-medium. Artefacts are associated with the construction of Gloucester Street bridge.
Rarity	Low. Material typical of mid-late 19 th century elsewhere in New Zealand.
Information potential	Low.
Cultural associations	None known.
Amenity value	Low. Assemblage too typical and fragmentary to have value.

DISCUSSION AND CONCLUSION

During earthworks for the repair and renovation of the Gloucester Street bridge eight archaeological features were recorded, related to the 1886 bridge and the 1936 bridge extension. Feature 1 consisted of 19th century artefacts recovered from the fill on the bridge. The artefacts may represent a

combination of both ground levelling fill brought to site for the construction of the 1886 bridge and opportunistic dumping by the construction workers.

Features 2-3 and 7-8 were features associated with the 1886 bridge. The features reveal the bridge was fortified by abutments and wing walls. Metal buckle plates formed the framework of the bridge. Feature 4, the wing walls of the bridge, were constructed using concrete. Historic research revealed the original limestone wing walls were reported as replaced using concrete during the 1936 bridge extension (Ince 1998: 55). It is possible Feature 4 dates to the bridge extension rather than the earlier 1886 bridge.

This method of construction differs from nearby bridges constructed during the same time period in the Christchurch city centre. The Armagh Street ridge, which the Gloucester Street bridge was modelled after, is located a block north of the project. Timber piles and framework was part of the 19th century bridge construction as well as a leather shock absorber layer were found during archaeological work there. Furthermore, the Colombo Street bridge, located northeast of the project and constructed during the same period, was constructed using brick abutments. As such, it seems that bridge design and methods, even during the same period, varied widely in the Christchurch city centre.

Features 5 and 6 were associated with the 1936 bridge extension. Newspaper from 1939 was found affixed to concrete panels. The newspaper suggests the footpath was constructed several years after the bridge extension. The footprints visible only in the concrete deck of the extension shows the workers walked on the bridge before the concrete had hardened.

As a result of this work, archaeological site M35/1317 has been updated.

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APPENDIX 1: METHODS OF ARTEFACT ANALYSIS

All data relating to artefacts was entered into a Microsoft Excel spreadsheet. Photographs were taken of notable, interesting and/or dateable artefacts, or artefacts crucial to understanding this site.

Dating: the TPQ method

Ceramic, glass and metal artefacts were commonly embossed or printed with information concerning the manufacture of the vessel or the product the vessel contained. These manufacturers can often be identified and the period of their operation dated. The specific sources used for this process are discussed above for each material category. This information allows for the calculation of a *terminus post quem* (limit after which) for each feature that is associated with a dated artefact. A *terminus post quem* (TPQ) is the earliest date at which an archaeological feature could have been deposited. It is derived from the date range of the youngest artefact in the feature. For example, if a manufacturer identified on a ceramic vessel is known to have operated between 1865 and 1880, and this is the latest date range identified in the feature, the TPQ for that feature is 1865.

Establishing a TPQ is useful because it can be used to associate deposition with a specific period of a site's occupation. However, it should be emphasised that the TPQ is the earliest possible date for a feature, not the definite date at which deposition occurred. The time between the manufacture and disposal of an artefact must be taken into account. Various factors influence this period. For example, a ceramic vessel is likely to proceed through a number of stages between creation and disposal. These include the time it takes for a vessel to be packed and processed in Britain, then shipped to New Zealand, and then more time in retail before its eventual purchase. After this process, the vessel was most likely used for a period of time before its disposal. This period is termed a vessel's 'use-life'. Therefore, it could be many years between the date at which a vessel was produced and the date at which a vessel was added to an archaeological assemblage.

Ceramic artefacts

A number of references were consulted during the analysis of the ceramic assemblage. Brooks (2005) was the principle reference used for the analysis of material ware, form and decorative technique. Samford (1997) was consulted in relation to decorative patterns and colours and internet resources such as The Potteries website were also utilised. Maker's marks were identified using Godden (1991) and The Potteries website. These resources contribute to the internal database maintained by Underground Overground Archaeology Ltd which records both identified ceramic maker's marks and patterns recovered from previous archaeological sites in Canterbury.

Ceramics were analysed according to a standard set of attributes and the specific categories are listed below. Some of these attributes and categories have been removed from the spreadsheets in Appendix 2 due to the constraints of printing on an A4 page. The columns left out were those in which no data was entered during the analysis, or where the data was not crucial to this report. Photographs were taken of all unidentified ceramic patterns and have been retained on file. These are available on request.

Bag ID	Material	Quantity	Decoration	General information
Site	Body type	NISP	Technique	Notes
Code	Glaze	MNI	Colour	References
Box number	Ware		Pattern name/motif	Photo number
Bag number	Function		Maker's mark	

Provenance Form
 Portion

Faunal material

Methods of analysing the faunal material drew on those outlined in Watson (2000). The faunal material was identified to taxonomic category and, where possible, mammal and bird bones were identified to species. Underground Overground Archaeology holds a reference collection of European mammal bones, and the bird bone reference collection at the Canterbury Museum was used to identify bird bones.

A MNE (minimum number of elements) was generated from the NISP (number of individual specimen present). The attributes recorded during the analysis of the faunal material are listed below and include skeletal details, taphonomic processes and, where possible, any butchery marks on the material were recorded. Minimum number of butchery units (MNBU) was also recorded to represent cuts of meat targeted (Watson 2000).

Bag ID	Description	Detailed analysis	General information
Site	Species	Taphonomy	Notes
Code	Element	MNBU	Photo number
Box number	Side		
Bag number	Portion		
Provenance			

Glass artefacts

Glass vessels were sorted by provenance and analysed according to the process outlined in Smith (2004). This included recording glass colour, finish, base type and any marks present. Further information concerning the bottle and product manufacturers identified by marks was supplied when possible. Internet research provided the majority of this information but Donaldson et al. (1990) and Lindsey (2012) also proved useful.

Some glass vessels could be identified to type by their form or their embossing. This information identifies the original contents of the bottle. However, identification of the original contents of a bottle does not necessarily connect the occupants of a site with the consumption of that product. Reuse of glass bottles for different products was a common practice in New Zealand in the 19th century, as there was no glass bottle production in New Zealand until the 20th century. All bottles had to be imported, which resulted in a scarcity of glass containers. However, the identification of reuse in an archaeological context is difficult. As such, glass vessels are discussed in relation to their original contents.

Bag ID	General description	Quantity	Manufacture	Identification details
Site	Colour	NISP	Type	Embossing
Code	Portion	MNV	Marks	Notes
Box number	Class			Reference
Bag number	Common name			Photo ID
Provenance	Details			

Metal artefacts

Metal artefacts were analysed and recorded by their material type, form and measurements. If the artefact could not be identified by form a description of its appearance was included.

Bag ID	Description	Quantity	Identification details
Site	Material	Measurements	Notes
Code	Form	NISP	Reference
Box number	Details	MNI	Photo ID
Bag number	Portion		
Provenance			

Miscellaneous artefacts

Miscellaneous artefacts included building materials and all other recovered artefacts not relevant to the already established material categories. Artefacts were cleaned and then analysed according to material type. Those that could be identified to form were recorded as such.

Bag ID	Description	Quantity	Information
Site	Material	Measurement	Notes
Code	Artefact	NISP	ID
Box number	Portion	MNI	
Bag number	Description		
Provenance			

Discard protocol

Underground Overground Archaeology uses a discard protocol involving the discard of non-diagnostic artefact fragments. A note is made in the artefact spreadsheet if an artefact is discarded. Copies of the artefact discard protocol are available upon request.

Abbreviations

Ceramic

b & b plate	bread and butter plate
bbe	buff bodied earthenware
bc	bone china
bd	body
bgst	bristol glaze
bs	base
cl	clear
ew-c	coarse earthenware
dbw	dyed body ware
fb	flow blue
ew-r	refined earthenware
h	handle
porc-h	hard paste porcelain
porc-s	soft paste porcelain
pw	pearlware
r	rim
rre	red refined earthenware
rt	rockingham type
sgst	salt glaze
st	stoneware
svww	Semi-vitrified whiteware
ugtp	underglaze transfer print
unid	unidentified
wg	white granite
ww	whiteware
yw	yellowware

Faunal

C	complete
C*	complete, missing 1 epiphysis
C**	complete, missing 2 epiphyses

P	complete proximal portion of the bone
P*	complete proximal portion but missing the unfused epiphysis
PE	the unfused proximal epiphysis
PS	proximal shaft
MS	shaft
DS	distal shaft
D	complete distal portion of the bone
D*	complete distal portion but missing the unfused epiphysis
DE	the unfused distal epiphysis
Glass	
1pc dm	one piece dip mould
2pc	two piece mould
2pc w cb	two piece mould with cup bottom
2pc w pb	two piece mould with post bottom
3pc dm	three piece dip mould
ab	amber brown
ag	aqua green
bd	body
bs	base
bv1	blake variant one
cb	cobalt
cc	concave
cl	colourless
cmpl	complete
c/s	cross section
cv	convex
-d	dark
dcc	dished curved
dft	dished flat
dm	dip mould
f	finish
fg	forest green
eg	emerald green
ft	flat
hs	seams horizontal on shoulder
hs/vb	seams horizontal on shoulder, vertical on body
hs/vbs	seams horizontal on shoulder, vertical on body and shoulder
hs/vs	seams horizontal on shoulder, vertical on shoulder
hz	horizontal
kbe	kickup bell shaped
kcm	kickup conical with mamelon
kcn	kickup conical
kdo	kickup domed
kpa	kickup parabolic
krc	kickup rounded cone
-l	light
mm	machine made
n	neck
nil	nil seams
og	olive green
rcb c/s	round cornered blake cross section
ro	rounded
s	shoulder
sc	scooped
st	straight
sts	straight short
td	tapered down
td/u/bead	tapered down/u-shaped groove/bead
td/v/skirt	tapered down/v-shaped groove/skirt
tp	tapered
tu	tapered up
tus	tapered up short
turn-b	turn marks on the body
turn-l	turn marks on the lip
vh/hh	seams vertical on heel, horizontal on heel
vh/tb	seams vertical on heel, transverse on base
vh/tf/cb	seams vertical on heel, horizontal on foot, circular on base
v3h/t3f/cb	seams 3 vertical on heel, 3 transverse on foot, circular on base
vbs	seams vertical on body and shoulder
v3bs	seams 3 vertical on body and shoulder
vcn	seams vertical complete on neck

v3cn
vpn
wrench-n
Metal
h
pt
s

seams 3vertical complete on neck
seams vertical partial on neck
wrench marks on the neck

Head
Point
Shaft

APPENDIX 2: ARTEFACT SPREADSHEETS

Due to the constraints of printing on an A4 page, the following artefact spreadsheets have been condensed (as noted in the footnotes for each table). For full spreadsheets please contact Underground Overground Archaeology.

At the time of writing, the artefacts were stored at Underground Overground Ltd offices at 31 Stevens Street, Waltham, Christchurch.

Artefacts were initially analysed as three separate features, Features 1, 2, and 3. During the process of analysis, these were determined to be part of the same fill layer and deposition event (as discussed above in the analysis section). However, the original feature numbers remain in the spreadsheets detailed here.

Ceramic²

Bag	Prov	Body	Glaze	Ware	Function	Form	Portion	NISP	MNI	Technique	Colour	Pattern	Maker's Mark	Notes (include date range)	Reference
1	F2	st	salt	sgst	household	blackening bottle	r-n-sh-bd-bs	2	1						http://www.sha.org/bottle/household.htm#Bulk ink bottles
2	F2	st	plain	pgst	unid	unid hollow ware	bd	1	1						
3	F2	spp	cl	bc	tea ware	saucer	m-bs	1	1						
4	F2	ew-r	cl	ww	table ware	dinner plate	r-m-sh	1	1	ugtp	blue	Albion			
5	F2	ew-r	cl	ww	table ware	plate	m-sh	1	1	ugtp	blue	Willow			
6	F2	ew-r	cl	ww	table ware	plate	r-m	1	1	edge-mld/ugtp	blue	Pastoral			
7	F2	ew-c	unglazed	rce	interior	tile		1	1						
8	F1	st	bristol	bgst	household/storage	jar	bd	1	1						
9	F1	ew-r	cl	ww	table ware	bowl	bd	1	1	flow blue	blue	unid: bnd/fruit-foliage		Space between bands is decorated with groups of small circular fruits and leaves. First	Samford 1997

² The following columns have been removed from this table: Site, code, EQ box # (all are stored in EQ653), photo ID.

														appears 1835/45	
10	F3	st	bristol	bgst	household/storage	stout bottle	n-sh	1	1					Originally developed c.1835	Brooks, 2005
11	F3	st	salt	sgst	household/beverage	ginger beer bottle	r-n-sh	1	1					bulk/master ink bottle	
12	F3	st	plain	pgst	household/storage	jar large	bd-bs	4	1						
13	F3	st	salt	sgst	household	black ink bottle	r-n	1	1						
14	F3	ew-r	cl	ww	tea ware	saucer	r-m	1	1	edge-mld/ogtp	black	Fibre			
15	F3	ew-r	cl	ww	table ware	unid hollow ware	bd	1	1	flow blue	blue	Holly			
16	F3	ew-r	Cl	ww	table ware	unid hollow ware	bd	1	1	ugtp	blue	unid: floral/ foliage		Flower and leaves filled by stripes	
17	F3	ew-r	Cl	ww	table ware	plate?	bs	1	1	ugtp	blue	Willow	...EN.../...RRANTED/[STAFF]ORDS HIRE	Unknown	Coys and Henrywood 1989
18	F3	ew-r	Cl	ww	table ware	dinner plate	bs	1	1	ogtp	blue			Architecture, flowers and leaves surrounded by geometric frame	
19	F3	st	bristol	bgst	household	wide mouth jar	cmpl	1	1	impressed	brown/cream		STEPHEN GREEN *LAMBETH* / IMPERIAL POTTERIES	1820-1858	Godden 1991: 289
20	F3	st	plain	pgst	household	bottle/jr	bd-bs	1	1						
21	F3	ew-r	Cl	ww	unid	unid		2	0					DISCARDED. Unid fragments	
22	F1	st	salt	sgst	household	ink bottle	bd-bs	1	0				ENCRE JAPONAISE / ANTOINE & FILS	Antoine et Fils. 1874 first referenced in NZ newspaper s.	Carvalho 1904: 158
23	F1	st	plain	pgst	household/storage	bottle	bd-bs	1	1						

24	F1	st	salt	sgst	household/storag e	ginger beer bottle	almos t cml	1	1				E. FOWLER / POTTER / SYDNEY	Enoch Fowler, 1836-1865.	Australian Dictionary of Biography
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Faunal

Site	Code	Box	Bag	Prov	Species	Element	Side	Portion	Butchery unit	Taphonomy	NISP	MNE	MNI	MNBU	NOTES
GSB	EQ653	F	1	F1	sheep	radius		p-m	foreshank	cut/broken	1	1	1	1	
GSB	EQ653	F	2	F1	sheep	mandibula- mental foramen	left		skull	broken	1	1	0	1	
GSB	EQ653	F	3	F1	cow	metatarsus		cmpl	hindshank	cut	1	1	0	1	
GSB	EQ653	F	4	F1	cow	humerus	right	p-m	hindshank	chop/broken	1	1	1	0	
GSB	EQ653	F	5	F1	cow	humerus	right	p	hindshank	broken	1	1	0	1	
GSB	EQ653	F	6	F2	cow	radius	left	p	foreshank	cut/broken	1	1	1	1	
GSB	EQ653	F	7	F2	cow	humerus	left	p	rumb	saw/broken	1	1	0	1	
GSB	EQ653	F	8	F2	cow	radius	left	m	foreshank	saw	1	1	0	1	
GSB	EQ653	F	9	F2	cow	rib		p	loin	chop/broken	1	1	0	1	
GSB	EQ653	F	10	F2	cow	metatarsus	left	p-m	hindshank	chop/broken	1	1	0	1	
GSB	EQ653	F	11	F2	cow	astragalus		cmpl	hindshank		1	1	0	0	
GSB	EQ653	F	12	F2	cow	calcaneus	left	p-m	foreshank	cut/broken	1	1	0	0	
GSB	EQ653	F	13	F2	cow	phalanx			hind/foreshank	cut	5	5	0	0	
GSB	EQ653	F	14	F2	cow	pelvis			acetabulum	broken	1	1	0	0	
GSB	EQ653	F	15	F2	cow	femur	right		foreshank	chop/cut/broken	1	1	0	0	
GSB	EQ653	F	16	F2	cow	carpal/tarsal			hind/foreshank	chop/broken	1	1	0	0	
GSB	EQ653		17	F2	cow	unid				chop/broken	1	1	0	0	
GSB	EQ653		18	F2	cow	pelvis	left	p-m	foreshank	chop/broken	1	1	0	0	
GSB	EQ654	F	19	F3	sheep	metatarsus		p-m	hindshank	cut/broken	1	1	1	1	
GSB	EQ654	F	20	F3	cow	scapula	right		rump	chop/cut/broken	1	1	1	1	
SCIRT11136	SCIRT55	F	21	F1	sheep	radius	left/right	cmpl	foreshank	small cuts	2	2	1	1	Distal epiphysis 3 years old
SCIRT11136	SCIRT55	F	22	F1	sheep	tibia	right	p-m-d	hindshank	chopped	2	2	0	1	One of the tibias was burned.
SCIRT11136	SCIRT55	F	23	F1	sheep	femur	left	m (head and condyles not present)	hindshank	broken	2	1	0	1	Burned
SCIRT11136	SCIRT55	F	24	F1	sheep	metacarpal	left	almost cmpl except condyles	foreshank	broken	1	1	0	0	
SCIRT11136	SCIRT55	F	25	F1	cow	metatarsus	right	almost cmpl except condyles	hindshank	broken, worn	1	1	0	0	
SCIRT11136	SCIRT55	F	26	F1	cow	femur		head, condyles	hindshank	sawn	3	1	0	0	

Glass³

Bag	Prov	Colour	Portion	Class	Common name	Details	NISP	MNE	MNV	Type	Marks	Embossing	Date	Notes	Reference
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³ The following columns have been removed from this table: Site, code, EQ box # (all are stored in EQ653), photo ID.

1	F1	og-d	bd-bs	alcohol	case gin	bd-td/heel-ro/bs-dcc	1	1	1	dm		cross pattern		diam 65mm	http://www.sha.org/bottle/liquor.htm#CaseGin bottles
2	F1	aqb	n-sh-bd-bs	alcohol	spirit/beer bottle	n-cv/sh-ro/bd-st/heel-ab/bs-dcc	1	1	1	3 pc dm	air bubbles			diam 70mm	
3	F1	og-d	bs	alcohol	spirit/beer bottle	heel-ro/kpa	1	1	1	dm	hh/vh, air bubbles			diam 89mm	
4	F1	og-d	bd-bs	alcohol	squat bottle	bd-st/heel-ro/kcn/bi pontil	1	1	1	dm				diam 90mm	
5	F1	og-d	d-bs	alcohol	small black beer	bd-st/heel-ro/kcn/sand pontil	1	1	1	dm					
6	F1	og-d	bd-bs	alcohol	black beer	bd-st/heel-ab/kdo	1	1	1	dm				diam 76mm	
7	F1	ag-l	bd-bs	non_alcoholic	torpedo		1	1	1	2pc		...E SUPER[IOR]...			http://www.sha.org/bottle/glossary.htm
8	F1	fg	bd-bs	alcohol	small ring seal beer/wine (champagne)	bd-st/heel-ro/kcm	2	1	1	tm	turn-b/vb			diam 60mm	
9	F1	ag-l	cmpl	food	catsup	ap ft/v/skirt//n-st//sh-hz//blake varient 2//bs-dft	1	1	1	2pc w cb	wrench-n				
10	F2	og-d	bd-bs	alcohol	large squat black beer	bd-st/heel-ro/kdo	1	1	1	dm	air bubbles, pimple, lettering	C W & C ^o	1848-1861	Firm G.W. Weston & Co. Not a glass manufacturer. Diam 83mm	Lockhart, Lindsey, Serr, Shulz and Schriever 2013.
11	F2	fg	bd-bs	unid	ro c/s bottle	bd-st/heel-ro/bs-dcc/	1	1	1	tm	air bubbles, pimple			prob mineral water or beer. Diam 79mm	
12	F2	ag-l	bd-bs	unid	ro c/s bottle	bd-st/heel-ro/bs-dcc/	1	1	1	dm	air bubbles, pimple			diam 67mm	
13	F2	aqb	bd-bs	unid	unid bottle	bd-cv/bs-fl	1	1	1	tm	air bubbles				
14	F2	ag-l					1	1	1					DISCARDED. window glass	
15	F3	og-d	bd-bs	alcohol	black beer	bd-st/heel-ro/krc	1	1	1	dm	hh/vh			diam 76mm	
16	F3	og-d	n-sh	alcohol	large squat bottle	n-cv/sh-ro	1	0	0	2pc	wrench-n, air bubbles			join with bottle 653-20. Diam 82 mm	
17	F3	ag-l	bd-bs	non_alcoholic	bevelled pharmaceutical	french square/heel-ab/bs-dcc	1	0	0	2pc w cb				flooded corners. Join with 24	

18	F3	aqb	f-n-sh	pharmaceutical	oval pharmaceutical	ap bead/v/ft//n-st/sh-ro	1	1	1	3pc dm	wrench-n, vsh				
19	F3	og-d	bd-bs	alcohol	small black beer	bd-st/krc	1	1	1	dm				uneven. Diam 74mm	
20	F3	og-d	sh-bd-bs	alcohol	large squat bottle	bd-st/heel-ro/kdo	1	1	1	3pc dm	hb/vb, air bubbles			Diam 82mm	
21	F3	og-d	bd-bs	alcohol	black beer	bd-st/heel-ro/krc	1	1	1	dm	hb/vb, hh			diam 75mm	
22	F3	og-d	bd-bs	alcohol	black beer	bd-st/heel-ro/kdo	1	1	1	dm	hb/vb, vh, pimple			diam 75mm	
23	F3	og-d	bs	alcohol	large squat bottle	heel-ro/kdo	1	1	1	tm				diam 90mm	
24	F3	ag-l	bd-bs	non_alcoholic	bevelled pharmaceutical	bd-st/heel-ab/bs-ft-dcc/kdo	1	1	1	2pc w cb	air bubbles				
25	F3	og-d	n-sh-bs-bs	alcohol	small squat bottle	n-cv/sh-ro/bd-st/krc	1	1	1	tm	turn-m			diam 72mm	
26	F1	green	bd-bs	unid	ro c/s bottle	ab heel, kdo bs?	1	1	1	2 pc m w c b	patina, air bubbles				
27	F1	og-d	sh-bd-bs	alcohol	black beer (small squat)	ro sh, st bd, ro heel, krc bs	1	1	1	3 pc dm	air bubbles			67 mm diameter bs. 94 mm length	

Metal

Site	Code	Box	Bag	Prov	Material	Class	Form	Details	Portion	Measurements	NISP	MNI	Date	Notes	References
GSB	EQ653	M	1	F1	ferrous	unid	unid	curved rod, slightly flattened oval c/s, tapering upwards with ball on thin end		19cm long/1cm thick	1	1			
GSB	EQ654	M	2	F2	ferrous	tool	file	half round file/chisel	blade-tang	37cm blade/8cm tang	1	1			Ross and Light 2000
GSB	EQ654	M	3	F2	ferrous	fastener	bolt			38cm/1cm	1	1			
GSB	EQ654	M	4	F3	ferrous	strip	strip	rectangular section		29cm long/3,3cm/0,5cm	1	1			
GSB	EQ654	M	5	F3	ferrous	fastener	chain	8 links identified		5cm/3,1cm/1cm	1	1			
GSB	EQ654	M	6	F3	ferrous	fastener	roofing nail	square section		10cm/0,7cm (head 2cm long, 3cm wide)	1	1			
GSB	EQ654	M	7	F3	ferrous	fastener	bolt	round section		22,8cm/1,5cm (head 3cm wide)	1	1			

Miscellaneous⁴

Bag ID					General Description					Quantity			Details	
Site	Code	Box	Bag	Prov	Material	Class	Artefact	Portion	Description	Measurements	NISP	MNI	Date	Notes
GSB	EQ653	O	1	F2	leather	clothing	belt		incomplete belt with 7 holes and marks of the ----	54cm long/4cm wide/0,2cm thick	4	1		
GSB	EQ654	O	2	F3	concrete		unid: structural element?				1	1		

Shoes⁵

Bag	Pro	Mat	Class	Port	Size	Type	NISP	MN	Toe shape	Heel type	Lifts	Closure	Decoration	Heel	Sole/i nsole	Upper	Reinforcing	Date	Notes	Measurements
1	F2	leather	foot wear	cmpl	adult	boot	4	1	rounded square	square	6	lace (8 eyelets)	stitched band on toe	i/n	can	machine stitched	hobnails on sole			heel:6cm/2cm; curve part:5cm wide; front part:9cm wide)
2	F1	leather	foot wear	heel	n/a	n/a	1	1	n/a	ro	at least 2	n/a	n/a	hand pegging (pegs remain)	n/a	n/a	pegs, nails	n/a	cuts on the inside part	53 mm wide
3	F1	leather	foot wear	heel	n/a	n/a	2	1	n/a	ro	at least 2	n/a	n/a	hand pegging (pegs remain)	n/a	n/a	pegs, nails	n/a	cuts on the inside part. It looked like the pair of the previous shoe (S-2).	broken
4	F1	leather	foot wear	lifts	children's mall	n/a	2	1	n/a	ro	at least 2	n/a	n/a	hand pegging	n/a	n/a	n/a	n/a	Shape looks like a horseshoe form.	40 mm wide.

⁴ The following columns have been removed from this table: Site, code, UO box# (all are stored in UO124), photo ID.

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