

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.

Armagh Street bridge – heritage diary

Story: Heritage Bridges

Theme: Construction

A document which details Downer's approach to heritage management when repairing the Armagh 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.

For more information about this document, visit www.scirtlearninglegacy.org.nz



This work is licensed under a [Creative Commons Attribution 3.0 New Zealand License](#).

The authors, and Stronger Christchurch Infrastructure Rebuild Team (SCIRT) have taken all reasonable care to ensure the accuracy of the information supplied in this legacy document. However, neither the authors nor SCIRT, warrant that the information contained in this legacy document will be complete or free of errors or inaccuracies. By using this legacy document you accept all liability arising from your use of it. Neither the authors nor SCIRT, will be liable for any loss or damage suffered by any person arising from the use of this legacy document, however caused.

Armagh Street Bridge Heritage Diary

18 th Feb 2014	Tom, Jenny, Maria	<p>Amendments made to TPP to incorporate additional balustrade works.</p> <p>Copy sent to Jenny and Maria.</p> <p>Comments received from Jenny 19th Feb</p> <p>Comments received from Maria 21st Feb</p>
20 th Feb 2014	Tom, Jenny, Maria	<p>Sent Pre Construction photographic record and plan to Maria and Jenny.</p> <p>Still to deliver high resolution photos on disk</p> <p>Maria responded that the report is good 21st Feb.</p>
21 st Feb 2014	Tom	<p>Planned start date 10th March 2014.</p> <p>Pre-starts completed with:</p> <ul style="list-style-type: none"> - Heritage - Arborist - CCC Parks & Reserves - Harbour Master consent - ECAN trout spawning - ECAN working in waterways (28th Feb) - Archaeologist to toolbox in first week on site
21 st Feb 2014	Tom	<p>First week of work to include:</p> <ul style="list-style-type: none"> - Establish site fencing/office etc - Installation of coffer dam approx.. halfway across river - Begin dewatering dam - Perhaps at end of first week or following week Goldfield stone to begin removing a trial section of bricks underneath for designers inspection.
28 th March 2014	Tom	<p>Now established to site.</p> <p>Dam in river and first 1m of brick removed. Internal rings of brick are still well intact so methodology has changed. Instead of removing 3 rings of brick we will now only remove the outer ring and crack inject from there. Then the outer ring of broken bricks will be replaced.</p> <p>CCC and Southern Cross Engineering were out on site this week to look at Balustrade and confirm methodology.</p> <p>SCE have proposed methodology and Jeff Belamore to forward to Heritage for review and approval.</p>

		<p>Will hopefully begin removing this within the next couple of weeks.</p> <p>Additional photos taken of balustrade damaged sections.</p> <p>Have found a few artefacts the last week. Archaeo's have been out a few times to map out old wooden bridge piles and also take samples of finds. Have found numerous horseshoes, pieces of metal, and old shoe sole and pieces of pottery.</p> <p>They will submit a report with their findings and return items found.</p> <p>This week no physical work has been done. We have some temporary works being fabricated to protect the workers under the bridge. It involves some timber plywood and props to prevent debris falling on the workers. This will hopefully be installed Monday/Tues next week.</p>
22 nd April 2014	Tom	<p>No work completed last week due to myself being on a course and Goldfield Stone workers being off sick.</p> <p>Back into removing bricks this week, should have main 14m crack and 2 lateral cracks removed and cleaned out mid next week.</p> <p>Later next week we will begin crack injection work of these 3 cracks.</p> <p>On the 11th April we removed 4 trial balustrade panels, all came off reasonably well. Panels have been transported to Hendriks and the posts and rails are still here on site.</p>
09 th May 2014	Tom	<p>Back into work this week. Goldfield have completed removing damaged bricks on western abutment.</p> <p>BBR Contech have prepped main crack ready for injection works to begin.</p> <p>Pre-EQ cracks in eastern wingwalls injected today.</p> <p>NZHPT advised of works on Armagh Bridge and replacement bricks etc. They are happy with how things are currently being run. I will provide them with photos and details of work at the end of project.</p> <p>Next week we should have western side crack injection completed and have Goldfield back onsite installing pins and stainless steel ties in preparation for installation of new bricks.</p>

27 th May 2014	Tom	<p>Concut on site this week coring the 10x holes into the concrete abutment.</p> <p>Southern Cross may also be prepping remaining balustrade panels for removal and transportation to Hendriks yard.</p> <p>Trial fixing post was also cored out and found to have around 700mm embedment below ground level.</p> <p>All 10 cores in abutment should be complete this week and steel placed to stitch the abutment crack.</p> <p>May have Goldfield back this week also to begin stitching works within brick and start replacing removed bricks.</p> <p>Cores taken through brick have been approved by designer as grout has penetrated well through crack.</p> <p>I need confirmation of proceeding with the concrete face repair to the abutment. I suggested the single piece of formwork with some timber imprints which will give a look similar to what's existing.</p> <p>I will be in touch this week to advise when the remaining balustrade panels will be removed.</p>
6 th June 2014	Tom	<p>Last week the cores into the abutment were completed and early this week we installed the steel bars.</p> <p>Southern Cross Engineering completed removing the balustrade today, all panels have been disassembled and are packed on pellets and boxes ready to be collected on Monday.</p> <p>Goldfield Stone also were back preparing to install new bricks and begin stitching. Installation will begin next week.</p> <p>Also hoping to complete the abutment touch ups next week, just awaiting final confirmation.</p>
24 th June 2014	Tom	<p>Bricks are steadily going back in now.</p> <p>Should finish the installation of new bricks this week and also the Helifix ties in the mortar joints.</p> <p>Southern Cross sorting repair comparisons and trials for review.</p> <p>Concut have cored 7 of 16 posts out of bridge, need to wait to do remaining cores until crack is repaired. Pic of removed posts below.</p>

		<p>Number of bricks installed so far:</p> <p>11/6 – 8</p> <p>12/6 – 10</p> <p>13/6 – 10</p> <p>16/6 – 16</p> <p>17/6 – 18</p> <p>18/6 – 24</p> <p>19/6 – 19</p> <p>20/6 – 6</p> <p>23/6 – 20</p> <p>Pic below of progress</p>
--	--	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------



10 th July 2014	Tom	<p>Replacement bricks have finished being installed.</p> <p>In total 160 bricks were replaced.</p> <p>We are now finishing installing the Helifix ties (which slot into the mortar joints) and are about halfway through coring the holes for the new stitching bars (these go up through the brick layers on a 45° angle and cross the crack).</p> <p>Once these are completed that will be the western abutment finished.</p> <p>Next week, once the stitching is done, I will have Concut back to finish coring out the remaining handrail posts and we will also starting excavating the bridge surface down to the top of the bricks.</p> <p>We have done 2 potholes to confirm the location of the 66kV cables that cross the bridge and we found a layer of leather over the bricks.</p> <p>There's soles of shoes etc which I believe were for shock absorption and water proofing.</p> <p>Malcolm has arranged a site visit to Hendriks on Tuesday to view balustrade panels, I will be attending this and I believe Jenny is also.</p>
8 th August 2014	Tom	<p>Dam has been shifted to opposite abutment.</p> <p>Goldfield Stone have removed damaged bricks on crack.</p> <p>Grout injected crack today.</p> <p>Cracks on surface of bridge have been injected.</p> <p>No concerns or incidents to report. A few pics below showing progress.</p>



22 nd August 2014	Tom	Goldfield Stone completed their works yesterday. Western abutment crack has been grout injected, bricks replaced, cross pinned and stitched.
---------------------------------	-----	----------------------------------------------------------------------------------------------------------------------------------------------

		<p>Re mortaring also completed. We mixed up some red mortar to also touch up some other areas.</p> <p>A total of 34 bricks were replaced on this side.</p> <p>Concut are now on site coring the abutment for cross pinning. This should be completed by Wednesday.</p> <p>The carriageway has also been backfilled and prepped ready for sealing. Damaged footpaths have also been stripped and prepped. Areas along the stonework were protected and completed by hand to ensure no damage was done to the stone.</p> <p>The final thing to complete under the bridge is the concrete patch which has eroded away. I have not received confirmation on whether to proceed yet. Jeff and Jenny are both currently away.</p>
--	--	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------