

PLAQUING NOMINATION REPORT

*MITCHELL'S PASS*  
*AND*  
*LENNOX'S HORSESHOE*  
*BRIDGE, LAPSTONE*

AS A JOINT

**HISTORIC ENGINEERING MARKER**



The 1833 Lennox's Horseshoe Bridge over Lapstone Creek,  
is the oldest surviving bridge on the Australian mainland.

Don Fraser  
Sydney Engineering Heritage Committee  
Institution of Engineers, Australia  
August 2002

## Nomination Form

Administrator  
Engineering Heritage Australia  
The Institution of Engineers, Australia  
Engineering House  
11 National Circuit  
BARTON ACT 2600

### THE AUSTRALIAN HISTORIC ENGINEERING PLAQUING PROGRAM

**Nominating Body:** Engineering Heritage Committee, Sydney Division, I E Aust

The following work is nominated for a:

National Engineering Landmark

Historic Engineering Markers

**Name of work:** Mitchell's Pass and Lennox's Horseshoe Bridge

**Location, including address and map reference if possible:**

Lower Blue Mountains at Mitchell's Pass, Lapstone, NSW

**Owner:** Blue Mountains City Council

**Operator:** Blue Mountains City Council

The owner has been advised of this nomination, and a letter of agreement is attached.

**Access to site:** By road via Layton Avenue, Blaxland

..... Glenn Rigden.....

Chair of Nominating Committee

Date: .....6 November 2002.....

## **STATEMENT OF SIGNIFICANCE**

### **Mitchell's Pass and Lennox's Horseshoe Bridge**

This 1833 combination of road and bridge is one of the most significant engineering works of the early colonial period of New South Wales.

The works are associated with two historically important men, Surveyor-General Major Thomas Mitchell and bridge builder David Lennox.

Mitchell's Pass was the new road in 1833 which provided an easy ascent to the Blue Mountains plateau on the eastern side.

Mitchell's Pass significantly improved communication with western NSW which greatly assisted its future development and benefit to New South Wales.

The Lennox's Horseshoe Bridge is the oldest surviving bridge, 169 years, on the Australian mainland.

Both works carried the Great Western Highway for 93 years. They are still in service carrying light traffic.

Final words, October 2002



The  
Institution of Engineers,  
Australia

## **HISTORIC ENGINEERING MARKER**

**Mitchell's Pass and Lennox's  
Horseshoe Bridge, Lapstone**

This road and bridge, allowing easy ascent of the Blue Mountains, formed the route of the Great Western Highway for 93 years from 1833, and opened up western NSW. Surveyor-General Major Thomas Mitchell discovered the Pass and aligned the road; David Lennox supervised building the bridge. The bridge over Lapstone Creek is the oldest surviving stone arch bridge on the Australian mainland. It was strengthened and repaired in 1982 with an internal concrete structure.

The Institution of Engineers, Australia  
Blue Mountains City Council  
2002



10<sup>th</sup> May, 2002.

*22/2015*  
Mr. Bruce Howard,  
President,  
The Institution of Engineers, Australia,  
P.O. Box 138,  
MILSONS POINT. N.S.W. 1565.

Dear Bruce,

Thank you for your letter dated 6<sup>th</sup> May concerning your proposal to plaque Mitchell's Pass and Horseshoe Bridge at Lapstone.

As I indicated to you on the day of your plaque unveiling at Mt. Victoria, I would be most pleased to assist in your project at Lapstone.

Would you kindly liaise with my Secretary, Ms. Karen Ives on telephone 47 80 5520 to discuss arrangements in relation to this forthcoming event.

Yours faithfully,



JIM ANGEL,  
Mayor.

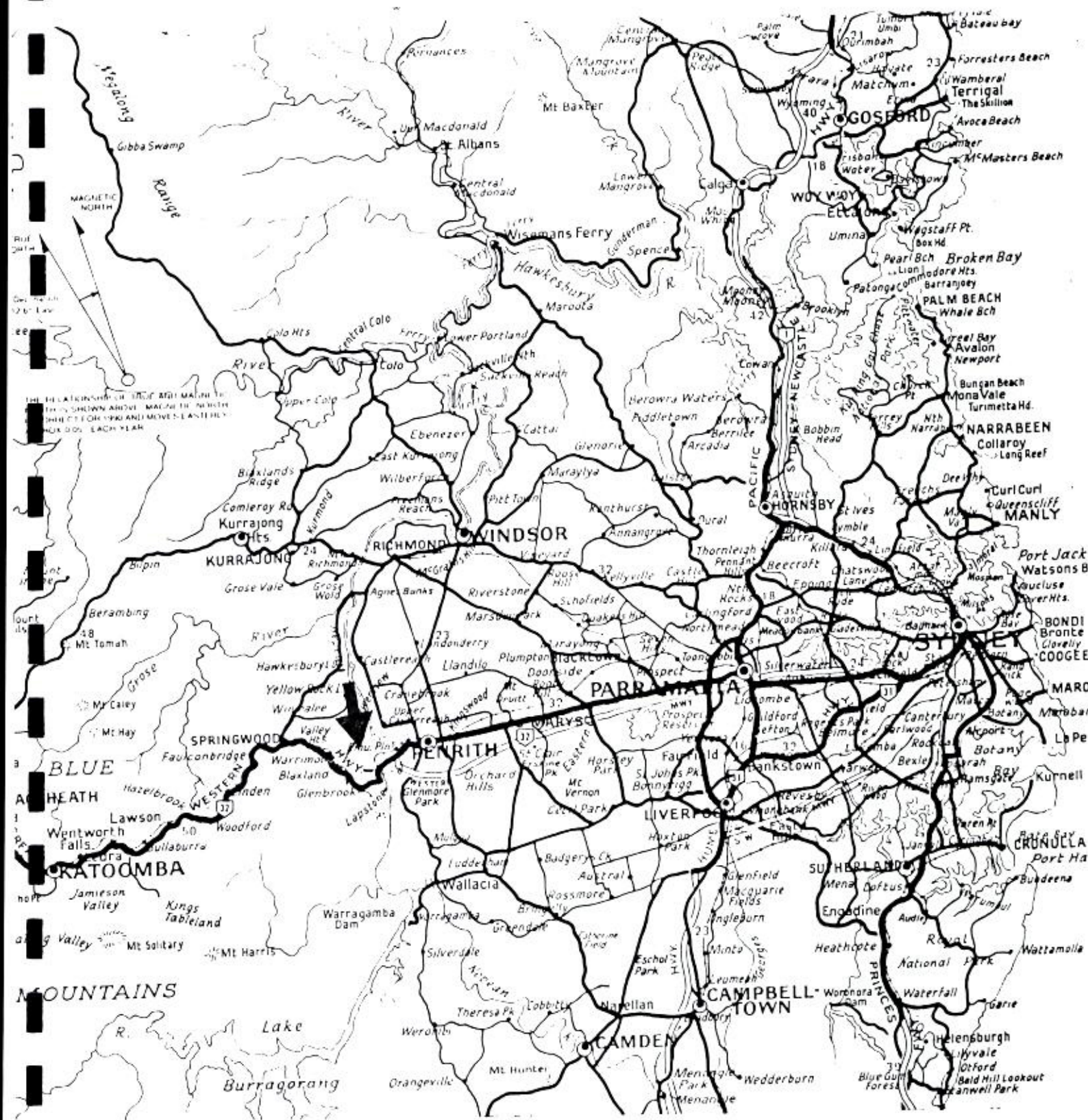


Figure 1 Locality plan



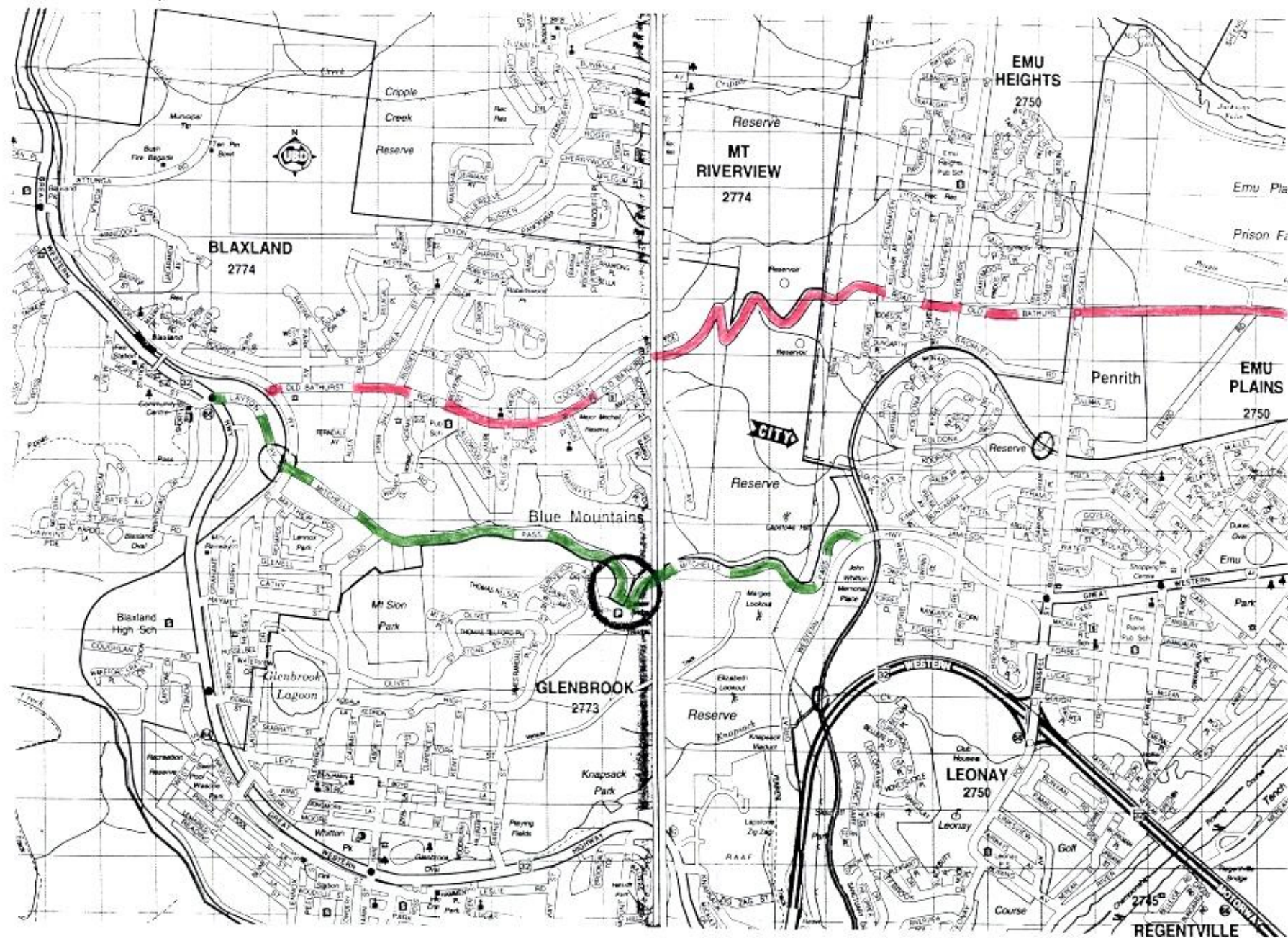


Figure 2 Site plan



## **HISTORICAL REVIEW**

### **Introduction**

Following the crossing of the Blue Mountains in 1813 by Blaxland, Wentworth and Lawson, a road of sorts was constructed, starting near Emu Plains across the Nepean River from Penrith on 18 July 1814. A party of thirty convicts under the supervision of William Cox built the road in six months and it was used by Governor Macquarie in early 1815 to visit the area now occupied by the town of Bathurst.

The abrupt nature of the rise of the Blue Mountains above the low country east and west led to the two most difficult features of the road, the eastern ascent of Lapstone Hill near Emu Plains and the western descent at Mt York. The latter was displaced in 1832 by Victoria Pass which was declared a National Engineering Landmark in April 2002.

This nomination deals with the eastern ascent which became Mitchell's Pass and includes the Lennox's Horseshoe Bridge.

### **The Ascent at Lapstone Hill**

The location of the area of interest relative to Sydney is shown in figure 1 and a detailed map is shown in figure 2.

Cox's 1814 road began near the present site of Emu Plains railway station and headed south-west parallel to the Nepean River, crossing Knapsack Creek at Nepean Street then swinging west to climb the steep escarpment via Glenbrook to present-day Blaxland near the conjunction of the Old Bathurst Road and Mitchell's Pass, figure 2. Cox's road was in use for seventeen years but was very steep and was frequently flooded by Knapsack Creek. By 1830 a more direct route from Emu Plains to Blaxland had been constructed which climbed the southern edge of Mt Riverview by zigzagging through the steepest parts. Known as the "zig-zag road" it became the Old Bathurst Road, red on figure 2.

Concurrent with his work with Victoria Pass on the western descent, Major Thomas Livingstone Mitchell (later Sir Thomas and Surveyor-General of New South Wales) had traversed the area adjacent the "zig-zag road" and discovered a gully that was almost a straight line between Emu Plains and Blaxland through which a road could be built at a much lesser grade than the "zig-zag road". However, a tributary called Lapstone Creek crossed the line of road which required a bridge. This was subsequently built under the supervision of David Lennox. The combination was to become Mitchell's Pass and Lennox's Horseshoe Bridge, green on figure 2.





Figure 3 Mitchell's Pass looking towards Emu Plains (RTA Archives).

Construction of the new road seems to have been reasonably straightforward although sections were described as being "absolutely carved out of living rock – huge slices of the hillside have been blown off by blasting" with much of the rock broken down for forming a macadamised surface, figure 3.

The bridge was built from stone quarried nearby, hence the local street named "Bridge Quarry Place". The arch of dressed stone has a single clear span of 6.2 m (20 feet) carrying a roadway 9.1 m (30 feet) wide. The clear height of the arch soffit above the bed of the stream is also 9.1 m, figure 4. The bridge was completed in July 1833 prior to which Governor Bourke had named the road Mitchell's Pass and authorised one keystone be inscribed "DAVID LENNOX" and the other with "A D 1833". With its rough stone wing walls, the northern one curved to suit traffic flow, the structure is 14.3 m (43 feet) long.

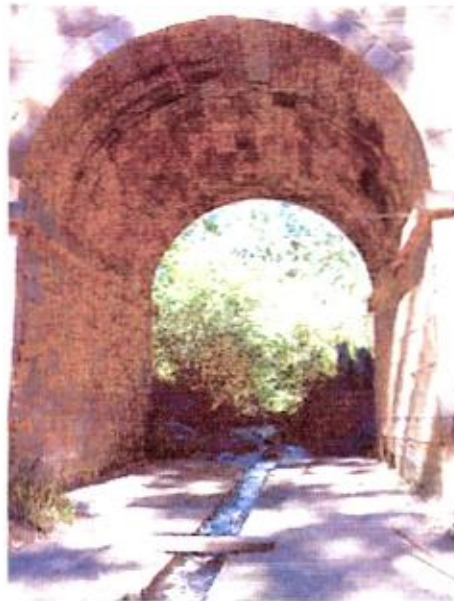


Figure 4 The arch of Lennox's Horseshoe Bridge (Colin O'Connor).

The combined work carried all traffic of the Great Western Highway until 1926 when the abandoned railway formation and its viaduct over Knapsack Gully were converted to road use. Since then Mitchell's Pass has served only lightweight traffic, mostly local and tourists.

In the year of this nomination, the combined work is 169 years old, one of the most durable and significant engineering works of the early colonial period.

## Biographies



Figure 5 Major Mitchell (RTA Archives)



David Lennox (RTA Archives)

Thomas Mitchell (1792-1855) was born in Scotland and had served in the Peninsular (Spain and Portugal) War, against Napoleon's army, where he excelled in surveying and topographical work. In 1827 he arrived in Sydney to take up his appointment as Assistant Surveyor-General and became responsible for land surveys and for planning many towns, roads and bridges in the Colony. During 1831 and 1846 he made important exploratory journeys to inland New South Wales and the Western District of the future colony of Victoria. During this same period he was appointed Surveyor-General and was knighted in 1839.

David Lennox (1788-1873) was also born in Scotland and in the early 1800s gained valuable experience in building stone arch bridges with the famous Thomas Telford. Shortly after arriving in Sydney in 1832 he was "discovered" by Major Mitchell doing quality stone work in Macquarie Street and was immediately hired to "plan the stone bridges we require". On June 26, 1833 he was formally appointed Superintendent of Bridges thus becoming responsible for planning, design and supervision of construction of bridges including training many convicts in the skills of stonework. Typical of the quality and durability of his bridges are the surviving, 1833 at Lapstone Creek, 1836



Prospect Creek at Lansdowne and the 1839 Church Street bridge over the Parramatta River at Parramatta. In 1844 Governor Gipps directed Lennox to work in the Port Phillip district (Melbourne) and before returning to Parramatta in 1855 he had built the first Princes Bridge (1850) over the Yarra River, about fifty other bridges, plus roads, wharves and jetties.

## RESTORATION



Figure 6 Restoration acknowledgements and typical damage to stonework of Lennox's Horseshoe Bridge (Henry Kullas and DPW&S).

Despite its "retirement" to light traffic in 1926, the earlier heavy traffic had taken its toll and by the 1950s the bridge was exhibiting signs of severe structural distress, figure 6.

In the early 1960s the bridge was closed. In the mid-1970s the Blue Mountains City Council undertook the stabilization of the bridge with the Department of Public Works providing engineering design and supervision, and the Government Architect's Branch recording the condition of the stonework, figure 6, and preparing a conservation document.

Investigations revealed that the primary cause of structural and stonework damage was due to the ingress of water to the fill between the arch and the abutments. Radical remedial measures were required if the bridge was to regain its function rather than be relegated to an historical curiosity.

The solution was to clean out the old fill inside the structure, replace selected stones that were critical to stability (Government Architect's drawings L.B.2 and L.B.3), build a bridge structure to relieve the original stone arch of load then backfill with compacted clean sand and improving the drainage paths (Department of Public Works drawing 792342 - 3).



Figure 7 Temporary support of stonework.  
(DPW&S)



Figure 8 The arch exposed and old fill removed.  
(DPW&S)

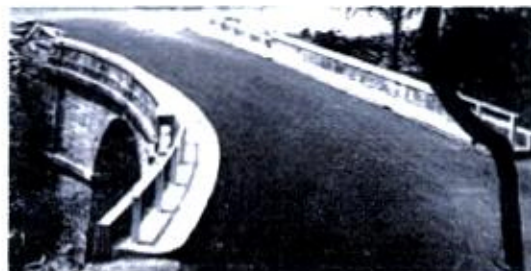
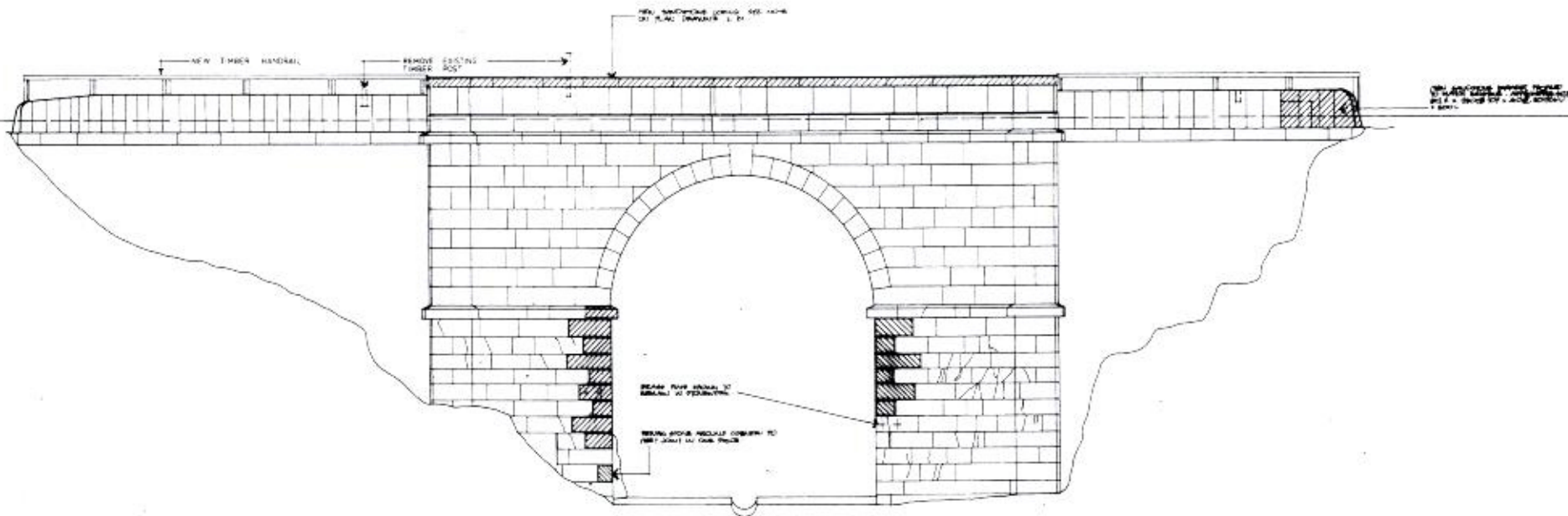


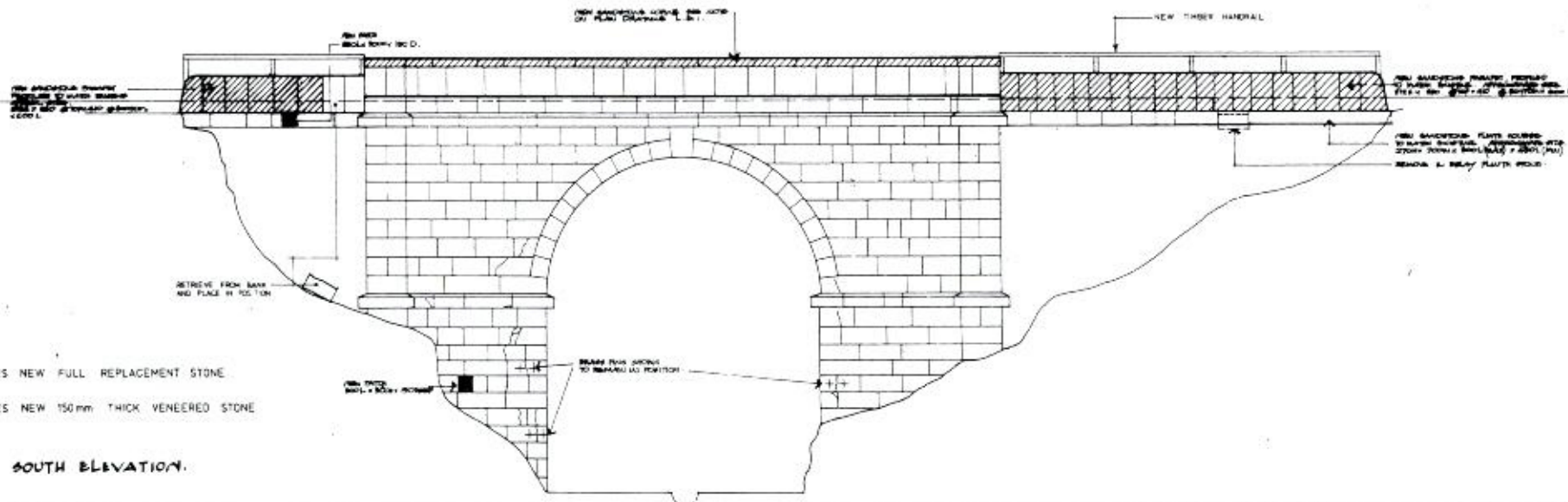
Figure 9 (left) The concrete road slab covering the stone arch (Henry Kullas) and (right) The restored bridge. It looks, to all intents and purposes, to be the original structure (DPW&S). However, the stonework is a façade with a load-bearing bridge inside.

The restored bridge was reopened to traffic on 14 December 1982 by Mayor Peter Quirk and rededicated on its sesquicentenary in 1983 by the Premier of New South Wales.





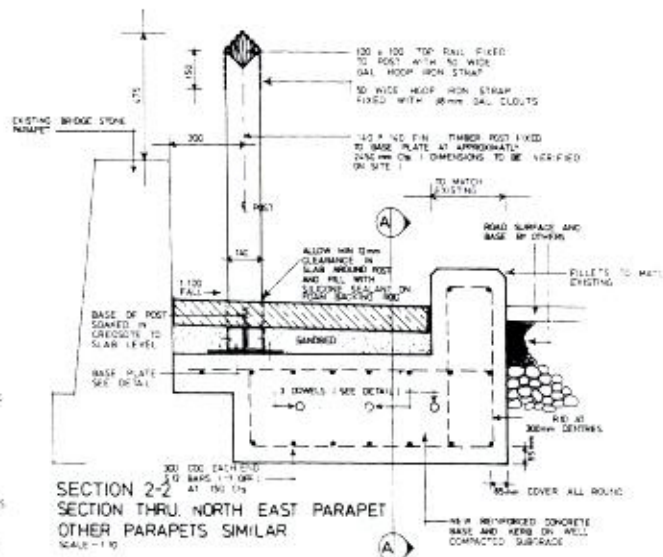
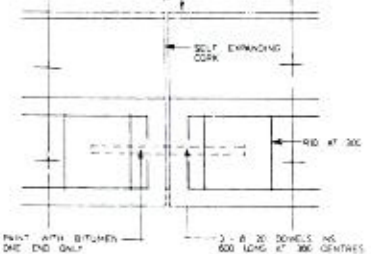
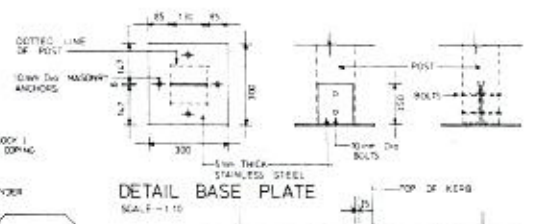
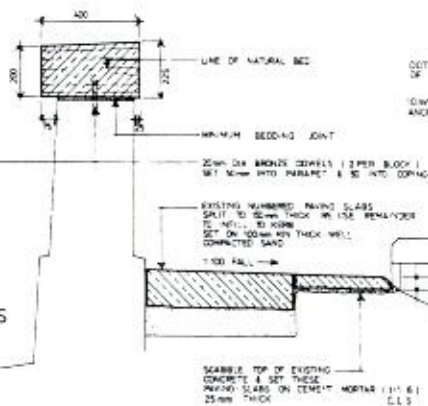
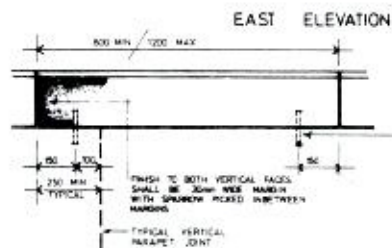
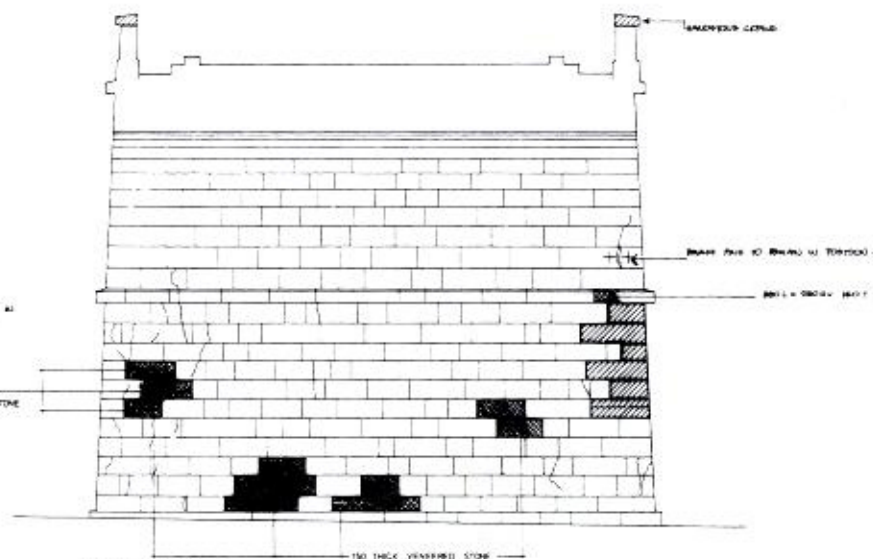
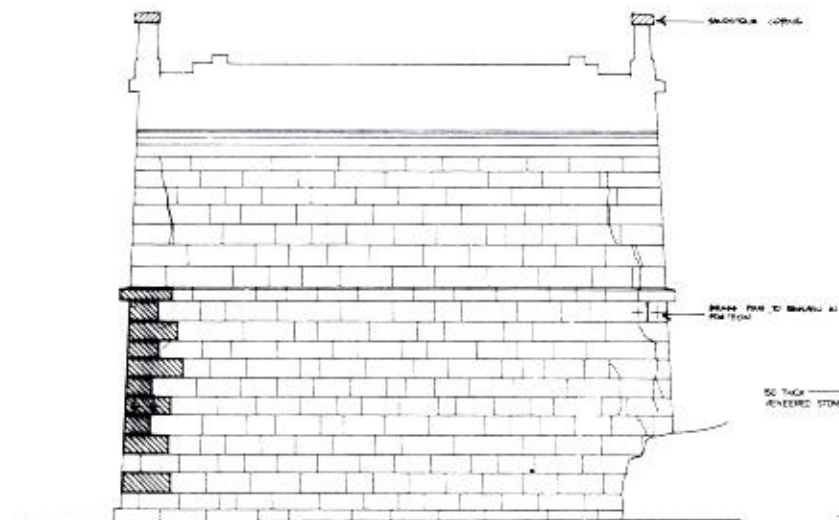
NORTH ELEVATION.



SOUTH ELEVATION.

LEGEND

-  INDICATES NEW FULL REPLACEMENT STONE
-  INDICATES NEW 150mm THICK VENEERED STONE



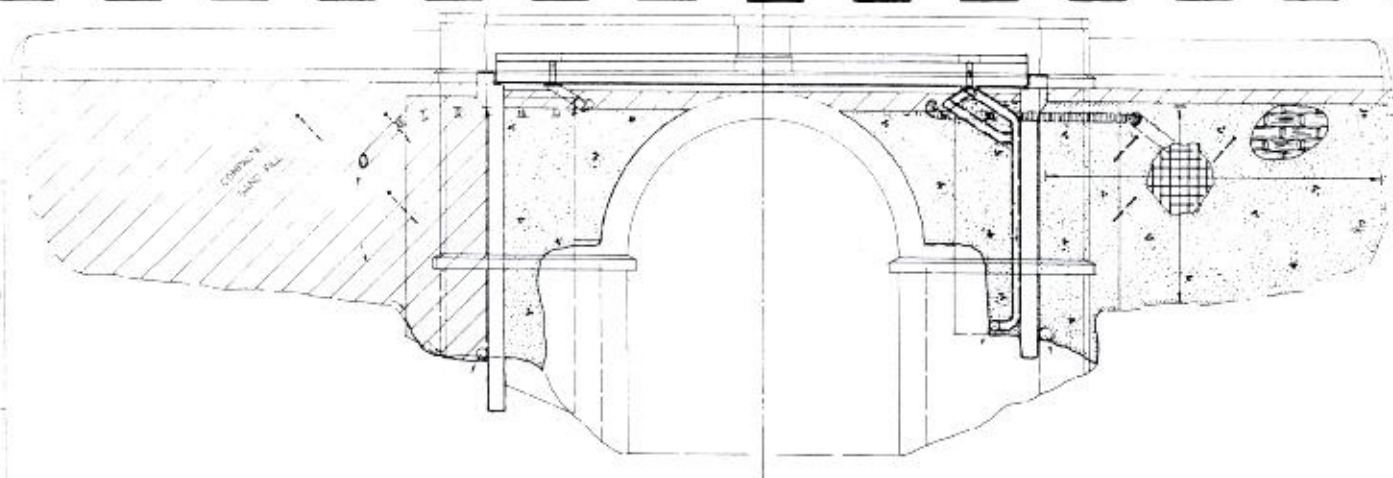
**DETAIL ELEVATION OF COPING STONES**

**LEGEND**

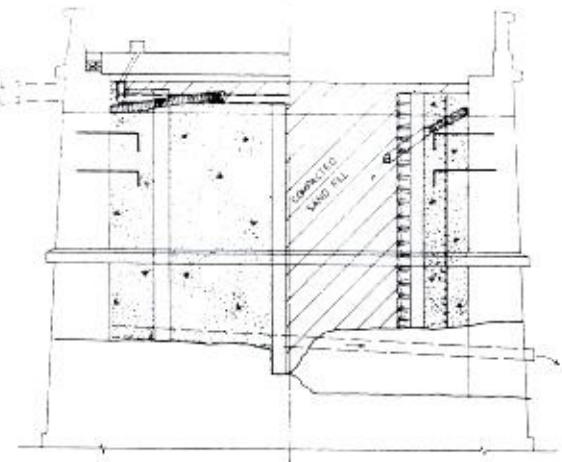
- INDICATES NEW FULL REPLACEMENT STONE
- INDICATES NEW 150mm THICK VENEERED STONE

**SECTION 1-1**  
SECTION THRU BRIDGE PARAPET (NORTH SIDE)  
SOUTH SIDE SIMILAR

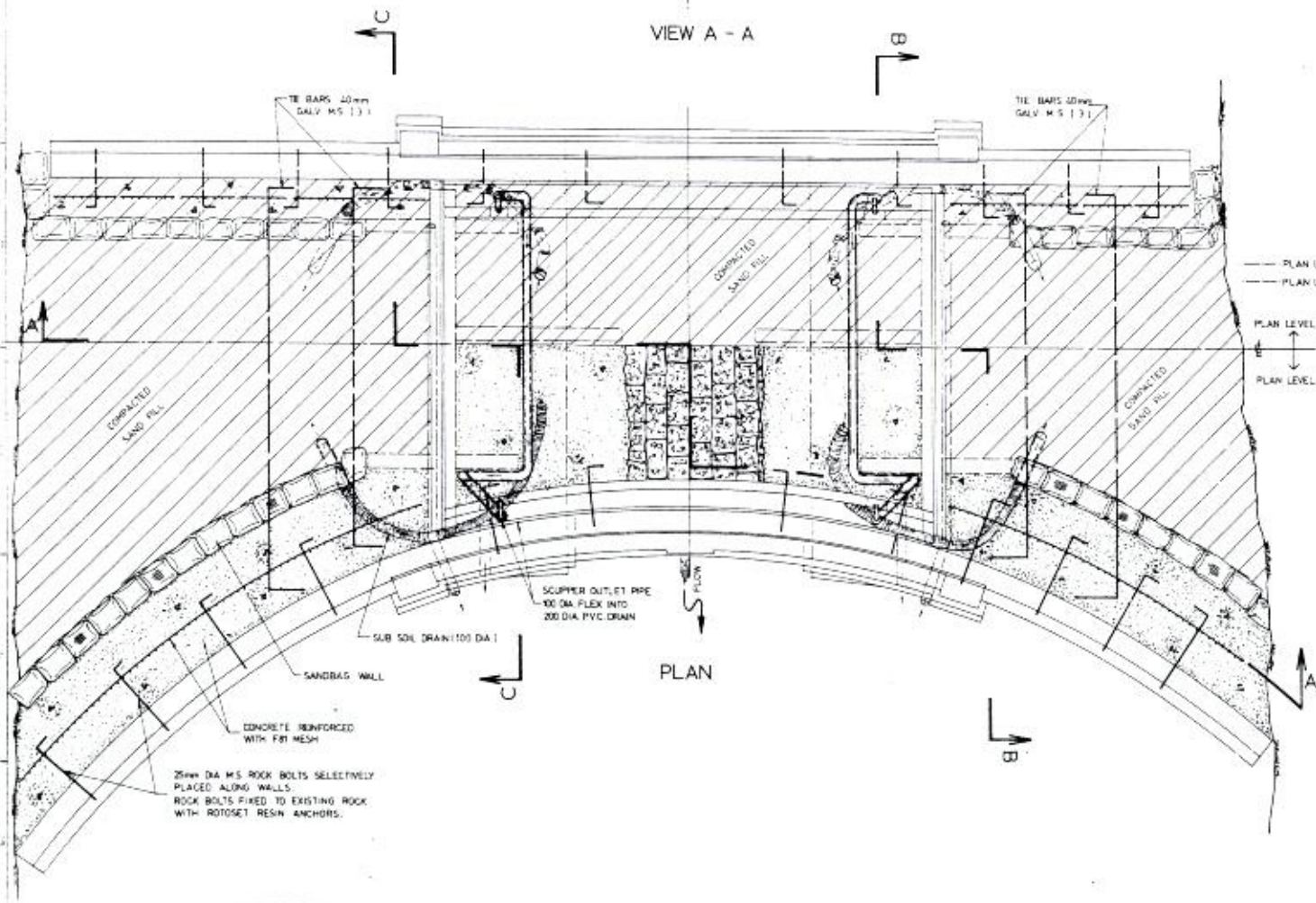




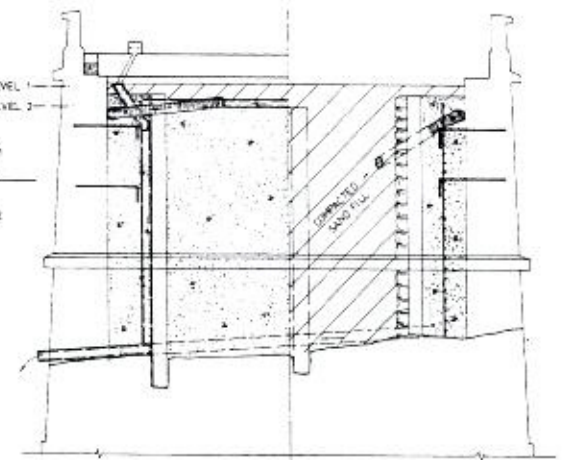
VIEW A - A



VIEW B - B



PLAN



VIEW C - C

25mm DIA M.S. ROCK BOLTS SELECTIVELY PLACED ALONG WALLS. ROCK BOLTS FIXED TO EXISTING ROCK WITH ROTASET RESIN ANCHORS.

CONCRETE REINFORCED WITH FB MESH

SANDBAG WALL

SUB SOIL DRAIN (100 DIA)

SCUPPER OUTLET PIPE  
100 DIA FLEX INTO  
200 DIA PVC DRAIN

FLOW

↑

TIE BARS 20mm GALV. M.S. (3)

TIE BARS 20mm GALV. M.S. (3)

COMPACTED SAND FILL

COMPACTED SAND FILL

COMPACTED SAND FILL

NO.	DETAILS OF AMENDMENTS	APPROVED	DATE
DEPARTMENT OF PUBLIC WORKS N.S.W.			
M. S. HILL, DIRECTOR OF PUBLIC WORKS			
W. J. WILTON, CHIEF ENGINEER			
BLUE MOUNTAINS CITY COUNCIL			
LENNOX BRIDGE			
RECONSTRUCTION			
DETAILS OF ASSOCIATED WORKS			
AS EXECUTED			
APPROVED	DRAWING		792342-3
DISTRICT ENGINEER		METROPOLITAN DISTRICT	FILE

ALL LEVELS ARE IN METRES.  
ALL OTHER DIMENSIONS  
ARE IN MILLIMETRES,  
UNLESS STATED OTHERWISE



Engineering Heritage Australia  
Plaquing Nomination Assessment Form

Item Name	<b>Mitchell's Pass &amp; Lennox's Horseshoe Bridge, Lapstone</b>
Location	<b>Lower Blue Mountains</b>
Suburb/Nearest Town	<b>Lapstone</b>
State	<b>New South Wales</b>
Other/Former Names	<b>Lennox Bridge also called the Horseshoe Bridge</b>
Local Govt. Area	<b>Blue Mountains City Council</b>
Owner	<b>Blue Mountains City Council</b>
Current Use	<b>Road and road bridge</b>
Former Use	<b>As above</b>
Assessed Significance	<b>State</b>
Statement of Significance	<p>This 1833 combination of road and bridge is one of the most significant engineering works of the early colonial period of New South Wales.</p> <p>The works are associated with two historically important men, Surveyor-General Major Thomas Mitchell and bridge builder David Lennox.</p> <p>Mitchell's Pass was the new road in 1833 which provided an easy ascent to the Blue Mountains plateau on the eastern side.</p> <p>Mitchell's Pass significantly improved communication with western NSW which greatly assisted its future development and benefit to New South Wales.</p> <p>Lennox's Horseshoe Bridge is the oldest surviving bridge, 169 years, on the Australian mainland.</p> <p>Both works carried the Great Western Highway for 93 years. They are still in service carrying light traffic.</p>



## ENGINEERING HERITAGE AUSTRALIA

<b>Historical Notes:</b>	<p>Following the crossing of the Blue Mountains in 1813, convicts under William Cox built a road of sorts in 1814 from Emu Plains to Bathurst over the Blue Mountains plateau.</p> <p>The two most difficult sections were the eastern ascent at Lapstone and the western descent at Mt York.</p> <p>Major Thomas Mitchell improved both by discovering easier routes, Mitchell's Pass in the east, 1833 and Victoria Pass in the west, 1832.</p>		
<b>Designer:</b>	Major Thomas Mitchell planned the new route which became Mitchell's Pass.		
<b>Maker/Builder:</b>	<p>Major Mitchell laid out the road.</p> <p>David Lennox supervised construction of the bridge over Lapstone Creek.</p>		
<b>Year Started</b>	1832	<b>Year Completed: 1833</b>	<b>Circa:</b>
<b>Physical Description:</b>	A semi circular arch of dressed stone 6.2 m clear span with rough stone wing walls. The bridge carries a roadway 9.1 m wide and has a vertical clearance of 9.1 m above the creek bed to the soffit of the arch.		
<b>Physical Condition</b>	In 1980 the bridge was in poor condition. However, a joint rehabilitation project was undertaken by the Blue Mountains City Council and the Department of Public Works in 1982, which saw a concrete bridge built inside to carry the traffic and the deteriorated sections of stonework replaced.		
<b>Modification Dates:</b>	1982, a concrete bridge was built, inside the stone façade of the original bridge, to carry the traffic.		

## ENGINEERING HERITAGE AUSTRALIA

<p><b>SIGNIFICANCE</b> <b>Historical Phase</b></p>	<p>This 1833 road and bridge are among the most historically significant engineering works of the early colonial period.</p> <p>They displaced the earlier two roads over the Lapstone Hill with a more direct route on a much easier grade which greatly improved access up to the Blue Mountains plateau.</p> <p>They continued in service for the Great Western Highway for 93 years until bypassed in 1926. However, both survive.</p>
<p><b>Historical Association:</b></p>	<p>Major Thomas Mitchell, explorer and Surveyor-General, later Sir Thomas, discovered the easier route in 1830.</p> <p>David Lennox, the first builder of durable stone arch bridges, supervised the construction of the bridge over Lapstone Creek.</p> <p>Governor Bourke named the road and the bridge after these two men.</p>
<p><b>Creative or Technical Achievement:</b></p>	<p>The Lennox or Horseshoe Bridge was the first scientifically proportioned bridge on the Australian mainland, based on the experience Lennox had gained from working with the famous Thomas Telford in England.</p>
<p><b>Research Potential:</b></p>	<p>Provides a reference base for developments in bridge engineering in New South Wales.</p>
<p><b>Social:</b></p>	<p>Provided an easier route up into the Blue Mountains that significantly improved commerce and travel with western NSW, and continued that important social function for 93 years.</p>
<p><b>Rarity:</b></p>	<p>Only example of its type in NSW.</p>
<p><b>Representativeness:</b></p>	<p>Does not represent Lennox's later, larger stone arch bridges.</p>
<p><b>Integrity/Intactness:</b></p>	<p>The stonework is original but there is a 1982 concrete arch inside to carry traffic.</p>
<p><b>References:</b></p>	<p>Henry Selkirk, "David Lennox, the Bridge Builder and His Work", Journal RAHS, Vol VI, Part V, 1920, pp 200-243.</p> <p>Department of Main Roads, "Great Western Highway", Main Roads, September 1949.</p> <p>Henry Kullas, "150th Anniversary of Lennox's Horseshoe Bridge", Journal Local Gov Engg A ssoc of NSW, July 1983.</p> <p>Anne Higham, "Conservation works for Lennox's Horseshoe Bridge – notes, plans, photographs", Dept Pub Works and Services, Sydney.</p>



<b>ENGINEERING HERITAGE AUSTRALIA</b>				
<b>Listings</b>	<b>Name:</b>	<b>Title:</b>	<b>Number:</b>	<b>Date:</b>
	Register of the National Estate	Yes		
	State Heritage Register NSW	Yes		
	National Trust of Australia (NW)	Classified		c 1980

<b>Item Name:</b>	Lennox's Horseshoe Bridge
<b>Location:</b>	Lapstone Creek, Lapstone NSW
<b>Image/s:</b>	<i>Could not get image to appear in this space, hence see below.</i>
<b>Caption:</b>	The 1833 Lennox's Horseshoe Bridge, Lapstone NSW.

