# **Proposal to Nominate**

# **Chelmsford Bridge, Leura NSW**

# as an Item of Engineering Heritage Interest

Item Name:	Chelmsford Bridge		
Other/Former Names:	Bridge over Road to Baths, NRS 12453, AP Plan No 74000		
Locality:	Bridge spans Leura Falls Creek and is located along Chelmsford Drive between Leura and Katoomba, NSW Australia.		
Address:	Chelmsford Bridge is located within the Crown Reserve referred to as Peter Carroll Field Reserve (Lot 7308, DP1145096)		
Co-ordinates	33°43'09.4"S, 150°19'23.5"E (Google Maps)		
Current Owner:	Blue Mountains City Council (amalgamated 1947)		
Original Owner:	Blue Mountains Shire Council (original Council prior to amalgamation) For a brief history of Blue Mountains City Council refer to: <a href="https://www.bmcc.nsw.gov.au/about-us/council-overview">https://www.bmcc.nsw.gov.au/about-us/council-overview</a>		
Current use:	Pedestrian and Cyclist access to/from the Leura Cascades Recreation Precinct.		
Former use:	2021 to current - Pedestrian and Cyclist to/from the Leura Cascades Recreation Precinct. 2020 to 2021 - precinct closed due to nearby landslip. 1970's to 2020 - Vehicle, Pedestrian, Cyclist access connecting Leura & Katoomba. 1913 to 1970's - Vehicle, Pedestrian, Cyclist access to the former Katoomba-Leura Baths.		
Proposed use:	Pedestrian and Cyclist access to/from the Leura Cascades Recreation Precinct.		
Item Condition:	Refer Conservation Management Plan (CMP) 2021.  https://www.bmcc.nsw.gov.au/documents/2023-06-27-council-meeting-enclosure-2-to-item-12  (Adapted from Chelmsford Bridge CMP).  Chelmsford Bridge is in remarkably good repair despite its age and minimal maintenance. Significant impact of water on the structure is clearly evident. Whil the spandrel walls have drainage relief holes above the springings, there is evidence of moisture percolation through the base of the arch, causing efflorescence staining as well as deteriorating the matrix of the concrete itself. A slight crack at mid-span of the footway cantilever exists, probably due to thermal movements across the years causing some differential expansions and contraction between the relatively thin footway and the more massive arch. Horizontal cracking of the pilasters/parapet walls above deck level exists, probably due to thermal cycling or perhaps vehicle impacts. Proliferation of graffiti, around the springings, on the arches and also on the outside of the balustrades impacts the visual appeal of the bridge. The railings appear generally original although at leas one vertical is welded near its base, indicative of straightening if not replacement The mesh is of galvanised wire enclosed in black PVC and is not original.  There is a pattern of squared holes in the bedrock beneath the arch, attesting to the foundations of the timber centering used to support the construction of the arch. The separate sandstone block retaining wall supporting the southern		

	by vegetation, with trees to a diameter of perhaps 0.5m anchoring themselves into the fabric of the embankment and displacing the stonework. Elsewhere the stone is in generally reasonable condition for its age although some surface fretting is occurring. A proper survey of condition is needed.  The bridge is highly intact and retains a high degree of integrity.					
Designer:	Chelmsford Bridge was designed under the supervision of H.H. (Harvey) Dare, Engineer in Charge, Water Conservation and Drainage.  Designs for handrail for the bridge were put forward by Katoomba Public Works Department office, signed off by Herbert Fleming (a later Chief Engineer for Public Works 1934-35) and Ernest Macartney De Burgh, the Chief Engineer, Water Supply and Sewerage.					
Builder:	Public Works Department	The Municipal Baths at Leura were designed by Mr R.D Fitzgerald, Engineer of the Public Works Department, and the works were carried out by day labour under the supervision of Mr. Kendall and Mr. Spiers. They also likely supervised the bridge's construction (CMP 2021).				
Started:	1912	Completed:	December 1913			
History:	European Context and Emergent Tourism.  Early European incursions into the Blue Mountains included a number of unsuccessful attempts at crossing by early colonists. In May 1813 Blaxland Wentworth and Lawson led the first successful and official European crossing of the Blue Mountains from the Cumberland Plain in the East to Mount Blaxland in the west. Following the successful crossing, William Cox was instructed by Governor Macquarie to construct a road across the Blue Mountains to the west. The road with a convict workforce of 30 was completed in 6 months and opened in early 1815 for restricted traffic. An 1820 deviation off Cox's Road's ascent of Pulpit Hill, provided a more level route around the hill. In 1824, French visitors, Surgeon Rene Lesson and Lieutenant Jules d'Urville travelled across the Mountains and at the divergence of the new line of road from the old, dismounted and walked back along the old Cox's line to take in the view. Lesson's account was published in Paris in 1826 and according to historian Jim Smith, is the first published account of visitors to the Mountains walking on a man-made track for recreational purposes and foreshadows what was to become a predominant theme in the development of the area, tourism. A theme that is central to the construction of Chelmsford Bridge, in terms of both form and function and the development of the surrounding area, both in the immediate vicinity and in terms of the Cascades area, and more generally in the Blue Mountains National Park.  Settlements in the Mountains developed from sites of military, toll collecting or inn keeping associated with the role of the area as a thoroughfare. In 1867 the Western Railway reached Wentworth Falls and in May 1868, the section to Mount Victoria was completed. The railway was a major catalyst in opening up the Mountains to settlement, though it was not built to serve the Mountains, but to link the western plains to Sydney. Prior to its construction, there was practically no settlement in the Blue Mountains apart from					

## **Development in the Twentieth Century.**

To attract tourists the provision of facilities comparable to those found in Sydney was a high priority for Blue Mountains businesses. By 1905 the Katoomba and Leura Tourist Association listed 41 establishments providing accommodation in the towns and by 1912 there were 5,000 permanent residents in Katoomba, most relying on the tourist trade for a living. Katoomba was particularly marketed as a resort town and to cope with the growth in tourist numbers multi-storied guesthouses. proliferated. To render visits to formerly remote scenic locations relatively comfortable, lookouts, walking and riding paths continued to be constructed and disused mining infrastructure was converted for use by the tourism industry, such as that associated with kerosene shale mining and the system of tramways linking the various coal and shale mines of the Megalong and Jamieson Valleys with the Western Railway Line. In the 1920s the area became a 'honeymoon mecca' and amenities for the motorized tourist were developed and included golf courses, swimming pools, theatres, skating rinks, bowling greens and tennis courts. Formerly the chief attraction of the area had been the natural beauty and health giving climate, in the 1920s however, entertainments were also required to attract tourists. Lookouts and walking tracks were constructed including the Projecting Platform at Echo Point (now referred to as Queen Elizabeth Lookout), the Giant Stairway and the Prince Henry Cliff Walk which incorporated the Leura Cascades and Bridal Veil Falls. The Cliff Drive at Katoomba which allowed panoramic views of the Megalong and Jamison Valleys was opened in 1937. Visitation increased to the Blue Mountains and the upper mountains area served as a major tourist destination in the 1940s with population on average inflated from 25000 to 90000 in peak season.

# Leura Reserve.

The 110 acre Reserve 91 (Leura Park) was proclaimed on 17 April 1888. It was described as being defined by perpendicular cliffs, and of: ... sandstone formation, soil poor and stony, swampy and steep along the creeks, southern part excessively rough and broken by bold precipitous cliffs, the timber consists of blackbutt, peppermint, stringy bark and mountain-ash, water good & permanent. It became one of five reserves managed under the Katoomba Reserves Trust including Katoomba, Banksia, Echo Point and a town recreational reserve. A walking track downstream from the "Meeting of the Waters" to Evelyn's and Leura Falls lookouts, via Leura Cascades was completed by 1890. By 1903, the trustee's responsibilities included the Federal Pass and the numerous stairs, seats, shelter sheds and amenities. There were by then several miles of paths with steps, ladders and bridges, fireplaces, weather sheds, seats and the planting of ornamental trees. These parks were the principal recreation grounds for locals and increasing tourists.

In February 1911 the Blue Mountains Shire Council instructed R.D.Fitzgerald, a Department of Public Works Engineer, to identify sites at Blackheath, Leura, Springwood, Glenbrook and Mount Victoria suitable for bathing facilities. The criteria included a natural basin, permanent running water, economic feasibility and at Katoomba and Leura—access for both towns. Fitzgerald identified the valley of Leura Falls Creek about a mile above the 'Meeting of the Waters' as a suitable site. A road that connected Leura and Katoomba through the Reserve was also a part of this idea. The road after crossing Leura Falls Creek would continue over the top of the earthen concrete walled dam on the high side. Fitzgerald's report was adopted by Blue Mountains Shire Council on 31 March 1911.

The proposal for Leura Baths, access roads and bridge was put to the Minister for Works on 29 June 1911 and works commenced in 1912. The Public Works Annual Report noted that: 'A new drive has been constructed by day labour between

Katoomba and Leura skirting the new swimming baths which are being constructed by day labour near the Meeting of the Waters. The baths are being constructed by means of two concrete dams across the creek and will include a deep pool for men and a shallower pool for women and children, together with the necessary sheds and appurtenances.' The Leura Baths opened on 3 December 1913.

## Chelmsford Bridge.

The construction of the Leura Baths included the construction of an access road and a bridge. The construction coincided with the most intensive period of development of the mountains reserves for tourist and recreational pursuits. The site for the bridge was between two abrupt banks of Leura Falls Creek and required some side cutting. The Katoomba Echo Newspaper noted that the architectural plans designated: ...a pretty little bridge as one could wish – a semi-circular arch springing from the rocks at stream level, and even in the sketch, suggesting a highly ornate and artistic crossing... Chelmsford Drive ran a length of 2 miles round the face of the cliffs. It was designed by R.D. Fitzgerald. A Mr Kendall and Mr Spiers supervised the construction of the baths and possibly the bridge's construction. An aerial ropeway suspended over the creek was used to convey material to the site. The project was intended to use reinforced concrete; however, it appears that a design decision was made to use unreinforced concrete with a thicker ring – this design was signed off by H.H. Dare as Engineer in Charge, Water Conservation and Drainage, on 5 June 1912 (Figure 1). A design for the timber formwork or centering was also signed by Dare on 26 June 1912 (Figure 2). The design allowed an alternative method of achieving the restraint to the top surface of the arch as the concrete was poured. The centering drawing showed radial steel ties holding the upper formwork, but an alternative concept is included using struts from above providing restraint. Designs for the handrail of the bridge were put forward by the Katoomba PWD office in April 1913 and signed off by Herbert Fleming (a later Chief Engineer for Public Works – 1934-1935) and Ernest Macartney De Burgh then current Chief Engineer, Water Supply and Sewerage. The Department of Public Works Annual Report for 1913 noted: ... the new road has been completed including the concrete bridge to carry same over the Leura Creek at the "Meeting of the Waters." This bridge is of mass concrete, and consists of a central arched span of 46 feet between abutments, carrying a roadway 17 feet in width, and two footways each 2 ft. 6 in. wide. The baths are finished with the exception of some additional work asked for by the council, and the ladies' and men's dressing-sheds are nearing completion.

## Naming of Chelmsford Bridge.

The State Governor Lord Chelmsford had opened the new Katoomba Town Hall in January 1912 and at the luncheon following, it was suggested that the £6000 newly constructed road between Katoomba and Leura, be named Chelmsford Drive in his honour. Katoomba Baths and Chelmsford Bridge were officially opened on December 3, 1913 by the Minister for Works, The Hon. Arthur Griffith.

## H.H. (Harvey) Dare.

H.H. (Harvey) Dare was one of the most prominent bridge engineers in the Public Works Department in the early 20th century and is known for his work on timber truss design, in particular the eponymous Dare Truss, of which many remain in use on NSW roads. Having joined the Public Works Department in 1889 as a draftsman, he was involved in the design of bridges until 1904 when he was placed in charge of irrigation and drainage works. In 1912 he was promoted to Engineer-in Chief of Sewerage. He moved to the new Water Conservation and Irrigation commission in 1913 and was Engineering Representative there till his retirement in 1934. Whilst the bridge was not designed by Mr Dare, it would have been designed under his supervision, and the calculation sheet is annotated *"Seen by Mr Dare 1 – 7 – 12"*.

## Leura Park - Development in the 1930s.

During the 1930s the then Katoomba Council devoted a large amount of funding to enhancing the tourism assets of Leura Park. Mock rock shelters, toilets, a stone archway, rockeries, picnic tables and seats, a horse trough, flower gardens and improved walking tracks, a bridge crossing the Leura Falls Creek between the Chelmsford Bridge and the cascades and new hand railing were some of the improvements installed in 1932-33. Chelmsford Bridge also played a prominent role in the 1930's tourist driven craze of "Floodlighting" - where giant thousandwatt lamps were used to nocturnally illuminate particularly scenic aspects of the landscape. This spectacle attracted notable figures such as photographer Harry Phillips who captured the play of light on the landscape. The Council's opening of the 1932 floodlighting by the Hon. C Marr, Minister for Health on 3 December 1932 saw 6000 people in attendance. The Sydney Morning Herald of 5 December 1932 reported that, following the flicking of the switch by Minister Marr: the slender lines of the Chelmsford Bridge appeared in the background in the midst of t-tree and gum, revealing colours that even the sunshine had not brought forth previously. Between overhanging trees the sparkling water like molten silver danced on its way over the varied tinted rocks, emerald, amber and brown. The new sport of nocturnal bushwalking emerged and people could walk down the Leura Cascades as far as the Bridal Veil Falls. Several instances of the Chelmsford Bridge being used for choral performances, band recitals and artistic inspiration have also been described, revealing its importance as an artistic fixture and local landmark. The 1930s were boom years for government funding and the expansion of walking tracks in the mountains generally. The following decades were period of retraction, with drastic cuts in the early 1940s and road access became of increasing importance, over walking tracks.

#### Later changes to Leura Park.

Water quality issues led to the closure of Leura Baths in the 1970s and the baths were filled in to create lawns in 1975. The southern part of Leura Park was incorporated into Blue Mountains National Park on 13 February 1987. Recent update to Local Heritage Inventory and current planning processes Amendment 5 to the Blue Mountains LEP 2015 was made on 26 March 2021 (Gazette No. 139). This created a new heritage conservation area (landscape) Leura Falls and Cascades Reserve (local ID LA102) which includes Chelmsford Bridge as part of the listing inventory. Chelmsford Bridge is proposed to be listed as a heritage item on the BM LEP in the next heritage review of the LEP. Blue Mountains City Council has initiated Master Planning process in 2022 to inform the management of the southern escarpment, which incorporates key sites from Wentworth Falls through to Katoomba. Leura Cascades is one of these important locations and the adopted Leura Cascades Precinct Plan is aimed at improving access, renewing the facilities and rejuvenating the Reserve. Night-lighting to rejuvenate the nocturnal bushwalking is also being pursued as part of the Leura Cascades Precinct Plan.

General Description: (Adapted from Chelmsford Bridge CMP, 2021)

## **Description:**

Chelmsford Bridge is an unreinforced closed spandrel, circular arch structure, rendered with simple architectural detailing. It is a 46 feet (14.02m) clear span with an arch radius of 30 feet (9.144m). The thickness of the arch is 2 feet (0.61m) and this arch is continuous with the abutments which are founded directly on sandstone, benched into sound sandstone bedrock. The side walls or spandrels are also of mass concrete, ranging in height from approximately 0.6m at the crown to 4.5m at the springings, and then tapering to approximately 2m at the bridge's ends. From there the fill is supported by natural embankments except for the

southeastern side which is retained by an inclined sandstone retaining wall which sweeps around the hillside following the curve of the approach road. Embellishments to the spandrels include pilasters detailed as ashlar stonework at the springings and endposts. They have dentil supports to a kerb level corbel which runs the full bridge length. The end pilasters are topped with monumental endposts and connected by parapet walls. Between the springings, pedestrian safety is afforded by steel pipe railings with mesh insert panels.

<u>Details:</u> (Adapted from Chelmsford Bridge CMP, 2021) **Arch.** 

The arch is a hingeless arch, 2 feet thick, with a radius of 30 feet, cast integrally with its footings and spandrel walls. The arch is backfilled, presumably with locally sourced clean fill. The matrix of the arch is concrete, presumably mixed on site and cast against timber centering (Figure 2). The texture of this timber remains clear on the visible surfaces of the arch. The concrete mix and the source of the sand and aggregate has not been identified. The outer face or voussoir is vertical and topped by a modest 3 inch corbel which chamfers to 4 inches at the face of the arch. A calculation sheet for the original design (Figure 3) shows the graphical means whereby the load path of the surcharge loads was carried through the concrete of the arch.

### Spandrel Walls.

The spandrel walls above the arch show the horizontal planking of the formwork. The unseen rear face has a batter of 1 in 6, providing it with stability as a gravity wall to resist the pressure from the fill and superimposed traffic loadings. Topping the spandrel wall is a footpath, supported by corbels at 5 foot centres. These corbels are the only part of the bridge to contain reinforcing, an acknowledgement of the utility of reinforcing where loads would put the concrete into tension. Around the springing and end pilasters, the footway line is extended, with dentil corbels at close centres providing decorative support.

#### **Balustrades and Fence.**

The parapets are designed to match the generally robust proportions of the bridge, with the end pilasters matching the mock column pilasters adjacent to the arch springings interconnected by 12 inch (305mm) walls. These contrast with the light railing above the arch, allowing it to appear as a light construction, of minimum depth at the crown. This railing and netting was to a detail proposed by Herbert Fleming and approved by DeBurgh (Figure 6).

### Road and Walkway.

The original roadway has a depth of fill to centreline of 2 feet 7 inches (0.79m) and a curved camber to the gutterline. The surface is now asphalt seal. The horizontal alignment of the roadway was laid out as part of the development of the scenic Chelmsford Drive. This route was the main tourist route until the 1930s when a new deviation was constructed immediately upstream (Cliff Drive). Instead of a bridge, this deviation relied on a reinforced concrete culvert to carry the waters of Leura Falls Creek under the new earth embankment. To the east, the new alignment swung to the south and the original path of Chelmsford Drive was converted to a walking track. The bridge carries two walkways of 2 feet 6 inches (0.76m) width, separated from the roadway by a simple 6 inch (150mm) kerb. The road approach from the western end is constrained by the rock cutting to the high side and the concrete retaining wall and metal handrail, which form part of the original Baths construction, on the lower side.

#### **Adjacent Retaining Wall.**

The roadway embankment on the southern side of the eastern approach to the

	bridge is retained by a sandstone retaining wall which forms part of the curtilage of the bridge, having been built as part of the original road construction. It is built on a batter of approximately 1 in 3 using stone presumably sourced locally. Whilst some of the stone shows signs of fretting due to exposure, the majority retain original surfaces. Approximate dimensions are 30m in length, maximum height 3m., average height 1.7m. Due to the amount of vegetation overgrowth, it is difficult to approximate the full extent.  Appurtenance.  The bridge was illuminated in the 1930s. This involved brackets being attached to the bridge. Subsequent refurbishments of these systems have seen other conduits and fittings attached to the bridge as well as placed on nearby embankments.		
Significance:	State Significance. Listed May 2025. SHR02101 in May 2025 NSW Government Gazette No 178 of 09 May 2025		
Webpage Summary:	Chelmsford Bridge, located in the Leura Cascades Recreational Reserve in the Blue Mountains, has been listed on the New South Wales State Heritage Register. This recognition acknowledges the bridge's historical and engineering significance, particularly as an extant unreinforced concrete arch bridge. Chelmsford Bridge is understood to be the second, and last, unreinforced concrete arch road bridge built in New South Wales. Refer Section 3.3 of the CMP for the Comparative Analysis prepared by Dr Sid French, including Table 4 for non-exhaustive listing of masonary arch road bridges pre-1939.  Rendered with simple architectural detailing the bridge can be seen from important vantage points which enhance and show the bridge to be more than just functional but to be a beautiful built addition to the natural landscape.  The bridge construction was part of a major upgrade of the area beginning in 1911, in association with the construction of the Katoomba-Leura Baths which included the construction of an access road and a bridge. Their construction coincided with the most intensive period of development of the mountain's reserves for tourist and recreational pursuits. The site for the bridge was between two abrupt banks of Leura Falls Creek and required some side cutting. Former trustee and Katoomba Mayor at the time, H. R. Goyder, and his councillors accompanied Department of Public Works Engineer for the area, R. (Rob) D. Fitzgerald on a site inspection in May 1911. As referenced in contemporary stories from the Katoomba Echo Newspaper, they all agreed the architectural plans designated: a pretty little bridge as one could wish – a semi-circular arch springing from the rocks at stream level, and even in the sketch, suggesting a highly ornate and artistic crossing  The State Governor Lord Chelmsford had opened the new Katoomba Town Hall in January 1912, when it was suggested that the £6000 newly constructed road between Katoomba and Leura, be named Chelmsford Drive in his honour. Katoomba Baths and Chelmsford B		
Engineering Theme:	Transport, Tourism & Recreation, Utilities (Water).		
Heritage Listing:	Chelmsford Bridge is a State Heritage Item, listed in-conjunction with the Leura Cascades & Recreational Reserve SHR02101 in May 2025 <a href="NSW Government">NSW Government</a> <a href="Gazette No 178">Gazette No 178 of 09 May 2025</a>		
References/Sources:	1.Chelmsford Bridge Conservation Management Plan, October 2021. The CMP was commissioned by Blue Mountains City Council and was prepared by Dr Sue Rosen (Historian), Dr Sid French (Engineer) and Emily Pickering (Researcher) heritage		

	consultants of Sue Rosen Associates. The CMP was prepared in collaboration with Amelia Parkins and Katie Hicks from Craftech Heritage Services Pty Ltd and Graeme Erskine from Heritage, Environment & Planning (a then Business Unit of Public Works Advisory). Council staff assisting in the preparation of the CMP included Rachel Sutcliffe (Engineer), Damien Taylor (Engineer), Sara Reilly (Built Heritage), Christo Aitken (Built Heritage).  2.The State Heritage Nomination submission and the CMP were adopted by Council in June 2023: <a href="https://www.bmcc.nsw.gov.au/documents/2023-06-27-council-meeting-enclosure-2-to-item-12">https://www.bmcc.nsw.gov.au/documents/2023-06-27-council-meeting-enclosure-2-to-item-12</a> 3.State Archives. Original bridge drawings - NSWAO: Department of Main Roads, Plans of Bridges, 1860-1965, Katoomba-Leura Bridge, Bridge over Road to Baths, NRS 12453, AP Plan No 74000.				
Nominated by:	Rachel Sutcliffe, FIEA, CPEng.				
Contact Ph. & Email:	0414195140	rsutcliffe@bmcc.nsw.gov.au			
EHA Branch:	Sydney	Nomination Date:	6 <sup>th</sup> August 2025		

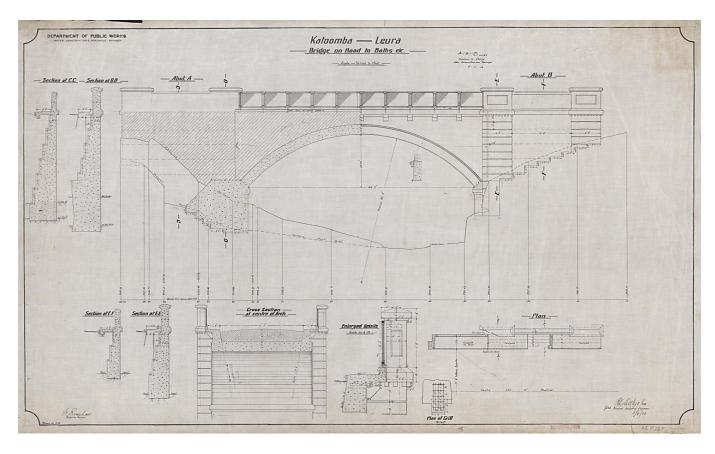


Figure 1. Chelmsford Bridge, Leura - Plan Elevation, Public Works Department 1912. (AO Plan 74000)

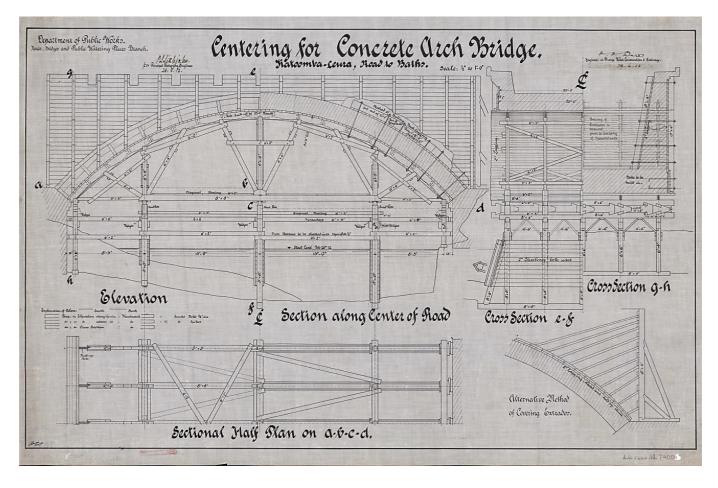


Figure 2. Chelmsford Bridge, Leura - Plan Centering, Public Works Department 1912. (AO Plan No 74001).

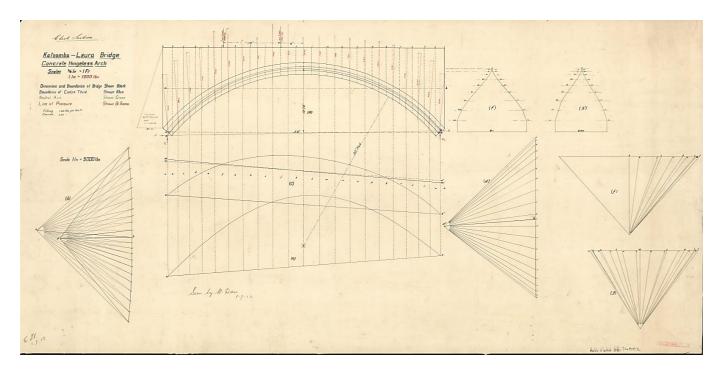


Figure 3. Concrete Hingeless Arch, Load Diagram, Public Works Department 1912. (AO Plan No 74002).

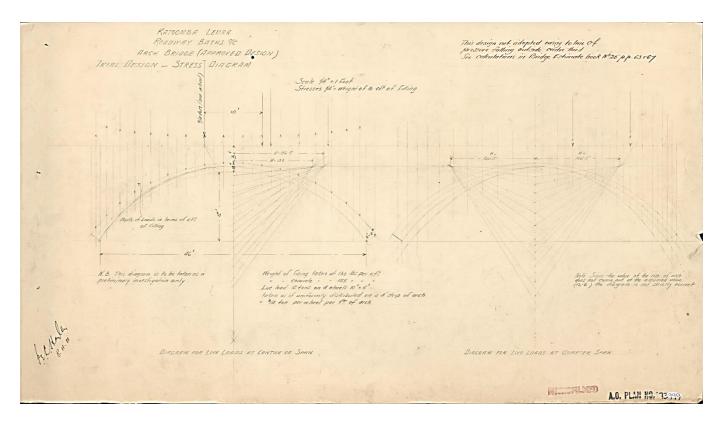


Figure 4. Trial Design of approved Bridge Design, Stress Diagram, Public Works Department 1912. (AO Plan No 73999).

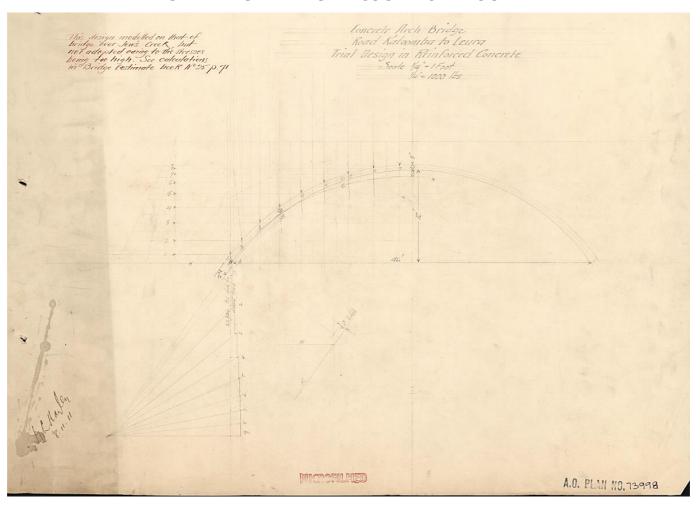


Figure 5. Trial Design in reinforced concrete, not used, stress diagram, Public Works Department 1912. (AO Plan No 73998).

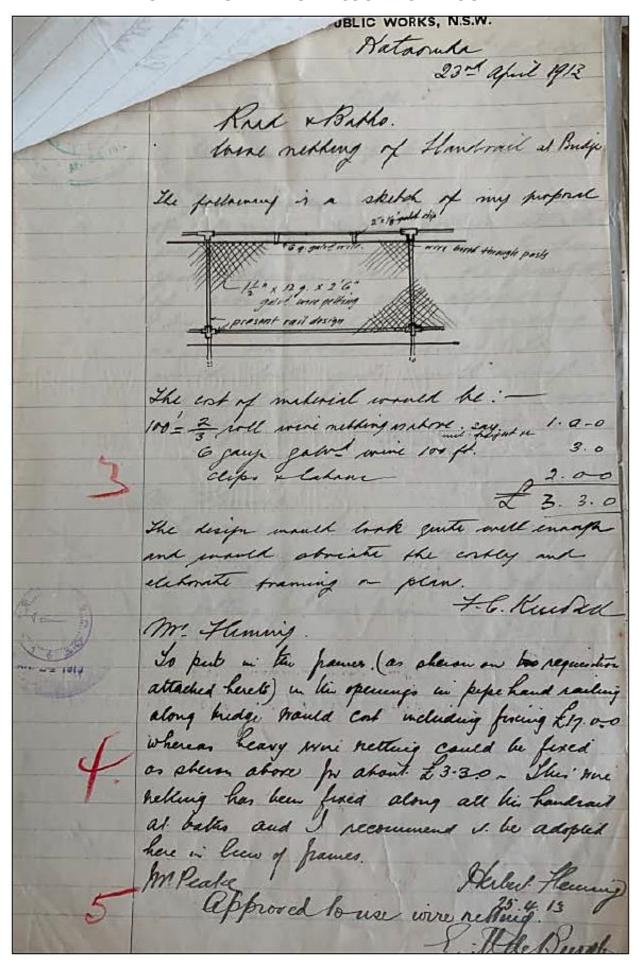


Figure 6. Handrail design, signed by Herbert Fleming and E de Burgh (extract from NRS 12640-2, item No.562 at 13469)

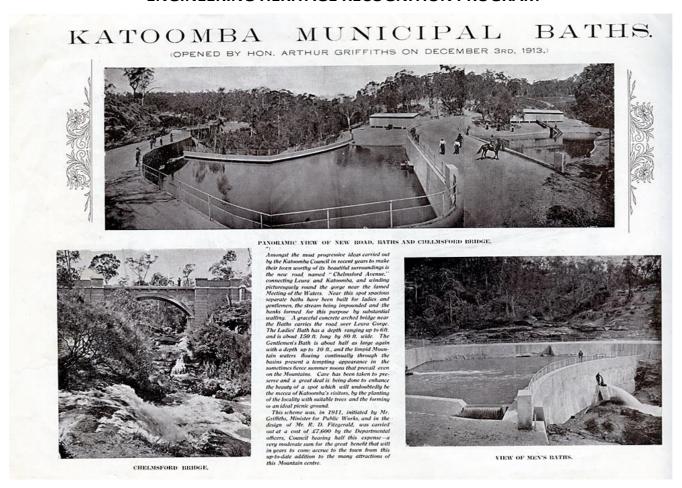


Figure 7. Official Opening

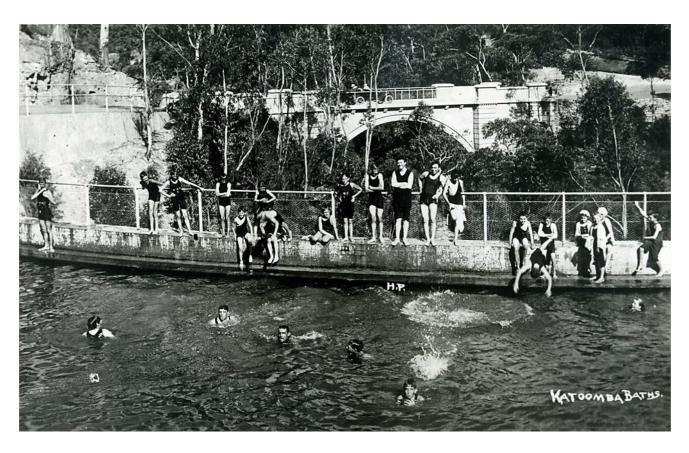


Figure 8. Harry Phillips photo circa 1920's(https://www.flickr.com/photos/blue\_mountains\_library - local\_studies/)



Figure 9. Looking west, circa 2024 (BMCC)



Figure 10. Timber Centering foundations, squared holes in bedrock beneath the arch (extract from CMP, photo Sid French)