Friends of Barwon River Ovoid Sewer Aqueduct
P O Box 1512
Geelong 3220
barwonaqueduct@gmail.com

19 June 2020

Mr Steven Avery
Executive Director
Heritage Victoria
Level 7
8 Nicholson Street
East Melbourne
Victoria 3002

Dear Mr Avery

Re Permit application P32806
VHR H0895 Ovoid Sewer Aqueduct Over Barwon River, 42 Leather Street, Breakwater
Permit application P32806 for a permit to demolish four (4) of the fourteen (14) pier and truss spans and to retain the four (4) associated pier base structures, construct an expanded public exclusion zone and deliver a heritage interpretation program at the above place.

Please find attached a submission relating to the above Permit Application objecting to the demolition of four spans. This submission supports the development of the 66ha project, and making the entire Aqueduct a drawcard to bring visitors to enjoy the proposed Porronggitj Karrong cultural and community parkland.

The Friends of Barwon River Ovoid Sewer Aqueduct submit that this highly significant engineering masterpiece is so important to what remains of Australia's engineering heritage architecture that every endeavour must be explored to retain the entire structure for our nation's collective benefit to admire and enjoy this magnificent visually stunning place.

Yours sincerely

Rod Charles
President
Friends of Barwon River Ovoid Sewer Aqueduct

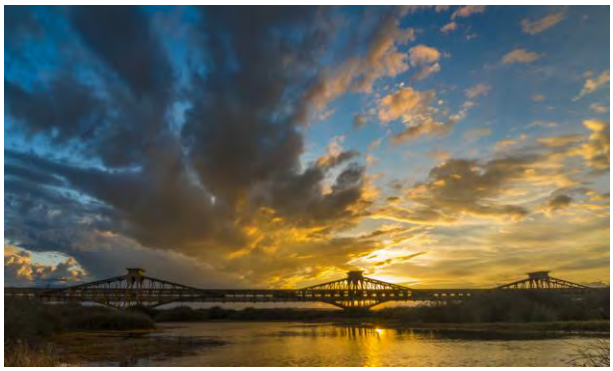

Photo: Instragram @drgeoffr / Web: http://www.drgeoffr.com

https://friendsofbarwonriverovoidseweraqueduct.org

This submission to Heritage Victoria is in response to the public notice in the *Geelong Advertiser* newspaper Saturday 23rd May 2020 inviting responses to Permit Application P32806.

Re VHR H0895
Ovoid Sewer Aqueduct Over Barwon River, 42 Leather Street, Breakwater
Permit application P32806 for a permit to demolish four (4) of the fourteen (14) pier and truss spans and to retain the four (4) associated pier base structures, construct an expanded public exclusion zone and deliver a heritage interpretation program at the above place.

Submission from

Friends of Barwon River Ovoid Sewer Aqueduct
P O Box 1512
Geelong 3220
barwonaqueduct@gmail.com
Incorporation No. A0109745B

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1. **Formation of the Friends of Barwon River Ovoid Sewer Aqueduct**

The Friends of Barwon River Ovoid Sewer Aqueduct (Friends), was formed in May 2020, and incorporated from 16th May 2020, in reaction to plans to demolish parts of the structure. The Friends believe the Aqueduct is of extremely high significance and is one of the finest reinforced concrete constructions in Australia.

The Friends have created a web site to provide information to the public about the background and significance of the Aqueduct, and to explain the present threat to its aesthetic original form.

The Friends submit the content of this web site to Heritage Victoria, to be considered as a component of this submission, accessed by the hyperlink below.

https://friendsofbarwonriverovoidseweraqueduct.org

As an indication of the interest in the Aqueduct, the Friends web site went on line on 4th June 2020. Since that date two weeks ago, 245 different people have visited the site and 1,154 pages have been opened. As a result of the Friends Facebook page sharing information across the other groups/pages with a history focus, 89 people viewed the website.

• **The Friends strongly object to the demolition** of four of the pier and truss spans of the Ovoid Sewer Aqueduct and submit that the permit application be refused.

• **The Friends strongly support a solution** that is respectful of the Wadawurrung desire to have both the Barwon River water flow and the land around the Aqueduct accessible, and respectful of the views of others who desire to see the conservation of this magnificent example of engineering innovation in its entirety.

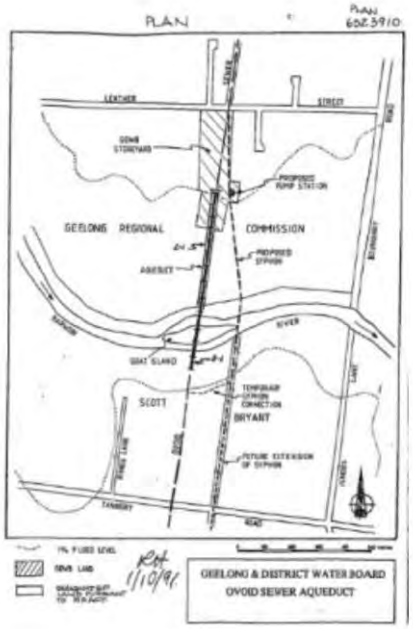
2. **The extent of the registration of the subject site**

Extract from the Victorian Heritage Register for VHR H0895
Extent of Registration
AMENDMENT OF REGISTER OF HISTORIC BUILDINGS
Historic Building No. 895.
The Barwon River Ovoid Sewer Aqueduct Barwon River near Breakwater, Geelong.
To the extent of-
1. the whole of the structure known as the ovoid sewer aqueduct, marked B-1 on Plan 6023910 endorsed by the Chairperson, HBC and held by the Director, HBC and
2. the land 10 metres either side of the structure and 10 metres to the Northern end of the structure, marked L-1 on Plan 6023910 endorsed by the Chairperson, HBC and held by the Director, HBC being located on land described as Crown Allotment 5 and Part Crown Allotment 4, Section 12A, City of Geelong, Parish of Corio. [*Victoria Government Gazette* No. G41 23 October 1991 p.2938]

The specific area of land pertaining to Permit Application P32806 is designated and described in the text above and H0895 plan below.

This submission objects to the demolition and works proposed for the Aqueduct heritage structure in the designated registered area.

The documents submitted accompanying the permit application, in some instances are substantially addressing an area of land of 66 hectares outside the registered area, surrounding the registered site.



H0895 plan

The applicant information relating to the land outside the designated area of VHR H0895, although of important interest, is not directly pertinent to the subject structure under the jurisdiction of Heritage Victoria that is entirely within the designated extent of registration.

3. Proposed Porronggitj Karrong Project

Friends of Barwon River Ovoid Sewer Aqueduct does not object to the proposal for development of parklands on the 66 hectare land surrounding the Aqueduct. The Friends strongly support the creation of the proposed Porronggitj Karrong Project, as shown on page 21, in *Lovell Chen Heritage Impact Statement (updated), Figure 14 Concept image describing the development of the Porronggitj Karrong cultural precinct in the vicinity of the Aqueduct. Source: Barwon Water.*

This *Porronggitj Karrong cultural precinct* plan is presently in concept and is a long term prospect. Other comparable plans have been proposed and exhibited before:

• April 2002 Barwon River Land Use and Open Space Corridor Plan City of Greater Geelong and Corangamite Catchment Management Authority

• November 2016 Aqueduct Park Masterplan Barwon Water

The prospect of the completion of this plan remains providential. The outcome of the present permit application should not be determined predominantly by the factors relating to the cultural precinct plan that is outside the registered area of the subject site of this permit application, and is still a concept only.

If the proposed parklands development proceeds, it would be enhanced and augmented, and made a greater attraction to a wider audience, by having the Aqueduct in its entirety as a major feature, after it was made safe and accessible.

4. Heritage Interpretation Overview Lovell Chen April 2020 (updated)

Information from the Aboriginal Heritage Council, as of 18 May 2020, advises that the Wathaurung Aboriginal Corporation trading as Wadawurrung, is the Registered Aboriginal Party (R. A. P.) for the land on which the Aqueduct is situated.

https://www.aboriginalheritagecouncil.vic.gov.au/victorias-current-registered-aboriginal-parties

No R. A. P. independent official position statement about the demolition of the Aqueduct, could be found in the documents available on the Heritage Victoria website relating to this permit application.

The paragraph in *Heritage Interpretation Overview Lovell Chen April 2020 (updated)* p 6 is referenced as Source: Barwon Water, and is consistent with the Australian Water Association online publication, *Indigenous Partnerships - Water e-journal, Online Journal of the Australian Water Association Vol 4 No 1 2019, Progressing Reconciliation through Indigenous Partnerships within Australian Water Utilities*.

This publication is in reference to the Corangamite Catchment area of Victoria, and involves reference to the Wadawurrung, Gulidjan and Gadabanud people.

There is no reference to the many heritage listed structures within the state's water utilities in this area as needing to be demolished because they are a hindrance to progressing reconciliation.

The views of the Wadawurrung representatives are important considerations but cannot be the sole determinative factor because the consequence is the logical extension, that if that is the principle by which a heritage issue is assessed, then any heritage structure of western post contact origin should be demolished, if it interferes with Aboriginal cultural heritage.

There are several other structures crossing the Barwon River in the vicinity of the Aqueduct.

The Aboriginal cultural heritage value consideration if the construction was a new bridge would be a different circumstance rather than the consideration of an existing structure. That value is one factor that needs to be considered together with all of the other equally valid heritage considerations relating to the site.

5. Heritage matters under section 101 and section 3 of the *Heritage Act 2017*

The Heritage Victoria web site suggests that submissions should … *Relate to heritage matters under section 101 of the Heritage Act 2017*

5.1 Friends of Barwon River Ovoid Sewer Aqueduct submit that:

• Clause (2) (a) and (f), and Clause (3) (b) of the HERITAGE ACT 2017 - SECT 101 are relevant to Permit Application P32806.

Determination of permit applications

(2) In determining whether to approve an application for a permit, the Executive Director must consider the following—

(a) the extent to which the application, if approved, would affect the cultural heritage significance of the registered place or registered object;

(f) any matters relating to the protection and conservation of the registered place or registered object that the Executive Director considers relevant.

(3) In determining whether to approve an application for a permit, the Executive Director may consider—

(b) any other relevant matter.

Friends of Barwon River Ovoid Sewer Aqueduct submit that Clause (2) (a) and (f), and Clause (3) (b) stress that determinations by the Executive Director refer to the "registered place", that is the designated area of land in Plan H0895. The Act does not require that the determination consider the wider context other than the registered area.

These Clauses also specify that the determination of a permit application must consider the affect on cultural heritage significance of the registered place, and the protection and conservation of the registered place.

The legislative process formed to provide the protection and conservation of the Aqueduct, would be abrogated by a permit issued for demolition.

5.2 Also in the HERITAGE ACT 2017 - SECT 3 the definitions of 'conservation' and 'cultural heritage', are relevant to Permit Application P32806

"conservation" includes—

(a) the retention of the cultural heritage significance of a place or object; and

"cultural heritage" means places and objects of—

(a) cultural heritage significance; or

(b) State-level cultural heritage significance;

cultural heritage significance means aesthetic, archaeological, architectural, cultural, historical, scientific or social significance;

The Friends of Barwon River Ovoid Sewer Aqueduct submit that the affect of issuing the subject permit, on the cultural heritage significance of the Aqueduct would be catastrophic, because its aesthetic, architectural, historical, scientific, social significance, to the present generation and future generations, would be severely damaged and irreparably ruined.

With four spans demolished, the purpose of the Aqueduct's structure will be incomprehensible. The design will not be understood, and the beauty will be destroyed.

6. Sightlines and Sewerage - a Masters Architecture Student's study of the Barwon River Ovoid Sewer Aqueduct by Marjan Oczkowicz MA Arch Deakin University

Industrial heritage places built forms should be very worthy, but are currently largely overlooked inclusions in our local post-settlement design heritage that would further justify our status as a UNESCO City of Design.

Quote from Dr Geoff Russell former Manager Corporate Communication and Marketing City of Greater Geelong, on the occasion of a presentation about the Aqueduct, held at Barwon Solutions Kadak Place 22nd March during Design Week 2019, by Deakin University student Marjan Oczkowocz M A Arch.

Marjan Oczkowicz:

The Ovoid Sewer Aqueduct, spans the Barwon River at Breakwater, Geelong. As one approaches from the west, it stretches across the flatlands like the skeletal remains of a once-great serpent; delicate, still and monumental. Today, devoid of function and fenced-off, it is reduced to a purely visual artefact; a piece of engineering ornamentation upon the landscape.

Not resigned to stand as an echo of what it once was, it imposes its own disruptive influence: a defiant symbol of impermanence and possibility. Through the state of its decay the Aqueduct breathes.

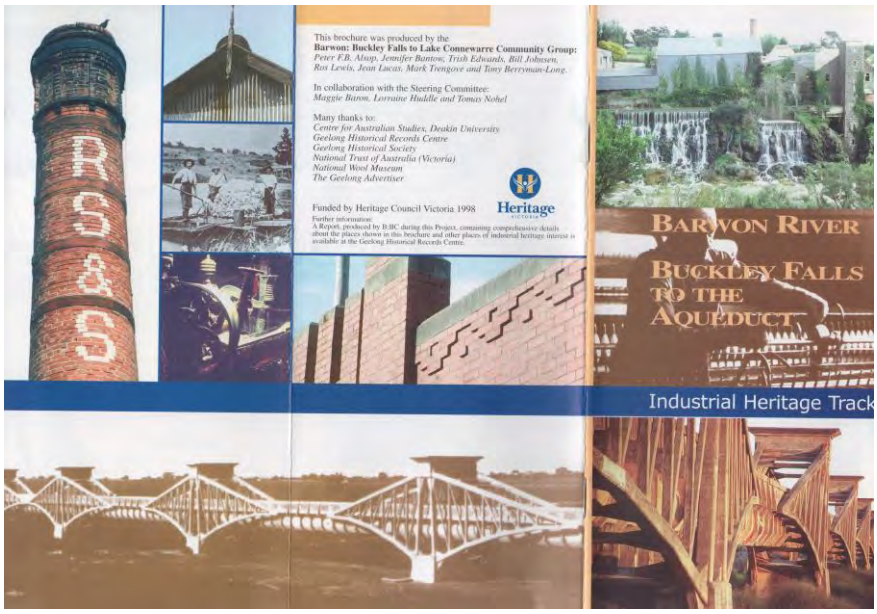
The engineering design of the Breakwater brought about the supply of fresh water to the embryonic settlement of Geelong in 1839. The Aqueduct continued innovative design by combining aesthetics and function.

7. Geelong's industrial heritage places

When considering a City's heritage places, what stands Geelong apart from other comparable regional Victorian cities, is its significant industrial heritage. The Aqueduct is an example of Geelong's industrial heritage in the context of a Barwon River longitudinal precinct.

Barwon River Buckley Falls to the Aqueduct Industrial Heritage Track 1998 funded by Heritage Victoria, is a walking, cycling, driving tour guide to industrial heritage along the Barwon River.

This is a 14 page DL size brochure with fold-out map and descriptions of 22 places, culminating with the Aqueduct.


R S & S
This brochure was produced by the
Barwon: Buckley Falls to Lake Connewarre Community Group:
Peter F.B. Alsop, Jennifer Bantow, Trish Edwards, Bill Johnsen,
Ros Lewis, Jean Lucas, Mark Trengove and Tony Berryman-Long.
In collaboration with the Steering Committee:
Maggie Baron, Lorraine Huddle and Tomas Nohel
Many thanks to:
Centre for Australian Studies, Deakin University
Geelong Historical Records Centre
Geelong Historical Society
National Trust of Australia (Victoria)
National Wool Museum
The Geelong Advertiser
Funded by Heritage Council Victoria 1998
Heritage
Further information:
A Report, produced by B.BC during this Project, containing comprehensive details
about the places shown in this brochure and other places of industrial heritage interest is
available at the Geelong Historical Records Centre.
BARWON RIVER
BUCKLEY FALLS
TO THE
AQUEDUCT
Industrial Heritage Track

8. Feasible solution

The Friends submit that a solution to balancing the heritage aesthetic, architectural, engineering, historic values, and the Wadawurrung values, and the financial considerations of the future of this highly significance place, can be achieved by an alternative to that proposed in the current permit application.

The details of a solution are already provided in the existing documentation. This solution is a practical and achievable different option to that proposed by Barwon Water's proposal to demolish four spans, in the current permit application.

We object to the current application, and we strongly recommend that Heritage Victoria refuse the application.

The alternative solution would provide safe access for canoeists and rowers to use the river under the Aqueduct, and also provide access under the Aqueduct on the land for walkers and cyclists, as well as maintaining the Aqueduct's heritage values.

This solution negates the need for demolition and is less cost than the demolition of four spans, or at least a near cost neutral outcome.

Extracts from Part 1 and Part 2 of a report by engineering firm GHD commissioned by Barwon Water in September 2017. These options provide safety by protective structures.

GHD are the initials of the founder of the Company in 1928 Gordon Guttridge, and the two partners who joined in 1939, Gerald Haskins and Geoffrey Davey.

At a stakeholders meeting convened by Barwon Water in 2017, both Barwon Water and invited stakeholders jointly accepted Option 2a.

• Option 2a in the Report provides safe access under one land span, and one river span. Option 2a cost estimate $2,865,866 in 2017.

• Option 2b in the Report provides safe access under one land span and two river spans. Option 2b cost estimate $4,840,757 in 2017.
One criticism of the culvert was that at times it would get filled with water. When this was happening the river would be in flood and unable to be accessed, so the pathway would be closed and not be in use, until the water subsided and the culvert was pumped dry.

Whilst these cost estimates were made in 2017 and a percentage increase would apply, they still favourably compare, and reach a near cost neutral comparison, to the cost estimate of $5,500,000 to demolish four spans as documented in:

Strategic Heritage Appraisal December 2019, updated March 2020
Prepared by Lovell Chen and Arup Table 4 Delta Group (2019) budget estimate for demolition

River Spans	Complete structure	Per-unit, removal of terrestrial span
$5,500,000	$9,500,000	$200,000 to $1,000,000, conditional on location and structural (eg. propping) requirements

The Friends therefore submit that there is a feasible option for the Aqueduct and the parkland proposal to perfectly co-exist.

To introduce the cost of full restoration is a distraction from the attainable options of the choices available now.

Full conservation of the Aqueduct is an option for the future should alternative management and sources of funding become available for there eventually to be a chance to fully experience the brilliance of this amazing structure.

9. Conclusion

Two early outstanding examples of significant Geelong structures made of reinforced concrete have gone; the Bow Truss Former Dennys Lascelles Concrete Woolstore 60 Brougham Street, built 1910-1913 was demolished in 1990, Belcher's building corner Ryrie and Moorabool Streets, built 1926 was demolished in 2020.

The Barwon Sewage Aqueduct is probably the most remarkable example of concrete engineering surviving in Australia, and there can be no justification for permitting it – or the most important part of it – to be demolished. *

It is adding insult to injury in this case that the owner seeks to demolish the river spans of the structure, the very portion which the 1996 panel singled for immediate conservation action. *

The Aqueduct is now needlessly under threat, no part of this structure should be demolished. Alternative feasible solutions have been documented.

For all the above reasons presented in this submission, which includes the Attachment: Supporting Statement by Miles Lewis 19 June 2020, the Friends of Barwon River Ovoid Sewer Aqueduct request that Heritage Victoria refuse to issue permit application P32806 to demolish any part of the Barwon River Ovoid Sewer Aqueduct.

* Quote from Attachment: Supporting Statement by Miles Lewis 19 June 2020

Attachment: Supporting Statement by Miles Lewis 19 June 2020

Proposed demolition of the central part of the Barwon Sewage Aqueduct

The Barwon Sewage Aqueduct is probably the most remarkable example of concrete engineering surviving in Australia, and there can be no justification for permitting it – or the most important part of it – to be demolished.

There are certain principles which should be regarded as axiomatic in a case of this sort.

1. The assessment of the item should be based upon independent and expert heritage advice, not solely or principally upon reports commissioned by the owner.

2. A heritage item should not be subject to a process of attrition, whereby a series of proposals over the years steadily erodes its significance – that is, multiple jeopardy.

3. The owner should be responsible for properly maintaining an item, and should not be rewarded for demolishing it or for encouraging or allowing its deterioration.

4. The financial feasibility of preserving an item should be considered in relation to the scale of the structure, the overall financial position of the owner, and its public role.

5. Any proposal for partial demolition on practical or financial grounds should be confined to the minimum practicable and to minor elements, and should not impact upon its essential significance.

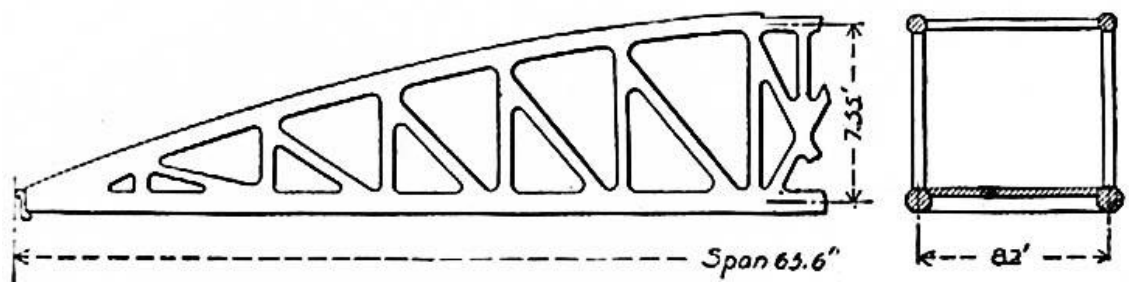
Technical assessment

The material provided with this application contains serious misstatements as to the nature of the Considère system, the role of the engineer E G Stone, and the principles underlying the design of the Barwon Aqueduct, some of which were included even in the 1996 panel report, and others of which have been newly fabricated.

This is because most of the purported information about this structure to date has been provided in the reports of consultants engaged by the owner, each one building upon the previous one in the manner of Russian scandal, with little or no primary research being undertaken.

A-G Considère

A-G Considère, though an important French engineer, was virtually unknown in Australia. No published reference to him has been identified in the early twentieth century, and there had been none by modern engineers or historians before 1980 when I identified the Considère system and the Considère bridge form in the Dennys Lascelles Austin wool store ['Bow Truss Building'], Geelong. Evidence which I gave at the time appears to have been partly misinterpreted by the late Peter Alsop, and since relayed by others, as will appear below.

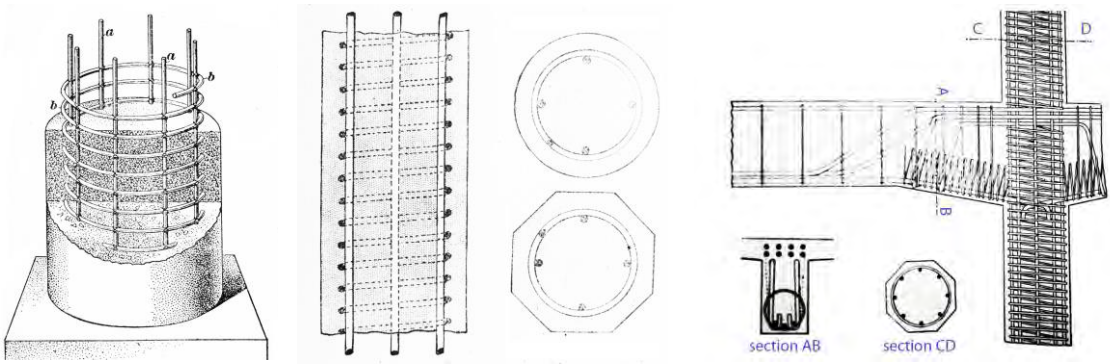


The basic form of Considère's test bridge at Ivry Paris, 1904: Armand Considère [translated L S Moissief] *Experimental Researches on Reinforced Concrete* (2nd ed, McGraw, New York 1906), p 191.

However Considère was responsible for two innovations of relevance to Australia. One was the so-called Considère system, and the other a form of segmental girder bridge which he introduced when he was Inspecteur Général des Ponts et Chaussées in 1902-5. A test bridge was constructed at Paris-Orléans Railway Company freight yard at Ivry, Paris, and loaded to destruction. On the strength of this a major example was then built at Plougastel in Brittany.

It is important to stress that the Considère system and the segmental bridge form were two separate developments. Although the bridges at Ivry and Plougastel were on the Considère system, other bridges of the same form were built in France on quite different systems. The reverse is of course even more true: the Considère system was used for numerous structures other than bridges.

The Considère system



The Considère system as used in columns. International Library of Technology, *Stone &c,* §45, p 22; W N Twelvetrees, *Concrete-Steel* (c 1907), p 205, figs 70, 71, 72.
The Considère system used in a haunched beam, modified from Frederick Rings, *Reinforced Concrete Theory and Practice* (London 1910), p 13.

What is referred to as the Considère system, or béton fretté, is not so much a system as a single development. The basic principle of *béton fretté* was the reinforcement of compression members with heavy spiral reinforcing bars, much heavier than would be necessary for a simple ligature. This was based upon experiments begun by Considère in 1898 and published in the proceedings of the Académie des Sciences and elsewhere in subsequent years. These showed that the hooping increased the compressive strength of the concrete core. Considère's compression members were usually circular or polygonal in section, and he introduced his spiral winding in other zones of compression, such as the haunches of beams, where they were angled up on the slope. In most respects other than the compression reinforcement, the system derived from that of Hennebique, which was the best-known in France.

The Considère system does not include ‘square ligatures for tension members’.[1] Nor does it include ‘an unusual set of elements that act purely in tension.’ [2]

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1 Lovell Chen, *Barwon River Ovoid Sewer Aqueduct: Proposed partial demolition: Heritage Interpretation Overview* (Melbourne 2020), p 6.

2 Lovell Chen, *Barwon River Ovoid Sewer Aqueduct: Proposed Partial Demolition: Heritage Victoria Permit Application and Heritage Impact Statement* (Lovell Chen, Melbourne, undated), p 3.

Nor does the system include the procedure described by Moles in the 1996 panel report:

> The true Considere method utilises a system of construction of casting compression members first, then loading fully or partially the structure, with the continuous reinforcing bars of tension members taking load without any concrete around them. This allows the steel to align in exactly straight lines in the direction of the load. Concrete is then cast around the steel under load. Generally the loadings increase before casting sufficient to cause all the bars to become straight and taut. After casting and curing the full load is applied to the structure. Considere considered that this system reduced the likelihood of cracking in tension members. It seems that this method was not closely followed in the case of the Aqueduct.[3]

There is no reason to expect that the method would have been followed at the Aqueduct, and it was not.

E G Stone

E G Stone was an extraordinarily innovative engineer. His innovations at the Dennys Lascelles Austin building included

- the use of built-up steel plates for tension reinforcement in the bottom chord of the truss
- the sequence of construction as referred to by Moles, above, which was the equivalent of pre-tensioning
- the construction of the sawtooth roof lights and panels though and across the trusses

The second of these is of real international significance, for nothing similar had been done before.

There are no comparable innovations in the Aqueduct except for the overall form, which is influenced by, but significantly different from the Forth Bridge. However it should be noted that Stone was still the only engineer in Australia making use of the Considère system.

The Aqueduct structural system

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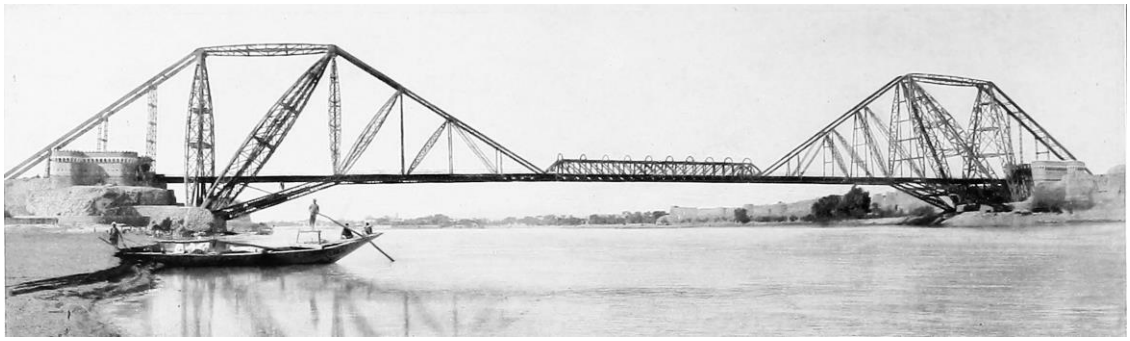
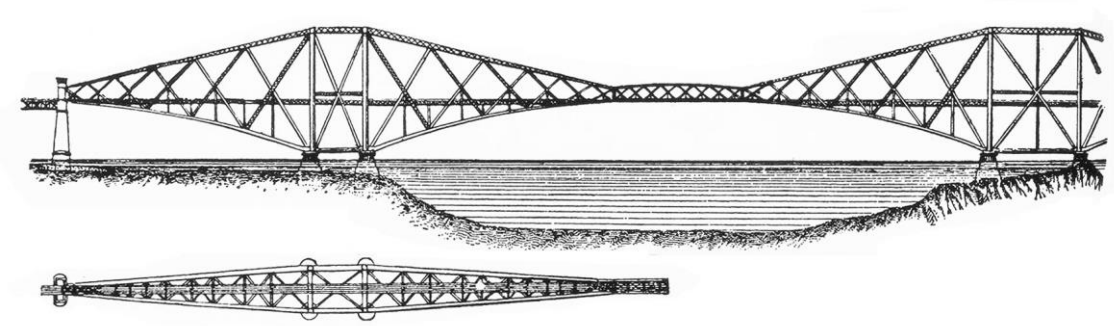
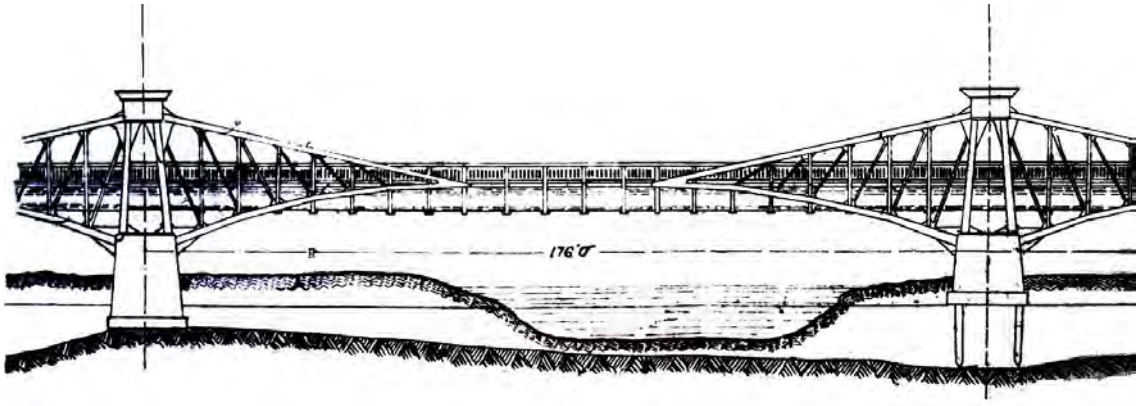
3 Moles 1996, quoted in Lovell Chen, *Barwon River Ovoid Sewer Aqueduct: Proposed partial demolition: Heritage Interpretation Overview* (Melbourne 2020), p 6.



The Lansdowne Bridge over the Sukkur at Rohri, designed by Sir A M Rendel,1887-9: *The Queen's Empire: a pictorial and descriptive record illustrated from photographs* (Cassell London 1899**).**

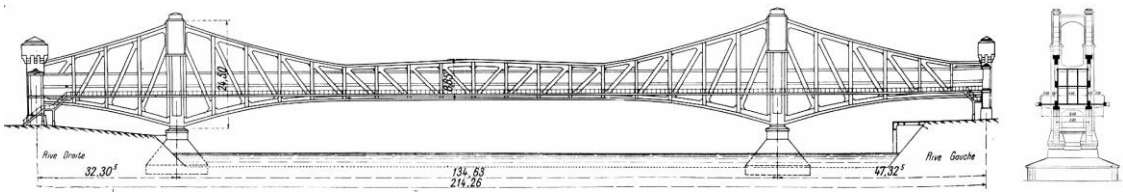


The Forth Bridge, Scotland, by John Fowler & Benjamin Baker, 1888-90, structural system.



Barwon Sewage Aqueduct, by Stone & Siddely (1912) 1914-15, edited detail of the original drawing. Geelong Waterworks and Sewerage Trust.

It has been correctly reported that the form of the aqueduct is influenced by that of the Forth Bridge, but this influence is confined to the overall form, in which short girders are supported from the ends of coathanger trusses. The Forth Bridge was not the first example of the type, as it was narrowly preceded by the Lansdowne Bridge at Rohri, [now] Pakistan. The internal framing of the trusses. The Aqueduct is entirely different from both these examples.



The Passerelle Industrielle d'Ivry-Charenton, near Paris, by C N Charlot, 1926-30, elevation and section: Isabelle Duhau, *La Passerelle Industrielle d'Ivry-Charenton* (Conseil Régional d'Île de France, Paris 2009) p 4.

The Passerelle Industrielle d'Ivry-Charenton, view: Isabelle Duhau, *La Passerelle Industrielle d'Ivry-Charenton* (Conseil Régional d'Île de France, Paris 2009), p 1.

The Aqueduct was unique in its time, but it was followed in a little over a decade by the Passerelle Industrielle d'Ivry-Charenton, near Paris.[4] The Passerelle is also on the Considère system and is framed in the same way as the Barwon Aqueduct - unlike any other reported example – making it hard to resist the conclusion that the one influenced the other.

It is rare for any structure in Australia to influence work overseas, and the fact that the Aqueduct should have exerted influence in France, the very home of the Considère system, is quite remarkable.

4 Drawn to my attention by David Beauchamp.

The Lovell Chen interpretation

The report by Lovell Chen is not an independent conservation assessment, but an advocacy statement prepared, as it says, 'on behalf of Barwon Water', to accompany the application for demolition.[5] This is evidenced in the tendentious observations which it makes.

Lovell Chen say:

> The Considère system includes an unusual set of elements that act purely in tension, a loading regime in which concrete is inherently weak and is rarely used.

It is unclear what is meant by 'an unusual set of elements that act purely in tension', because any concrete truss necessarily includes tension members. In these, at the Aqueduct as elsewhere, the tensile stresses are taken by the steel reinforcement, not by the concrete.

They further say:

> The Aqueduct was modelled after a steel truss railway bridge in Scotland, the Firth of Forth Bridge outside of [*sic*] Edinburgh, and the unsuitability of reinforced concrete in this type of application was seemingly not understood at the time of the Aqueduct's design and construction cracking of the tensile elements began immediately.

This is an extraordinary distortion. Firstly, the internal design of the trusses is completely different from those of the Forth Bridge, so it is obviously not an unthinking copy. Secondly 'the unsuitability of reinforced concrete in this type of application' is a fiction. There have numerous examples of reinforced concrete trusses, including the Passerelle at Ivry, referred to above. Thirdly, the patronising 'seemingly not understood' is ridiculous as applied to Stone, whose innovations at the Dennys Lascelles Austin building show his understanding of tension in reinforced concrete was in advance of the great body of engineering knowledge.

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5 Lovell Chen, *Barwon River Ovoid Sewer Aqueduct: Proposed Partial Demolition: Heritage Victoria Permit Application and Heritage Impact Statement* (Lovell Chen, Melbourne, undated), p 2.

The owner's responsibility

The 1996 panel recommended a course of action: 'Staged repair, starting with the river spans and ultimately taking in the entire structure**'.**

It is apparent from the evidence submitted by the owner that little repair has taken place, and that the structure has been allowed to deteriorate seriously. This does not support an argument that the structure should be wholly or partially demolished. Rather it suggests that the owner should be subject to all the penalties available under the legislation, and the matter should taken out of its hands by the Heritage Council and the necessary repairs carried out at its expense. The shameful treatment of this structure is comparable with the recent demolition of the Corkman Hotel. Because this is so much more important an example the response should be even more rigorous.

It is adding insult to injury in this case that the owner seeks to demolish the river spans of the structure, the very portion which the 1996 panel singled for immediate conservation action.

Cost

Almost every applicant to demolish or deleteriously alter a registered structure mounts an argument on the grounds of cost, which it is usually impossible for a third party to assess or critique.

But in the case of an important structure in public ownership that should hardly be necessary. If there is a proposal to demolish the Parthenon, Athens, on the grounds of its high cost of upkeep, I know that this is unacceptable. I do not know, and I do not have to know, whether the cost of keeping it will be borne or whether it can be can be borne by the Acropolis Trust, the Greek Tourist Authority, or the National Government. The case of the Barwon Aqueduct is the same.

The principles of demolition

There are instances where the demolition of part of a historic structure is inevitable. But there are two general principles to be applied.

In the case of a great engineering structure the preservation of a token portion is unacceptable, and so is a step-by-step process of erosion by demolition staged over a period of years. The Great Wall of China, for example, far from being steadily reduced, is being rebuilt in stages by the national government.

Secondly, where there is to be some demolition, it should never be the crucial element of the structure. After the recent fire in Nôtre-Dame, Paris, it was not argued that the sanctuary should be demolished and only the nave kept, on the basis that it represents two-thirds of the structure and is sufficiently representative.

Conclusion

The Barwon Sewage Aqueduct has had an extraordinarily raw deal. Although its importance has become steadily more apparent over the last forty years, it has been attacked and denigrated in a series of consultant reports. And it has been allowed to deteriorate to an alarming extent. This process should be halted now, and for good.

Miles Lewis

19 June 2020